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APRIL 2014

History & Evolution Offshore

CNR Interview
Rear Adm. Matt Klunder, U.S. Navy Chief of Naval Research

Floating Production
Growth Market hits Headwinds

The Arctic
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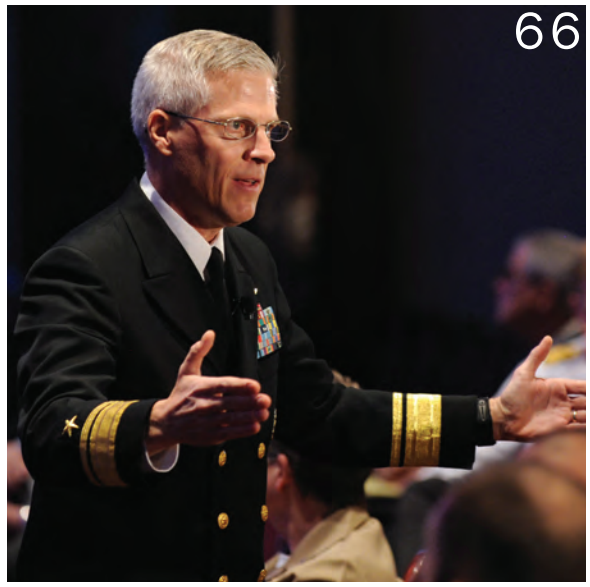

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THE COVER

Pictured on this month's cover is Autonomous Surface Vehicles (ASV) Ltd.'s C-Worker, a new oil field services unmanned surface vehicle (USV), a development that ASV touts as a breakthrough in unmanned oil and gas operations.

The History of Offshore starts on page 56.

Full details on the C-Worker are on page 76

(Photo Credit: ASV)

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NEW YORK
118 E. 25th St., New York, NY 10010
Tel: (212) 477-6700 • Fax: (212) 254-6271
e-mail: mren@marinelink.com
Web: www.marinelink.com

FLORIDA
215 NW 3rd St., Boynton Beach, FL 33435
Tel: (561) 732-4368; Fax: (561) 732-6984

PUBLISHERS
John E. O'Malley
John C. O'Malley *jomalley@marinelink.com*

Associate Publisher & Editor
Gregory R Trauthwein *trauthwein@marinelink.com*

EDITORIAL
Web Editor: Eric Haun haun@marinelink.com
Contributing Editors: Dennis L. Bryant, Joseph Keefe, Ned Lundquist
Correspondents: Joseph Fonseca, India, Greg Knowler, China, Claudio Pashoa, Brazil, Peter Pospiech, Germany

Editorial Consultant: James R. McCaul, President, International Maritime Assoc.

PRODUCTION
Production Manager: Irina Tabakina *tabakina@marinelink.com*

CORPORATE STAFF
Manager, Accounting: Esther Rothenberger *rothenberger@marinelink.com*
Manager, Public Relations: Mark O'Malley *momalley@marinelink.com*
Manager, Information Technology Services: Vladimir Bibik *bibik@marinelink.com*

CIRCULATION
Circulation Manager: Kathleen Hickey *mrcirc@marinelink.com*

SALES
Vice President of Sales & Marketing
Rob Howard howard@marinelink.com

National Sales Manager

Terry Breese	breese@marinelink.com	t: (561) 732-1185	f: (561) 732-8414

Sales Representatives

Lucia Annunziata	annunziata@marinelink.com	t: (212) 477-6700	f: (212) 254-6271
Frank Covella	covella@marinelink.com	t: (561) 732-1659	f: (561) 732-8063
Mitch Engel	engel@marinelink.com	t: (561) 732-0312	f: (561) 732-8063
Mike Kozlowski	kozlowski@marinelink.com	t: (561) 733-2477	f: (561) 732-9670
Dawn Trauthwein	dtrauthwein@marinelink.com	t: (631) 472-2715	f: (631) 868-3575
Jean Vertucci	vertucci@marinelink.com	t: (212) 477-6700	f: (212) 254-6271

Sales & Event Coordinator: Michelle Howard *mhoward@marinelink.com*

INTERNATIONAL SALES REPRESENTATIVES

Scandinavia	Roland Persson *roland@orn.nu* Orn Marketing AB, Box 184 , S-271 24 Ystad, Sweden t: +46 411-184 00 f: +46 411 105 31
Western Europe	Uwe Riemeyer *riemeyer@intermediapartners.de* t: +49 202 27169 0 f: +49 202 27169 20
United Kingdom	Paul Barrett *ieaco@aol.com* Hallmark House, 25 Downham Road, Ramsden Health, Essex CM11 1PU UK t: +44 1268 711560 m: +44 7778 357722 f: +44 1268 711567
Japan	Katsuhiro Ishii *amskatsu@dream.com* Ace Media Service Inc., 12-6, 4-chome, Nishiike, Adachi-ku, Tokyo 121, Japan t: +81 3 5691 3335 f: +81 3 5691 3336
Korea	Jo, Young Sang *biscim.co.kr* Business Communications Inc., Rm 1232, Gwanghwamoon Officia Bldg., 163, 1-Ga, Shinmoon-Ro, Jongro-Gu, Seoul, Korea 110-999 t: +82 2 739 7840 f: +82 2 732 3662

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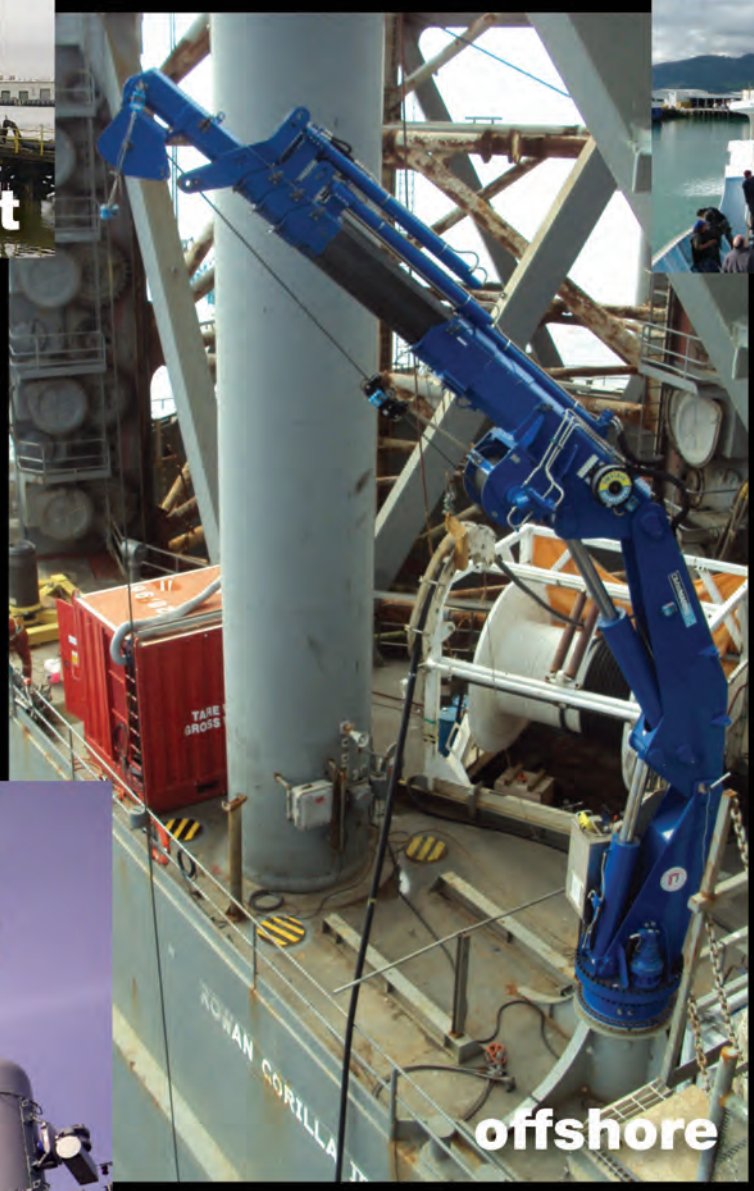

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Offshore Bound ... Further & Deeper but certainly not Cheaper

GREG TRAUTHWEIN, EDITOR & ASSOCIATE PUBLISHER

Exploring the history of this business is easily the most enjoyable task that I have, as I am somewhat of a history buff by nature, and I believe that a solid knowledge of what has come before lends invaluable perspective on where we stand. And at the age of 48, I am reminded almost daily by my kids that I, too, am rapidly becoming somewhat of a 'historical artifact' (to put it nicely, 'fossil' to put it bluntly!), particularly when I say things like "before there were cell phones" … or … "before there was the internet," usually followed by a look of disbelief and a laugh before they turn and walk away.

This month we continue the celebration of *Maritime Reporter's* 75th Anniversary as we have done each of the previous three months: via an exhaustively researched feature article from **Patricia Keefe**, this one focused on the history and evolution of the Offshore Energy industry, starting on page 56. It goes without saying that the hunt for offshore oil and gas has had profound impacts on the maritime industry over the past 75+ years, particularly so in the last 20 years or so as the ability to discover and recover energy in deeper, more hostile water further from the safety of shore has driven incredible changes in the machines and methods.

There are examples too numerous to mention, but an obvious first look is the size, shape and capability of the Offshore Service Vessel market. In the beginning, as Keefe reports, "shrimp boats were drafted to tow barges, haul supplies and equipment and to ferry the crews." Fast forward to today and taking a glance at pages 12 through 16, and you will find that the OSV sector is arguably one of the most progressive and aggressive for marine designers, suppliers, builders and owners today, as this emerging fleet of sleek, strong and capable vessels continues to literally change shape and grow.

Floating Production Systems is another market sector that has changed dramatically over the past 20 years, and I would argue that you will find no one with more knowledge and insight on the topic than **Jim McCaul** of IMA, who has studied and reported on the sector in depth for nearly two decades. McCaul writes a monthly column for MR on trends in the sector, and in conjunction with this, our Offshore Annual, he goes much further in depth starting on page 38.

While McCaul continues to see signs of growth in the sector, he and other analysts and insiders are beginning to chime warning bells that growth in Floating Production Systems, and deepwater offshore in general, are increasingly hitting stronger headwinds. The financial resources of the oil majors are legendary, but a rapid increase in costs for systems and people to work offshore, and the proliferation of cheaper-to-develop shale oil and gas around the United States could start to impact the future of this lucrative market.

Stay tuned to MR and all of our electronic channels for more … if history is any indicator, we should be in for another wild ride.

trauthwein@marinelink.com

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tel: (212) 477-6700; fax: (212) 254-6271

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Tourists & Immigrants

Two speeches stood ourt at a robust and well-attended CMA Shipping 2014 in Stamford. I turns out that tourists and immigrants matter on the waterfront

Stamford, CT: CMA 2014 is done and dusted. The exhibits broken down and the throngs of c-suite executives scattered to the four winds; some back to Europe, others to Asia and still others, points closer. As always, it was a useful and entertaining event. Beyond the networking and booth visits, this year's conference agenda was especially valuable. There was literally something for everyone. And, finishing up with the annual Gala dinner on Wednesday night, I also heard two of the better speeches that I've had the good fortune to be present for in some time.

Frank Coles, President, Inmarsat Maritime

Immigrants

On Tuesday, I sat in on Frank Coles' informative and entertaining address on the future of the 'wired vessel,' how it's already here and why those who fail to adjust and get on board are doomed to go the way of steam reciprocating steering gear. The President of Inmarsat Maritime specifically talked about what will drive the next wave of technology – the youthful ship's staff now just coming on board. Furthermore, he insisted, they will demand it. In their way, he said, were "the immigrants" to the world of high tech. He was referring to people who, like it or not, had been introduced to E-mail, the Internet, cellular telephones and 'personal digital assistants' somewhere in mid-career.

It was at about this point in his speech that I shifted a little uncomfortably in my chair. He was, of course, talking about me – the over-50 guy in the audience. As I surreptitiously checked my Blackberry under the table for those 'important' messages that just can't wait under any circumstances, I also realized at that very same moment that I was at least three releases of Blackberry behind and that I was perhaps one of only a handful of folks at the conference still driving a Blackberry. I was "an immigrant." I put the device away. No sense someone else in the audience seeing me drive yesterday's technology.

Don't get me wrong: I like my Blackberry. I like the tactile feel of the keyboard. I'm not much of a WEB surfer at work – I like to get things done. So, perhaps the heightened web service I might get on another platform isn't as important to me as it might be to someone else – like for example, my 14-year old daughter. Probably, sometime in the near future, that beaten and scratched Blackberry will need to be replaced. That said; I will tell you that this robust little package takes a licking and keeps on ticking. Like most people, I'm not big on change and I am frankly not looking forward to learning a new system. But, I will. This 'immigrant' will adapt.

It also wasn't too long ago when I stepped into a bridge simulator and used ECDIS for the first time, more than 20 years after last having served in a professional capacity. I admit to having been nervous, even if anything I might wreck might be just make-believe. But, all that high tech gadgetry is here to stay and somewhere, someone wants to monitor how it works, when it doesn't, and provide data analysis to fix it when it doesn't. And, that's where Frank Coles, his colleagues (and his competitors) come in. SATCOM provides the trunk, the bandwidth and the platform to make it all happen. But, only if the immigrants don't get in the way. Frank Coles gets it.

Tourists

I don't know if it was the best speech I've ever heard, but it was right up there. Robert Bugbee's talk, given just after receiving the coveted CMA Commodore's hat, had the room eating out of his hand. I'm pretty sure they taped the speech. Take the time to see it, if you can. The President of the Scorpio Group held forth at length about a number of things, displaying a remarkable ability to speak extemporaneously and pull out of thin air any number of obscure (and sometimes embarrassingly funny) facts about his CMA predecessors.

Tongue-in-cheek – I think – he spoke of "wanting that hat bad – really bad." And then he outlined his devious plans to steal it and why that hadn't worked. Some, he said, had it hidden in their myriad startup companies and still others, the hat had brought what he characterized as bad luck. He wouldn't steal THAT one, he insisted, to the delight of the audience. He also warned the gathered executives about the danger of letting "the tourists" take over the business.

The tourists, he explained in so many words, had no business interloping in the business that he and so many of his colleagues knew far better how to steer. I guess I can't really argue with a CMA Commodore on that point. This 'tourism' might include, I surmised, changes in how financing is accomplished or structured and in general, a shift of control to those not necessarily tied to the past nor inclined to learn from it. I'm still not sure who 'the tourists' are. Maybe that's for the best.

Tourists and Immigrants

At the end of Mr. Bugbee's enormously entertaining speech, I found myself wondering if the majority of maritime 'immigrants' were also 'tourists' or, rather, did they constitute a very small subset of one another? According to Frank Coles and Robert Bugbee, both groups seemed as welcome as a swarm of red ants at a family picnic. That said; you can't question the success of either individual. Maybe we should be listening just a little harder. I think I'll head over to the cell phone store and see what they've got in stock, what's new and what it might do for me.

Posted by Joseph Keefe on MaritimeProfessional.com

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China on the Rise ... Again

China Growth Plans are Positive for Global Shipping

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In 2013, Chinese seaborne imports surpassed 2 billion metric tons, doubled from 1 billion metric tons in 2008

China's aim of 7.5% GDP growth for 2014 is positive news for the shipping market – in particular, dry bulk, the Baltic and International Maritime Council (BIMCO) said in a published report.

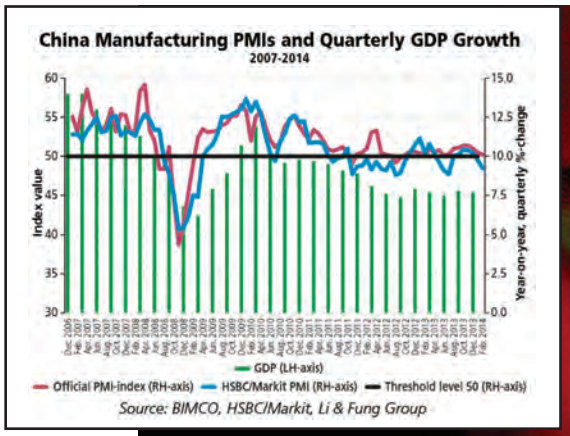
Despite being a little down on the 2013 GDP growth of 7.7%, BIMCO said the growth target of 7.5% set by China's Premier Li Keqiang at his first appearance at China's annual parliamentary session bodes well for shipping, trade and commodity demand in 2014.

In 2013, Chinese seaborne imports surpassed the 2 billion metric tons mark, according to CRSL. To put that into perspective, it means that China has now more than doubled its imports from 1 billion metric tons in 2008 to 2.1 billion metric tons in just five years.

Imports of dry bulk commodities dominate the trade by accounting for 74% in 2013. Led by iron ore, which accounts for 39%, the scope of imports become larger and wider every day.

"The importance of China to the shipping market is second to none," said Peter Sand, Chief Shipping Analyst, BIMCO. "This goes for all major shipping segments. In spite of leaving the double-digit growth rates behind us in the previous decade, the sheer size of the world's second-largest economy now gives so much impetus to our industry that we have become addicted to China."

A stable and improved Chinese economy, even at a slower GDP growth level, is thus vital to a sound shipping market going forward. The announcement of the target, delivered during the 12th National People's Congress on March 5, comes after a couple of month where the Chinese economy has shown some weakness in Purchasing Managers Index (PMI) developments.



Source: BIMCO, HSBC/Markit, Li & Fung Group

Key Figures for Trade and Economy in 2013 and 2014E

	China		World	
	2013	2014E	2013	2014E
Steel production	7.5%	3.5%	3.5%	3.3%
Iron ore import	10.0%	9.9%	8.9%	8.4%
Coking coal	73.4%	11.8%	12.8%	5.3%
Steam coal	6.2%	2.4%	5.9%	3.8%
GDP	7.7%	7.5%	3.0%	3.7%
Trade	7.6%	7.5%	4.5%	5.2%

Source: BIMCO, SSY, CRSL, IMF

Recent development in Chinese PMI showed an eight-month low in the official PMI, coming in at 50.2 in February. The HSBC China Manufacturing PMI posted at 48.5 in the same month supplements this slowing tendency. Both indexes agree on tougher conditions for smaller and medium-sized enterprises, whereas larger enterprises seem to fend off the headwind rather better.

The average of China's manufacturing PMI for 2013 was 50.2 for the HSBC/Markit indicator, which is more focused on smaller and medium-sized enterprises, whereas the official PMI indicator, which is more focused on the larger enterprises, averaged at 50.8.

Selected key statements from the China Premier

BIMCO gathered statements, all relevant to the shipping industry and the macroeconomic foundation, taken from the Premiers speech (source: Bloomberg):

- **Future Economic Development:**
"We must keep economic development as the central task and maintain a proper economic growth rate. On the basis of careful comparison and repeatedly weighing various factors as well as considering what is needed and what is possible, we set a growth rate target of around 7.5%."

- **Recalibrating the Economic Growth Model:**
"Boosting domestic demand is both a major force driving economic growth and an important structural adjustment. We need to fully leverage the basic role of consumption and the key role of investment, foster new regional economic mainstay belts, stimulate both supply and demand, and establish a permanent mechanism for increasing domestic demand."

- **On Foreign Trade:**
"We will make it a strategic priority to upgrade exports and promote balanced growth of foreign trade. Total imports and exports are projected to grow at around 7.5% this year. We will keep export policies stable and improve them, accelerate reform to facilitate customs clearance, and extend trials of cross-border e-commerce."

74

Imports of dry bulk commodities dominate the trade by accounting for 74% in 2013.

7.5

China's aim of 7.5% GDP growth for 2014

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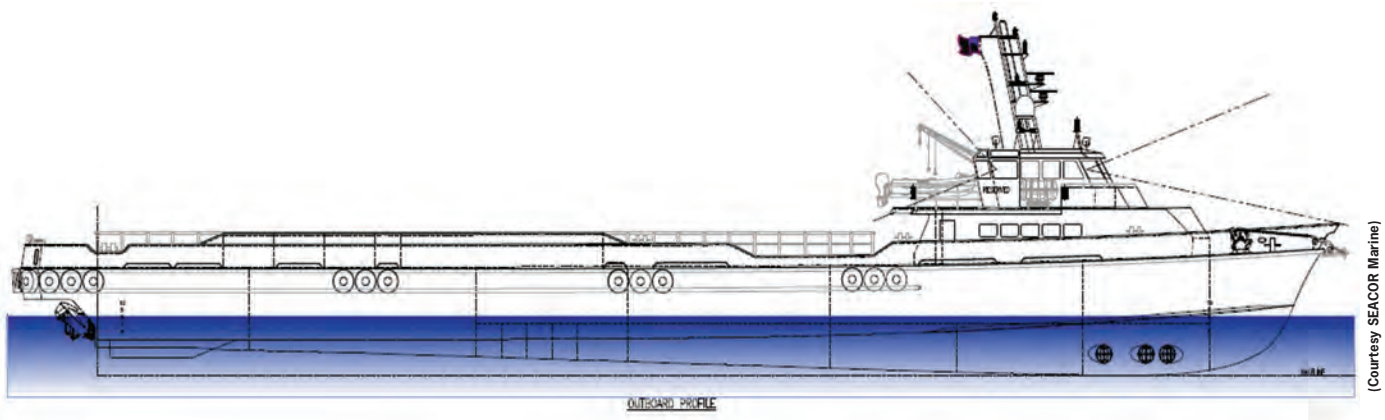


(Courtesy SEACOR Marine)

Long acknowledged as a firm to watch in U.S. crewboat and fast supply boat innovation, Seacor Marine will be attracting industry attention once again when its latest set of new boats begin delivery in 2014. While this new class of mono-hull boats have some big dimensions, the more noteworthy feature will be the size of its engines.

With 10 vessels in three different classes all more than 200-feet long, this is the largest single order of fast supply boats of their size. Cummins QSK60-M engines, each delivering 2,700 hp, will power all vessels.

There will be four boats in the "202-Class." Two of these are building at Gulf Craft, while the other two are taking shape at C&G Boat Works. Each of these will have four of the 2700 hp Cummins QSK60-M engines driving Hamilton 810 jets through Twin Disc 61500 gears with 2:1 ratios. The boats will each have capacity for about 68 passengers and a cargo deck in excess of 3,500 sq. ft.

A second set of vessels, designated "Express Class" to denote their higher speed, will deliver from C&G Boat Works. At 210 x 33 ft., these boats will have five Cummins QSK60-M engines for a total of 13,500 hp each. These vessels, three of which were already started in October this year, will have a fifth booster jet on the center line. The same Hamilton model as the others, the center-waterjet will not require steering and reversing buckets as it will only be used in transit for extra speed. And it is speed that gives these boats the "Express" designation as they have a design speed in excess of 37 knots when running light.

"They are pretty much the same below the waterline," Joe McCall, Seacor's Senior Project Manager said, "but Incat-Crowther gives them a different look above the waterline."

The third set of boats is the "Express Plus Class." At 206 x 33 ft., with five Cummins QSK60-M and Hamilton jets, they are also designed by Incat-Crowther's Louisiana office. "This class will be just as fast as the "Express Class", but will have capability to transport 100 passengers," McCall said, "100 passengers is more than a typical crewboat can carry." Construction of the "Express Plus Class" boats will begin in 2014 at Gulfcraft Shipyard. "These boats are being built on spec," McCall said, "but we feel that vessels with these capabilities will be in high demand. These vessels will deliver in late 2015 and early 2016."

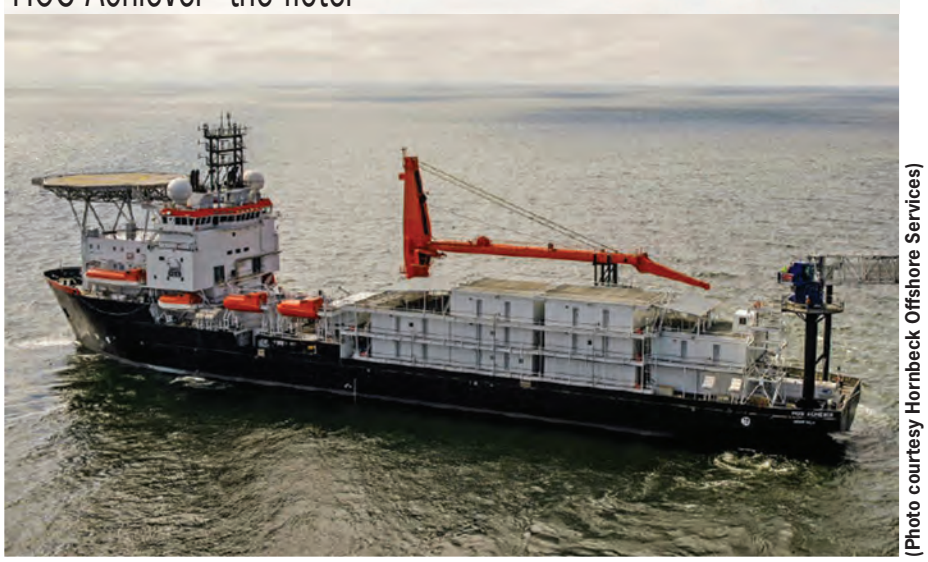
All three classes of vessels will be ABS Classed DP2 and will have three 200-HP bow thrusters. This is enough redundancy that they would still be DP2 even if they lost one bow thruster. The same engines, gears and jets have also been specified for the three classes of boats. "These boats will make better than 20 knots loaded, but we are marketing them for their light boat speeds," explained McCall.

Design Innovation
Offshore Service Vessels (OSV)

Rolls-Royce design for Chellsea

(Photo courtesy Rolls-Royce)

HOS Achiever "the flotel"



(Photo courtesy Hornbeck Offshore Services)

It could be argued that no other sector of the maritime market has experienced a design innovation revolution quite like the Offshore Service Vessel (OSV) market. Driven by demands to supply people, gear and goods to offshore installations that are increasingly further from shore in deeper waters, today's OSV is a far cry from those built only a decade ago. Maritime Reporter examines some of the recent innovations in design and function.

Deepwater operations are increasingly demanding more personnel offshore, often for longer periods of time, placing a greater emphasis on crew accommodation. Now accommodation and special features join safety as the key components for a new range of comfortable, large-scale offshore housing vessels.

Emerging in this range is **Hornbeck Offshore Services' HOS Achiever**, a ship perceived as relatively normal offshore multipurpose vessel. What's unique about HOS Achiever, though, is what she accomplishes. In order to provide top-of-the-line offshore housing, Hornbeck has essentially converted the HOS Achiever into a floating hotel (flotel) with total accommodation for the berthing of 267 persons by way of 93 air-conditioned and heated staterooms. Also chief are the ship's amenities: HOS Achiever houses a coffee and tea room, diner, exercise room, galley, internet café and quiet room, laundry room, locker/wash room, recreation room, smoker's lounge, sick bay and deck changing room. And with DP-3 positioning, a motion-compensated gangway, helideck, helicopter refueling capabilities and a 160-metric-ton crane, HOS Achiever' safety and comfort are notably matched by functionality.

Originally conceived as a dive support and construction vessel, the HOS Achiever has lived up to its designation as a multipurpose support vessel. Since its launch in 2008, the HOS Achiever has supported a diverse range of offshore activities such as platform inspection, repair and maintenance activity, well intervention projects including decommissioning and riserless intervention – periodically serving as a flotel for major projects throughout.

But HOS Achiever's capacity for accommodation has made her especially attractive to customers requiring flotel support, particularly for offshore construction and wind farm operations. Hornbeck recently won a contract to support the hookup and commissioning of an extended tension leg platform production facility in the ultra-deepwater Gulf of Mexico, a project that requires hundreds of offshore workers to transfer repeatedly between the worksite and dynamically positioned vessel over an extended period of time.

HOS Achiever's conversion was completed in January 2014, and the vessel was delivered to HOS Port, the company's shore-based facility in Port Fourchon, Louisiana.

Rolls-Royce has won an order to provide an integrated design and equipment package for two offshore supply vessels to be built at COSCO (Guangdong) Shipyard Co., Ltd. in China for Singapore based **Chellsea Group**. The order represents the exercise of an option for another two vessels contained in an initial contract for two vessels with the same yard and owner announced in October last year. All four vessels will be added to the fleet of two UT-vessels operated by Chellsea.

The two Rolls-Royce UT 771 WP platform supply vessels feature the wave piercing bow designed to cut through waves in rough seas, making it possible to keep a more constant speed, reduce fuel consumption and increase on board safety.

The delivery from Rolls-Royce will comprise ship design and an extensive integrated systems package including MTU-engines, a propulsion system, a power electrical system, a bulk handling system, deck machinery, an automation and control system as well as a dynamic positioning system that uses satellite technology to automatically maintain the vessels' position without anchoring.

Power Play

Long reserved for specialized applications such as icebreakers, diesel electric has enjoyed a rapid growth for marine propulsion in the past decade, and Cummins Marine has been a leader, supplying over 900 diesel electric packages since delivering its first genset 2003. Early adopters of this flexible propulsion technology included the Rigdon Marine with twenty vessels and France-based Bourbon Offshore with more than 100 vessels.

In late 2011 Aries Marine built two STX-designed Tiger Shark Class PSVs. After nine months operating in Mexico, one of their vessel engineers, Darrell Bickham, enthused over the performance. "We only put enough engines on line as we need for the job. We can stand by the rig outside the 500-meter zone on one of our four Cummins QSK60-powered generators. Traveling we can make 10 knots with only two operating at 50 to 60 percent of their rated power."

Captain Philip Munsch added, "If we get into weather we can bring on three or even four engines as required. But they are always running at a steady 1800 RPM with no revving up and down so crew comfort and safety is improved because of the reduced fatigue."

The fuel economy made possible by using only the number of engines required to do the job at hand is pleasing to both owners and charterers. The flexibility in engine placement afforded by the absence of a long drive shaft between the generators and propulsion motors allows for engine placement on the main deck resulting in increased cargo capacity in

Bravante, built by Eastern, powered by Cummins

(Photo courtesy Eastern Shipbuilding)

PSV World Sapphire from Damen

(Photo courtesy Damen)

the vessel's hull.

There is virtually no downtime as engine servicing can be done with one or more engines off line. Modern electronic systems have made diesel electric generator sets reliable and easily managed. It is, then, little wonder that this form of powering the modern offshore fleet is gaining even more followers.

Brazil's Bravante Group in late February took delivery of the M/V Bravante VI, their second in a five vessel series of diesel-electric PSVs, from Eastern Shipbuilding. Bravante V delivered in 2013 is already on charter in Brazilian waters.

Designed by STX and designated the STX SV290 design the 86.5-m (284-ft.) by 18.3-m (60-ft.) by 7.5-m (24-ft.) vessels are built around four Cummins-powered generators. Each 16-cylinder Cummins QSK60-DM engine rated for 1825 kW at 1800 rpm powers a Marathon Model 744 690VAC generator also supplied by Cummins.

A pair of 690VAC electric motors each turning nozzled fixed-pitch propellers on Schottel Combi-Drives provides main propulsion.

These two propulsion motors are each rated at 2,500 kW at 750 RPM to give a total of 6700 HP. Two Schottel 1180 kW tunnel thrusters with direct coupled electric drives also draw their power from the four main Cummins QSK60-powered generators.

The flexibility of the diesel electric system in providing power to both ends of the vessel as well as to a wide array of cargo pumps and general ship requirements continues to attract owners' attention and orders.

Innovative propulsion technology is also evident on a series of PSVs being built in Japan. Modular liquid-cooled drives and PLCs from ABB have been included in VARD ELECTRO's application-specific propulsion and thruster power solutions for offshore supply vessels. The electric motor propulsion technology designed by VARD ELECTRO is used on a series of six platform-supply vessels (PSVs) - the first two of which currently are being built in Japan.

Twenty years ago, in response to growing global competition and demands for ever-more sophisticated propulsion performance, the innovative shipbuilding group VARD decided to bring its systems integration function in-house. VARD established a fully owned daughter company, VARD ELECTRO, specializing in system integration and development and providing tailor-made marine electronics solutions for offshore specialized vessels.

VARD ELECTRO looked for a drives and control supplier that could provide a highly configurable drives platform, and chose drives from ABB's ACS800 range, with control provided by ABB's AC500 PLCs.

For each vessel of the six PSVs which are being built in Japan, ABB is supplying five PLC-controlled variable-speed drives to control a total of over 6MW of power: two 2MW drive systems for the main engines, two 730kW drives for bowthrusters, and one 730kW drive for a dual-fed bowthruster that is able to survive the failure of either of the vessel's two power generators. The ABB drives and controller system are now part of VARD ELECTRO's new SeaQ Power intelligent power systems range, which was created during the past year.

Before delivering the new electric power propulsion control system, VARD ELECTRO performed detailed testing on the PLC and drive combinations at its test facility in Søvik, Norway. These trials were also witnessed by VARD ELECTRO's Japanese shipyard customer. The integrated control system passed all of its tests and VARD ELECTRO now has shipped the propulsion systems for the first two vessels.

The very first vessel with this technology will be launched in mid 2014, and will be destined for use in platform supply applications.

Sign of the Times ... Bulletproof pilothouse on 20m Crewboats

(Photo: Incat Crowther)

Incat Crowther said that **Veecraft Marine** delivered a pair of 20m Monohull Crewboats and signed a contract to build a 30m Wave Piercing Catamaran Crew Boat. Hot on the heels of delivering Magen Defender and Masud Defender, the South African yard commenced construction of a 30m Wave Piercing Catamaran Crew Boat for Africa Diving Service Ltd. of Nigeria.

The 20m Monohull Crewboats feature a large cargo deck forward, with a pair of doors from the passenger compartment allowing bow loading either side of the foredeck cargo. The main deck passenger cabin features seating for 25 passengers and a head with lavatory. Under the raised pilothouse are bins for passengers' luggage.

A notable requirement for the vessels is their bulletproof pilothouse. As well as fitting bulletproof glass, they are plated with Armox 500T steel, capable of withstanding an AK-47 cartridge fired at a distance of 10m.

The pilothouse features overhead windows forward to enhance visibility when approaching offshore platforms. Heavy duty replaceable fendering is fitted all round, and a 3,000 l/hr remote control fire monitor is fitted to the pilothouse roof.

The vessels are each fitted with a pair of MAN 2842 LE410 main engines, each producing 824kW. Propulsion is via a pair of propellers, recessed in to tunnels to meet the demanding draft requirement.

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U.S. Coast Guard
Doing Less with Less

BY DENNIS L. BRYANT

The Administration's budget request for FY 2016 calls for a 6.2% decrease in Coast Guard funding

Funds appropriated for use by the US Coast Guard are about to be decreased – again. The service's funding has decreased in four of the previous five fiscal years, generally by 1% each year. The Administration's budget request for FY 2016 has just been submitted to Congress. It calls for a 6.2% decrease in Coast Guard funding. For FY 2015, the Coast Guard was appropriated $10,438,120. For the upcoming year, the Administration is requesting only $9,796,995.

The budget request identifies various minor cuts. These include a reduction of 574 full-time equivalencies (FTE) [approximately 1.1% of the present 50,926 military members and civilian employees]; the decommissioning of two of the old High Endurance Cutters being replaced by new National Security Cutters; decommissioning of eight 110-foot patrol boats being replaced by new Fast Response Cutters; adjustment of HC-144A Ocean Sentry aircraft annual Programmed Flight Hours from 1,200 to 1,000 hours per aircraft; removal of the fixed-wing Bravo-Zero readiness requirement from all but two air stations; and closing of one aids to navigation team (ANT) and reduction in billets at some other ANTs. These are drops in a leaky bucket and will not compensate for the significant funding cuts anticipated by the Administration.

The Coast Guard famously does more with its relatively meager funding than any other comparable agency. Whatever fat there may have been in the budget in earlier years has long since vanished. Operating and support units are operating on starvation funding. Taking across-the-board cuts, as was done in previous years is a recipe for disaster. It is time to do less with decreased funding than has been done in prior years.

Cuts should, in my opinion, start with a reduction in performance measures. The Coast Guard establishes performance measures for each of its 11 statutory missions. Both the Coast Guard and the Department of Homeland Security (DHS) Office of Inspector General (OIG) then evaluate actual performance against the target performance measure. In FY 2012 (the last year for which data is fully available, the Coast Guard met or exceeded 20 of the 23 summary performance measure targets for its 11 statutory missions. The performance measure targets serve as the Coast Guard's forecast to the Department of how it thinks it will do during the upcoming year in accomplishing its varied missions. With significantly less funding expected in the pipeline, the Coast Guard must lower expectations across the board.

Another means of reducing costs is by flattening the organizational structure. The primary organization of the Coast Guard consists of the following: one Headquarters; two Area Commands; nine District Commands; and 36 Sector Commands. Sector Commands serve as the primary operational units of the Coast Guard – accomplishing such missions as search and rescue (SAR), general law enforcement, maritime security and marine safety and environmental protection. Districts coordinate activities of and provide support to the Sectors and oversee operations of units such as buoy tenders and medium endurance cutters. Areas coordinate activities of the Districts and oversee operations of high endurance cutters, air stations and polar icebreakers. Headquarters provides support for the entire service via the chain of command.

I propose that Districts be disestablished and that some of the flag billets that serve as District Commanders be abolished rather than be reassigned. The Coast Guard adopted the concept of geographic Districts when the Lighthouse Service merged with it in 1939. Prior to that, most support for units came directly from Headquarters, with coordination being provided by small cadres on the Atlantic and Pacific coasts. Districts have served the Coast Guard well over the years, but times have changed. Until about eight years ago, each Coast Guard unit had only a few missions. Group Offices were in charge of search and rescue and general law enforcement for a defined small geographic area. Marine Safety Offices were in charge of marine safety and environmental protection for another separately-defined geographic area. Coordination was vital and this task fell to the District Offices. Area Commands were small and largely confined to coordination of major operational activities.

All of this changed. Sectors were established to provide the public and other stakeholders with one-stop-shopping. They combined the functions of Group Offices and Marine Safety Offices and established one set of geographic boundaries for those functions. At about the same time, the tasks of the Area Commands were increased. Now, Area Commands largely resemble District Commands in scope of mission coverage.

The Coast Guard can no longer afford two sets of mid-level bureaucratic overseers. At the same time that District Commands are disestablished, I recommend that a third Area Command be established for the Gulf of Mexico region. The Area Commands will need some beefing-up to handle the increased workload inherited from the Districts. Each Area Command, headed by a Vice Admiral, should have two Rear Admirals – one to coordinate operations and one to handle support functions. Area Commands currently have one Deputy with the rank of Rear Admiral.

The Coast Guard may not need, or be able to afford, all of its current Sector Commands and smaller field units. Analysis should be done to identify the two or three Sector Commands with the least activity and geographic coverage. Similar analysis should be done with respect to stations and sub-units. Cutters should not be immune from downsizing. Consideration should be given to decommissioning the small harbor tugs and the small inland buoy tenders, both classes having far exceeded their planned life cycles.

Personnel reductions will be necessary to conform to the decreased funding. For rough numbers, I suggest an 8% reduction in the commissioned officer corps and a 4% reduction in the enlisted ranks. Civilian employee staffing should adopt corresponding reductions.

The cuts I have proposed above will obviously be painful. They, or some alternative thereof, will be necessary though, if Congress goes along with the Administration's proposed FY 2015 budget. The federal budget pie has gotten smaller. Each agency will have to make tough decisions regarding how it will continue to provide vital services to the American public in times of austerity. Non-vital activities must be eliminated so that vital services survive.

The Coast Guard may find other ways to work within its new budget constraints, but the above provides a straw man for due consideration. The service cannot continue to operate at its present high level when funding is being drastically reduced. Such blind inertia is unfair to its many dedicated personnel, setting them up for failure. Now is the time to do less with less.

The Author

Dennis L. Bryant is with Maritime Regulatory Consulting, and a regular contributor to Maritime Reporter & Engineering News as well as online at MaritimeProfessional.com.

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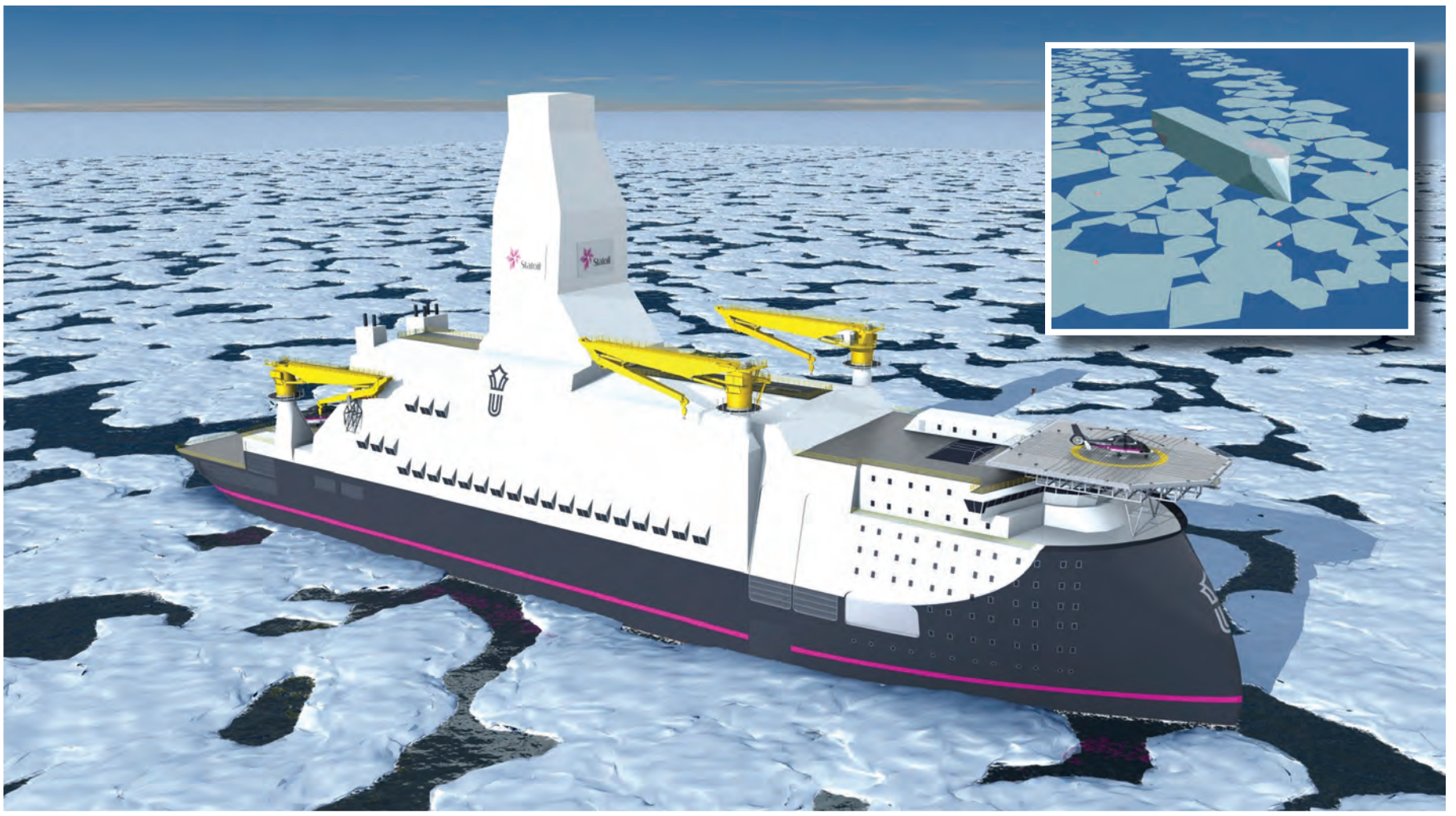
BY SOLANGE VAN DERWERFF



When Ulstein Sea of Solutions (USOS) took part in a concept design competition for an arctic drillship, MARIN was asked to investigate the concept variations.

USOS was asked to participate in a concept design competition for a drillship capable of operating in arctic conditions for several months a year. Special requirements are posed for the design of such a vessel due to the cold climate and the probability of encountering sea ice during operations.

Instead of making adjustments to a conventional drillship design, USOS developed a completely new concept dedicated specifically to the purpose of the vessel. Each aspect of the design was subject to a sensitivity study in order to assess the impact of particular parameters on the vessel design. Combining these design parameter sensitivities enabled MARIN to draw conclusions for the optimal ship design.

MARIN was involved in the design aspects related to the hull. The goal of the sensitivity study was to give qualitative insight into the station keeping performance of the vessel when considering various concepts. Each concept used a disconnectable turret and had dynamic positioning (DP) capability, but the position of the turret varied between the concepts. Evaluation of the mooring loads, the required thrust and the DP watch circle revealed the best turret positions for a range of environmental conditions.

Ice field in aNySIM

With the aNySIM tool, a time domain simulation was conducted whereby hundreds of particles represented a managed (pre-broken by icebreakers) ice field. A number of parameters were given to describe the severity of the ice conditions, including most importantly, the ice concentration (the fraction of the total area covered by ice) and the average ice floe (particle) size. An algorithm based on Voronoi Tessellation was used to obtain a set of ice particles that exactly complied with the specified parameter values.

All concepts were tested for their capabilities in the specific environmental conditions, evaluating four different vessel orientations with respect to the approaching ice field and for a blackout situation. Based on the results of these simulations, USOS could take an informed decision about the placement of the turret in the drillship. (USOS approved publication of their concept design test.)

The Author

Solange van der Werff is project manager at the Trials & Monitoring department of MARIN, the Maritime Research Institute Netherlands.

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If You Have DPS Questions ...
OSVDPA Has Answers

BY AARON SMITH

Over the past two years, the only constant in the dynamic positioning industry has been uncertainty. A new certification scheme, a long-awaited revision of the industry standard and threats of regulation continue to cause oscillating senses of hope and fear. As a result, the DP industry has a collective case of whiplash. However, even today few answers exist as to what direction the industry should take toward a worthwhile system of DPO certification. To some, the answer is a return to a one-size-fits-all DPO certification system.

But is uniformity the answer for an increasingly diversified industry? While the principles are the same and the equipment is similar, no one will honestly argue that running a DP system on a MODU and running a DP system on a crew boat are similar activities.

So why should operators only have one option for DPO certification?

The newly formed Offshore Service Vessel Dynamic Positioning Authority (OSVDPA) is in the process of crafting an alternative DPO certification system open to all prospective DPOs, regardless of industry, but targeted towards the unique operational tempo of offshore service vessels, an industry segment long ignored by the current certifications schemes. The OSVDPA system will ensure those controlling DP system on a day-to-day basis have access to training on these systems. This common sense allowance is not provided by the current certification systems thereby discouraging those without STCW licenses from becoming certified. This prohibition not only decreases the safety of the industry, it blocks off the hawse pipe, depriving the offshore service industry from cultivating some of its most skilled mariners.

Similarly, mariners aboard vessels with unclassed DP systems are currently cutoff from receiving training in the safest way to use DP systems. This is another prohibition that might make sense in the board room or conference hall, but causes practical problems for vessel operators. As stated, these prohibitions do nothing to improve safety. In fact, they hinder safety and ignore reality. Regardless of the opinion of DPO certification systems, professional mariners without STCW credentials are controlling DP vessels, and some of those vessels—more than 100 in the Gulf of Mexico alone—do not have classed DP systems. It is incumbent upon the industry to provide certification systems to train these mariners in the safe operation of DP.

While the OSVDPA was founded to fill these gaps, there are certain actions the Authority refuses to consider.

The Authority will not create employment restrictions or divide the DP industry. As previously stated, the OSVDPA's intention is to create a DPO certification option for mariners. We understand that mariners will not choose the OSVDPA if its certificates lead to dead-ends or restrictions. Thus, it would be counterproductive for our system to create employment restrictions.

Instead, the Authority seeks a system where prospective DPOs can pick the certification system that works best for them and subsequently transfer between certification systems and industries, provided each adheres to the same high standards. As early as last summer, the Authority initiated conversations with the NI and DNV about how reciprocal recognition could be granted.

Additionally, the OSVDPA will not reduce standards. The Authority is comprised of some of the safest vessel operators, the best training centers and most respected DP manufacturers. To a person, the Board of Directors understand that a good safety record is vital to our industry's reputation. As such, the OSVDPA Board refuses any action which will degrade the safety of our people, our vessels, the environment or our customers. The OSVDPA is not going to waste its time creating a system that will not pass muster. The OSVDPA system will be subject to rigorous review from our customers, flag states, industry associations and others. We welcome this review and understand these partners will not accept a system which creates shortcuts or produces less-than-qualified mariners. It is also important to understand that the informal precursor to the OSVDPA did not set out to start a certification system. In fact, our first goal was to work with the existing system to solve the certification problems the offshore service industry faces. Unfortunately, after working within the Nautical Institute's scheme revision process for a year, not only were the previously described problems not addressed, the NI's reformatted system will actually make it more difficult for some service vessel DPOs to earn their certificate.

While these developments were disappointing, the OSVDPA continues to work with the Nautical Institute, DNV, industry associations and regulators to craft a system that is a benefit to the industry. Specifically, the OSVDPA certification system will be based on a combination of sea-time and competency assessment. The OSVDPA understands that experiential and observational learning is vital to producing quality DPOs; thus our system will have a duel layer sea-time requirement, one layer tracking on-board experience (traditional sea-time), and the other measuring time the prospective DPO spent at the controls.

However, experience alone is not proof of proficiency. For this reason, the OSVDPA certification system will incorporate competency based assessments. Under our system, prospective DPOs will be assessed at each stage of their training; failure to pass will mean a failure to advance. The capstone of our training system will be a final assessment ensuring the prospective DPO is competent not just in DP buttonology but in the real-world operation of a vessel.

Under the OSVDPA system all training and certification components will all be based on a defined list of competencies, ensuring prospective DPOs know what they are expected to learn, training centers know what they are expected to teach, and employers know what to expect from our certificate holders. The OSVDPA believes this addition should be a requirement for all DPO certification systems as it provides clarity and comparability to the industry.

The OSVDPA understand our system is not the answer to all of the questions surrounding DPO certification. Just as the other certifications systems do not work for the offshore service vessel industry, our system might not be a good fit for other sectors. However, in the Authority's opinion, it is high time mariners had a choice and the ability to find a system that meets their needs and industry expectations.

As stated, the OSVDPA understands that the DP industry has experienced more than its fair share of change over the past couple of years. We understand that our formation is only adding to this fatigue. However, the Authority wholeheartedly believes we can provide a viable alternative to existing DPO certification methods, one that is inclusive of relevant mariners, gauged properly to service vessels and will ensure greater operational safety. The OSVDPA looks forward to working with the maritime industry as we finalize our certification system.

The Author

Aaron C. Smith is Executive Director, Offshore Supply Vessel Dynamic Positioning Authority (OSVDPA), charged with managing the day-to-day operation of the Authority, including helping to craft the Authority's dynamic positioning operator (DPO) certification program and ensuring this program is accepted by the U.S. Coast Guard, the offshore energy industry, and international counterparts.

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Staying Afloat

How to Work with Your Insurer When Experiencing a Loss

BY TERENCE HARRIS, SECOND VICE PRESIDENT OF CLAIMS, TRAVELERS OCEAN MARINE

Marine insurance – just like health, automobile and homeowner's insurance – can be a valuable safeguard in case something unexpected happens. And when something bad happens, it provides reassurance that you have assistance in place to help get back to business quickly.

In the maritime industry, there is a high likelihood that your businesses will experience a loss at some point. Vessels run aground, cargo containers get damaged, and fires occur in shipyards. These are just some of the types of situations that can – and do – happen routinely to maritime owners and operators.

Knowing these risks exist, you should ask yourself two questions to make sure your business is prepared: First, what can I do to mitigate the risk of loss before an incident occurs? And second, how should I work with my insurer when something does happen?

When You Have a Claim

Imagine that you are a towboat or tugboat operator hired to move other vessels and cargo for customers throughout the country. If your boat were rendered inoperable, you would stand to lose thousands of dollars a day during the period of time that the vessel is out of service. In an industry where margins are tight, this type of situation could cause serious harm to your business' bottom line.

Here are four steps you can take to ensure that your response to a loss does not make matters worse, but instead helps you get your business back on track:

Action Step #1

Find an agent who understands your business

If you're the towboat operator, your needs will be different from the company that builds and maintains vessels. This is why you want to work with a specialist agent who has experience in your particular maritime niche, as opposed to an insurance agent who is a generalist.

Action Step #2

Get the right coverage

Marine insurance – or any type of insurance – is not a one-size-fits-all solution. Businesses often have multiple policies with multiple coverages, placed with several carriers. This can be difficult to navigate for a business owner trying to coordinate coverage for a particular loss. Depending on the incident, there may be a gap in coverage, potentially leaving your business on the hook for substantial expenses. Working with a single carrier for all your insurance needs helps minimize gaps in coverage and avoid the potential for bureaucratic hassles, since the single carrier can view the entire scope of coverage with you.

Action Step #3

Develop a contingency plan

It's never too late to think "what if?" What if someone slips and falls on my vessel? What if a hurricane damages my fleet and destroys my cargo? What if a fire started by a worker in a neighboring shipyard causes all the electricity to go out and disrupts my computer systems? In addition to carrying the right type of marine coverage and limits, it's key to plan for the things you hope never happen. Perhaps it's arranging to charter someone else's tug until you can get your vessel repaired, or buying a generator and backing up all of your important company records in the virtual cloud. You may also want to consider purchasing business continuity insurance to help recover any potential revenue losses you may have. Having a plan in place can help you take charge when you need to most.

Action Step #4

Know how to work with your insurance company

Here are several "Do's & Don'ts" on how to maximize your relationship and interactions with your insurance carrier to help you get back to business:

- Do contact your insurer right away. By waiting days, weeks – or months – after an incident, you risk losing valuable evidence or relying on faulty memories.

- Do notify all insurers (this includes marine, property, casualty, etc.)

- Do take pictures of the scene. Note the damage, the location, the weather, any cargo onboard and the people involved.

- Do understand who the various players are in the claims process:

  – Your agent – may have significant involvement in the claim.

  – Surveyor – an expert that will visit the vessel or site to assess the damages.

  – Claim Professional – an employee of the insurance carrier who handles the claim investigation, the appraisal of damages, liability, the amount of coverage and recommends a settlement.

  – Independent adjuster – like a Claim Professional, he or she investigates insurance claims, but unlike a Claim Professional, he or she may work for several insurance carriers.

- Do consider meeting with insurance company claim representatives to create a course of action before you need to make a claim. Having these relationships in place can really help to expedite matters in the event of a claim.

- Don't start or authorize repairs until the insurance company has inspected the damage and given you their position on what is payable.

- Don't throw anything away. This includes cargo manifests, receipts and passenger/worker logs.

- Don't admit liability (even if you think it was your fault). Leave that up to the insurance investigators and adjusters to determine. Admitting liability can cause big problems on a claim.

Creating Beneficial Relationships

Purchasing insurance is about having peace of mind – it's the protection against the unexpected that could destroy a business in an instant. By taking these four action steps, you can save important time and money by having your claim processed as soon as possible and with fewer delays.

Along with having the right coverages, a smooth claims process also depends on having a solid relationship with your agent and insurance carrier. This means working with professionals who specialize in the maritime industry, who know your business and its risks, and who are committed to your company's success.

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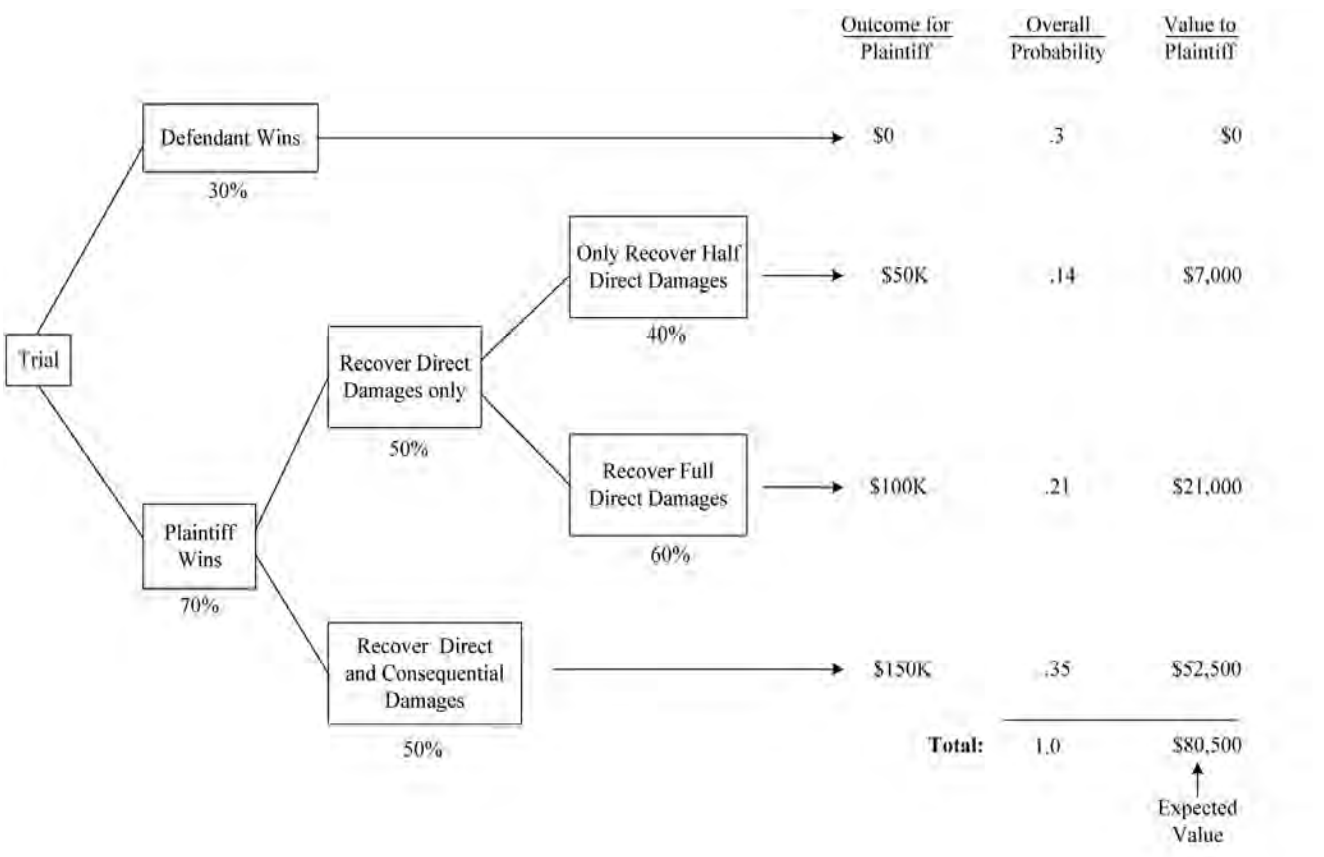
Calculating Settlement Value of a Case

BY THOMAS H. BELKNAP, JR.



It has been said that war is politics by other means. It is probably equally true that litigation is business by other means. On the one hand, the threat of litigation – and the resulting costs, inconvenience and uncertainty – will often compel parties to resolve their differences on terms which they might otherwise consider less than ideal. And on the other hand, if an acceptable compromise cannot be reached, then litigation is the tool by which the parties can obtain a definitive resolution to the dispute.

This analogy does not apply just to "business" litigation. Resolving a personal injury claim is equally a "business" transaction in the sense that one party is seeking payment from the other, and each side has to decide how much it is willing to take or pay to avoid litigation. To the extent that litigation is just another means of conducting business, it follows that the parties to a dispute should be continually assessing the costs and benefits of that strategy just as they would assess the costs and benefits of any other business strategy they undertake. But how does one "value" a claim that may end up in litigation so that he can make a reasoned determination about what a reasonable settlement value might be?

Factors in Valuing a Claim

First, what are the factors that help determine a claim's settlement value? Of course, every case is different. But there are some factors that apply in nearly every case. Probably the most obvious factor, and often (but not always) the most important, is the strength of the claim or defense. If a party's claim is highly meritorious, then that will clearly suggest a high settlement value. On the flip side, if a party's defense is strong, then that will favor a low settlement value.

In any given case, of course, there are many other factors which may greatly impact the claim's settlement value, whether on the plaintiff's or defendant's side. Litigation costs often are a major factor, and both parties must consider the benefit of avoiding such costs in any settlement analysis.

Other factors may include the likely inconvenience and interruption of business that may result from litigation; the potential publicity and damage to (or enhancement of) reputation; the value of an ongoing commercial relationship with the opposing party; the impact of settlement on the deterrence of similar claims in the future; the consequences of a catastrophic adverse judgment; the time value of money – i.e. the value of payment now versus at some point in the future; and the financial stability of the counterparty – i.e. its ability to pay on a favorable judgment. And on top of those factors are often more emotional ones such as pride, ego, reputation and the personal agendas of the decision makers on each side. And this just scratches the surface.

Based on the above, one might think it impossible to meaningfully analyze a claim's settlement value. To be sure, it is part science and part art. There are, however, ways of applying rational business-style analysis to the process which can be extremely useful.

Expected Value

The core skill required to properly assess a claim's settlement value is the ability to identify a case's possible outcomes and to accurately assess the probability that any particular outcome will come to pass. This process allows a party to assess a case's "expected value." This is a task that lawyers perform in some form or another every day, and this process of analysis underlies every reasoned recommendation that a lawyer makes to his client.

To take a simple example: in a coin toss scenario where someone would pay you $10 every time the coin landed on heads but nothing when the coin landed on tails, the expected value of a single coin toss would be $5, i.e. 50% of the $10 payout. This same analysis can be applied to a claim: where a party seeks damages of $100,000 and assesses it chances of success at 50%, the expected value of the claim is $50,000.

To take a more realistic example, say plaintiff claims for breach of a contract and seeks $100,000 in direct damages plus $50,000 in consequential damages.

Defendant denies it breached the contract, and it contends that even if it did, the direct damages are only half of what plaintiff claims. It further contends that plaintiff is not entitled to consequential damages. If the matter goes to litigation, each side is likely to incur $20,000 in attorneys' fees and costs, and the contract states that neither party can recover fees and costs from the other side.

How does one begin to analyze the settlement value of a claim like this? The answer is to break it down into all of the possible outcomes and then to ascribe a probability of occurrence to each possible outcome. Here, one possible outcome is that the defendant wins a judgment that it did not breach the contract. Let's say the plaintiff has analyzed the claim and concludes there is a 30% chance that may happen. That means plaintiff considers there is a 70% probability that it will win. But, even if it wins, let's say plaintiff estimates that it has only a 60% chance of recovering its full claimed direct damages (as opposed to half) and only a 50% probability of recovering consequential damage.

We can analyze the expected value of the claim in a chart which shows each possible outcome, the likelihood each outcome will occur, and thus each possible scenario's contribution to the overall expected value of the case:

(See chart to the left on page 26)

You can see from the chart that there are four potential outcomes: one in which the defendant wins, and three in which the plaintiff recovers different sums depending on how the damages issues turn out. The chart allows one to calculate "compound probabilities," that is, the likelihood of a chain of events taking place, and then fit each alternative outcome into the overall picture.

Of course, most litigations will be more complex than this, but the same technique can be expanded as necessary to account for any number of variable outcomes, such as counterclaims, dispositive motions, variable damages awards (i.e. where the potential damages are not fixed at a known dollar amount) and so forth. The analysis may be more challenging, but as the case gets more complicated the analysis becomes all the more useful.

Attorneys' Fees, Costs & Other Factors

There is one critical factor that the Expected Value Analysis does not account for, and that is costs. Anyone analyzing the settlement value of a case obviously has to be cognizant of what it will cost to accomplish the forecasted result. In the above example, we know that plaintiff and defendant are each estimated to spend $20,000 to get to a verdict. So, if each party is analyzing this issue at the beginning of the case (i.e. before it has spent those fees), then an economist would say that the plaintiff should be willing to settle the case for any value greater than $60,500 (i.e. $80,500 expected value less $20,000 costs), and the defendant should be willing to settle the case for any value below $100,500 (i.e.

Most importantly, if a party is overly optimistic or pessimistic about the chances of an event occurring,
then its calculation of the expected value of the case will be correspondingly skewed

$80,500 + $20,000). This establishes a range within which both sides should rationally be willing to settle the case.

The time value of money also must be considered. A cash settlement today is more valuable to a plaintiff than an equivalent judgment two years from now, and any settlement analysis should take this factor into account.

The Importance of Critical Analysis

Of course, this kind of analysis is only as good as the data that goes into it. Most importantly, if a party is overly optimistic or pessimistic about the chances of an event occurring, then its calculation of the expected value of the case will be correspondingly skewed. In most cases, this kind of analysis is an evolving process. At the beginning of a case the parties may not have all the facts or they may not have had an opportunity to research all the critical legal issues at stake. Moreover, in a highly complex case it may not be possible at the beginning of the matter to anticipate all the developments that will unfold as parties are added, motions filed, counterclaims asserted, and so forth. As the case develops, therefore, it is critical to revisit the analysis to see how those developments impact the claim's expected value.

The Soft Factors

Economic analysis is a very useful way to look at a claim from a "business" perspective, but in many cases there are other factors that may materially alter a party's assessment of its "settlement value." A claim involving serious injury or death, for instance, may be charged with emotional factors that strongly influence a plaintiff's assessment of what it is willing to accept in settlement.

Risk acceptance or avoidance is often another significant factor. It is one thing to say that a coin toss is a 50/50 endeavor, but in any given coin toss one side wins and the other side loses, and a party may be willing to pay a premium or take a discount in exchange for the certainty of avoiding a total loss. Moreover, psychological studies have shown that a plaintiff may in some instances be willing to take an economically "irrational" risk where there is a low probability of success but a very high potential reward. (You might call this the lottery effect). And conversely, a defendant may be willing to pay an "irrationally" high amount to avoid a high value but low probability judgment, especially where such a judgment would be economically catastrophic.

Commercial considerations often significantly impact a party's settlement threshold. For instance, a defendant may be willing to pay a premium to resolve a claim that is interfering with other business objectives, such as a merger or a public offering of shares. A plaintiff may be willing to offer a discount in order to fund its "war chest" to allow it to more vigorously pursue claims against other parties.

Personality traits and "aspirations" of the negotiating parties may also play a significant role in how a party assesses the settlement value of a case. Pride and ego are always wildcards, and if the person making settlement decisions for one party has a personal incentive (raise, bonus, promotion) to accomplish a favorable settlement, that person may be "irrationally" willing to risk an adverse outcome at trial in exchange for that prospect.

Conclusion

Analyzing the settlement value of a case is still part art and part science. Even the best analysis can never fully account for all the vagaries of litigation, such as predicting how a witness will hold up under skillful cross-examination or how a judge will rule on a motion. But as the above discussion demonstrates, a candid and thoughtful analysis of a case can help develop a solid framework from which to start a settlement negotiation. And, as new facts and information develops, the expected value of the case must be constantly reanalyzed and the assumptions and calculations adjusted as necessary.

Importantly, for this kind of analysis to lead to a settlement, both sides have to carefully and candidly analyze their respective claims and defenses. One of the great frustrations in litigation is to deal with an opposing party who is either too busy or otherwise unable to critically assess the case's true risks and probable outcome. If everyone understands the relevant facts and legal issues and takes a candid view of the case, however, then each side's analysis should theoretically lead to similar estimated values. When that happens, the chances for settlement greatly increase.

The Author

Thomas H. Belknap, Jr. is the Vice Practice Group Leader of the firm's International and Maritime Litigation/ADR practice group and concentrates his practice in the areas of international commercial and insurance litigation and arbitration, with particular emphasis on the maritime industry.

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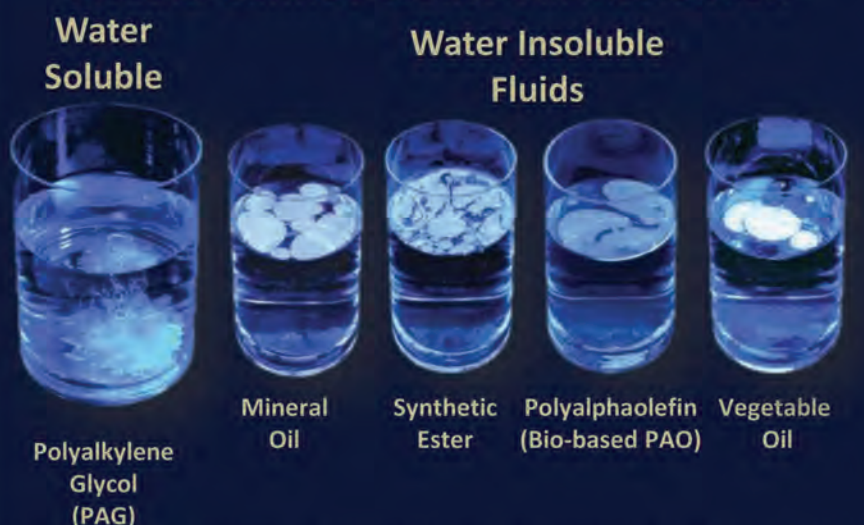
1. ***Biodegradation*** – The process of chemical breakdown caused by microorganisms or their enzymes in which said chemical may be decomposed and absorbed by the environment.
   - Lubricants must be rated "Readily Biodegradable." "Inherently Biodegradable" does *NOT* qualify as an EAL.
2. ***Aquatic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

How is Your EAL Going To Handle Water Contamination?

EAL Product	Change in Acid Number mg KOH/g	Total Acidity of the Water Layer mg KOH
Polyalkylene Glycol (PAG)	-0.01	Water Solubilized
Polyalphaolefin (Bio-based PAO)	-0.08	6.9
Synthetic Ester	0.83	19.37
Vegetable Ester	2.02	3.23

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

US EPA Clean Water Act Also Requires That A Fluid Cannot Create Surface Sheen



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Strategic Planning With Aggregate Data

BY PEKKA AUTERE

A sensor is a device that measures some kind of input from the physical world. On complicated technical systems such as vessels, there is an enormous amount of different sensors. The number of sensors will surely grow as the size and cost of sensors continuously decrease. A person technically trained is able to gain some information from a single sensor reading, but the information is much more useful when the data from multiple sensors and sources is combined and aggregated at a higher level. At a higher level the whole vessel can be seen as a moving sensor that is collecting data from environmental conditions as well as the performance of the vessel.

Similarly as the information received from a single sensor is limited, it is inadequate to interpret the information from only a single vessel. By combining the information from several vessels, it is possible to form a higher level view of the entire fleet and compare individual vessel performance by creating benchmarks and baselines. By comparing a vessel performance to another vessel, or even hundreds of other vessels, it is much easier to evaluate if individual vessel performance is up to the mark or not. Aggregating information from several vessels can bring insight about how the environmental conditions affecting vessel fuel consumption differ between sea areas.

When planning a budget, vessel operators need to estimate the fuel costs for a selected route. Fuel costs depend not just on the voyage distance, route and the schedule, but also on the environmental conditions the vessel is going to face on the voyage. An interesting measure when estimating cost of a specific route is considering the average sea margin that will be experienced in that sea area. Sea margin refers to the energy used by the vessel to overcome the environmental and sea conditions. In ideal conditions vessel sea margin would be zero.

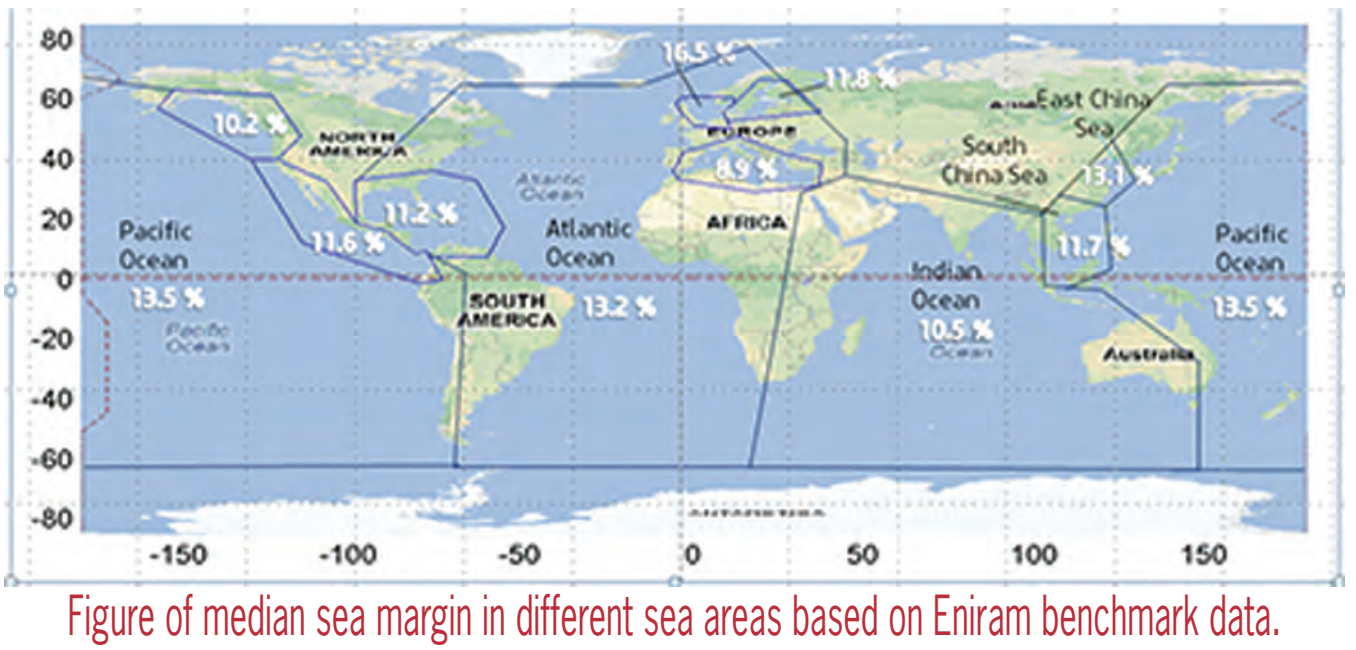

Figure of median sea margin in different sea areas based on Eniram benchmark data.

Average sea margins are bigger on the Atlantic and the Pacific Ocean. This is expected as the weather conditions and sea state are generally worse when compared to areas closer to the coast. Interestingly in the Mediterranean Sea, the sea margin is the lowest of all the defined sea areas. This is understandable as it's a smaller sea area, where the waves are typically smaller and thus have less impact on a vessel's energy consumption. In the Baltic Sea shallow water increases the average sea margin as vessel squatting has a big impact thus the average sea margin is larger.

The average sea margin does not, of course, tell the whole truth about the environmental conditions in that area; the environmental conditions vary seasonally and on some sea areas the conditions are always harsher. When we look at the sea margin distributions for the Mediterranean Sea and Pacific Ocean, we can see that in the Mediterranean Sea, the sea margin on the average is more likely to be less than 10%. The probability of the sea margin being over 20% is lesser than on the average. On the other hand in the Pacific Ocean it is the other way around. There the sea margin is likely to be higher than the average and sea margins of over 20% are more probable. Showing the seasonal variation in the sea margin distributions would give even better insight of the changes in operating cost between different areas. When planning high level fleet deployment, the differences in energy consumptions in different areas due to sea margins should therefore be taken into account. For example operating in Mediterranean or in the Caribbean has over 2% difference in propulsion energy usage of the vessel. This is already a significant difference on fuel bill.

The average sea margin in a certain sea area is certainly not the only way the aggregated data could be used. The information can be used to simulate the fuel consumption of an individual vessel on a certain route, giving even more accurate information for voyage planning. This kind of simulation would bring a new level of accuracy to fuel budgets. Although an individual measurement is difficult to interpret, aggregating data brings valuable insight to see the larger picture. High level of aggregated data can be of great help in making strategic decisions on how to operate the vessels better.

The Author

Pekka Autere, Lead Analyst, Eniram is part of Eniram analytics team and has broad experience in converting data into information and strategic guidance using mathematical and statistical modeling in different fields of application. At Eniram he has been working in developing statistical modeling and leading research team before moving to Analytics. He is a Master of Science in Automation and System Technology and System Analysis and a Master of Social Sciences in Economics.

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Methane Slip

Is Methane Slip of Internal Combustion Engines Harmful to the Environment?

By Peter Pospiech

Forget Marine Engines ... Regulate Cow Belching

While much attention is paid to commercial ship and boat powertrains, perhaps regulators should turn attention to cows when it comes to methane production, as cattle belch methane accounts for 16% of the world's annual methane emissions.

Tighter regulations on exhaust emissions are prompting rapid change within the global shipping industry. Orders for scrubber systems have soared higher than before, suppliers of emissions monitoring software are rapidly taking increasing orders, and the market for natural gas-powered engines continues to break new ground.

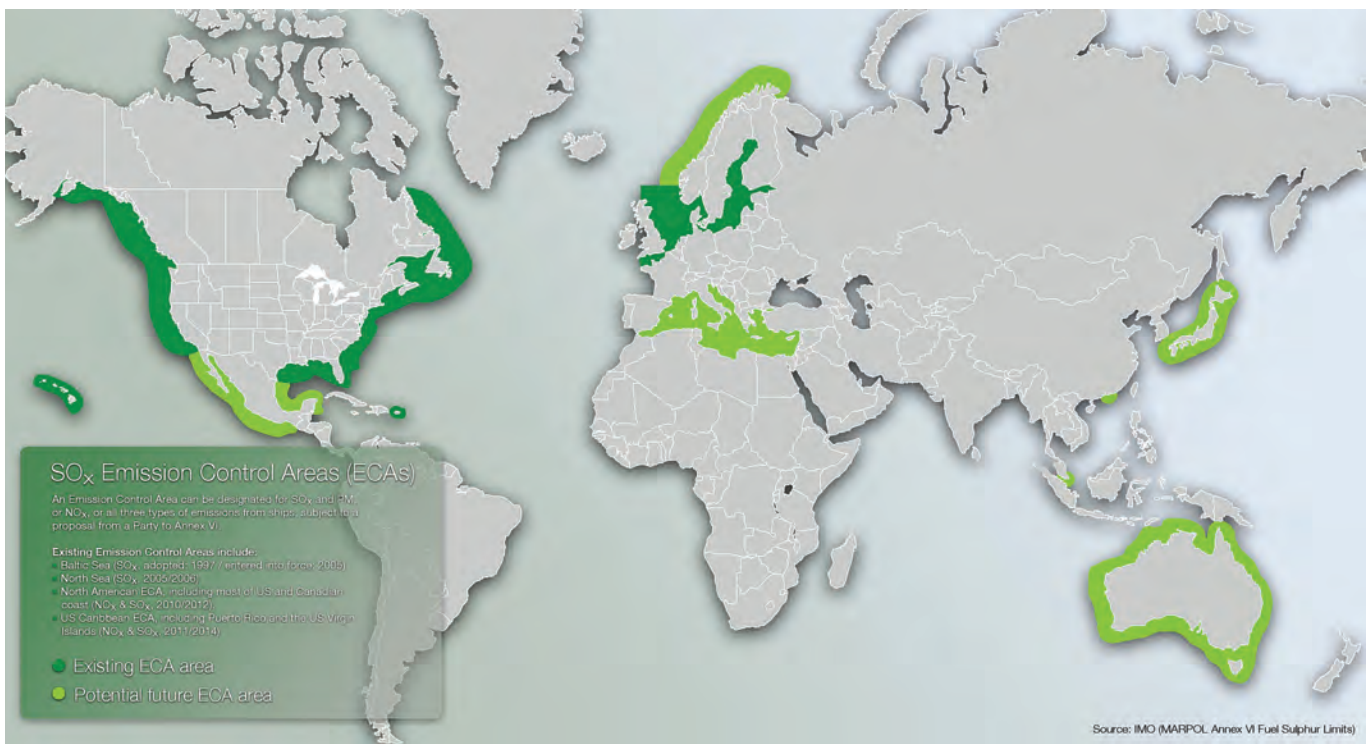
Choosing the most cost-effective way to reduce exhaust emissions is vital for the industry. Regulations for Emissions Control Areas (ECAs) are now enforced across many countries and there are further designation zones under discussion. Also, the maximum sulfur content in fuel burnt in such designated areas will drop from 1% to 0.1% very shortly. This change will be wide-reaching; around 80-90% of merchant vessels will enter a SECA zone (Sulfur Emission Control Area) in their lifetime. What's more, failing to adapt to the change could be expensive; the cost of low-sulfur fuel that is compliant with regulation is stated to be up to 30% higher than the price of standard bunker fuel.

Gas engines are expected as a strong substitute for diesel engines in marine fields, where strict emission regulations have been introduced and will become more stricter.

Thanks to the sulfur-free and low-carbon features of natural gas, gas engines emit much less CO2 and particulate matter than marine diesel burning heavy fuel oil.

The premixed lean-burn gas and partly dual-fuel engines, however, suffer one massive flaw: it is the methane slip, which substantially means the unburned methane emitted into exhaust ports and the atmosphere. And any gas which is not combusted is a highly potent greenhouse gas, with an effect that offsets the gain from reduced CO2.

SOx Emission Control Areas (SECA's): *Existing and Planned*



Environmental Aspect of Natural Gas

Natural Gas is often highlighted as the cleanest fossil fuel alternative. When compared to diesel oil used for piston engines, natural gas has the following potential benefits / reduced emissions as opposed to conventional diesel engines.

It is important to note that the gas engines available today can be divided in two main categories:

- Dual fuel engines
  (e.g. Wärtsilä, MAN)
- Lean-burn gas engine
  (e.g. Rolls-Royce, Mitsubishi)

The different engines and engine - propulsion arrangements have varying characteristics and levels of efficiency.

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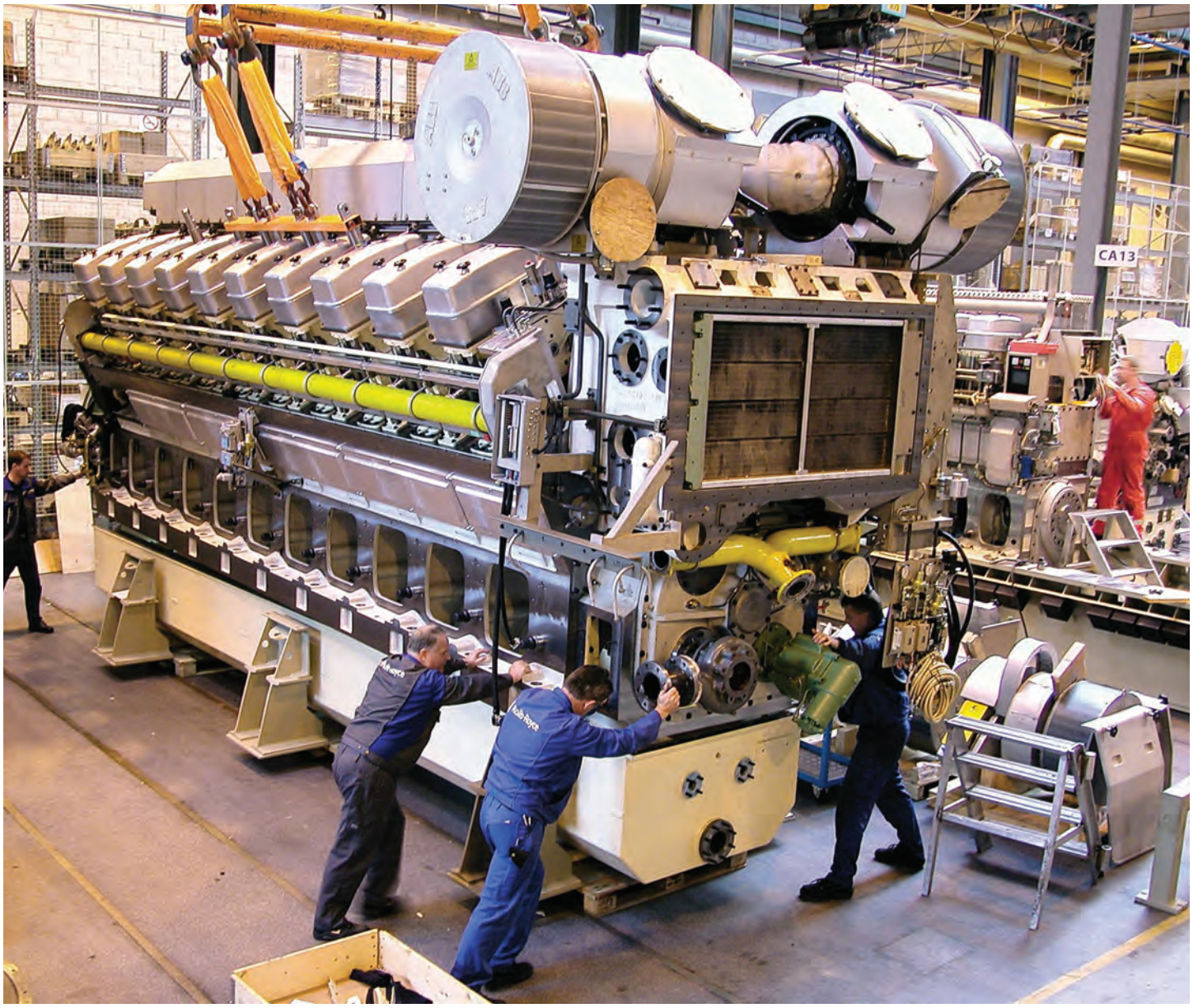
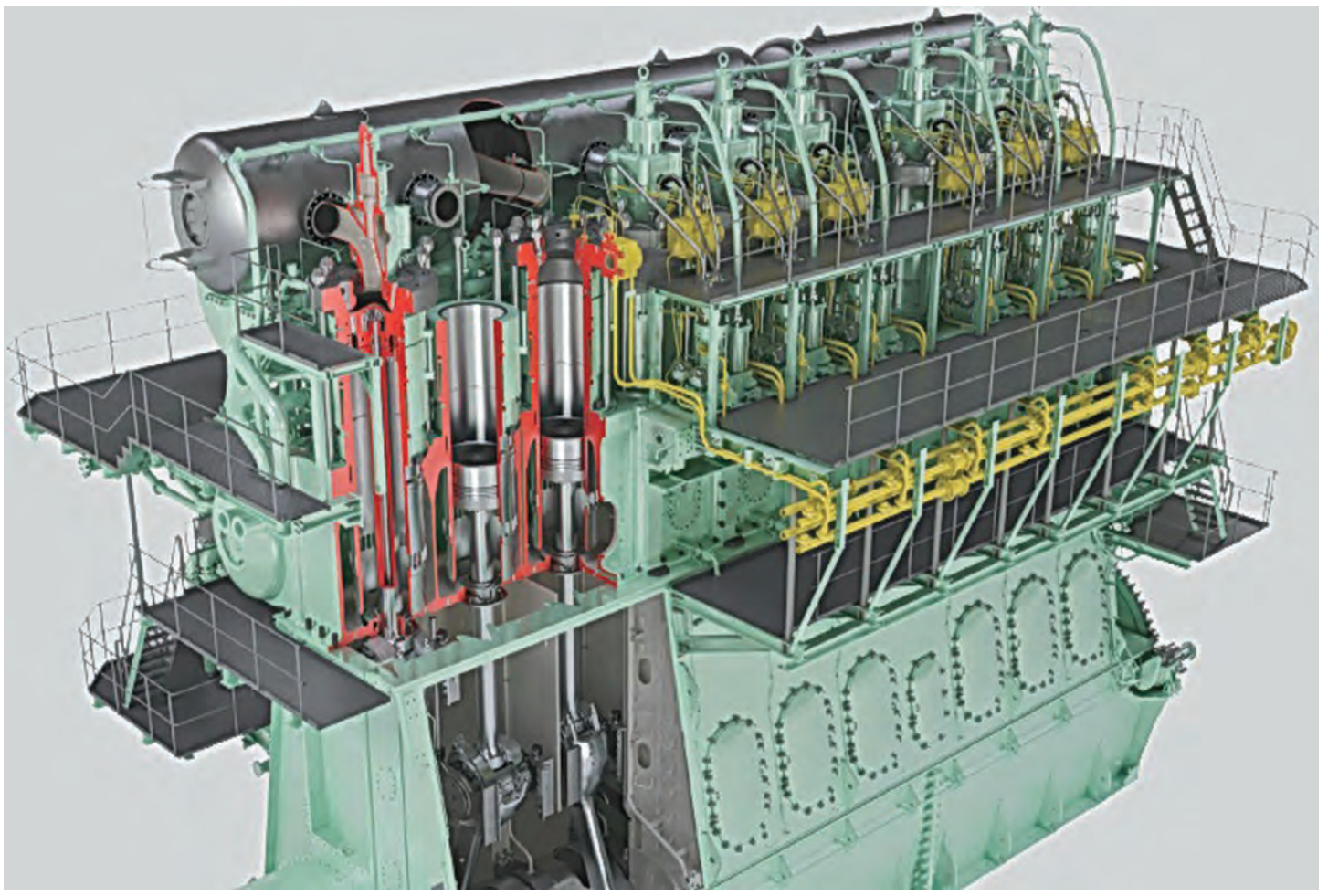


Rolls-Royce engine manufacturing.

The ME-GI concept is based on direct gas injection with the engine operated as a conventional diesel engine. Thus, no gas is present during the compression stroke or scavenging period, minimizing methane slip to a level comparable to operation on conventional liquid fuel.



MAN Diesel&Turbo's 2-stroke DF engine ME-GI without methane slip.

The true reduction of greenhouse gas emissions in each individual case will of course depend on the total efficiency of the chosen alternative. It should be noted here, however, that methane slip, will negatively influence the reduction of greenhouse gases significantly, and in worst cases eliminate the gains from CO2 reductions. In consideration of the fact that CH4 is about 20-25 times more powerful than CO2 as a greenhouse gas during a 100 year time span, release of even small volumes of methane easily spoils the potential gains.

Available Methane

Apart from gas fields, an alternative method of obtaining methane is via biogas generated by the fermentation of organic matter including manure, wastewater sludge, municipal solid waste (including landfills) or any other biodegradable feedstock, under anaerobic conditions. Rice fields also generate large amounts of methane during plant growth. Methane hydrates/clathrates (ice-like combinations of methane and water on the sea floor, found in vast quantities) are a potential future source of methane. Cattle belch methane accounts for 16% of the world's annual methane emissions to the atmosphere. One study reported that the livestock sector in general (primarily cattle, chickens, and pigs) produces 37% of all human-induced methane. A more recent study found that at a conservative estimate, at least 51% of global greenhouse gas emissions were attributable to the lifecycle and supply chain of livestock products, meaning all meat, dairy and by-products, and their transportation.

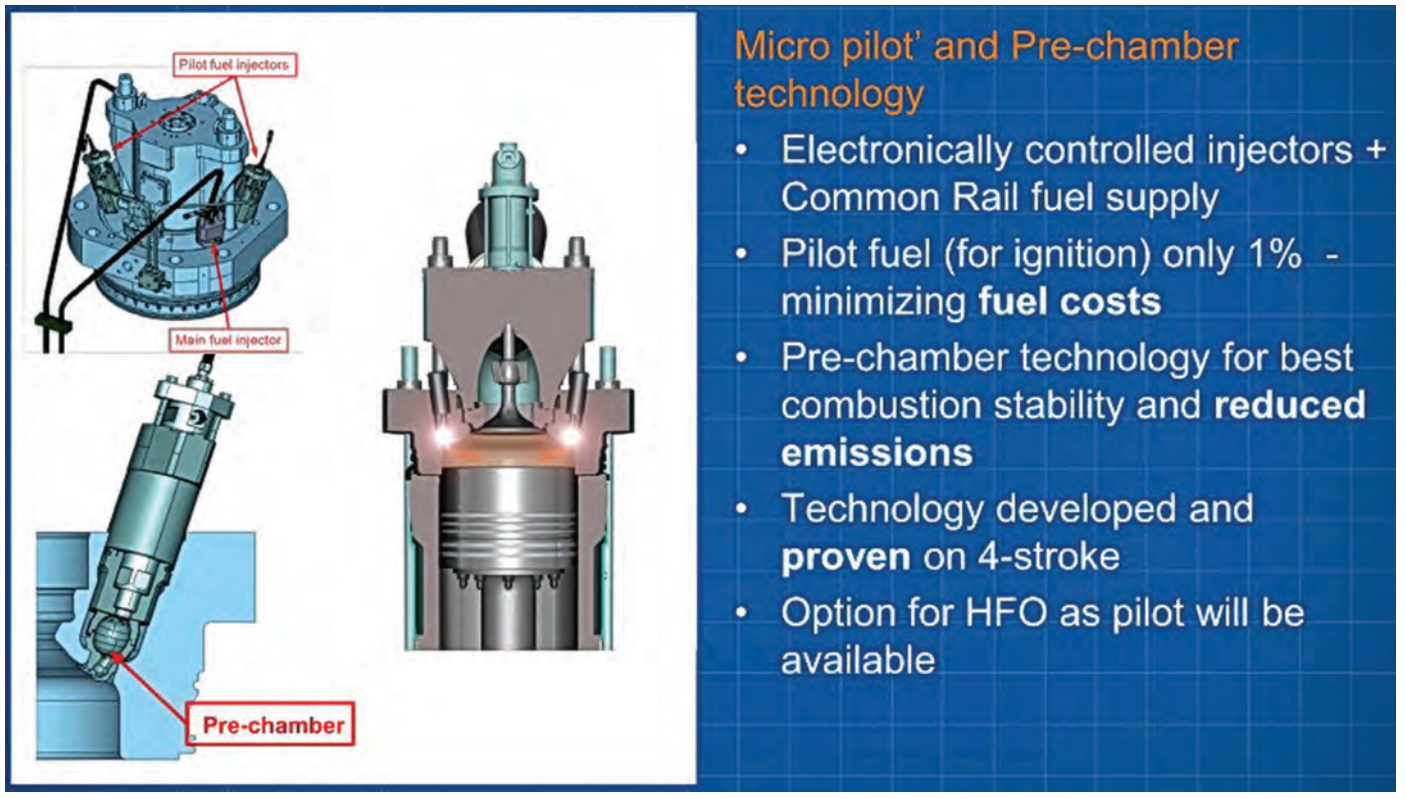
Compared to this enormous amount of direct methane emission, the contribution to total world greenhouse gas emission of marine engines is very minute.

Methane Slip Reduction

In connection with gas engines, while NOx emissions are negligible, emissions of unburnt methane are a subject of increasing attention for all mayor engine manufacturer

"The amount of unburnt gas following combustion in a Wärtsilä gas engine is small," said Ingemar Nylund, Director Research & Development. "It is trapped in clearances in the combustion chamber (piston rings, the anti-polishing ring, valve seats etc.) where the air-fuel ratio means that the gas does not burn during combustion but is released unburnt with exhaust gases during cylinder scavenging. We ensure that methane slip is minimized in our engines in two ways," he continued. "By continuous development of the combustion chamber technology to improve the combustion process, new Wärtsilä products have to be the reference in terms of engine efficiency, output and greenhouse gas emissions, and by the oxidation of unburnt methane using a catalyst. And with our latest development, our low-pressure 2-stroke engine, the methane slip is almost negligible.

The "methane slip" inherent in the RT-flex 50DF engine is less than what is found in the equivalent 4-stroke engine and still results in 25% less equivalent CO2 emissions, because the combustion has much more time to burn more completely, which is not the case in 4-stroke engines. On top of this: the RT-flex DF engines have the potential to further reduce the methane slip by further developments, which means: 'Direct' methane slip can be avoided by correct gas admission valve timing, the use of pre-



Wärtsilä's 2-stroke DF - Key Technologies to reduce emissions.

chamber technology to have complete combustion and an optimized combustion space to avoid 'dead volumes. This well-proven technology is commonly featured in Wärtsilä solutions packages and we're working hard to further reduce its size and cost."

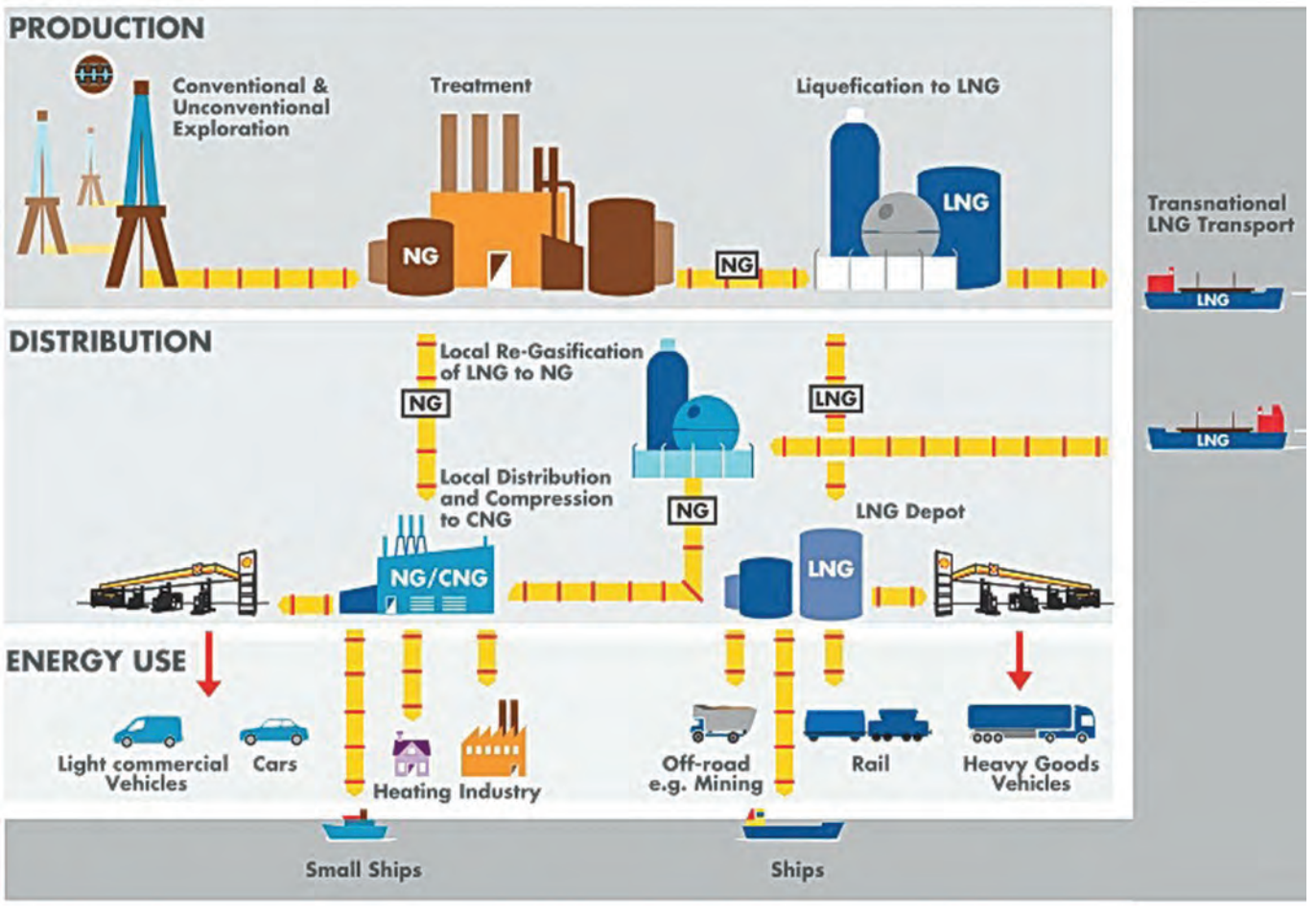
And well-known engine manufacturer Rolls-Royce claims to have lean-burn 4-stroke gas engines with very small amounts of methane slip in the range of appr. 3-4 g/kWh. But, nevertheless, as Tobias Haack, Sales Manager, said: "we are working on this to reduce this amount because it is unburned fuel – and unburned fuel means higher fuel consumption and that increases operation costs." According to the company, it is focussing on extremely close control of combustion in every cylinder at all times, the design of the combustion chamber using the latest computer aided design tools and optimised turbo charging. MAN Diesel & Turbo explains its high pressure 2-stroke engines concept does not have any methane slip.

The ME-GI concept is based on direct gas injection with the engine operated as a conventional diesel engine. Thus, no gas is present during the compression stroke or scavenging period, minimizing methane slip to a level comparable to operation on conventional liquid fuel. Recent tests of ME-GI engines have revealed a measured methane slip in the order of 0.2 g/kWh, independent of engine load. This slip is 20-40 times lower in comparison to the methane slip recorded for the most modern, state-of-the-art, dual-fuel engines.

The global warming potential (GWP) of methane is 72 times as high as CO2 over a 20 year time interval. Thus, when calculating total GWP, in addition to CO2, CH4 must be considered as well. Taking the methane slip of the ME-GI engine into account, the total GWP is still significantly lower than normal fuel-oil operation, approximately 17-20% lower. But it is not only the combustion engine, also in the supply chain from the terminal all the way to their combustion in the engine climate change emissions may be formed (gas leaks = methane slip). Here, the escape of methane is of specific importance by means not only of gas leaks but also of the methane slip of pipe connection, couplings etc. This is a loss of usuable energy which must be avoided.

It is without doubt that the very large amount of all human-induced methane (primarily cattle, chickens, pigs, etc.), and in addition naturally existing methane on earth, can hardly be reduced. But it is in our hands to reduce possible methane slips in combustion engines and not to forget the supply chain, with all technical possibilities we have.

Engine manufacturers are on the best way to do so. In general methane harms our environment, but compared to the enormous amount of direct methane emission, the contribution to total world greenhouse gas emission of marine engines is very minute.



Not only the gas engine itself has to considered when one is talking about methane slip, but also the entire supply chain is important to consider.

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Floating Production

Floating Production inventory continues to grow, but rising costs, shale oil & gas are starting to create significant headwinds

BY JIM MCCAUL, IMA

Floating production has been one of the most significant developments in the oil and gas industry over the past four decades. Since the first floating production unit (Argyll) was installed in 1975, more than 350 offshore fields too deep, too remote or too small for fixed platforms have been developed using floating production facilities. Looking forward, the future of the sector continues to look very promising, but some barriers and threats to growth have appeared.

Current Inventory

Three hundred and twenty (320) oil/gas floating production units are now in service, on order or available for re-use on another field. FPSOs account for 65% of the existing systems, 74% of systems on order. Production semis, barges, spars and TLPs comprise the balance.

Another 29 floating LNG processing systems are in service or on order. Liquefaction floaters account for 14%, regasification floaters 86%. No liquefaction floaters are yet in service: all four are on order. Several of the 12 active FSRUs are interim regasification units being used until the long term unit is delivered. In addition, 102 floating storage units are in service, on order or available. **(See Chart 1, top left on page 40)**

Ten Year Growth Trend

The number of production floaters in service or available has increased 84% over the past 10 years. At end of 2003 there were 152 units; by the end of 2013 the total increased to 279 units. With scheduled deliveries this year, by end-2014 the inventory will grow another 8% to 300 units in service or available, assuming no units are scrapped. Composition of the op-

erating/available inventory has changed over the past decade. FPSOs accounted for 59% of the units in 2003. At end of 2013, FPSOs were 62% of the total. This reflects the faster growth of FPSOs since 2003. FPSOs increased 96% over the 10 year period. All other units grew 67%.

Ten Year Growth in Floating Production Systems

(No. of Units in Service or Available As of End Each Year)

2003	152
2004	166
2005	177
2006	190
2007	203
2008	231
2009	246
2010	248
2011	253
2012	262
2013	279
2014	300

Ownership of Production Semis, Spars, TLPs and Barges

In the March MR we profiled the ownership of FPSOs. Here we profile ownership of other types of production floaters. Five field operators own ~50% of the 108 production semis, spars, TLPs and barges now in service or on order. Petrobras is the clear leader, with 16% ownership share of the inventory.

(See Chart 2, bottom left on page 40)

Production unit preferences of various operators are indicated by the type units owned. Petrobras has almost entirely production semis. Anadarko has almost entirely spars. Shell has mostly TLPs. Statoil, Chevron and Total have a mixture of units.

Unlike FPSOs where leasing contractors own 48% of the units in service, all but a few of these other type production units are owned by field operators. The exceptions include several GOM production units owned by midstream companies, a few small production barges operated in Africa and a production semi in the GOM (Thunder Hawk) owned by SBM and supplied to Murphy under a production handling agreement.

Also differing from FPSOs, 83 of the 108 units (77%) are built on new hulls. Only 25 were converted from existing hulls; 22 using drill rigs as the conversion hull. In contrast, 35% of FPSOs have been built on new hulls, 65% have used an existing tanker for conversion.

Another difference is the scarcity of redeployment in this group of production units. Compared to FPSOs, they are harder to relocate. Only three of the existing units (all semis) have been redeployed from a previous field. In contrast, 24 FPSOs have been redeployed over the past ten years.

Production Floater Orders

Sixty-six (66) production floaters are currently on order. The figure includes 37 FPSOs, 13 other oil/gas production units and 16 LNG processing units. In the latter are four floating liquefaction plants and 12 regasification terminals.

Orders for 203 production floaters have been placed over the past 10 years, an average of just over 20 units per year. As indicated in the chart below there has been significant variation in number of orders during this time period.

There are indications that overheating in the sector is now occurring.

For example, Statistics Norway in a December 2013 report said, "the high activity in the oil and gas sector has resulted in higher costs in many of the development projects."

Chart 1

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

(As of April 1, 2014)

	Total	Active	On Order	Available
Oil/Gas Production				
FPSO	212	156	37	19
Production Barge	10	8	2	0
Production Semi	47	40	3	4
Production Spar	23	18	4	1
TLP	28	24	4	0
Total	320	246	50	24
LNG Production				
FLNG	4	0	4	0
FSRU	25	13	12	0
Storage Systems				
FSO	102	92	9	1

Ten Year Pattern of Orders for Floating Production Systems

(No. of Units Ordered in Each Year)

2004	14
2005	23
2006	27
2007	18
2008	19
2009	6
2010	29
2011	18
2012	27
2013	22

The peak was in 2010 when 29 production floaters were ordered. Partially responsible for the 2010 spike was the deferral of orders resulting from the 2008/09 global financial collapse. In two other years (2006 & 2012) the ordering pace reached 27 units. The low point was in 2009 when the financial crisis shut down orders for 12 months.

Order Backlog

The backlog of production floater orders has had several peaks and troughs over the past two decades. The most recent low was hit in late 2009 when the financial collapse created havoc in the offshore sector. Crude prices dropped into the $40s, production floater orders dried up and the order backlog dropped to 30 units in November 2009. Since then order backlog has climbed to a new high that has remained between 65-70 units since mid-2012.

Growing backlog reflects a strong business sector. But as backlog grows, delays and cost growth eventually appear in the supply chain. Bottlenecks in the industrial base create inefficiencies, lower performance and ultimately cause financial problems and delays throughout the industry.

The source of problems can be from many directions. Industry capacity to supply floating production equipment is constrained by available manpower, facilities and management capability at all levels of the supply chain. Capacity limits could be set by specific components, such as availability of compressors. Or limits can be set by engineering capability for concept design, FEED and detailed design/engineering involving production floaters.

Capability to manage multiple projects simultaneously could also be the limiting factor – as even the largest field operators and EPC contractors have a finite number of experienced project managers. Two to three projects executed simultaneously may be feasible for major contractors, but more projects at one time could result in performance problems.

There are indications that overheating in the sector is now occurring.

For example, Statistics Norway in a December 2013 report said "the high activity in the oil and gas sector has resulted in higher costs in many of the development projects." In a November 2013 review of Norwegian offshore projects, the NPD said "a high activity level has resulted in increased prices for input factors and scarcity of certain resources … and is a contributing cause of the major time and cost overruns incurred in some of the projects in this review."

Backlog of Planned Floater Projects – 243 floating production projects are in various stages of planning as of beginning April. Of these, 57% involve an FPSO, 15% another type oil/gas production floater, 23% liquefaction or regasification floater and 5% storage/offloading floater.

Brazil, Africa and Southeast Asia are

Chart 2

Top Owners of Production Semis, Spars, TLPs & Barges In Terms of Number of Units Owned

(As of April 1, 2014)

Owner	Type	In Service	On Order	Total	Composition
Petrobras	FO	17	-	17	16 Semis, 1 TLP
Statoil	FO	10	1	11	8 Semis, 1 Spar, 2 TLPs
Anadardo	FO	7	2	9	1 Semi, 8 Spars
Shell	FO	8	1	9	1 Semi, 1 Spar, 7 TLPs
Chevron	FO	6	1	7	2 Semi, 2 Spars, 2 TLPs, 1 Barge
Total	FO	3	2	5	2 TLPs, 3 Barges
BP	FO	4	-	4	3 Semis, 1 Spar
ENI	FO	2	1	3	2 TLPs, 1 Barge
ExxonMobil	FO	3	-	3	1 Spar, 2 TLPs
Hess	FO	2	1	3	3 TLPs
Murphy	FO	3	-	3	3 Spars
Plains E&P	FO	3	-	3	2 Spars, 1 TLP
BHP	FO	2	-	2	2 TLPs
ConocoPhillips	FO	2	-	2	2 TLPs
LLOG	FO	1	1	2	2 Semis
Petrofac	FO	1	1	2	2 Semis
Williams	MS	1	1	2	2 Spars
EPP	MS	2	-	2	1 Semi, 1 TLP

FO = Field Operator / MS = Midsteam Company
Note: One of Anadarko's Spars has stopped production.
Some units are jointly owned.

Breakdown of Planned Projects by Type of Production System

(As of April 1, 2014)

Type System	# of Projects
FPSO	138
Other FPS	37
FLNG	31
FSRU	24
FSO	13
Total	243

the major locations of floating production projects in the visible planning stage. We are tracking 50 projects in Africa, 50 in Brazil and 44 projects in Southeast Asia – 59% of the visible planned floating production projects worldwide.

The composition of projects by region varies. Projects in Africa and Brazil mostly involve FPSOs, a significant portion of which are big units. In SEA there is a mixture of FPSO, FLNG, FSRU and FSO requirements. The GOM has a mixture of Semi, Spar and TLP projects on the U.S. side, FPSO projects on the Mexican side and FLNG export terminal projects on the U.S. GOM coast. In North Europe there are a mixture of FPSOs, a few Semi/TLP projects and several small projects that might use a production buoy. In Australia the projects are mostly FLNGs.

Breakdown of Planned Projects by Location of Field
(As of April 1, 2014)

Project Location	# of Projects
Africa	50
Brazil	50
SE Asia	44
GOM	24
No. Europe	22
Aust/NZ	15
Medit	12
SW Asia	11
Other	15
Total	243

Near Term Outlook for Orders

Around 25% of the 243 projects in the planning stage are at an advanced stage of development. These projects have either entered the FEED phase, pre-qualification of floater contractors has been initiated or bidding/negotiation is in progress. Award of the production floater contract in these projects is likely within the next 2-3 years.The remaining 75% of the planned projects are in an early development stage. Contract awards are more likely in the 3+ year time frame.

Longer Term Outlook

Over the next five years we expect orders for 104 to 150 production floaters. Our most likely forecast is 126 orders. In the most likely scenario FPSOs will account for 65% of the orders. The balance will consist of other types of oil/gas production floaters (15%) and LNG liquefaction/regasification floaters (20%). Differences in the high and low scenarios will be primarily in the number of smaller and intermediate size production units to be ordered. These units tend to be more sensitive to market conditions. Assumptions in each scenario are shown in the accompanying box.

We see the order pace continuing to grow. Compared to actual orders over the past five years, our most likely forecast is 25% higher than the number of orders between 2009/2013. Looking further back, our most likely forecast figure is up 31% over actual orders between

is up 31% over actual orders between 2004-2008. But our forecast is significantly lower than the forecast made last year. There we forecast orders for 124 to 190 production floaters over the five year period 2013-2017, with the best estimate being 160 units. Now we are forecasting 104 to 150 orders, with a best estimate of 126 units. **Why the big drop?**

Over the past year it has become clear that supply chain and other constraints are much stronger than previously thought. Deepwater project start opportunities keep growing, evidenced by the growing backlog of projects in the planning stage. But capability limitations in the supply chain, increasing project complexity, escalating costs, access to financing and bottlenecks created by local content targets appear to have worsened. These factors have been constraining, and will continue to constrain, deepwater project starts. Another reason for the drop is the mounting pressure on oil company capital spending budgets. Many oil companies have been cutting capex budgets. ExxonMobil, for example, said its capex spending for 2014 will be 6% less than last year. Chevron said it will cut 2014 spending 5%.

Perhaps more ominous, alternative opportunities to invest in shale oil/gas development appear to be eroding investment in deepwater development. There have been indications that better investment opportunities have been squeezing deepwater projects from oil company capex budgets. Several deepwater project starts have been delayed or cancelled within the past year. Different reasons have been given for each decision, but ultimately management decided there were better uses of available funds.

Strategic moves by Marathon illustrate the shift in investment priorities taking place in the industry. Marathon has recently sold its interest in Block 31/32 in Angola and is marketing its interests in the North Sea. Explaining the company's strategy, the CEO in March said the divestiture "is a continuation of our portfolio optimization to simplify and concentrate our portfolio toward higher margin and higher growth opportunities." Marathon sees these opportunities in unconventional oil. The 2014 capital budget of $5.9 billion includes $3.3 billion in spending in the Eagle Ford and Bakken shale/tight oil and wet gas plays.

Looking forward, as the cost of deepwater development escalates and shale/tight oil development costs fall – which is happening – we see the diversion of resources becoming greater over the next several years.

Bottom line: deepwater is still a growth sector. But it has hit headwinds and serious competition.

Production Floater Forecast Assumptions

Three plausible forecast scenarios are profiled below that capture a realistic range of the underlying market environment for floating production system orders over the next five years.

Future Business Driver	Most Likely Scenario	High Scenario	Low Scenario
Global energy demand growth	Annual growth averages 1.5% / similar to the past two decades	Annual growth accelerates to >2% as world economy rebounds	Annual growth slows to ~1% as global economy decelerates
Global energy supply developments	Shale output grows in U.S., shale cost declines but at slower pace, little spread beyond U.S.	Shale oil hits strong environment & logistics resistance, shale development slows	Shale development spreads glob ally, costs of shale production fall, shale output grows
Future oil/gas prices	Crude in $80-100 range, LNG pricing down 10%	Crude in $100-120 range, LNG pricing remains near current levels	Crude in $60-80 range, LNG pricing down 20%
Energy company Capex budgets 2014-18	Capex stabilizes in 2015, then slowly increases between 2016-18	Capex increases 5% each year between 2015-18	Capex falls another 5% in 2015, then stabilizes through 2018
Financial returns from non-conventional energy	Shale projects divert some funding of deepwater projects	Shale investment less attractive, lower return than expected	High return from shale diverts increasing future funding of deepwater
Access to deepwater drilling equipment	Recent rig rate weakness reverses, UDW rig orders continue but at slower pace	Recent rig rate weakness reverses, UDW rig orders continue at recent pace	Recent rig rate weakness causes cancellation of some UDW rig orders
Supply chain capacity for production floaters	Local content policies ease, lead times have gradual improvement	Big loosening of local content, more suppliers enter market	Local content policies tighten, equipment lead times grow
Cost escalation in deepwater development	Local content policies ease, cost growth slowly levels off	Big loosening of local content, cost growth levels off	Local content policies more tightly imposed, costs escalate
Access to production floater financing	Lenders recover funds in OSX failure, but future FPSO deal terms tighten	Lenders recover funds in OSX failure, no impact on future FPSO deals	OSX failure results in lenders haircut, future lending terms tightened
Major deepwater environmental event	None assumed	None assumed	None assumed, but if one occurs market could be greatly impacted

Project Alert

Below are some of the projects most likely to produce production/storage floater contracts during the next 12 months or so..

- **Bream (Norway)**

Teekay is likely to receive a contract from Premier to build/lease a cylindrical 30kb/d FPSO for use off Norway

- **Catcher (U.K.)**

BWO is likely to get a build/lease award from Premier for a 60kb/d + 60mmcf/d FPSO for use offshore the U.K.

- **Kaombo GC & CLM (Angola)**

Saipem and Modec are competing for an award from Total for two similar FPSOs with 100kb/d + 105mmcf/d processing plants

- **Atlanta (Brazil)**

QGEP is set to award a ten year lease for an 80-100kb/d FPSO and a three year lease for a 25kb/d EWT FPSO to use until the large unit is completed

- **Tartaruga Verde (Brazil)**

Petrobras has invited bids to supply a 150kb/d + 140mmcf/d FPSO under a 20 year lease in Campos Basin

- **Sul Parque Baleias (Brazil)**

Petrobras in 2H 2014 will likely invite offers for a 150kb/d FPSO to produce a cluster of light oil discoveries in Campos Basin

- **Libra EWT (Brazil)**

Petrobras has invited bids to lease a 50kb/d + 140mmcf/d FPSO to use as an EWT unit on the Libra complex

- **FLNG Export Terminal (U.S. GOM)**

Likely that construction of at least one of the half dozen proposed U.S. FLNG export terminals will be contracted within this year

- **Ayatsil (Mexico GOM)**

Pemex is evaluating offers from Exmar and BWO to supply a 300kb/d $2bil+ FPSO for use in shallow water off Mexico

- **EWT Pemex (Mexico GOM)**

Pemex will likely lease an FPSO with ~15kb/d and DP2 to use for well test/early production in the GOM

- **Mad Dog 2 (US GOM)**

BP will likely proceed with KBR into the FEED stage to acquire a production semi for Mad Dog, but the EPC contract could slip into 2H 2015

- **Rosebank (U.K.)**

Chevron will probably revive the suspended contract with Hyundai to build a 100kb/d + 190mmcf/d FPSO for use off the Shetlands

- **Abadi LNG (Indonesia)**

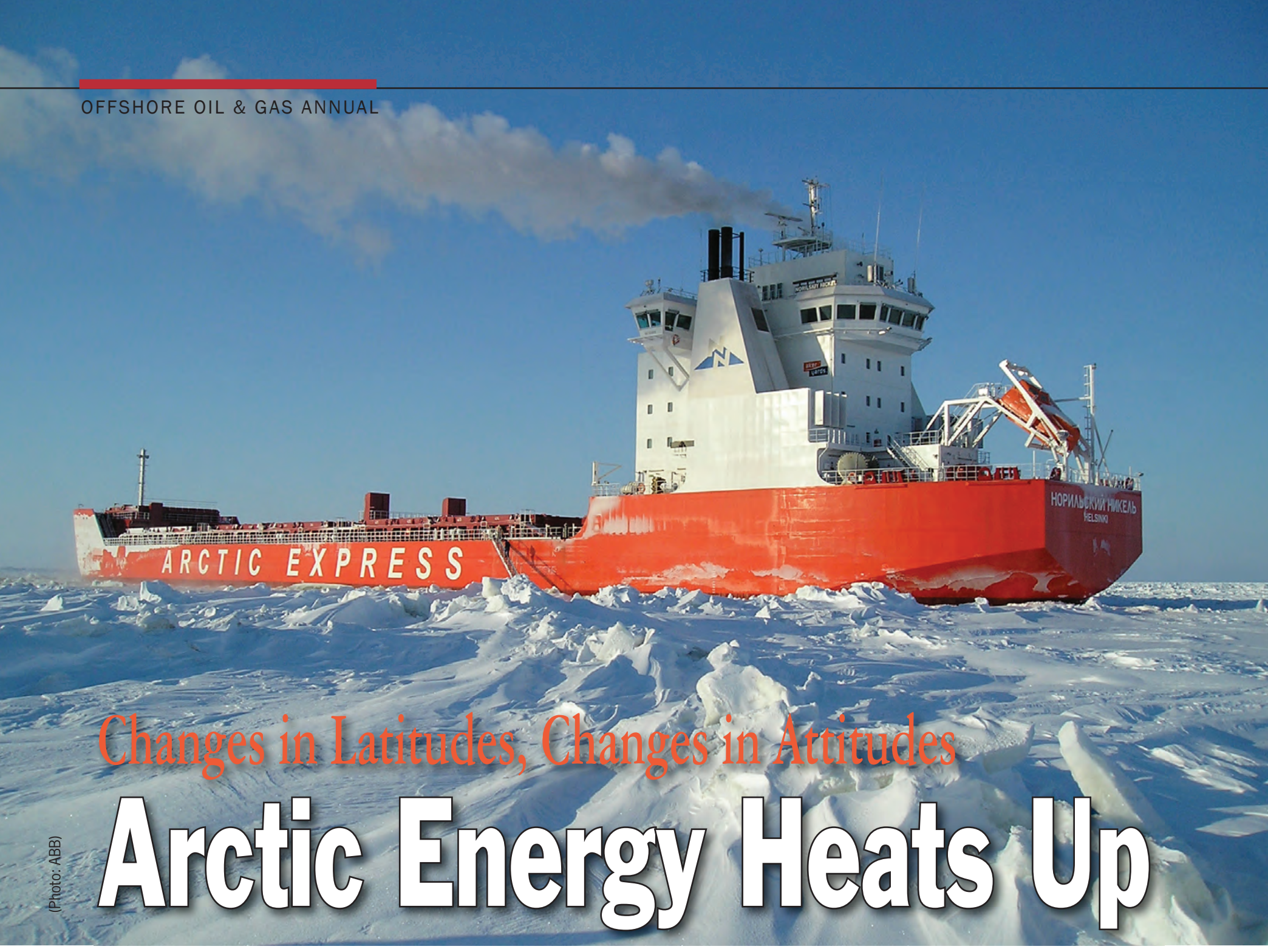
Inpex will likely contract with either JCG/Technip/Modec or Saipem/Chiyoda/SBM for a 2.5 mtpa FLNG

- **Gehem/Gendalo (Indonesia)**

Chevron will likely choose McDermott or Saipem to supply two 25-30kb/d + 420-700mmcf/d production barges for East Kalimantan

- **Ubon (Thailand)**

Chevron is likely to award the contract to supply a 650-750kbbl condensate FSO for use in the Gulf of Thailand



(Photo: ABB)

Changes in Latitudes, Changes in Attitudes

Arctic Energy Heats Up

By Edward Lundquist

Oil and gas—and also mining—are the drivers today propelling Arctic maritime operations and the construction of new vessels able to operate in extreme latitudes.

While the gas and oil resources can be recovered in the Arctic or far north and shipped to markets by sea or pipeline, the cost of doing must be balanced upon the global market price for those commodities.

Ships and marine structures able to operate in the harsh conditions of the extreme latitudes require special designs and construction techniques. Ships that will operate in or around ice, or could likely encounter ice, may require icebreaking ships or tugs to open channels.

The International Maritime Organization (IMO) is developing an International Code of safety for ships operating in polar waters (Polar Code).

An IMO report on the Polar Code explains some of the challenges. "Ships operating in the Arctic and Antarctic environments are exposed to a number of unique risks. Poor weather conditions and the relative lack of good charts, communication systems and other navigational aids pose challenges for mariners. The remoteness of the areas makes rescue or clean-up operations difficult and costly. Cold temperatures may reduce the effectiveness of numerous components of the ship, ranging from deck machinery and emergency equipment to sea suctions. When ice is present, it can impose additional loads on the hull, propulsion system and appendages."

In some cases, ships are being built which can conduct icebreaking on their own and do not require the assistance of one or more other ships. This can mean the difference between an economically viable enterprise and an inaccessible to overly expensive venture.

The Danish the ice-strengthened bulk carrier Nordic Orion, owned by Danish Nordic Bulk Carriers, carried coal from Vancouver to Finland via the Northwest Passage in September of last year, the first commercial bulk carrier to make the transit since the Manhattan in 1969. The ship not only saved time and fuel due to the shorter transit, but was able to carry more cargo because it was not constrained by Panama Canal draft limitations.

But while the number of transits across the top of the word may not be large, there are a growing number of vessels operating in the ice.

Pictured Above

The first ever cargo vessel to sail from Murmansk to Shanghai via the Northern Sea Route, without the assistance of icebreakers, recently completed its maiden crossing, cutting a 65-day journey on the return leg down to 19 days. ABB's Azipod electric propulsion technology helps to make the year-round journey possible.

"Major oil companies continue to make major commitments to oil and gas exploration operations in the Arctic region," said Mikko Niini, until recently the managing director at Aker Arctic in Helsinki, and now a senior management advisor.

"We're developing more independent cargo vessel solutions," said Niini.

Some of Aker Arctic's more unusual designs include the double-acting ship (DAS) and the oblique icebreaker.

The first DAS, Finnish tanker Tempera, was delivered to Neste Oil Corporation in 2002. The development of the steerable electric podded-propulsion system, known as Azipods, has revolutionized marine propulsion for cruise ships and other platforms, but nowhere more dramatically than for icebreakers.

Niini says the Tempera design looks like a standard tanker with a bulbous bow, bBut with a stern that's designed for icebreaking. "In winter it goes backwards," said Niini.

The prop wash keeps the ice from freezing and adhering to the steel hull, thus reducing friction. "This has been proven to save up to 50% of energy and fuel."

"It has been operating for 10 years in the Baltic Sea and has never needed any icebreaker assistance" said Niini.

"Our crude oil fleet was designed for independent operation in ice conditions encountered in Gulf of Finland, mainly between our two refineries in Porvoo and Naantali and Primorsk Oil Terminal in Russia. In practice these vessels are as pipeline extension from Russia to our refineries in Finland," said Captain Ari Inkinen, fleet manager for Neste Oil Corporation in Espoo, Finland.

"Our product fleet was designed for icebreaker assisted operation to ports in Gulf of Finland, Sea of Bothnia and Bay of Bothnia, carrying cold product cargoes at temperatures as low as-20 degrees C," said Inkinen. "All of our vessels have extra ice reinforcement above the rule requirement in bow area and winterized according to our experience."

"Ice navigation was taken into consideration in bridge design. The helmsman is located in front of the main conning position with an unobstructed view and bow searchlight control. All searchlights can be controlled from main conning positions and bridge wings," Inkinen said. "We adopted paperless ECDIS Navigation in 2002. We wanted to increase the bridge team's situational awareness in ice infested waters."

Aker Arctic's DAS design was employed for the design of five ice-capable containerships and one tanker for Russian mining company Norilsk Nickel, the world's largest producer of nickel and palladium. The ships are capable of operating without icebreaker support to conduct year-round shuttle operations between Murmansk and Dudinka on the Arctic coast. The first vessel, Norilsky Nikel, was delivered in 2006, followed by Monchegorsk, Zapolyarny, Talnakh, Nadezhda and Enisey.

Aker Arctic has also designed a fleet of DAS icebreaking LNG tankers for the joint Novatek/Total Yamal LNG project in Northern Russia on the Ob River where the river meets the Arctic Ocean. When all 16 ships are complete, the company says a ship will arrive to take on cargo every 38 hours and carry the product to Asian markets.

According to Yamal LNG, the Sabetta seaport— which is ice-bound nine

months of the year—will be protected by a pair of anti-ice barriers to manage ice jams and drifting ice blocks. The Sabetta seaport will also have six icebreakers to keep the port navigable in ice conditions.

Glencore Xstrata Nickel's Raglan Mine is located on the Ungava Peninsula in the Nunavik region of northern Quebec. Milled ore is trucked north to Deception Bay for shipment by sea to a railhead in Quebec City for further transportation to smelting facilities in Ontario. Ice capable bulk carriers can transport large bags of nickel ore to market, such as those operated by the Netherlands-based Wagenborg and its fleet of 180 ice-classed vessels. Fednav recently took delivery of the 25,000-ton icebreaking bulk carrier, Nunavik, to transport nickel concentrate from the Nunavik nickel mine in northern Quebec to Europe.

The 70,000-ton DAS shuttle tanker Mikhail Ulyanov was designed by Aker Arctic and built in Russia for OAO Sovcomflot and delivered in 2010. Along with sister ship Kirill Lavrov, it takes on crude oil from the Aker Arctic-designed floating storage and offloading (FSO) unit moored off Murmansk in the Prirazlomnoye oil field development in the Pechora Sea.

Double Wide

For many icebreaking operations, a single icebreaker isn't able to create a channel wide enough for ships to navigate. This is especially true for Russian crude oil shipments in the Baltic during the winter months. A novel design from Aker Arctic has designed has resulted in a ship that can break ice sideways. The oblique icebreaker is an asymmetrical design. Using podded propulsion—one pod in the bow, one aft and one on the port side in the aft part of the vessel—the ship can move forwards, backwards and obliquely in ice. The first oblique icebreaker, Baltika, is now undergoing sea trials and will be delivered by Arctech Helsinki Shipyard to the Russian Federal Agency of Sea and River Transport this spring. Baltika will be used in icebreaking, rescue and oil combatting operations in the Gulf of Finland.

When moving obliquely, the design also allows the ship to respond to an oil spill by creating a wider area for collecting oil. "The vessel's hull is being used as a boom to guide the oily water into the collecting tank via a hatch. The oil is separated from the water by using a skimmer," said Arctech Helsinki Shipyard's Baltika Project Manager Mika Willberg.

Aker Arctic is working with Finnish naval architects Mobimar on a trimaran icebreaker, which is actually a single hull ship with two side hulls. "It creates a channel twice as wide without increasing the power requirement," Niini said.

Hannu Tiainen of Mobimar said the trimaran design is particularly suitable for ice operations and icebreaking. "Our solution is to make the middle hull slim and simultaneously shaped so to break ice effectively. A slim hull means less breaking energy. The middle hull can be shaped so that the propeller can be placed quite deep without a risk of stability problems because the side hulls provide the needed stability."

With the current design variations under consideration, Tiainen said the displacement of the side hulls is quite small compared to middle hull. "With the propulsion being in the middle hull, the side hulls can be quite simple and shaped to give the required stability as well as bending the already broken ice edge down."

Aker Arctic's model basin was used to experiment with multiple designs and

Aker Arctic is working with Finnish naval architects Mobimar on a trimaran icebreaker, which is actually a single hull ship with two side hulls. "It creates a channel twice as wide without increasing the power requirement," Niini said.

VMT - Bilgewater ▶
Membrane
Separators
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.35-2.5 m³/hour

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▲
VMT - Standard Watermakers
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configurations in its unique ice testing facility located in Helsinki.

"Aker Arctic has additionally studied a case where the side hulls have turning thruster bodies to give better steering ability as well as forcing the ice blocks to both sides for a wide ice-free channel," said Tiainen.

A new icebreaker is being constructed at Arctech Helsinki Shipyard for the Finnish Transport Agency that will use both diesel and LNG as its fuel, which is cleaner and more efficient. The vessel will also be equipped for oil spill response operations and emergency towing missions.

Ice conditions also require specialized research vessels, offshore support vessels and anchor handling tugs.

The 360-ft. icebreaking anchor handling tug supply vessel (AHTS) Alviq was constructed by North American Shipbuilding in Larose, Louisiana and LaShip in Houma, Louisiana, and owned by Edison Chouest Offshore (ECO). She was chartered by Royal Dutch Shell for towing and laying anchors for drilling rigs in support of Shell's now-postponed oil exploration and drilling in the Chukchi Sea off Alaska. The $200 million vessel is also equipped for oil spill response. Two more are under construction, but, Niini said, is fitted with azimuthing thrusters instead of shaftlines as in Aiviq.

Aiviq was towing the mobile offshore drilling unit Kulluk off the coast of Kodiak Island, Alaska, in December, 2012, when the tow line parted. Kulluk subsequently went aground.

Because the anchors touch the bottom within the U.S. EEZ, the anchor handling tugs must comply with the Jones Act and be U.S. flagged.

As the U.S. market grows, other ice-capable ships can be expected to serve in Jones Act business. For example, Seattle-based Foss Maritime Company is building three 132-ft. Ice Class ocean-going tugs at its Rainier Shipyard in Rainier, Oregon on the Columbia River to support Foss work in Alaska and the Arctic servicing the oil and gas industry, mining and other sectors.

Business Model

Niini said the Aker Arctic business model has changed as there are fewer shipyards in Finland. Today Aker Arctic's designs and concepts are built in the U.S., Russia, Rumania, Japan and Korea. "Instead of supporting the group's own shipyards, which was the original idea, now we follow the concepts to wherever the clients want to build them."

(Photo: ABB)

Azipod and DAS make it possible for Norilsk Nickel's five container ships to sail bow first in open water and stern first in thick and heavily ridged ice. They can cut through 1.7 meters of level ice and more than 10 meters of ridged ice with considerably less installed power (13 megawatts) and lower energy consumption than conventional diesel-driven vessels of the same weight and hull design.

The test facility is a big freezer with a 229 ft. long and 24.4 ft. wide test basin, with a water depth of 6.4 feet. Mist can be sprayed into the minus 25 centigrade cold air to generate snow to simulate real conditions on the ice.

All types of ice conditions can be made for testing different hull designs and structures in the operational and environmental conditions expected to be encountered. "We know the performance criteria, that information is taken into scale, and we know how thick the ice needs to be," Niini said.

A glass bottom allows the Aker Arctic team and its customers to how a ship design responds from underneath.

Steerprop of Finland is offering Steerprop CRP (Contra-Rotating Propellers) propulsors with forward and aft dual-end counterrotating props. The company has tested the system extensively at the Aker Arctic facility. Fincantieri in Italy is building a passenger ferry for Société des Traversiers du Québec (STQ) with its Steerprop pods.

Azimuth propulsion systems can project a slipstream in any desired direction. SteerProp's Hannu Jukola, said they are a "most potent tool for ice-management."

"The power is divided to two relatively short propeller shafts pointing in opposite directions. Both propeller shafts have their own gear wheels, bearings and seals which, thanks to the reduced velocities from lower propeller RPM, have longer lifetimes than the bearings and seals that have higher operational velocities.," Jukola said.

"We used the ice basin at the Aker Arctic test facility to evaluate different propulsion configurations and propulsor installation angles in varying ice conditions to discover the best propulsive efficiencies. Another equally important aspect of the tests was to discover the best ice-management configurations for both dedicated ice-management vessels and other ice-going vessels," Jukola said. "As a result of the tests, the CRP propulsors were discovered to have particular advantages in ice-management and ice-going applications due to the unique nature of the CRP slipstream."

"The propulsors themselves can be used to widen fairways as the vessel moves along the fairway, blow away or break up ice ridges, or relieve ice-pressure from Arctic offshore installations. In addition to these slipstream based ice management abilities, an icebreaking vessel with azimuth propulsors is also capable of more 'traditional' icebreaking methods, including such as ice-milling. The propulsors' maneuverability has also enabled new types of vessels, such as tankers or cargo vessels capable of stern-first icebreaking," Jukola said.

Loading at Sea

As the Arctic Ocean is not exceptionally deep, one Aker Arctic solution is the Prirazlomnoye platform, a loading tower anchored to the sea bottom where bow loading tankers capable of independently operating in the ice can moor and take on crude oil.

If the U.S. doesn't look at the Arctic strategically, Russia certainly does. Russia's interest extending from its expansive coastline in the north has prompted establishment of a new Northern Fleet-Unified Strategic Command, as announced in February. The command reportedly will protect Russian shipping, fisheries, oil and gas and other endeavors in the region and along its northern border.

Vice Adm. Peter Neffenger, U.S. Coast Guard deputy commandant for operations observed that as diminishing sea ice is opening the region for oil, gas and mineral extraction, steadily increasing shipping traffic, commercial fishing and maritime tourism, the Coast Guard must provide a much greater presence to patrol and govern U.S. sovereign waters. Neffinger was speaking to reporters at the 5th Symposium on the Impacts of an Ice-Diminishing Arctic on Naval and Maritime Operations, held in Washington last July.

"For us, this is not an abstract, academic discussion," Neffenger said. "All of the Coast Guard's authorities and responsibilities apply in this new ocean that has opened up."

And for some, the discussion is not about ships or icebreakers, it's about people. "It's the Arctic that puts Alaskans to work—in oil and gas, fisheries, security and aviation," said Alaska Lt. Governor Mead Treadwell.

Arctic Issues to the Political Forefront

While commercial activities in the Arctic continue to increase at brisk pace, the Arctic and its future in terms of en-

vironment, commerce and defense has come to the forefront of both the United States and the International Maritime Organization (IMO).

In January 2014 the White House signaled its interest in Arctic matters, outlining its plan to make Arctic Shipping safer. The Implementation Plan for the National Strategy for the Arctic Region was to put flesh on the bones of the May 10, 2013 National Strategy for the Arctic Region, and assigns lead agencies and supporting agencies for each of 36 identified taskings. While safety is the headline, maritime security and defense issues are simultaneous "A-List" concerns. The U.S. Defense Department will lead an interagency effort to forecast icy conditions by launching a satellite and improving analytic methods to forecast icy conditions. The Department of Commerce, will lead coordination on surveying and charting of U.S. Arctic waters to ease shipping and improve adaptation to climate change in coastal communities. In addition, the State Department will seek agreement with Canada on the Beaufort Sea maritime boundary, and the Department of Homeland Security will work on developing an international code for ships operating in polar waters.

The lack of significant icebreaking capability in the U.S. has long been a lament U.S. shipbuilding and maritime communities, while the Russian Federation has a substantial fleet of polar icebreakers, carrying out regular activities in the region including regular trips to the geographic North Pole. On the other hand, the U.S. has the USCGC Polar Star, a polar icebreaker that has exceeded its intended 30-year service life, and the USCGC Healy, which is considered a medium icebreaker. While it has less icebreaking capability that Polar Star, Healy has extensive scientific research assets. The most important of the USCG taskings of the 36 to emerge from the plan is the requirement to sustain the federal capability to conduct maritime operations in ice-impacted waters of the Arctic. In order to ensure that the U.S. maintains icebreaking and ice-strengthened ship capability with sufficient capacity to project a sovereign U.S. maritime presence, support U.S. interests in the polar regionsp and facilitate research that advances the fundamental understanding of the Arctic, the Department of Homeland Security and the Coast Guard are directed to develop a document by the end of 2014 that lists the capabilities needed to complete the tasking. More importantly, by the end of 2017, they are directed to develop long-term plans to sustain federal ability to physically access the Arctic with sufficient capability to support U.S. interests. To many this can mean only one course of action: the construction of several new, powerful polar icebreakers.

Meanwhile, the International Maritime Organization (IMO), which is the United Nations specialized agency with responsibility for the safety and security of shipping and the prevention of marine pollution by ships, is developing a draft mandatory International Code of safety for ships operating in polar waters (Polar Code), to cover the full range of design, construction, equipment, operational, training, search and rescue and environmental protection matters relevant to ships operating in the inhospitable waters surrounding the two poles.

Its first session was held in January 2014 where a subcommittee on the matter agreed in principle to the draft text of the mandatory International Code for ships operating in polar waters (Polar Code) and also agreed in principle to proposed draft amendments to IMO's safety and pollution prevention treaties to make it mandatory.

The subcommittee agreed in principle to a draft new chapter XIV "Safety measures for ships operating in polar waters," of the International Convention for the Safety of Life at Sea (SOLAS), to make the Code mandatory, for forwarding to the Maritime Safety Committee (MSC), which next meets in May 2014, for consideration.

Also, proposed draft amendments to the International Convention for the Prevention of Pollution from Ships (MARPOL), to make the Polar Code mandatory under Annexes I (prevention of pollution by oil), II (noxious liquid substances), IV (sewage) and V (garbage) were also agreed, in principle, for forwarding to the Marine Environment Protection Committee (MEPC), which was to meet in early spring 2014.

The draft chapter of the Polar Code relating to training and manning will be referred to the SubCommittee on Human Element Training and Watchkeeping (HTW), which met in February 2014, for further review, while the draft chapters on fire protection/safety and life-saving appliances will be referred to the SubCommittee on Ship Systems and Equipment (SSE), which met in March. The draft chapters on Safety of navigation and Communication will be referred to the SubCommittee on Navigation, Communication and Search and Rescue (NCSR) in June/July.

Saipem

A fleet grows in Brazil

As some pre-salt plays begin production, a wide range of subsea infrastructure is being built, with O&G transportation pipeline grids being one of the vital downstream systems. Saipem has been recipient of the first major contracts to install deepwater pre-salt pipelines by national operator Petrobras. Claudio Paschoa, Maritime Reporter's correspondent in Brazil brings us an in-depth look at Saipem's vessels and projects in Brazil.

By Claudio Paschoa

(Photo Saipem)

Saipem FDS 2 with new J Lay tower at anchor.

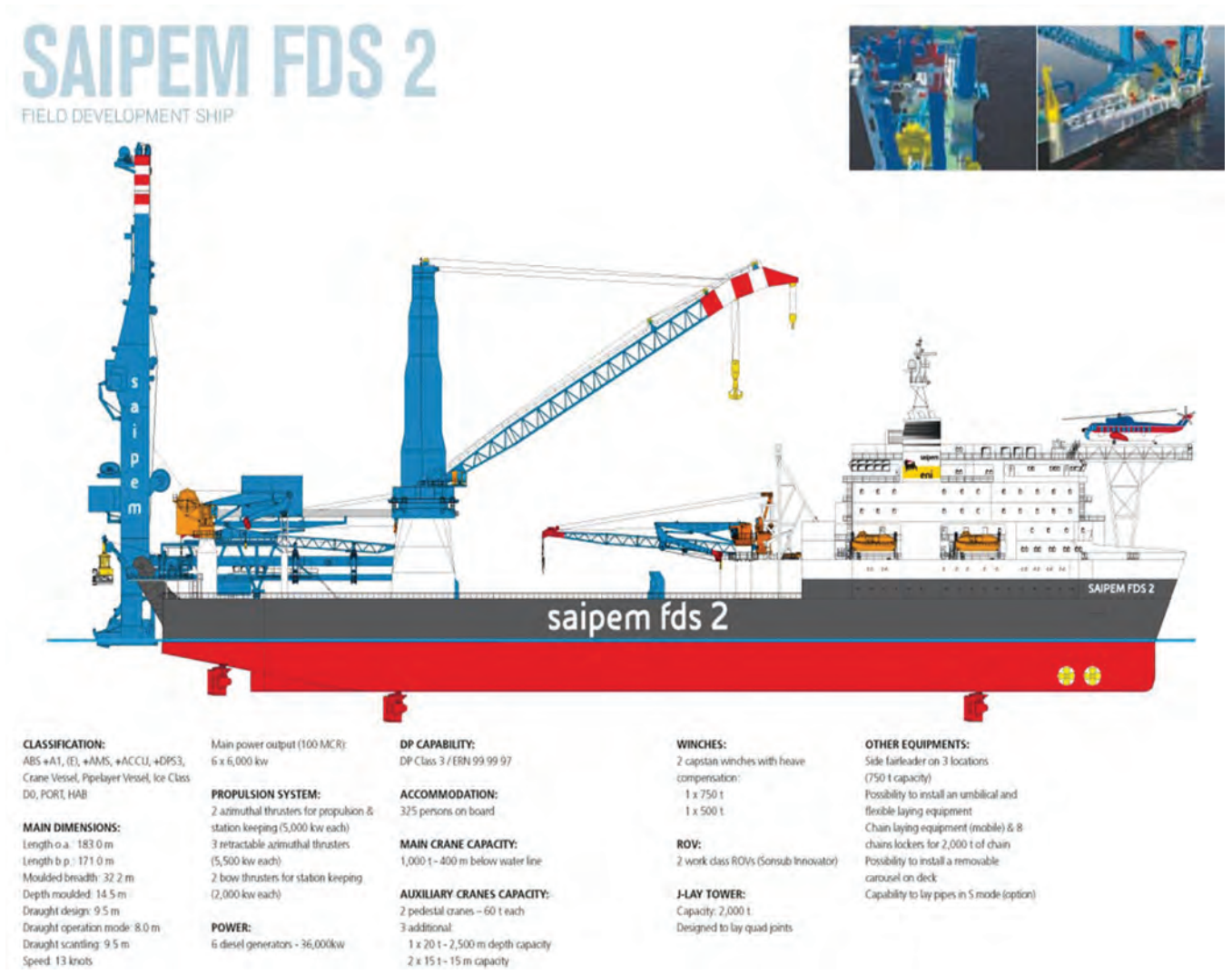
Saipem's pipelaying segment is part of a unified Business Unit Engineering & Construction, an entity with more than 30,000 employees from more than 100 nationalities, with more than 60 permanent establishments and numerous project execution centers worldwide, which has maintained yearly revenues exceeding $13 billion.

Saipem is capable of developing projects from feasibility and conceptual studies to complex integrated solutions combining design, engineering, procurement, field construction, fabrication and offshore installation and ancillary services such as revamps, upgrading, maintenance, decommissioning, reclamations and decontaminations in virtually every world market. Often this is in remote locations with harsh environmental conditions and challenging logistics, through its proven experience across significant sectors of the oil and gas industry, such as deepwater O&G transportation via offshore pipeline systems. Saipem's fleet of about 40 offshore construction vessels undertake large offshore and subsea installation tasks worldwide, performed either within major complex EPIC projects or as stand alone T&I contracts. "2014 will be a transition year in which a significant proportion of Engineering & Construction activities will stem from low-margin legacy contracts," said Saipem CEO, Umberto Vergine. In the pipe layer segment, one of Saipem's main vessels is the Saipem FDS (Field Development Ship), a special purpose vessel used in the development of deepwater fields, equipped with a dynamic positioning system, a crane with a 600 ton lifting capacity and a vertical pipelaying system capable of operating in water depths of up to 2,000 m (6,561 ft). Deep and ultra-deepwater projects can be tackled by using the J-lay technology on the almost vertical towers of the powerful FDS, FDS2 and Saipem 7000, and by the steep lay of the new company flagship MV Castorone. Saipem maintains that with the J-lay technology they have available even the depth of the Mariana Trench could be reached or exceeded, with the limit only resting in the line pipe resistance. Looking at the future, Saipem has been strengthening its fleet by completing the construction of a new state-of-the-art vessel in 2012, the MV Castorone, a deepwater pipelaying vessel for high productivity operations in extreme environments. The extraordinary growth of the world subsea market over the past decade and the rising demand for O&G plays in deep and ultra-deep waters to begin production and for the deep and ultra-deep water drilling to continue in Brazil, the Gulf of Mexico and in West Africa, has led to the development of a range of new offshore field development and support vessels, including this large new pipelay vessel, currently laying pipelines along the GoM.

Saipem has been present in Brazil since 1987, and. Saipem do Brasil, founded in 2002, has become one of the leading companies in the Oil and Gas sector in the country. According to a Petrobras Engineer directly involved in pre-salt O&G transportation projects, who asked to remain anonymous, "Saipem was chosen for these projects due to their track record in deepwater projects and their investment in state-of-the-art vessels that are perfect for our deepwater pipeline installation needs. Another major factor weighing in their favor was their willingness to build a yard in Brazil and therefore increase the level on local content in their projects." The integration of the Engineering and Projects Center, the company base located in Rio de Janeiro, with the Offshore Construction Technology Center being built in Guarujá (CTCO), and the use of modern deepwater capable vessels offered Petrobras unique advantages and features.

Saipem FDS

The Saipem FDS mobilized to offshore Brazil in late 2009. The FDS undertook the installation of the Uruguá to Mexilhao gas trunkline. Stretching more than 170 km (105 miles), this 18-inch gas export line represented Saipem's first major trunkline work in Brazil in many years. The Saipem FDS had previously been a mainstay of the West African offshore construction market. The relocation of this vessel highlights the enormous potential seen offshore Brazil. The vessel is currently working on a project connected to the P-55 production platform at the Roncador field in the Campos Basin, around 120 km (74.5 miles) off the city of Arraial do Cabo, in Rio de Janeiro. Development of the deepwater Roncador field is considered to be one of the most challenging projects from the technological and dimensional points of view, given the depth of the water, which ranges from 1,500 - 2,000 m (4,950 - 6,600 ft.), the size of the field, which is 111 sq. km (43 sq. mi.) and the characteristics of the hydrocarbons, which are located among high quality siliciclastic rock from the Cretaceous age with average porosities of 25% and average absolute permeabil-



(Photo Saipem)

Saipem CTCO location in center of photo.

ity of 800 mD. The field is divided into two great blocks separated by an expressive normal fault, with oil gravity varying from 18 - 22º API in Footwall Block and 28 - 30 ºAPI in Hanging wall Block. For development purposes the field is divided in four modules. Preparatory work began in the second half of 2010, while underwater installation operations began in the second half of 2012. Vergine said Saipem has invested heavily to make these new deals in Brazil possible. “Let’s look at Brazil. A closed market where the discovery of big offshore oil fields has created huge perspectives. To enter that market we first closed small deals and now we’re negotiating on a completely different basis.”

Since 2012, Saipem has been operating the MV Castorone, a pipelay vessel with an overall length of 330 m (1,082 ft), excluding stinger and DP 3 capable. The Castorone was classed by ABS and is also Ice classed, capable of berthing 700.

The Castorone is currently the larg-

Saipem Finances

2013 (restated in accordance with CONSOB indications)

Revenues:	€12,256 million
EBIT:	€147 million
Net profit: -	€159 million

2013 (pro-forma consistent with 2013 reporting)*

Revenues:	€12,011 million
EBIT: -	€98 million
Net profit: -	€404 million
Investments:	€908 million (€1,015 million in 2012)
Net debt:	€4,707 million (€4,278 million at 12/31/2012)
New contracts:	€10,653 million (€13,391 million in 2012)
Backlog:	€17,514** million at 12/31/13) (€19,739 million at 12/31/2012)

New contracts awarded in January and February 2014: € 800 million

Guidance for 2014

Revenues:	€12.5 to €13.6 billion
EBIT:	€600 to €750 million
Net profit:	€280 to €380 million
Investments:	approx €750 million

* Data “consistent with 2013 reporting” do not include the effects of Consob restatement.

** Excluded from backlog: €72 million for Perro Negro 6, €795 million for FPSO Firenze.

MV Castorone

(Photo Saipem)

est PLSV at sea and is officially classed as a PCV (Pipelay Crane Vessel). It was designed to transit at speeds of up to 13 knots, allowing it to reduce the down-time, usually caused by long transits. The Castorone can remotely prefabricate pipe strings 36m long and is capable of laying up to 60" pipes in S-lay mode or up to 36m pipes, with the capability of joining two 18 m pipes as an alternative to the 3 by 12 m conventional joints, in J-lay mode. With her unique J-lay tower capacity of 2,500 tons installed, Castorone can deploy pipelines and trunklines in water depth down to 3,000 m (9,842 ft.). The stinger is specifically designed for any pipe diameter and water depth through continuous control of the overbend stresses on the pipe. The MV Castorone is currently contracted for three projects at the GoM. Following completion of that work, the MV Castorone will move to the Santos Basin in Brazil and join the Saipem FDS 2 in laying Petrobras' 380 km (236 mile) Lula NE to Cabiúnas trunkline to the coast of Rio de Janeiro, in depths of up to 2,230 meters (7.316 ft.). It will be the first major trunkline connecting Brazil's offshore pre-salt plays to the coast.

The Saipem FDS 2 vessel already has an EPIC contract for the Guara & Lula-Northeast gas export pipelines in the Santos Basin approximately 260 km (161 miles) off the coast of the Rio de Janeiro, in water depths between 2,100 - 2,200 m (6,889 - 7,217 ft). The contract encompasses the transportation, installation and pre-commissioning of two export pipelines, as well as the engineering, procurement and construction of related subsea equipment: the first 18-inch line will be 54 km (33.5 miles) long and will connect the Guara's FPSO to a subsea gathering manifold in the Lula field; the second 18-inch line, will be 22 km (13.6 miles) long and will connect the Lula-Northeast FPSO to the same manifold in the Lula field. Saipem has also been awarded an EPCI contract by Petrobras for the Sapinhoá Norte and Iracema Sul Project, to be developed in the Santos Basin pre-salt, approximately 300 km (186 miles) off the coasts of the Rio de Janeiro, in this project the scope of work includes engineering, procurement, fabrication and installation of two offshore pipelines, with related terminations (PLETs) to be installed in the Sapinhoá Norte and Iracema Sul fields in water depths up to 2,200 m (7,217 ft.), along with engineering, procurement, fabrication, installation and pre-commissioning of the SLWR (Steel Lazy Wave Riser) for the collection system at the Sapinhoá Norte field, and of the FSHR (Free Standing Hybrid Risers) for the gas export systems at the Sapinhoá Norte and Cernambi fields. The work will be done by the Saipem FDS 2 vessel, in the fourth quarter of 2014. The FDS 2 is currently working off the coast of Cape Town, South Africa.

In October 2011 Saipem agreed on the acquisition of 100% of TPG (Terminal Portuário de Guarujá S.A.), a company, which fully owns, as a perpetual concession, an area of 35 hectares in Guarujá, within the industrial hub of the Santos Port, the largest port of South America, in the state of São Paulo. The area is strategically located, approximately 350 km (217 miles) from the Santos Basin, where the largest ultra-deepwater pre-salt fields have been discovered and where some plays are already being developed, and approximately 650 km (404 miles) from the Campos Basin, currently the most important Brazilian offshore oil basin, where over 80% of Brazil's oil is produced. Saipem will develop the area through the construction of a fabrication yard for subsea and floating structures and a logistics base. In the new yard, Saipem will carry out activities which are complementary to the services provided by the highly specialized ultra-deep water fleet recently built by the company.

The yard's activities will help satisfy the ambitious Brazilian local content requirements in the high-tech industry of ultra-deepwater subsea development. Saipem's new yard in Guarujá, São Paulo, currently under construction, will be used for pipe logistics and storage for the MV CastorOne, Saipem FDS and the Saipem FDS 2.

Inside Paraguay's Oil Boom

By Claudio Paschoa

The Republic of Paraguay is a landlocked country in South America bordered by Argentina to the south and southwest, Brazil to the east and northeast, and Bolivia to the northwest. The Paraguay River runs through the center of the country from north to south. Due to its central location in South America, it is sometimes referred to as the Heart of South America. Paraguay's geography consists of grassy plains and wooded hills in the east and mostly low, marshy plains to the west.

Paraguay has a population of around 6.5 million, who consume 28,000 barrels per day (bpd) of refined petroleum products. Paraguay currently imports all of its oil, as it does not yet have any domestic production. In early December 2013, the International Monetary Fund raised its forecast for Paraguay's 2013 economic growth from 10.5 to 11 %. Also according to the IMF forecast, the country had a GDP of $31.1 billion in 2013. Economy Watch has forecast $34,066 GDP for 2014, a 4.6% growth from 2013. Paraguay issued an inaugural $500 million in 10-year international bonds and Moody's has upgraded the government bond rating to Ba3 from B1, citing stable currency.

Oil exploration in Paraguay has a complex and bloody history. The Chaco region is believed to have massive oil reserves, with some estimates pointing to over 4 billion barrels in the Chaco region. The EIA (US Energy Information Administration) in 2013 forecast unproven wet-shale gas technically recoverable resources (TRR) at 75 tcf (trillion cubic feet). Because of potential for oil in the Chaco region Paraguay and Bolivia went to war in 1928 over claims to part of the region, where oil had been found. The Chaco War, which raged until 1935, resulted in 100,000 casualties and, despite winning the war, Paraguay was never able to develop the region's potential, while Bolivia went on to become a major producer. In 1944, Union Oil, from California, obtained authorization for exploration of the Paraguayan Chaco. It completed the acquisition of 4,600 km of seismic lines and drilled the first five deep exploratory wells which were pioneers in the country: Santa Rosa, Pirizal, La Paz, Oriuela and Picuiba. According to data from the Paraguayan sub-ministry of Mines and Energy from 1945 - 2013 there have been a total of 15,859 km of seismic lines and 48 exploration wells have been drilled, of which 28 wells recorded evidence of hydrocarbons. According to the same source, the last drilling in Paraguay was performed in 1997, making this new exploration effort by President Energy, the first exploration of its kind to be done in the region in over 25 years.

The Paraguayan Government is giving new emphasis to unconventional resources, along with conventional oil in the Chaco and by the end of 2013 there were eight concessions granted (including the Pirity and Dematteі prospects) with five further concessions under negotiation and 10 prospecting permits and contracts being processed. Using the latest technology in 2D and 3D seismic the companies involved in the exploration have been able to pinpoint the oil reservoir with greater accuracy and certainty. A MOU (Memorandum of Understanding) between President Energy and Global Geophysical is in place, providing state of the art seismic acquisition, processing and interpretation services, on a risk-sharing basis. President Energy, Pirity Hidrocaburos and Crescent Global Oil have confirmed that they will start drilling three wells in March 2014.

President Energy holds a 59% interest in Pirity and a 60% interest in Dematteі, following the seismic and drilling programs in the concessions. The Pirity and Dematteі concessions total 16,000 sq. km and are located in the Pirity Sub-Basin in NW Paraguay. The Pirity Sub Basin is an extension of a proven petroleum system in the Olmedo Sub Basin on the Argentine side of the border, which has produced in excess of 150 million barrels of oil equivalent to date. There is proven source rock, multiple structures, and production (the Palmar Largo field in Argentina, 20 km to the west has produced 44 million barrels to date, and Gran Tierra have recently discovered an extension to the field, with the well Proa X2 initially flowing over 6,000 bpd). President Energy's Farm-in provides sole operatorship and control over an almost entire Cretaceous rift basin of 16,000 km², with a proven petroleum system, which has been inaccessible for 25 years.

In December 2012, Degolyer and MacNaughton, the international reserve and resources auditors, completed an independent evaluation of President Energy's concessions in Paraguay. The estimated mean gross prospective recoverable oil resources assessed by D&M adjusted for probability of geologic success were of 159 million barrels, supporting President's internal estimates made at the time of the farm-in to the relevant concessions in Paraguay.

A second CPR (Competent Person's Report), which was released in late 2013, following results from the 3D seismic program, significantly increased the forecast of reserves in the Chaco. President Energy acquired over 1,000 sq. km of 2D seismic on its two 16,000 sq. km concessions in the Pirity Rift basin of the Paraguayan Chaco to add to 793 km² of 3D seismic acquired earlier in 2013. This is 300 km more 2D data than previously indicated and early processing and interpretation of the results were very positive and show the possibility for a significant expansion of the basin estimate of 159 millions of barrels of oil published in last year's competent person's report.

"At least two major structural play fairways have now been identified and although early in the interpretation phase, management believes a total resource potential of greater than 500 million barrels oil risked could be a realistic possibility," said the second CPR. President Energy has signed an 18-month contract with Schlumberger covering project management and integrated drilling and completion for the drilling program, as it increases the tempo of its activities in Paraguay ahead of the spudding of its first well next year. Peter Levine, chairman of President Energy, added that Schlumberger had been involved with the project from the earliest stages of basin study and its involvement in the operational phase was a significant vote of confidence for the project. "This contract marks an acceleration in activity as we remain on course for the spudding of our first well in 2014," said Levine. "Negotiations are also in an advanced stage with drilling rig contractors, with long lead items to be ordered imminently." In September 2013, President Energy received confirmation of a $20.42 million investment from the World Bank's International Finance Corporation (IFC).

As a result of the first investment it will have a 12.2% stake in President Energy and the right to appoint a director to the board. It has indicated an interest in financing the development of any commercial oil discoveries.

A success could prove 'company making', especially as the government has already expressed an interest in buying oil at the well- head, which could potentially make field development cheaper and expeditious. President Energy shares were in demand after an independent audit revealed another three Paraguay prospects targeted for drilling this year are bigger than the company previously thought. Consultant RPS estimates they contain a gross mean, unrisked prospective resources of just under 1.1bn barrels of oil equivalent.

That's just over 647 million barrels net to President Energy. Aside from the three drill prospects there are a 20 more leads and prospects that have yet to be evaluated. "This is exploration. We haven't found anything yet," Levine cautioned. The largest of the three prospects, Jacaranda, really demonstrates the company has a tiger by the tail, it straddles the Pirity and Dematteі concessions and is estimated to be contain a net 370 million barrels unrisked. Drilling is expected to get underway in May, testing multiple, or stacked, targets.

The other two prospects are Jurumi and Yacare. "It is of material size in a country that has no oil, with hydrocarbon demand and no material issues with transportation. It is very encouraging," said Levine. President Energy shares, which have advanced 148% in the last six months, were up a further 7% on January 24th.

(Photo President Energy)

Left: Peter Levine - Chairman of President Energy in Paraguay. Right: President Energy Drilling at Puerto Guardian in Argentina and near the Paraguay border.

(Photo: Jan Berghuis)

Offshore

Offshore exploration is a history of man v. nature with ever bigger technology and investment

1806
Spring pole cable drilling developed in US.

1869
Thomas Fitch Rowland patents a "submarine drilling apparatus," a fixed, working platform for drilling offshore to a depth of almost 50 feet. The anchored tower had telescoping legs, similar to modern offshore platforms.

1891
First ocean-going tanker launched.

1914
President Woodrow Wilson opens the Houston Ship Channel for ocean-going vessels.

By Patricia Keefe

"Prospecting for oil is a dynamic art. The greatest single element in all prospecting, past, present and future, is the man willing to take a chance," said Petroleum geologist Everett DeGolyer, 'the father of American geophysics.'

From a lake in Ohio, to piers off the California coast in the early 1900s, to the salt marshes of Louisiana in the 1930s, to the first "out-of-sight- of-land" tower in 1947 in the Gulf of Mexico, the modern offshore petroleum industry has inched its way over the last roughly 75 years from 100 ft. of water ever farther into the briny deep, where the biggest platform today, Shell's Perdido spar, sits in 8,000 ft. of water.

As a planet, we have two unquenchable thirsts – for water and for oil. Everybody knows oil and water don't mix. Not so obvious is the fact that whether via oily swamps, gassy lakes or blubber-laden whales, the link between oil and water is historical and undeniable. And today, more than ever, to get to more of one, we're going to have to go deep down into more of another. To get there, it's going to require the same "can-do," pioneering spirit that grew the industry into the geopolitical force it is today, along with much more – more billions of dollars, more revolutionary technology, more layers of safety, more collaboration and more upsizing of every piece of equipment and vessel involved.

Black Gold

Long before the first well was ever struck on land, the value of oil, and it's location near and under water (typically in marshy or swampy areas) was noted and utilized. For example, bitumen, the sticky oily tar that leaches up into the ground, was put to use by fishermen 6,000 years ago to seal their boats, an innovation that became a standard waterproofing method practiced throughout the history of wooden vessels, and which gave sailors the nickname of "tars."

As uses for oil expanded down through the centuries, so did the process of refinement, culminating in the mid-1800s, when the first two oil refineries for making kerosene were launched. One in 1851 in near Edinburgh to distill oil from early shale fields mined in Scotland, and another in 1856 when a scientist figured out how to manufacture kerosene on a large scale and launched a crude oil refinery in Ulaszowice, Poland. Kerosene soon overtook whale oil as the fuel of choice for lamps, and the rising need to keep those lamps filled lit a fire under the hunt for fuel.

Wildcatters and the early beginnings of some of today's mightiest oil companies were already drilling for oil on land in the second half of the 1800s. The world's first oil well is generally credited to Baku (Azerbaijan) on the Caspian Sea. First opened in 1847, by the 1860s it was producing most of the world's oil, and continues to produce oil today. A little more than a decade later, the Seneca Oil Co. struck black gold in Titusville, Pa., the first well in the U.S. A year earlier, Canadian James Williams beat Seneca to the punch, digging the first well in North America in oil-rich swamps in Ontario. But the wild speculating for oil and gas took on new dimensions once mass production unleashed the automobile and its attendant service stations across America in the first quarter of the 1900s.

The Move from Land

From the swamps, oil men followed the black gold, venturing out off piers into lakes, first in Ohio, in the 1890s, where wells were built on piles in Grand Lake, St. Mary's, and then in 1897 and beyond off piers on the California coast, as far out as 35 ft. in Summerland, near Santa Barbara, where production peaked in 1902 at 75 barrels a day. In 1932, the Indian Oil Co. placed what is possibly the first stand-alone platform in shallow waters off Rincon, Calif.

Still, the southeast – Texas and Louisiana specifically – is generally considered to be the place where offshore drilling first began to percolate. The nascent industry first dipped its toe in lake waters when Gulf Oil Corp. bought drilling rights to what it hoped was a large oil and gas field under Caddo Lake, which straddles Texas and Louisiana. In 1910, using a floating pile driver, the company built a series of wooden platforms on pilings spaced out in the lake, each topped by a derrick and a generator. The platforms were connected to each other by pipelines so that some pumped fuel, directing it to other platforms for collection.

"Over the next four decades, Gulf drilled 278 wells and produced 13 million barrels of oil from under Lake Caddo, creating in the process a commercially successful prototype for water-based operations, the platform on piles," according to "*Deepwater Petroleum Exploration & Production: A Nontechnical Guide,*" by William L. Leffler, Richard Pattarozzi and Gordon Sterling.

In 1938, in a joint venture, Pure Oil Co. and Superior Oil Co. built a 320-by 180 ft. free-standing, wooden drilling platform using steel strapping and redundant piling in deference to hurricane winds, near Creole, La. Located a mile offshore, the platform stood 15 ft. above the waterline in just 14 ft. of water in the gently sloping Gulf of Mexico. Shrimp boats were drafted to tow barges, haul supplies and equipment and to ferry the crews. The 33,000-acre lease eventually yielded close to 4 million barrels of oil.

Swamps, lakes and a few piddling feet offshore aside, the formal birth of the offshore industry is generally said to be the Kermac 16, universally recognized as the first "out-of-sight-of land" well, built 10 miles offshore by Brown & Root for Kerr-McGee, Phillips Petroleum and Stanolind Oil & Gas in 1947. The site, which was located on a salt dome and

1921
Erle P. Halliburton patents a "Method and Means for Cementing Oil Wells," a design that isolates the various down-hole zones, guards against collapse of the casing and permits control of the well throughout its producing life.

1924
First platform erected on Venezuela's Lake Maracaibo.

1928
Patent to Louis Giliasso for submersible barge drilling unit, launching the era of mobile drilling.

1937
First offshore oil platform in 14 feet of water one mile off the Louisiana shore (Creole – Superior/Pure).

The formal birth of the offshore industry is generally said to be the Kermac 16, universally recognized as the first "out-of-sight-of land" well, built 10 miles offshore by Brown & Root for Kerr-McGee, Phillips Petroleum and Stanolind Oil & Gas, in 1947.

As the hunt for energy offshore continued to flourish and grow, Maritime Reporter was there too, covering **LeTourneau's $2m "Portable Island"** in the February 1, 1956 edition.

stood in about 20 ft. of water, was touted by the *Oil & Gas Journal* at the time as a "Spectacular Gulf of Mexico Discovery. Possible 100-Million Barrel Field." Indeed, Kermac 16 eventually produced 1.4 million barrels of oil and 307 million cubic feet of natural gas by 1984. Not bad for a $450,000 investment.

Following a brief lull in the early '50s while the states and the federal government hashed out offshore ownership boundaries, Gulf activity started to heat up considerably mid-decade, and the industry hasn't looked back since.

It was a gradual creep – foot by hard-won foot – out into the Gulf, according to University of Houston Professor, offshore historian and author Joseph A. Pratt.

Interest in prospecting for energy offshore was also gaining steam outside of North America. In the mid-1920s, wooden structures were placed in Lake Maracaibo in Venezuela, but were laid to waste by worms in less than a year. A government project to build a seawall on the lake lead to experimentation with cement pilings, which were eventually married to steel heads and connected together with steel cable for stability and integrity. By the 1950s, wells on the lake had progressed to hollow, cylindrical cement piles supporting 900-ft platforms.

In 1960s came a series of big discoveries of oil and gas deposits out into the rougher, but still relatively shallow North Sea, primarily in British and Norwegian waters. According to U.K. energy analyst Jeremy Cresswell, one of the most important findings almost didn't happen.

The Ekofisk field was discovered in 1969 by Phillips Petroleum Co., and remains strategic for the Norwegians. But Phillips, facing bad weather and unsuccessful drills, "only drilled the well because they had bought the rig time – there was still time on the clock," marveled Cresswell. Other participants in the North Sea are Germany, Denmark, France and the Netherlands. Beyond the Gulf of Mexico and the North Sea, the most productive offshore drilling areas today include coastal areas off Brazil and West Africa, the Southeast Asian seas and the Arabian Gulf.

What stands out about the early pioneers of offshore, according to petroleum historians like Pratt and F. Jay Schempf, author of "Pioneering Offshore: The Early Years," is the upbeat, optimistic spirit of this tough, ambitious group. In the early days, no one really knew what they doing in the water, except that onshore drilling tools and techniques did not necessarily translate to offshore. Pratt, who is involved in the Offshore Hall of Fame oral history project, quotes one participant as saying, "We were less afraid of failure then." Problems arose; they were tackled and solved. Most pressed on, perhaps in keeping with the adage, "Omnia bona quoad perfora," which essentially means "All prospects look good until drilled," – a motto used decades later by future Kerr-McGee parent Anadarko Petroleum in 1994 as it drilled in the Gulf of Mexico.

In the early offshore years, prospectors had little more than hunches to go on when deciding where to drill. "These guys were brash and arrogant," said Robert Gramling, emeritus professor of sociology at the University of Houston and the author of several books on offshore drilling. Former President George H.W. Bush, who was a partner in an early offshore company, Zapata, which specialized in jack ups, has been quoted summing up the infancy of offshore drilling as "Low technology, huge risks."

Risk Meets Technology

The risk has never gone away, but gradually technological advancements came along that were so impactful, they transformed the industry many times over, bringing it to the point today where it's not a stretch to say that the petroleum industry deploys close to space-age level technology in its bid to go deeper, colder and safer, where no drill, platform or ROV has gone before.

What really opened up offshore drilling initially, was the advent of mobile

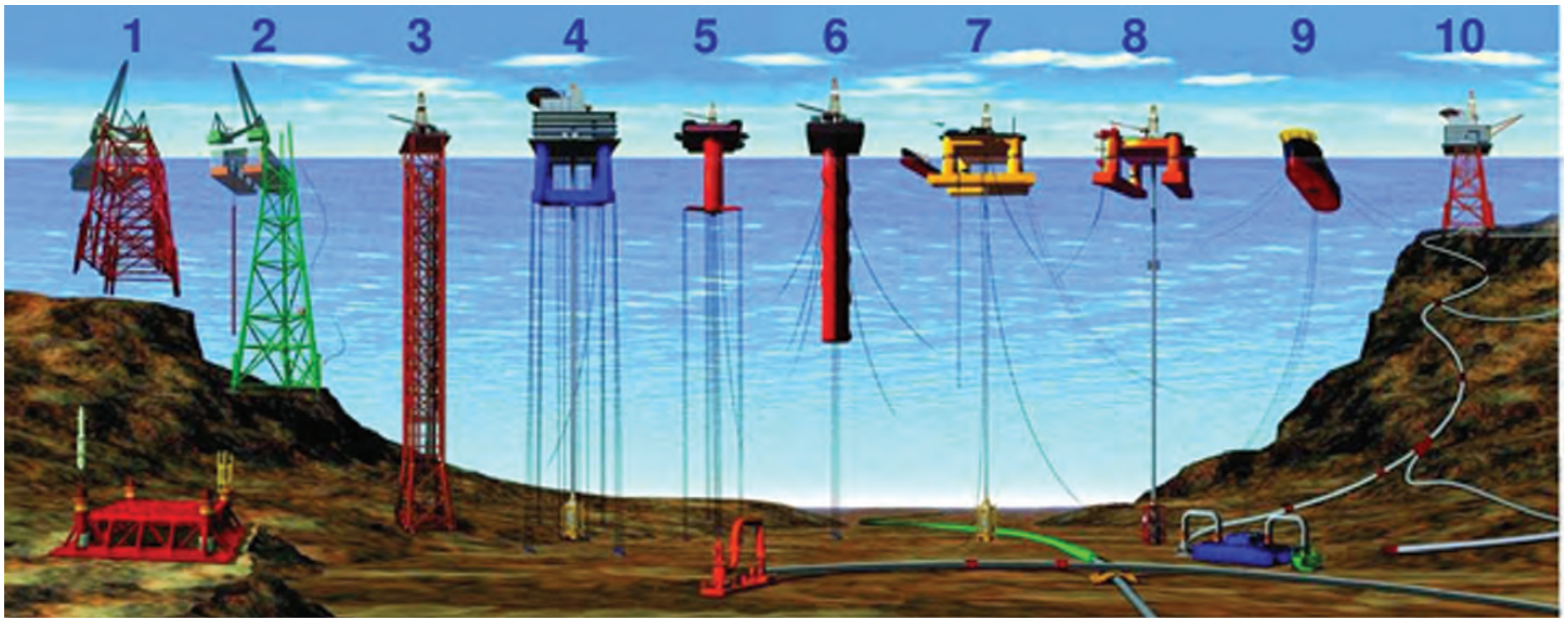
1945
First offshore U.S. lease sale.

1947
The Kermac 16 is credited as the first oil rig located "out-of –sight- of-land," and is located oil 10 miles off the Louisiana coast in 18 feet of water. Built by Brown & Root Company for Kerr-McGee for only $230,000, the "Kermac 16" goes onto produce 1.4 million barrels of oil and 307 million cubic feet of natural gas before being shut down in 1984.

1953
Congress passes the Outer Continental Shelf Lands and the Submerged Lands acts.

1954
Brazil's Petrobras begins offshore exploration.

First jackup drilling unit deployed.



Types of offshore oil and gas structures

Larger lake- and sea-based offshore platforms and drilling rigs are some of the largest moveable man-made structures in the world. There are several types of oil platforms and rigs: 1, 2) conventional fixed platforms; 3) compliant tower; 4, 5) vertically moored tension leg and mini-tension leg platform; 6) Spar; 7,8) Semi-submersibles; 9) Floating production, storage, and offloading facility; 10) sub-sea completion and tie-back to host facility.

Credit: Office of Ocean Exploration and Research, National Oceanic and Atmospheric Administration (NOAA)

drilling technology by the Texas (Texaco) Co. While the South Americans were testing concrete piles, Texas Co. in the early 1930s had the idea of using a moveable, submersible barge as a drilling platform, a boon in the days when drilling was more apt than not to come up dry, and the building and abandoning of multiple wells could quickly bleed investors dry. Dubbed the Giliasso, Texaco Co.'s mobile rig initially plied its trade in Lake Pelto, La., and cut the time between drilling new wells from 17 days to 2.

In 1946, Kerr-McGee advanced the idea of mobility by converting an old naval barge into a towable, drilling tender, with conceived a way to bring portability to offshore drilling by converting a 327-ft surplus naval materials barge into a towable drilling "tender" that, in conjunction with a small fixed platform, could drill wells relatively quickly. The tender also housed a crew and galley, setting the stage for manned, 24-hour operations that continue to this day.

Stability and depth were other issues addressed by a steady advancement in fixed and mobile platform types and size that helped to drive the march out into the sea (see image above) from shallow and calm, to deeper and more turbulent waters. Mobile drilling platforms evolved from fixed wood or concrete platforms placed on piles driven into the seafloor out to 1,500 ft., to "jack-ups," which while similar to a drilling barge, has legs that are lowered down to the ocean bottom, lifting the platform out of the water, but which can only be used in moderate depths. Somewhat similar are "submersible" rigs, which are elevated on stilts above barges that

1955
Platform installation depth reaches 100 ft.

1956
First drill ship launched.

1959
The world's first liquefied natural gas tanker –the Methane Pioneer –arrives at the world's first LNG terminal at Canvey Island, England. The converted WWII Liberty ship featured 5 7,000-barrel aluminum tanks.

1962
The first semi-submersible drilling vessel, Blue Water 1; first subsea well completion; and fixed platform depth reaches 200 ft

Gracing the cover of the June 1, 1957 edition was a **"Huge Oil Drilling Barge"** the Margaret which was one of the largest ever built at 300 ft. long, 200 ft. wide and 93 ft. high, capable of an operating depth of 65 ft. Margaret was built by Alabama Dry Dock & Shipbuilding Company for the Ocean Drilling and Exploration Company, New Orleans.

are flooded until they sink to the floor as an anchor, pushing the platform out of the sea. The "semisubmersible" rig improved upon the submersible via its ability to anchor a platform in deeper, rougher water. BP's ill-fated Deepwater Horizon well was a semisubmersible.

More recent is the emergence of drilling ships. Dynamic positioning is used to talk to the sensors on the template and communicate with thrusters on the underside of the ship to keep the vessel stabilized and anchored in position. The farther out to sea, the bigger the vessels. Currently scheduled for launch in June, the Chinese-built Dalian Developer will be the world's largest ultra-deep water drillship rated to a water depth of 10,000 ft. and capable of drilling to 35,000 ft. It reportedly will store 1 million barrels of crude.

Production platforms have also evolved to enable the push into ever deeper waters. After "fixed" platforms that rival skyscrapers in height and are kept in place by their sheer weight, "compliant towers'' kicked the early design up a few notches and finto deeper waters, from 1,500 to 3,000 ft. Similar in construction and height, they are narrower and built to "comply" or sway with the elements, making them more resistant to damage from wind, water and weather, major threats in the hurricane-prone gulf. Sea Star platforms are deployable from 500 to 3,500 ft., and are essentially a sturdier version of a semisubmersible that uses rigid tension legs instead of anchors to hold the platform in place.

To get beyond 3,500 ft. requires any of the following: a floating production and offloading facility (1,500 to 6,000 ft.), vertically moored Tension- and min-Tension leg platforms (1,500 to 7,000 feet) or a spar platform, (2,000 to 10,000 feett). Oil companies and governments want to get beyond not just 3,500 ft., but even the current depth stop of 8,000 ft. In 2007 alone, about 37% of annual oil production was credited to offshore production, and about 26%, or 41 billion tons, of the then perceived conventional oil reserves lay offshore in ultra-deep (3,500+ ft) waters, including up-and-coming anticipated well fields off India, in the South China Sea, the Caspian Sea off Kazakhstan and even the Arctic and Antarctica.

A FPS, which can be a floating semisubmersible or a drillship, places much of the production equipment on the ocean bed, pumping oil or gas into storage facilities on the platform, using dynamic positioning to stay in place.

Tension leg platforms are bigger versions of sea stars that have tension legs stretching to the ocean floor. It is more susceptible to horizontal and some vertical motion, but can store oil temporarily and permits drilling to almost 7,000 ft.

Subsea systems take the floor-mounted wellhead to significantly deeper depths, 7,000 ft and beyond. Once extracted, oil and gas are pumped into production facilities via pipelines or risers.

But to go really deep, the limit today is the SPAR platform, which can drill to a depth of 10,000 ft, and temporarily store oil. It consists of a hollow, tubular hull, the bottom of which drops 700 ft. into the ocean waters. A combination of the system's weight and a network of cables and lines hanging from the cylinder stabilize the platform and keep it in place. The mooring line scan be manipulated to move the spar from one well to the next.

Going Deeper

The deepest wells drilled to date are both dual oil and gas and are located in the Gulf of Mexico. The most remote and deepest is Shell's spar Perdido, which was deployed in 2010, stands 9,600 ft., and sits in just under 8,000 ft. of water 220 miles off the Texas coast. Perdido functions as a common processing and exporting hub supporting a 30-mile radius of wells.

Second in depth is the physically bigger Atlantis complex, located 190 miles south of New Orleans, covering an area with water depths ranging from almost 4,500 to just over 7,000 ft. of water. It started producing oil in late 2007.

Shell hopes to take drilling to the next

1965
First fixed platform in North Sea; patent awarded for an "underwater manipulator with suction support device" (an early ROV device).

1969
An oil platform six miles off the Santa Barbara, Calif. coast suffers a blowout, creating an 800-square mile oil slick. The incident is credited with triggering the launch of the environmental movement. Separately, Britain discovers major oil and gas fields in the North Sea and The U. S. government nets $900,220,590 in bids for Alaskan oil leases.

1972
U.S. oil production allegedly peaks.

1978
Shell Oil Co.'s Cognac production platform becomes the first to sit in 1,000 feet of water

depth level in 2016, when it plans to deploy a floating production, storage and offloading (FPSO) vessel to tap into subsea facilities 9,500 ft. below, in its ultra-deep Stones field, located in the Gulf's largely uncharted lower tertiary region.

To go deeper will require more than a new generation of platforms and systems to anchor and stabilize it. Ultra deep water exploration comes with particularly harsh conditions requiring what Shell calls "feats of engineering"– extreme temperature differences between the frigid waters of the deep and the boiling oil being extracted, wild weather, uneven ocean beds, rough seas and currents and intense pressure capable of cracking drill casings and in all likelihood some ROVs.

As the the depths get larger, the risks do too, and the probability of accidents is exponentially higher here than in more hospitable and shallow seas. Along with technological advancements to surmount these issues will come even more layers of environmental and safety requirements in an industry that is already hidebound in regulation.

Enabling Technologies

"First look at the size of the prize and then the risk involved - geology first, economics second" R.E.Mcgill

Seismology and geology have always been the divining rod of petroleum prospecting, onshore and off. At one time, oil companies employed armies of so-degreed workers, taking surveys and deciphering and analyzing acres of the resulting data. Then came desktop computing, with its enormous databases and software capable of crunching all that data and spitting out heavily detailed maps in a fraction of the time at a fraction of the cost, followed by 2D and 3D seismology. The technology shrank seismology and geology departments at oil companies as third parties sprang up and mapped, offering off-the-shelf maps galore at affordable prices.

More recently, in 2011, Shell and Hewlett-Packard Co. announced a breakthrough in the capability of its jointly developed inertial sensing technology to shoot and record seismic data at much higher sensitivity and at ultra-low frequencies down to 10 nano-g per square root Hertz (ng/rtHz), which is equal to the noise created by the earth's ocean waves at the quietest locations on earth as defined by the Peterson Low Noise Model. The wireless seismic system sits onshore and "talks" to seismic sensor networks in order to provide a more clear picture of the earth's subsurface.

Advances in drilling equipment, processes and techniques have also helped to pave the way down. Among the earliest innovations were the use of drilling mud to lubricate the process and to also extract drilled debris, ever increasing layers and strengths of casings, cement liners, diamond-tipped drill bits and very key, the ability to drill directionally. Directional or vertical drilling enables companies to explore not just straight down, but to look for pockets in the areas around a well. It saves time and money by eliminating the need to sink and man new wells.

Satellite communications, dynamic positioning and remotely operated vehicles (ROVs) have also done their bit to surmount the unreachable and the inhospitable, enabling isolated platforms to be monitored from ship, shore and space, and enabling research, maintenance and production work to take place beyond the endurance of human divers. For instance, advanced ROV technology figured prominently in Shell's Perdido project, which needed to find a way to get oil extracted by the most remote and deepest situated well on the planet back to shore. The solution was to build a connection to existing pipelines 4,500 feet down and 80 miles away, a tricky endeavor even under the best conditions. Shell tackled the job with several 300hp ROVs capable of diving to 10,000 feet and equipped with articulated arms able to turn valves, program control panels, make cuts, install pumps and other systems.

1979
Pemex's Ixtoc I exploratory oil well blowout in the Gulf of Mexico 600 miles south of Texas, spills 40 million gallons.

1979
Fixed platform depth exceeds 1,000 ft.

1981
First offshore horizontal well drilled; first Congressional Outer Continental Shelf leasing moratorium

1985-1991
Offshore bottoms out. Exploration stopped, projects were canceled as crude oil prices dropped steadily. The industry comes to a standstill as oil price falls below $10 per barrel.

1988-
A series of explosions and fires destroys the Piper Alpha North Sea Oil drilling platform, killing 16

1991
Largest Oil Spill in history - 500 million gallons – occurs as retreating Iraqi troops vandalize oil facilities, pouring oil into the Persian Gulf. Separately, Brazilian well is sited in 2,360 ft deep water; and supercomputer workstation processes 3D seismic model.

1993
Petrobras layaway subsea tree placed in 6,000 ft of water.

1994
First production comes in from Shell's Auger tension-leg platform in 2,860 feet of water

1995
Deepwater Royalty Relief Act; Conoco installs first concrete-hull tension leg platform in the North Sea; and Pres. Clinton blocks a $1 billion contract between Conoco and Iran to develop a huge offshore oil tract in the Persian Gulf.

Shell Perdido in the Gulf of Mexico in 2010.
Perdido, an oil and gas spar production facility, is the world's deepest oil development and the deepest drilling and production platform and will produce from the deepest subsea well.

Over the decades, the fortunes of offshore oil and its financiers have risen and fallen on the restraints of conservation, the agitation of environmentalism, the scrum of politics and the winds of war. Throw in leasing, royalty and taxes, along with the ups and downs of the worldwide and national economies, and it's been anything but steady ride for the industry.

The People Factor

One of the lingering offshoots of the down years, particularly the period in between the mid-'80s and '90s, is the shortage of experienced personnel. The oil companies went through periods where they slashed headcounts whenever things got tight, and in one point, even stopped hiring. As it looks baby boomer retirements square in the eye, the industry is seeing the payout for what some might call short-sighted hiring practices. Sure, some boomers can be enticed to stay on, and work can be done with universities and vocational schools to direct more graduates into entry-level positions, but there's a whole tier of mid-level experienced people who should be ready to move into the boomer jobs, that just aren't there right now, says Tyler Priest, an associate professor of history and geography at the University of Iowa and a member of the presidential commission on the Deepwater Horizon spill. Consequently, there's hardly an industry conference or seminar today that doesn't bemoan the labor shortage and brainstorm about how to address it.

Another issue is the impact of geopolitics. Decisions made today are as much about ease of access, cooperation and taxation, as they are about the probable number of barrels and projected

2004
Na Kika will become the deepest Gulf of Mexico production at 7,600 ft water depth.

2008
The record peak of $145 per barrel in July.

2008
A Nigerian militant group attacks Shell's main offshore oilfield and briefly kidnaps a U.S. oil worker. The attack shut down a tenth of the country's oil output in a rare attack on a deepwater facility.

lifespan of a particular field or basin. Oil companies have learned painful lessons about dealing with unstable and impetuous governments, said Cresswell.

Hence when looking at probable untapped oil and gas reserves today, it's not hard to figure out which areas are likely to be drilled first. "The major obstacle to the development of new supplies is not geology, but what happens above ground: international affairs, politics, investment and technology," said Dr. Daniel Yergin, Vice Chairman of IHS and founder of Cambridge Energy Research Associates, as well as the author of books about the oil industry, including, "*The Prize: The Epic Quest for Oil, Money & Power.*"

Location is something, but money is everything, according to numerous speakers at this year's 2014 CERAWeek conference. Yes, the oil and gas industry contains some of the most profitable and well capitalized companies in the world, but the cost of building deep water platforms, never mind supplying all the rest of the equipment and vessels and hauling everything out to essentially the middle of nowhere – sometimes in hostile seas – is as close to prohibitively expensive as oil companies can get. And more than ever, they want to hew to budget, and will hold off on a project in order to make their numbers.

Moreover it can take up to 20 years and billions of dollars to develop a project to the point where it starts producing, and U.S. demand for oil is down. It's expected then that offshore oil will lose some projects to gas. Jim McCaul of IMA told attendees at the 2013 Emerging FPSO Forum conference that shale oil and gas are a threat to deep water because they could drag investment away.

Ditto LNG. Plentiful resources of both could turn the U.S into a major exporter, while moving the country closer to energy independence say many observers. Already, the abundance of cheap gas is said to be sparking a renaissance in manufacturing on American shores. And, adds McCaul, plans to build onshore facilities to handle imported gas are being scrapped in favor of readying the market for export to the rest of the world.

There are significant shale deposits the world over, notes John Westwood, chairman of Douglas-Westwood, but only North America seems to be serious about it. That could be in part because the Green River Formation shale deposit that stretches across parts of Colorado, Wyoming and Utah, is said to be the largest shale reserve in the world.

LNG is attracting a lot of attention, and a lot of investment. Shell, once again, is at the forefront here, with plans to launch Prelude, one of four super-sized Floating Liquid Natural Gas (FLNG) production facilities currently under construction around the world.

Prelude will be 488m long and 74m wide; fully loaded it will weigh about 600,000 tons. Once towed in 2017 to its destination off the coast of Western Australia, it will be moored in 250m deep water, where it will stay for the next 25 years, designed to produce 3.6 million tons of LNG a year as well as LPG and condensate for export. After processing the gas, it will be offloaded to other vessels for export.

Prelude will be the first of its kind, and is designed to help develop "stranded" gas reserves at a lower capital cost. There's a lot of untapped gas in the deep, in part because gas is tricky to transport and store. FLNGs are the solution, and just in time too. World demand for gas is soaring while consumption of oil have been flat to dropping.

Even so, environmental, geographical and monetary constraints involved aside, more of the world needs even more oil and gas, in every form possible, from anywhere probable, and demand is only going to rise. Offshore production of oil and gas, which the International Energy Association (IEA) says accounts for just 6% of world's energy mix, has obviously never surpassed onshore output, but then it's a lot harder to find, develop and extract.

Still, the IEA is predicting an increase in deep water production from 4.8 billion barrels of oil equivalent (boe) a day in 2011 to 8.7 million boe by 2035. Moreover, the agency estimates that there are more than 300 billion boe beneath the ocean, which it says comprises at least 10% of the word's remaining recoverable conventional oil and gas, resources we have barely begun to tap.

With recent history of technological development in the offshore energy sector as a guide, it can be assumed that with considerably more black gold out there, the industry will gear up to go get it.

Shell's Prelude FLNG, scheduled to enter service in 2017, will be the world's largest ship ever built.

2010

Arrival of BP's Deepwater Horizon at Macondo well in January; well blowout occurs on April 10, killing 11 workers, and triggering a spill that takes three months to cap. The largest environmental disaster ever in the U.S. and the Gulf of Mexico, the BP disaster triggers a moratorium on drilling in U.S. waters and gives rise to a new era of safety regulation and oversight. In reaction, the U.S. orders oil and gas firms to permanently plug nearly 3,500 unused wells and dismantle hundreds of idle platforms in the Gulf of Mexico, in a bid to shore up industry safety.

C-MAR DP Training in Brazil

The modern offshore maritime industry heavily relies on different classes of DP vessels, from OSVs to Drillships and Tankers, almost all vessels serving the oil and gas industry need to be DP capable in order to safely operate offshore. The massive growth experienced in Brazil due to the uncorking of huge deepwater pre-salt plays has caused a steady demand for new ships, rigs and vessels, maritime officers and DP operators in the country. Maritime Reporter's correspondent in Brazil talks to Mauricio Santos, C-MAR Country Manager, about the reality of DP training in Brazil.

By Claudio Paschoa

C-MAR is a global provider of manpower, engineering and support services to the maritime and offshore sectors. The C-MAR Group owns and operates DP training centers in London, Croatia, Mumbai, Singapore and Brazil, offering basic and advanced courses for DP operators in accordance with the curriculum set by the Nautical Institute (NI) as well as tailored courses for shore based personnel involved in dynamic positioning. C-MAR also provides DP Maintenance Courses at some of its global facilities.

As a provider of NI accredited courses, C-MAR offers high standards of DP training and technical services to the offshore and maritime industries. C-MAR's DP training center in downtown Rio de Janeiro offers state-of-the-art Converteam and Kongsberg DP simulators for its students, which hail from all over Brazil and South America.

All courses provide practical and real experiences based on the extensive, combined knowledge and expertise from C-MAR's experienced instructors.

All DPC instructors have over five years' experience in the operation of DP vessels, covering dive support, IMR, anchor handling, platform supply and drilling operations vessels.

C-MAR DP Centers also provide technical services to the marine industry in the form of consultancy for the design and operation of DP vessels, Failure Mode Effect Analysis and Audits to IMCA guidelines.

Santos hosted a tour of the training center and explained how the training scheme is organized.

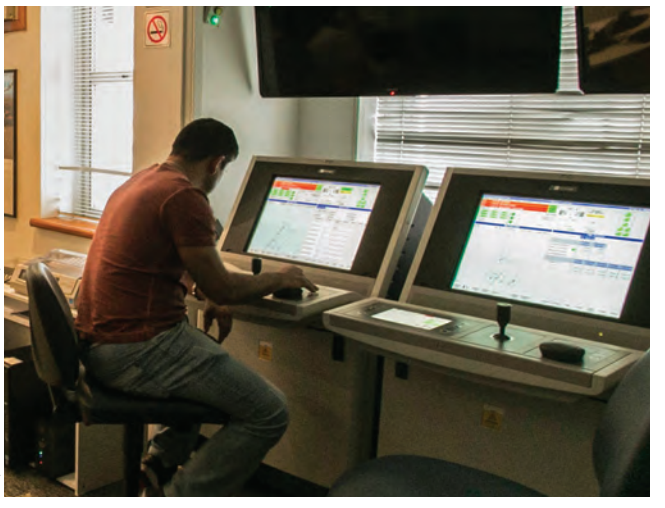
"The Basic course last four days and is introductory level, covering the basics of all areas of DP including; DP Systems Architecture, Basic Principles of DP, Operational Procedures, Power Management System, Rules and Regulations, Position Reference Systems and Risk Considerations through different forms of media, such as text, images, animations, video and audio.

Upon completion of the course our students are apt to start simulator exercises in one of our DP's simulators, students are required to complete 30 days of seagoing familiarization after the Basic course," said Santos.

Students at C-MAR's training center in Rio come from all over Brazil and other countries South American countries belonging to Mercosul (Free trade agreement between some South American countries). "The Advanced course also lasts four days and is composed of Practical Exercises, Planning Exercises, Risk Analysis, Use of Field Charts, DP Checklists, Watch keeping, Identification and Responses to Various Failures, Use of Status Lights, Evaluating Alarms and Messages, and Communications. The extensive simulator training in the Advanced course is done using Converteam DP systems, students are also required to complete 30 days of familiarization at sea upon completion of the Basic course," said Santos.

Santos has been with the company for more than four years, and he explained that the C-MAR's DP training course began almost a decade ago in a small office in Macaé, a city in the northeast of the State of Rio de Janeiro, which is the main O&G hub for the Campos Basin. With the success of the course they

Above: Mauricio Santos, C-MAR Country Manager at the Rio de Janeiro training center.



(Photo Claudio Paschoa)

(Photo R. Yasyrkin)

Right, top: Advanced DP simulator training at C-MAR Rio.
Right, below: Kongsberg shipboard DP2 station.

relocated to the current suite of offices in Rio.

"We train between 300 and 400 DPOs per year, with a maximum of eight students per week in the basic course and four students per week in the advanced course," said Santos. A DP Maintenance Course is also offered at the Converteam training facility in Macaé and also has a four day duration, targeting individuals who may be required to perform, or assist in, the maintenance of a vessel's Dynamic Positioning System.

The course includes System elements, Interfacing, Monitoring and Documentation, normally this course is taken by electronics technicians who will do maintenance and repair of the systems aboard a vessel. DP systems are highly complex and are made up of an array of GPS transmitters/receivers, sensor and control hardware and power modules, usually located below a vessel or ship's bridge, and these are connected to the DP main and backup modules located on the bridge.

"The DP courses are now administered in English and this sometimes causes problems for students that do not have a advanced level of English, so many times teachers need to explain things in English and follow up in Portuguese, which sometimes causes courses to be extended by a day or two. It's important for prospective students to hone their English skills before signing up for any of our courses," said Santos. The Nautical Institute has full oversight over the DP courses to the point where courses are filmed and the NI can check on classes in real-time. "Since all classes are filmed, the NI can patch in at any time and check on the class' development, what is being taught and what difficulties the students are having. It's common for post-accident investigators to check on the class videos to see if the DPO who had the accident had similar problems during simulations. What happens during simulator training here is reflected on real-life situations offshore," said Santos.

With the continuing growth of the oil and gas industry in Brazil, there has also been a major growth in shipbuilding and vessel and rig leasing. These facts have significantly increased the demand for Brazilian DP operators since main contractor Petrobras requires specific levels of local content on each ship or vessel it hires.

"We are experiencing a continuous growth in the Brazilian offshore market and in the near future we may need to expand our training facilities in order to accommodate the influx of prospective DPOs. Looking at the future, it is quite clear that the offshore growth in Brazil will continue at least for another decade. With the complex nature of drilling for and producing deepwater pre-salt oil and then in some cases transferring this oil from FPSOs to export tankers offshore, there is no doubt that the demand for DPOs will continue to grow and C-MAR will need to adapt accordingly. I believe we are well prepared to tackle this demand at C-MAR," added Mauricio.

At this point C-MAR is also investing in increasing its visibility at other Mercosul full member countries such as Argentina, Paraguay, Uruguay and Venezuela, Bolivia, and associate members such as Chile, Colombia, Ecuador, Guyana and Peru.

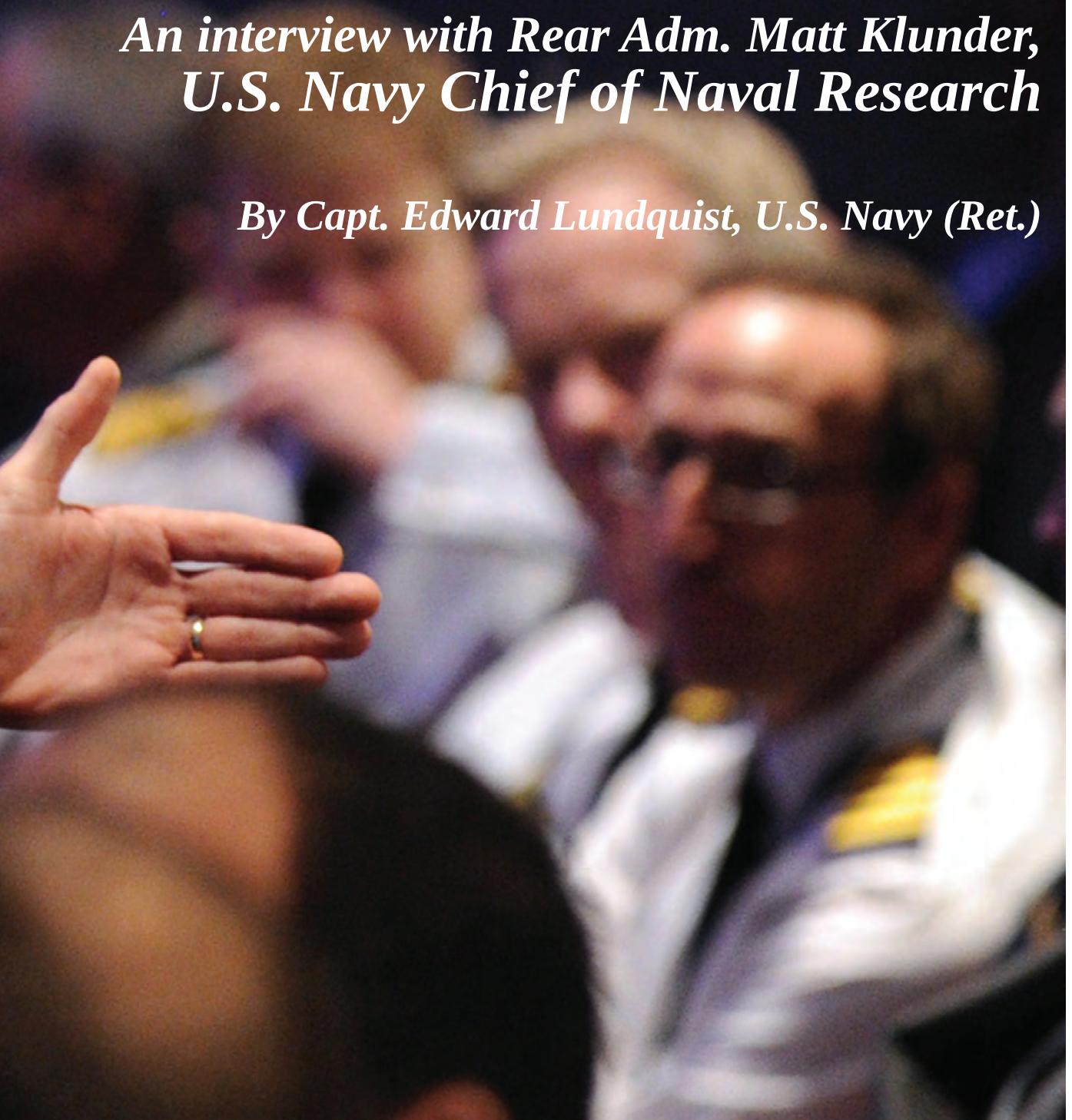
CNR View from the Helm

(U.S. Navy photo by John F. Williams/Released)

Culture of Innovation and Invention: Ensuring Sailors and Marines Have a Technological Edge

An interview with Rear Adm. Matt Klunder, U.S. Navy Chief of Naval Research

By Capt. Edward Lundquist, U.S. Navy (Ret.)



What are your near term, mid-term and long term science and technology (S&T) objectives?

It's critical that our Sailors and Marines never go into a conflict as a fair fight. Whether it's a near-term threat we're trying to address, or a long-term leap-ahead technology, we need to make sure that we're investing in cutting edge technologies that are going to give our Sailors or Marines that decisive technological advantage. Across everything we do, we have to stay under that big umbrella called "affordability." It's no longer good enough to develop an incredibly impressive capability. It's got to be affordable. Our vision is to deliver hugely effective capability with affordability.

You can look at our strategic plan and see all of the areas we're focusing on, but there are a few that are most important to us. First is the undersea domain, including manned and unmanned vehicles with autonomy, persistence and endurance, and modular payloads that can be changed as the mission dictates, along with the ability to net all those together for communications and information flow.

Another important area is that we need to understand the electromagnetic spectrum and optimize how to move and protect that data.

And then we get into electronic warfare. We need to make sure that that data is protected as we're sending it out, and it's protected as it comes back.

The fourth area is directed energy, not only from the capability it provides—with lasers, electromagnetic rail guns or high-powered microwaves—but also the affordability. We're talking about systems where you can shoot a round a pulsed-energy for less than a dollar and create the effect you want. That's compelling to me and that's a focus that we have at ONR.

Finally, the fifth one really comes back to people. With all the great technology I just described, it's only as good as the people behind it. So we need to train our people to handle all those new technologically impressive systems. So we're focusing on live virtual constructs, where live operational units integrate fully with virtual constructive units or avatars to create an optimized training scenario that's very affordable.

So what's your metric on affordability?

We start with the equation: what is the threat potentially coming at us with, and what does it cost; and do I have an effective defensive system for that, and is it more affordable that what it has to defeat. Some people call it "flipping the cost curve on your adversaries."

Rear Adm. Matthew Klunder, chief of naval research, discusses rapid innovation during the Surface Navy Association (SNA) 26th Annual National Symposium.

(U.S. Navy photo by John F. Williams)

Rear Adm. Matthew Klunder, Chief of Naval Research, meets with squadron personnel assigned to Scientific Development Squadron (VXS) 1 of the Military Support Division at the Naval Research Laboratory. VXS-1 supports the naval research enterprise by conducting manned and unmanned airborne science and technology operations.

There are many ideas out there, from academics, military people, or companies. If they think they have some science or technology that can contribute to the Navy-Marine Corps mission and to defense, how might they be able to bring that in?

The normal process is through our broad area announcements — or BAAs — that we'll release through our web site to all the performers and they can come in and provide us with white papers and ideas. But we have also started open forums here at ONR where we sit around and talk about these issues. The first one we had back in January was on autonomy. It was hugely successful. We're probably going to do our next one on information/C4I, and we think that's probably appropriate for the time, based on our focus on the electromagnetic spectrum and cyber. We want to share what we're focusing on. And we want to know, "what are you focusing on?" We have a general discussions in the morning, and one-on-one opportunities in the afternoon to present a proposal, a white paper, or do a poster board. We have a large Tech Expo every two years, but now we're allowing these focus area forums to happen with the general, technical, research community about once every 3 - 4 months.

(U.S. Navy photo by John F. Williams)

One of the things that Maritime Reporter is very interested in, obviously, is ships. Are there major efforts here at ONR that get into new types of propulsion, ship or hull designs, construction techniques, or coatings—things that relates to the maritime community that they might someday benefit from them?

Absolutely. Some of the technology involving the axial flow on the water jets with LCS is impressive. We

Rear Adm. Matthew L. Klunder, Chief of Naval Research, introduces CHARLI-2 from Virginia Tech's Robotics & Mechanisms Laboratory during the Office of Naval Research (ONR) 2012 Science and Technology Partnership Conference.

got quite a bit of efficiency out of those new water jet technologies, starting with LCS 4, the ones we developed are going on those ships. Our advanced composite propellers have delivered some pretty good efficiency numbers. Our bow and stern flap designs have been very successful. The maritime community may not be aware of the advances we've made in coatings, particularly bio-fouling hull coatings where we've seen that we could probably get an increase of maybe 6% in fuel consumption efficiency numbers. We don't want our sailors out their chipping and painting, so we want our topside paints and polymers we designed to give a 2 - 3 times greater life expectancy, which saves man hours in depot maintenance and on deployment. We've developed quick-cure void coatings over at the Naval Research Laboratory (NRL) where we've saved about five days of application and curing time. That's real savings and real money. The commercial sector will benefit from these as well.

You mentioned underwater systems and connectivity. How are we making it so that our underwater systems and distributed underwater sensors can communicate?

We're looking at all sorts of different mediums to move data in the undersea domain. I will tell you that we have successfully done it—I can't say the ranges or the times—but I'll just tell you we've done it. I'm feeling more and more confident as we understand the dynamics of the water and all those kind of obstacles underneath the water, that we've got a pretty good understanding on how we can move that data in real time. And it's not only, it's through the water medium, but it's also through the air-sea interface medium as we might port it up to airborne assets or to a maritime operational center. You may want just one vehicle out there all alone, which has advantages, but we think there are advantages in being able to distribute in a netted kind of way of those undersea vehicles and sensors.

You mentioned the air-sea boundary. What kinds of progress are we making, or what's new and exciting about our understanding of the atmosphere and the ocean so that we can be masters of those domains.

We'll never be the "masters" because Mother Nature still holds that in her precious hands. But ocean science is part of our heartbeat here. The Arctic used to be described as a frozen maritime desert, a lot of ice but not a dynamic environment. In the last few years, however, the Arctic has become extremely dynamic and unstable. We are heavily involved in trying to understand that dynamic and potentially forecast that dynamic. And while I'm inside that dynamic, how do we understand and monitor in real time the limitations to communication, to movement, etc. We've been able to look at it from all angles of the domain—from airborne platforms; pre-positioned ice sensors and undersea vehicles that are beneath the first year sea ice—now we're netting all those together in a real time way and looking at that constellation of data regularly. We want to understand it better, we want to

"You can look at our strategic plan and see all of the areas we're focusing on, but there are a few that are most important to us. **First is the undersea domain**, including manned and unmanned vehicles with autonomy, persistence and endurance, and modular payloads that can be changed as the mission dictates, along with the ability to net all those together for communications and information flow. Another important area is that **we need to understand the electromagnetic spectrum**, and optimize how to move and protect that data."

Rear Adm. Matthew Klunder

(U.S. Navy photo by Mass Communication Specialist 2nd Class Sean Hurt)

be able to forecast it better, and then we want to be able to operate up there better.

You touched on training. And you also briefly mentioned some of the work that we're doing with combat care. How are we improving warfighting performance? How are we helping our Sailors and Marines do their jobs better, be safer and more survivable?

Let me take a step back from human beings for a second. We're moving ahead with the robotic fire fighter over at NRL that can go monitor a dangerous space or an area that may be under some kind of environmental concerns. Don't send a human there; send this robotic individual to investigate or potentially go fight the fire. So that's one area. Regarding people, we're looking at how we can optimize how a Marine platoon or an LCS crew can go about doing what they're required to do. Have we optimized their manning positions? We're looking at the optimal manning and their work and sleep patterns. On the human performance side, with simulations and virtual training, we can provide training on systems that are otherwise not available or at least where they may be in the world at a given time. We can also accelerate their learning through intelligent adaptable training. I'm not talking about "computer based training." What I'm talking about is interactive training where the avatar or the processing and brains behind the unit you're interacting with can now sense that that the student is moving a lot faster than we expected, so we can increase and ramp up the knowledge for him.

For another student, the result may be we're finding that student needs help grasping certain concepts, and the training then adapts to help that student improve where needed. We call it Intelligent Tutoring—and we have a hands-on lab to reinforce it. We think that's an area where there's a lot of room to grow for accelerating our folks' learning capacity.

How about survivability?

We've developed lightweight body armor. We've developed ballistic measurements helmeting to insure that if we got a sense of a concussion or something that impacted them neurologically, we can assess that and get them help before it becomes a very damaging event. We've even done neurological evaluations and synapse assessments to determine, even before going into combat, if that person is tuned for combat? And on the flipside, when they come out of combat, we might detect any neurological damage that we can then heal before they get into a bad state.

So you'd be able to figure out sort of what's normal, and find out if someone is abnormal?

Or even enhance their ability before they go into combat.

Can you tell me a little about the Transition Insertion Program (TIPS) and the Rapid Innovation Fund (RIF), and how small businesses get engaged?

We depend on small businesses — not only for the TIPS program and the RIP program, which are very powerful, but even in some of our large prototypes. The electromagnetic railgun system that we designed and developed down in Dahlgren had eighty small businesses involved in that effort. It could be through metal science, it could be through mechanical engineering work – that's 80, in just that one program alone. And that's a pretty big program. The smaller TIPS kinds of insertion programs have done some tremendous things for us. It could be in propulsion, advanced energy management or battery storage

Science, Technology, Engineering and Math (STEM) programs are big today, but ONR has been promoting STEM for a long time.

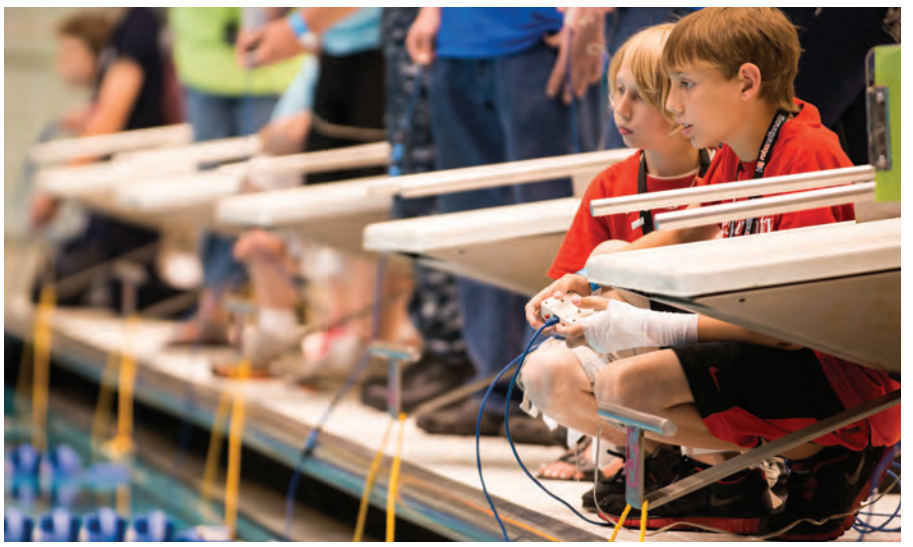
STEM is hugely important to us. About half of the engineers and scientists at our laboratories and our warfare centers will be eligible to retire in the next 10 years. That's almost 50% of our workforce. The "greying" of the science and engineering community—especially in information technology, cyber, ocean and nuclear engineering, those areas that are very important to the Navy and the Marine Corps—means we have to strengthen the pipeline of young people coming into these STEM areas. We are going to start to really focus on middle school to high school in the pipeline. Our SeaPearch program captures that 7th to 8th grade into high school. You build from there. The next step would be a high school internship at one of the labs, such as NRL, Dahlgren, or Carderock. Then we get them interested in an undergraduate program in one of the STEM disciplines, and they might come into a summer internship as an undergrad. And then there we've got a progression. We will be developing young people with skills and aptitudes for STEM disciplines that we need in the future.

With today's budget pressure, is this sophisticated research affordable, or is it an expensive luxury?

In this complex world, we can't defend our nation by fighting the last conflict. The only way you can be ready for the next conflict or threat that our country may have to face is because we are thinking ahead, doing good research, doing good scientific work. There are the near-term things where we're in the fight right now and we have to solve those dilemmas and those threats.

But there are other things where we want to be so far in front of our adversaries that they can't afford, or are unwilling to come and try to attack our country because they know we have the technological advantage. This complex world does not allow us for a second to relinquish our advantage in research technology. In America, we're innovative. We always want to give the edge, a decisive edge, to our warfighters, to our people. If you tend to skimp on those kinds of resources, you don't get there.

You always lose.



SeaPerch

University of Southern Mississippi Site for Fourth National SeaPerch Challenge – Underwater Robotic Championships

Excitement continues to build for the Fourth Annual National SeaPerch Challenge, as 2014 will see the largest group of SeaPerch competitors ever to assemble and compete for the title of National Champion.

Hosted by the Mississippi Regional SeaPerch Committee, this year's national competition will be held at the University of Southern Mississippi (Southern Miss) in Hattiesburg, MS, on Saturday May 17, 2014.

Here, more than 100 middle and high school teams from all over the country will come together for a weekend of learning, sharing, competing and fun. The teams scheduled to be in Mississippi have earned the right to compete against their peers on the national stage by winning at the regional level.

Registered participants and spectators will be treated to the "college experience," as the entire weekend's activities, including Friday night's ice cream cocial and Saturday's in-pool and poster competition events as well as the awards Banquet, dorm room accommodations and meals through Sunday morning, will be available for all on the picturesque Southern Miss. campus.

What is SeaPerch?

SeaPerch is the innovative K-12 underwater robotics program, sponsored by the Office of Naval Research (ONR) and managed by the Association of Unmanned Vehicle Systems International Foundation (AUVSIF), that trains teachers and group leaders to inspire their students to build their own Remotely Operated Vehicles (ROVs) following an academic curriculum consistent with national learning standards supporting Science, Technology, Engineering, and Mathematics (STEM) subjects with a marine engineering-based theme.

The program promotes hands-on learning of engineering and scientific concepts, problem solving, teamwork and critical thinking, and introduces students to potential and rewarding career opportunities in naval architecture, marine, ocean and naval engineering. "With guidance afforded by AUVSIF and with ONR's commitment to SeaPerch, we have grown exponentially, reaching more than 153,000 students to date," said Susan Nelson, Executive Director of SeaPerch. Currently more than 12,200 teachers and mentors are committed to supporting student learning through this stimulating and fun hands-on activity and to promoting student discovery and excitement of STEM subjects leading to a potential future career path. The program reaches a diverse population, and participants in the National Challenge frequently include students from inner city Baltimore to rural Mississippi to Native American reservations in Minnesota to the islands of Hawaii, all of whom have now been introduced to STEM though SeaPerch. This year, there may even be the first international team coming from New Zealand to compete.

The weekend starts beginning on Friday, May 16, when arriving teams check into their dorm rooms before heading to registration, where they will check in and submit their ROVs for a compliance review. For those vehicles requiring adjustments and/or repairs, a triage station with spare parts and tools will be available. Following dinner at the student dining hall, teams will be treated that evening to an ice cream sSocial where students from across the country can meet, mingle and compare their design enhancements and innovations. All student participants will receive National SeaPerch Challenge t-shirts and giveaway bags with items contributed by the SeaPerch program, corporate sponsors and the Mississippi hosts.

Competition day, Saturday, May 17, will begin at the university's Natatorium with the continuation of registration check-in and compliance reviews, for those not completing their inspection on Friday night. The opening ceremony, featuring a number of relevant speakers, will be accompanied by photographers, videographers and local media. Again this year, live streaming of the day's competition events will be provided via the SeaPerch website for the benefit of fellow classmates, parents and friends back home to follow the action.

This year teams may consist of a minimum of one student and one adult leader, and there is no restriction on the maximum number of students that can participate on a team. A juried poster competition is planned for the middle and high school teams to introduce their designs through graphic displays, to deliver oral presentations about their design philosophy and construction challenges and to answer questions posed by the judges. The in-pool technical competition events will consist of a submerged obstacle course, and an entirely new event, called the "Heist Challenge."

Specifications for both underwater events were posted on the SeaPerch website, www.seaperch.org, for teams to construct their own events for practice prior to the national competition. Nearly 100 judges and volunteers are also anticipated to attend during the day in order to adequately oversee the multiple poster presentation and in-pool competitions as well as ensure a rewarding and memorable day for all.

On Saturday evening the gala awards banquet will take place in the Payne Cen-

ter on campus where presentations of first-through-third place trophies in each event for middle school, high school and open classes will be awarded, and the SeaPerch National Champions will be revealed. In addition to more than 500 student team members and their leaders, classmates, parents, friends, volunteers, judges, invited guests, speakers and committee members will comprise the anticipated total of nearly 800 attendees. Invited speakers, representing corporate sponsors, local and state congressional representatives, ONR, U.S. Navy, U.S. Coast Guard and other military branch personnel, will be invited to observe the day's activities. All will be encouraged to arrive early, to observe the competitions, judge various events and speak first hand with the students before addressing them that evening at the banquet about the importance of STEM to their future careers. All student team members will receive participation medals, and be photographed by team for the benefit of their families and schools.

Sunday, May 18, will be a free day for the teams to explore on their own the rich cultural history and outdoor activities including parks, historic sites and museums in the greater Hattiesburg, Mississippi area.

Sponsorship opportunities are still available for individual, local and corporate funding, details of which are posted on the SeaPerch website. Also, judges and volunteers are always welcome. Should you be interested in participating as a volunteer or judge on May 17, contact Cheri Koch at koch@auvsifoundation.org.

Certificates of Participation are available both for student participants and for teachers and advisors to download following the National Challenge.

For Your Information

For news and updates concerning the National Challenge, please visit the SeaPerch website, www.seaperch.org, and for questions please contact Susan Nelson, Executive Director, at

e: snelson@seaperch.org

Second Modular Capture Vessel for U.S.

(Photo: Drydocks World)

Drydocks World completed and delivered Eagle Louisiana, the second of two Modular Capture Vessels (MCV) for the U.S. The first MCV, Eagle Texas, sailed away from Drydocks World's yard in August last year. The vessels are the world's first MCVs. Drydocks World converted the AFRAmax tanker for AET, a global leader in petroleum shipping, which has a 20-year agreement with Marine Well Containment Company (MWCC) for the operation of the MCVs. Ten companies form MWCC: ExxonMobil, Chevron, BP, ConocoPhillips, Anadarko, Shell, Apache, Statoil, BHP Billiton and Hess. The MCVs will operate as normal tankers in the U.S. Gulf of Mexico and will be outfitted and deployed for containment services in the event of a deepwater well control incident in the region. The work scope included installing four retractable azimuth thrusters, a tunnel bowthruster, new machinery spaces, diesel generator sets and associated tanks, auxiliaries, switchboards, and electrical distribution equipment. The main engine was modified for Controllable Pitch Propeller (CPP) operation and a control system was added for dynamic positioning, power management and equipment monitoring. Structural support stools and foundations were added for the future installation of topsides processing modules, a turret, flare tower, communications equipment, control facilities and other miscellaneous equipment. The ship's systems were modified to provide services to topsides processing equipment, as well as hydraulic systems for the CPP, thrusters, cargo valve control and fire pumps. A new main deck central pipe rack was fabricated and piping was installed to support topsides processing equipment. The ship's living quarters were also upgraded to accommodate more than 65.

The amount of steel used for the Eagle Louisiana project is 2,530 metric tons with 19.68 km of pipes and electrical cables of 292 km also utilized. The MCVs will individually have 700,000 barrels of liquid storage capacity, and can process, store and offload the liquids to shuttle tankers.

Ocean Osprey Ready to Serve

Zamakona Yards said that the newly built vessel Ocean Osprey arrived to Scotland to begin operating in the Martin Linge offshore oilfields to support the works of Norwegian company Total E&P. Ocean Osprey was launched January 31 at Zamakona's facility in Pasajes (San Sebastián) and is the first ship ordered by the Norwegian shipping company Atlantic Offshore AS built by Zamakona Yards. Atlantic Offshore's second vessel, Ocean Marlin, a Havyard HY820 design, is expected to be ready by the end of June 2014.

(Photo: Zamakona Yards)

(Photo: Dutch Ministry of Defense)

Dutch Navy's Largest Ship

On March 8, Dutch Defense Minister Jeanine Hennis-Plasschaert named the Karel Doorman, the new Joint Support Ship for the Royal Netherlands Navy. The ceremony took place in Vlissingen at the shipyard operated by Damen Schelde Naval Shipbuilding. With a length of 204.7m, the Karel Doorman is the biggest ship in the Dutch navy. The new logistical support vessel can be deployed to supply units at sea, for strategic sea transport and for logistical support from the sea (seabasing), with the ship acting as a seaborne base for implementing and supporting land operations. It must be possible to perform these duties worldwide, and anywhere within the spectrum of force. In addition to a below-deck transport deck, medical facilities, and its own loading and unloading facilities, the new vessel also has a helicopter deck with two landing pads for different types of helicopters. The new vessel was largely built at Damen's shipyard in Romania, but has been fitted out in Vlissingen. It will commence trials in May.

Stena RoRo Heads Hospital Ship Construction

Mercy Ships signed an agreement for the construction of the world's largest civilian hospital ship tentatively named Atlantic Mercy, and Stena RoRo announced that it is engaged as project manager. The vessel, an investment of more than $10m, will be built at the Chinese Tianjin Xingang Shipyard, and delivery is expected by July 2017.

Atlantic Mercy will serve across the world with approximately 9-10 month-long stops in each port. On board there is room for 154 patients and 600+ crew and medical staff. There are six surgery rooms for both medical care and educational training. The intention is to increase cooperation, training and education for health care personnel in the countries where the ship is active. The total deck area is approximately 30,000 sq. m. and the vessel is equipped with a school and kindergarten.

Atlantic Mercy will be based on Stena RoRo's in-house RoPax concept Stena Seabird. The interior layout has been completely rearranged, the cargo handling equipment has been changed, the hull shape has been optimized and the ventilation and propulsion systems has been adapted. The ship will be classed by LR.

The New Face of Automony Offshore

Autonomous Surface Vehicles (ASV) Ltd. launched a new oil field services unmanned surface vehicle. ASV announced its breakthrough in unmanned oil and gas operations with the introduction of C-Worker. The multi-use offshore unmanned surface vehicle has been developed to conduct subsea positioning, surveying and environmental monitoring. C-Worker was demonstrated to members of the oil and gas and offshore surveying industries in January 2014 when ASV, alongside sister company C&C Technologies operated the vehicle in the Solent off Portsmouth, UK. Fitted with a Sonardyne Gyro USBL acoustic positioning system, the vehicle successfully executed seabed positioning and Compatt calibration as well as station keeping and following survey lines.

C-Worker leverages technology from more than 50 unmanned vehicles ASV has built to date. Additional technological advancements introduced in the C-Worker include the integration of a variety of offshore payload combinations including USBL, ADCP (current meter), CTD, Multibeam Sonar, Acoustic Telemetry, and Passive Acoustic Sonar (PAM) for marine mammal detection. Payloads can be developed by ASV or by customers who are supplied an empty payload frame and a software and power interface specification. The C-Worker's navigation sensor suite is comprised of C-Nav DGNSS, colour and light cameras, an infra-red pan tilt camera, an x-band marine radar and AIS.

C-Worker was put through its paces for offshore oil & gas operations.

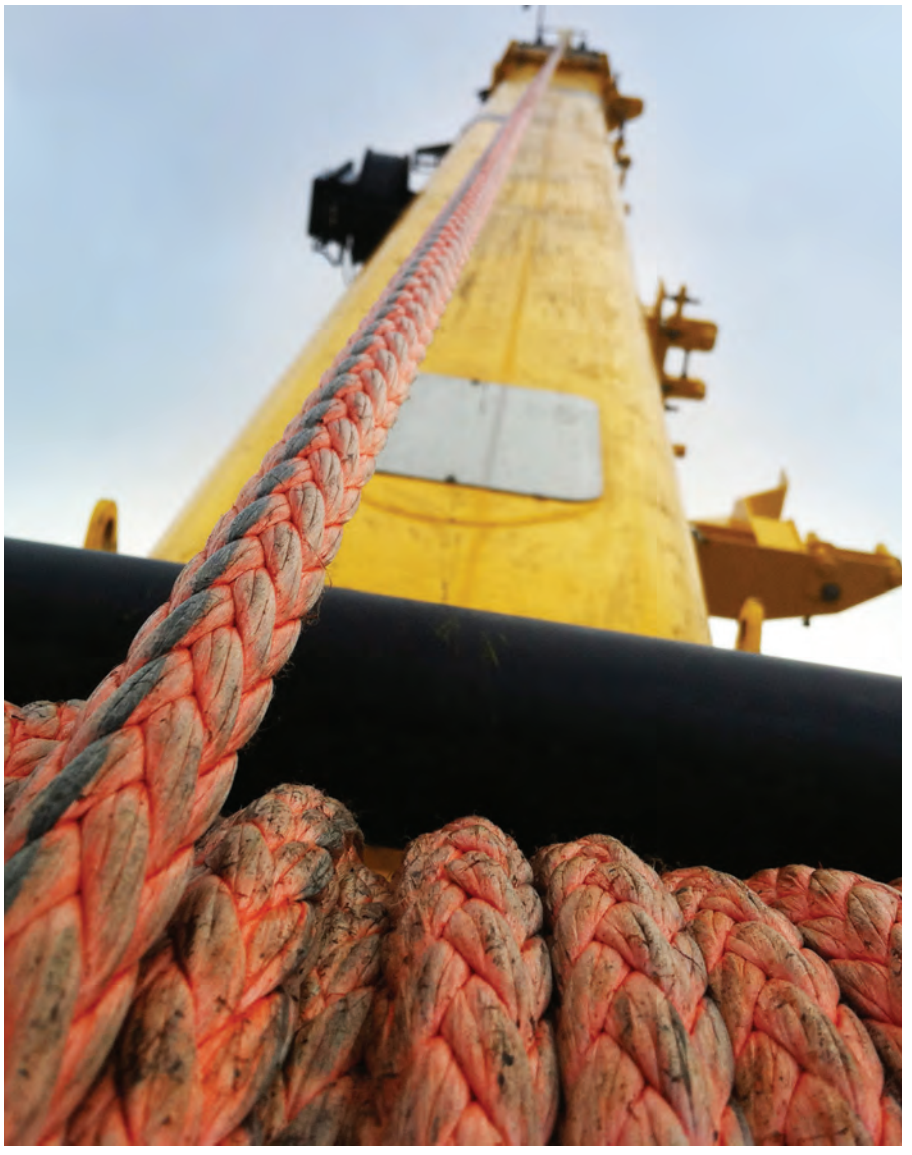
Heavy Lifting

Modern heavy lift capabilities are crucial for safe, efficient operations offshore

Heavy lift operations offshore are an awe-inspiring feat, but an operation that requires consistent monitoring of man, machine and procedure to ensure they are conducted in as an efficient and safe manner as possible. Due to a growing focus on safety related to subsea lifting operations, **DNV GL** recently established a Joint Industry Project (JIP) to develop practical methods for reducing the risks and lifetime cost of steel wire ropes for subsea lifting applications, using an integrated systems approach. In all, 14 industry players have already signed up and more partners are welcomed, said Inger-Lise Tangen, project manager, DNV GL.

"Frontier areas have emerged as serious attractions for oil and gas operators in recent years," said Elisabeth Tørstad, CEO of DNV GL Oil & Gas. "Over half of the industry executives we interviewed for our industry outlook report Challenging Climates said they expect subsea technologies to absorb the strongest investment this year, to support exploration into new or challenging environments. Operating in these areas requires leading-edge technologies and new knowledge. Industry collaboration is even more important here where the technical challenges are complex and the risk exposure may be higher. This JIP is therefore very timely."

The growing number of subsea field developments worldwide is demanding greater focus on safe execution of subsea lifting operations, both in the installation phase and throughout the lifetime of the field. High safety levels will be even more important going into deeper and ultra-deep waters, lifting larger and heavier equipment and more complex and expensive structures.



Samson and Manitowoc Announce KZ100 Synthetic Crane Hoist Line. (KZ100 is also featured in the image running across the top of this page)

However, there are limited rules, regulations and standards suitable for ensuring and assessing the integrity of steel wire ropes for subsea lifting, especially for larger diameter ropes. A number of different factors can influence the integrity of a steel wire rope, but the knowledge about their effect and interaction, and how to assess them, is unfortunately limited currently.

"Industry players have expressed concerns related to today's knowledge levels, competence and technology related to assessment of the condition and integrity of wire ropes. This is why DNV GL in cooperation with the industry has established a JIP with the aim of developing a Recommended Practice (RP) for integrity management of steel wire ropes used for subsea lifting applications," explains Inger-Lise Tangen, Project Manager, DNV GL.

The new methods for integrity management of steel wire ropes will form the basis for documentation of the safety and reliability of integrated systems according to DNV-OS-E407, throughout

the service life of the rope until it is duly discarded. The project will include relevant issues related to system integration, monitoring, condition assessment, inspection, maintenance, lubrication, production, etc.

Partners are: Bridon, DMT GmbH & Co. KG, DOF Management, Farstad Shipping AS, GC Rieber Shipping ASA, Heerema Marine Contractors Nederland SE, Huisman Equipment BV, National Oilwell Varco (NOV), Redaelli, Rolls Royce Marine AS, Saipem, Technip UK Limited, TEUFELBERGER Seil Ges.m.b.H. and W. Giertsen Services AS.

While the DNV GL Joint Project focuses on matters surrounding the safety of wire rope, **Samson** continues to be a pioneer in delivering solutions and gaining acceptance of synthetic rope various industries and applications. The company recently debuted Manitowoc Cranes' Grove RT770E rough-terrain crane using Samson's KZ100, the first synthetic hoist rope designed specifically for mobile cranes. KZ100 is a product of joint application development between Samson and Manitowoc, supported by fiber supplier DSM Dyneema, and ushers Samson into the crane industry.

KZ100 is a lightweight alternative to traditional steel wire rope and provides multiple benefits for safe and easy handling. According to Samson, with the same load pull and load chart as wire, KZ100 can be used with a 5:1 safety factor. It is 80% lighter than the wire it replaces, making for easy handling/reaving and installation. Synthetic KZ100 does not rust and requires no lubing, and the unique construction eliminates kinking, bird caging, and damage caused by diving on the winch drum. Because of its torque-neutral construction, KZ100 eliminates load spin and cabling.

Manitowoc and Samson conducted an extensive lab testing and field trial program to prove the viability of using synthetic rope as a crane hoist line. KZ100 was tested in the lab to characterize tensile strength, tension fatigue, bend fatigue, and the effects of temperature on the rope's performance. These tests were performed at four different testing labs—two Samson labs and two third-party labs. The testing plan required more than 4,000 hours of machine and sample preparation time to complete. The total length of rope manufactured for testing and field trials pursued over the course of this project came to 24,500 ft., or more than 4.6 miles of rope. In addition to Samson's tests, Manitowoc conducted reliability tests over more than 280 hours and 14,000 cycles.

Lankhorst Ropes supplied Arctic vessel builder Arctech Helsinki Shipyard with steel wire towing ropes for three new icebreaking supply and emergency operations ships operating in seas off Far East Russia and the Gulf of Finland. The emergency and rescue vessel, NB 508 Baltika, is being built for the Russian Ministry of Transport. While the NB 506 Vitus Bering and NB 507 Aleksey Chirikov, high capability multifunctional icebreaking supply vessels are for Russian shipping company Sovcomflot.

Lankhorst Ropes riser tethers for the Knarr field development.

Lankhorst has supplied each of the NB 506 Vitus Bering and NB 507 Aleksey Chirikov with 1,000m of 66mm diameter steel wire rope; the ropes have a minimum breaking load (MBL) of 310Mt. The NB 508 Baltika will use 700m of 58mm diameter rope with 240Mt MBL. The steel wire ropes feature an independent wire rope core, providing greater strength and stability to the rope than a fiber core. As well as towing, the galvanized rope can also be used for multiple other offshore applications.

Two of the vessels, NB 506 Vitus Bering and NB 507 Aleksey Chirikov, will support the Sakhalin-1 Arkutun-Dagi oil and gas field in the Sea of Okhotsk, Far East Russia. The ships' main tasks will be to protect the oil and gas rigs from ice accumulation, provide supplies and transport crews, as well as, oil spill recovery, firefighting, ocean towing, stand-by and rescue. The ships and their equipment will have to perform in temperatures of minus 35 °C, waves up to 18m in height and wind speeds exceeding 140 km per hour.

Lankhorst Ropes also won a contract by Aberdeen based Dana Petroleum to provide Gama 98 polyester mooring lines for the Western Isles Development FPSO vessel (Floating Production Storage and Offloading). Given the weather conditions in the North Sea, and relatively shallow water depth, the cylindrically shaped FPSO will use a semi-taut leg mooring system. It will be moored with 14 polyester mooring lines in three clusters of 4, 4 and 6 lines at 250m water depth. Two clusters will have longer lines to the prevailing weather that, together with seabed chain, will provide the lateral restoring force needed to keep the production vessel on station.

The Gama 98 polyester rope tethers are made from parallel laid sub-rope cores within an outer braided jacket. The Western Isles Project (Dana 77% and Cieco 23%) will develop two discovered oil fields called Harris and Barra in the Northern North Sea, 160km east of the Shetlands and 12km west of Tern field. It involves a subsea development of at least five production and four water injection wells plus two exploration wells tied back to a new build floating production, storage and offloading vessel (FPSO) with oil export using shuttle tankers.

Lankhorst Ropes also won a contract by NOV Flexibles, Denmark, to supply Lankoforce riser tethers for the Knarr field development, located in 410m of water in the North Tampen region of the Norwegian Sector of the Northern North Sea. The riser tethers will be the first to use Dyneema DM 20, a high modulus polyethylene (HMPE) rope, for permanent subsea anchoring of flexible risers. Lankoforce riser tethers are designed to hold risers and umbilicals in position, connected to subsea production systems such as well manifolds, wellheads, Christmas trees and well jumpers. Each of the Knarr development riser tethers comprises two HMPE tethers connecting a hold-down clamp with an anchor, allowing rotation around two axes.

The riser tether has a Lankoforce rope construction with a 12 strand braided rope core made from Dyneema DM20. The high modulus polyethylene core provides the strength and mechanical performance expected of these long-term tethers. The entire rope core is protected by a braided polyester jacket and polyurethane coating, and includes ROV handling points for ease of installation.

Caley Ocean Systems supplied a high performance, A-frame handling system

Project Profile

The Berard Team took a role in transporting the Navy's newest addition to its fleet, the Coronado, a 418 x 107 ft. Littoral Combat Ship (LCS) built by Austal in Mobile, Alabama. Berard provided a turnkey service and accomplished the task using 104 axle lines of self propelled modular transporters. The team rolled the 2800 ton LCS from the final assembly bay to a waiting deck barge. The Coronado was then barged down river for transloading from deck barge to drydock.

Job Specs

Weight	2800 Tons
Dimensions	418 x 107 ft.

Equipment Used
20 lines of ESE SPMT's and 84 lines of SLE's, loading ramps, 18 high volume water pumps, 425 x 126 x 25 ft. deck barge, and numerous 65 ton winches and tugs.

1,250 Ton Shiploader for Adani Mining

SAL Heavy Lift recently completed a project to transport and install a 1,250 tonne coal shiploader at Abbot Point in Queensland, Australia, marking the conclusion of a year-long, technically complex project whereby, early last year, SAL Heavy Lift first transported the shiploader from Abbot Point to New Port shipyard at Mokpo, South Korea, for refurbishment and upgrading, returning it to Abbot Point earlier this month. The shiploader is owned and operated by the Adani Mining Company.

The project began when the shiploader was loaded at Abbot Point, in January 2013, by the SAL Heavy Lift Vessel (HLV) MV LONE. It was transported back this month on the MV SVENJA. Both vessels are in SAL Heavy Lift's Type 183 range, featuring 2,000 tonne crane lift capacity and up to 20 knots service speed. "A key point in this project was the difficulty of loading the shiploader from the jetty in open water at Abbot Point and returning it to the same position," explained Justin Archard, managing director of SAL Heavy Lift, Singapore Pte Ltd and Australia Pty Ltd. "This was made complex by the big difference in height of the jetty above the water line and the height of the ship's deck. It meant lifting the shiploader very high to achieve sufficient clearance. Issues of tidal range and vessel stability were instrumental in the planning stage." Prior to upgrading, the shiploader had been in service for 20 years. On the outward voyage to South Korea, the shiploader weighed 1,050 tonnes. Following its upgrade, its return weight was 1,250 tonnes due to steel and other material additions. Previously it was capable of loading bulk carriers at 5,000 tonnes per hour. It can now load at 7,000 tonnes per hour.

to Boskalis Offshore for launching trenching vehicles and ploughs from the company's first 'N Class' cable-laying vessel Ndurance. Mounted on the stern of the Ndurance, the Caley A-frame is capable of handling loads of 70 ton with a maximum lift and reach of 21m up to Seastate-5. The A Frame structure is manufactured in three sections, two leg sections and a top crossbeam. The crossbeam includes the pivot mountings for A-frame's telescopic swinging beam assembly mounted on a dampening frame, allowing the lifting system to handle a wide range of equipment.

The A-frame includes an anti-pitch system incorporating two double acting hydraulic cylinders trunnion mounted to the crossbeam, together with hydraulic power unit (HPU) and winch, for maximum operational flexibility. In addition to cable-laying, the Ndurance's A-frame will be used for a range of other tasks, including launch and recovery of tools and equipment associated with offshore construction projects.

The Caley A-frame is widely used in offshore and ocean science applications where several systems have been in continuous service for over 30 years with many thousands of successful deployments.

Caley A-Frame for new Boskalis cable laying vessel.

(Photo: Edison Chouest)

Cool Runnings

A hallmark of the global maritime industry is the proliferation of smaller, family founded and managed businesses. R.W. Fernstrum is one such company: a ubiquitous presence for more than 65 years providing engineered cooling solutions to maritime and offshore markets. MR went to Menominee, MI, to meet with Sean Fernstrum and his team for insights on the unique products it produces and the markets it serves.

By Greg Trauthwein

Big, modern OSVs have been a good source of business for R.W. Fernstrum, both in it traditional grid-cooler keel cooler business as well as the WEKA Fernstrum Boxcoolers. Pictured above is Edison Chouest's Ted Smith, with its Fernstrum Gridcooler Keel Coolers shown directly above.

R.W. Fernstrum & Company of Menominee, Mich., is a leader in engineering and manufacturing keel cooling technologies, and today remains a privately held, third-generation company run by brothers Sean and Todd Fernstrum, grandsons of founder Robert W. Fernstrum.

Sean & Todd's great-great-grandfather was a boilermaker that emigrated from Sweden, working at and eventually purchasing a local boiler shop that in the late 1800s supported the world-class lumber business in the region. The Fernstrum family grew and many of the sons participated in the business, but as Sean explains, his grandfather Robert W. was a born inventor and entrepreneur, and he eventually realized that "there were more boys than business," so he struck out on his own getting a job as a draftsman with Gray Marine in Detroit.

"When the Great Depression hit, he wanted to keep his job, so he went into his boss and told him that he would come in and work on Saturday's for free," said Fernstrum. "He went from a department of 35 draftsman to one. By the time the Depression was over, he had moved up from being an entry level draftsman to being the chief engineer of the company."

It was here at Gray Marine where the seeds of R.W. Fernstrum were planted, as the company roots started in 1945 when Robert W. Fernstrum patented the first rectangular tube keel cooler with an angled header for the United States Army and Navy. As Fernstrum explained, during World War II the U.S. Navy encountered engine cooling problems with its landing craft – a problem discovered during a mock invasion off of Iceland—and required a new closed circuit cooling system.

"Gray Marine was building landing craft for the Army. When the Army conducted a mock assault of Iceland, less than half of the landing craft made it to shore," said Fernstrum. "The ice plugged up all of the strainers and it became a nightmare. So the Army went back to Grey Marine and said 'you've

"It's really belts versus suspenders. What do you like?"

While R.W. Fernstrum's history is firmly founded in its signature gridcooler keel cooler, it has had a contract to build WEKA Boxcoolers for more than 18 years in what has been a natural progression of its business. ***Sean Fernstrum*** *said the choice comes down to personal preference.*

got a problem.' And (the management of Gray Marine) went to its Chief Engineer, my grandfather, and said 'you've got a problem!' Out of that problem he ended up designing the prototype of our keel coolers."

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

Eventually Sean's father Paul and uncle David joined the business in the 1960s, with brothers Sean and Todd following in the early 1990s, with the pair eventually buying the business in 2000. Today the company employs nearly 40 and stands on the spot where it was founded, with many of its key employees counting their tenure in decades. Today the company's business is booming globally and it is a true global player in maritime markets from South America to Europe and China, and nearly every stop in between.

Respect the Past, Plan for the Future

"From a personnel standpoint it's very much the same," said Sean in explaining how his company's business has stayed the same over the years. "We have a lot of the same employees here. We've expanded in a lot of different areas, but many of the same people, knowledge and experience remain."

The tandem of Dale Gusick, Export Sales Manager and Frank Bjorkman, Domestic Sales Manager, are good examples, as the pair has led sales for the company for more than 30 years each.

But when it comes to production of its signature products, the business today could not be any more different. "The really dramatic changes have been in production, as we could not have dreamt of the things we're currently doing now," such as flexibility in design, double stacked units and use of materials such as aluminum versus strictly copper nickel, said Sean.

A Family Affair

For 65 years R.W. Fernstrum has been family owned and run. Above is Paul, Robert & David Fernstrum; Below is the next generation: Sean, Paul & Todd Fernstrum

Specifically he attributes capability and productivity gains to engineering software solutions. In addition to enhancements to the products, it has exponentially sped along the process by which the company is able to offer recommendations on sizing, for example, from a process that took an hour or two and brought it down to five minutes.

An Engineered Solution

Like many of its manufacturing brethren, R.W. Fernstrum has a near fanatical obsession with quality and control, as Bjorkman explains most succinctly: "People have expectations, and one of their expectations is that we beat their expectations."

Easier said than done, particularly when you consider that nearly half of its business is custom work. "A lot of what we do is not standard; about 30 to 35% of what we do every day in the shop is custom work," said Bjorkman. "We are not simply building standard coolers, we're delivering engineered solutions."

To that end, the process starts well before anything takes place on the shop floor, starting with the procurement of the highest quality materials at the most favorable prices; no small feat for any manufacturing company and a challenge taken on daily by Todd Fernstrum.

"Material quality, testing and verification is paramount to the overall success of the Fernstrum products," said Todd Fernstrum. "There have been some real challenges in the past few years in getting some of the materials. There are some things that we can order a mill quantity at a time, but there are some materials that we get on a shorter basis."

He said the main challenges in recent years have centered on consolidation in the metals market, as with some metals there may be only one or two suppliers globally. "For example you can't get brass plate in the U.S. Nobody makes it; it all comes out of Germany or Asia."

Once material is in hand, R.W. Fernstrum prefers to do as much of the work on the material in-house, as a matter of quality control.

"The big thing is being hands on, we want to control the quality and timeliness of getting the parts that go into these coolers," said Bjorkman. "We bring the raw material here, and we make all, or the vast majority of all of the parts ourselves. We're doing the threading, we're doing the punching, we're doing the forming. We do it all in house. We want that kind of control for a number of reasons; it's a quality

"Material quality, testing and verification is paramount to the overall success of the Fernstrum products"

Todd Fernstrum

thing going right down to the threading on those bolts."

Riding the Maritime Wave

While more than 90 percent of R.W. Fernstrum's business is in the cyclical maritime sector, Sean Fernstrum and his team take a long-term approach in all that they do. "I don't worry too much about market share percentages, I worry about getting the business, and it has been a banner year. In fact, we've had two banner years in a row. Last year (2012) was our best year ever, and this year (2013) was better than that," said Sean Fernstrum. "But it is a cyclical business, and generally you have three to five years up, then three to five years down. It doesn't vary a lot from that, and that's the way it's been for 65 years."

While the company is diverse in the markets it serves, Bjorkman said "A lot of our business revolves around the oil business, and the construction of offshore supply vessels. When they're building boats we're busy. Also, the inland pushboat market is a contributor, which has been very busy of late. Bottom line, a lot of our business is dependent on what's happening in the (Gulf of Mexico oil) patch, and right now, things are looking very good."

MV Connor Bordelon built by Bordelon Marine is a Stingray 260 Class multipurpose PSVs. This vessel features WEKA Fernstrum Boxcoolers.

(Photo: Bordelon)

Both Frank Bjorkman (left) and Dale Gusick (right) have been long-tenured and valuable members of the R.W. Fernstrum team. Bjorkman cares for domestic sales and Gusick cares for international sales, and both have worked for the company for more than 30 years each.

An Engineered Solution

Founder Robert Fernstrum invented the company's prototype keel cooler while solving a problem on WWII Landing craft

Part of the company's long-term success is built on expanding R.W. Fernstrum's business by world region, a task headed by Dale Gusick. Today international sales contributes about 25% to the bottom line.

"Looking at the world, the area that holds the most potential for us in the next five years is South America," said Gusick. "But there are questions, such as are they ever going to release the money to buy everything that they have talked about? I have no idea."

"We've got several projects: one is for 20 pushers for Transpetro, an order we've had for almost two years and the last 16 months they haven't done a thing with them. We're monitoring the market and if it can keep moving for the next five years, that probably holds the biggest overall potential for us worldwide."

R.W. Fernstrum is hardly alone in its wait for Brazil to fully develop its potential, and its long-term view on markets and patience help in these cases. In the meantime, Gusick said there have been pockets of prosperity in other South American locales, including Paraguay which he said "is coming on line and just exploding right now with two or three yards building pushers. In addition, several owners from Argentina, Brazil and Paraguay are looking to build pushers in Turkey and other countries to operate in the home markets.

We're also starting to see some good things happening in Australia and New Zealand for fast ferries and smaller workboats. Germany has always been a good market for us, as we have a number of coolers going into Fassmer at the moment for their Search and Rescue and Police boats, high speed vessels."

Belts vs. Suspenders

While R.W. Fernstrum's history is firmly founded in its signature grid cooler, it has had a contract to build WEKA Boxcoolers for more than 18 years in what has been a natural progression of its business. When asked to describe the inherent difference between grid and box coolers, Sean Fernstrum made it simple: "It's really belts versus suspenders. What do you like?"

Box coolers are mounted inside of the hull in a sea chest, which is good for the protection of the unit. On the other hand it consumes valuable interior space and presents some buoyancy issues.

Grid coolers, on the other hand,

don't consume internal space or cause buoyancy issues, but its external mounting can demand some guarding around the unit on the hull.

"That's really what it comes down to, as they are both proven closed cooling systems. The box cooler is a system developed in Europe, so it's more common there. Where as here in the U.S. our grid cooler product line is more common. They both work, they both have their plusses and minuses. It comes down to preferences."

Regardless of preference, the trend toward increased machinery cooling onboard all vessels is growing exponentially, driven by a number of factors, including a new EPA & IMO tier level ratings for marine engines, the proliferation of diesel / electric solutions and the need to draw full power while dead in the water for DP operations, and the trend toward building boats capable of worldwide operation, hence building for a much broader temperature range and the need for more cooling capacity onboard.

"The tier levels on the engines are driving all of us" said Sean Fernstrum, explaining that there is a requirement for colder temperatures for the after coolers and charge air circuits. Some of the bigger OSV may have 20 to 25 coolers onboard, and "the way they are trying to generate power now, using a smaller frame engine block, the only way to get more power out of that block is to have a colder temperature to charge air circuit. The colder that charge air circuit can be, the more power that block can generate, and these EPA ratings requiring colder and colder temperatures is one of the things driving the double stack coolers."

In addition to the main engines, diesel electric propulsion systems have requirements for cooling many different types of systems onboard OSVs, starting with the bowthrusters and going to and through the DP systems.

In fact with the proliferation of diesel electric propulsion systems (which is now infiltrating the push boat market) and the changing emission requirements, Fernstrum has become an intelligence base for designers, helping to re-engineering the cooling systems when owners move from Tier 2 to Tier 3 units, for example. "I think that is one of the things that have made us very successful," said Sean Fernstrum. "We really watch these tier ratings and watch the engine data and we alert the yard or the owner or the architects. We have developed a real trust, and they like coming to us as a double check."

While keeping ahead of ever moving markets and technical issues is challenging enough, Sean counts continuing the Fernstrum lineage as a prime area of challenge, too. "Succession planning is a big one for us. We have the double edge sword of a lot of experience here, and a lot of experience takes a lot of time to develop. People don't work forever, people don't live forever. You have to make allowances to bring new people in, give them the time to learn the business, learn the industry, to maintain that level of expertise and service, so there is not any major hiccups when personnel change takes place."


Roelse


McNamara


Ingram


Minnig


Lauricella

(Photo: Louisiana state archives)


Monacchio

IHC Merwede Names Roelse CEO

Bram Roelse was appointed Chief Executive Officer (CEO) of IHC Merwede effective April 1, 2014. He has taken over this leading role within the company from predecessor Dirk Philips who stepped back in November 2013. Roelse has worked at IHC Merwede for the past 13 years. He was originally appointed as the Managing Director of the company's business unit IHC Systems. At the end of 2004, he moved to the company's shipyard at Kinderdijk, where he became Director of the Dredging division.

Ingram, McNamara to be Honored by SCI

The Seamen's Church Institute (SCI) announces the recipients of awards it will confer at its 37th Annual Silver Bell Awards Dinner in New York City on Thursday, June 5, 2014. SCI presents the Silver Bell Award, in recognition of outstanding leadership in the maritime community, to Orrin H. Ingram, President and CEO of Ingram Industries and Chairman of Ingram Barge Company and honors Captain James (Jim) McNamara, former President of the National Cargo Bureau, with a Lifetime Achievement Award.

New Director of Engineering for Foss

Foss Maritime said that Michael Minnig has been promoted to Director of Engineering. Minnig joined Foss in 2012 with more than 15 years of naval architecture experience in vessel design, shipyard construction support, and project management. He has a background in vessel stability assessment, structural engineering including finite element analysis and 3-D modeling. Minnig has previously worked for Washington State Ferries, Guido Perla & Associates, Elliott Bay Design Group, and Ingalls Shipbuilding. He is a registered Professional Engineer -Mechanical Engineering- in the state of Washington.

Mike graduated with a Masters in Ocean Engineering from Virginia Polytechnic and State University and a Bacelors in Maritime Systems Engineering from Texas A&M University.

Former Port Chairman Lauricella Passes

Former Port of New Orleans Board Chairman Francis E. "Hank" Lauricella has died at age 83. Governor Mike Foster appointed Lauricella to the Board in April of 1997, and he served as Board Chairman from October 2001 until June of 2002. Prior to his service on the Port's Board, Lauricella served 32 years in the Louisiana Legislature, first serving two terms in the House of Representatives and later serving in the Louisiana Senate from 1972 until he retired in 1996.

Prior to his public service, Lauricella gained a national reputation on the football field as the featured tailback of the 1950 and 1951 national championship teams at the University of Tennessee. An All-American, Lauricella was runner-up for the 1951 Heisman Trophy and later inducted into the College Football Hall of Fame and the Louisiana Sports Hall of Fame.

Volvo Penta Bolsters Americas Team

Volvo Penta announced two key appointments to strengthen its management team in the Americas, appointing Ed Monacchio as vice president distribution development, region Americas and Gabriel Barsalini as general manager, South America. Monacchio joined Volvo Penta as U.S. marketing manager in 1996. Most recently, he was vice president of aftermarket and customer support for North America. Barsalini's most recent role was after sales director for the VCE South American market.

He and his team have contributed to significant development and growth of the VCE aftermarket support and distribution network.

Antoniazzi Named Sales Director, MAN Diesel & Turbo

MAN Diesel & Turbo North America President, Robert Burger appointed David Antoniazzi as Director Sales – Cruise, Ferry and Merchant. In his new capacity, he is responsible for promoting and selling MAN Medium Speed Engines and aft ship products in North America.

"Rosie the Riveters" Meet VP Biden

Women workers from Kaiser Shipyard welcomed to the White House


Photo: Office of VP Biden

Six of the original "Rosie the Riveters" who worked in Kaiser Shipyard during World War II gained a little more recognition after being welcomed to the White House by U.S. Vice President Joe Biden. ABC reported that Phyllis Gould, one of the original riveters, wrote a letter to Vice President Biden stating her dream was to meet him and the President, prompting the meeting at White House. The six women, who worked as welders, electricians and draftsman at the Richmond, Calif. shipyard while the men fought overseas, donned their signature red bandanas as they were met with hugs and kisses from Biden and a surprise visit from President Obama, according to ABC's report.

Biden recognized the women for the "positive example they've set for generations of women," according to a post on the Vice Presidents Twitter account. By the end of World War II, more than 18 million American women went to work, many occupying "blue-collar" jobs traditionally performed by males, thus initiating change to long-established attitudes toward gender relations in the United States. "This was the start of the first women's liberation movement," Biden told ABC. "You see these women working in a factory doing anything any man can do. It began to change everything."

Barsalini

Antoniazzi

Maersk's SeaLand Sets Leadership Team

SeaLand, the newly founded intra-Americas regional carrier of the Maersk Group, announced the appointment of its executive team. The new appointees are Alfredo Di Palma, Maria Batista, Shane Sawyer, Thiago Covre and Timothy Child, who will all be on board within the next two-three months, joining SeaLand CEO Craig Mygatt. Di Palma will join SeaLand as Chief Commercial Officer (CCO) in charge of all commercial efforts for the company. Batista has accepted the role of Head of Customer Service, and has more than 20 years of experience with Maersk Line and Safmarine, including postings in Miami, Costa Rica, Toronto, Charleston and Charlotte. Sawyer has been appointed as Chief Finance Officer (CFO). He currently leads Regional Business Performance function for Maersk Line in West and Central Asia. Covre will join the team as Chief Liner Officer (CLO), and brings more than 10 years of knowledge in line management. Child will be responsible for overall operations as Chief Operations Officer (COO), and is a Maersk Line veteran, with a career spanning 25 years in areas such as trade management (including 7 years of trade experience with Central America and Caribbean), capacity management, and external and inside sales.

Capacci Named Washington Ferries Chief

State Transportation Secretary Lynn Peterson named Capt. George A. Capacci interim assistant secretary in charge of the Ferries Division for the Washington State Department of Transportation. Capacci will lead the ferry system until a permanent assistant secretary is selected. WSDOT will conduct a nationwide search to find the best replacement for outgoing Assistant Secretary David Moseley who resigned effective April 15. Capacci joined Washington State Ferries in 2009 as regional port captain and was promoted to deputy chief of operations and construction for ferries in 2010. In his current position, he is responsible for overseeing ferry operations, vessel maintenance and preservation and terminal engineering.

Five Cat Engines to Power World's First LNG-Hybrid Barge

Caterpillar Marine announced the first shipment of Cat 3500 series marine gas engines from its Lafayette, Indiana manufacturing facility. Five Cat G3516 marine engines were selected to power the Becker Marine Systems subsidiary, Hybrid Port Energy, LNG-Hybrid Barge, reported to be the world's first LNG-powered barge in the Port of Hamburg. The LNG-Hybrid barge will provide shore power to cold ironing cruise ships and serve as a backup power provider for the local Hamburg electric power and heat grid.

Scott to Keynote @ ShippingInsight

September 30 - October 2, Stamford, Connecticut

Edward Scott, COO of Excelerate Energy, will deliver the keynote address at the SHIPPINGInsight 2014 Marine LNG Symposium, Sept. 30 in Stamford, Conn.

The Marine LNG Symposium is a forum dedicated to all aspects of conversion to LNG as a marine fuel. The full day of discussion immediately precedes the two-day SHIPPINGInsight Fleet Optimization Conference & Exhibition, Oct. 1-2.

Scott's topic – "LNG–New Reality or Simple Evolution" – will set the stage for the symposium, which will include sessions addressing regulatory issues, infrastructure, bunkering, designing and building new LNG-powered ships, retrofitting existing ships and training requirements for handling LNG fuels. Speakers will include experts from all industry sectors. As chief operating officer of Excelerate Energy, Scott is responsible for the implementation of the operations as well as technical and administrative initiatives of the company.

www.shippinginsight.com

BMT Fleet Technology Names Byrtus President

BMT Fleet Technology appointed Darcy Byrtus as President. Byrtus joins BMT from General Dynamics Canada where he held the post of Director of Business Development for Naval Programs and Project Management. There, he was responsible for the strategic planning, opportunity identification and pursuit for all naval programs and for the promotion of General Dynamics' capabilities to the Canadian Department of National Defense. With a dual Masters in Naval Architecture and Mechanical Engineering from MIT and a degree in Physics and Oceanography from Royal Roads Military College, he served in the Royal Canadian Navy as a Marine Systems Engineering Officer, a Ship Naval Architect and an Engineering Manager.

Byrtus

3SUN Group Appoints Dawson Chairman

3sun Group, a provider of products and services to the global energy industry, appointed Les Dawson OBE as Chairman of the Board of Directors. Operating in the oil and gas and wind sectors both onshore and offshore, 3sun Group is an established supplier of control panels for offshore oil and gas subsea and platform applications, as well as the installation, inspection and maintenance of wind turbines. Dawson's role as chairman will underpin the company's growth plans and commitment to delivering a high-quality, fully-integrated service from launch to completion.

Dawson

Colfax Names Bramstång Sales Director

Colfax Fluid Handling, a business of Colfax Corporation and company in fluid-handling solutions for critical applications, named Carl-Henrik Bramstång Sales Director, Shipowner Sales. His new role will include the sales efforts for the company's latest technology breakthrough, the Smart Technology CM-1000 Series, an intelligent controller for sea water cooling systems.

Bramstång

Nordic American Offshore Appoints CEO

Nordic American Offshore Ltd. (NAO) announced that Tor-Øyvind Bjørkli will join the company as CEO, effective April 1, 2014. Tor-Øyvind will be working from out of the Oslo office on the same premises as Orion Tankers; the chartering department of Nordic American Tankers Limited (NAT). A subsidiary of Nordic American Tankers is the manager of the recently established Nordic American Offshore Ltd. (NAO). Tor-Øyvind graduated from Vestfold University College with a Bachelor of Science degree in Marine Engineering in 1992. He completed the Royal Norwegian Naval Officer Training School in 1993 and his Master of Science degree at Norwegian University of Science and Technology (NTNU) in 1999.

MPT Names Stiles VP, Curriculum

Maritime Professional Training appointed Al Stiles as the school's Vice President of Curriculum Development in a newly expanded role focused on broadening MPT's course offerings in both on-campus and e-learning online settings. MPT is the largest private maritime training school in the U.S. with a range of course offerings and class schedules. The school opened in 1983 and serves more than 10,000 students per year providing training for mariners pursuing careers in both the commercial and yachting maritime industries. Stiles most recently worked with the Department of Justice for eight years as the Enterprise Learning Technologies Program Officer. He previously also served as Director for the Center for Instructional Technology at the Department of Health and Human Services and as the Advanced Learning Program Officer/Chief Human Capital Office in the Department of Homeland Security. Additionally, Stiles served 20 years in the U.S. Coast Guard.

Kobelt Hires Business Development Managers

Kobelt announced the hiring of Lance Lidstone and Sylvain Robitaille as Business Development Managers. Both will report directly to David Bockhold, CEO, and will be responsible for business development in the controls and steering sectors worldwide. Lidstone comes to Kobelt with over 30 years of experience in technical sales and engineering roles with Wagner, Jastram and AMT. Robitaille also comes to Kobelt with an in-depth understanding of marine technology and over 12 years of experience in electrical wiring, field installation, operations and project management, as well as an executive role in sales and marketing with Techsol Marine.

Checchi Named VP at MOL America

MOL (America) Inc. said that Michael Checchi will enter the position of vice president, area operations, where he will lead MOL's equipment, intermodal services, contract management, and operations administration groups for the United States and Canada. He will report to Richard Craig, executive vice president for sales and operations.

Mitsubishi Announces $580m Cruise Ship Loss

Mitsubishi Heavy Industries, Ltd. (MHI) said it would book an extraordinary loss of $580.6m from its cruise ship business. In November 2011 MHI received an order for two large-sized cruise ships for the AIDA Cruises brand. Based on its previous experience building cruise ships, the company set up a project to facilitate prompt implementation of measures necessary for the newly ordered ships' construction. As work proceeded in the actual construction phase of the project, difficulties involved in the construction of the prototype became evident. Moreover, the volume of design work relating to the cruise ships cabins and other areas has been vast and significant design changes have been made, with the combined result of a delay in the design work. The delay translated not only to increased design costs but also to negative factors in terms of additional material procurement, construction schedule, etc.; and these adverse influences have eroded the originally planned cost structure.

ClassNK Registers First US-flagged Ship

ClassNK announced that it has classed its first United States-flagged ship. The vessel, newly named MT SLNC PAX, owned by Schuyler Line Navigation Company, LLC (SLNC), is classified as an oil tanker and chemical tanker with IMO type II & III, and will be operating in the U.S.-flag cargo preference service.

"We are very pleased to be working with ClassNK as they have been knowledgeable and diligent in issuing class certificates for the MT SLNC PAX in the US registry,@ said Russell Paret, President of SLNC said. ClassNK was granted the authorization to carry out statutory survey for U.S.-flagged ships from the United States Coast Guard (USCG) in 2011 for the first time for the Load Line (LL) and Tonnage (TM69). It was granted extended authorization on December 2012, enabling ClassNK to render a full range of services for survey and certification for the SOLAS, MARPOL and AFS conventions, as well as to perform ISM Audits on behalf of the United States flag administration. This service commenced with the classification of the MT SLNC PAX.

(Photo: ClassNK)

ASRY, ABB Industries Sign Agreement

ASRY reports signed a cooperation agreement with ABB Industries (LLC), Dubai, a division of ABB Turbocharging, a leader in the manufacture and maintenance of turbochargers for two-stroke and four-stroke engines for various types of vessels. The agreement

Modern Solutions Power Systems Conference

Thomas Alva Edison, who is considered to be one of the most prolific inventors in history, once said, "I find out what the world needs. Then I go ahead and try to invent it." His invention of the long-lasting electric light bulb was exactly what the world needed and has revolutionized the way we live today. Since then, the explosive growth of the electric power industry has brought about as many challenges as it has accomplishments. What the world needs now are solutions for the critical issues affecting modern power systems.

Schweitzer Engineering Laboratories, Inc. (SEL) recognized this need and wanted to create an environment where these critical issues could be discussed, where people from multiple industries could converge to share their knowledge, and where today's ideas could become the foundation for the future.

The result is the Modern Solutions Power Systems Conference (MSPSC), a conference that brings engineers, managers, executives, and technical experts into an atmosphere that fosters the collaboration, innovation, and creation needed to carry power systems smoothly into the future. This year MSPSC will be held June 3-5 in Houston.

The opening keynote speaker is **Dr. Edmund O. Schweitzer III** (pictured), president of SEL and pioneer of the microprocessor-based protective relay industry. Dr. Schweitzer will discuss the importance of maintaining simplicity in an increasingly complex world.

Throughout this three-day event, there will be several sessions, led by panels of industry experts, which will examine today's key issues, including the benefits of islanding, the effects of standardization, and how humans factor into cybersecurity. MSPSC participants are encouraged to ask questions and push the boundaries of organizations, industries, politics, and trends.
To register for this event, visit www.selinc.com/modernsolutions.

www.shippinginsight.com

ASRY signs ABB pact: Magdy Mustafa, Nils Kristian Berge, John Fyfe

will see ABB open a new workshop in ASRY, provide international factory warranties from ASRY, and provide onsite accessibility for ASRY customers to ABB's worldwide Service Network. ASRY Chief Executive, Nils Kristian Berge, called it a "landmark agreement by which ASRY can expand its provision of quality services to its wide range of global customers."

Herbert-ABS Opens Korea Office

Herbert-ABS Software Solutions LLC, a company in marine regulatory, load management, salvage and ship design software, said it has opened an office in Busan to reinforce support for Korean-based shipyards, as well as improve the quality of service to this key market. Herbert-ABS also has an office in Shanghai and earlier this year expanded into Singapore. The Busan office will be led by Arnold (Woo-Sung) Cho, Marketing and Sales Manager, whose primary focus will be to strengthen relationships with the Korean yards. Cho's activities will also consist of representing Herbert-ABS at industry conferences, to include Gastech, 24-27 March in South Korea at stand G360.

Henrik Uhd Christensen

VIKING Powers Ahead in Tight Market

Viking Life-Saving Equipment A/S announced its 2013 financial results, reporting growth in both turnover and profits for 10 straight years. In reporting it said it has "once more beaten the odds in an industry plagued by reductions in passenger and cargo ship newbuilds, falling exchange rates in key markets and downward price pressure."

Adjusted for falls in the U.S. dollar exchange rate, currencies pegged to the dollar, and European member state non-euro currencies, the company's turnover for 2013 increased 6 percent to DKK 1.612 billion, Viking said. Profit before tax grew more than 20 percent to a record DKK 141.2 million.

"Our earnings have now reached an appropriate level for a healthy manufacturing company," said Viking CEO Henrik Uhd Christensen. "In 2013, Viking achieved moderate growth in turnover, and the increased profit level primarily reflects internal improvements. We have, in fact, been able to reduce the costs of administration, logistics and production while simultaneously strengthening customer service."

He points to the Viking Shipowner Agreement, where his company offers to take care of all aspects of a shipowner's safety equipment and servicing tasks for predictable, transparent prices. It's a concept that addresses shipowner needs for flexibility at a time where access to financing is limited, and has quickly become the industry's gold standard since its launch four years ago. With its broad product portfolio, Viking has also been able to compensate for slower activity in some market segments by expanding in more promising ones. Here the offshore industry stands out, with growth rates fueled by continued high oil prices. VIKING expects to see growth both in turnover and profit during 2014.

GTT North America (GTT-NA), the Houston-based subsidiary of French engineering and technology company Gaztransport & Technigaz SA (GTT), received approval in principle from ABS for the design of a 2,200 cu.m. liquefied natural gas (LNG) bunker barge. The design incorporates GTT's membrane Cargo Containment System (CCS), which is used in 70% of the global LNG carrier fleet and nearly 90% of LNG carrier projects on order. GTT developed the membrane LNG bunker barge to demonstrate the efficient storage of LNG and safe, reliable management of Boil-Off Gas (BOG) in an unmanned push barge application. The barge was designed for use in bunkering operations including ship-to-ship LNG transfers or LNG bulk transport in US inland waterways, harbors, and intra-coastal service. The barge could operate as a mobile refueling resource or be moored temporarily to serve as a refueling station.

The CCS selected for the barge was GTT's proprietary Mark III Flex system, an enhancement of the Mark III system that allows for improved thermal and structural performance of the CCS. The Mark III membrane CCS consists of a cryogenic liner directly supported by the vessel's inner hull, which allows for maximum volumetric utilization of the available cargo space. This liner is composed of a primary metallic membrane fastened atop a prefabricated insulation panel that includes a complete secondary membrane.

The GTT membrane LNG bunker barge will be capable of loading 2156 cu. m. (at 98%) or 570,000 gallons within 4.5 hours and towed at maximum speed of 8 knots. It will measure 212 x 48.5 ft. (64.2 x 14.8 m), with a 15.7 ft. (7.2 m) depth and a 8.5 ft. (2.6 m) fully loaded design draft. The dimensions and gross tonnage of approximately 1,440 GT afford the LNG bunker barge greater maneuverability and access throughout inland and intra-coastal waterways.

A distinguishing feature of the GTT membrane LNG bunker barge is the management of natural BOG through small-scale reliquefaction units. The StirLNG-4 cryo-cooler unit from the Netherlands-based Stirling Cryogenics was the basis of the boil off management system design.

Alameda, Calif.-based Herbert Engineering Corp. (HEC) was commissioned to develop the hull and preliminary machinery design scope and Houston-based CH-IV International to develop the cargo handling system (CHS) design scope. ABS Consulting also assisted in the development of the GTT membrane LNG bunker barge project.

RAL Contracted for Teekay FSO Conversion

Robert Allan Ltd. announced that it was selected by Teekay Shipping (Canada) Ltd. to provide the contract engineering package for the conversion of the M/V Navion Clipper from a shuttle tanker into a Floating Storage and Offloading (FSO) unit.

Teekay Offshore Partners LLP, a subsidiary of Teekay Corporation, was awarded a contract in 2013 to supply a FSO unit to the Bualuang Field in the Gulf of Thailand. The contract is for a 10-year charter, with extension options. The oilfield is operated by Salamander Energy and has been in production at this site since 2008. The scope of work from Robert Allan Ltd. includes the design of the crude oil export and import systems (turret design and supply by London Marine Consultants),a new helideck capable of landing a Sikorsky S61N helicopter, accommodation and systems modifications to suit an increased crew complement, produced water-handling and delivery systems, materials handling systems, offshore crane support structures, upgrades to the fire and foam system and safety systems, and on-going construction support services. The FSO System is designed to stay continuously moored on site for an initial period of up to 15 years without dry-docking, and to withstand the 100-year storm environmental criteria.

With a storage capacity of 480,000 barrels, the FSO will be capable of accommodating peak production throughput of 20,000 barrels per day of Bualuang crude oil, while discharging at the rate of 20,000 barrels per hour simultaneously to a tanker from a stern-mounted offloading hose. It will have dedicated settling tanks and storage tanks. The FSO will be moored by an external turret Single Point Mooring (SPM) with weathervane capability through 360°.

Imtech Opens Middle East Training Center

Imtech Marine has expanded its training facilities in the Middle East with a new training center in Sharjah, United Arab Emirates. The training center, hosted by Imtech Marine's company Radio Holland Middle East, has started with a type specific ECDIS Training Course for Navigators and Masters to meet the high demands for ECDIS familiarization.

The Imtech Marine Training Center offers this type specific training course as a turnkey solution for safe maritime purposes to the global shipping industry, upgrading navigators and masters with specific knowledge of the functionality and effective use of ECDIS. The training center is equipped with Furuno FEA and FMD stations, supported with simulated surroundings and open sea areas. The program of the training course has been designed according to the IMO regulations and is kept up-to-date with the current flag state requirements.

(Photo: Imtech Marine)

Intertek Invests in O&G Lab in Abu Dhabi

Intertek expanded its Exploration and Production services in the Middle East by investing in a new £1.4 million facility in Abu Dhabi. The laboratory will house cutting-edge equipment that will enable the organisation to provide high-specification testing for oil and gas customers in the region. Located in Musaffah, the laboratory will provide reservoir characterisation services including core analysis to support critical testing for oil and gas clients. The facility comprises three

ABS Approves Design for GTTNA's LNG Bunker Barge

AWARD WINNER

Rolls-Royce Wins Heyerdahl Award

Rolls-Royce has been awarded the maritime Heyerdahl Award 2014. The award was presented by His Majesty King Harald at the Norwegian Shipowners' Associations Annual Conference in Oslo March 31.

The award goes to the Environship Concept, an innovative ship design which integrates a highly efficient gas-based power and propulsion system with an innovative hull design to provide significant reductions in emissions.

The committee, chaired by Secretary General of the International Chamber of Shipping (ICS) Peter Hincliffe, said in its reasoning that Rolls-Royce had taken a holistic approach to vessel design and has succeeded in combining a number of innovative solutions that increase energy efficiency and contribute to significant reductions in emissions. The committee emphasized that the measures are adaptable for a broad range of ship types and have the potential to reduce emissions from many segments of the worldwide fleet. Helge Vatnehol, Managing Director of Rolls-Royce Marine AS in Norway, received the award on behalf of Rolls-Royce: "We strongly believe that to succeed in making emissions reductions, several types of environmental technologies have to be combined. This is the basic idea behind our Environship concept and it is therefore a great pleasure and very inspiring to receive this recognition."

The Thor Heyerdahl International Maritime Environmental Award was launched in 1999 by Thor Heyerdahl (1914–2002) and the Norwegian Shipowners' Association. The prize recognizes candidates who have demonstrated exceptional technical innovation and environmental work in keeping with Thor Heyerdahl's desire to promote the conservation of the marine environment. Emphasis is placed on measures that combine environmental benefits with improved profitability. The Norwegian Shipownwers' Association (NSA) holds the secretariat for the award.

Raymond Pirie, VP of Intertek's global Exploration and Production business line, at one of Intertek's laboratories

buildings which extend to approximately 1,300 square metres, housing a wide range of specialised equipment and instrumentation.

This investment will include the installation of advanced testing equipment, as well as the employment of up to 10 scientific staff from the local region. Intertek will also bolster the new Middle East operation by transferring key skills from its international network of experts.

"Fluid and rock characterization provides valuable data associated with the development of new and existing oil fields," said Raymond Pirie, Vice President of Intertek's global Exploration and Production business line. "We focus on gaining a deeper understanding of reservoirs to assist our customers in enhancing and improving oil and gas recovery processes. The new facility in Abu Dhabi will allow us to deliver services locally and minimise the need to transport samples out of country.

DNV GL Building Service Targets Fuel Efficiency

DNV GL launched a new service named Build2Design to help shipyards and ship owners improve the fuel economy of their ships by reducing variations in their building process. Significant improvements have been achieved in the design of more fuel-efficient ships in recent years. The performance of these Eco-Ship designs has been documented by both Computational Fluid Dynamics (CFD) and tank testing and some designs have also proven their performance in operation. However, questions have been raised about variations in performance and research has now shown a wide variation in different ships of the same design.

(Photo: DNV GL)

"We have compiled data that shows there is a large variation in fuel consumption between ships of the same design. This has led us to develop a new service, Build2Design, which aims at ensuring that the actual ship delivered is as good as its design," said Michael Aasland, Business Director for Bulk Carriers at DNV GL.

Dr. Olav Rognebakke, Head of Hydrodynamics at DNV GL, added, "Build-2Design is based on a solid theoretical foundation combined with the latest technology and uses advanced CFD calculations to identify the parameters that affect fuel consumption and the effect of each individual parameter."

From the first pilot project carried out on the Green Dolphin 38 design, a conservative estimate shows that a saving of 2% can be achieved, which equates to 80 metric tons of fuel/year and a saving of $50,000/year. Corresponding figures for a typical Capesize bulk carrier are 200 metric tons of fuel/year and a saving of $120,000/year.

Auto-Maskin Opens Houston Office

Auto-Maskin, makers of the Marine Pro range of diesel engine controllers, opened a new regional office in Houston to support the expansion in the marine and oil and gas sectors in North America. The facility in Houston will be staffed by sales, engineering, application, aftermarket and commissioning resources, backed up by the HQ in Norway.

With a comprehensive local inventory of parts for both new project sales or replacement parts for the extensive equipment population already in North America, the team of Auto-Maskin employee's will be able to provide extensive services to both new and old customers. In conjunction with the announcement, the company appointed Geary Long as regional sales manager.

Long has more than 30 years of solution sales, power plant operations, and maintenance services experience. His unique blend in diverse roles of increasing responsibility, combined with technical expertise and multi-functional market knowledge, has allowed him to strategically set and attain market and sales goals during his tenure with past companies.

(Photo: Intermarine

Intermarine Open Houston Ship Channel Ops Center

Intermarine, LLC, opened its state of the art Operations Center at Industrial Terminal on the Houston Ship Channel. The Operations Center is located at 14035 Industrial Road in Houston, Texas, and is a five story, 13,311 sq. ft. building just 200 ft. from the Houston Ship Channel. The fourth floor houses a customer center with floor to ceiling windows and premium audio visual equipment from where customers will have sight lines to all of our main docks.

NewLead Buys Two Bulk Carriers

NewLead Holdings Ltd. executed definitive agreements for the acquisition of two eco-type 31,800 dwt, Handysize bulk carriers built in 2012 for a total acquisition price of $37 million.

The two eco-type vessels are expected to be delivered in NewLead by the end of June and July this year. Upon completion of this acquisition, NewLead will own five dry-bulk vessels, consisting of three Handysize and two Panamax vessels.

Rolls-Royce Training Center Opens in Brazil

To better support marine customers in South America, Rolls-Royce opened a new training center in Brazil, to cater for customers operating the large number of vessels with Rolls-Royce systems that work in country's deep water oil and gas fields.

The center is located at the existing Rolls-Royce Marine Services site in Niteroi, just outside of Rio de Janeiro. It will provide a wide range of training programs, initially in support of winch and dynamic positioning (DP) operations – in which satellite technology automatically controls a vessel's propulsion system to maintain position in heavy seas.

Paulo Rolim, Rolls-Royce, Country Manager – Marine, Brazil, said, "The provision of training to our customers in Brazil is critical in ensuring their ability to maximize the value and full potential of the equipment and systems onboard their highly complex vessels.

Damen Opens JV Yard in Vietnam

On March 20, 2014, Vietnamese Minister of Transport Nguyen Hong Truong, cut the ribbon for the latest addition to Damen Shipyard Group's portfolio. Damen Song Cam is a new yard, and is one of the largest in the group and represents Damen's first formal Joint Venture yard in Vietnam.

Damen said Song Cam is considered state-of-the-art, bringing a western shipyard designed to meet European health, safety and environmental standards into a Vietnamese environment. The yard will produce around 40 ships per year in phase one. Damen has an established history in Vietnam and has been working with five shipyards for more than 12 years.

"We have successfully built 226 vessels in Vietnam with our partner yards," said Pim Schuurman, Managing Director of Damen Holding Vietnam. "Vietnam has a lot of shipbuilding knowledge, the people are very hard working and in the next stage of Damen's Vietnam journey we are looking forward to having our own Joint Venture shipyard, which has been designed to maximize efficiency."

With direct access to open sea, the new yard is based on a 43-hectare site, of which 500m is directly alongside the River Cam. The yard has a 120 x 85 m outfitting hall, plus extensive paint and carpentry workshops.

Damen Song Cam's shipbuilding hall is in fact a dedicated outfitting hall, with three 25 metric tons overhead cranes over every bay. Swing arms on the top of the vessels give access to power, oxygen and compressed air. A Rolls-Royce Syncrolift shiplift, with a platform of 60 x 24 m, is also on site. And directly next to the site of Damen Song Cam there is another 43 hectares, which will be developed as a maritime industrial zone.

Currently 300 people work at Damen Song Cam. Phase 2 envisions 80 vessels per year and 800 employees. Damen works with Song Thu (Da Nang), Song Cam/Ben Kien (HaiPhong), 189 (HaiPhong) and Ha Long Shipyard (Ha Long). Recently, the original Song Cam Shipyard merged with Ben Kien and this organization is owned by Shipbuilding Industry Corporation (SBIC), formerly known as Vinashin. By the end of 2014, Damen will have formed a joint venture with the newly merged company Song Cam/Ben Kien, as well as with Ha Long.

www.damen.com

BASS Management Team from left: Haakon Dalan, Per Steinar Upsaker, Martin Bjornebye, Mark Ravi, Nyuk Lan Wong, Rajesh Purkar and Jaume Mortensen.

BASS Launches its Latest Fleet Management System

BASS introduced the BASSnet 2.9 Fleet Management System during the recent Asia Pacific Maritime event in Marina Bay Sands, Singapore. BASSnet 2.9 now features new modules such as Environmental Management, Port Forms Management and Excel Forms Management. In the era where messaging tools are increasing in popularity, the 2.9 release also features the 'My Discussions' feature which allows Users to a create topics of discussions in a 'chat room' style environment in relation to specific records in the System. The new "Maintenance Cost" feature covers all bases in the Maintenance module as with the inclusion this powerful feature Users can quickly generate either the 'Forecast' or 'Actual' maintenance cost incurred for Jobs, Material and/or Resource.

To ensure compliance with the ever-changing guidelines related to crew safety, BASSnet 2.9's Work & Rest Hours module has now been enhanced to ensure compliance with the OPA90 regulation.

Environmental

In 2013, the International Maritime Organization (IMO) mandated the need for all vessels to comply with an energy efficiency plan. By 2015, IMO plans to implement new sulfur emissions targets for all vessels in order to reduce CO2 emissions. Built on the Microsoft .NET platform, BASSnet Environmental Management module was designed to meet the maritime industry's aim of reducing a vessel's impact on the environment. With BASSnet's Environmental Management Module, Users can track all information pertaining to the calculations for environmental emissions based on date ranges and voyage legs. This data can then be used for comparison and for generating environmental impact trends. This helps shipping companies, ship operators and ship personnel to calculate the amount of pollution created compared with the cargo carried and the distance sailed; hence helping to manage and reduce fuel consumption and lower greenhouse gases and other emissions.

Port Efficiency

BASS also considered the complexity of Port operations, which involves a tedious amount of administrative work which is time consuming. With this in mind, BASS developed the new Port Form Management module which contains a repository of country-specific port forms for pre-arrival clearance to be tendered to the immigration, customs, health and security authorities at a port, and for statutory bodies such as the International Maritime Organization. The Port Form Management integrates with other BASSnet modules to auto-populate the forms with relevant data that is required for reporting. Print-out the relevant port-specific forms that will be required at a particular port and also store and print non-port related forms such as Environment related forms, class related

BASS
Streamlining Maritime Operations

Per Steinar Upsaker, Chief Executive Officer and Managing Director

forms, regulatory forms and so on. The module also contains company-specific forms, and forms can even be imported in any document formats allowing the BASS Customer Community to work hand-in-hand to share Port Form templates.

"BASS is foreseeing the future technology in reducing paperwork involved in order to create a green environment. We are pleased to introduce our solution to meet the imminent needs," said BASS' Chief Executive Officer, Per Steinar Upsaker.

BASS prides itself in creating and designing tools to generally simplify the work-load of the average user while maintaining a paperless workplace. With the new Excel Forms Management feature, users can now create as many forms as they require using Microsoft Excel. These forms can then be linked to various records in the system, for instance, link a form to a job order in the maintenance module and uers can access and fill them up during the reporting process. The values entered in the form will then be captured and stored as a record in the BASSnet Documents' Record Manager.

Redesigned HR Manager

Another enhancement in BASSnet 2.9 is the newly improved and re-designed BASSnetTM HR Manager which now fully complies with MLC, 2006 i.e. the Seafarers' Bill of Rights which aims to ensure that seafarers' rights are covered by providing a safe and secure workplace with safety standards, fair terms of employment, social conditions and decent working and living conditions. The enhanced Work & Rest Hours feature and the HR Manager's Payroll module for instance, meets the International Labor Organization (ILO) standards. Complaints reported on the fleet can now be logged in the system and recorded based on vessel and persons involved.

E: Bee-lin.lee@BASSnet.no

Pipe-joining Techniques Examined:

A Comparison of Mechanical Pipe Coupling and Flanging for Shipboard Applications

Didier Vassal, Vice President OEM and Maritime Services at Victaulic, compares the flanged and grooved pipe-joining methodologies and explains the advantages that grooved pipe joints provide over flanges.

Efficient piping systems are essential for the range of services needed on board a vessel including secondary systems such as bilge and ballast systems, sea and fresh water cooling, lube oil, fire protection and deck wash.

For these systems, where piping class permits, an effective pipe-joining alternative to welding/flanging is the use of grooved mechanical joints which offer a range of technical, economic and practical benefits. These include enhanced performance; faster, simpler installation and maintenance and weight reduction on board.

Performance Issues

In a flanged pipe joint, two mating flanges are bolted together and compress a gasket to create a seal. As the bolts and nuts of a flanged joint absorb and compensate for system forces, over time the bolts and nuts can stretch and lose their original tightness due to pressure surges, system working pressure, vibration and thermal expansion and contraction. When these bolts experience torque relaxation, the gasket will lose its compressive seal, which can result in varying degrees of leakage.

Depending on the location and function of the piping system, leaks can be costly and hazardous, resulting in maintenance/repair downtime and exposure to risk. Gasket replacement will be required when the joint is taken apart, as the gasket will bond to the flange faces during the course of time. When the joint is disassembled, the gasket will need to be scraped from both flange faces and these surfaces will need to be cleaned before the gasket is replaced, again increasing maintenance downtime. Due to the bolting forces along with system expansion and contraction, flange gaskets can also develop compression "set" over time, presenting another cause of leakage.

The design of a grooved mechanical pipe joint overcomes these performance issues. A groove is first formed in the pipe end and the piping connection is secured by a coupling which houses a resilient, pressure-responsive elastomer gasket. The coupling housing fully encloses the gasket, reinforcing the seal and securing it in position as the coupling engages and forms a positive interlock into the pipe groove. The latest coupling technology enables pipes up to 24" (600mm) in diameter to be fully assembled with only two nuts and bolts in order to secure the self-restraining joint. The mechanical joint creates a triple seal due to the design relationship between the pipe, gasket and housings, which is enhanced when the system is pressurized.

Couplings are most effective in attenuating noise and vibration.

Rigid and Flexible Couplings

Available in both rigid and flexible forms, grooved mechanical pipe couplings are Class Society Type Approved, and may be used in lieu of welded/flanged methods in 30 systems, subject to installation criteria established by each certifying agency.

Rigid couplings are used, for example, around areas such as manifolds and valves, where they offer easier access and replacement than flanges. By nature of their design, rigid couplings also provide axial and radial rigidity comparable to flanged or welded joints.

Flexible couplings have advantages in applications where relative movement between the pipe and supporting structure is anticipated, in addition to pipe movement resulting from thermal expansion or vibration. Expansion and contraction can stress the flange and piping, which can compromise the gasket over time. When this occurs, the joint is at risk of leaking. Grooved flexible couplings can accommodate pipe displacement in the form of axial movement or angular deflection. For this reason they are ideal for installing long piping runs especially between blocks where high seas can cause flanges to loosen over time, resulting in leaks and the risk of pipe separation. Both rigid and flexible couplings also provide the benefit of noise and vibration attenuation, eliminating the need for specialised noise reduction components and perishable rubber bellows or similar items.

Using a mechanical grooved piping system can speed up and simplify both installation and maintenance and improve the efficiency of onboard piping systems.

Ease of Installation

On initial installation, bolt holes of a flange must be precisely aligned and then tightened to hold the joint. The bolt-hole index on equipment inlets and outlets must also line up perfectly with the flange on the piping to be connected to the unit. With only one of a number of fixed positions determined by the number of holes in a flange, a fitting or valve can only be rotated to match the bolt holes. Additionally, the opposite end of the flanged pipe must also line up with its mating flange, which further increases assembly difficulty and the risk of misalignment.

Grooved piping systems do not have this problem and allow much more convenient installation with a full 360-degree rotation available for the pipe and mating components. There is no bolt-hole pattern to line up, and a coupling can be oriented at any position around the joint. The coupling can be rotated around the pipe to provide easy access to the bolts and simplify access to the equipment.

In addition to eliminating misalignment during installation, a coupling's 360-degree orientation capabilities, together with its smaller profile compared to a flange, make the installation of grooved systems ideal for confined spaces.

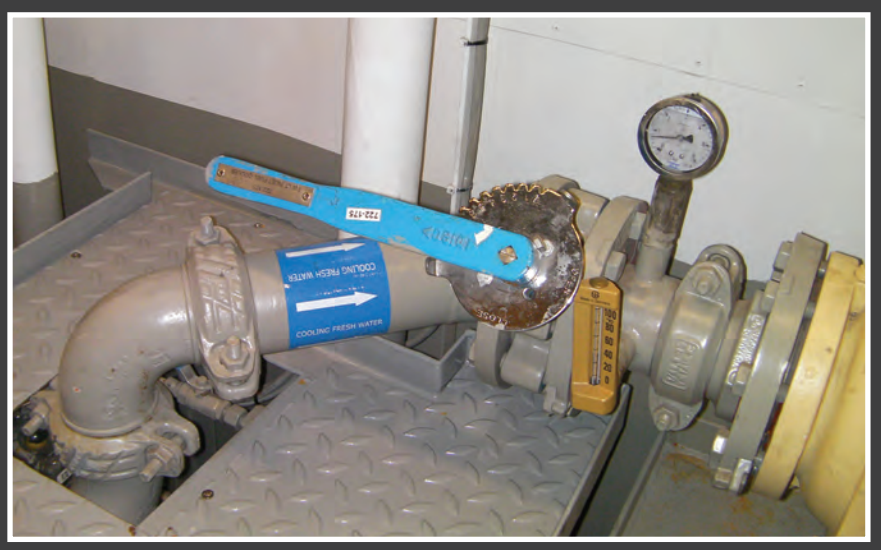
Additionally, the installer can orient all of the assembly bolts on each joint in the same position to ease system inspection and maintenance.

Flanges are roughly twice the outside diameter of the pipe they are attached to. On average, grooved couplings are only half this size. The size advantage of the smaller design makes the grooved system ideal for jobs where space is limited, such as deck and wall penetrations - a fact recognised as far back as the 1930s when Victaulic couplings were originally used in U.K. shipyards.

Speed of Assembly

Because couplings have fewer bolts and no torque requirements up to 12" (300mm), grooved piping is much faster to install than flanging. Unlike flanges that must be welded to the pipe end, grooved valve assemblies do not require welding, which further cuts installation time and eliminates potential heat damage to the valve while also reducing safety risks by eliminating hot works.

A comparison of a DIN 150 ballast line



Deck penetration: the small size of grooved components makes them ideal for jobs where space is limited.

Weight reductions by using grooved pipe couplings instead of flanges are achievable across a range of pipe sizes.

installed using Victaulic grooved products versus traditional joining methods showed a 66% reduction in total installation time required (150.47 man hours vs. 443.16 man hours). The time needed to install 52 slip-on flanges and weld elbows and tees compared with 60 rigid couplings showed the largest time differences.

Couplings require just two bolts up to 24” (600mm) pipe size. For comparison, at the higher size range a flange would require a minimum of 20 sets of nuts and bolts.

In addition, flanges require time-consuming star pattern tightening with specialised wrenches to measure and ensure that correct torque specifications are achieved. Grooved pipe technology allows couplings to be assembled using standard hand tools and the joint is properly installed once the mating bolt pads of the coupling housings meet metal-to-metal. A simple visual inspection confirms correct assembly. Flanges, on the other hand, do not provide visual confirmation: the only measure to ensure proper assembly is to fill and pressurise the system, check for leaks and retighten the joints as needed.

Maintainability

The same characteristics of grooved piping systems that accelerate installation—fewer bolts and no torque requirements — also make system maintenance or alteration a quick and simple task. To gain access to a pump or valve, for example, the two bolts of the coupling are loosened, and the housings and gasket are removed from the joint. In a flanged system, multiple bolts need to be removed. The same time-consuming bolt-tightening sequence required upon initial installation is also required upon reassembly of the flange.

Because they do not require retightening, couplings eliminate much of the routine maintenance associated with flanges. Unlike a flange that puts variable stress on the gasket, nuts and bolts, a coupling holds the gasket in precise compression from the outside of the pipe joint. Additionally, since coupling gaskets are not subjected to high compressive forces, they do not need to be replaced on a regular maintenance schedule, while flange gaskets need to be replaced when the system is disassembled for maintenance.

To attenuate system noise and vibration, flanged systems require rubber bellows or braided flexible hoses. These items can fail due to overextension and, with normal wear, need to be replaced every 10 years on average, incurring cost and system downtime. Mechanical grooved pipe couplings, however, last the life of the system. Their ability to accommodate system vibration reduces the risk of joint failure, without the need for speciality products that require periodic repair or replacement. The resilient elastomeric gasket contained within both flexible and rigid couplings is very durable and can handle significant operating pressures and cyclical loading. A system can be pressurized and depressurized repeatedly without fatiguing the elastomer gasket.

Weight reduction

Valve assemblies are typically constructed with flanged components. However, this joining method can add unnecessary weight to a piping system. A 6” (150mm) flanged valve assembly constructed with a lug butterfly valve, connected with weld-neck flanges and eight bolts and nuts on each side of the valve, weighs approximately 85 lbs. A 6” (150mm) valve assembly that utilizes a grooved-end butterfly valve, grooved-end pipe and two rigid couplings to connect the components weighs approximately 35 lbs, representing a 58% weight reduction over the flanged assembly. A grooved valve assembly is therefore, an ideal alternative for the shipbuilding industry.

The above-mentioned comparison of a DIN 150 ballast line installed showed a weight reduction of 30 percent (2,164 lbs vs. 3,115 lbs) when Victaulic grooved products were used instead of traditional joining methods. The 52 slip-on flanges, bolt sets and gaskets, versus 60 rigid couplings accounted for major weight increases in the welded/flanged system.

Weight reductions by using grooved pipe couplings instead of flanges are achievable across a range of pipe sizes. The magnitude of the reduction depends on the pipe diameter and type of coupling used. In tests where piping was connected using one Victaulic Style 77 coupling – the heaviest coupling in the range – compared with two light-weight PN10 slip-on flanges the total installed weight of the grooved assemblies was significantly lower. Weight reductions were recorded as follows: 4” (100mm) – 67 percent; 12” (300mm) - 54 percent; 20” (500mm) – 60.5 percent.

With the lighter-weight flexible Style 75 or rigid Style 07 couplings and/or a heavier type of flange, weight reductions of 70% are easily achievable. As an example, a 24” (600mm) flanged set for a TG2 system would weigh 507 lbs but a comparable assembly using Victaulic couplings would weigh only 88 lbs. Shipyards that have used grooved couplings in preference to flanges on selected systems have recorded weight savings of 12 tons on offshore support vessels and 44 tons on cruise ships.

The economic benefits of grooved technology to ship owners are clear: less weight means more cargo or passengers and less fuel consumption. It makes the handling of piping systems on board easier as well.

Growing Trend

Grooved piping systems can offer significant advantages over their flanged equivalents because of their speed of installation, maintainability and reduced weight. These characteristics, coupled with additional benefits such as reliability, ease of alignment and lower safety risks, are leading owners, engineers and shipyards to choose grooved mechanical systems instead of flanges.

This growing trend towards the use of grooved technology is supported by suppliers of equipment such as heat exchangers, box coolers and chillers, along with valve and compressor manufacturers, many of whom are now providing their products with grooved end connections. The range of services where grooved pipe couplings may be used is steadily increasing. Building on successful applications in water systems, Victaulic is continuing its long history of innovation to develop fire-resistant gaskets and gain Type Approval for their use on maritime fuel services.

Luxury Yacht Design Takes a New Tack

Simutech Solution Corp. uses realistic simulation to craft a better boat

While it's widely recognized that HTC smartphones, Garmin GPS devices and a sweeping array of big-brand laptops are staples of the Made in Taiwan effort, it's a lesser-known fact that luxury yachts (those measuring 80 - 120 ft. are a booming business in Taiwan.

Producing high-quality boats at comparatively low prices, Taiwan's luxury yacht industry reached a peak in 1987, exporting 1,755 vessels for an export value of more than $190m. However, rising labor costs and the appreciation of the Taiwanese dollar took its toll over the years, and the industry had to weather its share of storms.

However, Taiwan's luxury yacht sector is back on course, with the country surpassing Germany as the sixth largest yacht maker last year, according to yachting magazine *ShowBoats International.*

With an E-Composites report pegging growth for the global recreational yacht market at an annual rate of 7% between 2005 and 2012, the Taiwanese luxury yacht sector has been looking to shore up its position and head off international competition from traditional sources, as well as Chineses. To do so, the country's Economic Planning and Development committee has identified luxury yacht production as an emerging core industry and a variety of efforts are underway to advance growth in this area.

One such plan is the construction of a dedicated yacht-building precinct as part of the Kaohsiung Port City Reconstruction project. On the technology and manufacturing front, industry players are promoting the use of computer-aided engineering (CAE) and advanced simulation to foster innovation among Taiwanese yacht makers while helping them decrease overall cycle times.

"While many yacht companies, shipyards and naval architects have adopted DassaultSystemes' CATIA application in the last three years, the value of numerical simulation and the concept of digital design evaluation are still not broadly promoted in Taiwan," said Ray Tsai, technical director of Simutech Solution Corp., which provides consulting services for DassaultSystèmes' SIMULIA application. "Lots of yacht companies don't know there is a powerful tool that could immensely improve their design with shorter cycles and better systems integration."

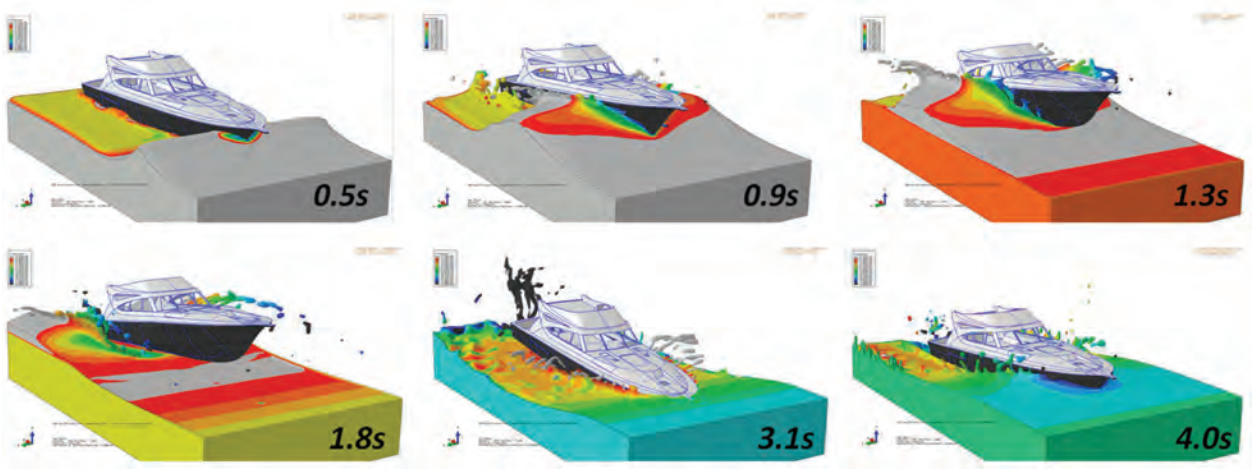
Employing a Total Design Package

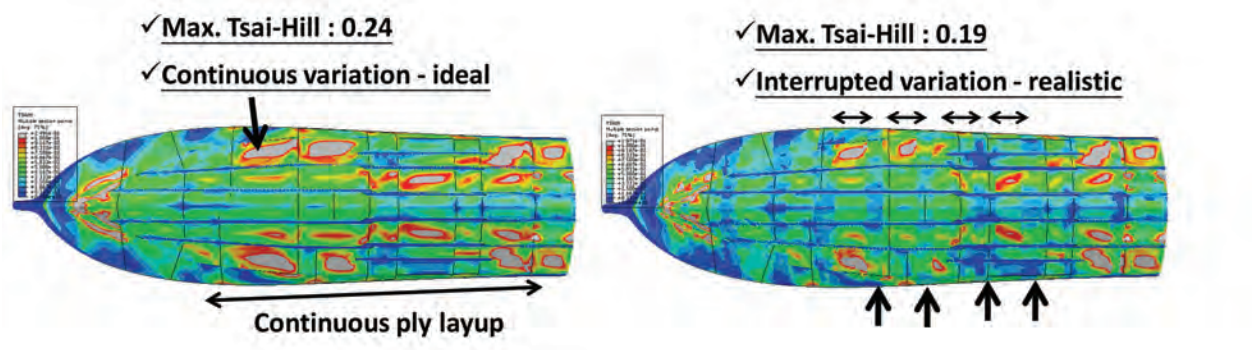
Tsai, together with colleagues Rey-Yie Fong of Tiny Machine and Mechanics Laboratory, and Chia-Chuan O and Yu-Chieh Lin, both deputy engineers with the Ship and Ocean Industries R&D Center in Taipei, have mapped out a route intended to demonstrate just what's possible with SIMULIA's realistic simulation toolkit. Discussions with Taiwanese yacht manufacturers revealed a glaring hole in the development process: Most of them outsource the upfront design of their boats to foreign partners. "Often they don't have the tools or the expertise to design a structure from scratch, let alone optimize a hull structure with composite layouts, or even modify subsequent concepts to increase performance," said Tsai.

With mounting global competition around styling and price, it makes sense that Taiwanese yacht makers could command a greater edge by bringing more of the design process in-house. Manufacturers are increasingly under the gun to respond to customers' demands as quickly as possible while still keeping costs low. They also need to strike that proverbial balance between aesthetically pleasing style and delivering a range of competitive onboard features and performance. Technical challenges in the areas of design proficiency, manufacturing cost and quality control have long been barriers for Taiwanese companies looking to maintain their competitive strength against rivals.

Simulation technology provides yacht makers with a deeper understanding of their designs from the start, allowing them to iterate incrementally far earlier in the cycle while also tracing problems during every stage of the development process. "We wanted to help them move iterating cycles from the manufacturing stage to the design stage so that the performance criteria could be evaluated earlier when it costs less to modify," Tsai said.

To showcase the powers of digital simulation, Fong chose three critical elements of yacht design that were uni-





versally creating challenges for Taiwanese manufacturers: Composite structure layup, ventilation and thermal analysis, and wave impact transient analysis.

"These three areas were most frequently encountered by designers, manufacturers, and customers," Tsai said. "They were struggling with how to achieve the optimal intrinsic strength and stiffness in their designs along with cabin ventilation efficiency and navigating the tradeoffs around static structure performance and dynamic wave slamming impact. Sometimes the key to orchestrating a design leap is there, but hiding within another configuration. What we wanted to do is to dig it out with different examinations."

The partners set out to prove their case, taking advantage of the extensive SIMULIA application portfolio based on Abaqus finite element analysis (FEA). Abaqus/Standard, together with Simulayt, was tapped for composite structure layup analysis and manufacturing process management; Abaqus CFD (computation fluid dynamics) came into play for ventilation and thermal analysis; and Abaqus/Explicit was used for Coupled Eulerian-Lagrangian (CEL) analysis, which is central to slamming wave impact simulation.

Having an integrated interface between the CAD tool—in this case, Dassault-Systèmes' CATIA—and the different CAE functions that leverage Abaqus and Simulayt is critical, Tsai said, so users don't have to change tools or deal with cumbersome data import procedures.

"The concept of integrating structural analysis within the design process benefits complex design projects immensely," he said. "We are able to import geometry from CATIA and use Simulayt with the composite modeler for Abaqus [CMA] to analyze composite layups. We were also able to reuse the same models for CFD simulation, and material properties and conditions could be shared between models without duplication."

Fong chose a 70-ft. Monte Carlo Yacht to serve as a benchmark for the simulations since it is the median size for Taiwan's yacht industry and because the specifications of the model mapped pretty closely to the proprietary specifications of most manufacturers.

Modeling Strategies Set Sail with Composites

Applying simulation to the modeling and manufacture of structures made from fiber-reinforced materials is one of the areas where computer-aided engineering (CAE) in luxury yacht design can shine. With all eyes on fuel efficiency and performance, use of composite materials is exploding in the aerospace and automotive sectors, in part because of strict sensitivity to weight demands. While yacht design shares many of the same engineering techniques as the two other sectors, for example, numerical methods, materials selection, system integration and multi-body mechanics—in Taiwan the concept of lightweight structure design is far less mature.

Abaqus CMA provides flexible modeling strategies for quick evaluation of geometry and meshing at both the preliminary and final design stages. With its precise geometry definition, CATIA Composites comes into play at the detailed design stage, helping to optimize design for manufacturability. CATIA generates the composite layup patterns, which can then be assigned to Abaqus with specified material properties and fiber orientation. An interface connects CATIA Composite and Abaqus CMA with automatic data transfer, eliminating the possibility of typos and tedious property assignments layer by layer.

The Simulayt tool helps designers and engineers simulate the forces on a composite structure during manufacturing, rounding out the analysis by predicting plant-floor issues that can be mitigated earlier in the development cycle and helping to meet production timeframes within budget.

Channeling the Sea Breezes

Tsai's team also applied simulation tools to the design challenge around yacht ventilation. The goal of the exercise was to understand the conduction-convection heat transfer phenomenon, allowing an engineering team to zero in on the optimal ventilation system specification and vent arrangement that would minimize the compressor requirement.

"The challenge is to decide how to arrange the inlet and outlet vents to provide a uniform cooling status in all the cabins," Lin and O said. Passive vents use a convection effort to circulate air and they work well on nice breezy days, but on hot, still days, they are not as effective.

Active vents include a powered fan and apply a conduction effect. "We set a target that we wanted to unify the temperature distribution and utilize the convection effect to transfer cool air from the upper deck to the lower deck as much as possible," Lin said. "The CFD visualizations presented a clear image of the air flow along the cabins so we could come up with a concept to improve the arrangement of the vents and design a more comfortable yacht."

Ensuring Hull Integrity in Rough Seas

The third area where simulation was applied was evaluating the performance of a yacht design under impact from waves, or other scenarios that might test its buoyancy and maneuverability. "Planning a motor yacht or high speed cruiser design needs to take into account the dynamic lifting effect, which implies that the center of buoyancy and center of floating will change with increasing speed," Fong said. "The subtle balance between center of gravity, center of buoyancy, and center of floating is crucial. It's tricky to keep the yacht in an evenly keeled condition with a traditional approach."

Using Abaqus CEL, the team was able to simulate the yacht design's transient and non-linear varying response to wave impact conditions as well as different turning maneuvers. Reaction force, reaction moment, displacement, velocity and acceleration are recorded on the mass center of the yacht to examine the dynamic performance over time. Slamming contact pressure on the hull is also output to determine the structure loading under transient impact.

More widespread use of these advanced simulation methodologies will help Taiwanese yacht makers have a better chance of sailing past the competition, Tsai feels. "Simulation can help them innovate designs faster while keeping costs in check," he said.

"To build a faster, lighter, and more luxurious yacht is a challenge, trying to find that compromise between different design considerations. We believe Taiwanese yacht makers will be more competitive in the global market if they are capable of handling more of the design by themselves."

2014 Editorial Calendar

MARITIME REPORTER AND ENGINEERING NEWS

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

Maritime Reporter
Celebrates "75"

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

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

New Air Regulator from TDI

Tech Development (TDI) introduced its new TurboFlow Air Regulator which the company says improves air delivery to the start system. The TurboFlow Regulator combined with other TDI start system components provides matched air-flow to the turbine starter for improved reliability and system savings. “One of our marine customers was looking to get more than the three starts they were receiving from their air reservoir using (another) turbine starter,” said Dave Rawlins, Senior Product Manager at TDI. “We switched them to a TDI T515-I inertia-engaged start system with our new TurboFlow Air Regulator and they were able to get 9 starts at 50 psig. This allowed them to re-classify their boat as an ocean going vessel and enabled them to gain additional value in terms of higher daily rates.”

TurboFlow Air Regulators are used on engine start systems in the marine, oil & gas, power generation, and mining industries and on specific engines including Caterpillar, Cummins, GE, GM, Ford, MAN, MTU, Waukesha, Wartsila, Yanmar and other large engine makes. TurboFlow can also be applied as a part of plant air systems or in applications where both high and low pressure differentials exist.

A significant amount of an engine’s air is wasted because of the inability of the components in the system to flow as needed during the process. The TurboFlow Regulator minimizes dynamic air-flow loss and delivers the optimized air volume to the starter every time.

http://tdi-airstarter.com

DNV GL ShipManager for Entire H&P Fleet

Shipowner Harren & Partner (H&P) will implement the DNV GL business intelligence software systems ShipManager Analyzer and ShipManager QHSE for its fleet of 52 vessels, which includes container feeder vessels, bulk and heavy lift carriers, tankers, multipurpose carriers and dock ships, ranging from 4,000 to 76,000 tdw. The first trial implementation for the two software systems is expected to be running in April. By mid-year the entire fleet will have ShipManager Analyzer and ShipManager QHSE installed.

www.dnvgl.com

FARO Debuts New X Series Laser Scanner

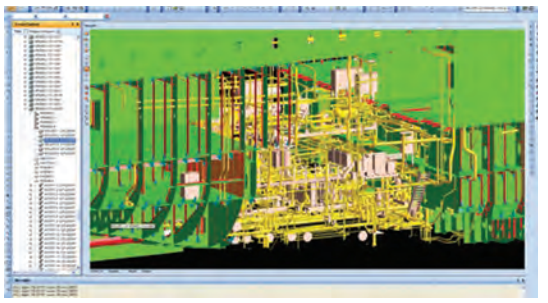
FARO Technologies, Inc. released the new FARO Laser Scanner Focus3D X 130, the newest member of Focus3D X Series range of laser scanners. With a scanning range of 130m, this laser scanner is suited for mid-range scanning applications. The portable Focus3D X 130 enables fast, straightforward and accurate measurements of objects and buildings, combining high-precision scanning technology with true mobility and ease-of-use to offer reliability, flexibility and real-time views of recorded data.

www.faro.com

Jinglu Chooses AVEVA Design Software

Penglai Zhongbai Jinglu Shipbuilding Co., a key shipbuilding enterprises in Shandong Province, Greater China, signed a new contract for AVEVA Marine software to address the current, challenging market situation and to future-proof its operations. The AVEVA technical team in China supported Jinglu Shipbuilding with a detailed evaluation exploring how AVEVA Marine would improve project efficiency and quality across the shipyard.

www.aveva.com/marine



Macro Sensors Gauge Tank Volume Changes

Configured with a float, Macro Sensors HSIR Series LVDT Linear Position Transmitters are serving as level sensors to measure liquid level changes from a few inches to several feet in gauging tank level volumes.

In operation, as water level changes, the float moves up or down, raising the LVDT core along with it. A threaded stainless-steel rod, that protrudes from the other end of the core, carries two jam nuts that are used to adjust the position sensor output at the desired low water level.

www.macrosensors.com

Special Coupling Solution for Offshore Drives

The focus of this year’s product and performance presentation by Vulkan Couplings at the Sea Japan are the specially integrated marine drive solutions for offshore ships. Vulkan Couplings has become known for its drive solutions for drill ships. The latest project was the equipment of six drill ships, built by the Estaleiro Enseada do Paraguacu shipyard for the Brazilian Charterer PETROBAS. Vulkan Couplings supplied the highly flexible couplings for the Caterpillar MaK 16CM32 gensets and the electric motors CAT 3516 B, as well as the torsionally rigid couplings and brakes for the Kawasaki steering propeller KST-320LF.

www.vulkan.com

MirTac and StarIPS

MirTac said that Conquest Offshore purchased the Star software and related database and implementation services. Conquest will be implementing the software both in the office as well as onboard its fleet. The Star software will support Conquest Offshore with the management of maintenance planning, inspections, purchasing and spare parts, document control, safety and environmental procedures and onboard barge administration. The fleet management system is designed to reduce down time and support the barge master with detailed instructions and ready-to-use procedures onboard.

www.mirtac.nl

Eniram Launches New Optimization Product for LNG Sector

Eniram Limited, a provider of energy management technology and data analytic services to the shipping industry, announced an advanced fuel-saving product based on the Eniram vessel platform.

VPM for LNG in a nutshell:

- Collection of the most critical data for LNG operators and owners such as boil-off and reliquification plant efficiency.
- Offers the possibility for onshore analyses of one vessel, as well as the possibility to compare the energy management performance on several vessels or on the entire fleet.
- Constant performance evaluation. Main dashboard view to offer an easy way for the crew to have a holistic view of the vessel's energy management.
- Normalized Key Performance Indicators. VPM presents a set of normalized KPI for key energy consumers which allow direct comparison and tracking of energy effciency operation onboard interdependent of operational area, season or cargo loading. These KPIs allow true comparison and tracking of different energy initiatives.
- Intuitive graphical interface. The intuitive graphical dashboard shows in a holistic way the main energy producers and consumers in one screen. Users can access the detailed graphical view on one click to further explore the behavior of a specific component and compare it to another component in the vessels energy management system.

www.eniram.fi

COSCO Selects Rolls-Royce Package

Rolls-Royce won an order to provide an integrated design and equipment package for two offshore supply vessels to be built at COSCO (Guangdong) Shipyard Co., Ltd in China for Singapore based Chellsea Group. The two Rolls-Royce UT 771 WP platform supply vessels features the striking wave piercing bow designed to pierce through waves in rough seas, making it possible to keep a more constant speed, reduce fuel consumption and increase on board safety.

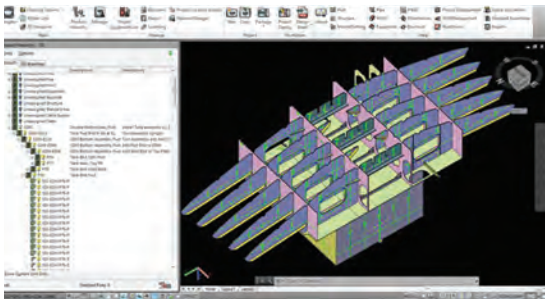
www.rolls-royce.com

New Tests for Ballast Water Contamination

The new upgrade for Speedy Breedy enables it to test for contamination in Ballast Water in accordance with the Ballast Water Treatment Performance Standard (D2). The new features enable Speedy Breedy to test for the three bacteria as set out in the D2 standard, Vibrio (Cholera), E. coli and Enterococcus, to enumerate contamination in CFUs (colony forming units) and then to pasteurize the sample so that it can be disposed of as regular waste.

www.speedybreedy.com

SSI Debuts Updated ShipConstructor



In what SSI calls its "most user-focused release," the latest release of the company's flagship CAD/CAM software, ShipConstructor 2014 R2, features more than 425 enhancements. SSI said ShipConstructor 2014 R2 streamlines workflows for users and enhances the user experience, which according to the developer, has been accomplished by collecting feedback from clients in all markets and industries, then implementing hundreds of suggestions that boost efficiency, quality and stability.

www.ssi-corporate.com

Wärtsilä's Launches Inline Scrubber System

Wärtsilä said its new inline scrubber system is designed to offer benefits over conventional exhaust gas cleaning systems, and its compact form saves space. With just one scrubber system per engine, installation is designed to be faster and easier, Wärtsilä said, which consequently reduces the out-of-service time for the vessel. The inline scrubber system operates as a conventional Wärtsilä open loop scrubber system, but has three water inlets in the main body of the scrubber, as opposed to two in the conventional system.

www.wartsila.com

New Transas Liquid Cargo Handling Simulator

Transas Marine launched its new liquid cargo handling simulator LCHS 5000 TechSim LNG which boasts ship-to-ship transfer functionality. The new Transas LCHS 5000 TechSim product line includes simulators for LNG tanker, LNG terminal and LPG carrier. Ship-to-ship transfer is a complex operation which requires adequate training to minimize the risks of damage to personnel, environment and assets. Transas LCHS 5000 allows for a complete resource management training involving crews of both mother and daughter vessels.

www.transas.com

New Hull Structure Analysis Software

The Korean Register (KR) released SeaTrust-HullScan, a software solution to analyze and appraise a vessel's hull structure in accordance with the new harmonized common structural rules (CSR-H). SeaTrust–HullScan is a new ship design support program that enables ship designers and ship builders to accurately apply IACS CSR-H and all subsequent amendments when designing and constructing a vessel. SeaTrust–HullScan was developed in-house and has been rigorously verified with the major Korean shipyards.

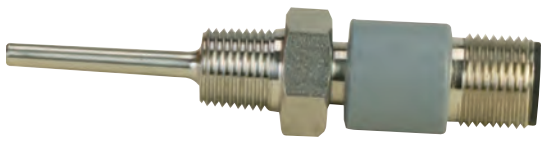
www.krs.co.kr

GEA Westfalia Separator Launches New Control Generation

The new control generation GEA Westfalia Separator IO is designed to reduce complexity and focus on user-friendliness. The initial consideration when developing the human machine interface was not what the implemented logical controller or the centrifuge are able to do; instead, the focus was on what the user needs, either the operator, the commissioner or the company's own service engineer. Who needs what information and functionalities in which situation and what is not required, or in short: user-friendliness.

www.westfalia-separator.com

Omega Debuts Compact RTD Temperature Sensors



Omega's new RTDM12 series of compact RTD temperature sensors are extremely rugged with a molded (IP67) 4-pin connector with M12 male thread and a fast response time. This RTD plug is suited for pressure vessel applications, pressurized containers and applications requiring a temperature sensor with an NPT mounting fit. Omega said its new offering is ideal for chemical, water and automotive industries. Price starts at $33.

www.omega.com

Better Air Quality Onboard

Wilhelmsen Ships Service (WSS) launched a solution to assist shipowners in meeting one of the demands of MLC2006. The Duct Air Treatment, showcased for the first time at APM Singapore, is an anti-bacteria block which works within HVAC systems onboard vessels to stop the spread of invisible mould, bacteria and viruses. The block works by sterilizing and sanitizing the entire onboard air conditioning system, including both the air passing through the system and the air handling unit, ducts and diffusers. It is 100% natural with no maintenance or energy costs and is quick and easy to install, with no need for installation equipment or training, according to WSS.

www.wilhelmsen.com

Heavy Duty CNC Plasma

MultiCam's new V-PRO CNC Plasma system features a standard, heavy-duty, all-steel water table with integrated bladder capable of production processing of sheet steel up to 1.25" thick without the need for fume evacuation. The CNC plasma system comes standard with a Hypertherm MAXPRO200 (200 amp) power supply engineered for heavy-duty, high capacity mechanized cutting. The V-PRO motion platform is isolated from heat built up in the cutting tank resulting in smooth, precise cutting of all material thicknesses. Automatic torch height is a standard feature and MultiCam's EZ-G code software is included for easy conversion of CAD drawings to machine-ready G-code. MultiCam has over 70 Technology Centers worldwide that sell, service and support its products. Contact us today for more information and a product demonstration of our new V PRO CNC Plasma.

marketing@multicam.com

Wärtsilä Introduces 46DF Dual Fuel Engine

Wärtsilä announced the debut of its new dual-fuel 46DF engine which it said offers lower specific fuel consumption, higher output and attractive lifecycle costs . The fuel flexible Wärtsilä 46DF engine was developed for the high-output market segment, including cruise ships and ferries, merchant vessels, LNG carriers and FSRUs (Floating Storage and Regasification Unit) and offshore vessels and platforms, and is capable of operating on natural gas, heavy fuel oil or marine diesel oil.

The Wärtsilä 46DF consists of two different versions to meet specific customer needs. The high efficiency version offers drastically lower fuel consumption with a cylinder power of 1,045kW, while the high power version is capable of a cylinder power of 1,145kW with excellent engine thermal efficiency. For LNG carrier applications, the Wärtsilä 46DF can offer fuel savings of as much as 20 tons/day compared to the first introduced DF engines. With up to 14 fewer cylinders installed, the overall lifecycle installation costs are positively impacted by roughly $1,000 per day. When operating in gas mode, the Wärtsilä 46DF engine is compliant with IMO Tier III regulations without any secondary exhaust gas purification systems. When fueled by gas, the sulfur oxide (SOx) and carbon dioxide (CO2) emissions are notably reduced, and smokeless operation is attained. In liquid fuel oil mode, the Wärtsilä dual-fuel engines are fully compliant with the IMO Tier II exhaust emission regulations set out in Annex VI of the MARPOL 73/78 convention.

www.wärtsilä.com

Trojan Marinex BWT System
Earns IMO Type Approval

TROJAN marinex™
A TROJAN TECHNOLOGIES BUSINESS

Trojan Technologies announced that the Trojan Marinex Ballast Water Treatment (BWT) product suite has obtained IMO Type Approval from DNV on behalf of the Norwegian Maritime Directorate.

"We are the largest UV company in the world, and are committed to providing pioneering water treatment technologies that meet the highest standards and help protect and preserve our environment," said Marvin DeVries, president, Trojan Technologies. "The IMO Type Approved Trojan Marinex product suite is a reflection of our forward-looking commitment to our customers. We performed our certification process, in every way possible, to the rigorous standards required by the United States Coast Guard, supporting our goal of achieving U.S. Type Approval this year. Testing was successfully completed in the most challenging conditions. This dispels the myth that UV cannot be used in the poorest of water qualities and gives vessel owners the confidence and reassurance they deserve, knowing that their operations will be unencumbered."

Rather than focusing on being among the first to get IMO Type Approval and testing to minimum standards, focus was instead put on the continual refinement of the BWT treatment technology and a robust testing protocol.

Five differentiating facts about the Trojan Marinex BWT system IMO Type Approval:

1. Testing was conducted under the supervision of DNV, who is now certified as an Independent Lab (IL) by the United States Coast Guard (USCG), in accordance with United States Environmental Protection Agency (USEPA) Environmental Technology Verification (ETV) Ballast Water Protocol. The ETV protocol is a key testing requirement for systems to obtain USCG Type Approval.

2. Land-based testing was completed at the DHI Maritime Technology Evaluation Facility in Hundested, Denmark and shipboard testing was completed on board the Training Ship Golden Bear (TSGB) – both are now part of DNV's network of subcontractors approved by the USCG for testing BWT systems.

3. Tested and approved to the lowest UV transmittance value (poor water quality) in the industry under full flow conditions, meeting the requirements of IMO Circular BWM.2/Circ.43c (Guidance for Administrations on the Procedure for Evaluating an Application for Type Approval of a Ballast Water Management System).

4. Land-based testing was conducted up to 1250 m3/h to verify the efficacy of the system at higher flow rates, meeting the requirements of IMO circular BWM.2/Circ.33 (Guidance on the Scaling of Ballast Water Management Systems). To date, this is the largest flow land-based test of a BWT system.

5. Tested and approved in all three salinity ranges - brackish, fresh and marine.

In addition to the rigorous certification and testing methodologies employed, the Trojan Marinex BWT system is differentiated in that custom-designed filtration and UV is integrated into in a single, compact unit. TrojanUV Solo Lamp Technology was utilized to ensure the lowest installed power draw of other systems in the market. This extremely low power draw means that larger vessels, such as bulkers and tankers, can effectively choose a UV-based solution.

www.trojanmarinex.com

BUYER'S DIRECTORY

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

ALUMINUM BOATS

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

ANCHORS & CHAINS

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

ATTORNEYS

Blank Rome - Admiralty & Maritime Law, 600 New Hampshire Avenue, NW, Washington, DC , USA , tel:(202) 944-3568, fax:(202) 772-5858, PBroadbent@BlankRome.com

AUTOMATIC IDENTIFICATION SYSTEM

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

BARGE FABRICATION

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

BATTERY CHARGERS

Ward's Marine Electric, 617 SW 3rd Avenue, Fort Lauderdale, FL 77258, USA , tel:(954) 523-2815, fax:(954) 523-1967, monica.avendano@wardsmarine.com

BOATBUILDING AND DESIGN

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

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

BOW AND STERN THRUSTERS

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

COATINGS/ CORROSION CONTROL/ PAINT

Hempel A/S, Lundtoftegårdsvej 91 2800 Kgs. Lyngby , tel:45 4593 3800, fax:45 4588 5518, marine@hempel.com , www.hempel.com

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Jon Farinholt
Chesapeake Boat Works
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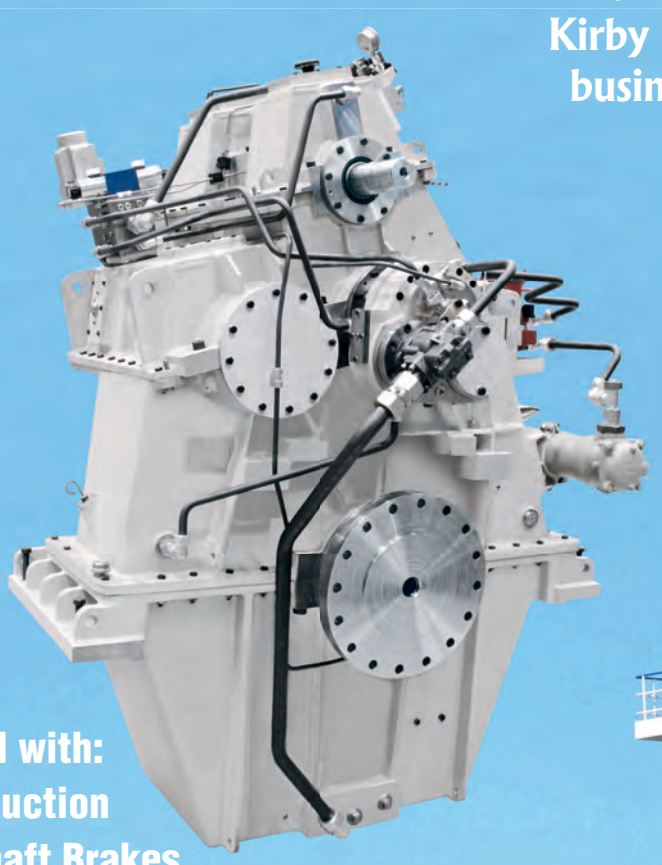

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