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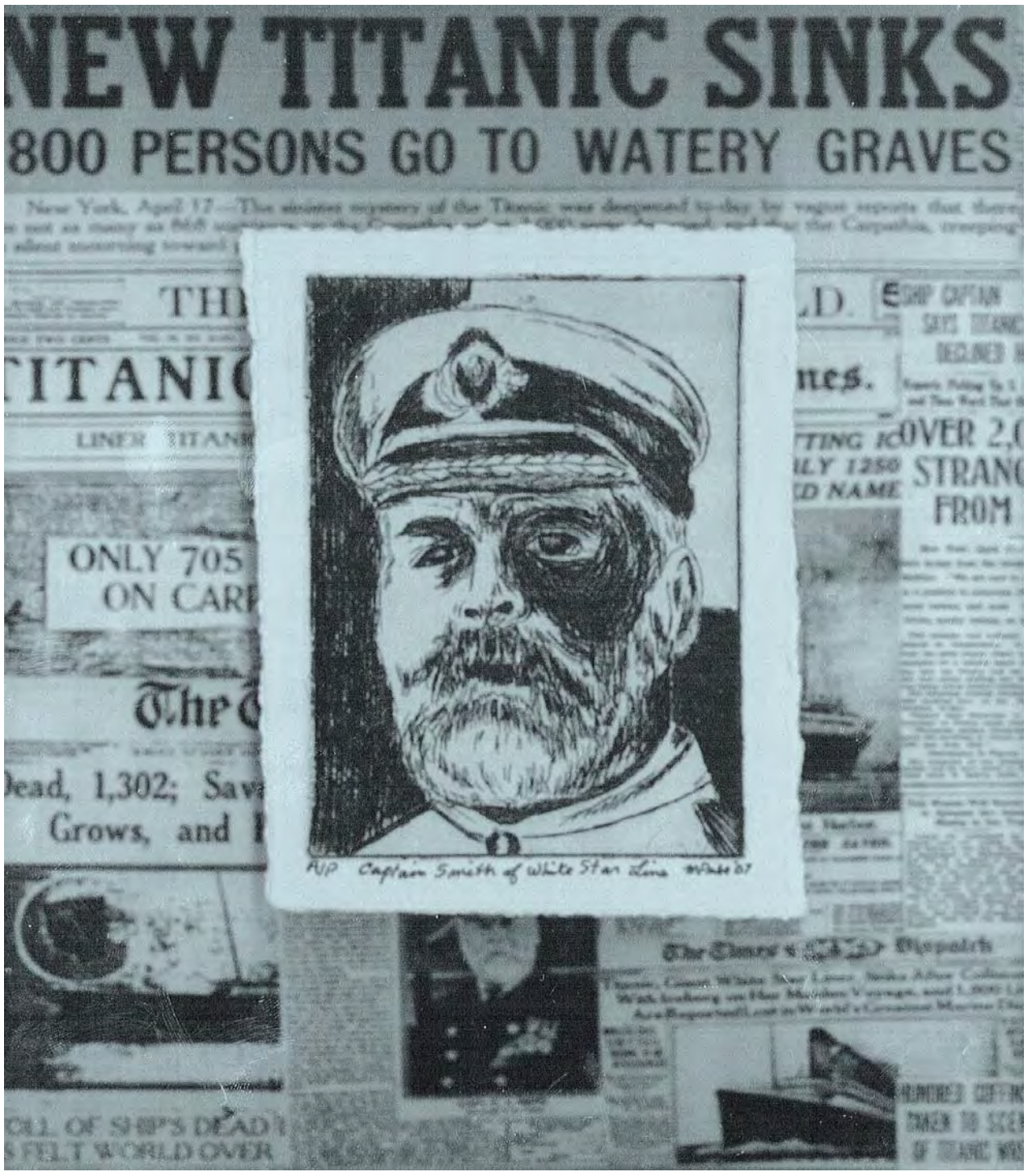

(Images copyright Malissa Priebe courtesy of the Noble Maritime Collection)

Titanic on Canvas

Pictured is — *Captain Smith of White Star Line by Malissa Priebejust* — one of the pieces of art on display by The Noble Maritime Collection in a showing dubbed "Titanic: A Centennial Exhibition of Contemporary Art." The show opens on April 15, 2012, exactly 100 years to the day after the sinking of Titanic. For more details, visit: **www.noblemaritime.org**

Full Coverage starts on page 27.

ON THE COVER

60
LNG-fuelled Viking Lady is the first merchant ship to use a fuel cell as part of its propulsion system. **Full details on this and other OSV innovations starting on page 60.**

(Photo: Eidesvik Offshore)

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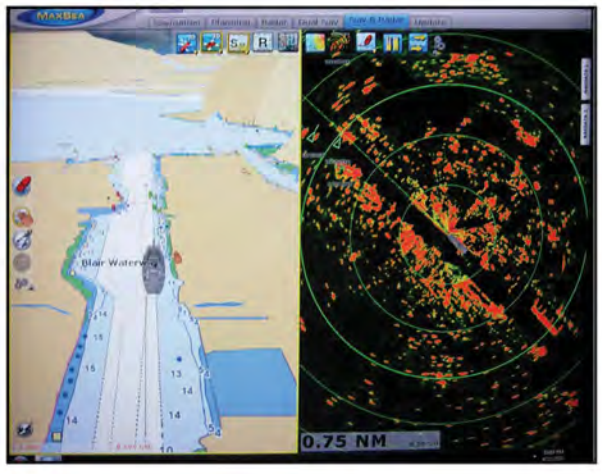

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The cover of this edition, our traditional "Offshore Annual" in conjunction with the Offshore Technology Conference (OTC) in Houston, is one of my favorites simply because of the breadth of its coverage. The image is Eidesvik Offshore's Viking Lady, a unique vessel that arguably is one of the "greenest" vessels in the world, a three-year-old LNG-fuelled ship. And today the vessel is ready to receive its new energy storage battery pack, a technology that will enable it to fully leverage its fuel cell technology as part of its propulsion system, operating in a similar fashion as hybrid cars have for several years.

It is no small coincidence to find the Viking Lady working amongst another symbol of environmental advance, an offshore wind farm. While our "Offshore Annual" has long-been the domain of matters surrounding the discovery and recovery of offshore oil and gas, a sustained high oil price; increasing global demands for reduced emissions; and more efficient technologies in generating and transferring power via renewable technologies has conspired to push offshore wind and tidal power projects from field tests to commercial production.

While the U.S. still lags Europe by a large margin in the development of offshore wind projects, a trio of attorney's from Blank Rome LLP find that the Obama Administration's policy to 80% of our nation's electricity from clean sources by 2035 is starting to spur business, as they report in their column entitled *"Renewable Energy: Marine Renewables Sector Begins to Take-off in 2012"* starting on page 18. The emergence of renewable offshore energy sources is in fact spawning a new maritime niche, as the portfolio of custom design, built and outfitted vessels specifically tailored to service offshore renewable projects is growing rapidly.

In the second of three articles examining the power of renewables, our German correspondent, Peter Pospiech, looks at the emergence of offshore wind projects among Germany's traditional offshore oil and gas suppliers, in *"The Power of the Wind,"* starting on page 45. And starting on page 50 is my interview with Doug Keefe, Executive Director of the Fundy Ocean Research Center for Energy (FORCE). For those not familiar with the Bay of Fundy tidal environment, it is one of the most prolific tidal sites on the planet – the "Everest" of tidal power – with 160 billion tons of water flowing through the bay each tide, with 14 billion tons squeezing through the Minas Passage at upwards of five meters per second.

While there is much focus here and throughout the industry on renewable energy, there is still no doubt where the money lies, and that is still in offshore oil and gas. It appears now that there is serious traction among oil and gas producers again in the Gulf of Mexico, particularly in the deepwater sector. U.K.-based analyst Douglas-Westwood recently issued a report that projects $232 billion in Global Capex in the deepwater sector through 2016 … or to put it in perspective, 90% more than was spent in the preceding five years. DW's Jennifer Harbour gives a comprehensive overview of the investment, broken down by world region, starting on page 56.

Rounding out our energy coverage, we sent (figuratively, of course) Ned Lundquist to the Arctic. While the melting ice cap has multiple implications for the planet, in the sphere of maritime and offshore energy it is literally the Wild West, with a host of political, technical and logistical challenges to address. While the interest in tapping the energy potential under the cap is well-recorded, the Arctic is a unique region with some challenging hurdles that must be addressed to ensure safe, efficient operations as well as procedure and technology to help clean up when disaster strikes.

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Flying Sky High

CEO Matt Desch has Iridium at full steam ahead to provide innovative maritime communication solutions

By Greg Trauthwein, editor

Please provide a brief overview of your management philosophy.

I just had a wonderful chance to contemplate about that. I recently found myself writing an acceptance speech for a *"Satellite Executive of the Year"* award. My first reaction was to request that the name be changed to "Satellite Team of the Year." My second reaction was to dig up some quotes about one of the values I hold most dearly – collaboration.

Charles Darwin once said, "In the long history of humankind (and animal-kind for that matter), those who learned to collaborate and improvise most effectively have prevailed." That pretty much boils down my management philosophy. Collaboration is a very apt concept in our business. If I've learned anything about delivering communications services via the world's furthest-reaching network it's that it's hard. It's unforgiving. There is little room for error. And while you deliver upon that equation, you need to continue innovating to succeed. Few can go it alone. Iridium may have been one of the first commercial satellite organizations to really grow into maturity and long-term success, but we didn't do it alone. I think of the Iridium network today — the world's only truly global satellite communications network. It is comprised of 66 satellites, and six in-orbit spares, circling the planet in the harsh environment of space, providing reliable, critical communications lifelines for our customers. Our technology partners today, such as Boeing, played an important role in building and operating this amazing network and now share in our success. Many of the same distribution and development partners have grown with us since 2001 and continue to be integral to our collective success. These collaborative partner relationships continue to be a fundamental part of our success.

Iridium has more than 275 distribution and development partners innovating around the capabilities of our network every day. Of course, cooperation and collaboration means we have to give something up to get what we are looking for together. So we have deliberately decided not to be too greedy about technology or market control and this is where it is really paying off. We've opened up our core technical interfaces, chipsets, and technology to external partners so they can trust that our network is the one they want to innovate around. And, through them, our goal is being realized in making sure Iridium truly is everywhere. We view 2011 as the year we really unlocked our "innovation engine" by doing things like opening up our handsets with our Iridium ForceSM strategy, accelerating our machine-to-machine (or M2M) business success with even smaller and more cost-effective devices, and packaging Iridium waveforms into technology that partners can download into tactical radios.

As we increase our bandwidth with Iridium NEXT, we see collaboration as critical to how we will sell our expanded broadband services. We would never take on the VSAT industry directly – we believe our products can be fully complementary to each other.

Finally, the most important collaboration of all, and responsible for Iridium's growth, is the incredible team that I work with every day at Iridium.

According to your recent figures, total billable subscribers grew 22% year on year: How does this growth compare to your projections; and to what do you attribute the growth?

Desch Indeed, 2011 was an important year for Iridium. In March 2012, we reported fourth-quarter and full-year results that delivered on the operating and strategic targets we set for ourselves in 2011. We reported 523,000 total billable subscribers, and have projected continued growth for 2012. Our subscriber acceleration reinforces how far we've evolved over the last ten years from a supplier of mobile satellite phones for niche markets into a global communications company connecting people and things all over the world in ways never thought possible. We've expanded the types of devices we've delivered to market, but we've also launched new initiatives to enable the WiFi capability of consumer devices, such as Blackberries and iPhones, to work through our network. In addition, a key growth driver in our business has been in the broadband arena, both in maritime and aviation. We recently launched our new value-based, truly global maritime broadband product, Iridium Pilot, which is doing well in terms of market reception.

Overall, Iridium continues to perform well because we do important things in completely different ways, as I discussed in relation to my management philosophy. We operate in attractive and growing markets, have a superior network, a great partner ecosystem, recurring service revenue business with strong operating leverage, and cash flow growth. **Most importantly, we're relentless innovators committed to delivering cutting-edge communications.**

But, as mentioned, we're not in this alone. Critical to our success is our large partner ecosystem that drives creativity and innovation on a scale we couldn't do ourselves.

While Iridium serves many markets, we are concerned in this context with only commercial maritime, offshore and subsea industry users. Can you put in perspective the importance of these markets to Iridium's future success as a whole?

Desch The maritime market is a natural fit for Iridium. There's a huge demand for complete global coverage, which only Iridium can provide, versus partial coverage, and a constant search

(Continued on page 78)

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Sea Scout

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Sea Scout is an innovative "Quad-Prop" Survey Vessel for C & C.

By Alan Haig-Brown

At 134-feet (40.8 meters) in length the research vessel Sea Scout is the largest catamaran built by All American Marine in Bellingham, Washington and the largest vessel designed by Nic deWaal's Teknicraft Design of Auckland New Zealand. With its length and 37-foot 4-inch beam, this is not only a large vessel it is, as C&C Technologies Survey Services newest vessel, a highly sophisticated and complex craft.

A vessel such of this has a dual personality. The first being a crewed vessel designed to get from place to place in an efficient manner. The second is to support a team of technicians with specific goals.

As a purpose-designed craft, the Sea Scout has some interesting innovations. A large clear after deck is fitted out to take C&C's custom built containers for storage and operation of their autonomous underwater vehicle (Konsberg Hugin AUV CSIV). A large stern gantry (14,000 pounds, 16-foot swing and 8-feet clear over stern) and smaller side gantry are designed to facilitate the deployment of the AUV and other instruments. A Morgan Marine Crane is mounted starboard-side and is capable of lifting 4,158 pounds at a 36.75-foot extension. Deck equipment also includes a side scan sonar winch (Klein 5000), a coring winch (piston & box), and a CTD winch with water sampling rosette. With four propulsion engines, the Sea Scout can make 28 knots and cruise economically at 20 knots. This is great for getting to and from jobs in the offshore oil and gas industry but for much of the time the boat will be working at speeds under ten knots. To meet these variables, the boat has a 1600 HP 32C ACERT and a 553 HP C18 ACERT Caterpillar engine in each hull. Each engine turns a prop so that for commuter-speeds all four engines can be employed while for slow speed survey work the two small engines will do the job with significant fuel savings.

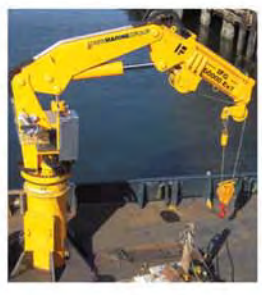
Chief Engineer David Wright in one of this two identical engine rooms.

Fitting multiple engines into the narrow twin hulls of catamarans always presents challenges. The designers of the Sea Scout have an elegant solution. The larger engines are set forward in each hull with an ultra-light weight carbon fiber shaft running aft from the ZF 3055A gears (2.25:1) to the propellers. A generator set is mounted laterally across the hull just aft of the big engine on an elevated platform. At a lower level and aft of that, the smaller engine is mounted with a carbon fiber shaft running forward to a ZF550 V-drive gear mounted in space under the gen set in such a way that the propulsion shaft can pass back under the engine to its propeller. A shaft brake is mounted on the tail shaft to lock up the propeller when not in use. ZF provided all compo-

Name	Sea Scout
Owner	C & C Technologies
Designer	Teknicraft Design Ltd.
Builder	All American Marine (AAM)
Length	134 ft.
Breadth	37 ft.
Main engines	4 x Caterpillar
Gears	ZF
HiPAP	Kongsberg
AUV	Kongsberg
Speed	28 knots
Cruising Speed	20 knots
Fuel capacity	11,000 gal.
Berths	26
Class	ABS
AUV	Kongsberg
Side Scan Sonar	Klein 5000

Captain Jeramie Rivette at the helm of the Sea Scout.



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"If James Bond were to own a survey boat, this would be it"

David Wright, C & C Technologies, Sea Scout Chief Engineer

nents from the engine flywheels aft to the rudders as well as the control system.

Sea trials have shown that locking the smaller shafts can cause greater fuel consumption at some speeds when running all four engines. With this complexity of propulsion it is likely that it will require some experimentation to find the optimum combination for various speed and survey requirements. Capt. Jeramie Rivette will pilot the vessel from the builders in Puget Sound south through the Panama Canal and up to Louisiana. He is expecting to cruise at about 15 knots on the voyage. He reports that sea trials showed, that making 23 knots with all four engines, fuel consumption was 180 gallons per hour but dropped to just 60 gph at 15 knots.

On arrival in the Gulf of Mexico the Sea Scout will begin work under contract to NOAA mapping near shore sea bottom. With a 37.4-foot (10.8-meter) beam there is room to provide good accommodation for a total of 26 people; the vessel crew will typically be four people plus a cook. This leaves up to 21 bunks available for survey technicians. To feed this many people the boat has a good size galley and mess area. The vessel will also carry a cook, Mark Quinney, who is well versed in Louisiana style cooking from gumbo to pralines and fried chicken. To work off the calories, one of the hulls is fitted with a small gym with its own shower.

Aft of the wheelhouse on the second deck, the scientific lab supports an array of computer screens that display the feed from the transducers mounted on a special section on each hull. Initially these include a Simrad EK60 38Hz fisheries sounder, (2) Odom MKIII single beam (200/24 kHz), Kongsberg EM30002D multibeam sounder (in Wesmar retractable hoist), Kongsberg HiPAP 501 USBL acoustic positioning system, Kongsberg Geopulse sub-bottom (profiler 4x4 array), Accommodations for Kongsberg EM302 2x4 multibeam sounder.

When on the job the large after deck will be filled with custom containers and equipment.

ZF Marine supplied the complete propulsion system, apart from the engines, including this ZF550 V-drive gear and shaft brake for the smaller C18 engine.

Vessels doing extensive sonar surveys benefit from an ability to reduce the number of engines operating – either diesel-electric or, as with the Sea Scout, a pair of smaller propulsion engines. Of equal importance is a hull that will not set up turbulence that could interfere with the sonar signals. The Sea Scout has pods mounted on the bottom of each hull below the keel. These contain cavities into which the various transducers listed above, are fitted. Wiring then brings the signal directly to the operations room. Lab equipment includes (2) C-Nav 3050 BPS receivers plus C-Navigator control unit, a Coda F180 Inertial navigation unit, a Kongsberg MRU5 (for HiPAP) and (2) YSI velocity sensors.

For specialized transducers that may be required by chartering parties, a leg that can be raised and lowered through an opening in the deck just aft of the main house can be used.

Offering a wide range of geophysical services to government and industry in the Gulf of Mexico and Brazilian waters, C&C Technologies has a great depth of experience in defining successful hull forms. There are two interrelated criteria for which Teknicraft designed the Sea Scout hulls. A clean flow of water over the keels and transducers assures an accurate recording of data. At the same time, maintaining this clean flow at increased speed reduces the cost of collecting data. For inshore work, a shallow draft is also desirable. The Sea Scout meets these demands with a relatively shallow 6.5-foot (2-meter) draft and two finely shaped hulls each capable of supporting an array of transducers. The decision was made not to install bow thrusters on the vessel. Although this precluded dynamic positioning, it was felt that the thruster tunnel would create turbulence on the bow that could distort data collection.

The extensive experience of C&C (**www.cctechnol.com**) combined with the Teknicraft design (**www.teknicraft.com**) and the ability of All American's aluminum building expertise (**www.allamericanmarine.com**) will make the Sea Scout one of the more noteworthy vessels of the year.

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The first (of 20) of the 300 series ...

... and the 54th and last 200 series.

Bourbon 300

Bourbon Ends One Series, Starts Another in China

Bourbon maintained its steady march forward to offshore dominance with a unique naming ceremony in China, which included the naming of Bourbon Liberty 254, the last of 54 vessel to be delivered of the Bourbon Liberty 200 series; and the naming of Bourbon Liberty 301, the first vessel of the Bourbon Liberty 300 series of 20 AHTS.

The new Bourbon Liberty 300 AHTS has been designed and built by Sinopacific Zhejiang Co. of China. The vessel boasts a larger deck area and liquid capacity, driven by the need to service increasing number of deepwater energy projects. Thanks to the innovative diesel electric propulsion system, this AHTS uses less fuel than vessels with conventional direct drive systems and as a result produces less pollution. With two azimuths thrusters and two bowthrusters, a fully redundant class II dynamic positioning system provides good maneuverability. In addition, this AHTS is classed FiFi I and cleanship to satisfy more stringent future environmental requirements.

Continued Success

About a year and a half ago the group announced its "BOURBON 2015 Leadership Strategy" and the ordering of three new series of vessels from Sinopacific shipyards. Bourbon Liberty 301 is the first vessel of the first series to be delivered. "Delivery of the Bourbon Liberty 301 is an important milestone for Bourbon," said Christian Lefèvre, CEO, Bourbon. "Our strategy of building standardized vessels in large quantities, as exemplified in the Bourbon Liberty 100 and 200 series, has been a tremendous success."

The first Bourbon Liberty, Bourbon Liberty 101, was delivered to the Group in February 2008. Four years later, all 76 Bourbon Liberty vessels (54 Bourbon Liberty 200 and 22 Bourbon Liberty 100) are operational.

"We operate a fleet of 76 Bourbon Liberty vessels worldwide," said Rodolphe Bouchet, VP Business Management for Marine Services. According to Bouchet the 19 remaining vessel in the 300 series will be delivered by 2014.

Deeper Waters Demand Bigger Capacity

"Bourbon Liberty 300 vessels are the extension of Bourbon Liberty 200 vessels. They provide clients with a larger deck space and the capacity to carry more liquid mud and bulk products. At the same time, they use the same key features as the Bourbon Liberty 200 series (Class 2 Dynamic Positioning system, main gensets, azimuth thrusters)," said Olivier Daniel, Bourbon Newbuilding Managing Director. The 300 series is an extension of the Cleanship Class AHTS, and further vindication of the push to service the highly demanding and environmentally stringent offshore oil and gas client. Bourbon decided voluntarily to apply this Cleanship notation to the Bourbon Liberty 300 series even though the deadweight of the vessels does not require it.

Sinopacific Shipbuilding

The event to deliver the first of the 300 series – named Bahtera Mulia – was similarly triumphant for the privately owned Chinese shipbuilding company Sinopacific Shipbuilding Group's Zhejiang Shipbuilding Co., Ltd., as it highlights the first time that the company completely designed and built a vessel of this type. The delivery of the SPA 80 Diesel Electric DPII 80mt AHTS marks the completion of the transition from joint to independent design that the OSV design capability of Sinopacific has, breaking the situation that preliminary designs of OSVs were mostly monopolized by European, American and Singaporean companies. Bouchet noted that designing the vessel where it is built has certain strategic advantages, particularly in regards to efficiency of construction.

Today, Sinopacific reports that it has mastered the entire design chain ranging from the front-end concept design and basic design to the back-end detailed design and production design, dramatically improving its overall planning factors over the OSV construction project, and enabling it to more quickly respond with solutions. After nearly four years of design and research, in addition to SPA 80, SINOPACIFIC has also independently developed a series of OSV products such as the SPP 17, SPP 35 and SPU1000.

The SPA 80 was designed by SDA, a design company of SINOPACIFIC. It is a small, high-tech AHTS. Compared with the same type of AHTS designed by foreign design companies, the SPA 80 has not only absorbed their advantages, but also added many of the world's most advanced design and technical features. Its indicators, such as safety, reliability, maneuverability, operational efficiency, environmental friendliness have reached world class status. In order to improve its environmental performance, the SPA 80 innovatively uses the fuel tank double hull protection design on the small AHTS to reduce the risk of environmental pollution caused by accidents. In addition, the SPA 80 has been added with the self-recovering function of oil slicks on the sea, and has obtained the Oil Recovery Ship certificate. Most importantly, the SPA 80 has also obtained the BV' Clean Ship certificate for its foresight in meeting more stringent environmental requirements.

(All images copyright Bourbon)

Specification of SPA 80

Length, o.a.	65.8m
Breadth, molded	16m
Depth, molded	6m
Design, Draft	4.3m
Max. Draft	5.07m
Generator power	6,000 kw
Deadweight	1,800mt
Service speed	12 knots
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Maritime Security

Legal Definition and Consequences Surrounding the Use of Force

The recent incident involving the MV Enrica Lexie off the coast of India highlights the increasing carriage on merchant vessels of armed security guards (whether military personnel or private contractors) to ward off attacks by pirates and robbers. I will not speculate as to what may have occurred on board the tanker or on the fishing vessel where two individuals unfortunately lost their lives. Suffice it to say that this is a tragic incident for all involved.

The International Maritime Organization (IMO) has reluctantly acquiesced to this trend of weaponizing merchant vessels by promulgating guidelines for flag states, coastal states, and ship owners/operators regarding use of privately contracted armed security personnel. The guidance empathically states that the master retains overriding authority for acts undertaken on board the vessel. It also states that the security personnel should have rules for the use of force, as agreed between the ship owner, the master, and the security personnel.

Unfortunately, there is very little guidance available to the owner and the master to judge whether a particular security company's rules for the use of force are adequate and appropriate.

Since the master and, to a lesser extent, the ship owner are ultimately responsible for everything that occurs on a merchant vessel, it behooves them to understand the rules for use of force that are to be implemented by the armed security guards. It is also important that the master and owner be able to distinguish between adequate and inadequate rules.

The principles discussed below generally apply in common-law countries. For legal principles in specific jurisdictions, expert legal advice should be sought.

The basic construct of this discussion involves the right of self-defense and/or the defense of others. An individual is entitled to use force, up to and including deadly force, to thwart an attack upon that individual or another when and only when the attack poses an imminent threat of great bodily harm or death. In other words, you may not shoot someone who merely slaps your face. You may, though, be entitled to use deadly force against someone who attacks you with a gun, knife, or other deadly instrument (e.g., a crowbar). Whether the attack poses an imminent threat of great bodily harm or death depends in large part on weapon being employed. For example, a crowbar being wielded by an attacker 100 meters away would not be considered an imminent threat, whereas an attacker with an AK-47 at the same distance would constitute an imminent threat. Even when an imminent threat is presented, that does not mean you are required to use deadly force in such circumstance, only that the use of deadly force may be reasonable in those circumstances.

(Image: Courtesy Transas' Anti-Piracy Simulator)

Your resistance to an attack must be proportional to the threat presented. If you can safely retreat, you should do so. For example, if pirates in a skiff attack your vessel and fire their weapons, you should (if able) increase speed and change course to evade the pirates. If that is not feasible, you should warn the pirates off. If warning shots are to be fired, it is important the shots be fired so as not to result in unintended injury. Several years ago, military personnel on a US vessel fired warning shots in front of a small boat that was approaching the US vessel. The shots were fired in front of the approaching boat. Unfortunately, one of the rounds skipped on the surface of the water and struck an individual on the boat, killing him. It was then learned that the small boat was approaching the US vessel in hopes of selling trinkets – no harm had been intended. In other instances, local fishermen fire their weapons for the purpose of alerting a passing vessel that it is approaching their fishing nets. Again, they are not pirates and are not intending to attack the vessel. Use of deadly force in such circumstance would be inappropriate. Persons using deadly force in either instance would be operating outside the usual and accepted bounds. They and the master could possibly be held responsible for any injuries or damages incurred by an innocent party.

Non-deadly force may be used for self-defense or defense of others; for defense of the vessel; or to prevent theft or damage to property that one is authorized to protect. Non-deadly force may include such things as: maneuvering the vessel to place an attacking boat in its wake; use of sonic booms or dazzling lights; use of fire hoses or monitors; deployment of barbed or concertina wire; and deployment of an electrified fence around the vessel's gunwales. The goal of non-deadly force is for the attacker to be deterred, without killing or severely injuring the attacker.

Masters should carefully consider all circumstances when employing force and resort to the use of deadly force or to authorizing armed security guards on board the vessel to use deadly force only when there is imminent danger of death or great bodily harm. The inappropriate use of deadly force may result in civil and/or criminal charges against the armed security personnel, the master, and the owner. Reasonable care and careful consideration is required before one exercises or authorizes the use of deadly force. Masters and owners should also carefully review the rules for use of force by armed security guards prior to embarkation of those guards on the vessel. The rules should fully address the restrictions on use of force, including a provision that deadly force may only be used with the express permission of the master.

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Renewable Energy

Marine Renewables Sector Begins to Take-Off in 2012

(Photo: Fundy Ocean Research Center for Energy – or FORCE)

The U.S. lags behind Europe in the development of offshore wind (OSW) projects in part due to the lack of a mandatory national renewable energy standard and other tax incentives. But, the Obama Administration has set its own voluntary goal of producing 80% of the nation's electricity from clean sources by 2035. And, various federal agencies have worked diligently to promote new sources of energy, including OSW and tidal and wave energy. This year, we anticipate the first new commercial leases for wind off the Atlantic Seaboard (since Cape Wind), and the first commercial project for tidal energy in New York Harbor. This article reviews the current legal and regulatory framework for OSW and tidal energy, and the remaining impediments to further progress and next steps for going forward. The most recent estimate of the Department of Energy's (DOE) National Renewable Energy Laboratory (NREL) is that there are over 4,000 gigawatts of potential offshore wind resources in the U.S., or four times the existing sources of electricity. Wind is abundant on the U.S. Outer Continental Shelf (OCS) and relatively "free" once it is tapped. Getting the wind developed and brought to shore is another matter.

Why Tidal Energy?

Two recent DOE reports estimate that wave and tidal energy off the nation's coasts could contribute significantly to the total annual electricity production of the U.S., or up to 15% of its electricity by 2030. Companies like Verdant Power are tapping into this available energy source by developing projects in the East River of New York. On January 23, 2012, FERC granted Verdant Power the first commercial license for tidal power in the U.S.

The "Smart from the Start" Initiative

Giving credit where credit is due, one must give credit to Secretary Ken Salazar and his Department of the Interior (DOI) for developing the "Smart from the Start" Initiative. Secretary Salazar announced this initiative on November 23, 2010 to accelerate the responsible development of renewable energy resources on the Atlantic OCS. The main objective is to identify areas on the OCS, so-called Wind Energy Areas (WEAs), which are best suited for wind development. The underlying authority for the development is Section 388 of the Energy Policy Act of 2005. Federal law enables DOI to lease areas of the OCS for wind development. However, this jurisdiction does not extend to State waters. DOI recognized early on that bringing the wind onshore would require collaboration with the States along the Atlantic. As a result, DOI supported a series of Task Forces, comprised of federal, state, local, and tribal stakeholders, to resolve use conflicts and identify the most suitable WEAs. While there have been stops and starts in the program, the Task Forces were able to resolve most of the critical use conflicts, i.e., between military, shipping, port, and other existing uses of the WEAs. On February 3 and 6, 2012, respectively, DOI issued Calls for Nominations (Calls) for leasing specific WEAs off the coasts of Virginia, Maryland, and Massachusetts. (Areas off New Jersey and Delaware were already the subject of Calls.) DOI announced the Calls simultaneously with issuing a final Environmental Assessment (EA) on the defined WEAs, concluding that there would be no significant impacts caused by the lease sales. Under a lease, a developer can only conduct certain site surveys and collect meteorological and other data. Further environmental reviews would be deferred until proposed construction of a wind farm. Interested developers had until March 19, 2012 in the case of VA and MD, and March 22, 2012 in the case of MA, to respond to the new Calls. If there is competitive interest in a particular Call area, DOI, through the Bureau of Ocean Energy Management (BOEM), will conduct an auction to sell the lease-hold interests. BOEM will finalize its auction procedures prior to the actual sale beginning. BOEM expects to award leases off the Atlantic Seaboard by the end of the year.

How Will Power Be Brought Onshore?

Like their onshore counterparts, OSW projects must be "interconnected" to the land-based power grid to deliver the electricity they generate. The construction of new transmission lines, while critical to integrating renewable resources, faces powerful barriers, such as cost recovery uncertainty, siting concerns and technological limitations. In an effort to incentivize investment in transmission, FERC issued rules establishing several broad categories for incentive rate treatments for transmission investments including: incentive rates of return on equity for new investment; use of hypothetical capital structures; and accelerated depreciation.

The Atlantic Wind Connection project (AWC), which promises to build the first offshore "transmission highway," successfully petitioned FERC for incentive

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The most recent estimate of the Department of Energy's (DOE) National Renewable Energy Laboratory (NREL) is that **there are over 4,000 gigawatts of potential offshore wind resources in the U.S.**, or four times the existing sources of electricity.

rate treatment in 2011. AWC would consist of four 320 kV direct current transmission cables that will run parallel to the Mid-Atlantic coast approximately 20 miles offshore for 250 miles. This project would integrate OSW generation with the land-based transmission system in New Jersey, Delaware, Maryland, and Virginia. While it succeeded in obtaining FERC rate treatment, such approval was conditioned on the transmission project being included in the Regional Transmission Expansion Planning (RTEP) process of PJM. Therein lies the challenge for AWC. Regional planning processes, like RTEP, generally only consider transmission projects that address a demonstrated reliability need or economic benefits. However, a recent FERC rule will require regional planners to consider "public policy requirements" when conducting planning studies. The new mandate offers renewed hope for offshore transmission projects, such as AWC, that otherwise would not be "economic" or alleviate reliability concerns.

What Role Will the States Play?

Several States with the potential for OSW have commenced initiatives aimed at fostering the development of this growing industry. New Jersey became one of the most prominent when it announced in its 2008 Energy Master Plan its goal of installing 1,000 MWs of OSW. While several years behind schedule, the 1,000 MW target remains a State goal.

Last summer, the New Jersey Board of Public Utilities (NJBPU) launched stakeholder proceedings on implementation of the State's Offshore Wind Economic Development Act (OWEDA). One of those hearings explored various methods for funding the state's Offshore Wind Renewable Energy Certificates (ORECs). Despite the NJBPU activity, uncertainty pervades the OREC market.

In Maryland, Governor O'Malley pledged support for the Maryland Offshore Wind Energy Act of 2012 that would establish an OSW "set-aside" within Maryland's Renewable Portfolio Standard. The proposed bill would require regulated utilities to comply by developing or purchasing ORECs by 2017. The OREC model comes after last year's attempt at similar OSW legislation that centered on long-term (25+ years) power purchase obligations. That bill largely failed as a result of cost concerns.

States like Virginia have not pursued the OREC model but are more reliant on investor-owned utilities developing OSW when prices become more competitive.

What are the Remaining Impediments to Offshore Wind?

A number of economic and regulatory barriers need to be surmounted for OSW to achieve its potential to provide an abundant source of clean energy and to mitigate climate change.

• Economics

One reason the U.S. has not developed OSW to date is that the economics of OSW are not currently attractive. The installed capital cost of OSW is materially higher than onshore facilities and OSW requires comparatively higher operation and maintenance costs since OSW facilities at sea are more difficult to access and maintain. The economics of OSW can be materially enhanced by government incentives and the liquidity of markets for commodities the OSW produces (i.e., renewable energy and renewable energy certificates (RECs). The production tax credit (PTC) and the Section 1603 cash grant have played pivotal roles in the development of wind generation. The PTC confers a dollar-value credit (currently $2.11/kWh) for each kWh of wind electricity generation. Unfortunately, the PTC for wind will expire at the end of 2012 and the cash grant expired at the end of 2011.

OSW must have viable markets for the long-term sale of energy and RECs. Liquid markets with plentiful energy and REC off-takers do not exist. In the absence of markets created by regulation, like portfolio standards, and designated markets for OSW RECs, OSW developers will struggle to find off-takers willing to commit to long-term purchases and financing will be hampered.

• Regulatory

OSW represents a relatively new technology in the U.S. and the necessary regulatory infrastructure has not yet developed. For example, there is insufficient coordination between BOEM and states which have to regulate the siting of transmission in their waters. Finally, while BOEM has leasing authority, it lacks one-stop permitting authority over the entire process. At the end of the day, a number of environmental and civil authorities still must approve the lease.

What Does the Future Look Like?

A handful of serious developers are continuing to pursue OSW development. They are primarily looking to states to develop the incentives needed to support development of this available source of renewable energy. If the U.S. is to reduce its dependence on foreign oil, it should promote this form of abundant energy with appropriate policies and tax credits. Consumers, too, must be willing to pay more, at least initially, for this clean energy until it can become more competitive with existing sources.

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eLearning & Maritime

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Never has training been more important in an industry than it is now in the maritime industry. Hardly a day goes by without a new story about a high profile maritime incident, invariably causing us to wonder what role training played. Further compounding the issue is the ever-increasing complexity of safety-critical vessel and shore-based systems that mariners have to understand and operate. Few would disagree with the need to take advantage of any practical, available tool which might help in our quest to provide the best training possible to officers and crew. One such tool is eLearning.

You May Think You Understand eLearning ... But Do You?

eLearning is sometimes dismissed as a cheap and inferior alternative to classroom-based or on-board training. And there are certainly many examples of poor eLearning implementation in existence. Yet the vast majority of the world's universities and most large organizations use eLearning as an integral part of the education and training they provide. The question is, can it be used to improve training in the maritime industry?

The short answer is “yes”. Like any useful tool, it has both strengths and limitations, but can be used to great advantage when intelligently applied. Therefore, while it is foolish to think that eLearning is always inferior to classroom or on-board training, it is just as foolish to believe that it could ever replace all aspects of classroom or on-board training. So what is it, what can it do, and how is it best applied? This is the first in a series of articles which examines those questions.

What is eLearning?

A quick definition summarized from Wikipedia is in order here:

“E-learning is essentially the computer and network-enabled transfer of skills and knowledge. … It can be self-paced or instructor-led and includes media in the form of text, image, animation, streaming video and audio.”

Wikipedia, March 26th, 2012

The definition above is very broad. That's because there are many kinds of eLearning, each with its own applications, and each with its own strengths and limits. All include some form of learning content delivery (training). Many include tests or assessments. Some of the most advanced environments include training management, communication and collaboration tools, and training analytics.

Knowledge Training

A common initial criticisms I hear of eLearning is that it cannot replace hands-on learning. I could not agree more. After all, as the saying goes, you cannot learn the skill of playing the piano by hearing a lecture about it. But there is another part to learning. Although you will never learn to play the piano by attending a lecture, it can be equally said that you’ll never acquire the criical knowledge of music theory by practising, no matter how many hours you spend at the keyboard.

eLearning is very effective for learning information or “knowledge acquisition”. Knowledge forms the foundation for the skills that mariners need. It also allows mariners to make critical decisions in the face of increasingly complex on-board systems and their interactions. Knowledge supplements the skill of "how" to do something with the knowledge of "why" it is important to do it in a particular way, and the expected consequences if not done so. One of my favourite sections of the STCW code (we all have our favorites) speaks to the need for mariners to acquire knowledge as the basis for the duties they perform:

“Scope of knowledge is implicit in the concept of competence. ... This includes relevant knowledge, theory, principles and cognitive skills which, to varying degrees, underpin all levels of competence. It also encompasses proficiency in what to do, how and when to do it, and why it should be done. Properly applied, this will help to ensure that a candidate can:

- *work competently in different ships and across a range of circumstances;*
- *anticipate, prepare for and deal with contingencies; and*
- *adapt to new and changing requirements.”*

Manila Amendments, Chapter II, Section B-II/1, Paragraph 14

Knowledge and skills are required by the modern seafarer, and different training techniques are necessary for each. In fact, as we will see below, the best approach is neither hands-on nor eLearning in isolation, but rather a blending of the two.

What the Research Says

There is a great deal of research on the effectiveness of eLearning. Here I will recount some of my early research as a faculty member of Computer Science at the University of British Columbia. The results have been confirmed and expanded upon by a large body of subsequent research. There are two main results.

Blended is Best for Performance

First, eLearning has been found to be, on average, equally effective to classroom-based instruction at teaching knowledge. The basis for that finding in my research was an experiment where I divided a set of students I taught into three equalized, but randomized, groups. One group took the course using the traditional classroom-based approach. The second group took the course entirely on-line with access to me (as their instructor) and their peers through the course discussion forum. The third group had full access to both the lectures and to the on-line resource. The result was that, on average, the on-line students performed equally to the classroom-based students.

Most interestingly however, the students with access to both the lectures and the on-line course performed significantly better than either of the other two groups. The combination of learning experiences better addressed the needs of a wider variety of students, and therefore the group as a whole performed much better. This is a technique known as "blended learning". In blended learning, students are taught using a combination of models - typically face-to-face instruction supplemented with eLearning. This technique is being employed with great success for job training and familiarization by British Columbia Ferries Services Inc. - one of the largest ferry operators in the world. Their story was published in the Maritime Reporter, November 2011, pp. 68-73.

Blended is Best for Participation

There was also a significant difference in terms of student participation in the learning experience. As every trainer is aware, some trainees are reluctant to speak up and join a discussion or ask questions - especially in a classroom environment when surrounded by their peers. This is unfortunate because students learn better when they are engaged and participatory. In my early research, when asked, roughly 50% of students reported to be comfortable making a contribution to a class-based discussion (asking a question or making a comment). However, when those same students were asked whether they were comfortable making a contribution to a web-based eLearning discussion, approximately 70% of students reported comfort in doing so. This is a significant improvement in itself. Most interestingly however, when we looked closely at the results, approximately 90% of the students were comfortable making a contribution to a discussion in at least one of the web or the classroom. This was a startling result and, once again, spoke clearly to the benefits of blended learning approaches. By simply adding an eLearning discussion feature to a lecture-based class, we went from approximately 50% to 90% participation.

Conclusion

Does this “research” translate to results in the maritime industry? Absolutely, as we have seen in the BC Ferries example. Even so, maritime training is somewhat unique and there are practical considerations which must be accommodated. In parts two and three of this series, we will look at some of the practical strengths and limitations of eLearning in the maritime industry.

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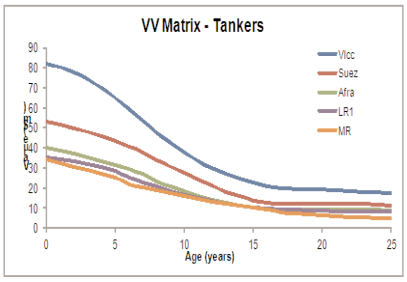
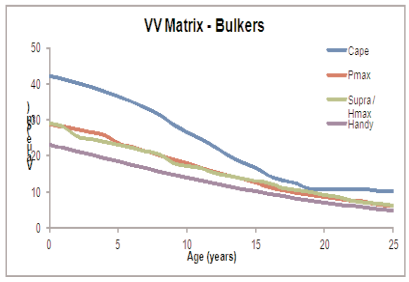
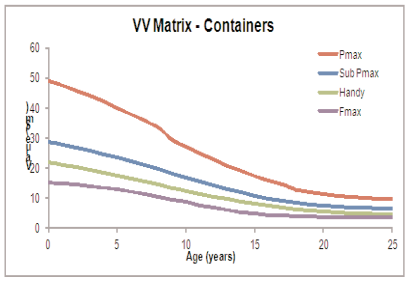






SHIPPINGInsight 2012 Fleet Optimization Conference Debuts

A new maritime industry conference, scheduled for October 2012 in Stamford, Conn., will provide a forum for discussion of fleet optimization and efficient ship operations, according to its organizers. The SHIPPINGInsight Fleet Optimization Conference is being co-produced by Soccoli Associates LLC, a maritime consultancy, and Rhodes Communications, Inc., an international communications firm specializing in the maritime industry. ***Maritime Reporter*** and ***Maritime Professional*** are the exclusive media sponsors for the event.

"In the current economic client, it is imperative that ship owners find effective tools and techniques to operate their vessels more efficiently," said Frank Soccoli, president of Soccoli Associates LLC and SHIPPINGInsight conference co-director. "This conference will bring together stakeholders from across the industry to explore best practices to achieve gains in ship efficiency, including hull design, fuel and bunkering, ship routing, asset management and IT solutions."

"The Fleet Optimization Conference is the first in a new series of conferences that will be marketed under the SHIPPINGInsight brand, addressing the pressing issues faced by ship and fleet operators in the 21st Century," said conference co-director Jim Rhodes, president of Rhodes Communications, Inc. "We will hold future conferences covering other timely themes such as risk management, maritime safety and crew training in other maritime centers around the world in the future."

The SHIPPINGInsight conference will bring together representatives from ship and fleet operators, as well as naval architects, marine engineers, shipyards, classification societies, IT specialists, system integrators and regulatory bodies.

www.shippinginsight.com

Fire blazing onboard your ship?

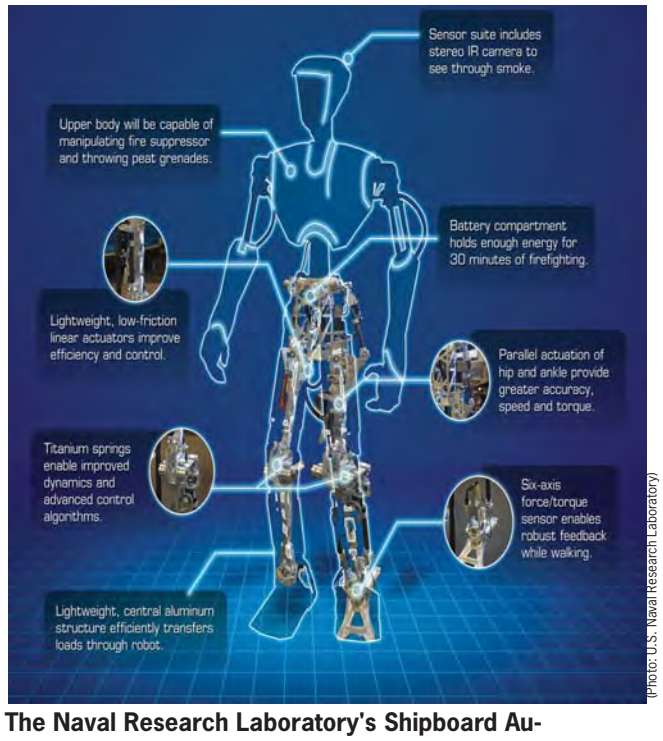
SEND IN THE ROBOT

In both war and peace, fire on ships is serious and frequently results in excessive damage and high repair costs because the fire is not detected or controlled adequately. To improve future shipboard firefighting capability, scientists at the Naval Research Laboratory have formed an interdisciplinary team to develop a humanoid robot that could fight fires on the next generation of combatants. A humanoid-type robot was chosen because it was deemed best suited to operate within the confines of an environment that was designed for human mobility and offered opportunity for other potential warfighting applications within the Navy and Marine Corps. The firefighting robot, called the Shipboard Autonomous Firefighting Robot (SAFFiR), is being designed to move autonomously throughout the ship, interact with people, and fight fires, handling many of the dangerous firefighting tasks that are normally performed by humans. The humanoid robot should be able to maneuver well in the narrow passages and ladderways that are unique to a ship and challenging for most older, simpler robots to navigate.

The robot is designed with enhanced multi-modal sensor technology for advanced navigation and a sensor suite that includes a camera, gas sensor, and stereo IR camera to enable it to see through smoke. Its upper body will be capable of manipulating fire suppressors and throwing propelled extinguishing agent technology (PEAT) grenades. It is battery powered that holds enough energy for 30 minutes of firefighting. Like a sure-footed sailor, the robot will also be capable of walking in all directions, balancing in sea conditions, and traversing obstacles. A key element of the SAFFiR development is to allow damage control personnel and the robot to work cohesively as a team. Algorithms are being developed to allow autonomous mobility and decision making by the robot as a team member. To enable natural interaction with a human team leader, the robot will have multimodal interfaces that will enable the robot to track the focus of attention of the human team leader, as well as to allow the robot to understand and respond to gestures, such as pointing and hand signals. Where appropriate, natural language may also be incorporated, as well as other modes of communication and supervision. Researchers from Virginia Tech and University of Pennsylvania are also working with NRL on the project. They plan to test the firefighting robot in a realistic firefighting environment onboard the ex-USS Shadwell in late September 2013.

(Photo: Virginia Tech)

Virginia Tech and the University of Pennsylvania are working with NRL on the firefighting robot project. NRL's firefighting robot will be a follow-on version to the existing Virginia Tech CHARLI-L1 robot, pictured here.



(Photo: U.S. Naval Research Laboratory)

The Naval Research Laboratory's Shipboard Autonomous Firefighting Robot (SAFFiR) is a humanoid-type robot being designed for shipboard firefighting.

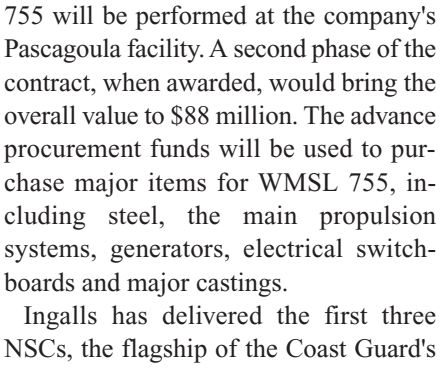
Ingalls: $76m Advance Procurement Contract

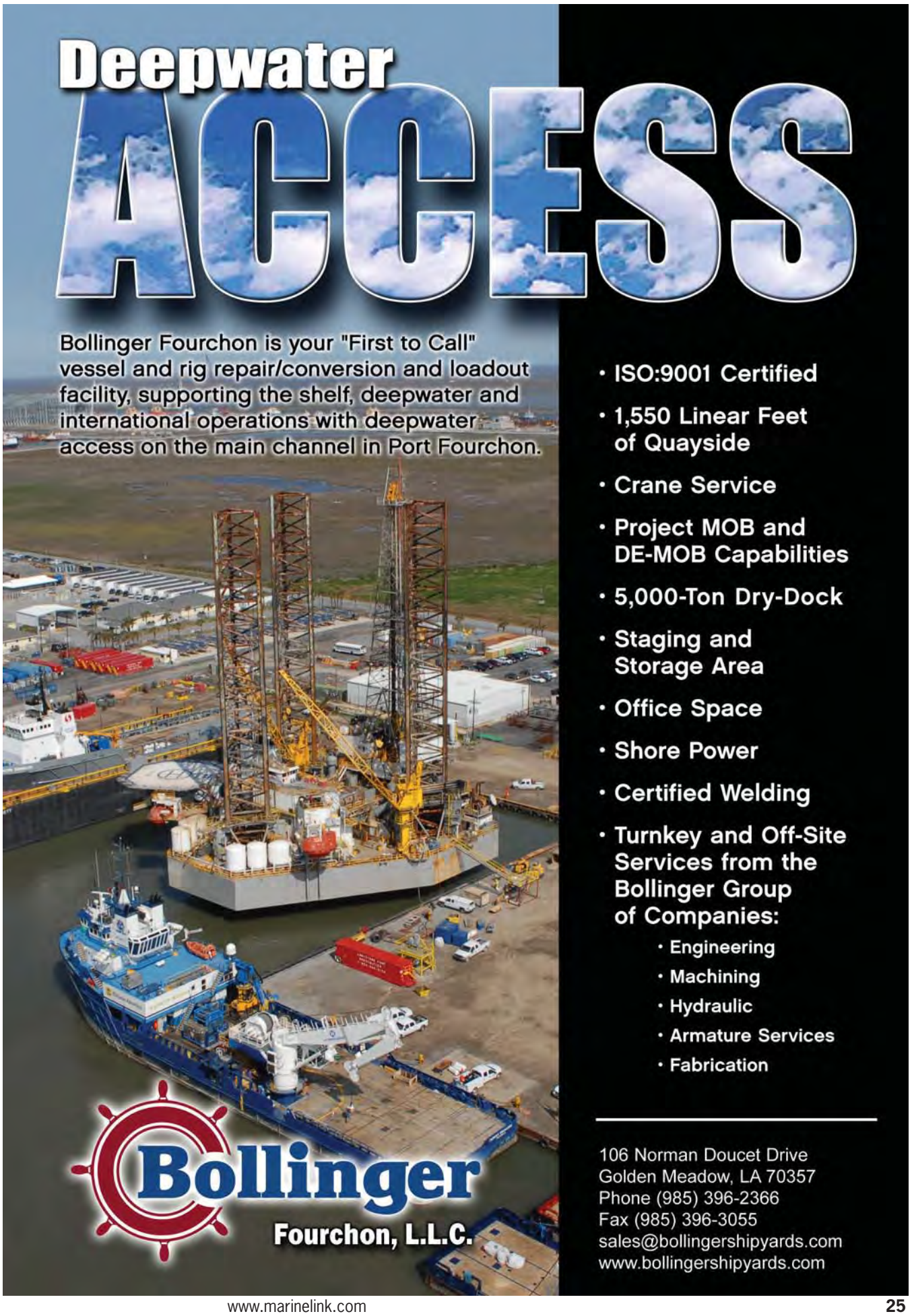
Huntington Ingalls Industries said that its Ingalls Shipbuilding division received a $76 million fixed-price contract from the U.S. Coast Guard to purchase long-lead materials for a sixth National Security Cutter (NSC). Construction and delivery of the yet-to-be-named WMSL 755 will be performed at the company's Pascagoula facility. A second phase of the contract, when awarded, would bring the overall value to $88 million. The advance procurement funds will be used to purchase major items for WMSL 755, including steel, the main propulsion systems, generators, electrical switchboards and major castings.

Ingalls has delivered the first three NSCs, the flagship of the Coast Guard's cutter fleet, designed to replace the 378•foot Hamilton-class high-endurance cutters, which entered service during the 1960s. The first two ships are performing missions for the Coast Guard, while the third ship, Stratton (WMSL 752), will be commissioned on March 31 in Alameda, Calif. The fourth NSC, also named Hamilton (WMSL 753), is currently under construction, and the fifth, Joshua James (WMSL 754), will start fabrication later this year.

MHI Kobe Shipyard: Last Commercial Vessel Launched

The christening and launch of a pure car carrier named the Emerald Ace took place last month at the Kobe Shipyard & Machinery Works of Mitsubishi Heavy Industries, Ltd. (MHI), for delivery to Mitsui O.S.K. Lines, Ltd. The ship is significant in that itrepresents the last commercial vessel to be built at the Kobe Shipyard, a consequence of the ongoing reorganization of MHI's production structure in the company's Shipbuilding & Ocean Development business segment. Delivery of this historic vessel is slated for late June 2012. The ceremony was attended by a number of dignitaries, including Koichi Muto, president of Mitsui O.S.K.; Takanobu Ito, president of Honda Motor Co., Ltd., who together with his wife performed the ship's tethering rope cut; and Hideaki Omiya, president of MHI. Emerald Ace is hull no. 1296 built at the Kobe Shipyard, and it measures 200 x 32.26 m with a 34.5m depth. The 60,200-gt vessel is capable of carrying 6,400 units (standard passenger cars) at a service speed of 20.7 knots, and it will be Mitsui O.S.K.'s first ship to have a hybrid electric power supply system onboard. By using power from an energy storage system consisting of a large-size photovoltaic power generation system and a lithium-ion rechargeable battery, the vessel at anchor can prevent emission of exhaust gas from a diesel power generator and thereby realize "zero" emission in harbor. Since its foundation in 1905, the





Kobe Shipyard & Machinery Works has primarily handled the construction of container carriers, pure car carriers, submarines and deep submergence research vehicles. Following delivery of the Emerald Ace, commercial vessel construction will be concentrated at the Nagasaki Shipyard & Machinery Works and Shimonoseki Shipyard & Machinery Works. The Kobe Shipyard will boost its competitiveness through establishment of an enhanced operational structure, focusing on construction of submarines and deep submergence research vehicles.

297,000-dwt Iron Ore Carrier Completed

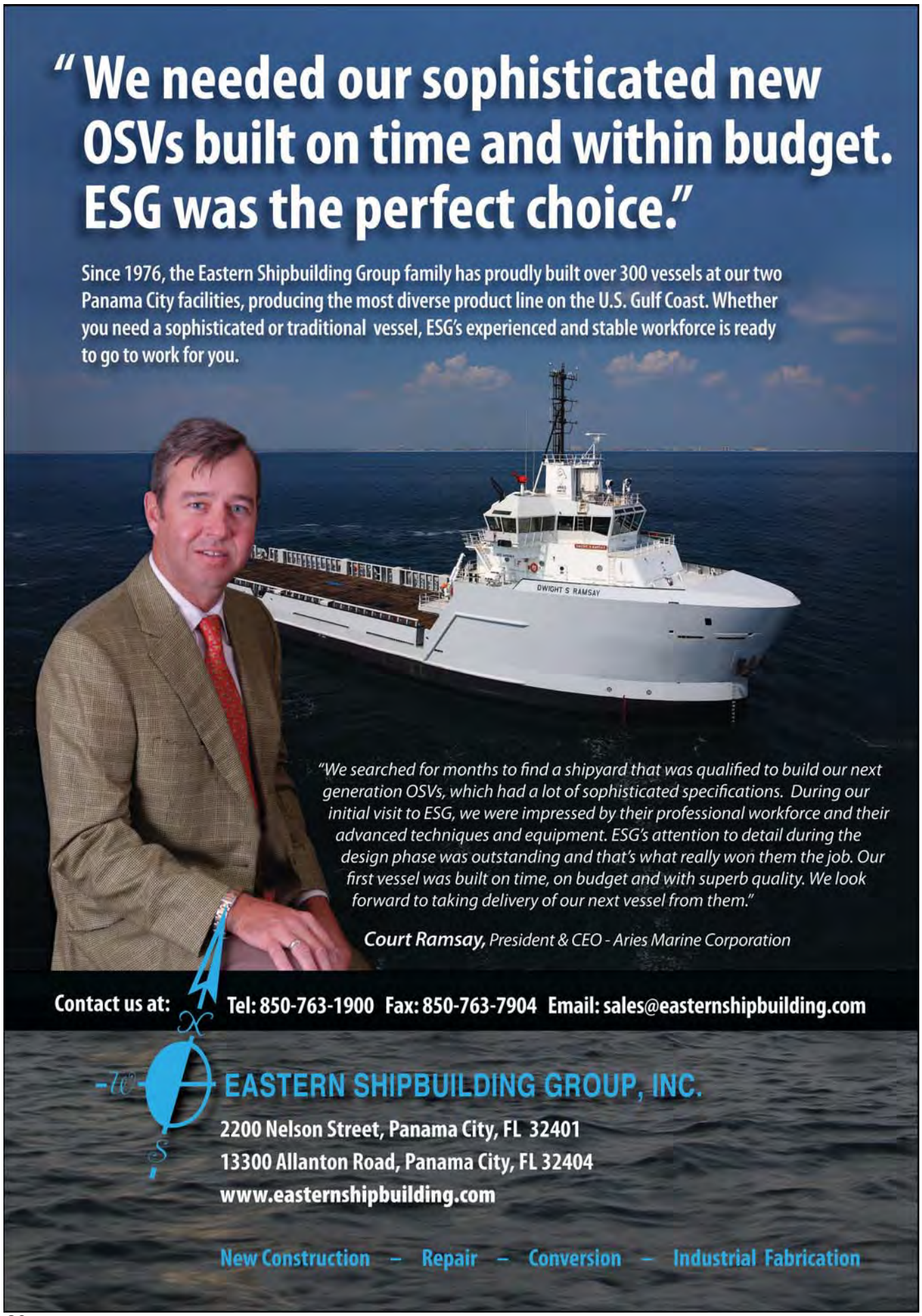
Mitsui O.S.K. Lines, Ltd. (MOL) last month announced the completion of the 297,000-ton iron ore carrier Ore Sao Luis at the Universal Shipbuilding Corporation, Ariake Shipyard. Ore Sao Luis will transport iron ore from Brazil to mainly China, under a long-term contract with Vale. Among those on hand for the naming and delivery ceremonies were Vale International General Manager, Shipping, Pietro Allevato, who named the vessel, and Universal Shipbuilding Director and Senior Managing Officer Kuniteru Ishikawa. The ship's name is derived from the capital and largest city in Maranhão state in Brasil. MOL operates 300,000-dwt class of six (6) VLOCs in total, including Ore Sao Luis.

Ore Sao Luis Main Particulars

DWT (Capacity)	297,076 tons
Length	327m
Breadth	55m
Draft	21.4m
Registry	Liberia

Tug Fleet Overhaul Commences

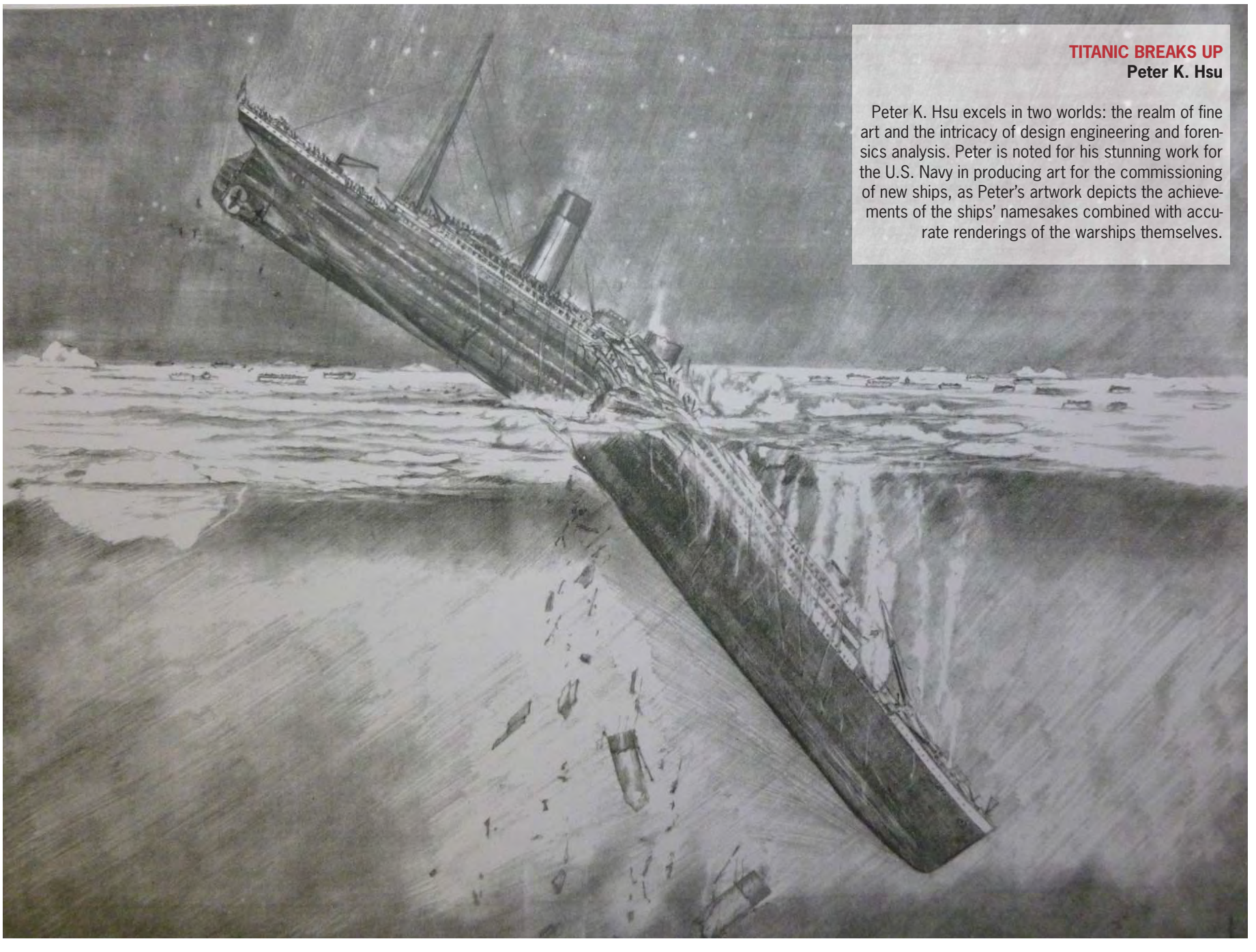
The Great Lakes Towing Company commenced an overhaul program for its Great Lakes fleet of 37 harbor assist tugboats. The Illinois is the first to undergo the overhaul at the new Cleveland shipyard. **The new 770-ton Travelift; the largest on the Great Lakes, second largest in the Western Hemisphere, and the third largest in the world;** permits the yard to "dry dock" on land several vessels at a time. Also, this April, the shipyard will deliver another of a series of newly constructed HandySize 3200 hp multi-purpose ice strengthened tugs for an undisclosed owner. Great Lakes Shipyard is now completing the last phase of a major shipyard modernization and expansion program with its designation as the Rolls-Royce Great Lakes Regional Service Center. The new shipyard is a full-service yard specializing in new construction, repairs, modifications, and steel and aluminum fabrication of all types of vessels and barges. Most recent projects include winter work on McKeil Marine's tug/barge John Spence and Niagara Spirit, the shipyard's first contract with a Canadian tug/barge company; and the conversion of Interlake Steamship Co.'s ITB Dorothy Ann and Pathfinder's Z-drive thrusters from fixed-pitch to controllable pitch.



Titanic on canvas

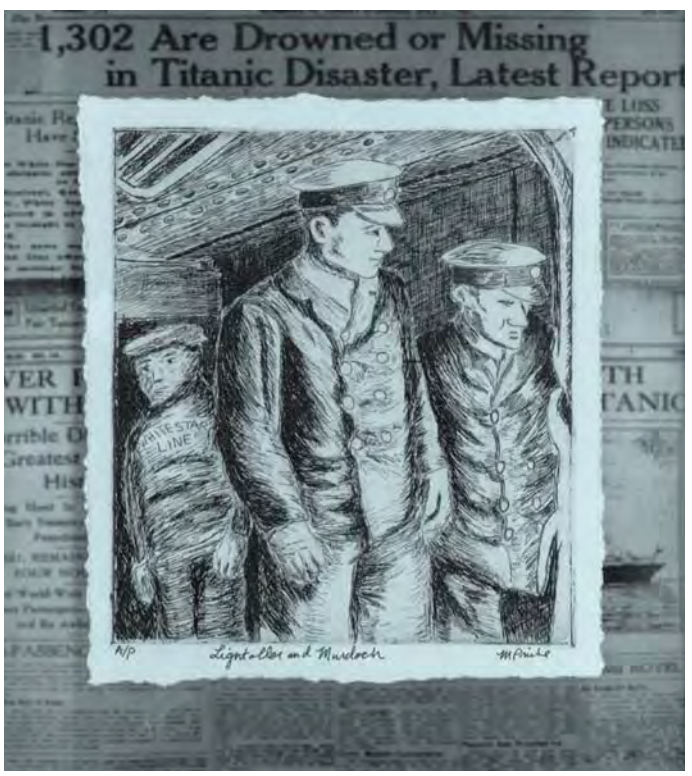
Arguably no other maritime casualty in history elicits discussion & debate as does the ill-fated Titanic. On the 100th Anniversary of her loss — April 15th, 2012 — the ship, its sinking and the loss of 1500 lives remains fresh as ever in the minds of the public through all forms of media. On the ensuring pages find a unique, artistic perspective of the ship and its loss (or, in the case of James Flood's "What If" work showcased on the bottom of page 27, a view at the ship as she could have looked arriving unscathed into New York Harbor). Many of the works are being featured this month by The Noble Maritime Collection, as it presents Titanic: A Centennial Exhibition of Contemporary Art commemorating the sinking of the ocean liner, set to open April 15, 2012. The Noble Maritime Collection is a museum and study center located on the grounds of Snug Harbor Cultural Center and Botanical Garden. **www.noblemaritime.org**

*Note: James Flood's and Peter K. Hsu's work are not featured in the Noble Maritime Collection Titanic Exhibit.



TITANIC BREAKS UP
Peter K. Hsu

Peter K. Hsu excels in two worlds: the realm of fine art and the intricacy of design engineering and forensics analysis. Peter is noted for his stunning work for the U.S. Navy in producing art for the commissioning of new ships, as Peter's artwork depicts the achievements of the ships' namesakes combined with accurate renderings of the warships themselves.



Lightoller and Murdoch
Malissa Priebe

(Images copyright Malissa Priebe *courtesy of the Noble Maritime Collection)*

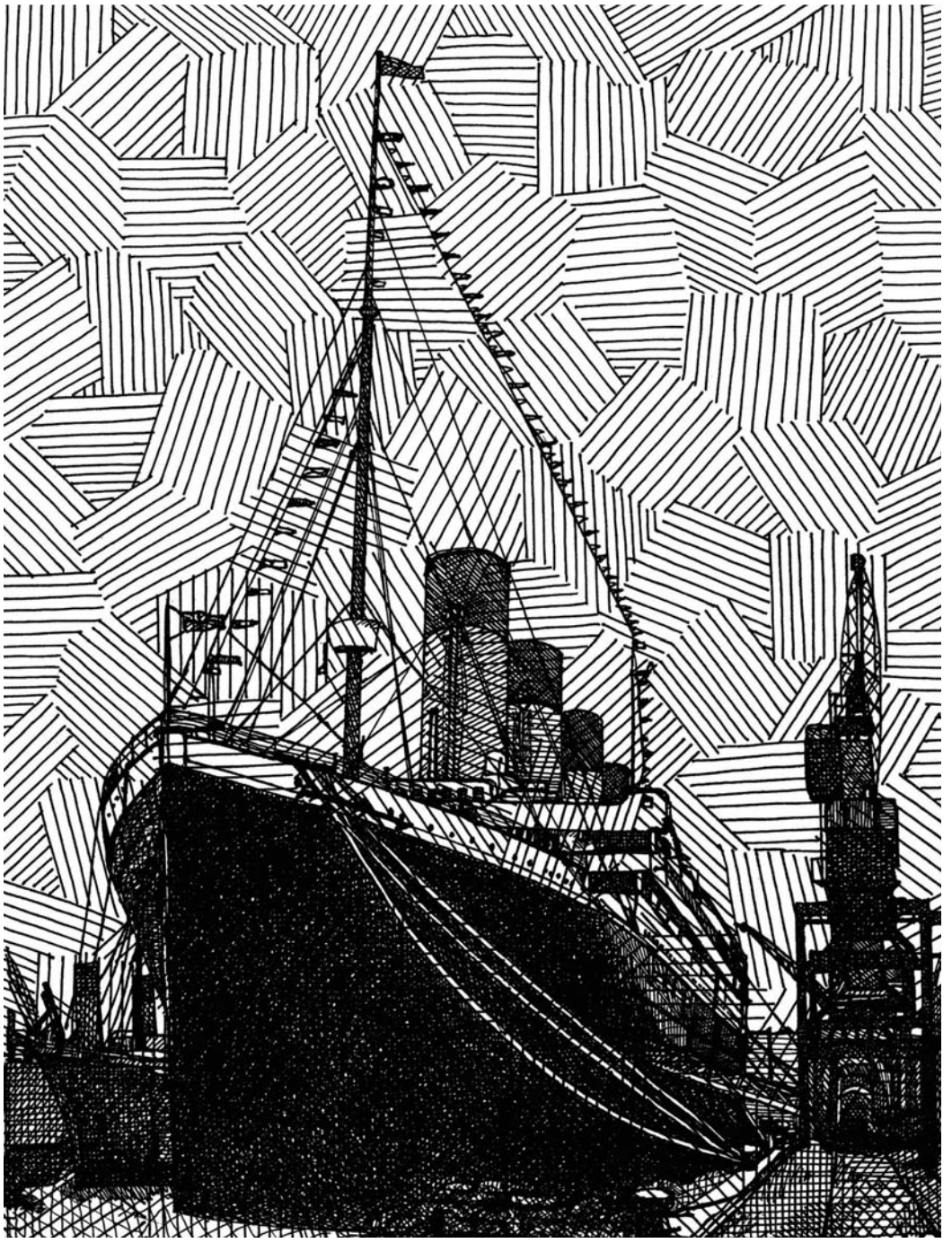
"WHAT IF ..."
(Bottom of the page)
RMS Titanic Arriving at Chelsea Piers, New York
Wednesday, 17th of April, 1912
James A. Flood

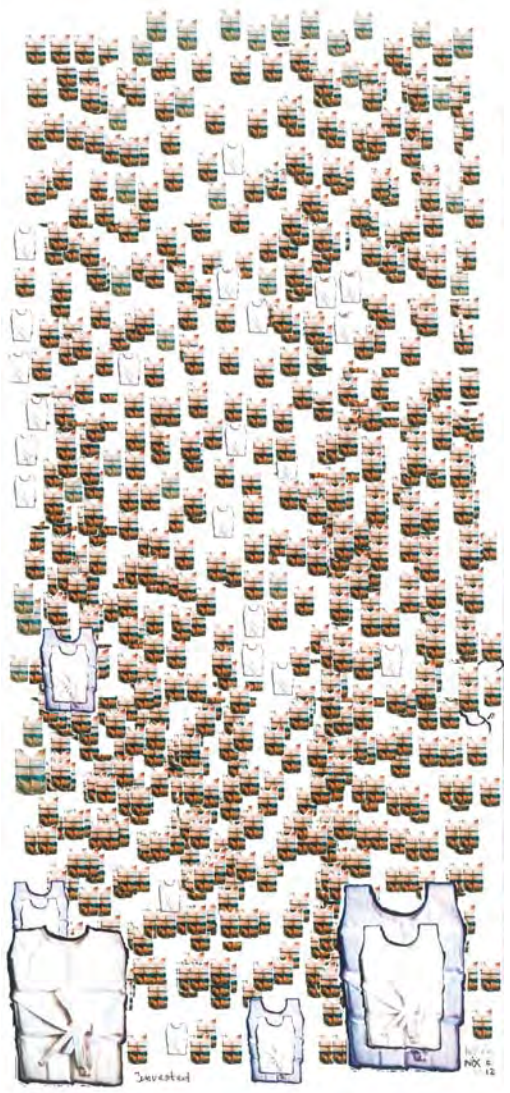
In this painting RMS Titanic does not sink into the Atlantic; indeed, she makes it to New York on Tuesday, nearly a day ahead of schedule, spends the evening at anchor for Customs, and heads for her berth early Wednesday morning. Once she is moored the passengers will disembark. However, this is not the age of speedy travel; it will take a week to get everything in order for the next voyage. In this setting it is Wednesday morning and crowds have gathered and are waiting to share in the spectacular event. Titanic and her world are merging at Chelsea Pier 59. Here the rounded curves of living horses, the opulent glory of carriages, the classic (and since destroyed) pier architecture, and the elegant period clothing - all come together to be part of the day that should have been.

This is the first in the series of ***'What If'*** *paintings by James A Flood. For the purpose of delivering the artist's intended message, some details of this setting have been altered from what might actually have appeared. For instance, the wall that (at that time) connected Chelsea piers 59 and 60 has been removed to better reveal the ship.*

RMS Titanic, Southampton 1912
Ink on paper
Matthew Benchimol

(Images copyright Matthew Benchimol, courtesy of the Noble Maritime Collection)





Invested
Graphics on canvas
Nelleke Nix

(Images copyright Nelleke Nix, courtesy of the Noble Maritime Collection)

Texting
Ink with Embossing
Rudolph Montanez
This image shows the patterns of Morse code.

(Images copyright Rudolph Montanez, courtesy of the Noble Maritime Collection)

Surface Warships 2012

There will be no more destroyers or frigates ... there will be combat ships; Future focus on cooperative efforts, common adaptable platforms.

By Edward Lundquist

Focusing on common interests in the surface combatant of the future, delegates from around the world gathered January 23-25 in Paris for the IQPC Surface Warships 2012 conference. Attendees included naval officers involved in operations, requirements and procurement; naval architects and designers, shipbuilders and systems integrators, and even members of the intelligence and research communities.

The recurring theme was flexible and adaptive designs that can be built and configured in modular fashion by international partnerships.

A pre-conference day workshop examined new technologies, materials, construction concepts and design tools that will be required for successful warship programs moving forward. The new automated design tools can deliver literally thousands of feasible designs in a matter of hours, which allow designers to narrow in on the most stable, effective and constructible iterations that meet the established parameters. Non-traditional materials such as aluminum, composites and even titanium were discussed, and the relative merits of different materials discussed and evaluated by the delegates.

The range of required capability for the next generation of surface combatants ranges from high-level warfighting such as ballistic missile defense to support of humanitarian assistance and disaster relief.

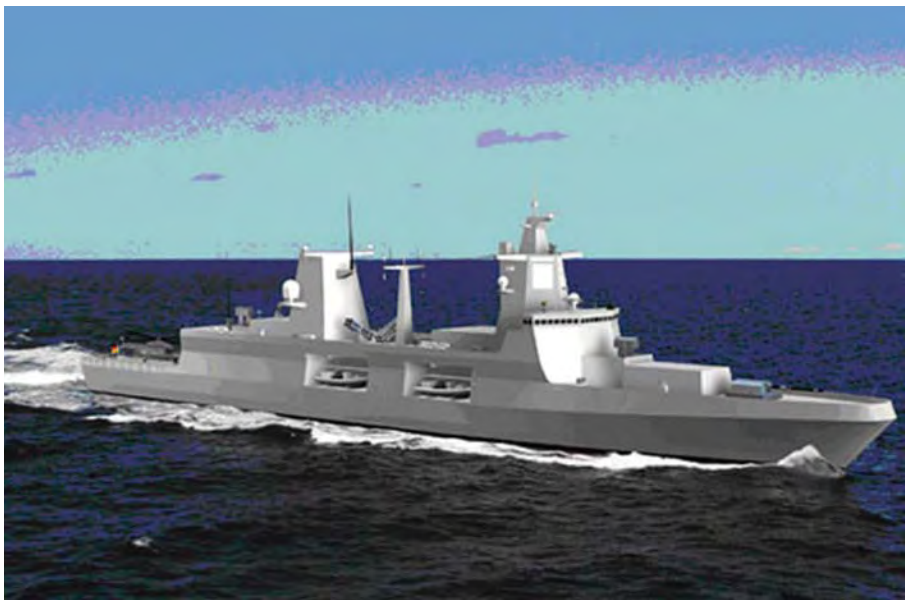
Several of the new designs feature large open spaces for boats and aircraft, both manned and unmanned, but also containerized modules for offboard systems, additional berthing, and even medical facilities.

Collaborative Efforts

A recurring theme during the three-day workshop was the importance of collaboration, both internally and internationally. Ships that are best suited to the

Navantia's Aegis frigate F-101 Álvaro de Bazán.

(Photo Credit: Navantia)



(Illustration courtesy of Renk)

Artist impression of the new German F125 frigate.

requirements have representatives of the operational forces working with the designers and naval architects. No successful ship can be designed in a vacuum, said Erik Takken, senior architect for future vision with the Royal Netherlands Navy.

Takken, senior architect for future vision with the Royal Netherlands Navy discussed efforts to achieve longer service life for fleet units, as well as integration of automated systems to increase productivity and reduce cost and novel design techniques to ensure optimum mission flexibility. Takken talked about the importance of government and industry working together, but the ultimate accountability rests with government. "You can outsource tasks, but you can't outsource responsibilities."

Some of the major ship programs currently in various stages of concept development, design or construction were presented, to include the Dutch M-class frigate replacement program; Navantia's Future Generation Frigate; the U.K. Type 26 Global Combat Ship; the joint French-Italian FREMM frigate program; and the U.S. Littoral Combat Ships.

A warship needs a helicopter, and new designs also are making provisions for unmanned aerial vehicles to compliment manned aircraft. In fact most new concepts and designs either Stern ramps for boat launch and recovery are becoming prevalent, although allowances must be made when the design requires a towed passive array or active sonar.

Changing Paradigm

"The world is changing," said Rear Adm. Chris Clayton, who is retired from the Royal Navy and now a vice president with BAE Systems, speaking about future cooperative efforts and implications for industry. "What we built for ourselves is what we offered everyone else. 'Take it or leave it.' Our international offerings were based on our national needs. There was little concern for other customers. But the old model doesn't work."

With declining budgets come fewer ship numbers, leading to consolidation, rationalization and the number of companies in naval shipbuilding shrinking. Meanwhile, Clayton says, some countries are growing their maritime forces. "Countries are aspiring to higher-end technologies."

This trend has led to joint programs among navies, with the desire for further export potential. Some countries looking to acquire naval ships may purchase outright, build in their own yards under license, or in some cases buy the first one or more ships, then build the remainder in their own yards.

"There will be a smaller number of platforms. There will be fewer ships, but with a greater range of capabilities," Clayton says.

Cmdr. Ken Houlberg of the Royal Navy also drew upon his recent command experience aboard a Type 23 frigate in the Arabian Gulf and Indian Ocean to ex-

(E. H. Lundquist photos)

Rear Admiral Chris Clayton, RN (Ret.), Maritime Military Advisor for BAE Systems, led one of the panels to explore the future of surface combatant fleets.

plain the requirements for the UK's Type 26 frigate, known as the Global Combat Ship. In his current assignment with the Ministry of Defence, he is responsible for above water surface combat capability. Houlberg showed how the UK plans the Type 26 Global Combat Ship to be the replacement for the 13 Type 23 frigates.

Common hull designed can be applied to multiple missions. "In the future, there will be no more destroyers or frigates," Houlberg says. "There will be combat ships."

The current program is to build T26 GCS frigates in ASW and Multi Mission variants, with Air Defence variants possibly replacing the Type 45 destroyers in the future.

The Type 26 will have a crew of 118, but accommodation for 190 to 'tailor' the ship for specific missions, by embarking capability teams or individual mission experts. "Mission tailoring is the Royal Navy's future direction."

Major changes in configurations of modularized combat systems would not likely be changed often. It may be easy enough to remove something in two or three days, but putting in a new system, testing it and certifying it for use could take up to 4 to 6 weeks, Houlberg says.

Speed and Volume Equal Flexibility

While global market for combatants is mainly for frigates, the U.S. is replacing their frigates with a new type of ship, called the littoral combat ship. Two LCS variants are being built today. One team, led by Lockheed Martin, is building the LCS 1 Freedom class at Fincantieri's Marinette Marine in Wisconsin, on the U.S. Great Lakes. The other team, with General Dynamics and Austal, is building the LCS 2 Independence class at Mobile, Alabama, on the Gulf Coast.

The LCS concept calls for a sea frame with significant internal volume for exchangeable modules called mission packages, as well as a tailored air detachment that includes manned and unmanned aircraft. The ship was designed to close the capability gap in addressing three critical anti-access threats in the littoral: mines, quiet diesel submarines and small, fast armed boats. While the ship has core systems onboard for self-defense, LCS relies on offboard systems for combat capability to address these focused missions.

Joe North, vice president for littoral ship systems with Lockheed Martin Mission Systems & Sensors, says LCS is a "fast, agile, and networked surface combatant with capabilities optimized to defeat asymmetric threats, and assure naval and joint force access into contested littoral regions."

What makes LCS new and different isn't just the fact that it's mission reconfigurable, or has a very shallow draft for increased port access, or interoperable with both manned and unmanned systems, or has a very small crew to run the ship, and a new and affordable readiness sustainment model to support that crew, or even the high speed approaching 50 knots. What's truly remarkable is that LCS is all of these.

North points to the proven experience of Freedom's semi-planing monohull design, based on the record-breaking 400-ton Destriero, which crossed the North Atlantic in 1992 at a speed of 53.1 knots, and the 4,500 high-speed ferry Jupiter.

While some customers equate the high LCS speed with high fuel consumption, North says LCS doesn't operate at full speed most of the time, and that the propulsion plant has a great deal of flexibility.

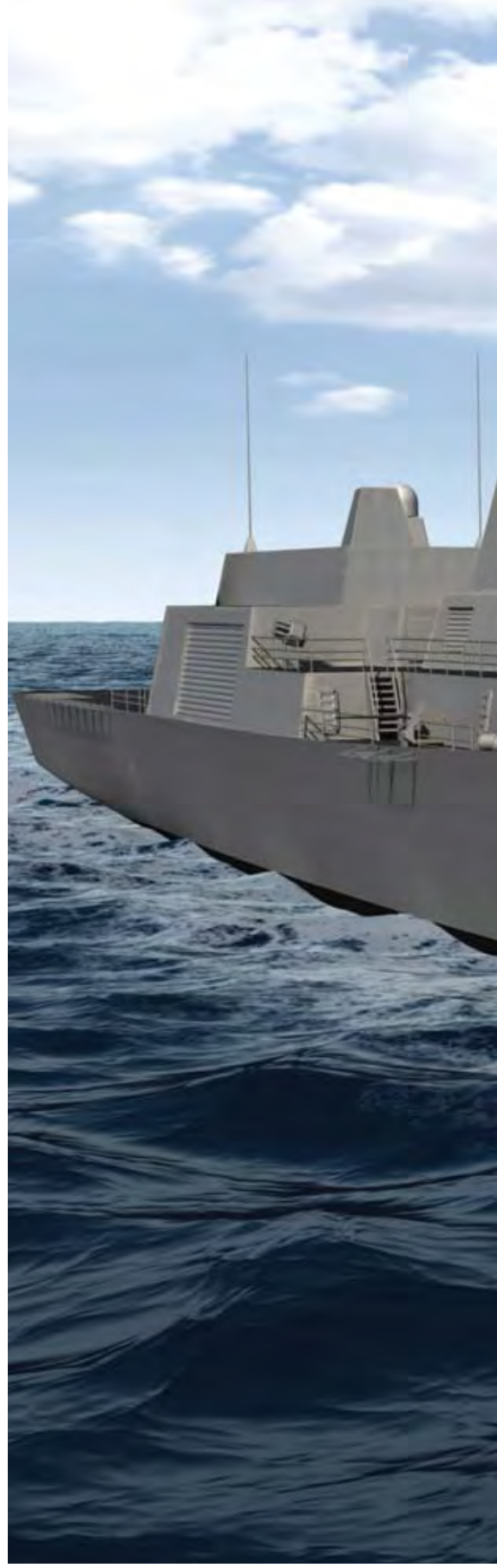
Although scheduled for extensive testing and evaluation after commissioning, the Navy decided to deploy the first LCS two years early to see what it could do, and Freedom's counter-narcotics operations in the U.S. Fourth Fleet area of operations and then participating in the annual multi-national RIMPAC exercises off Hawaii proved to be highly successful. Mission Systems options for an export variant of the Lockheed Martin LCS include AEGIS (multi-mission) or COMBATSS-21 / Lockheed Martin Agile Combat System (LMACS), North says.

A stern ramp near the waterline allows for safe launch and recovery of watercraft while the ship is underway, North says. "We can conduct flight operations up to Sea State 5. The flight Deck is more than 1.5 times bigger that of current DDG, CG 47 and FFG7 surface combatants," he says. "The Independence has an even bigger flight deck, but the LCS 1 hangar is the larger of the two designs. In fact, the aircraft hangar is size is two times that of current surface combatants with space for two H-60 helos or one H-60 helo and three VTUAVs"

North says his team has learned a lot from the start of the program and has incorporated lessons learned and changes from LCS 1 to LCS 3, LCS 5 and beyond. "We have listened to the shipbuilders and the Sailors aboard USS Freedom, and have assimilated these lessons learned rapidly and effectively."

North says his team has a mandate from the customer to build an affordable ship. "Our costs are coming down as a result of efficiencies, investments, design stability, and working with our suppliers. We are realizing gains with new and alternative materials, mission system components, equipment, electronics, controls, metalworking—casting, welding, forming, joining—and sustainment solutions.

While LCS has a range of 3,500 miles, North says there are other versions of LCS being offered to international customer. "We have a fast frigate version with multi-mission capability for blue water and littoral missions that has a 7,000 mile range. A multinational version of the ship is also offered with a top speed of 35 knots, which includes a multifunction radar, the Aegis weapons system and SPY-1F radar, a vertical launch system and Close In Weapon System."



Extreme Operating Environments

Cmdr. Niels Markussen of the Royal Danish Navy, who heads Division 19 in support of Greenlandic and Arctic patrol operations, shared his unique perspective of an operator. He described the waters around Greenland, with severe weather, heavy seas, fog and cold temperatures, as well as ice bergs and sea ice. The new patrol boats for the Danish Navy are built for that environment to fulfill Denmark's sovereignty, fisheries protection, and maritime security missions. The hull of the Knud Rasmussen class was built in Poland, with Danish MAN B&W engines and propulsion systems. The rest of the ship was built in Denmark. The ship is

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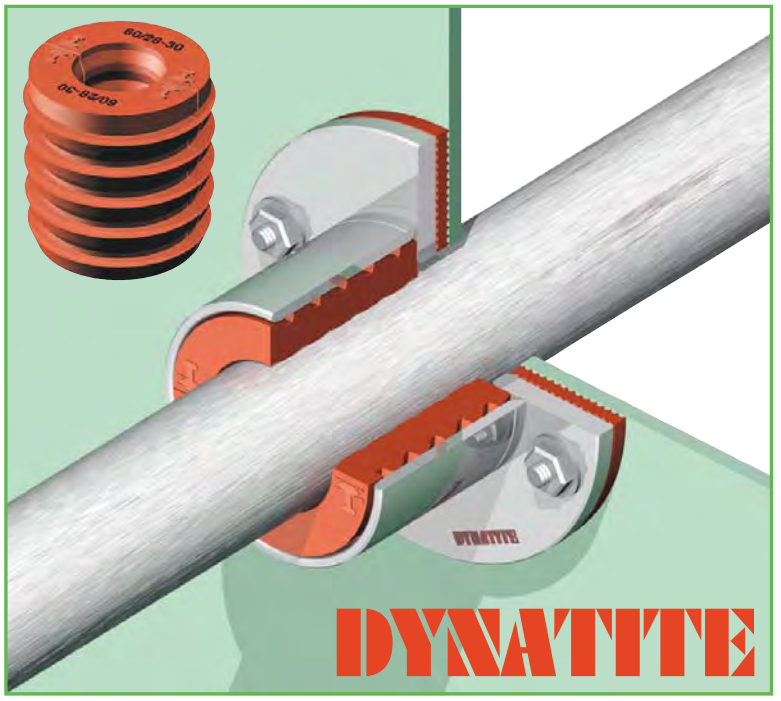

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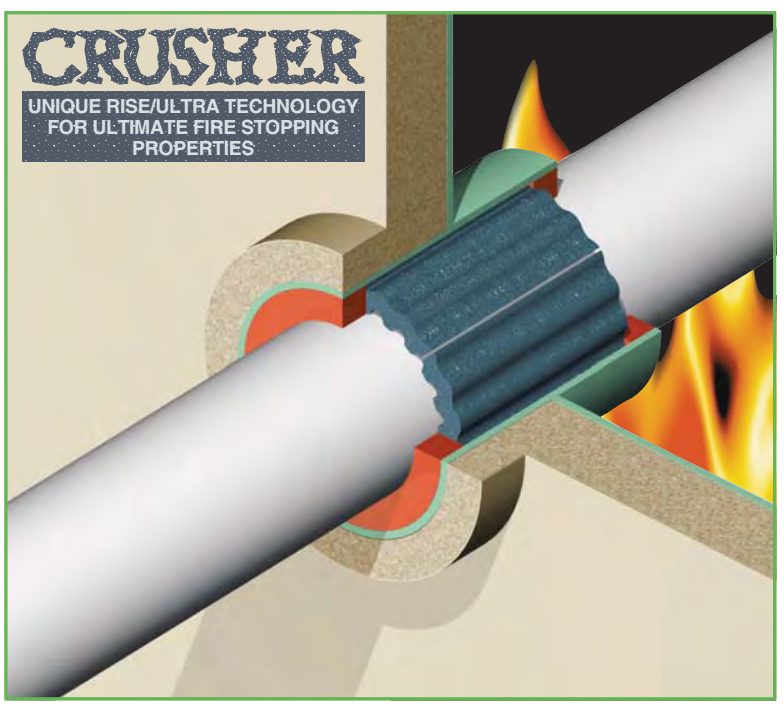

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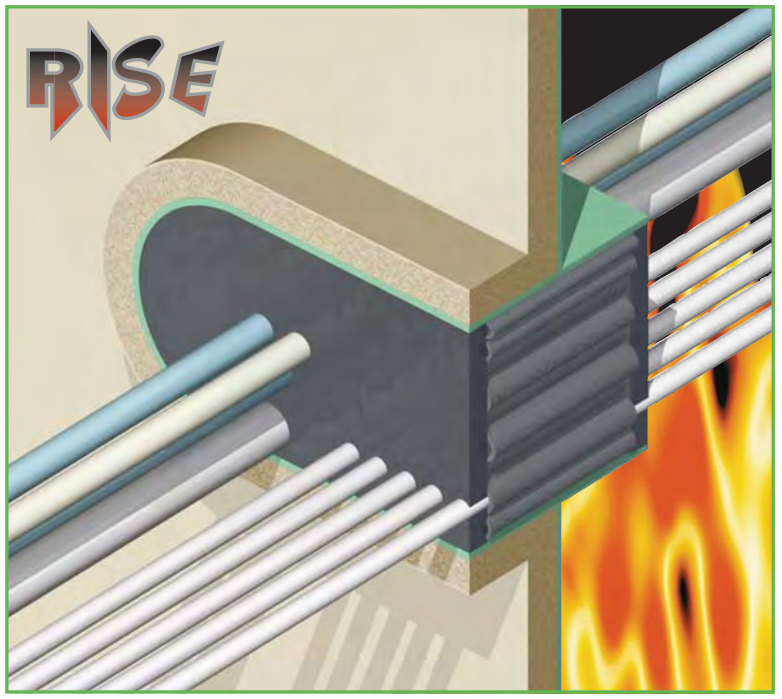

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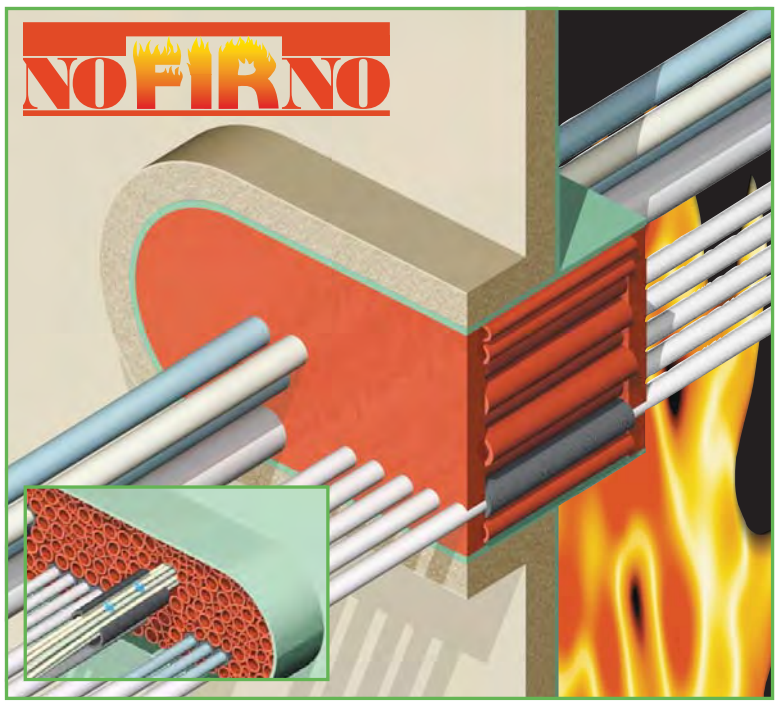

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- Breakthrough - bundled cable sets approved
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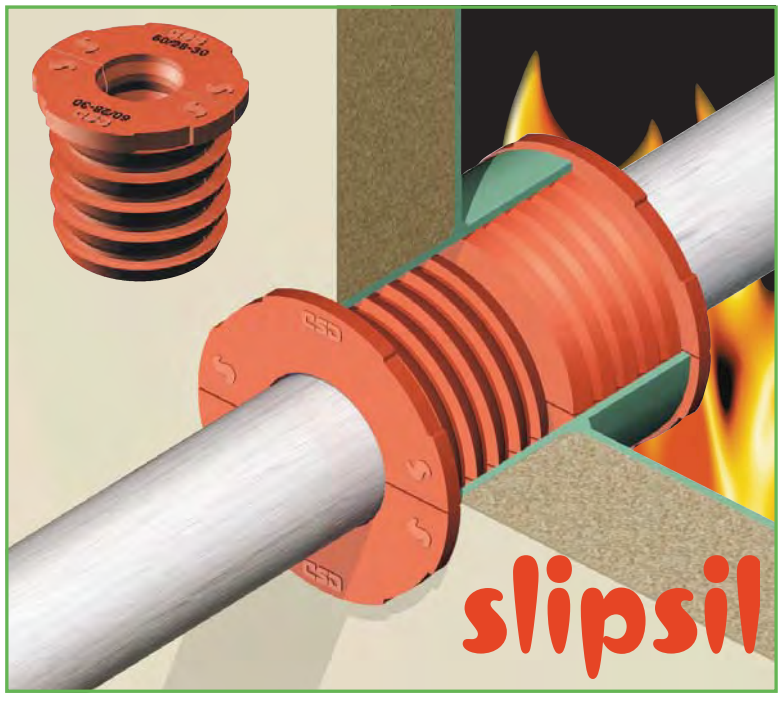

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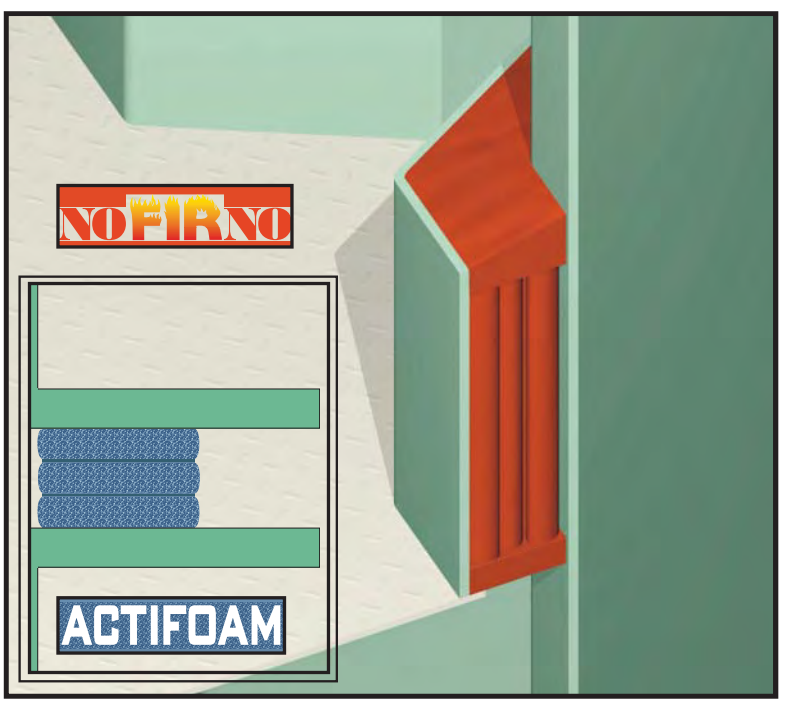
- Breakthrough - corrosion protection, even in seawater conditions, guaranteed for many years
- For cases where durability of the installation counts.



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armed, but also has positions for STANFLEX modules that can give the ship added capability.

Cmdr. Oscar Boot of the Royal Netherlands Navy is the team leader for future vision with his county's Defence Materiel Organization. He discussed key decisions that must be made that will drive the design and therefore cost. "Do I need a hull mounted sonar or not? Do I need a second missile layer or not. For each cost driver we must design to a performance level."

Additionally, several programs involve close partnerships, such as the French and Italian FREMM frigate and the Dutch replacement for the M-Class frigates for both the Netherlands and Belgium.

The NATO SeaSparrow Project was held up as a model for international cooperation, where by the partners share in the cost, risk, work and product. The consortium has been together for more than 40 years, and continues to bring relevant and updated defensive capability to the member navies. Such an effort is built upon mutual trust and well defined expectations, a key to success in any cooperative effort, according to several of the presenters.

"This is one of the most brilliant, effective conferences I've attended," says Rear Adm. Massimo Annati, a retired Italian Navy officer who attended and presented at the conference.

Markussen says it's a great idea to have a forum where the users, producers and experts can meet and talk. "As an officer at sea the conference gave me a good update on the current developments and future trends within my area of work. In Denmark we have had a tradition for a strict separation between the military and industry, but now it seems more legitimate to interact. I am aware that industry is there to make money. But I am there to tell them what will make my operations better. If you choose the positive way of looking at it - as I do - it should be a win - win situation."

oulberg agrees. "I thought the conference was helpful and, for those of us in this overheated industry who want to succeed, I think it is essential that we gain awareness of others in the industry and learn from their experience and mistakes."

The conference was sponsored by Navantia, DCNS, Raytheon, Lockheed Martine, BAE Systems, Hawk Transit System and Ultra Electronics.

Captain Edward Lundquist, U.S. Navy (Ret.), is a principal science writer for MCR Federal, LLC. He was the chairman of Surface Warships 2012.

The Dutch Maritime Industry

The broad base of the Netherlands maritime industry operating internationally with a high percentage of export orders has weathered the financial storms of 2008/9 with little or no damage. The maritime industry as a whole provides employment in the Netherlands for around 190,000 persons and with a turnover of $24.7 billion p.a., contributes approximately 3% to the gross national product.

(Image credit: Dockside)

Dockside's new Super Vessel, Dockwise Vanguard presently under construction at HHI shipyard in Korea is due for completion in the latter part of 2012. It will have a capacity of more than 110,000 metric tons, and deck size of 900 x 230 ft (275 x 70 m).

By Keith Henderson

The merchant fleet of ships and tugs flying the Dutch flag totaled 974 vessels on December 31, 2010: a further 800 vessels under other flags are managed by Dutch shipowners. The number of merchant ships in 2010 is higher than in 2009, but the total gross tonnage has decreased due to a number of large ships having flagged out.

According to the Royal Association of Netherlands' Shipowners (KNVR), today's maritime industry is alive and healthy with many interesting developments. New markets are evolving from the rise in offshore wind farms, the surveying, building and maintenance of them is a fast growing sector requiring specialist vessels and manpower. There is increasing interest in CO2 capture and storage below the sea floor in obsolescent oil and gas wells. The use of LNG as a future fuel is also creating opportunities in the equipment, storage and distribution of the fuel. There are a number of important issues facing the industry in the forthcoming years regarding requirements and regulations:

- **Targets to cut carbon emissions have been outlined as a long term goal.**
- **The imminent reduction of the sulfur content of maritime fuels in Emission Control Areas (ECA).**
- **A reduction in underwater noise.**
- **The implementation of the Ballast Water Management convention.**
- **Meeting the new standards of NOx Emission Control Areas.**

Around 60% of the Dutch fleet is involved in short sea shipping between European countries and neighboring countries such as Russia. Short sea shipping, accounts for 40% of the total goods transported within Europe's member states, and boasts significantly lower carbon emissions than road transport.

The International Maritime Organization (IMO) resolution declaring the Baltic Sea, the North Sea and the English Channel as an ECA (Emission Control Areas) is due to come into force on January 1, 2015. It will require the sulfur content of fuel to drop from 0.5% to 0.1%.

There is growing opposition to this early introduction. Present estimations are that this will increase costs to the short sea fleet by 70 to 80 percent. The industry has appealed to the European Union EU in Brussels for more time and an investigation to prove that the cost will deliver the anticipated benefits. There is a real danger that soaring transport costs by sea will force goods off ships and onto the roads. The political expression is "reverse modal shift"! This would produce a net adverse effect on the environment – a situation that would be very contrary to the aims of Brussels.

Ship Operators

There are many Dutch sea and inland shipowners, the following is an overview of the activities of some of them.

The shipping line Anthony Veder was established in 1937, is based in the Port of Rotterdam and is one of the few tanker owners totally dedicated to the transport of the liquefied gases. Their fleet covers specialist vessels for the transport of liquefied petroleum gas (LPG), liquefied natural gas (LNG), petrochemicals and Carbon Dioxide (CO2). Veder was the

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Fast Facts
Netherlands

Holland is the name of two of the 12 provinces of the Netherlands, North Holland and South Holland, the country is called The Netherlands.

The Zuider Zee (Southern Sea) became the Ijsselmeer (Lake Ijssel) in 1932 when the causeway closing off the sea was completed. The water gradually changed from salt to fresh water. Capital city is Amsterdam, the Parliament is in The Hague.

Surface area:	590 sq. miles (18.41% water)
Total population:	+16.5 million

Hans Brinker is the name of the little boy who saved Holland by stopping the leaking dyke with his finger.

See http://members.chello.nl/m.jong9/map12/hansbrinker.html for the full story!

first tanker company to introduce a purpose built CO2 tanker in 1999. It is participating in a CCS (Carbon Capture and Storage) project called the Rotterdam Climate Initiative (RCI) as one method of reducing Green House Gases (GHG) through the safe storage of CO2 underground. Plans are underway to use a piped network to collect and store CO2 from power generating stations in a central location. A CO2 tanker is used to transport the CO2 to an offshore installation where it is pumped into a disused oil or gas well. This has the added bonus that when pumped into a partially depleted oil well more oil can be extracted.

Dockwise, was created in 1993 through a merger of two renowned companies, Wijsmuller Transport and Dock Express Shipping. Their assets combined to become one of the world's largest and most versatile seagoing heavy transport shipping company. The Dockwise fleet comprises 19 (semi- submersible) vessels of different types and designs. Their activities include the design, engineering, planning and logistics necessary to perform satisfactory collection, transport and delivery of a wide range of cargoes that range from a small 10 ton sailing to a large production and drilling platform weighing up to 73,000 tons.

Finter, with a fleet of over 50 vessels in ownership or control, rank in the top five shipping companies in the Netherlands. Flinter provides transport by sea and related services managing and operating a fleet of modern cargo vessels, the majority of which are ice-strengthened with a capacity of up to 11,000 t.

JR Shipping group owns and operates a fast growing fleet of modern container feeder vessels sailing under the Dutch flag. The fleet continues to expand with newbuild vessels and competitive existing tonnage with much of the fleet having the highest Swedish-Finnish ice class. All the vessels are financed through limited partnerships which JR Shipping structures itself.

Jumbo Shipping is specialized in heavy lift transportation of large unit weight and size cargo worldwide. Jumbo presently operates a fleet of 12 dedicated heavy lift ships, with a lift capacity of up to 1,800 t. Their fleet of vessels with dynamic positioning offer a unique concept to load, transport and install offshore (sub sea) structures without interfaces or double handling. Where clients prefer an integrated transport solution, a sister organization Jumbo Logistics provides a door-to-door service taking total responsibility during the entire transport chain.

Jumbo Offshore has established itself in the offshore industry as a reliable installation contractor, focusing on underwater structures, mooring systems and light weight jackets and topsides. Making this possible are two specialized installation vessels each with two 900 t Huisman mast cranes, a Konsgberg dynamic positioning system (DP2) and an enormous deck with large storage capacity. One of these vessels is also fitted with a deepwater deployment system (DDS) to facilitate lowering of heavy subsea structures to depths exceeding 10,000 ft.

Ferry services to and from UK are operated by P & O Ferries with a freight and RoPax service between Rotterdam and Hull, UK. DFDS operate freight and RoPax services between Ijmuiden and Newcastle, UK.

Stena Line operates a passenger and freight service from the Hook of Holland to Harwich, UK using two new super ferries. The MS Hollandica and MS Britannica were built in Wismar, Germany in 2010 and exhibit a number of advanced new features. The dimensions offer greater passenger comfort and cargo capacity with faster loading. The special hull shape and underwater coating combine to reducing drag, thereby reducing fuel consumption and emissions. The

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twin MAN 14V48/60CR engines have a common rail fuel system delivering more efficient combustion and reduced emissions. The exhaust systems of the propulsion engines and auxiliaries are fitted with selective catalytic converters (SCR) giving virtually zero NOx emissions.

The largest shipowner in the Netherlands is the Amsterdam based Spliethoff Group. The group consists of Spliethoff and the subsidiaries BigLift Shipping (heavy lift), Sevenstar (yacht transport), Wijnne Barends (short sea) and Transfennica (liner service). Established in 1921, the group owns and operates a fleet of well over 100 multipurpose, heavy-lift and Ro-Ro vessels ranging in size from 2,100 to 23,000 tonnes. Spliethoff Group, all of which sail under the Dutch flag vessels have 1A Ice Class and several even 1A Super.

Shipbuilding

The Dutch shipbuilding industry in 2010 had turnover of $9.8 billion (2009: $9.6 billion) and a total employment of 33,000 persons (2009: 34,500). It is strongly export orientated with 47% going to export with the larger domestic demand split between sea going ships and vessels for inland waterways.

Image credit: Anthony Veder

The 1,666-dwt, 262 ft. MV Coral Carbonic was built in 1999 for the transport of liquid CO2. The quality of the system ensures safe handling of the gas which can be used for human consumption and cannot be carried in other gas tankers.

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LIEBHERR
The Group

The Dutch shipbuilding industry in 2010 had turnover of $9.8 billion (2009: $9.6 billion) and a total employment of 33,000 persons (2009: 34,500). It is strongly export orientated with 47% going to export with the larger domestic demand split between sea going ships and vessels for inland waterways.

The leading shipbuilders are Damen Shipyards and IHC Merwede. Both companies have a large number of sites in the Netherlands as well as yard abroad. Other large shipbuilders of commercial vessels are Keppel Verolme, Bodewes Royal Shipyards and Niestern Sander. The major megayacht builders (greater than 148 ft) are Feadship, Royal Huisman, Heesen and Amels. The Damen Shipbuilding Group owns the specialist warship shipyard Royal Schelde and megayacht builder Amels. (covered in detail in a separate article starting on page 40).

In 2010 there were 141 seagoing ships delivered (2009: 176 ships). Orders taken were for 67 ships (2009: 37 vessels) with a value of $960 million (2009: $0.5 billion) with and export share of 63% (2009: 75%).

In a separate segment covering the building of small ships, i.e. under 100 GT and inland waterway vessels, the number of ships built in 2010 was 130 ships (2009: 170 vessels) with a value of $680 million (2009: $990 million) completed. Orders as of end 2010 were 37 ships (2009: 68 vessels) with a total value of $264 million (2009: $449 million).

During 2010, Dutch yards delivered 30 megayachts (2009: 19 super yachts) with a value of $1.45 billion. The orderbook at year close stood at 64 megayachts worth over $2.54 billion.

The Dutch inland shipping fleet with a capacity of more than 7 million tons, is the largest and most modern in Europe and represents more than half of the entire Western European fleet. The majority of inland vessels are skipper owned and is mainly focused on the Rhine River and specialized transport and container transport especially between Antwerp and Rotterdam.

Offshore

The Netherlands is one of the world's largest gas producers and gives it a leading position in Europe. Ashore and offshore in the Dutch sector of the continental shelf a total of 20 mining companies are operating at about 800 locations on land and around 150 at sea. Annual production in 2009 was 2,612 billion ft3 of natural gas and 56.5 million ft3 of oil.

Hydraulic Engineering

The market for hydraulic engineering can be segmented into: land reclamation, dredging, coastal and offshore work, structural engineering, soil remediation, site planning, commercial sand and sand transport. In the Netherlands there are about 160 engineering companies jointly responsible for a domestic turnover in excess of $1.32 billion per year and 10,000 jobs. Two Dutch companies play a significant role in world projects: Boskalis and Van Oord. Sales in 2008 amounted to $2.64 billion.

Seaports

Amsterdam Seaports, including the ports along the North Sea Canal, saw transhipment increase by 3% in the first six months of 2011. Until June 2011 the port region counted over 46 million ton in total. It is the fourth largest seaport in Europe behind Rotterdam, Antwerp and Hamburg.

Europe's largest port, Rotterdam booked financial results for 2010 amounting to $203 million, a full $13.2 million more than the results for 2009. The increase in business is mainly due to the strong recovery in goods throughput, up by 11% over 2009. The two main sources of income for the Port Authority are the sea harbor dues and the leasing of sites. Harbor dues increased by $18.5 million to $380 million with revenue from leasing land increasing by $22.4 million to $329 million.

Marine Equipment

There are around 750 companies in the Netherlands supplying Marine Equip-

Ned-Deck Marine's hydraulic pivoting Fast Rescue Boat davits is delivered as a complete unit for onboard installation and is available as a Work Boat Davit System or Fast Rescue Boat Davit System. It is manufactured in accordance with the latest IMO/SOLAS and European requirements on Marine Equipment (MED).

Image credit: Ned-Deck Marine BV.

ment. In 2010 the segment was responsible for approximately 20,000 persons in full time employment (2009: 21,000 persons) and realized a turnover of circa $6.6 billion (2009: $7.26 billion).

The Marine Equipment sector in the Netherlands covers a wide variety of companies of varying sizes and complexities providing a large range of products. As an example we list a few selected companies and their products.

Dyneema manufacturers of what is claimed to be the world's strongest fibre is widely used in a variety of marine applications. In high strength wear resistant fishing nets and ropes, lightweight yet strong SkySails for merchant ships to substitute wind power and reduce fuel consumption. In the offshore industry Dyneema is used extensively in mooring systems, for towing and lifting operations where its attributes of stronger than steel, elastic and floats coupled with maintenance free finds a wide range of uses in the harsh conditions that are commonplace in the offshore industry.

Royal Imtech is not just active in the marine sector, its commercial interests are widespread and global in nature. In the marine sector, the company was selected to install the electrical control and charging systems of PlanerSolar, the world's first solar circumnavigator. It is a major player as a systems integrator in megayachts, naval vessels (logistic support ships, frigates, corvettes, patrol vessels and submarines), special ships (dredgers, crane ships and tramp steamers), the offshore industry onboard offshore support vessels, FPSOs, offshore platforms, cargo vessels (container ships, bulk carriers and other cargo ships), passenger cruise ships and inland waterways vessels.

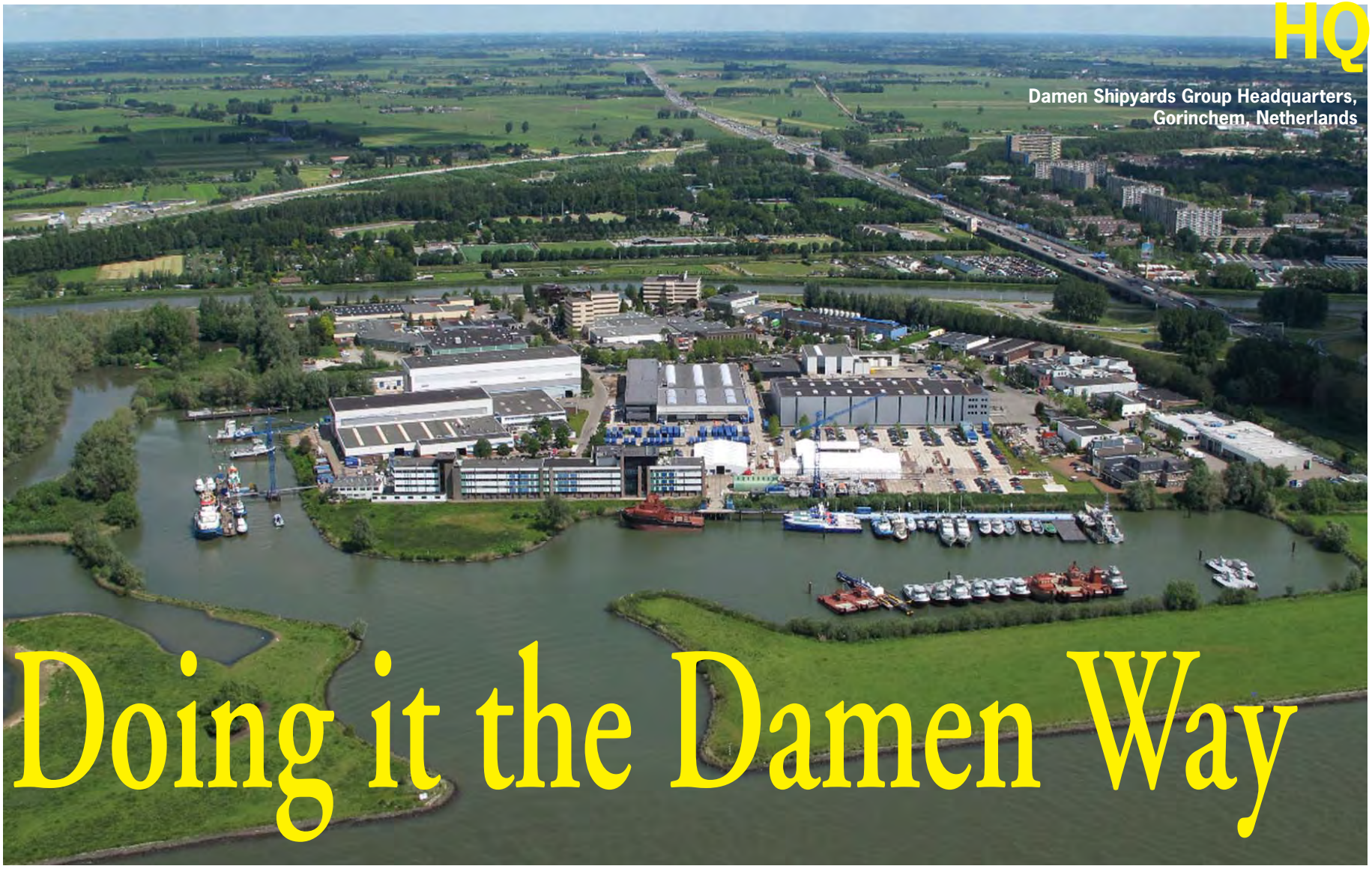
Hatenboer-Waters B.V. is a specialist water treatment company providing a wide range of systems for land, air and sea applications including the offshore industry to both domestic and export markets.

G J Wortelboer B.V. is specialized in the anchor, chain and mooring business. Supplying both new ship, offshore and aftermarket requirements, the company boasts a wide range of large anchors of different types and mooring chain in stock at its Rotterdam headquarters.

Ned Deck Marine B.V. is a major supplier on the international market for survival systems and deck equipment. The company is based in the Netherlands and has production facilities in Romania and Vietnam. Cranes and davits of different size and weights are produced for the offshore and merchant ship markets worldwide.

In addition they produce a range of specialist workboats and fast rescue boats together with their own design of boat handling systems for commercial and naval applications.

The maritime industry in the Netherlands has been one of the strongest in Europe for many centuries and continues to be healthy despite the recent setbacks in the world economy. There are many challenges ahead for the industry but with the usual pragmatic Dutch solutions to problems the outlook continues to look optimistic.



HQ

Damen Shipyards Group Headquarters, Gorinchem, Netherlands

(Credit: Damen Shipyards Group)

Doing it the Damen Way

One of the most successful shipbuilding businesses based in Europe and operating globally is the family owned Dutch company Damen Shipyards Group.

By Keith Henderson

It all started in 1927 when the father and uncle of the present Chairman Kommer Damen, founded a shipyard at Hardinxveld near Rotterdam, building and repairing ships on the River Merwede that flows into the North Sea.

As with most yards then and even today, the traditional way of building ships is for the customer to go to a shipyard or naval architect who designs a new ship for the job and then, subject to approval by classification society and client the vessel is built, usually taking years.

In 1969 Kommer Damen took over the running of the shipyard and listening to his clients' requests, instigated the vision of producing standard rather than custom built vessels. This is the "recipe" of the Damen success, in one word - standardization.

It allowed Damen to have the more popular ships "in stock" able to be delivered in a matter of weeks rather than months or years. Today's stock of ships in different locations, exceed 150 vessels. All a customer has to do is to specify the paint livery: in some cases the electrical/ electronics / navigation packages to be fitted and the ship is ready for delivery. A further and important benefit is that standardization of production means, greater efficiency and a lower manufacturing cost. No wonder this "double win" of fast delivery and competitive pricing meant rapidly increasing sales.

It was not long until the company was outgrowing its capacity and had to look out for a new site that would offer growth in numbers as well as growth in ship size. A suitable site was found in Gorinchem, some 7 miles east and in 1973 the new shipyard and headquarters opened.

The standardization concept also makes it easier for ships to be sold in "kit form" whereby the steel is precut to size for assembly (welding) locally in far off places. As required, a suitable workforce can be flown in to do the work, or more often, supervise and train a local workforce to build the ship themselves. On going training to ensure a lasting business is provided on request.

Where an indigenous shipbuilding industry already exists, instead of creating a new ship design, a Damen design can be used or modified and built locally under license or as a joint venture.

Where no shipyard exists, Damen will even help to create the shipyard first, then supervise building the ship(s). A modularized floating dock is one of the specialized vessel types in the Damen program that can offer rapid expansion of any local shipyard facility.

Design standardization and building the same basic ship over a number of years has further benefits. It allows for the continuing improvement of the design as new production methods and design techniques can be incorporated into the next build.

The continuing close relationship of Damen with its customers allows detailed feedback of in-service experiences where suggestions and improvements can be incorporated into the design in an evolutionary environment.

Standardization of a fleet considerably benefits the operator where crew training is simplified and maintenance routines are uniform. Spare parts stocking is also more efficient with reduced inventories thereby lowering the operating cost of the vessel. On engine matters, the Damen preference is for Caterpillar engines although the customer is free to specify whatever he wishes.

According to Damen the benefits of standardization are further bourne out in the market place with their ships maintaining their value and depreciating slower than competitive vessels. Confidence in the sustained value of their vessels is manifested by the service offered to some of their customers to give a guaranteed buy back price for the ships after a fixed period.

In some cases even after a period of twenty years, the buy back price may be the same as the original price of the ship! The service is however not available for all vessel types and is currently only offered on tugs and workboats.

Luxury

(Credit: Damen Shipyards Group)

The 171 ft (52 m) Bel Abri megayacht, built 2010 by Amels Shipyard, part of the Damen Group.

This influences the financing aspect of ship owning, favoring the Damen brand.

Thanks to the number of Dutch clients working overseas, especially in the hydraulic engineering and dredger markets, a large number of their ships operate far from the Netherlands. Servicing these ships in the far flung corners of the world forms a vital part of looking after the customer to ensure continuing satisfactory operation of the ship long after its delivery.

Damen therefore have an international network of distributors, partners, branches and shipyards throughout the world able to maintain their vessels. A further backup of essential spare parts is held at the Dutch headquarters in Gorinchem and is able to be sent at short notice to the required destination.

Another part of the Damen philosophy is looking after the customer for the life of the vessel. It is not just a case of building and selling ships.

Despite the continued expansion of sales in their traditional areas of tugs and workboats, continuous additions of new vessels types are added to the product range and where necessary acquiring other shipyards to fulfill this capacity. Over the years the program expanded to include cargo vessels, dredgers, ferries, high speed craft, special structures and offshore vessels.

The luxury (mega) yacht market was added in 1991 after the buy out of the Dutch Amels Yard.

Government and naval vessels were added in 1998 following the acquisition of the naval shipbuilders Royal Schelde: this included Schelde Gears giving the Damen Group a company with over 90 years of expertise in the manufacture and repair of simple and complex naval and merchant ship transmissions.

Research and development has always played an important part of Damen's Philosophy, looking to improve existing designs and harness emerging technologies to build better vessels able to work more efficiently and with better handling and seakeeping characteristics. Environmental aspects are studied and improvements to reduce its impact are constantly investigated and applied.

Damen participates in several programs carried out in the Netherlands with respected research institutes such as Delft University of Technology, MARIN (Maritime Research Institute of the Netherlands and Netherlands Organization of Applied Scientific Research (TNO) and others.

The performance of high speed vessels although accepted under the ideal trial conditions of calm seas and gentle breezes, is frequently degraded in the real life sea going conditions of strong winds and a running sea. As wave height increases speed must be reduced to prevent damage to ship or crew.

Damen, together with Delft University decided to investigate this and develop new designs for high speed craft for 'operability at sea' in other words for real life situations instead of just perfect trial conditions.

Fundamental is the realization and acceptance that comfort of all on board allows a crew to perform better no matter whatever the job, be it maintenance of a windfarm or operation of a warship. Comfort in this sense does not mean luxurious surroundings but low bodily stresses that cause seasickness and exhaustion.

In the 1990's "The Enlarged Ship Concept"(ESC) was introduced in the patrol ship designs of the Stan Patrol 4207 and 4708 vessels. The ESC extends the length of the ship without changing the beam and importantly, not loading up the additional space with heavy objects so the displacement is not greatly increased. The lengthened hull offers more suitable positioning of vital areas such as the wheelhouse and crew accommodation areas.

Increasing the length without changing the functionality creates more space enabling greater hydro-mechanical optimization of the hull design. A very sharp slender bow further reduces vertical accelerations with large waves.

Artists impression of the 2,100 t displacement Damen Offshore Patrol Vessel 9515, with LOA of 311 ft (95 m) and 50 ft (15 m) beam, is the largest ship offered with the Sea Axe bow.

(Credit: Damen Shipyards Group)

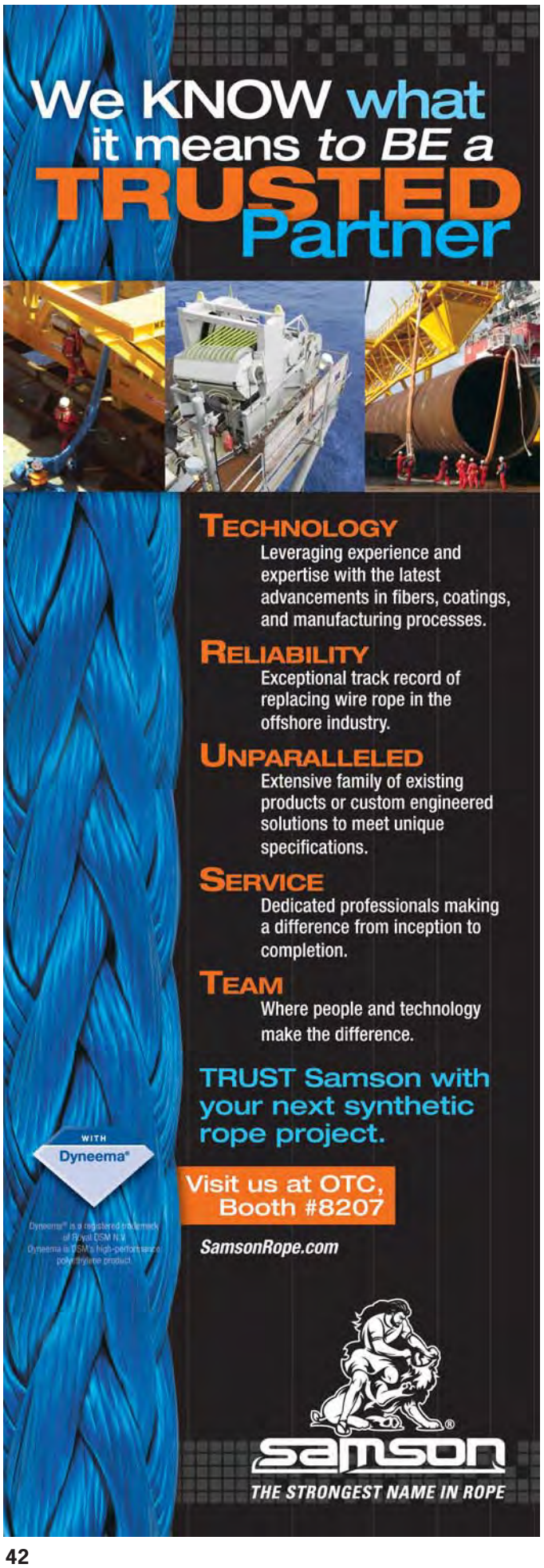
New Concepts

Early in the new millennium, complementing the ESC, the Sea Axe Bow Concept was developed offering superior motion behaviour and unprecedented sea keeping attributes for certain applications. Damen was quick to incorporate these benefits into new ship designs producing greatly improved bow performance with dramatic reduction in wave resistance and offering up to 20 per cent reduction in fuel usage.

The Sea Axe Bow is so called from the side view of the straight perpendicular bow where the keel line slopes down forward and the sheer line slopes up – strongly resembling the blade of an axe. It was originally developed by a team of Delft Technical University, Damen Shipyards, US Coast Guard, Royal Netherlands Navy and MARIN for patrol boats but is widely used for crew boats and fast supply vessels. Recently a 26m Fast Crew Supplier with catamaran hull has been successfully introduced called the Twin Axe

Already more than 60 Sea Axe vessels have been sold in the offshore industry as Crew Boats and Fast Suppliers, varying in length between 19 and 67 meter. The first Sea Axe 5009 patrol boat entered service last year. The Sea Axe design combines – as one of the owners exclaimed – "extraordinary seakeeping characteristics" with very fuel efficient hull lines. Where a conventional high speed vessel bounces over the waves, the Sea Axe effortlessly cuts through them. **In the quest for lower emission ships, Damen is actively participating in several different projects, for example: a hybrid E3 tug design, on commercial vessels an air lubrication experiment using the ACES concept and on alternative fuels investigation looking into applications for LNG and CNG.** The E3 tug project, started in 2008 together with propulsion specialists Alewijnse Marine Systems and tug operator Smit. The objective of the project is to improve environmental friendliness, economic viability and efficiency in harbor tug operation over the life cycle of the ship. The usage profile of a typical Rotterdam harbor tug over 18 operational cycles was determined.

Using the data collected, the best available technology will be used to design a harbor tug and its systems that are as environmentally friendly as possible. Although a propulsion system using diesel engine, battery and electric motor is presently favored, alternatives including LNG/CNG fuels, fuel cells and RIM drives are also under consideration. Damen is also participating in a joint industry Safe Tug project to improve the safety aspect of tugs that assist tankers at offshore terminals and harbor escort tugs operating in heavy weather conditions. The purpose of the project is to study precisely how tugs behave in open seas and what is necessary for them to endure even harsher conditions. The knowledge that Damen gains from this project will facilitate the development of tugs that can sail under more extreme conditions for a longer period of time. As a result of participating for many years in the PELS project (Project Energy-saving air Lubricated Ships) with a focus on inland waterway barges, a new type of air lubrication was developed called ACES (Air Chamber Energy Saving). It was decided to modify an inland waterways commercial tanker, the MT Kraichau, LOA 203 ft, beam 25 ft, to allow full scale tests. Building on knowledge gained from model testing the smooth bottom of the ship was changed to the ACES corrugated bottom that better retained the lubricating air. Tests in shallow and deep water running upstream and downstream on rivers produced varying results, delivering between 5 per cent and 40 per cent fuel savings with most advantageous conditions being during operation at slow speeds. Tests are contin-



Workboats

(Credit: Damen Shipyards Group)

The E3 tug is based on the Damen ASD 2810 tug shown here.

uing but the indication are that an overall annual saving of 15 per cent on fuel costs could be expected using a normal sailing profile. Despite the economic slowdown of the last years, the Damen philosophy of standardization of supply while offering full through life support of the vessel, continues to be their secret of success. The Group enjoys an annual turnover of US dollar $1.8 billion from their 35 owned or partner shipyards in 34 countries worldwide. Annually, the group's 6,000 plus employees build around 120-150 vessels and complete 1,000 repair jobs.

Security

The "Sentinel" Class Fast Response Cutter is built by Bollinger and uses a Damen Stan Patrol 4708 as parent design.

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Jack-up barge carries rotor blades for a new wind turbine.

THE POWER OF THE WIND

By Peter Pospiech
Germany

L to R:
Dr. Wulf Bernotat, CEO E.ON; Federal Environment Minister Dr. Norbert Röttgen; Dr. Werner Brinker, CEO EWE; Tuoma Hattakka, CEO Vattenfall Europe on the occasion of starting offshore wind park Alpha Ventus.

German Offshore suppliers are continuing to step up their involvement in the offshore oil and gas industry, a trend that is now several years in the running. And while much business is centered on the traditional oil and gas area, the emerging offshore wind segment is providing plentiful opportunities.

On August 4, 2010 the Federal Government adopted a national renewable energy action plan (NAP) and reported this to the European Commission in Brussels. According to this, about 25 gigawatts offshore wind-energy power shall be installed by 2020. This corresponds to an investment volume of over 75 Billion Euro during the next 10 years. Thus, the offshore wind-energy sets a bearing pillar in the energy and climate protection policy, with enormous potentials of growth. Particularly by the needful networking with the maritime economy – shipping, ports, shipyards – a sustainable growth in these branches can be created.

More than 1 billion Euro have already been invested in works and infrastructure for the development of the offshore wind-energy at the coastal line of the North and Baltic Sea. Beside the regional economy in the coastal areas benefits the supplier industry in all federal states. Hence, the growing energy and industrial political weight of the offshore wind-energy is of outstanding economic importance.

Offshore Energy Supply Increases

Around 108 (2010: 50) MW in Germany have been connected to the grid. This corresponds in total to around 200 MW at the grid by the end of 2011. “Offshore is a long planned large plant construction business which follows other laws than onshore business. Hence, there will be, by the end of 2012, 10 offshore wind-parks, with a total of more than 2,000 MW power output, with an ensured order volume of around 7 billion Euro, under construction. To bring these parks into successful business concepts and further parks become reali-ty, it is of essential necessity to have planning dependability at the grid connection,” highlights Thorsten Herdan, head of VDMA Power Systems.

Positive Results from Alpha Ventus

Alpha Ventus is the first German offshore wind farm that was constructed on the high seas. The pilot project is located approximately 45 km from the coast of Borkum, and provides fundamental experience in the construction and operation of an offshore wind farm. Twelve 5-MW class wind power turbines are operating at the Alpha Ventus test field: six AREVA Wind M5000 turbines and six RE-power 5M turbines, resting on two different foundations. Whereas the AREVA wind turbines stand on tripods, the REpower turbines are mounted on jacket foundations in a water depth of 30m.

This first offshore wind farm Alpha Ventus is generating more power than expected. While the first half of 2011 was disappointing for onshore wind farms, the constant and strong winds on the open sea by the end of 2011 have produced about 200 Gigawatt hours of electricity. The Alpha Ventus consortium, consisting of the utilities EWE, E.ON and Vattenfall, reports that the wind yield was around 6% higher than had been expected for this period.

"The high power yield of Alpha Ventus shows that offshore wind is already one of the pillars of a safe and reliable power supply. Offshore and onshore wind power complement each other perfectly, and even balance each other out", says Dr. Claus Burkhardt of the utility company EWE in his capacity as DOTI

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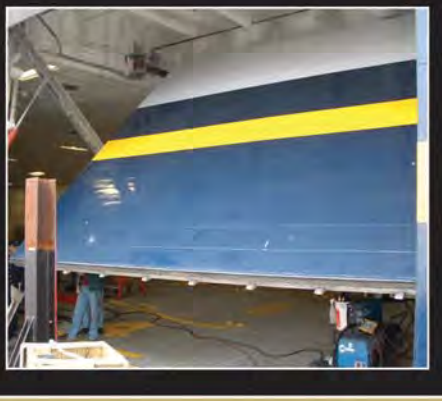

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(Deutsche Offshore-Testfeld und Infrastruktur-GmbH&Co.KG) executive and overall project director of Alpha Ventus. After the technical problems of the first operating phase had been solved successfully, the wind turbines have reached a high availability.

The turbines were operational for nearly 98% of the entire period. Claus Burkhardt: "This speaks for the reliability of German engineering in the wind energy industry. It also shows that our operations and maintenance concepts are fully validated."

On the other hand, Burkhardt points out that an offshore wind farm in Germany requires a considerably higher wind yield compared to its onshore counterpart in order to compensate for the significantly higher investment and operational costs. "This is a result of the difficult overall parameters here in Germany as opposed to other European countries, such as the required long distances from the coast and the correspondingly large water depths. They require elaborate offshore engineering for the turbines and foundations, as well as a corresponding infrastructure, such as suitable construction ships." According to Burkhardt, these factors continue to have a negative effect on the economic feasibility of German offshore wind farms and discourage potential investments.

Thus, the German offshore wind industry first needs sufficient financial assistance to establish this young industry sector in Germany.

DOTI executive Rudolf Neuwirth of E.ON also underscores the great chal-

Self-propelling jack-up barge WIND-LIFT 1 in ops.

lenges the German offshore industry has to face in order to meet the ambitious goals set for offshore wind energy by the German Federal Government: "The successful Alpha Ventus pioneer venture shows the potential of offshore wind energy, but also the financial risks of complex offshore construction. Right now, as part of the massive changes in energy policy, the creation of no less than an entirely new industry is underway in the German North and Baltic Seas. Despite the positive experience of Alpha Ventus, many steps must still be taken", says Neuwirth. Nevertheless, Alpha Ventus' positive interim results show that the German Federal Government is on the right path in focusing on offshore wind energy as an important element in establishing a renewable CO2-friendly energy supply for the future of Germany.

DOTI executive Bent Johansen of Vattenfall is pleased that the pioneer venture is bearing its first fruits: "Alpha Ventus' positive performance confirms that we are on the right path in terms of our offshore commitments.

Both the plants and their 'motor' – that is, the wind – have proven to be reliable. With Alpha Ventus, we are making an important contribution to the development of climate-friendly energy production. Furthermore, in the rough conditions of the North Sea we are gaining valuable technical experience for the ongoing development of the entire German offshore industry. With the follow-up offshore projects by our three utility companies in the German North and Baltic Seas, we will further widen our expertise."

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Atlantis deploys tidal turbine at EMEC

THE POWER OF THE TIDES

Nova Scotia is home to one of the most prolific and interesting tidal sites on the planet courtesy of the Bay of Fundy, which has the world's highest tides and represents a mass of untapped power. The area is the ideal breeding and proving ground for a host of subsea technologies which could help to advance the use and distribution of renewable energy from our tides. Fundy Ocean Research Center for Energy – or FORCE – is Canada's leading test center for in-stream tidal energy technology, an organization that works with developers, regulators, and researchers to study the potential for tidal turbines to operate within the Bay of Fundy environment. **Doug Keefe, Executive Director, FORCE**, discussed his organization's initiatives with *Maritime Reporter & Engineering News.*

By Greg Trauthwein

The FORCE site has been called the Everest of tidal. Tidal electricity is a team effort too and FORCE is the advanced base camp.

Doug Keefe
Executive Director, FORCE

(center, flanked left by Premier Dexter, right by Minister Parker)

The Bay of Fundy provides some interesting tidal conditions that are unique to the world. Please give a brief overview of the area and its characteristics?

FORCE's test site is in the Minas Passage in the Bay of Fundy. 160 billion tons of water flows through the Bay of Fundy each tide, equal to about four times the estimated flow of all the freshwater rivers in the world combined. **We get roughly 14 billion tons of that water squeezing through the Minas Passage on an incoming tide, where we see not only the highest tides in the world, but potentially the most powerful.** That's because that huge volume of water has to pinch through the Minas Passage's relatively narrow width of 5 km. Like putting your thumb on a garden hose, as you pinch the water, it speeds up. We have a lot of water, moving very fast. Tidal power output is very sensitive to water speed – the power varies with the cube of the water velocity. So if the water speed doubles, the turbine will provide 8 times more power. And the FORCE test site is very fast – upwards of 5 meters per second. The power here compares with a hurricane force wind.

Another important feature is that by May of this year we will be connected to the provincial transmission system, part of the North American eastern seaboard grid, by a 10km, 138kV transmission line. There are other good sites around the world, but few with the close proximity to power lines and customers…and building new transmission capacity can be very expensive.

In addition, the site is well suited to development, with water depths up to 45m at low tide, a sediment-free bedrock sea floor, and straight flowing – like a piston – currents.

What is FORCE's role in the development of subsea technology/energy for this area?

We have three key roles: host, watchdog, and research center.

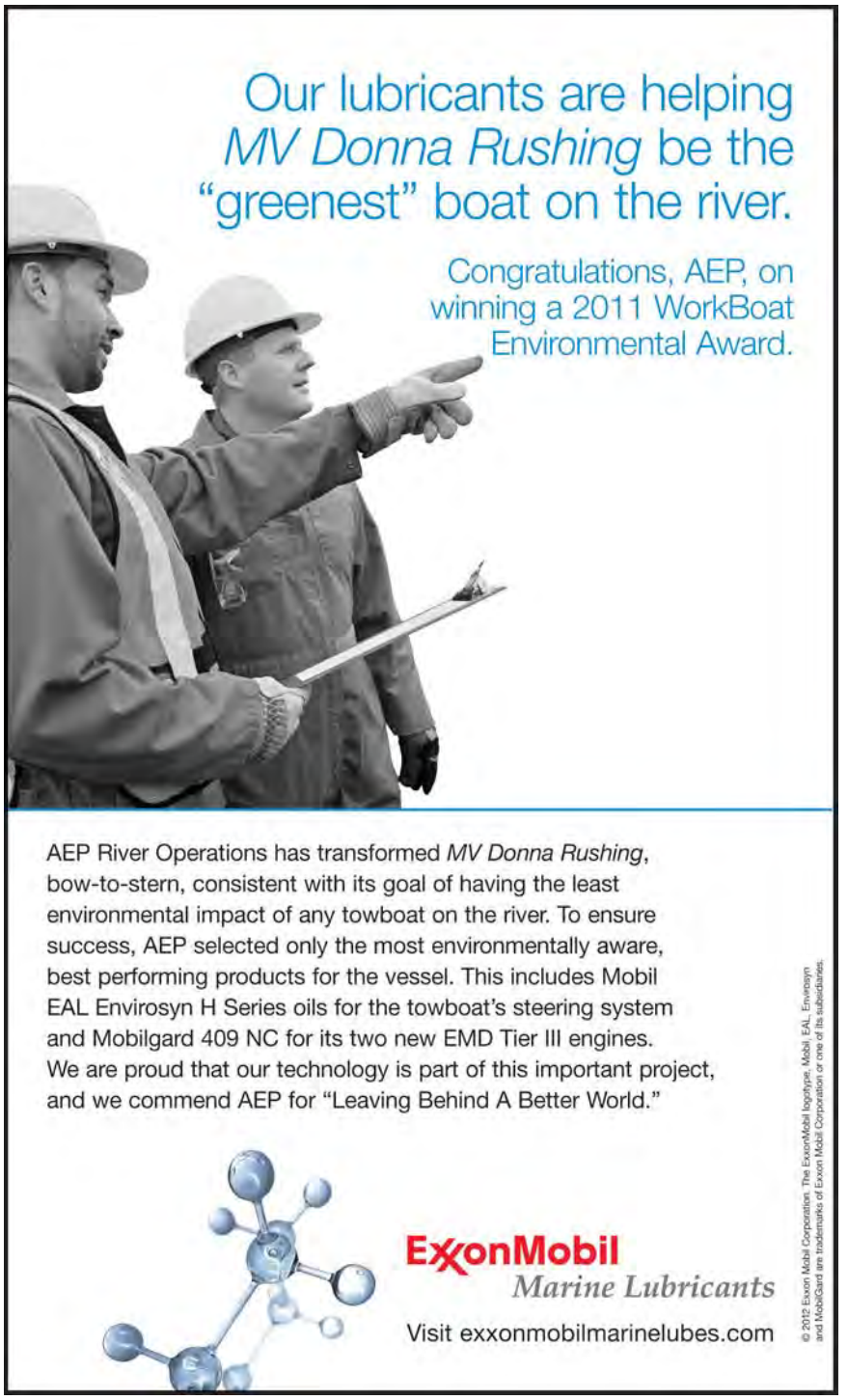
First is host: acting as a catalyst to industry, lowering their cost of entry. In simplest terms, that means we provide all the infrastructure necessary to deliver electricity from turbines to market. And it is from an approved and permitted site in one of the world's most powerful tidal regimes.

Second is watchdog, providing an independent environmental monitoring program, which we hope will contribute to public confidence in testing and demonstration, and, if warranted, large-scale development.

Finally, is our increasingly significant research program, which ranges from resource assessment to subsea mapping, current profiling, near and far field effects, environmental impacts, and technical barriers. A critical piece of this is site-specific data for developers, who want to understand what kind of tides they are dealing with and what the seabed is like.

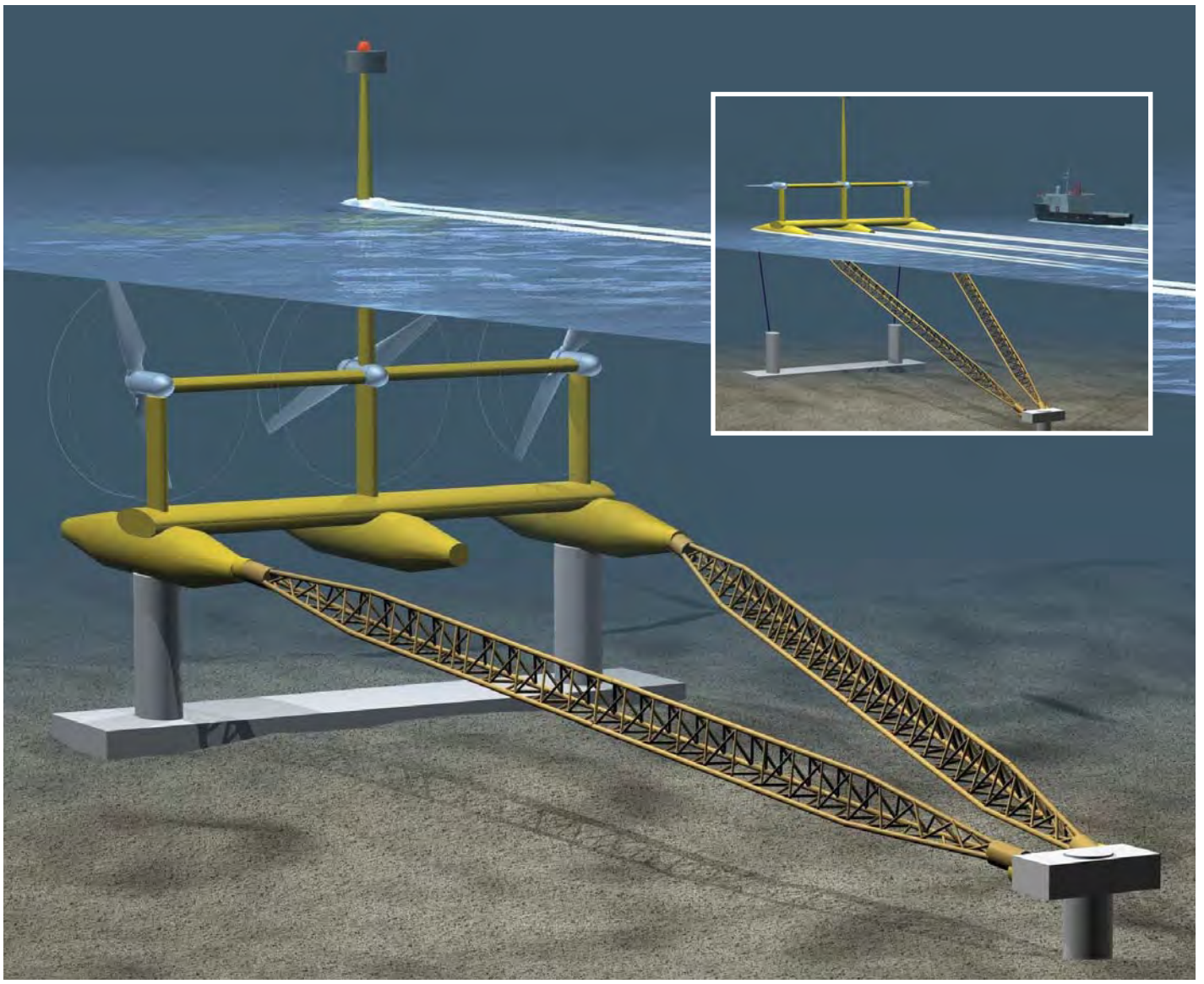
Specifically, is the Bay of Fundy area seen strictly as one of the world's harshest testing grounds for subsea equipment, or are there plans on the board to eventually commercialize, to harness the power of the tides for commercial use.

FORCE is here to better understand the potential to commercialize, and support informed decisions. Ultimately, the move to large-scale projects will depend on investors, governments, public confidence, and most importantly consumers – they pay for the electricity. But as the



Models suggest we can safely extract 2500 MW from the Minas Passage during peak flows – and the peak electricity demand for the entire province in only 2300 MW!

Doug Keefe,
Executive Director,
FORCE



Pictured: MCT in the down and (inset) up position.

technology matures, the potential is definitely there. Models suggest we can safely extract 2500 MW from the Minas Passage during peak flows – and the peak electricity demand for the entire province in only 2300 megawatts.

With this potential in mind, we have built capacity for growth into our electrical infrastructure. We have enough submarine cable capacity for 64 megawatts, which is like putting 64 commercial-scale turbines in the water. This means we have more capacity than any other tidal turbine site in the world.

The province has also supported the idea of commercial growth by creating feed-in tariffs for tidal – an effective way to incent development in the Bay of Fundy. The feed-in tariff has garnered the interest of every major tidal developer on the planet.

What, currently, do you count as your Greatest Technological needs and challenges to help you go about your daily work?

For FORCE, one of our greatest needs is access to high quality, site-specific data. Developers, researchers, and regulators all want that data, and acquiring it in a high flow site like ours is challenging.

While the challenges of the region are obvious, what do you count as the top three operating challenges for traditional subsea equipment.

The fundamental challenge is the extreme conditions at FORCE; this lies at the center of a number of associated challenges: turbine installation and maintenance, vessel access and mobilization time, and electronic equipment reliability and performance.

While the challenges are indeed great, what do you see as the ultimate reward of your work?

The FORCE site has been called the Everest of tidal. Everyone knows Edmund Hillary and Tenzing Norgay were the first to the top of the mountain. But they always said it was a team effort. Tidal electricity is a team effort too and FORCE is the advanced base camp. When we see technologies succeed here, and over time prove both their safety and economic viability, I believe FORCE will have played an historical role in the emergence of a new and clean energy technology. Better still, this technology has the potential to transform Nova Scotia's electricity supply. This will take time – and there won't be any shortcuts. Developers need time to refine their designs, and we need time to make sure we understand how this technology interacts with both the Bay of Fundy environment, and our electricity market.

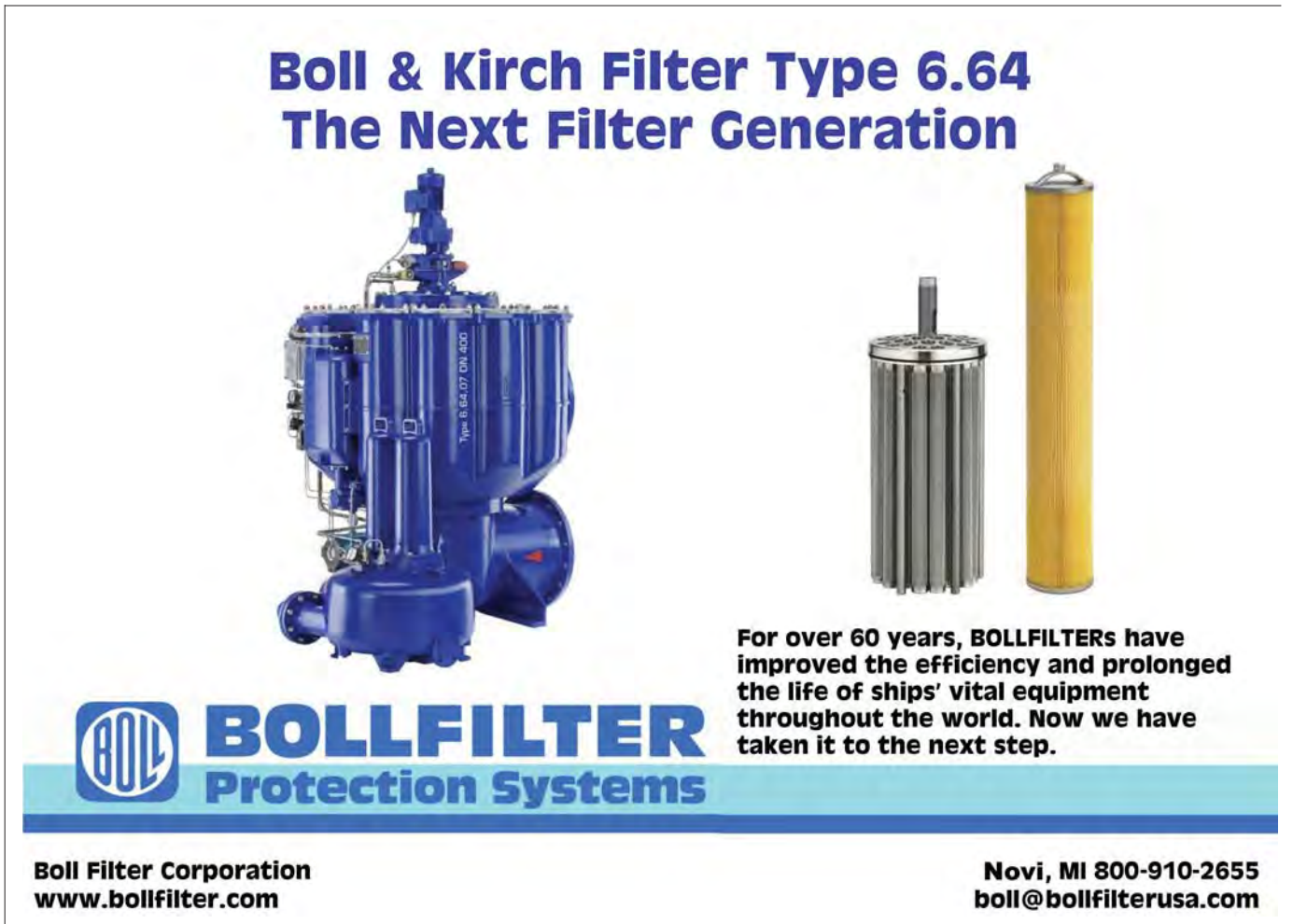
For this specific project, can you explain how government and industry work together for a common end?

Everyone sees the enormous opportunity for Nova Scotia and Canada. On the research side, we live in a province with more post-secondary institutions per capita than any other region in North America, and much of that work is centered around ocean-related activity. In terms of industry, we have over 300 companies with years of experience supplying and servicing Nova Scotia's offshore oil and gas projects: Cohasset, Sable, and more recently Deep Panuke … and many of those companies work in the marine energy environment all over the world.

Their skills are directly translatable to the tidal industry. And they've already been put to work: identifying the test site, monitoring the environment, towing equipment, building a gravity base, pioneering new research.

All of the turbine developers have supply chain partners in Nova Scotia and Canada.

There have been positive signals from



The Bay of Fundy, home to the world's most powerful tides

all levels of government. The federal government sees a potential supply chain that flows from the Bay of Fundy right across the country, where up to 80,000 megawatts of tidal power lies in wait – they have chipped in the largest grant to the project to date: $20 million.

The province has been hugely influential by building the right incentives: feed-in tariffs, caps on GHGs, and aggressive renewable targets.

When FORCE installs the submarine cable this year, we will have a total of 64 megawatts of cable capacity from our test site.

That moves Canada to the front of the pack in terms of total capacity worldwide … more than any other tidal test site in the world.

So yes, I think it's fair to say we all see the potential. Standing at the window of our visitor centre, the potential is obvious to anyone: as the tide moves in and out, the island just offshore forms a bow wave just like a ship steaming through the water. The water moves fast here. And there's 14 billion tons of it.

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BPA WORLDWIDE

NOR POWER

Norway is a leader in innovation and development of subsea technologies. The Bergen region, on the country's west coast, has more than its fair share of subsea innovation and expertise. As operators like Statoil, Shell, and BP focus efforts on getting more oil out of mature North Sea fields, a number of innovative companies with a presence in Bergen are developing subsea technology to support these goals. Below are details on a few notables.

Aker Solutions

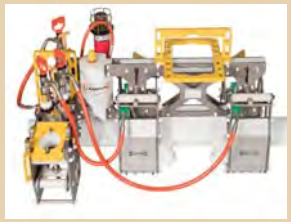
Aker Solutions is seeing growing interest in its **PodEx** instrument gateway solution, designed to improve oil recovery from mature oilfields. A wide range of new, innovative sensors and detection equipment is now being deployed in mature oil and gas fields, to better monitor well activity and regulate production. These add-ons require significantly more electrical power than older equipment, plus increased communications bandwidth to transmit subsea data to topside data acquisition systems – all made more complex by the fact that the equipment is operating in a subsea environment. Three modules have been ordered and completed installation testing for Statoil´s Njord field on January 2012. The first subsea unit is planned to be installed and commissioned in April 2012.

Framo Engineering

Framo Engineering has developed a cutting-edge subsea wet gas boosting system, which Statoil is considering for the Gullfaks field. The Framo Multiphase Compressor is a counter-rotating subsea compressor capable of boosting gas containing both water and condensate. Framo's Wet Gas Compressor is designed specifically for the pressure boosting of an unprocessed well stream. By eliminating the need for upstream compression, the compressor has the potential to save operators money and overcome the challenges of declining production or difficult-to-access gas resources.

Framo has invested 10 years and more than 100 million NOK. The company partnered with Statoil on the technology in 2009, and is waiting for Statoil's decision on whether to implement the technology for Gullfaks beginning in 2013.

ClampOn



ClampOn AS has introduced a non-invasive solution to the problem of corrosion and erosion in subsea pipelines – a key challenge to prolonging the life of mature fields. ClampOn´s Corrosion-Erosion Monitoring System uses acoustic transducers to monitor wall thickness and send information to the surface about the condition of a section of pipe. Between two and eight transducers are mounted on the pipe surface, and connected to a ClampOn control unit. Ultrasonic signals are sent continuously through the pipe material, received by a sensor and analyzed to give a picture of the condition and thickness of the pipe.

Roxar

Roxar, a Norwegian company acquired by Missouri-based Emerson Process Management in 2010, has its own innovative take on optimization and regulation of subsea production. Its Flow Measurement division has developed a collection of intelligent sensors addressing the various challenges of subsea operations, Roxar focusses on reservoir management and instrumentation to facilitate increased recovery and accelerated production at lower costs. With a view to facilitating tool renewal and retrieval, and avoiding the major costs associated with shutting down production to retrieve a subsea installation from the seabed, Roxar has developed a subsea ROV retrieval system for tools and sensors.

THE POWER OF OIL&GAS

(Photo Petrobras)

DW forecast a Global Capex of more than $232 billion for the 2012-2016 period – 90% more than the amount spent in the preceding five year period.

By Jennifer Harbour, Douglas-Westwood

Since Douglas-Westwood's coverage of the deepwater sector in the 1990s, it has developed into a vast multi-billion dollar business. The growth has been supported by some astonishing technological advances. However, the industry has seldom been free from political interference, environmental debate and commercial challenges. The intention of this article is to examine the present state of play, drivers of activity and future outlook for the deepwater sector, drawing upon Douglas-Westwood's industry-leading research.

Industry Drivers

Deepwater exploration and production (E&P) activity is driven by a variety of supply-side and demand-side factors:

- The potential for world-class (multi-billion barrel) discoveries
- The lack of new opportunities onshore or in shallow waters and the need to offset decline from existing reservoirs
- New technological advances that improve technical and economic feasibility of deepwater developments

In recent years, the world has witnessed oil price shocks driven by situations where supplies have become very tight as spare capacity is absorbed by growing demand for energy across the world. Future projections of oil supply and demand suggest that this situation is likely to be repeated again within the next few years.

Fossil fuels are becoming more expensive as the resources we extract become more technically demanding and indeed energy intensive to access. Ultimately, a future peak in world oil supply is inevitable; the only question remaining is the date that this will happen. The implication of this supply scenario for the global energy markets is that we will expect to see a sustained increase in oil prices as supplies tighten in the run-up to the peak year. This will impact on deepwater developments to the extent that they will become even more economically viable as the oil price rises. Developments that were marginal at $60/bbl will undoubtedly be more vigorously pursued in an environment where the long-term expectations of oil price are $80/bbl and upwards.

For oil companies the overall outlook for 2012 is positive, with Barclays Capital estimating that worldwide E&P budgets will increase by 11%. The longer-term outlook indicates that subsea, predominately deepwater, developments will continue to play a major part in the portfolios of the majors independent oil companies (such as Total, Shell, BP and Exxon) and some national oil accompanies (such as Petrobras and Statoil).

Regional Updates

Africa

Africa is one of the key regions of the deepwater 'Golden Triangle' and is currently the largest region of deepwater capital expenditure. However, it is likely to be eclipsed by Latin America over the forecast period. Most of the major deepwater developments in Africa are located off Angola, Ghana and Nigeria. Notable exceptions include West Nile Project (Egypt) and Windjammer (Mozambique).

— **Angola:** The country has had a reputation in recent years as a "deepwater tiger", with its output at 1.7 million bpd in 2011. Major projects that have recently come onstream in Angola include Pazflor and Platina, while those planned or underway include developments of the Canela and Kaomba fields.

— **Ghana:** The Jubilee field is one of the biggest discoveries offshore West Africa in recent years. Operated by Tullow Oil, the field commenced production in November 2010. Production was reported to be 70,000 barrel of oil per day in May 2011 and further development is planned to include integration with other

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discoveries. Other planned projects in Ghana include Tweneboa and Enyera.

— **Nigeria:** As Africa's largest oil producer, Nigeria already has an established deepwater oil and gas industry with major players including BP, Chevron, ConocoPhillips, ENI, ExxonMobil, Shell and Total. Production is underway from the Agbami, Akpo and Erha projects and development is underway at Usan. Planned projects include Bosi and Chota.

Latin America

Latin America is currently the second biggest deepwater region by total Capex after Africa. Continuing development of the pre-salt basins off Brazil by Petrobras should see this region overtake Africa in 2013. Notable developments in Brazil include Lula (Tupi), Lula Northeast, Guara (Sapinhoa) and Jupiter.

Petrobras, the Brazilian national oil company, is the largest energy company in Latin America and the third largest in the world. It has reserves estimated at 16 billion barrel of oil equivalent and production of 2 million boe/d. Over 40 deepwater prospects have been identified off Brazil since 2003 and Petrobras plan to deploy 50 FPSOs and semi-submersibiles by 2020. In November 2011, Subsea 7 confirmed a $500m, five-year deal from Petrobras to supply a deepwater flexible pipelay vessel for developments off Brazil. The new $350m vessel is equipped to transport and install flexible flowlines and umbilicals in water depths of 3,000m.

North America

The global economic recession led to a significant downturn in activity in the 2009/2010 period in this region. In addition to this, the Macondo incident in 2010 and the subsequent deepwater drilling moratorium caused oil production from the US Gulf of Mexico to fall significantly. The Macondo spill is likely to impact installations in 2012 due to the 18 to 24 month lead time for such projects. However, the outlook for 2013-2016 looks promising as many prospective deepwater developments exist and activity is expected to recover by 2013. However, there is a risk that new safety and environmental regulations will make permitting in the Gulf sufficiently cumbersome to prevent or delay its full recovery.

Asia

Despite a significant decline in activity during the global recession, deepwater basins remain an important focus area for development in this region. The market began to begin to recover in 2011 and is poised for significant growth over the next five years. Though some areas of Asia are considered relatively benign in metocean terms, India's Bay of Bengal suffers from harsh wind and wave conditions apart from during a four month weather window and many Asian countries are routinely visited by typhoons. These factors support the use of FPSOs that can disconnect and head for safe ports. Future deepwater projects include the continuing development of the Krishna Godavari Basin (India) especially the ultra-deep D6 Satellites fields, the Gehem and Gendalo fields (Indonesia) and Gumusut-Kakap (Malaysia).

Australasia

Although largely thought of as a shallow water region, Australasia is seeing an increased focus on deepwater basins, particularly off the coast of Western Australia. Significant future projects include Gorgon, one of the world's largest natural gas projects. The development will include subsea completions on the Gorgon

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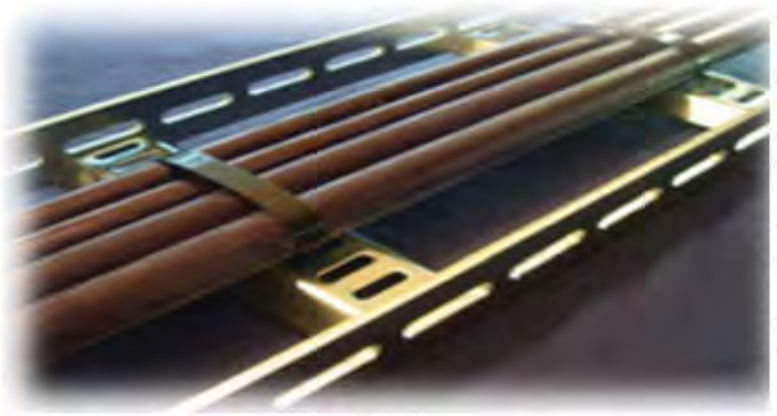

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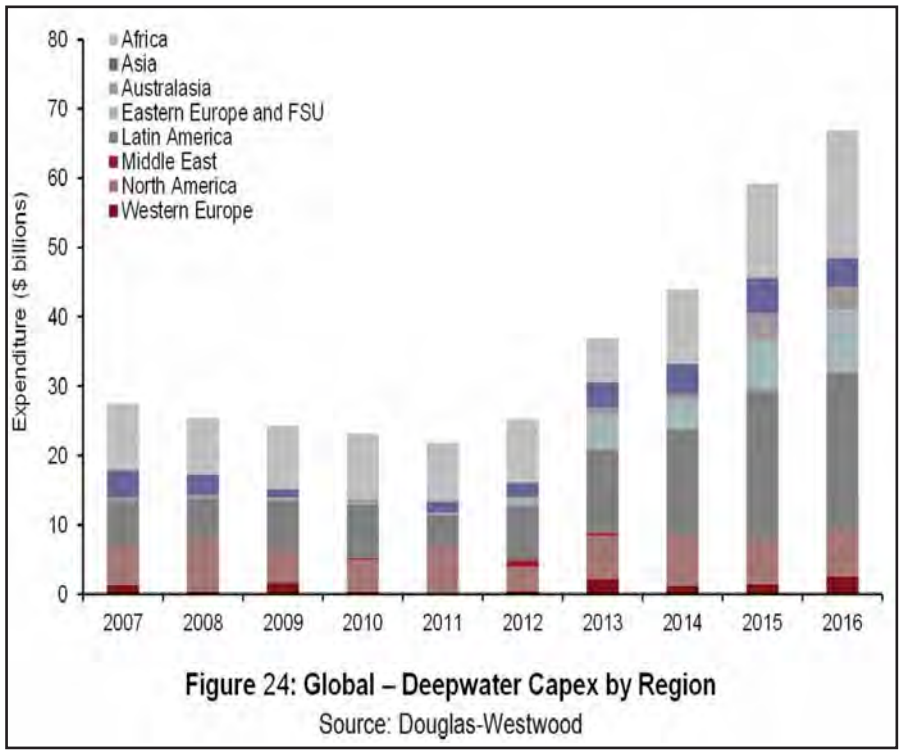

Figure 24: Global – Deepwater Capex by Region
Source: Douglas-Westwood

and Jansz fields and the construction of a LNG plant on Barrow Island. First gas is scheduled for 2014.

Eastern Europe and FSU

Eastern Europe and the FSU is predominately a shallow water region and historic deepwater Capex has largely been related to the deepwater Gunashli field in Azerbaijan as well as a few pipeline projects.

However, global trunkline expenditure over the 2012-2016 period is dominated by Eastern Europe and the FSU. The number of deepwater pipeline projects underway or planned for this region will require 5,300km of pipe to be installed over the next five years. Most of these trunklines, such as the 3,600km South Stream gas pipeline will traverse the Black Sea to bring gas to markets in Europe. Compared to the upstream market, the pipeline market is much more politicized and the viability of projects is heavily influenced by geopolitics, potential consumer markets and the viability of alternative supply routes (such as LNG or onshore pipelines).

Forecast

The deepwater market can be broken down into the following sectors:

- Drilling and Completion – including wet 'subsea completed' and dry 'surface completed' development wells
- Floating Production Systems – FPSOs, FPSSs, Spars and TLPs
- Subsea Hardware including:
  - o Production hardware (Units) – subsea trees, control systems, templates & manifolds, flying leads and jumpers
  - o SURF (km) – infield flowlines, production umbilicals and risers
  - o Processing hardware (Units) – boosting/pumping, separation, compression and multiphase metering
- Pipelines (km) – trunklines

DW forecast a global Capex of over $232 billion for the 2012-2016 period – 90% more than the amount spent in the preceding five year period.

The Golden Triangle of deepwater will dominate deepwater expenditure of the next five years with activity in West Africa, the Gulf of Mexico and Brazil. African and Latin American developments are expected to drive the forecast spend, with African developments largely concentrated in Angola, Ghana and Nigeria. Latin America is likely to experience substantial growth, exceeding Africa's deepwater expenditure towards the end of the forecast period. Activity in the region will be driven by Petrobras investing in development of its pre-salt Campos and Santos fields off Brazil.

Asia and Australasia are relatively small markets, but will become increasingly important areas for deepwater activity. Asian Capex is expected to total $19bn over the next five years, with important deepwater projects being developed off India, Malaysia and Indonesia. Australasia deepwater activity is focused in basins off the Western Coast, with notable projects feeding LNG export plants.

Drilling and completion of subsea wells dominates deepwater spend during the 2012-2016 period. Forecast expenditure will build each year over with expenditure on the drilling and completion of subsea wells to total $82b, more than double the previous five year period.

In the global context, the overall outlook for the global deepwater business is clearly one of significant long-term opportunity with substantial growth in activity in West Africa, Brazil and Asia. Political intervention and uncertainty is not a new challenge for the oil industry but it does threaten to over-shadow the great technical progress in recent years that has resulted in remarkable feats of engineering and the ability to explore for oil in water depths to 3,000m. As deepwater projects become increasingly capital-intensive there is an economic challenge for E&P companies and a significant potential prize for international oilfield service and equipment vendors.

Jennifer Harbour is an author of The World Deepwater Report Jenny joined Douglas-Westwood in 2011, having previously worked within the field of industrial energy generation, distribution and efficiency measures. She is a graduate from the University of East Anglia's School of Environmental Sciences where she focused her studies on energy management, low carbon energy technologies and scenarios of peak oil. Since joining Douglas-Westwood, Jenny has been responsible for the collation and verification of data from a wide range of sources, her input having being pivotal in the derivation of metrics used to determine future expectations of oilfield service demand.

About the Report

The World Deepwater Market Report 2012-2016 is the latest in an acclaimed series of business studies used by organizations in over 60 countries worldwide. These include oil majors, investment banks, OEMs, offshore contractors, agencies and government departments. Established in 1990, Douglas-Westwood is an independent company and the leading provider of business research & analysis, strategy and commercial due diligence on the global energy services sectors. The company has offices in Canterbury, Aberdeen, London and New York and, to date, has completed more than 750 projects in 70 countries across the globe.

OSV Tech

Diesel Electric Drives? **Hybrids? Battery Powered?** LNG Fueled?

The Offshore Service Vessel sector has arguably been one of maritime's more innovative sectors for a decade. Driven by oil major's demand for safety and efficiency, not to mention environmental friendliness, the modern OSV is one of the most innovative vessel categories in operation today. *Maritime Reporter & Engineering News* examines some of the more innovative recent entries.

(Photo courtesy: Eidesvik)

First True Hybrid System

A true hybrid energy system is currently being developed for installation on board the offshore supply vessel Viking Lady, with plans now for an impressive battery pack for energy storage to soon be installed. When the new system is complete, the design is for the operation of the engine to be more smooth and cost-effective, giving further emission reductions.

Viking Lady is truly unique when compared to any other offshore supply ship in the world. Thanks to its Norwegian heritage, which stresses both maritime innovation and environmental conservation, the three-year-old LNG-fuelled vessel, which is owned by Eidesvik Offshore, was the very first merchant ship to use a fuel cell as part of its propulsion system. The fuel cell, which generates an electric output of 330 kW, was installed in the autumn of 2009 and has successfully run for more than 18,500 hours. Based on this alone, the Viking Lady is can rightfully stake its claim as one of the world's most environmentally friendly ships.

Next Step: The Battery Pack

The time is now for another first, a move that will effectively reduce emissions even more. Once the Corvus-supplied battery pack is in place, the ship will operate using a hybrid system similar to that which has been installed in hybrid cars for a number of years. However, the potential emission reductions are higher and the return on investment period is shorter for ships than it is for cars. The Corvus Energy battery back in the Viking Lady will consist of Four packs of 17 AT6500 modules, for a total of 68 modules - or about 1/2 of a MW.

- Maximum bus voltage of 856V.
- Maximum current 1000A. (total: each pack is rated at 250A, we have four in parallel.

The pack needs no cooling system due

to its extremely low internal resistance. The batteries cathode is nickel manganese cobalt and has about 20-25% more power than competing lithium ion versions.

DNV is heading this research project, which is dubbed FellowSHIP, and it includes high profile partners including Eidesvik Offshore, the owner of the ship and Wärtsilä, who provides power solutions for the marine market. In this, the next project phase, an energy storage capability is to be introduced to the energy system. This allows the benefits of a true hybrid energy system to be explored.

The primary potential benefits of the hybrid energy system for a ship like the Viking Lady are a 20/30% reduction in fuel consumption and CO2 emissions through smoother and more efficient operation of the engines and fuel cell. The reductions of other exhaust components are even higher.

The project is interesting in a number of respects as vessel owners large and small, globally, are facing mandates to reduce emissions. At the same time, marine operators are facing record high fuel costs, a trend which shows no signs of abatement in the long-term. Based on these actual costs, the return on investment period for the hybrid system is estimated to be less than two years.

"We know that the hybrid system will reduce the energy consumption," said Bjørn-Johan Vartdal, DNV's project manager. "When operating, for example, on dynamic positioning, there will be a major fuel saving potential. When in harbor, too, the ship should be able to operate on the fuel cell and its battery power alone, which will reduce emissions significantly. For environmentally sensitive areas, this will be an essential benefit. Additional benefits are related to reductions in machinery maintenance costs and in noise and vibrations." A comprehensive measurement program will be carried out to verify the savings potential. The hybrid system will also be modeled in detail. Calibrated and verified process models will facilitate simulation and optimization of future hybrid systems. The new DNV class rules for battery-powered ships have been developed in parallel to this. These are the first class rules developed in order for batteries to be used as part of a vessel's propulsion energy - both as hybrid solutions and for "pure" battery-driven vessels.

The project is due for completion in 2013.

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OSV Tech

Electric Propulsion Drives

Using DC Bus Systems Installed on OSVs

Alewijnse Marine Systems is currently in the final stages of installing the first of a series of highly innovative new electric propulsion drives. Using a DC bus system for the main electric installation, the system is being fitted on the first of three vessels being built at Shipkits B.V. in the Netherlands. Designed by Vuyk Engineering Groningen, the three vessels will be 107m length in length, have a beam of 16m, and are designed for an offshore service role including the installation and support of wind farms. Jaguar Shipping will shortly take delivery of the first of the new ships and the remaining two will be delivered to Abis Shipping later this year.

At the outset, the owners were looking for vessels that would be low emission, exceptionally reliable, optimised for DP and which could be designed in such a way that the interior volumes could be laid out for maximum efficiency. The engineers at Alewijnse in partnership with Vacon conducted a study of the alternatives and finally proposed an electrical drive using a DC bus system as the solution that best answered the needs of the customers. Not only are these systems relatively simple, thereby reducing the possible risk of component failure, but Alewijnse also designed them to have an exceptional level of redundancy. There will be two independent propulsion systems on board, port and starboard, each of which will be made up of a propulsion switchboard equipped with three 500kW generators, one propulsion motor, one bow thruster motor, one rotating converter, and a cool water circuit. Should one of the propulsion switchboards fail, the other propulsion switchboard will remain running, thereby providing half propulsion power and half bow thruster power.

Additional factors including easy and fast synchronising for quick power requests, natural load sharing between generator inverters and no harmonic distortions also make these systems particularly suitable for vessels where dynamic positioning is a major factor. The three vessels will be certified DP (dynamic positioning) 1 and can be upgraded to DP2 if required.

The adoption of a DC bus system also had implications for the entire design of the vessels. With an increased number of smaller components replacing what traditionally was fewer, much larger pieces of machinery, the naval architects were freed from a major constraint when it came to utilising the interior volume, and the options for optimising them for their particular role were greatly increased.

The customers were also pleased that the selection of a DC bus system allowed the use of advanced technology at prices comparable to the conventional alternatives, and all the additional benefits of diesel electric propulsion also remained applicable, including flexibility in the use of the available power leading to lower emissions and improved efficiency, high levels of redundancy, fewer mechanical components and the ability to arrange equipment flexibly in the engine room. While the design of the drive is highly innovative, the application of proven technology and components enabled the accurate prediction of reliability and performance for these vessels.

"Alewijnse continues to demonstrate its leadership in the development and application of diesel electric propulsion systems," commented Jan Oud (Managing Director), "and our experience in this area has enabled us to meet the demands of our customers with particular requirements for specialist vessels. We very much look forward to seeing these ships in operation."

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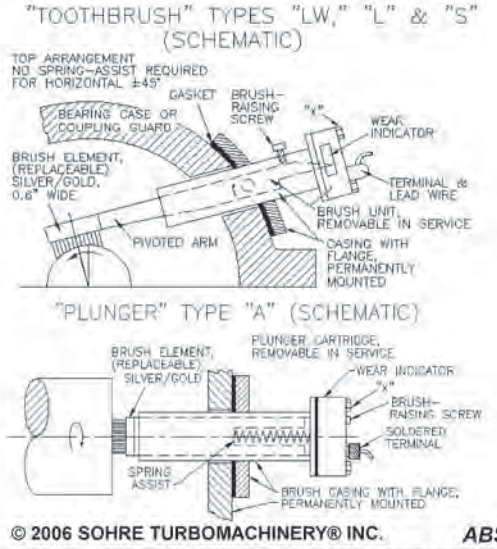

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Rolls-Royce: Building a Strong Business Offshore

Rolls-Royce won a $69m order to design and equip two advanced offshore anchor handling vessels for Norwegian ship owner Farstad Shipping. The UT 731 CD vessels are designed and equipped to handle anchors for oil rigs, tow rigs to location and also serve as supply vessels. They can operate in extreme climatic conditions and ultra deep waters, undertaking precise rig maneuvering operations in water up to 3,000m deep. They are also equipped for subsea construction and installation duties. Each vessel will feature a fully integrated equipment system from Rolls-Royce including deck machinery and vessel control systems. They will also include diesel electric hybrid propulsion systems to reduce the total fuel burn and cut CO2 emissions.

Both vessels will be built at the STX OSV Langsten yard in Norway and are scheduled for delivery in the first half of 2014. Farstad Shipping has now ordered eight vessels of this type. Each of the vessels will have a deck cargo area of about 760 sq. m. and the gross tonnage is approximately 6100 gt. The bollard pull is around 260 tons and installed power is approximately 24000 bhp.

$71.7m Contract from Hyundai

Rolls-Royce also won an order from Korean shipbuilder Hyundai Mipo Dockyard Co, Ltd. to design and equip four deepwater platform supply vessels. The contract is worth more than $71m to Rolls-Royce and includes options for another two vessels of the same type. The vessel designs are UT 776 CD - a development of the Rolls-Royce UT 700 series, designed specifically for supplying equipment and services to deepwater oil and gas platforms. The 4,400 ton, 97 m long vessels will feature a range of Rolls-Royce equipment including a diesel-electric propulsion system which improves fuel efficiency and lowers emissions when operating at reduced power levels. The propulsion system meets current Clean Design standards – an industry-specific range of stringent environmental and safety requirements that, through the design of the vessel, reduce emissions to sea and air. The vessels will be built at the Hyundai's shipyard in Ulsan, Korea.

PSV CBO Atlântico Delivered

The platform supply vessel CBO Atlântico was delivered last month, the first of six ULSTEIN designed X-BOW vessels to be built in Brazil, and the very first of the PX106 design. The PSV was built at Estaleiro Alianca shipyard in Rio de Janeiro, Brazil, for shipowner CBO (Companhia Brasileira de Offshore). CBO has already two PSVs of P106 design from Ulstein in its fleet. In the new PSVs CBO required:

- A ships to adapt to increasingly complex operations
- New technologies to provide quality services, ensure safety and protect sensitive marine environments.

Their final decision was to order two small vessels (PX106) and four large vessels (PX105).

The vessels comply with Petrobras' PSV3000 and PSV4500 tenders, and are designed for effective and flexible transportation of bulk and general cargo to installations offshore. The contracts include delivery of design, engineering, main equipment and commissioning follow-up.

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OSV Tech

Luke Briant, a graduate of the University of Plymouth (UK), has more than 14 years of experience in Marine propulsion engineering and service. For the last three years, he has worked in Marine Business Development for Siemens Industry Inc. Marine & Shipbuilding, specializing in Diesel Electric and Hybrid Propulsion and supporting technical and sales functions in the U.S.

OSV Propulsion Performance

Meeting High Performance, Low Cost and Energy Efficient Marine Propulsion System Demands

Offshore service vessel operators demand performance and dependability from their boats. From light construction and multi-purpose supply to anchor handling and tractor tugs, these vessels are the lifelines to offshore rigs and platforms.

Though conventional propulsion systems have typically been gas-driven, new system innovations are allowing operators to retain, and even increase, reliability while enhancing performance and reducing costs.

However, a trend has emerged that offshore service vessel operators must address – reducing greenhouse gases into the environment.

According to the Environmental Protection Agency (EPA), member states of the International Maritime Organization (IMO) adopted new international standards for marine diesel engines and their fuels that apply globally as of July 1, 2010. The amendments also established additional, more stringent emission requirements for ships that operate in designated coastal areas where air quality problems are acute, called Emission Control Areas.

The EPA states these new global and geographic standards have the potential to significantly reduce air pollution from ships, and provide important benefits to our national air quality.

Under the global standards, the EPA says NOx emissions will be reduced, and the fuel sulfur cap will drop to 5,000 ppm in 2020 (pending a fuel availability review in 2018). Under the new geographic standards, ships operating in designated ECA's will be required to use engines that meet the most advanced technology-forcing standards for NOx emissions beginning in 2016, fuel with a sulfur content not exceeding 10,000 ppm in the first phase of the program, and 1,000 ppm in the second phase of the program.

R&D Pay Off

One of the ways offshore vessel suppliers can address these environmental guidelines is by developing propulsion systems that reduce greenhouse gas emissions. For years, Siemens Marine Solutions Global Center of Competence in Trondheim, Norway, has studied new technologies that not only reduce these harmful emissions, but also greatly reduce fuel consumption.

An outcome of this research and development is Siemens new Blue Drive Plus C diesel-electric propulsion system. The propulsion system uses less fuel and has set new environmental standards for offshore vessels by reducing NOx and emissions of greenhouse gases.

To verify the environmental benefits of the new propulsion technology, Siemens commissioned The Norwegian Marine Technology Research Institute in Trondheim, part of the SINTEF Group.

The Institute agreed that the total emissions of NOx and greenhouse gases for the new drive system are lower than comparable vessels powered by diesel or gas. When compared with dual-fuel offshore vessels with the same operating profile, greenhouse gas emissions can be reduced by up to 27%.

Increased Performance

The system is also an alternative to more expensive systems for offshore service vessels, such as gas- driven engines. It takes into account a realistic operational profile for offshore vessels with variable and often low engine loads that have frequently been disregarded because low engine loads have unfavorable energy consumption and emission levels.

The Blue Drive Plus C system individually controls the diesel engines' speed over the complete speed range, independent of synchronous speed required for conventional diesel electric vessels. The integrated Siemens control system sets the speed according to the optimal operational point of the engine. This allows for the lowest possible specific fuel consumption (g/kWh).

When an offshore vessel operates at low load for a large part of the operational profile, the advantages are substantial. Production and spinning reserve can be improved with lowered consumption, emission and maintenance costs.

Lowered Energy Needs

The Blue Drive Plus C drive reduces total energy consumption by 15 percent when compared to today's diesel electric propulsion systems. The energy savings increase to 23 percent when compared to gas/dual fuel operations. Thus, for the operator, the investment is substantially lower compared to gas operation as an alternative propulsion technology.

Siemens also designed synchronous generators that operate at the same speed and power range as the connected diesel-engine. The extended development of main drives unit power electronics further enabled Siemens to develop a stand-alone integrated unit, including the generator and bus-tie panel as well as the frequency converter controls for all thrusters and auxiliary drives.

The unit also provides a clean power supply to all auxiliary consumers and all electronics. In addition to the operational advantages, the system reduces footprint, volume and weight by at least 30 percent.

Enhanced Control

Additionally, the new system contains an integrated control unit that covers all genset control, drives control and power management functionality. The speed and power of the diesel engines are controlled in correspondence with the total power consumption of the vessel.

The new design also allows for easy integration of modern large scale battery systems. Based on Lithium technology, these systems make it favorable and financially viable to install batteries on board different types of vessels.

The batteries act as sole energy source for the low load conditions, handling peak loads without starting standby gensets, and act as an energy buffer for optimized energy production. The utilization of batteries as a secondary energy source and buffer will give an optimized solution with regards to emissions as well as investment and life cycle cost. The system also makes it easier to connect the vessel to the harbor grid power system regardless of voltage and frequency differences

All systems are integrated together and are remotely accessible -- an integral feature of the new design. The Tele-service system allows Siemens and the client to provide competent on-shore support for failure analysis, condition monitoring, software upgrades and planned maintenance. This entire feature provides safer

operation worldwide and immediate access for ship owners and service and eliminates expensive and time-consuming travel. The propulsion system's main and sub systems are connected together holistically in an integrated system to manage a high degree of decision support. They have been designed to optimize the interface between all components, reducing engineering and investment costs.

First Ship to Be Completed in 2013

Siemens Blue Drive Plus C diesel-electric propulsion system is now being installed in Østensjø Rederi's supply ship Edda TBN. The Offshore Accommodation and Service Vessel (OASV) will be the world's first ship with the propulsion system. Completion is scheduled for late 2013.

The propulsion system combines Østensjø Rederi's "Mindset" environmental concept with Siemens diesel-electric technology. The system takes into account a realistic operational profile for offshore vessels with variable and low engine loads.

The Edda TBN will be the world's largest OASV designed to meet requirements for safety, efficiency, comfort and low emissions.

The 600 personnel vessel's dynamic positioning system (DP 3) and the five Voith Schneider propellers will provide a precise and stable position, resulting in low fuel consumption compared to other propulsion systems.

Edda TBN - 130 m long x 27 m breadth - will be equipped with a telescopic gangway installed on the 1400 m2 deck with one heave compensated knuckle boom crane and two marine deck cranes. The gangway will provide safe passage of personnel from the vessel to offshore installation.

The cabins and offices on board are of executive standard with additional recreation areas, such as fitness rooms, sauna, swimming pool and cinema.

The new vessel will be suitable to operate in the Gulf of Mexico, West Africa and South East Asia, but also in more weather exposed areas including the North Sea, Canada and the Northern part of the Pacific Ocean.

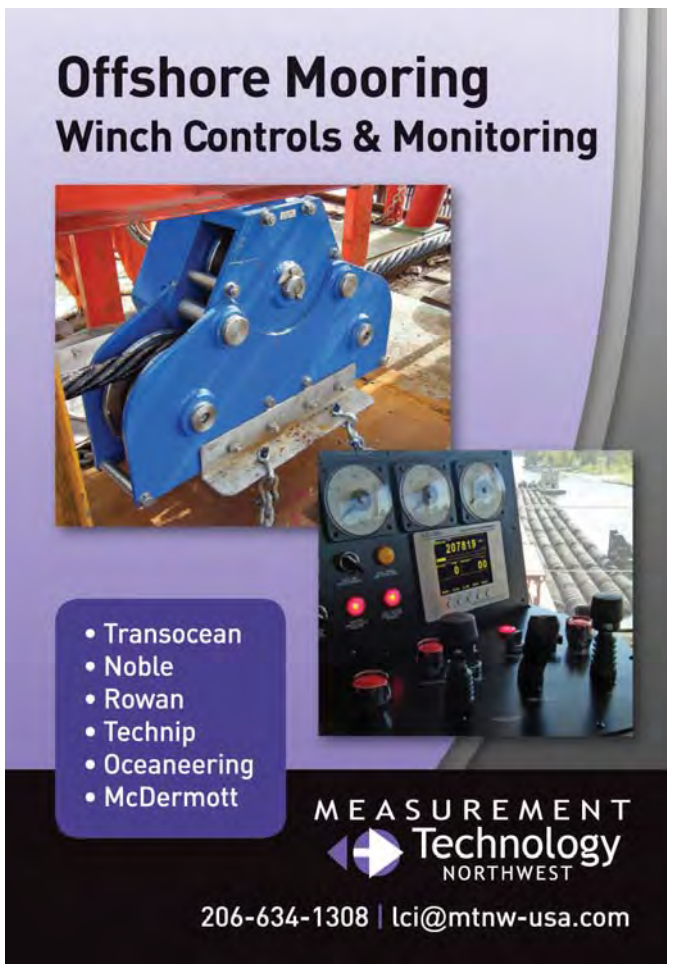
Step in the Right Direction

Addressing air quality issues with new technologies is important. According to the International Council on Clean Transportation (ICCT), ships are an increasingly important source of air pollution and greenhouse gas emissions.

A portion of this pollution occurs far from land, but an estimated 70 to 80 percent of air toxics from oceangoing vessels are released within 400 kilometers of shore, where they can have substantial effects on human health, the ICCT states. Carbon dioxide emissions from international shipping more than doubled between 1990 and 2007.

The marine sector now generates about 2.7 percent of global carbon dioxide emissions, and recent growth projections suggest it could account for seven percent of global emissions by 2050, according to the ICCT. By continuing research and development initiatives focused on reducing air pollution and energy consumption we will help protect the environment for generations to come.

The work being done at Siemens Marine Solutions Global Center is a good step forward to lower marine emissions and save energy. The Blue Drive Plus C diesel-electric propulsion system now being used by Østensjø Rederi and other companies is an example of how research and development can result in technology that can benefit people around the world.



Arctic

Ready or Not Here we Come

Great distances, extreme weather conditions and environmental concerns challenge development in Arctic region

(Photo courtesy of DNV)

Risk is commensurate with reward. In the Arctic, the rewards are great, but so is the risk. As the ice cover is diminished, a longer season and new opportunities exist for the extraction and shipment of minerals, oil and gas; new waters are open for fishing and tourism; and new routes are available to significantly reduce distance and transit time. All this has resulted in a surge in interest and activity.

By Edward Lundquist

SEA POWER

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"We have methods to disperse oil at sea with chemicals, or recover it with skimmers and booms. But you can't easily do that under the ice. If it happens in the winter, you may have to wait until the spring breakup when there is daylight and the ice recedes to expose the oil."

Dr. Kenneth Lee,
an expert in the in the fields of microbial ecology and chemical oceanography with Fisheries and Oceans Canada

The Arctic is a sensitive environment, and attention must be given to growing requirements for handling of waste, and managing the risk and consequences of an accident.

Operations in the Arctic must consider the great distances to travel, especially if an emergency response is required. Will there be a rush to the open water, or will we take a cautious approach to maritime presence in the extreme latitudes?

Arctic oil and gas exploration will be largely seasonal. Ice and long periods of darkness preclude many activities such as shipping and drilling in winter.

The stark but pristine beauty has attracted cruise ships, and fisherman are finding that they have bountiful catches.

"We don't have a deepwater port, airfield, medical or logistics support facilities in the Arctic waters," said Bob Freeman, a spokesman for the Oceanographer of the Navy. **It's tempting to cut the Asia-to-Europe transit nearly in half by taking the polar route, but insurance premiums could be prohibitive. Once virtually uncharted waters, now there are calls for a traffic management system for the Bering Strait. "There were 200 passages in 2010 and 300 in 2011. The number is not unmanageable, but it's growing," Freeman says.**

While the Northwest Passage over Canada has been safely navigated, the more traveled route, called the Northern Sea Route (NSR), runs over Russia.

According to the Arctic Institute, in 2010 the 40,000-ton Danish MV Nordic Barents was the first non-Russian bulk carrier to use the NSR as a transit trade route. Last year a much larger ship, Japanese bulk carrier Sanko Odyssey, carried iron ore from Murmansk to Xingang, China. The Barents Observer reports that the tanker STI Heritage, loaded with 61,000 tons of gas condensate, made a transit from Murmansk to Map Ta Phut, Thailand in just 8 days.

"The shortest route between Europe's largest markets and the Asia-Pacific region lie across the Arctic. This route is almost a third shorter than the traditional southern one," said Russian Prime Minister, Vladimir Putin at a recent meeting of the Arctic Forum held in Arkhangelsk. "I want to stress the importance of the Northern Sea Route as an international transport artery that will rival traditional trade lanes in service fees, security and quality."

Managing risk

"We need to understand the specific risks of working in the arctic," said Elisabeth Tørstad, executive vice president and chief operating officer division Americas and Sub-Saharan Africa for Det Norske Veritas, based in DNV's Houston office, is responsible for everything maritime oil and gas, supporting the industry for risk management and safety.

"The conditions and associated challenges vary significantly," she said. "Ice conditions vary significantly from one area of arctic to another, and of course there is a significant different between breaking ice and moving through ice by ship and being exposed to ice movement and loading on an oil installation."

The number of threats to be managed is increasing with the challenging conditions, and the consequences of an accident will typically be more severe in the arctic. "Based on this, we must ensure that our operations do not lead to higher overall risks than in other areas. A specific example of changes in consequences and emergency response is that lifeboats in a conventional sense are not practical in ice covered conditions," Tørstad said,

"To achieve this, we work closely with ship and rig owners, designers, builders, regulatory authorities and other arctic stakeholders," she said. "For arctic risk, DNV has a three-pronged approach – we have our own research and innovation unit's projects, but we also establish joint industry projects, in which we work together with industry and others on major issues, to be very effective for managing the new risks and qualifying the new technologies. And, of course, we have a significant volume of direct business with our customers related to arctic shipping and oil and gas activity. "

Tørstad said that ship or rig owners choose a classification society for a variety of reasons, such as technical know-how, work processes, project management and surveyor capabilities and similar factors, but in the arctic, perhaps one of the biggest factors is the knowledge and experience of working in Arctic conditions.

"Our long history of Arctic work, especially the research and development that we fund and carry out, is significant," she said. "In fact, the Arctic is one of our key R & D areas. This R & D is essential for those operating, or considering operating, in the northern latitudes. It includes the operating conditions in the arctic, and the analyses of how the increased number and level of threats affect the human capabilities as well as the functionality of technical systems and equipment. We also focus on how both physical and organizational working environments must be adapted to deal with these threats in order to keep the overall risk for any accident at an acceptable level. More specifically, our R&D programs cover topics such as ice loading, dealing with icing, navigating in ice conditions, design to reduce noise and vibrations during ice breaking, evacuation – and several other aspects."

"Risk management is at the core of what we do, both in our R&D work and in our deliverables to our customers. And risk management is much more than preparing an overview of threats or hazards and managing these. The immediate and long term consequences of an event in the Arctic--both small and large--are typically larger than in other areas, and we must manage them. For example, we want to prevent small fires or gas leaks from becoming major human catastrophes, or pollution events, or a grounding from becoming a sinking," Tørstad said. "So, the question is how do we do that in the Arctic frontier?"

Tørstad listed some of the major steps in assessing consequences: "We can review a design to evaluate what could happen if something goes wrong. We analyze in detail how an explosion, fire, or spill could develop. If we are examining a potential gas leak, we look at possible ignition points that could lead to an explosion. Then we look at where the people are, and we ensure that there are options for evacuation to remove people from potentially dangerous locations to where they have adequate protective systems and escape routes. And we use the power of numerous model simulations to find the best options."

Today, models are influenced by technical details of a particular physical asset,

but are increasingly including operating procedures and human factors, such as training, fear, panic and rapidly deteriorating operating conditions following an accident. Likewise, DNV has extensive capabilities in modeling oil spill risks, projected movements and consequence analysis.

Tørstad also sees a growing need for simulators to train mariners for operating in ice conditions. The simulators can be integrated with satellite imagery of actual ice cover and conditions and, similarly, this satellite imagery can also be provided to ships and rigs in ice areas – so people train to use all data available – data which can also be made available to ships. "DNV has ongoing research on how to use the satellite data and better understand what kind of ice you have in front of you," she said "and this can significantly reduce the risk of navigational errors in the arctic."

Ice class

To be classified for polar or ice conditions, ships must be designed for sub-zero temperatures and built stronger, and especially designed to be near or even break ice. The International Association of Classification Societies (IACS) publishes the Unified Requirements for Polar Class Ships, in concert with the IMO Guidelines for Ships Operating in Arctic Ice Covered Waters. This way, all the major classification societies have the same standard.

The IACS requirements recognize that conditions may include both sea and glacial ice, which can be found in many forms which could pose a hazard to vessels. In addition to specifying requirements for ships, it also calls for qualified "ice navigators" to be present when operating in ice conditions.

ABS is very much involved with Ice Class and Ice Breaker ships, said Han Yu, ABS Manager of Shared Technology. "The requirements have been recently updated in the ABS Rules for Steel Vessels (Part 6, Chapter 1 "Strengthening for Navigation in Ice"). ABS also publishes a Guide for operation in Low Temperature Environments.

"The IACS Unified Requirements for Polar Ships are often considered the best available reference for the design of the next generation, ice-capable ships operating in polar waters," said Yu. "But these standards provide only the minimum requirements for ice strengthening. ABS is incorporating knowledge gained from the in-service application of its polar and ice class requirements and its participation in joint research initiatives to develop a more comprehensive ice class system."

To achieve classified as ice class, ships will have thicker hulls with more scantlings (frames, beams and bulkheads that give the structure strength); different cooling systems for propulsion that won't freeze up; beefier rudders and stronger propellers; and equipment such as winches and cranes that can operate in extreme temperatures.

According to Yu, the new Enhanced Polar Class notation offered by ABS is the first step towards reaching this more comprehensive system. "This notation provides guidance to supplement the IACS Unified Requirements for Polar Ships where they are either silent or do not explicitly provide criteria," explained Yu.

"Classification Societies must create R&D initiatives that help develop new rules and guidelines to assist industry in addressing operational and environmental challenges related to Arctic operations," said Yu. "Class societies also need actual data collected from experiencing ship operation in harsh environments first hand." In 2009, ABS entered into a partnership with Memorial University of Newfoundland (MUN) to establish the Harsh Environment Technology Center (HETC) located on the MUN St. John's campus. The center will develop technologies for ships and offshore structures that operate in the Arctic and extreme environments, particularly the Arctic, to include ice covered waters, low temperatures, heavy seas and high winds.

Current research focuses on multiple areas impacted by Arctic operations such as dynamic positioning in ice, produced water management, ballast water management, corrosion protection of ships and platforms and fire and explosion assessment.

On April 3, the Research & Development Corporation of Newfoundland and Labrador (RDC) and ABS announced a combined $600,000 investment for the ABS HETC and associated research program to better understand how ship and offshore structures can be improved to work more effectively in volatile ocean conditions, such as the North Atlantic.

Scientific approach

The National Research Council (NRC), the Government of Canada's research and development organization since 1916, conducts multidisciplinary research in and about the Arctic. Today, there is a concerted effort to develop the economies of Canada's isolated communities in the far north, while ensuring that development is sustainable and environmentally responsible. The remote communities and the minerals, oil and gas operations

"The immediate and long term consequences of an event in the Arctic–both small and large–are typically larger than in other areas, and we must manage them. For example, we want to prevent small fires or gas leaks from becoming major human catastrophes, or pollution events, or a grounding from becoming a sinking."

Elisabeth Tørstad,EVP & COO,
division Americas and Sub-Saharan Africa,
Det Norske Veritas

are and will be reliant on transportation networks.

Dr. F. Mary Williams, who heads up NRC's Arctic program, is researching ways to make transportation less costly without becoming more risky. "The people in Northern Canada want economic development. But they are very, very frightened about the possible environmental impact."

Regarding oil exploration, Williams said research is being conducted to assess the risk of a spill occurring, and if it occurs how to mitigate it. "The technology we're focusing on will help create a tool kit for risk assessment for resource development projects. We need to be able to show the politicians and the people they represent what the risks are. We need to know the risk of the spill spreading, and how to mitigate that, and how to clean it up. We need to track where a spill has gone."

If a spill goes under the ice, the situation changes, Williams said. "There is a need for sensors can detect oil under the ice. Early detection means we can respond faster and limit the negative impact. And if we find it, we need to know the best way to clean it up."

Because the region is so dependent upon maritime transportation, NRC has invested in research for ship designs and systems for Arctic service. NRC has numerically modeled ship performance in complex ice conditions. These models can be used in both training simulators to prepare watchstanders before a voyage, and to give the bridge team decision making tools when approaching ice. "The operators can numerically experiment with different options before they get themselves into a situation," Williams said. "Want to refine this to a point where it's reliable and believable."

Dr. Kenneth Lee, an expert in the in the fields of microbial ecology and chemical oceanography with Fisheries and Oceans Canada, is an authority on current and emerging technologies for the cleanup of oil spills. Lee notes that in the long-term, a large fraction of the oil spilled in the marine environment is broken down and consumed by natural microorganisms such as bacteria, even in the far north. "Bacteria found in the Arctic waters are well adapted to their environment and oil is part of that environment due to natural seepages."

In some circumstances such as oil stranded within beach environments, Lee said that nutrients can be to accelerate the natural rates of oil degradation by microbes in a process called bioremediation. "Crude oil contains a lot of carbon, and the availability of nutrients such as nitrogen and phosphorous and oxygen become the limiting factor to microbial growth. So adding fertilizers to the contaminated sediments may enhance the rate of habitat recovery. This was contrary to the popular opinion of adding an oil degrading microbe, the concept of a super-bug) to degrade the oil. Crude oil is so complex," he said. "No single bacteria can degrade all the compounds. A mixture of bacterial species is required, and they already exist naturally in the environment."

In a wetland habitat, the loss of vegetation results in soil erosion, causing permanent damage. Lee studies a process called phytoremediation by which roots of some plants in oiled environments could provide both oxygen and organic compounds that stimulated the activity of oil degrading bacteria.

Lee agreed with Williams that an oil spill that gets under the ice is problematic. "We have methods to disperse oil at sea with chemicals, or recover it with skimmers and booms. But you can't easily do that under the ice. If it happens in the winter, you may have to wait until the spring breakup when there is daylight and the ice recedes to expose the oil."

Are we ready to respond to a major oil spill?

"Arctic nations may have to help each other out because the distances are vast, the environments are harsh and our capabilities are so limited," U.S. Vice Adm. Brian Salerno, deputy commandant for operations, said during a discussion March 28 at the Center for Strategic and International Studies in Washington where. Salerno and Canadian Lt. Gen. Walter Semianiw, commander of Canada Command with the Canadian Forces, discussed matters of mutual security, safety and environmental response in the Arctic. The subject is especially urgent as Shell begins exploratory drilling in the Beaufort and Chukchi seas this summer. The Beaufort and Chukchi seas could hold 27 billion barrels of oil and 132 trillion cubic feet of natural gas, according to the U.S. Geological Survey.

Shell will rely on a fleet of specialized vessels. The crews must have everything needed for drilling on hand because of the great distances from any point of logistics support. The difficulty to respond to a spill or other problem is magnified by the distance.

Speaking earlier at a June 23, 2011, hearing on the Coast Guard's proposed FY2012 budget before the Oceans, Atmosphere, Fisheries, and Coast Guard subcommittee of the Senate Commerce, Science, and Transportation Committee, Commandant of the Coast Guard Adm. Robert Papp compared the Coast Guard's ability to respond to the Deepwater Horizon spill and a potential spill in the Chuchki or Beaufort Sea.

"We have no hangars for aircraft. We have no piers, no Coast Guard boats. We've got zero capability to respond in the Arctic right now," Papp said. "An oil spill, a collision, a ship sinking in the Arctic keeps me awake at night because we have nothing to respond or, if we respond, it's going to take us weeks to get there."

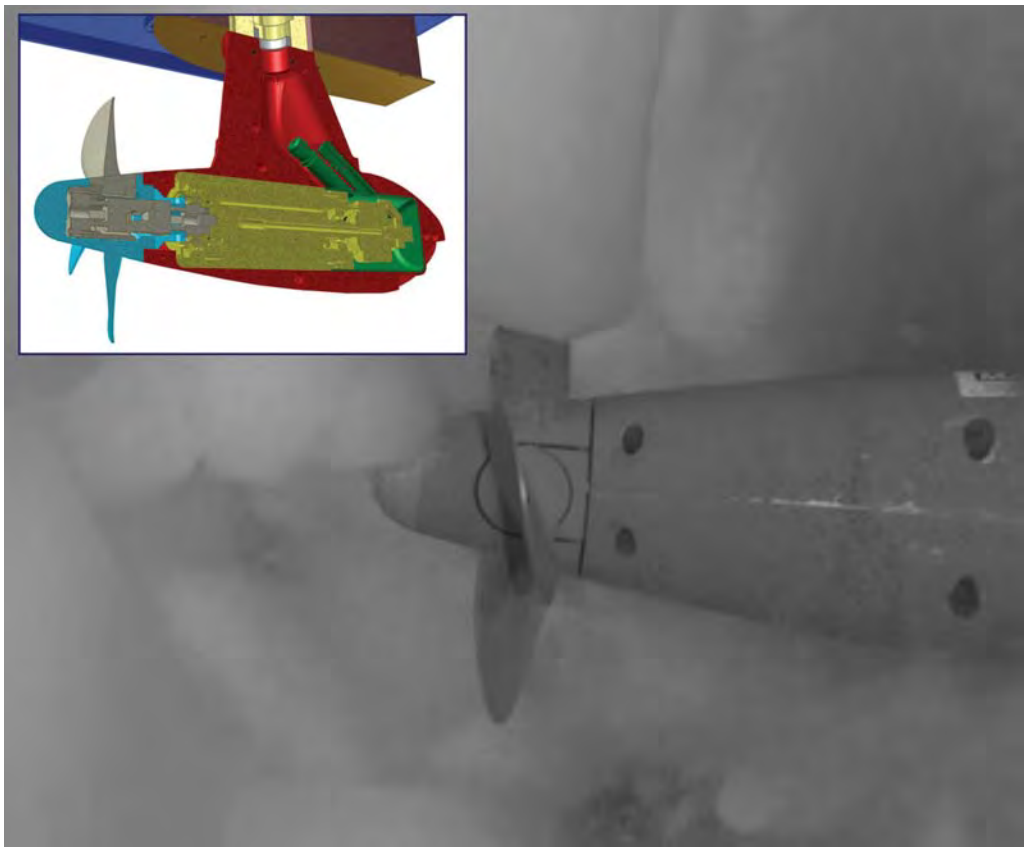
According to Shell, the U.S. Bureau of Safety and Environmental Enforcement (BSEE) approved Shell's Oil Spill Response (OSR) Plan for the Beaufort Sea on March 28, 2012, three weeks after the BSEE approved Shell's OSR Plan for the

Chukchi Sea. "Approval of Shell's Beaufort Sea Oil Spill Response Plan further reinforces that Shell's approach to Arctic exploration is aligned with the high standards the Department of Interior expects from an offshore leader and adds to our confidence that drilling will finally commence in the shallow waters off Alaska this summer," said Pete Slaiby, Shell's VP for Alaska. The Pew Environment Group's 2010 study, "Oil Spill Prevention and Response in the U.S. Arctic Ocean: Unexamined Risks, Unacceptable Consequences," said "the U.S. government and the industry have underestimated the risks of a catastrophic blowout."

"We hope that a spill like the Deepwater Horizon will never occur in the Arctic. But hope is not a plan," said retired Coast Guard Vice Adm. Roger T. Rufe at a briefing held at Pew's offices Feb. 24 in Washington, DC.

Thawing Out

The Challenges of Ice Loads



Ice loads on the propellers of pods are the focus of one of the "Cooperative Research Ships" working groups, organized by MARIN. Aiming to develop a mathematical model to determine the ice loads on podded propulsors, this particular project faced some specific challenges.

Today, the CRS consists of 25 member organizations and companies carrying out a joint work program, sponsored equally by all members. In principle the research is carried out by the members only. The research results are the sole property of the members.

The CRS ProPolar work group is a continuation of the Loads on Pods work group, which addressed the hydrodynamic loads of podded propulsors. To determine the ice loads on a propeller, the model test setup had to be capable of measuring the impact of an ice sheet or ice piece on an 18 cm propeller by means of measuring the highly dynamic forces and torque in all directions. To achieve this, one single lightweight aluminum blade was mounted on the six-component force transducer used in Loads on Pods. The other propeller blades were mounted directly on the shaft.

The ice tests were carried out in cooperation with AARC of Helsinki in its hi-tech ice tank. Since ice testing is a costly business, highly detailed preparations were carried out to ensure a successful measuring campaign during the two ice days that were available.

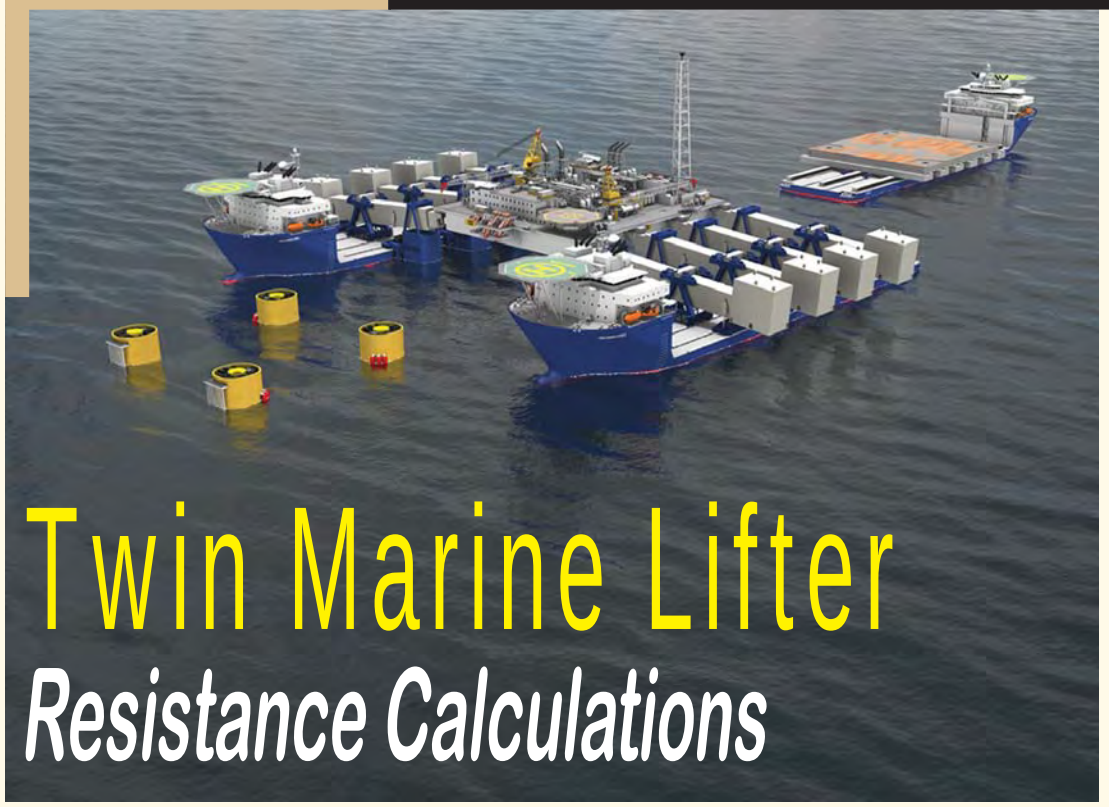
Ice Tests

With the ice pod test setup the following test series were carried out:

- Milling through a 4 cm thick ice sheet
- Milling through a 40 cm thick ice ridge

Synchronized, high-speed video recordings were made from some tests, which gave a unique insight into the propeller ice contact and the corresponding loads. With this test series, which were measured by MARIN, an excellent data set was successfully obtained on unsteady propeller ice loads. The newly developed model test setup elements have proven their merits and are more than ready to be applied in other ice projects.

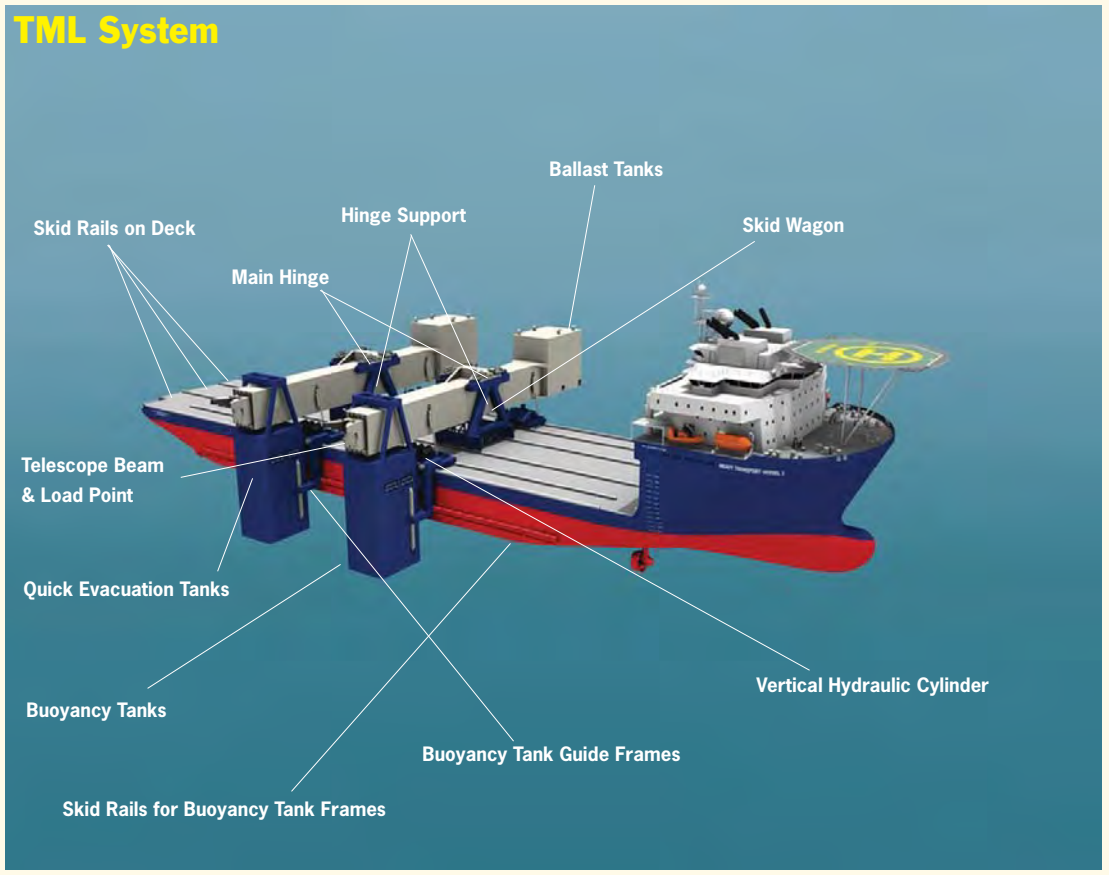
Gerco Hagesteijn is project manager at the Ships department of MARIN, the Maritime Research Institute Netherlands. MARIN offers simulation, model testing, full-scale measurements and training programmes, to the shipbuilding and offshore industry and governments. Email: g.hagesteijn@marin.nl



Twin Marine Lifter
Resistance Calculations

Twin Marine Heavylift AS (TMHL) is designing the Twin Marine Lifter system for installing and removing platforms. Each of the two heavy lifters has four rectangular buoyancy elements at one side, helping to lift the platform (on site) and place it on the bigger transport vessel. The buoyancy tanks are a challenge when assessing both resistance and course stability. DNV was called to assess the viscous resistance in calm water, the forces on the buoyancy tanks and course stability.

By Cosmin Ciortan, Kåre Bakken, DNV



(Images Courtesy: CD Adapco)

Transporting the platforms from one location offshore to onshore for dismantling and recycling is a cheaper and more environmentally friendly option than destroying them offshore. Twin Marine conceived a system that achieves this using a Twin Marine Lifter system (TML). The system features buoyancy tanks on one side of the ship, which help lifting the platform by taking part of the weight. The ship is 133m long and 40m wide, with a transit draft of 5.35m. The buoyancy tanks are rather large, with a rectangular section of 10m x 12m. In transit condition, the draught of the buoyancy tanks is 8.9m.

Obviously, the presence of large blunt bodies at the side of the ship will have a large influence on the resistance and course stability. Vortex shedding is certain to be an issue for flow analysis. In addition, the interaction between the buoyancy tanks and the hull is another problem to tackle.

The simulations were performed using STAR-CCM+. Two grids were used in order to check the sensitivity of the results to grid coarseness, using around 4 and 5 millions cells respectively. Trimmed cells were used, with prisms layers around the hull and tanks and increased refinement in their vicinity. The prescribed ship motion was advancing head-on, with no incidence angle to the flow. The simulations were performed for velocities of 3, 5, 7 and 10kn. For the 3 and 5kn simulations, the free surface was not considered. The ship and tanks were not allowed to sink and trim; they were considered on even keel.

The presence of the tanks makes it difficult to validate the results against traditional hulls predictions. It was decided to check the methodology by performing a simulation of the bare hull, without the tanks and with no free surface effects. Therefore, the results refer to the viscous resistance only, and as such can be compared with the ITTC ’57 formula.

Even so, as the ITTC ’57 formula refers to a flat plate, a shape coefficient must be employed. The value of the shape coefficient was estimated to be 0.35 for a perfect match with the results. But considering that a typical value for a Very-Large Crude Carriers (VLCCs) is about 0.25 and that the VLCCs bodies in our case are more slender and streamlined than average, the value of 0.35 seems realistic. The results showed strong vortex shedding due to the tanks and to the flow interaction between them. As a consequence, the individual and total resistance components display a highly irregular pattern in time. The jumps in the curves close to 200s are due to the change of meshes.The most interesting feature is that Tank 1 (the forwardmost one) displays the highest resistance, accounting for about 66% of the total resistance. It is also notable that Tank 2, which is located right behind Tank 1, displays a positive value of the resistance, i.e. it is sucked forward in the wake of Tank 1. Tank 3 gets back to the expected sign of resistance, though its value is low, whereas the resistance of Tank 4 is larger. The time-averaged, stabilized values of the individual and total resistance show a rather regular increase with velocity and confirm the observation that Tank 1 contributes the most to the total resistance and that Tank 2 is sucked forward by Tank 1. The rotation moment is rather large, and increases significantly with the velocity. A quick calculation indicates that at a speed of 7kn, the ship should sail at an incidence angle of about 9 degrees. About 12% of the installed thrust would be required to keep the ship on straight course. A dynamic course keeping is mandatory, considering the quick and irregular oscillations of the vertical rotation moment.

This case shows that CFD (and STAR-CCM+ in particular) can be successfully used for tackling complex phenomena, with useful results and in a reasonable period of time. The results indicate a periodic pattern of the flow around the hull tanks. The flow is dominated by vortex generation due to the presence of the tanks, and this influences the resistance value for each tank and for the ship.

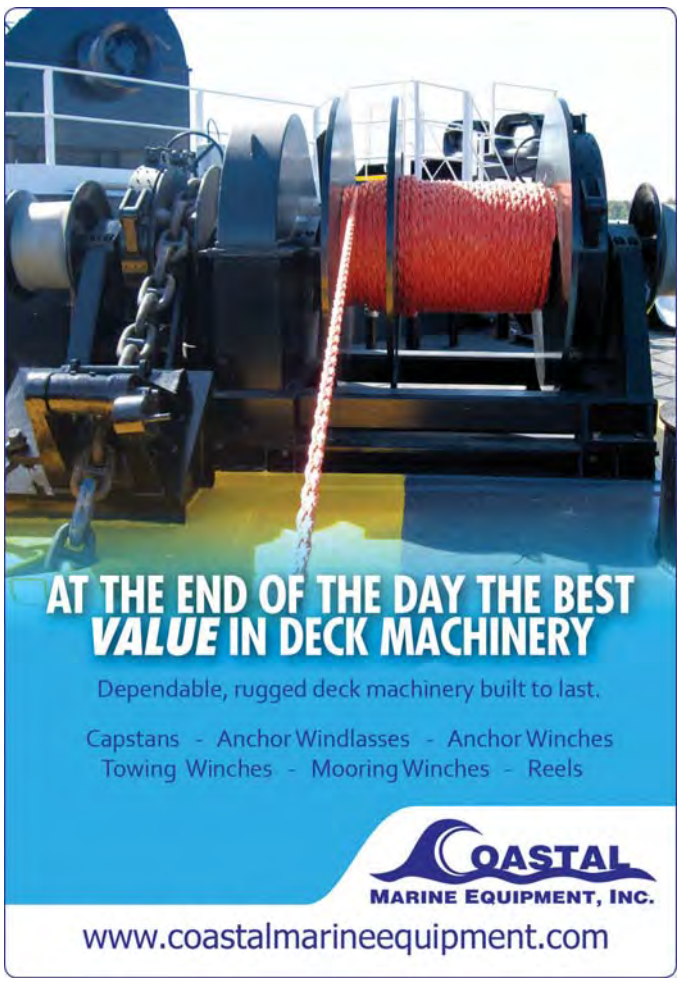
Cargotec AHC Offshore Cranes for Volstad

Following on from an order in April last year, Cargotec has won a contract for two active heave-compensated (AHC) offshore cranes from the privately-owned Norwegian specialist operator, Volstad Maritime. The two cranes, a 250-ton MacGregor AHC subsea crane and a 15-ton MacGregor AHC offshore crane, will be fitted to Volstad's new offshore construction vessel (OCV) on order at Bergen Group Fosen shipyard in Norway. The vessel (hull 90) is scheduled for delivery in August 2013, and following this, it will be chartered for subsea intervention services. This contract follows an identical one that was secured by Cargotec in April last year for Volstad's hull 89, which is due for delivery from the yard in July this year. Like its sistership, Volstad's latest OCV is an ST-259-CD design from Norwegian consultants, Skipsteknisk, and is 125m long and 25m wide. The vessel is designed to the highest environmental standards and Clean Design requirements. It will be classed to Ice-1A.

Crane Accident Investigation Complete

Kvaerner ASA last month concluded its internal investigation following a serious crane accident at its Verdal yard February 8, 2012. The report, which was presented to the Police and the Norwegian Labor Inspection Authority, examines the accident in detail, and finds that the accident could have been avoided if more safety barriers had been in place, been more precise and had been followed. The construction and related operations in conjunction with the production of large jacket structures at Kvaerner's yard at Verdal involve lifting operations and work at height. The accident occurred when a crawler crane with a boom of 51.8m and a jib of 30m, and outfitted with a personnel basket was provided to perform the final inspection of a windmill jacket. The crane driver and a signal man were controlling the crane operation. The signal man was working from the personnel basket. To enable inspection on the sea side of the jacket the jib was positioned over the top of the jacket.

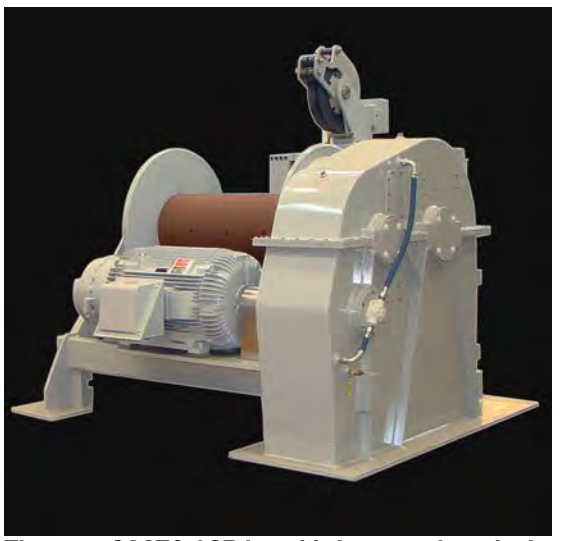
As the boom was gradually lowered, the jib came in contact with the railing at the top of the jacket. The jib collapsed in two steps, first when the inner part of the jib made contact with the inner top part of the jacket, and then again when the jib hit the outer part of the jacket. The jib collapsed and caused the wire suspending the basket to break at the jib tip. The basket with personnel, all secured by safety harness attached to the basket, fell to the barge deck. When the jib made contact with the jacket structure, the basket was approximately 32m above the barge deck. The first jib-collapse brought the basket down by 9m, and the second collapse by another 8m. The wire broke as the basket was approximately 15m above the barge deck. The basket hit the jacket structure during the fall. All three persons in the basket were severely injured as a consequence of the fall.



Markey Wins AGOR-27 Deck Machinery Deal

Markey Machinery won the bid for a complete suite of winch systems onboard AGOR-27, the new academic research vessel being built by Dakota Creek Industries. Sponsored by the US Navy's Office of Naval Research (ONR), this contract is central to the need to rebuild the country's aging fleet of academic research vessels, including ocean ranging vessels like the US Navy's Knorr (AGOR-15). Markey's has been a long-term partner in this regard, having previously supplied equipment to the AGOR-14 Melville (SIO), AGOR-15 Knorr (WHOI), AGOR-22 Moana Wave (retired), AGOR-23 Thomas G. Thompson (UW), AGOR-24 Roger Revelle (SIO), AGOR-25 Atlantis (WHOI), and the AGOR-NOAA vessel Ron Brown.

Markey's participation was from the project's outset, as it was to join Dakota Creek Industries and Guido Perla Associates, as ship board handling systems integrator during the competitive design phase for the vessel in 2010. The order for Markey is for one ship set, including two type CAST6-125 Deep Sea Research Winches with active motion compensation, a type DETW-9-11 All-Electric Traction Winch System with two storage drums, one instrumented flagging block, one ship board wire monitoring system and a type WES-23 Electric Anchor Windlass with two wild cats and two warping heads.



The type CAST6-125 is a third generation winch

The type CAST6-125 is a third generation winch that can support research and explore depths with its drum capacity rated at 10,000m of 0.393-in. diameter electro-optical-mechanical cable. The winch features a close tolerance low mass moment of inertia drum for precise motion control of CTD/Rosette sampling instruments in sea state 5 environments. The feature eliminates unwanted ship motion, thus extending the life of cables for improved safety. The winches use direct coupled vector-duty 125hp non-proprietary electric motors.

Features of the CAST6-125 include:

- A motor-driven precision level wind system. A pushbutton operator interfaces enables the level wind to electronically adjust to any diameter wire, cable or softline.
- A two sheave instrumented fairlead head that eliminates reverse bends. The elimination of one sheave in the cable path and all reverse bends will effectively extend the service life of expensive, fragile cables.
- The output sheave of the fairlead is mounted in a flagging block which sweeps 360 degrees. This unique design eliminates the need for deck hands to carry and rig intermediate blocks or fairleads, resulting in less time spent rigging, more time for sampling, which reduces overall operational time and expense.
- A single speed transmission coupled with AC variable-frequency speed controllers improves reliability and are more efficient, while requiring less maintenance than hydraulic powered machines.

www.markeymachinery.com

Kraaijeveld Delivers Winches to Dockwise

At the beginning of March, two special Kraaijeveld windlasses arrived in Korea, intended for the Dockwise Vanguard, a semi-submersible heavy vessel which is going to be built for Dockwise. In itself nothing special, except that the winches are quite substantial in size and will get a special position in the Dockwise Vanguard. Kees Kraaijeveld, general manager at Machine- en Lierenfabriek C. Kraaijeveld in Sliedrecht, said: "In one way or another, the winches nowadays are getting bigger, more customized and more complicated as well." The dimensions of the winch: length 4.5m, width 4,5m and height 4m; weighing 90 tons and suitable for a chain diameter of 157mm, are currently the largest chain size available. In addition to the two winches, Kraaijeveld has also delivered the hydraulic drive and the chain stoppers. Both the ship and the winches had to be delivered in a very short period of time.

Email: info@winches.nl
www.winches.nl

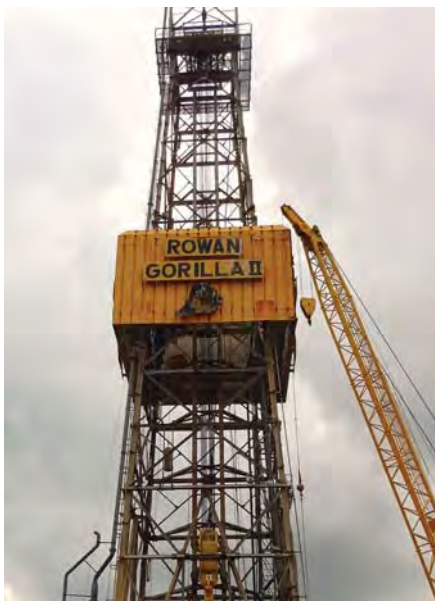
Heavy Lift for Offshore Wind

A new hydraulic lifting yoke from Denmark's Fyns Kran Udstyr promises to make 370-ton lifts of turbine foundation parts — also called Transition Pieces or TP's —for offshore wind parks in minutes, not hours. It has been tested in the world's largest offshore wind turbine park, London Array. Even better: only one employee is needed to handle and adjust the TP.

Mooring Controls Retrofit for Rowan Jack-ups

Measurement Technology NW (MTNW) successful installed and commissioned winch control systems for two Rowan jack-ups: the J.P. Bussell and the Gorilla II. MTNW collaborated with Applied Measurements of Texas to ensure the winch control retrofit was successful from initial design to final installation and commissioning on several Letourneau W-1500 Anchor winches.

Before the J.P. Bussell (225-C Tarzan class jack-up) and the Gorilla II (200-C Slotilever class jack-up) commenced contract operations in SE Asia last year, they underwent a controls and equipment retrofit in Singapore at the Keppel FELS shipyard. MTNW was brought in during the retrofit by Applied Measurements to provide a new PLC-based controls and monitoring winch systems which include running line tensiometers, a PLC control station with remote I/O, LCI-90i local displays,



and a central computer system combining existing monitoring software with new PLC interface functionality. "Now that we offer PLC-based winch controls, software for data-logging and the line riders to monitor winch activity, we are providing a full end-to-end mooring solution for customers," said Tom Rezanka, Managing Director of MTNW. "Since we design and build every aspect of these winch control solutions from the steel to the software, we can guarantee better accuracy and faster delivery." Applied Measurements chose to work with MTNW 3-sheave line riders to monitor the jack-ups' anchor winches. By integrating the line riders with the mooring controls, this system provides accurate and real-time feedback regarding the actions of the operator and the position/tension of the mooring line.

"Given the time constraints, MTNW's line riders were a quick and easy way to monitor the existing winches. We chose line riders because load pins are more accurate than hydraulic pressure or electric current in terms of winch monitoring," said Applied Measurements owner, Graeme Cashen. "Their PLC-based control consoles seamlessly integrated with the rest of the system. Every future offshore retrofit we're involved in will have this kind of approach."

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Wave Diver Class from Alnmaritec

Aberlour is the first of the new Wave diver class boats to be delivered by Alnmaritec to Stork Technical Services, deployed for a number of integrated subsea inspection, repair and maintenance activities, both inshore and offshore. The hull design was developed by Camarc Limited. Fitted with twin Cummins QSM 11 diesel engines and Ultra Dynamics UJ377 waterjets, it has a top speed of 32 knots. It is built to be self-righting and complies with the MCA category 1 requirement for operations up to 150 NM from safe haven.

Strategic to Build 8 Offshore Wind Boats

Strategic Marine started 2012 strongly signing contracts to build eight 20m offshore wind farm crew transfer vessels for the European market. Designed by BMT Nigel Gee, the catamarans will be built at Strategic Marine's Singapore shipyard. When delivered later in 2012, the multipurpose vessels will be among the most sophisticated in the market, built to DNV Class Rules (+IAI HSLC R2 Wind Farm Service 1). Each vessel will be powered by twin MTU 8V2000M72 engines and be capable of speeds in excess of 25 knots.

Voith Taps Offshore Wind Market

BMT Nigel Gee collaborated with Turbine Transfers, a provider of Windfarm Support Vessels (WSVs), on its latest unique development: the design of a 19m WSV using the Voith Linear Jet. The Voith Linear Jet (VLJ) is an advanced ducted propeller with a stator positioned in the duct aft of the propeller, in a similar arrangement to that of a waterjet. Interestingly, this will be the first application in a vessel. For the same installed power the VLJ is expected to provide a bollard pull approximately 50% higher than that of a waterjet and in excess of 30% higher than conventional propellers.

Grandweld Delivers DMSV for ADNOC

Grandweld Shipyards delivered Aradah, a 55m Dive and Maintenance Support Vessel (DMSV) to ADNOC. It is the first from its class to be built by Grandwelds and will serve as the flagship to ADNOC offshore fleet. It is equipped with a 360 degree Schottel Rotatable Propulsion System, and a subsea lifting crane of 70 Ton @ 14m capacity positioned at the aft of the vessel, capable of handling Deadweight Anchors, Mooring Buoys and SBM hoses. It also has two self-contained integrated diving systems complete with decompression chambers.

Bollinger Delivers Modified Barge & Tug

Bollinger Shipyards re-delivered tank barge B. No. 230 and tug Ralph E. Bouchard to Bouchard Transportation. B. No. 230, a 138,000 bbl black oil barge equipped with inert gas, vapor recovery and closed gauging measuring 467- x 80- x 36-ft., was docked at Bollinger's Amelia facility for the addition of the Intercon coupler system and for regulatory work. The tug underwent conversion, receiving additional coolers and a keel cooled John Deere 99 KW Tier 2 generator set as back up to the main generators and for powering the Intercon hydraulic system.

Damen, Afai Southern to Build Ferry

Liuzhou Yinliu Hotel Management Co. Ltd. (China) has ordered a Damen Ferry 3508 with Afai Southern Shipyard (China). The DFe 3508 is a 35m Aluminum Luxury Sightseeing Ferry and is designated for the municipal government of Guangxi Liuzhou. The city will use the ferry for receiving both government and industry representatives for official meetings and sightseeing tours along the Liujiang River. Delivery is scheduled in the first quarter of 2013. The DFe 3508 is specifically designed for this application. It has a passenger capacity of 100.

NAIAD Delivers 10 Meter Pilot Boat

Naiad delivered a 10 meter Pilot Vessel, the Dalton Pursuit, to its owner in Newfoundland, Canada. In addition to pilot work, it will provide commercial transport service for crew and small supplies to commercial ships moored off her home port. It is a highly efficient stepped-hull design that can accommodate up to twin 350 HP outboard motors. Combined fuel consumption is approximately 1 gallon/mile at 33 knots (33 GPH) with twin 250 HP outboard motors. The standard fuel tank is 280 gallons.

Kvichak Launches New Product Patrol 28

Kvichak Marine launched a new vessel at its facility in Seattle. The Patrol 28 is an all-aluminum vessel designed by Kvichak/Amgram Ltd., UK for effective operation in port and coastal waters, including shallow areas throughout the world. The parent design is based on the Offshore Raiding Craft from Holyhead Marine, UK for the UK Royal Marines. Missions for the Patrol 28 include search and rescue, border patrol and maritime security. Powered by twin Honda 225 hp VTEC outboards, the Patrol 28 cruises at speeds over 45 knots.

Pilot Boat to Launch Soon in Astoria

The pilot boat Connor Foss is currently under construction at the Foss Maritime Company's Shipyard in Rainier, Oregon, and will replace the Arrow 2 in June 2012. Connor Foss was designed by Kvichak Marine and will have a steel hull with an aluminum deckhouse and be propelled by twin engines rated for up to 1,430 hp. The new pilot boat can travel up to 14 knots with a semi-displacement hull riding more atop the waves than its predecessor. In April, the Rainier Shipyard will launch the vessel and delivery is expected by June 2012.

ACL's "Queen" Completes Sea Trial

American Cruise Lines said the Queen of the Mississippi left the pier at Chesapeake Shipbuilding in Salisbury, Maryland, for its first sea trial. The vessel performed perfectly as the huge paddlewheel churned the water and onlookers lined the riverbanks to watch. The new riverboat proved to be slightly faster than expected and is now nine weeks ahead of schedule. The Queen of the Mississippi will be completed in May, with its inaugural cruise scheduled for August 11, 2012 from New Orleans to Memphis.

"In the long history of humankind (and animal-kind f
vise most effectively have prevailed." That
Matt Desch, CEO, Iridium

(Five Minutes with Matt Desch, CEO Iridium — Continued from page 8)

for innovative communications solutions. There's also a deep-rooted desire for service providers who intimately understand this sector's unique customer needs. While others may view this set of customers as demanding, Iridium's partner ecosystem understands them well. Because of this, our maritime business makes up a large portion of our thriving commercial business. Our commercial service revenue during the fourth quarter of 2011 was $50.6 million, a 14 percent increase from last year's comparable period, which was primarily supported by gains in M2M data, handheld voice and Iridium OpenPort high-speed maritime customers. All three service offerings serve maritime market needs well.

Put in perspective the importance of Iridium Pilot, both in terms of its importance to your maritime customers, and to the company overall.

Desch Due to the vital communications service Iridium provides mariners, we are committed to delivering the best communications solutions at the best value. Iridium Pilot is small and durable, and has enhanced capabilities to optimize telecommunications across fleets. It provides fully global voice and broadband data connectivity to our maritime customers at an affordable cost. It's also fully compatible with VSAT technologies to even further increase the value of this broadband tool for our maritime customers. As far as importance to the company, we're committed to the broadband market as one of the key growth areas for the company going forward, complementing handheld service, M2M applications, and services to militaries and emergency workers.

Iridium Pilot is the third of many products the company plans to "power by" the Iridium OpenPort service. This strategy provides a growth path for Iridium to expand into new markets, and it underscores our dedication to uncovering new and better ways to help people communicate anywhere at any time. Most importantly, Iridium Pilot is designed to be compatible with Iridium NEXT, our next-generation satellite constellation.

What trends do you see among your maritime users that are helping to shape Iridium's product and service offering of tomorrow?

Desch One trend we're seeing is the increasing demand among ship owners for VSAT services due to their always-on, very high speed data connections and fixed monthly prices. We are working closely with major VSAT service providers to bundle Iridium Pilot with their solutions to offer low-cost broadband service plans, with global coverage, to their customers. This integrated package, for the first time ever, provides a complete global communications solution for this market, and is a great example of how a motivated partner channel magnifies our impact and reach.

Iridium Pilot is optimized to seamlessly integrate with a vessel's VSAT platform to overcome the coverage gaps, data-rate constraints and comparatively higher prices of other L-band mobile satellite service providers. Iridium offers VSAT companion packages with partners KVH Industries Inc. and Vizada, and we expect to add additional distribution partners into this fold.

What do you consider to be the top three challenges to running a profitable, effective satellite communications company today?

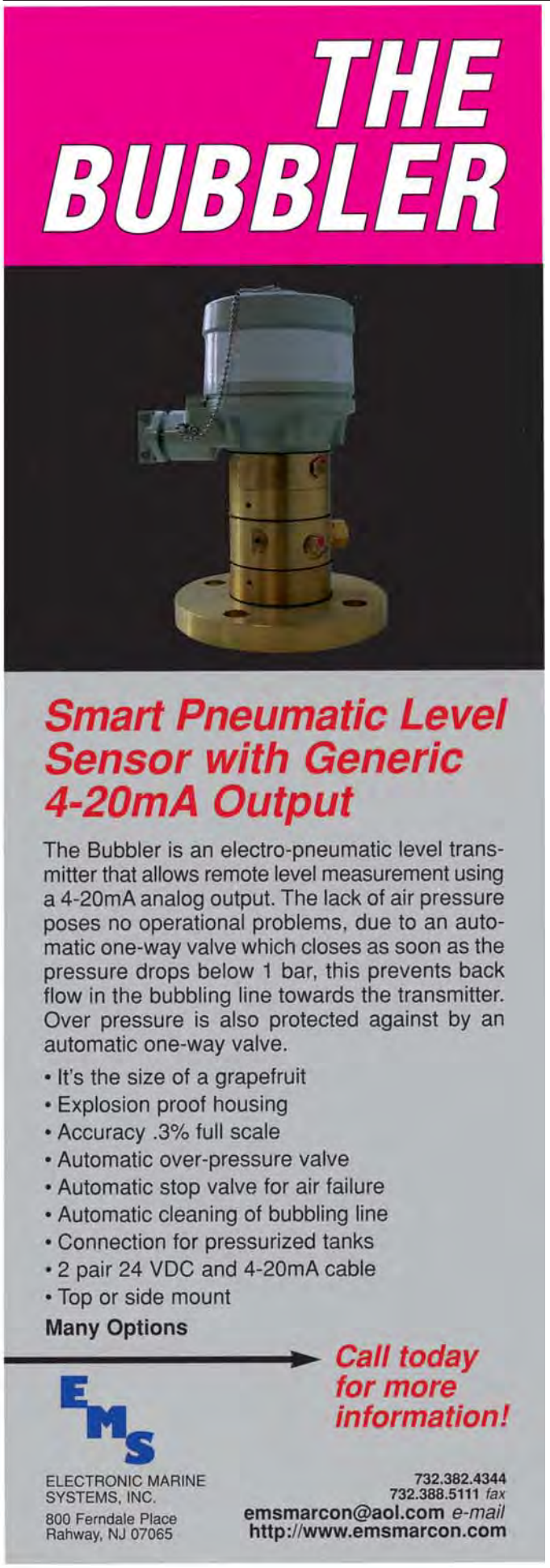
Desch First, in this trying global economy, your service has to remain vital. Business plans can get stale very quickly, as evidenced by the original Iridium. The original managers didn't continually challenge their assumptions along the way as the system was being built – but their competition had radically improved and changed along the way. I want to make sure that we don't miss anything this time around, and that we are constantly looking for new ways to get stronger, to be more successful, and to grow faster. While "paranoia" might be considered a negative for individual health, I believe a little of it actually pays off in business.

So, second, that leads to our need at Iridium to be obsessive innovators. We're not just about satellite phones or data modems. We're not just about leading a single product category or legacy market, or about adjusting pricing on the same product when nothing else has changed. What challenges us is how to always remain a catalyst for technology innovation. What inspires us, along with our partners, is making sure we are constantly innovating to meet the critical communications needs of our customers.

Finally, it's important for me to reinforce how critical our diverse and economically incentivized partner channel is to our success. They're more energized than ever to grow their business with us. We have more than 275 partner companies in our ecosystem today. We appreciate their independence, as it drives creativity and innovation on a scale we couldn't do alone.

The maritime industry is generally thought to be conservative. As satellite communications, in relative terms, is still in its infancy, what do you count as the best arguments in favor of the medium in breaking down traditional barriers?

Desch Today's crews are of a generation that expects ubiquitous connectivity wherever they are, so the restrictive, expensive, pay-by-the-minute communications models that used to work in the past



Charles Darwin once said:

or that matter), those who learned to collaborate and impro-
pretty much boils down my management philosophy.

simply don't work today. Ship owners are under immense pressure to reduce overall operating costs while maintaining crew morale, and because of this, we're seeing high demand for affordable, high-value voice and data services. Iridium has always been the leader in providing high-value, low-cost maritime communications and, since 2008, broadband solutions. We're continually investing in product development, our satellite network and our partners who meet the needs of the various industry stakeholders we serve. Iridium Pilot is the latest example of Iridium's long-term commitment to improving the customer experience and satisfying communications needs in the farthest reaches of the world.

How is Iridium investing today?

Desch Our partners are critical to our success. They are using our technology to create smart, exciting new devices and solutions, so we continue to support them in any way we can. Our team also continues to innovate by offering enhanced products, and even product-less solutions such as waveforms, from which we will be able to develop unmatched communications tools for the maritime market.

But our ultimate obligation as a leading communication company is to meet the growing expectation of connectivity. One of the biggest innovations and investments we're making today is the creation of our next-generation satellite constellation, Iridium NEXT. We're making our unrivaled network more accessible than ever so that it gets easier to connect and communicate on an ongoing basis.

Iridium NEXT is the world's most significant commercial space program underway. We have a fully funded plan to build it and are well along in the development. The system is on track for its planned launch in 2015.

What do you see on the regulation front that could be a boon for your industry?

Desch Safety at sea regulations related to LRIT and SSAS, as well as the modernization of GMDSS and e-Navigation, continue to introduce new customers to Iridium. Solutions based on our network are cost effective, reliable, and there are no compromises in coverage – for example, we're the only communications service that provides connectivity in the Arctic regions. We not only keep mariners connected, we help ensure vessel monitoring regulations are met in real-time, efficiently and effectively. Fishing and eLogbook regulations play well into the Iridium product and services portfolio in the same way, from the fisheries management standpoint as well as for man-overboard tools for fishermen.

Iridium also is playing an important role in the battle against pirates disrupting trade. One of the Best Management Practices published by the IMO for shipping companies and ship masters sailing in the danger zone is to establish a "citadel" – a hardened safe room below decks where crews can take refuge if pirates seize control of a ship. The citadel design calls for a reliable, secure communication link the crew can use from inside to communicate with forces coming to rescue. It needs to be a secure, stand-alone communication system, connected to an antenna and with cabling that pirates cannot disable. Iridium has become the preferred communication medium for this purpose, thanks to our reach, reliability and real-time voice service, as well as low-latency GPS tracking.

In the same way, Iridium is ideal for overall search and rescue (SAR) scenarios, providing a service that enables everything from medevac and vessel tracking, handheld satellite phones offering services such as SOS buttons and geo-fencing capabilities, and increasingly smaller, more feature-rich embedded devices for a myriad of partner handheld personal location products used at sea such as the DeLorme inReach and the Briartek Cerberus. We also see growth in the use of Iridium in oceanology applications such as the early tsunami warning system along the Pacific Coast of the U.S.

What do you see on the regulation front that could give cause for concern to the SatCom industry?

Desch I don't really see as much that is concerning as I see opportunities. One of the hot areas in regulation is the reuse of satellite spectrum for terrestrial use – to basically create value out of satellite spectrum. We're not interested in that – we see great value in using our spectrum in our business and don't need to lease it to others for cash.

Of interest to the maritime industry, of course, is the requirement for organizations to meet growing regulatory safety and security standards around the globe. Ships in distress rely on mobile satellite voice and data services. Many Iridium value-added manufacturer partners are approved to meet IMO standards for SSAS service. In addition, the IMO's requirements for LRIT of vessels address SOLAS issues but require truly global, pole-to-pole satellite service including one that works on shipping routes in Polar Regions. Iridium meets all requirements for serving as an LRIT communications service provider for location reporting, asset status updates, operator safety information, weather data, text messages and email. The IMO's efforts to expand reliability for Worldwide Navigational Warnings for the Arctic Region is a clear opportunity for Iridium, the only network providing complete coverage over Sea Area A4 (above 70 degrees latitude) and we feel we meet those requirements. Finally, we continue to

Iridium also is playing an important role in the battle against pirates. One of the Best Management Practices published by the IMO ... is to establish a "citadel" – a hardened safe room below decks where crews can take refuge if pirates seize control of a ship. *The citadel design calls for a reliable, secure communication link*

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meet the various licensing requirements in new countries and regions. We continue to pursue regulatory authority to distribute mobile satellite services into countries such as Russia. We look forward to eventually becoming a premier provider of services there given the country's extensive areas still underserved by terrestrial systems and other satellite communications – particularly maritime.

If you had the power to unilaterally enact one change, one philosophy or one piece of legislation that would most dramatically increase your business, what would it be and why?

Desch Since many of your readers have been following Iridium, you know that our next-generation constellation, Iridium NEXT, is designed with the ability to support "hosted payloads" on each of the 66 satellites that will encompass the constellation. We are close to announcing what that hosted payload will do, and details about the new business we plan to help create, going beyond our traditional communications service. We're spending the majority of our effort on forming a global aviation monitoring business, with strategic partners, which would deploy a payload that monitors aircraft all over the world and then supplies that information in near real-time for air traffic control – particularly over the oceans where there is no radar coverage today. We are incredibly excited about it, but I have to admit, I originally thought our hosted payload in space would have been rented out to a government agency for their use instead of them launching their own, very expensive satellites. Given the budget environment of the U.S. Government right now, I would say, if I had the power to unilaterally enact change, I would waste no time opening up the funding flow for more public/private partnerships around hosted payloads. U.S. Government organizations should be looking for their missions to hitch low cost rides into space first, rather than through the opportunistic manner in which they do today. I'm hoping they figure out how to do this more effectively in time for when we start planning our third-generation Iridium satellite constellation in 15 years or so!

ZF Marine Provides Propulsion Systems for New RV

ZF Marine was a major propulsion system supplier to the newly launched R/V Sea Scout (featured in full on page 10 of this edition). Sea Scout, built by All American Marine in Bellingham, WA, is believed to be the first catamaran featuring quad propeller propulsion. The vessel – owned and operated by C&C Technologies, Inc. of Lafayette, La. – will be used for various shallow and deep water survey activities as well as autonomous underwater vehicle operations. The catamaran hull design was a departure for this traditionally monohull vessel operator. Teknicraft Design Ltd. was charged with designing a vessel that could run efficiently at both high and low speeds for extended periods of time. As a result, a unique propulsion system was specified for the vessel, one that would enable the vessel to transit to site more quickly and stay on site longer.

All American Marine turned to ZF Marine to help make this unique and complex propulsion system a reality. The vessel is equipped with two ZF 3055A transmissions mated to the two specified Caterpillar C32 main engines and two ZF 550V transmissions mated to two smaller Caterpillar C18s. The four power packages are completed with shafting, Shaft Brakes (on the C18 systems), bearings, and custom propellers all supplied by ZF Marine.

All four propulsion systems are controlled by two sets of ZF SmartCommand control systems, one set for each of the vessel's propulsion systems. To minimize transit time to the research site, the power of all four engines is employed, giving the vessel a top service speed of 26 knots.

When the vessel arrives on site, the large engines are shut down, and the vessel runs on the two smaller power packages that employ trolling valves. The trolling valves combined with SmartCommand's AutoTroll functionality enables the crew to set exact vessel speeds - down to individual shaft rotations. Autotroll can be used for extended periods of time during survey operations without risk of damage to the transmissions. This feature will be extremely useful in helping perform research activities on board the vessel.

Wärtsilä dual-fuel technology selected for

South Korean Green Ship Project

(Photo courtesy Samsung)

Wärtsilä has been contracted to supply the engine for a Korean government Incheon Port Authority (IPA) Guideship. The Government of the Republic of Korea has specified environmental sustainability as a priority for this ship. The 200-gt Guideship is to be designed and coordinated by the Samsung Heavy Industries (SHI) in Korea on behalf of the state-owned Incheon Port Authority (IPA). The in-line Wärtsilä 20DF dual-fuelled engine with its 9 cylinders ordered for this vessel can operate on either gas or liquid fuel oils, and in gas mode is capable of meeting the most stringent emission regulations. The Guideship will operate in the port of Incheon and taking onboard passengers for various routings. The environmental benefit will be granted as the dual-fuel engine will have low emissions, in gas mode being compliant to Tier III regulations. "The IPA's Guideship, which is a green ship, concept is tremendously important as it clearly represents an industry trend. The fuel flexibility that our DF engines offer enables not only environmental sustainability, but fuel cost savings as well since these engines can operate on a wide range of fuels," said Aaron Bresnahan, Vice President, Wärtsilä Ship Power, Specials.

Wärtsilä's dual-fuel technology incorporates two separate fuel injection systems. When operating on gas, the electronically controlled common-rail pilot fuel injection system injects a very small amount of liquid fuel only. The conventional system is used when the DF engine is operated on standard liquid marine fuels. The switch between fuels can be made automatically and without loss of power.

The order was placed with Wärtsilä in October 2011, and the ship is scheduled to be in operation in December 2012.

www.wartsila.com

Vessel Facts: 200G/T Harbour Master vessel

Length, o.a.	38m
Breadth	8m
Depth	4.8m
Draft (design)	2.2 m
Speed	15 knots

Hempel for Oil Tankers

Hempel protective coating systems, including a range of HEMPADUR products and shop primers have passed the laboratory tests required by the IMO performance standard for protective coatings for cargo oil tanks (PSPC/COT). The tests ensure that coatings for cargo oil tanks in crude oil tankers comply with the specifications of the IMO MSC.288(87) SOLAS regulations. The performance standard requires approved coatings to remain in "Good" condition for a period of 15 years from initial application. The regulation applies to all building contracts placed on or after January 1, 2013 for newbuildings over 5,000 dwt. Testing was performed by COT bv in the Netherlands.

www.hempel.dk

BallastMaster Wins IMO Type Approval

GEA Westfalia Separator Group's new solution for the treatment of ballast water that incorporates ultraviolet radiation, the BallastMaster ultraV, was certified on in accordance with IMO guidelines and regulations. The BallastMaster ultraV ballast water management system is a mechanical/physical system solution for treating ballast water including that with a high concentration of organisms and sedimentary particles. The two-stage system works with mechanical pre-filtration and subsequent disinfecting of the ballast water by UV-C and ultrasonic radiation without the use or generation of chemicals.

Email: s.publicrelations@geagroup.com
www.westfalia-separator.com

New Hydrocarbon Leak Detection System

Teledyne TSS is bringing advanced hydrocarbon detection technology to the offshore sector with the introduction of the new TSS MELDS system. The instrument is designed to detect leakages of dissolved methane and combustible gases from pipelines and subsea structures at depths down to 3000m. The Mobile Early Leak Detection System has been developed to provide a versatile and sensitive tool that can be ROV-mounted and used in conjunction with Teledyne TSS subsea pipe trackers. The MELDS unit includes a methane sniffer and a flowhead, a PAH (Hydrocarbon) fluorometer, CTD sensor and a pump and T-handle with suction tube rated to 3000m.

www.tss-international.com

BAMS by Totem Plus

Totem Plus has developed the BAMS: a central Bridge Alert Management System. BAMS is type approved by GL, is in accordance with latest IMO resolutions and can be installed on any type of vessel. BAMS is designed to enable easy identification of the source as well as rapid silencing of the audible alarm. If alarm description or related information is available then BAMS reports the information content and allows acknowledgment from the panel. The backbone of the BAMS is the interface to all relevant bridge systems, either through serial inputs using NMEA protocol or alternately through hard wire (binary) signals. The BAMS shows all the systems in a clear display on a touch screen monitor.

www.totemplus.com

Dutch Decks for German-made Passenger Ships

German shipbuilder Meyer Werft and Dutch deck specialist Bolidt Kunststoftoepassing BV have extended their close relationship. This includes work on the latest cruise ship to be built at Meyer Werft's Papenburg shipyard. The 130,000gt vessel, is fitted with some 15,500 sq. m. of Bolidt material for the outdoor decks.

The majority of the deck areas, as well as the stairs and steps, have been covered using Bolidt's environmentally-friendly Bolideck Future Teak, a composite decking product that replicates the look and feel of traditional teak decks, but is ecologically more responsible and offers benefits through reduced installation times and easier maintenance.

"Completion of this newbuilding project continues an extraordinarily close working relationship between us and Meyer Werft," said Jacco van Overbeek, Bolidt's Director, Shipbuilding. "For the past 25 years all passenger vessels delivered by Meyer Werft have been equipped with Bolidt decks."

Other products used in the outdoor deck areas include Bolideck Select Soft, for some of the more colourful design features onboard, and Bolideck Select Hard for inside the pool wading areas. Bolidt has also supplied a special pool coating system and bespoke base design for the bottom of the pools. The new vessel also features more than 3,400 sq. m. of indoor deck coverings and in excess of 3,500m of C-Rail from Bolidt. The composite rail is designed as an alternative to traditional teak handrails, offers significant weight savings, a relatively low maintenance requirement, and is moreover, a sustainable product that reduces deforestation. The 340m long newbuilding is a sistership to a previous vessel which was delivered by the yard in 2011, and which was also equipped with Bolidt deck solutions. Two additional cruise vessels at Meyer Werft due for delivery this year will also feature Bolidt products. For Celebrity Reflection and AidaMar, the fifth and sixth in their respective series, Bolidt is supplying all the outdoor decks using Future Teak, as well as Bolideck Select Soft in colorful areas, while the balconies will feature Bolideck 525.

www.bolidt.com

A Bolidt running track aboard Celebrity Solstace.

CorDEX Instruments Wins

CorDEX Instruments won an award for its innovative explosion proof camera which is being used in the field by Weatherford. It won first prize in the 'Best User Application' category at this year's HazardEx Awards for its ToughPIX 2303XP camera and came second in the 'Contribution Towards Safety' category. It develops hand-held technologies ideally suited to the hazardous environments of the oil and gas sector. Its intrinsically safe equipment eliminates the need for shutdown or 'hot work' permits during Non Destructive Testing and inspection programs. ToughPIX 2303XP camera is more streamlined than its predecessor and includes still and moving images in AVI format of up to 10 mega pixels.

www.cordexinstruments.com

Thuraya Debuts XT-DUAL

Thuraya launched a dual mode hand-held phone that features both GSM and satellite capabilities: XT-DUAL.

XT-DUAL operates efficiently as a standard GSM phone within the reach of terrestrial networks, and when out of terrestrial network reach operates as a satellite phone supported by Thuraya's network. In addition to the built-in web browser, the phone can be connected to a laptop/PC for internet access and can be synchronized with a laptop/PC. The phone also has a battery saving technology to support a long lasting talk time of up to 11 hours and standby time of up to 160 hours contributing to the high attractiveness of the phone. The XT-DUAL offers a GPS functionality that allows waypoint navigation, tracking capabilities to send automatic location updates by SMS as well as an emergency function.

www.thuraya.com

Alignment Live Trend

M.A.C.E., Inc. offers now alignment live trend services. Cold alignment targets may not accurately predict the actual operating condition of a running machine.

With our live trend services we can monitor the movement of machines during run-up or coast-down phase, in order to determine the positional change over time and the influences of given events.

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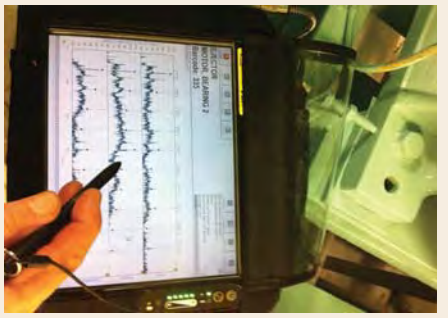
www.mace-inc.com



Hatteland Launches Series X Range

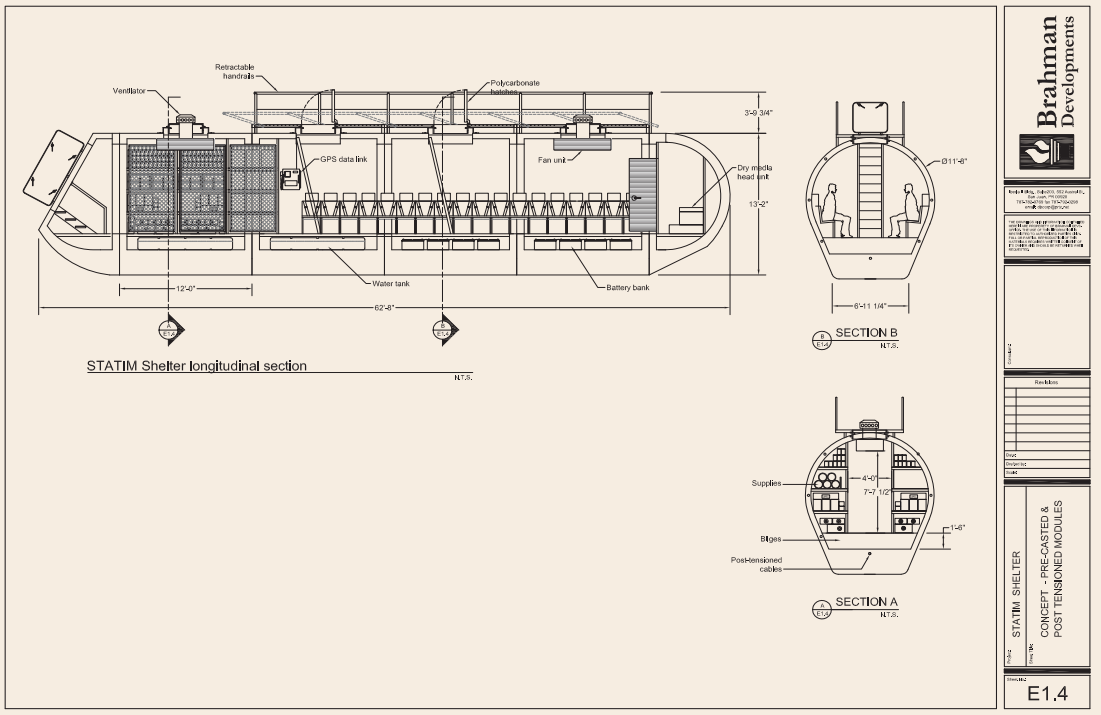
Hatteland Display launched its latest product range, Series X. The range is available as a Display or a Panel PC, and that applies for all 7 sizes launching this spring (8, 13 wide, 12, 15, 17, 19 and 24 wide inch sizes). A 26-in. widescreen will be available in Q3 2012. The features include sleek glass bridge design, Glass Display Control (GDC), optional Optical Bonding technology, High Bright performance, Wide Screens, LED displays across the board, Multi-power as standard and Multi-Touch.

www.hatteland-display.com

Tsunami Shelter Moves Forward

Brahman Industries developed a tsunami and flood shelter system, and announced its collaboration with Martinez Marine Design and Creative Systems to refine and validate the STATIM shelter's design and capabilities as a floating structure. The STATIM (acronym for Storm, Tornado And Tsunami Interconnected Modules) Shelter consists of an enclosable hull comprised of a series of precast, lightweight concrete modules, similar to large diameter concrete pipes. Once assembled, it provides a water-tight environment with buoyancy and self-righting capability. Inside, the shelters are equipped with secure seating for occupants, ventilation, and options of survival supplies capable of sustaining the occupants during and after a disaster. It is the equivalent of an "inland life boat."

www.statimshelter.com



New Focus Area for Broad Agency Announcement on Energy Conservation Applications for the U.S. Navy:

Waste Heat Recovery Efficiency Improvements

The Naval Surface Warfare Center, Carderock Division (NSWCCD) is soliciting abstracts ("White Papers") for Energy Conservation Applications for the U.S. Navy's Military Sealift Command (MSC) Combat Logistics Force, Auxiliaries and Sealift ships. This Broad Agency Announcement (BAA) solicits innovative concepts for Navy shipboard energy conservation and carbon footprint reduction with the potential for rapid transition to Fleet operations. The solicitation number is N00167-11-BAA-01. Past focus areas were:

- Heating, Ventilation, Air Conditioning & Refrigeration (HVAC&R) Efficiency Improvements
- Energy Efficiency Improvements for Shipboard Lighting
- Energy Efficiency Management System with Display and Interface.

Evaluations of white papers for the new Focus Area, "Waste Heat Recovery Efficiency Improvements," began on March 5, 2012. White paper topics outside this current focus area will still be accepted and reviewed. The BAA will be open for two years and white papers may be submitted any time throughout the period beginning December 1, 2010 and ending October 31, 2012. The one page BAA, additional information and directions on how to register and submit white papers to NSWCCD can be found at:

http://www.navsea.navy.mil/nswc/carderock/pub/business/baa.aspx

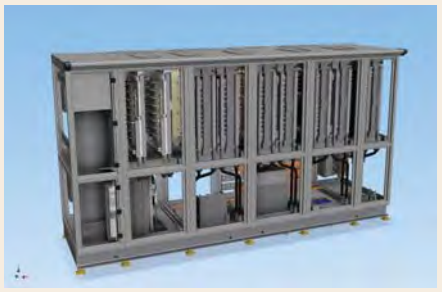
or

https://www.fbo.gov/ (search on N0016711BAA01)

Weather Charts for Raytheon Anschütz ECDIS

Raytheon Anschütz is offering an integrated weather chart overlay for the Synapsis ECDIS. Taking the special needs of navigation into consideration, the layer was developed in close cooperation with meteorological experts of the German sea weather provider WetterWelt. With the new feature Raytheon Anschütz combines sea chart and weather chart in one display. All weather parameter, which are important for navigation, are presented as values or symbols on a separate layer and can be switched on and off any time. The system can show all available weather forecasts for the next days, which is a great help for route planning under the aspects of safety, travel comfort and fuel consumption. In addition to the current weather conditions, the weather forecast for the next few days can be played as an animation. The parameters which can be displayed include the mean wind with direction and speed as well as gusts, wave height, wave direction and swell, period intervals of waves and swell, current, air pressure, weather conditions and air temperature. The navigator can flexibly define which of the data he wants to have displayed in which situation and which limits he would like to set. If individual weather values exceed the preset limits, the values are shown graphically as weather warnings.

www.raytheon-anschuetz.com



Medium Voltage Power Drive Technology

Wärtsilä launched its new Medium Voltage Power Drive, that will enable the delivery of electro and automation systems for large, electric propulsion vessels, such as drilling rigs and tankers, large passenger and cruise ships, various offshore service vessels, as well as compressors and pumps for the oil & gas industry. The Medium Voltage Power drive is designed for marine applications. Development work began in 2009, and has been carried out at Wärtsilä's R&D facilities in Norway. Pilot sales are scheduled to begin this year, with an internal pilot to be installed in early 2013 and an external pilot later in that year.

The Wärtsilä Medium Voltage Power Drive is based on press-pack IGBT (Insulated Gate Bipolar Transistor) technology with 3-level PWM inverter control. The modular design has large overload capacity, integrated gate driver boards, and a plug-in bus bar connection.

The unit can be used as a control device in various marine propulsion and thrusters applications, as well as in large fans, pumps, compressors and hoists. Together with Wärtsilä's patented Low Loss Concept, the introduction of this next generation of medium voltage power drives brings increased efficiency and redundancy to the larger marine electric propulsion market. It also has the added benefit of reduced weight and space requirements.

Alutech 400 and 500 Launched

Alu Design & Services (Alu Design) is re-launching two of its core product offerings with enhanced design and production standards. The result: better seating at costs of up to 20% less. From today, the Alutech 400 and Alutech 500 are available in aluminum made from pressurized die-casting. This production technique greatly reduces the product weight, makes the 400 and 500 even more robust than their predecessors and, crucially, allows Alu to offer the chairs with a reduced price tag.

www.alu-design.no

Rustibus Expands Tool Line

Rustibus are looking to enter into the industrial hand tool market with a new chain drum hand tool that is operated by using 110V, making it as dependable as our current walk behind equipment. In 2012 the company introduced an ATEX EX approved product line for descaling rust in the marine industry. All certifications apply to this new product line which is now black in color as opposed to the usual red color of the machines.

Email: djj@rustibus.com
www.rustibus.com

Spot Welding Pedestal

All the benefits of the C300 robotic system now available in a stationary pedestal system. The 100% servo-driven, water-cooled system has an adjustable gun height, intuitive user interface and does not require compressed air. The gun can be disassembled from the frame then converted for use on a robot making it a completely versatile system.

Email: gibson.stephanie@fronius.com
www.fronius-usa.com

Delta Wave Debuts Global Dispatch Solution

Delta Wave Communications offers a new global dispatch solution: Push to Talk (PTT) and dispatch over satellite, with global coverage. The new technology, according to the company, offers global coverage and gives the end user on-the fly control when it comes to managing user access. IP based, it eliminates the necessity of base station equipment, as the software allows the dispatcher to create talk groups on the fly. Ideal for maritime customers, as well as disaster recovery and emergency preparedness personnel, it operates over Thrane and Thrane's land, vehicular, and marine based Inmarsat terminals.

www.deltawavecomm.com.

World Wide Metric Adds Garlock Gaskets

World Wide Metric added gaskets to its product line, partnering with Garlock, a leader in high-performance fluid sealing products for the world's processing industries. Garlock 5500 Gaskets are now available in full face and ring type in metric JIS and DIN flange configurations. The Garlock 5500 provides a tight seal that offers great stability with minimal weight loss. As well as a reduced creep relaxation with an improved retention providing optimal seal ability.

www.worldwidemetric.com

GE LM Gas Turbines for Commercial Marine

GE Marine reports its LM aeroderivative gas turbines are poised to re-emerge in the commercial marine market as a prime power producer, especially for new natural gas applications such as fast ferry, liquefied natural gas (LNG) tanker or FPSO. GE's LM gas turbine fleet has logged more than 13 million hours in marine service. In the mid 2000's, Marine Gas Oil (MGO) burned in gas turbines experienced a significant price increase versus the heavy fuel oil used by diesels, moving the market back toward diesels. Fast forward to today and gas turbines are worth another look. Gas turbines are increasingly seem as more cost effective, particularly looking at tightening emission standards coming in 2014 and 2016. These new requirements will undoubtedly usher in increased use of gas turbines burning alternate marine fuels such as LNG.

www.geaviation.com/engines/marine

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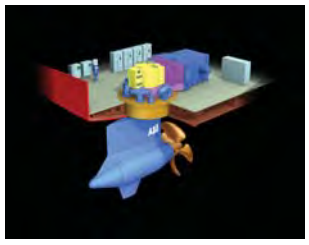
ABB Azipod Order = $60m

Pederstad Named Nor-Shipping Director

Nor-Shipping announced that Vidar Pederstad has taken on the role of Nor-Shipping Director. He has been a marketing and PR consultant to four Nor-Shipping event weeks over eight years, and was also a founding member of the Nor-Shipping Advisory Board. His key contributions during this period include the establishment of the high-profile Nor-Shipping conferences, which have greatly contributed to Nor-Shipping's position as a world-class meeting place for the industry, and Nor-Shipping Campus, a valuable branding initiative for the Norwegian maritime industry. Nor-Shipping veteran Tollef Schiander is now Exhibition Director.

GL Garrad Hassan: Finch New Business Development Manager

GL Garrad Hassan appointed Ian Finch as its new Business Development Manager in the UK. He will be responsible for managing sales and business development activities for the GL Group with a special focus on offshore wind. He will work closely with Christoph Thiel, the newly appointed Head of Business Development and Sales for GL Garrad Hassan and Colin Morgan, who leads the Group's Offshore Wind Practice.

Pharos Offshore Names Gartshore CTO

Pharos Offshore Group announced the addition of Scott Gartshore as Chief Technical Officer (CTO) to the executive team. Gartshore's previous roles include Project Manager and Senior Engineer, as well as Trenching Systems Sales Manager at IHC Engineering Business Ltd.

XL Expands Brown Water Business

XL Group plc's North American Marine business has boosted its underwriting expertise with the addition of Chris Cooke who has joined as Vice President, Hull and Liabilities. According to Richard DeSimone, President of XL Group's North American Marine business, "We are very pleased to have Chris join our team as we look to expand our Brown Water Hull, P&I and Primary Marine Liability capabilities. XL has long been a market leader in Excess Marine Liabilities, and we believe that extending our reach into these lines of business will help us address more of our clients' coverage needs." Cooke previously worked at Travelers, where he was the National Hull and Liabilities Practice Leader. Among his primary responsibilities were the development of policy forms, underwriting manuals, procedures, and initiatives to drive growth in Hull, P&I, Marine Liabilities, Marine Professional Liability and Excess Liabilities. He started his career with MOAC/Continental where he worked in both field and Home Office positions in the Hull & Liabilities and Excess departments. He also ran the Marine Department in Hong Kong for two years working with MOAC/Continental-owned Lombard General Insurance. A graduate of SUNY Maritime College, where he earned a

15 Small U.S. Shipyards Receive Grant Money

U.S. Transportation Secretary Ray LaHood announced last month $10 million in grants to 15 small shipyards throughout the U.S. to pay for modernizations. The U.S Maritime Administration's (MARAD) Small Shipyard Grants Program is designed to provide equipment and technical skills training for the workforce. MARAD received 141 grant applications requesting $123 million in assistance. A detailed list of grantees is as follows:

• **Allen Marine, Inc.** (Sitka, Alaska) will use a $163,500 grant to purchase a Welding Fume and Particulate Extraction System needed to meet Occupational Safety and Health Administration requirements for air changes per minute and to maintain the proper environment for aluminum welding operations.

• **Bludworth Marine, LLC** (Houston, Texas) - will use a $610,266 grant to purchase a rubber tire gantry crane to lift and transport barges, large modules, and materials throughout the yard.

• **Bollinger Shipyards,** Lockport (Lockport, Louisiana) - will use a $188,887 grant to purchase a robotic plasma pipe-cutting machine for fast and accurate pipe cutting, a big top tent structure to protect a vessel structure from the environment and to protect the environment from contaminants, and an induction heating distortion control system to reduce plate deflection and distortion.

• **Chesapeake Shipbuilding Corporation** (Salisbury, Maryland) - will use a $423,752 grant to purchase air compressors, personnel lifts, and a mobile grit recovery system to remove blasting grit from buildings and outfitting areas. In addition, the company will implement a cross training program to improve skill sets and utilize existing workforce more efficiently.

• **Conrad Shipyard, LLC** (Amelia, Louisiana) - will use a $1,117,019 grant for drydock modernization and upgrade to expand their 280-foot 10,000-ton floating drydock by 2,500 tons in capacity and 70 feet in length.

• **Detyens Shipyards, Inc.** (Charleston, South Carolina) - will use a $1,176,776 grant to purchase two 20-ton tower cranes that will be set at both ends of an existing drydock to facilitate increased and safer service to the drydock.

• **Foss Maritime Company**, Foss Seattle Shipyard (Seattle, Washington) - will use a $578,402 grant to purchase two 45-foot manlifts, a 14,000 CFM dust collection system to allow the yard to blast and paint without contaminating the atmosphere, a 3-ton forklift, and shelters for additional work overflow.

• **Duclos Corporation DBA Gladding-Hearn Shipbuilding** (Somerset, Massachusetts) - will use a $389,195 grant to fund shipyard infrastructure upgrades.

• **Gulf Marine Repair Corporation** (Tampa, Florida) will use a $1,083,055 grant to modernize and upgrade their 14,000-ton drydock.

• **Kvichak Marine Industries** (Seattle, Washington) - will use a $987,307 grant to purchase a water-jet cutting table to cut and bevel ferrous and non-ferrous plates, a hydraulic swing beam shear for accurate cutting in place of skill saws and band saws, lighting enhancements, a jib crane column replacement, and welding equipment. In addition, the grant will fund a training program in boatbuilding skills.

• **LEEVAC Shipyards, LLC** (Jennings, Louisiana) - will use a $667,324 grant to purchase a pipe and tube bending system that will bend pipes to the correct geometry required, eliminating the need to weld pipe sections by hand.

• **Liquid Waste Technology**, LLC (New Richmond, Wisconsin) - will use a $558,843 grant to purchase two forklifts, a 50-ton rubber tire gantry crane for transporting dredges and modules throughout the yard, and a training simulator room with two computers and software.

• **Navatek Ship Construction** (Honolulu, Hawaii) - will use a $248,805 grant to purchase wind turbines and towers that will provide clean renewable electrical service to the yard.

• **The Great Lakes Towing Company DBA Great Lakes Shipyard** (Cleveland, Ohio) - will use a $1,068,474 grant to purchase lighting, a burn table for automatic cutting, a scissor lift, welding equipment, scaffolding, a high pressure lifting skid to lift and move heavy components, boom lift, generator, and a self-propelled transporter to move vessels and modules throughout the yard.

• **Trinity Industries, Inc.** (Caruthersville, Missouri) - will use a $718,395 grant to purchase a one-side welding system that will fabricate stiffened panels using a butt-welding station, a stiffener fitting station and a stiffener welding station.

USCG Third Mates License, Mr. Cooke is also a Lieutenant with the NYFD.

Thome Offshore Bolsters Management

Thome Offshore Management (TOM) and Thome Oil & Gas (TOG) appointed John A. Sydness, as Managing Director for Thome Offshore and Thome Oil & Gas. He was previously Managing Director of TOG and prior to that he worked for major international companies in the offshore services and energy industries. He takes over from Claes Eek Thorstensen, who is moving into a group role in TSMI – the holding company of the Thome Group of companies. Claes will be supporting the development of all companies including commercial and marketing activities.

In addition Thome Offshore announce dthe internal promotion of:

- Paul Schaab appointed to General Manager, Offshore Fleet.
- Manfred Mueller appointed as General Manager, Commercial, Thome Offshore.
- Cynthia Surin Harris appointed as the Finance Manager of Thome Offshore and Thome Oil & Gas.
- Gaurav Gupta, a new hire, joins as the new Head of Marine HR, Thome Offshore and Thome Oil & Gas.

Imtech Marine wins Netuba Turkey Trade Award

Imtech Marine received the Netherlands Turkey Trade Award 2012. The award was handed over to Terry van Velzen, Business development director of Imtech Marine, by the Turkish Ambassador, His Excellency Ugur Dogan in the city hall of Rotterdam. The award is granted every two years, to a company or person who has remarkably contributed to the trade and/or investment relation between Holland and Turkey.

Grawe to Head Business Division at Voith

On March 1, 2012, Matthias Grawe (52) took over at the helm of the Division Industry at Voith Turbo. The graduate engineer has been working for Voith Turbo for 10 years, most recently as Head of the Product Group Variable-Speed Drives at the location Crailsheim.

Stewart Group Starts Specialist Subsea and Renewables Unit

International shipbroker, The Stewart Group, added depth with the appointment of Michael Braid to launch its specialist subsea and renewables business. As part of the RS Platou ASA Group, The Stewart Group uses a network of 390 professionals with a track record of global commercial delivery and time-critical market analysis in the shipbroking industry. The company has now added subsea and renewables capability and is active in the following sectors: subsea construction/pipelay; diving support; IMR and ROV support; decommissioning; well intervention/well stimulation; cable installation and maintenance; offshore renewable energy; seismic survey/seabed logging; trenching and ploughing support.

Irish Ferries Appoints Sheen Operations Director

Andrew Sheen has been appointed Operations Director, Irish Ferries. A former engineer on the company's fast ferry Jonathan Swift, Mr. Sheen joined Irish Ferries from the UK's Maritime and Coastguard Agency having served as Technical Performance Manager, Engineer and Ship Surveyor. A B.Eng (Hons), M.Sc and Chartered Engineer, he will be accountable for Irish Ferries' ships safety and operations, all port terminals within the company's network and costs associated with the company's operations in Ireland, Britain and France. From Liverpool, he succeeds Mr. John Reilly who has retired from the company after many years of service.

ABB Wins $60m Propulsion Order

ABB won a $60m order to provide complete power and propulsion systems for two new cruise ships to be built by Mitsubishi Heavy Industries, Ltd. at its shipyard in Nagasaki, Japan, for Germany's AIDA. Both 125,000 ton, 3,250-passenger cruise ships are scheduled for delivery in March 2015 and March 2016. ABB will supply complete electrical systems for both ships; including generators, and transformers for propulsion, engine room and distribution, frequency converters, bow thruster motors, and other related power system equipment, as well as its latest generation Azipod XO propulsion systems.

NAUTIS Simulator Delivered to Taiwan

VSTEP, in cooperation with its distributing partner Shipbridge, delivered and installed a NAUTIS desktop simulator at the National Taiwan Ocean University in Keelung, Taiwan. The Ocean University is a leading institute for maritime education and oceanographic studies in Taiwan. It also harbors the department of merchant marine and the department of shipping & transportation management. The simulator will be used to train university maritime students and maritime professionals in shiphandling and maneuvering. NAUTIS is a new range of advanced DNV certified maritime training simulators for training maritime professionals, officers and crews.

http://www.nautissim.com

WTS Appoints Bannerman

Wilhelmsen Technical Solutions strengthened its senior management team with the appointment of Philip Bannerman as Vice President, Americas Region. Bannerman has been with the Wilh. Wilhelmsen Group since 1997 in a number of sales and marketing roles, most recently as Regional Sales Director of Wilhelmsen Ships Service in the Americas.

Resolve Maritime Academy Opens

Resolve Maritime Academy (Academy) opened its new Simulation Training Center on Monday, March 12 with a ribbon-cutting ceremony at the Fort Lauderdale, FL, USA facility adjacent to Port Everglades. The state-of-the-art, 7000 sq. ft. facility will provide leading edge simulation-based training programs to enhance safe navigation at sea for cruise line and commercial shipping personnel and other maritime professionals worldwide. The Academy designed and developed the $6.5 million Simulation Training Center which features a Class A Full Mission Bridge Simulator with fully functional attached Bridge Wing with independent visual system, Electronic Chart Display & Information System (ECDIS) Classroom and Navigation Lab with a suite of advanced "mini" bridges. The Academy's unique curriculum utilizes state-of-the-art simulation technology and will initially include: Ship Handling; Bridge Resource Management (BRM); Operational Use of ECDIS; and RADAR/Automatic Radar Planning Aids (ARPA) programs. Customized programs also will be offered, including: Integrated Bridge Systems (Sperry VisionMaster and NACOS Platinum); Dynamic Positioning Systems; and Communication & Leadership Development for all ranks and employees. Future plans include an Engine Room Simulator for operational and Engine Resource Management (ERM) training.

www.resolvemarine.com

BAE Systems, Moran Iron Works Join Forces

BAE Systems Southeast Shipyards and Moran Iron Works, Inc. signed a teaming agreement in order to collaborate on the pursuit of plate steel fabrication projects for industrial plant customers. Together they will serve customers throughout the northern and southern regions of central and eastern North America.

Moran Iron Works, Inc. is a dynamic

Kleivdal to Head NSA

The CEO of Color Line AS, Mr Trond Kleivdal (48), has been elected as the new president of the Norwegian Shipowners' Association (NSA). "The maritime industry is dynamic and innovative, and a key value-generating component of the global economy. The maritime cluster has substantial inherent future growth potential. We are constantly searching out new, better and sustainable solutions, and this has made us a competitive centre of expertise, with a drive to innovate, and with global impact and attractive power", says newly-elected NSA president Mr Trond Kleivdal. The new president stresses that, over the generations, the maritime industry has demonstrated a great ability to navigate through difficult times. "Norwegian shipping companies, shipowners and seafarers have always been able to spot new markets and opportunities. This has made the country's maritime industry a world-leader, not just at sea, but now also in and under the sea. Over the years, many people have written off Norway as a maritime superpower, but they've always been proved wrong. The maritime industry is one of Norway's most valuable "renewable" resources. The shipping companies are at the heart of an activity with a workforce of 100,000, creating NOK 130 billion of value each year", says Kleivdal. Kleivdal has been a member of the NSA Board since 2002. He has held a number of executive posts at Color Line and, since 2001, has been the company's CEO and Managing Director.

Color Line AS is Norway's largest and one of Europe's leading cruise and transport shipping companies. The company's fleet of six ships carry more than 4.3 million passengers and 170,000 freight vehicles a year. The company operates four international routes between seven ports in Norway, Sweden, Denmark and Germany. Color Line employs 3,000 people in four countries, 2,300 of them at sea. Annual turnover is approximately NOK 4.7B.

and flexible provider of high quality steel fabrication products to a variety of industrial customers. With access to the U.S. Great Lakes, they are able to reach customers throughout the Midwest and Northeast regions of the United States and Canada providing fully integrated and outfitted steel platework assemblies and modules ready to install at their industrial sites. BAE Systems Southeast Shipyards has facilities located in Mobile, Alabama and Jacksonville, Florida and has a long tradition of high-quality production performing naval and commercial ship construction, modernization and repair.

Samson: 12th Patent for MLX Rope

Samson was awarded U .S. Patent No. 8,109,072 for the development of the technology to blend high modulus polypropylene (HMPP) with high modulus polyethylene (HMPE) together in fiber rope products. This is the first time HMPP has been used in the cordage industry. Samson's MLX provides higher performance characteristics than ropes made with traditional fibers such as nylon and polyester, but it is less costly than a rope made of 100% HMPE. For product specification.

www.SamsonRope.com

Transas Launches "Pay-as-you-Sail"

Transas Marine launches its 'Pay As You Sail' chart solution for (S)ENC. Transas received approval for the 'Pay-As-You-Sail' service by PRIMAR and IC-ENC after sea trials and verification by DNV. Traditionally the navigator has to select and purchase charts prior to each voyage using what is commonly called pre-licensing method. With Transas PAYS solution the vessel will have a license and access to install, view and pre-plan using official (S)ENC's where the necessary PAYS permissions have been obtained without additional cost. What's unique with Transas "Pay As You Sail" solution is that recording and reporting of charts used is done with extraction from Transas Navi-Sailor 4000 ECDIS logbook. Vessels only pay for charts actually used for navigation monitoring.

www.transas.com/PAYS

SOMEC Invests in Ecochlor

Ecochlor has completed a $4.1 million equity financing to support its growth into the growing ballast water treatment market. Investors participating in the financing included Sojitz Marine & Engineering Corporation, the shipping subsidiary of the Japanese trading company, Sojitz Corporation, and a number of individual investors. Sojitz invested $1.8 million. Since its formation in 2001, Ecochlor has raised more than $12m in equity.

MCO: Order for Six Sets of FPSO On-board Compressor Package

Mitsubishi Heavy Industries Compressor Corporation (MCO), a wholly-owned subsidiary of Mitsubishi Heavy Industries, Ltd. (MHI), has received an order for six compressor packages to be installed on a floating production, storage & offloading system (FPSO), which Tupi BV plans to operate in the area of BM-S-11 at Brazil's coast.

MSG Appointed by Danelec Marine

MSG MarineServe GmbH, one of Hamburg's leading training companies, has been appointed as official training agent by Danelec Marine to provide ECDIS training services locally and worldwide.

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

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PPG Protective & Marine Coatings, One PPG Place, 38N Pittsburgh, PA 15272 USA
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January — Ad Close: Dec 22

US Navy Report

Market: Floating Production Systems

Technical: Ballast Water Treatment Systems

Directory: Marine Propulsion Equipment

ASNE Day Feb 9-10

February — Ad Close: Jan 26

Cruise Shipping Annual

Market: Ports & Logistics

ROUNDTABLE: Satellite Communications

Directory: Marine Electronics Buyer's Guide

Special Report: Germany

Seatrade Mar 12-15

March — Ad Close: Feb 23

The Ship Repair Edition

Market:Training & Education: Facilities & Systems

Technical: Software Solutions

Directory: Coatings & Corrosion Control

CMA Mar 19-21
CIMPS-Europort April 25-27

April — Ad Close: Mar 22

Offshore Deepwater Annual

Market: Offshore Wind & Renewable Energy

Technical: Offshore Service Vessels

Directory: Deck Machinery, Winches & Ropes

Special Report: The Netherlands

OTC April 30 - May 3

May — Ad Close: April 26

The Green Ship Edition

Market: Patrol, Escort Craft & RIBs

Technical: The Integrated Bridge: Modern Bridge Technology & Technique

Directory: Posidonia 2012 Preview: New Technology Guide

Special Report: Middle East Maritime Cluster

RoRo May 22-24
MACC June
Posidonia June 4-8

June — Ad Close: May 24

Annual World Yearbook

Market: Military Might: Innovative Designs

ROUNDTABLE: Information Technology & Software Solutions

Directory: Maritime Fuels, Lubricants & Additives

Don Sutherland Photo Contest

July — Ad Close: June 2

Arctic Operations

Market: Oil Spill Response & Recovery

ROUNDTABLE: Coatings & Corrosion

Directory: Training & Education – Facilities & Systems

Special Report: Brazil

August — Ad Close: July 26

The Shipyard Edition

Market: Maritime Communications

Technical: Maritime & Shipbuilding Tools

Directory: SMM 2012 Preview: New Products & Technologies

Special Report: Singapore Maritime Cluster

SMM Sept 4-7

September — Ad Close: Aug 23

Marine Propulsion Annual

ROUNDTABLE: Diesel Engine Manufacturers

Technical: Marine Salvage & Recovery

Directory: Insulation, Pipes, Pumps & Valves

Rio Oil & Gas Sept 17-20

October — Ad Close: Sept 20

Marine Design & Construction

Market: Maritime, Port & Harbor Security

Technical: Deepwater Floating Production Systems

Directory:CAD/CAM & Other Software

SNAME Oct 24-26
MAST Americas Nov 14-16
Inmex China Nov 21-23

November — Ad Close: Oct 25

Workboat Annual

Market: Offshore Service Vessels (OSVs)

ROUNDTABLE: Workboat Academy: Training & Education

Directory:Heavy Lifting: Deck Machinery & Cranes

Special Report:Turkey

Int'l Workboat Show Dec 5-7

December — Ad Close: Nov 22

Great Ships of 2012

Market: Port & Harbor Dredging Annual

Technical: Maritime Fire & Safety Products & Systems

Directory: World Shipyards: Newbuild, Repair & Conversion

* Please note that the publisher reserves the right to alter this editorial calendar. All planned features are subject to change in light of changing industry trends and developments.

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Shipping Services Coordinator
Job Location: USA, Miami

JOB TITLE: Shipping Services Coordinator
LOCATION: Coral Gables, Florida

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•Input ship management expenses report for Vice President of Network Shipping on a monthly basis.
•Assist Director of Marine Insurance on all claim related matters.
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Boat Captain
Job Location: USA, Fountain Valley

OCSD is currently looking to fill the role of a Boat Captain.

Under general direction, the Boat Captain will command and navigate a 58-foot, 68 gross ton ocean vessel during approximately 80 to 90 days of field sample collection for the District's ocean monitoring program which supports the District's National Pollutant Discharge Elimination System (NPDES) permit. Responsibilities include oversight of vessel maintenance and slip management agreements; the safe operation, care and maintenance of the vessel; coordination of field sampling with ELOM scientists; directing the work of a scientific crew performing vessel operation and overseeing contract maintenance work. Other duties may include preparation for field sampling activities, such as organization of sampling equipment and sample containers, assisting with the maintenance of sampling gear and instruments, conducting beach or laboratory sample collection, and other duties as requested.

The successful candidate will possess a high school diploma or equivalent supplemented by college level coursework in science or a related field. In addition, five (5) years of increasingly responsible experience piloting a motor, oceanographic, or fishing vessel greater than 35 feet in length in coastal waters, including the deployment of heavy equipment overboard is required. Master or Mate of Mechanically Propelled Vessel (for inland and coastal waters) for up to 100 gross ton vessel issued by US Coast Guard, a valid third class Federal Communications Radio-Telephone Operator's License and radar endorsement, and First Aid, CPR and AED certification issued by the American Red Cross (or equivalent) is required.

Preference will be given to applicants with experience deploying oceanographic sampling equipment or relevant fishing gear, or having performed or participated in scientific work in the marine or freshwater environment. Education or experience equivalent to an Associate's Degree from an accredited college or university with at least one major course in science or a related field is highly desirable; a Bachelor's degree is preferred. Strong computer skills with applications such as navigation software are essential, while familiarity with the Microsoft Office suite is highly desired. Good verbal and written communication skills are required.

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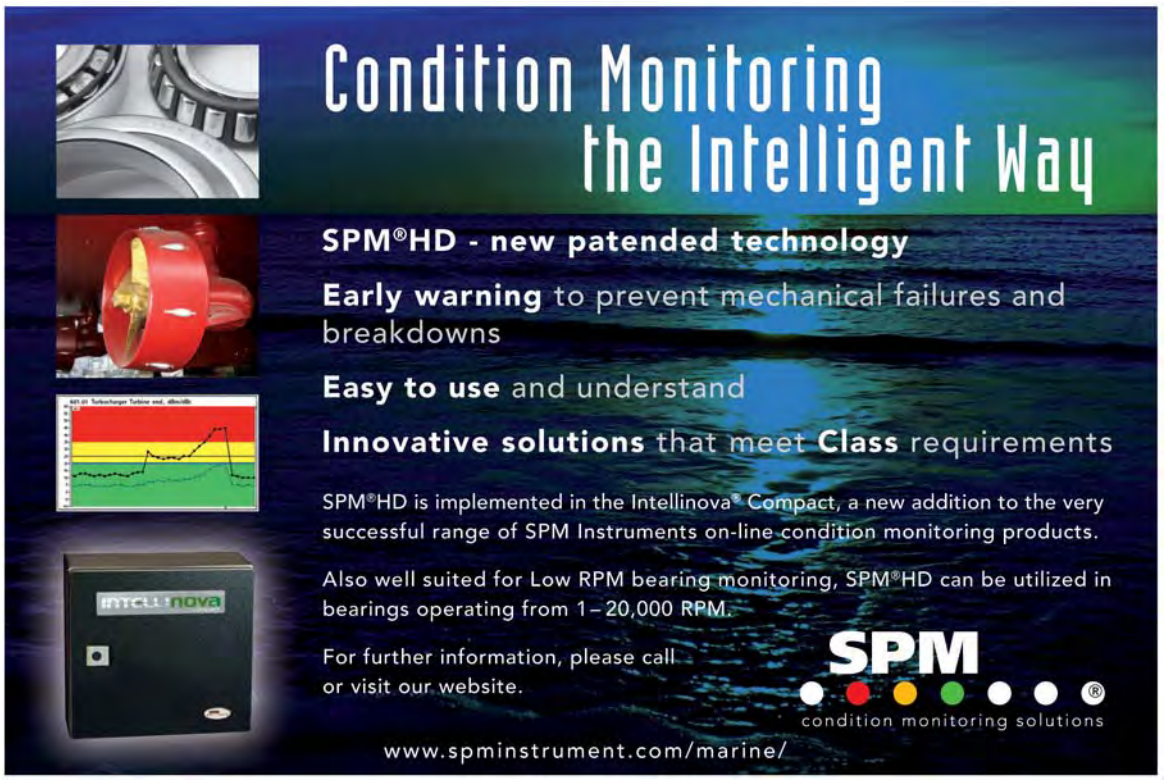

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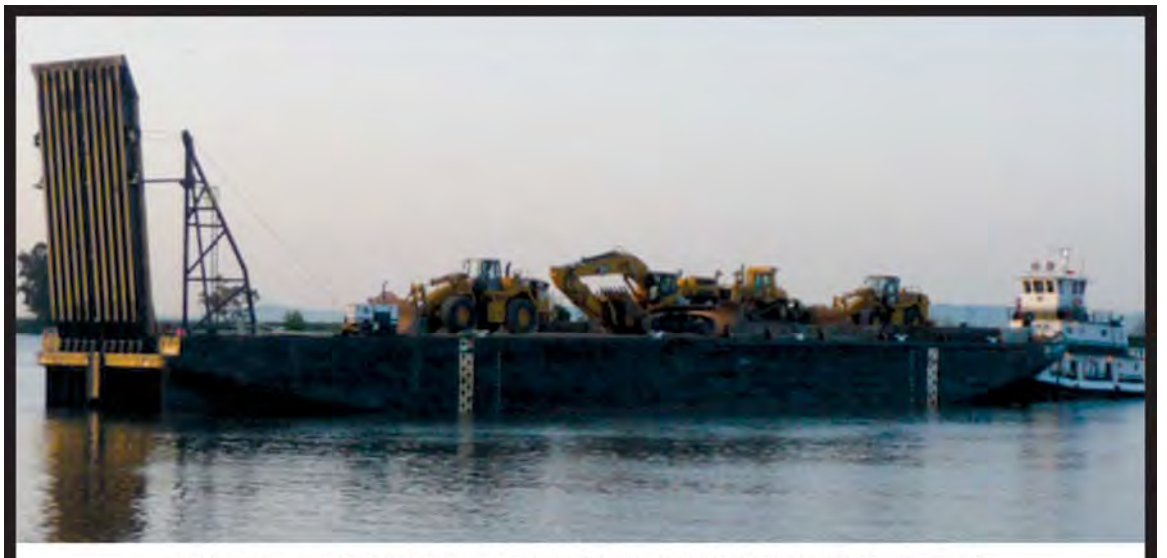

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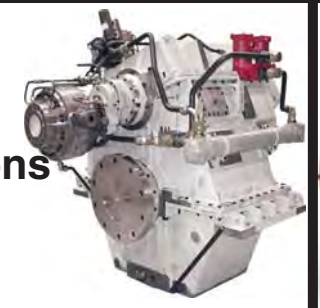

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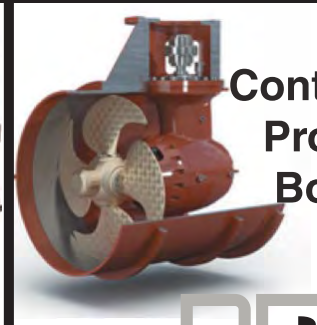

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