

FEBRUARY 2013

MARITIME REPORTER AND ENGINEERING NEWS

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Cruise Shipping

Fincantieri

Italian Cruise Builder is Firing on all Cylinders



Places of Refuge
Shelter for Ships in Need

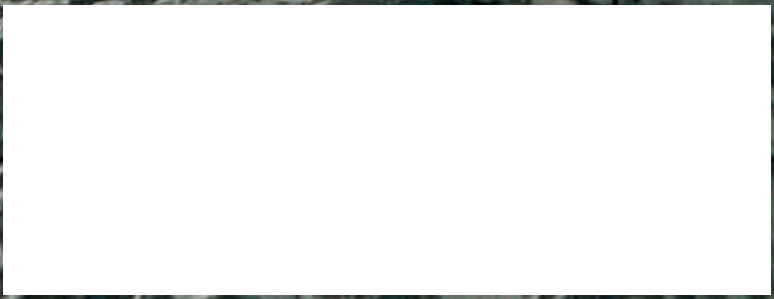
Simulation
CFD and the BWMS Problem

Halifax, Nova Scotia
An Emerging Maritime Hub

Shipbuilding
OSX Builds up in Brazil

Ballast Water Treatment
Which System is Right for You?

Unmanned Surface Vessels
A USV Franchise Grows Strong in Abu Dhabi



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In the cruise ship sector, the Fincantieri name is no stranger, having since the early 1900s built some of the world's most appreciated liners. Today, cruise remains its core and Fincantieri is famous for its gigantic cruise ships. But it has diversified in recent years to ensure its future.

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Built in Italy by Fincantieri, sister ships Royal Princess and Regal Princess will be the largest passenger ships in Italian shipbuilding history. In fact, at 141,000 gt, 330 m long and 38 m wide, the new ships are the largest ships ever built by Fincantieri. For full insights on the the Italian shipbuilder's activities inside and out of the cruise market, turn to page 26.

(Image courtesy Fincantieri)



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Did you hear the one
about the guy who fell asleep
on the bridge?

It wasn't funny.

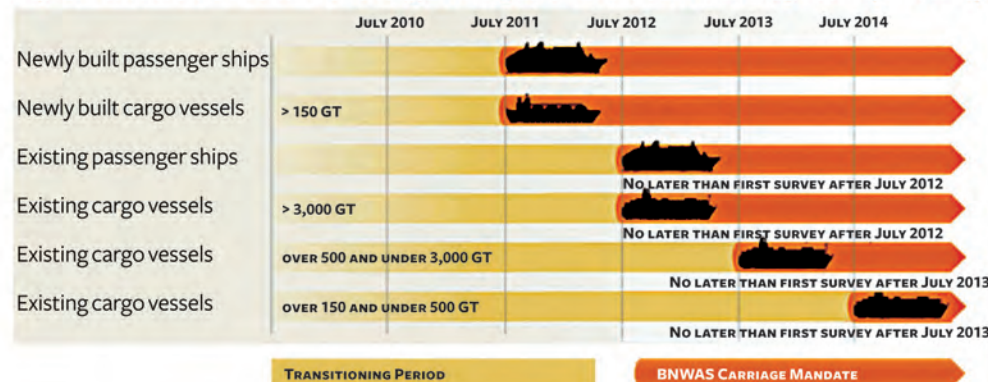


The USCG states that thousands of preventable maritime accidents are caused by operator inattention, citing this twice as frequently as the next leading factor. Understandably, the International Maritime Organization is requiring the installation of Bridge Navigational Watch Alarm Systems (BNWAS) aboard mandated vessels to monitor operator fitness.

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BR500 BNWAS

Implementation Schedule of Bridge Navigational Watch Alarm System (BNWAS)



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Siemens and Norled Announce 'World's First Electric Car Ferry'

Siemens, Norwegian shipyard Fjellstrand and shipping company Norled have developed what they say is the world's first electrically powered car ferry. The 80-meter vessel can carry 120 cars and 360 passengers. From 2015 onward, it will serve the route between Lavik and Oppedal, Norway, across the Sognefjord. The vessel currently serving this route uses on average one million liters of diesel and emits 570 metric tons of carbon dioxide and 15 metric tons of nitrogen oxides a year. The companies developed the electrically powered ferry for submission to a competition organized by Norway's Ministry of Transport. As a reward for winning the competition, the shipping company Norled has been granted the license to operate the route until 2025. Rather than a diesel engine, the ferry is equipped with electric motors to drive the ship's two screws. These motors are powered by a battery weighing 10 metric tons. The ship has been specially designed to fit the requirements of an electric drive system. As a catamaran with two slim hulls, it offers less resistance in the water than a conventional hull design. The hulls are also made of aluminum instead of heavier steel. All in all, the new vessel weighs only half as much as a ferry of conventional design. This saving has a direct impact on the specifications of the drive system. Whereas the ferry currently serving the route has an engine with an output of 1,500 kW or more than 2000 horsepower, the battery in the new vessel will have an output of 800 kW. In normal conditions, operating at a speed of 10 knots, battery power of 400 kW will be sufficient, Siemens says. Batteries powering the ship can be recharged in 10 minutes, meaning the ferry can be "refueled" during unloading and loading, Siemens says. In the two small villages linked by the ferry, however, the local grid is not equipped to deliver such a large amount of power in such a short space of time. To deal with this problem, batteries have been installed at each port. These serve to recharge the ferry's battery during turnaround and are then themselves slowly recharged from the local grid, Siemens says. Currently hundreds of ferries link Norway's mainland to the islands off its coast and provide routes across its fjords. This battery technology could be used to replace all ferries operating on crossings of 30 minutes or less, Siemens says.

Posted By Peter Pospiech at January 29, 2013 on www.MaritimePropulsion.com

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*Euroconsult Report, March 2012, NSR, May 2012, and Comsys, December 2012

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From the Middle East to Miami

While the Northeast United States remains stuck in one of the coldest winters in several years, I was pleased to find myself early in January 2013 in the balmy climate of the United Arab Emirates, embarked on a week-long venture across the region in visits with key maritime players and newsmakers. The list is long and distinguished, and frankly much of the coverage from the venture will appear in the April 2013 edition, our **Offshore Annual**, as without a doubt the offshore energy business is booming in and around the Middle East, continuing to serve as a prime driver for maritime investment here and afar.

But one of the most interesting stops on my journey, slightly off the beaten path, had nothing to do with the offshore energy business. While in the UAE, I took a half-day to visit the Al Seer Marine facility in Abu Dhabi, a small company with ultra modern manufacturing capabilities and a rich roster of technical talent. Al Seer Marine, which to date has made most of its business in the Superyacht business, has teamed with 5G International to design, build and deliver a new family of Unmanned Surface Vessels that – if delivered as envisioned – promises to advance the role and influence of unmanned systems in the region and the world.

While the leap from Superyacht to Unmanned Surface Vessel might seem a big chasm to bridge, Al Seer has a partner in 5G International and its owner Robert Murphy that has more than two decades experience in the design, development and creation of Unmanned Surface Vessels and supporting infrastructure. These systems stand out in many respects, but in particular due to the hybrid propulsion system available on the largest unit, the 11-m monohull dubbed Eclipse. The system is centered on a high-performance Fiat powerplant and a proprietary hybrid system that gives the unit a top speed of more than 50 knots, but the ability to loiter and patrol at low speeds to maximize precious fuel and battery power.

The demand for these systems, and for waterborne security in general is acute in the UAE, and the Al Seer Marine/5G International team has been working round-the-clock in preparation for world debut at the International Defense Exhibition and Conference (IDEX) scheduled to be held February 17-21, 2013 at the Abu Dhabi National Exhibition Center (ADNEC). But while the military need is real and immediate, the Al Seer/5G team has its eye on the bigger prize, and envisions its USV system catching on for a far broader commercial market, too. For more on the effort, turn to page 34.

The cover focus of this edition, as has been the tradition for many years in conjunction with the Cruise Shipping show in Miami, is the luxury niche segment of the maritime market, the cruise industry. The cruise market has been a bastion of innovation over the past two decades, continuing to make impressive strides in packing not only paying passengers onboard, but impressive arrays of passenger amenities and activities to make the ships themselves vacation destinations.

But the sector has certainly not been trouble free, and the vision of the Costa Concordia laying on its side off the coast of Italy more than one year after its grounding is a stark reminder.

This month we introduce a new member to our roving global team of contributors, and Italy-based Matteo Bianchi delivers an insightful look at the history and evolution of one of the world's iconic shipbuilding companies, Fincantieri – Cantieri Navali Italiani S.p.A.

Most of you likely know Fincantieri for its leading edge design and delivery of some of the most spectacular cruise ships in the world, as featured on the cover and continuing through the feature starting on page 26. Bianchi, through an interview with Giuseppe Bono, CEO, Fincantieri, some historical digging and financial analysis presents a balanced picture of the company, with the primary focus, of course, on the cruise sector.

But the case of Fincantieri is far more interesting that the shiny cruise veneer, as the company – despite a tough world economy, acute financial crisis and political maelstrom in country – has steadily increased its holdings and area of expertise around the world, and with the acquisition of STX OSV is making a strong play into the offshore market.

Finally, there is continued coverage this month of evolving innovation on the Ballast Water Management frontier, as it is this new equipment rule – routinely touted as the most expensive refit in the industry's history – that is a top of agenda item for all shipowners. Selecting the the correct system for your needs now and for the life of your ship is critical, and this month we provide insightful updates on several emerging and proven technologies.

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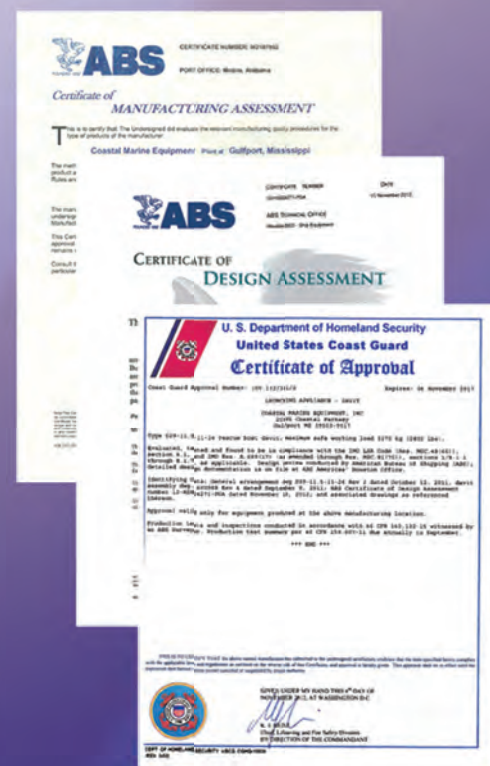
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Essar's Dramatic Recovery

One of India's largest shipping companies made a dramatic recovery reporting a net profit of \$6.5 million

Essar Shipping Ltd (ESL) one of India's largest shipping companies made a dramatic recovery reporting a net profit of \$6.5 million in 9 months ended Dec 2012 as against a loss of \$3.3 million in the corresponding period in the previous year. Revenue shot up by 25.21% to \$457.4 million in 9 months ended Dec 2012 as against \$365.3 million in the corresponding period in the previous year.

An integrated logistics solution provider, offering shipping, logistics and oilfield services to customers around the world, ESL operates a diversified fleet of 26 vessels, including VLCCs, Capesizes, Mini Capes, Supramaxes, mini bulk carriers and tugs on the shipping side. The Company has inducted two more Mini Capes Vessels into its growing Fleet increasing the tonnage to 2 million DWT. A sizeable part of the capacity is deployed on long-term contracts and COAs, insulating the company from the volatility of spot markets. The Oilfields Services business provides contract drilling services to oil and gas companies across the globe. This business owns one semi-submersible rig and 12 land rigs. The semi-submersible rig Essar Wildcat continues to perform with ConocoPhillips in Indonesia. The company has two new jack-up rigs on order. The Logistics business provides end-to-end logistics services, including intermodal transportation. The logistics services includes ships to ports, lighterage services to plants, intra-plant logistics and dispatching finished products to the final customer. ESL owns transshipment assets and provides lighterage support services, besides onshore and offshore logistics services. It manages a fleet of over 4,200 trucks. Speaking on the results, Mr. A R Ramakrishnan, Managing Director, Essar Shipping Limited, said: "The shipping freight markets continue to face challenges and the company is focused on operational efficiencies and optimization of voyage parameters and costs. The Oil-fields service business is maintaining its strong performance and is gearing for higher growth in the days to come."

Posted by Joseph Fonseca on MaritimeProfessional.com

Belt & Suspenders More is better in the Arctic

Following the grounding of the conical drill unit (CDU) Kulluk on Sitkalidak Island, a number of environmental advocates have called for a ban on oil and gas drilling in Arctic waters. The argument is that such offshore drilling in a harsh environment is too risky and that the grounding proves that the industry is not capable of the work. Others have pointed out that the loss of the tow of the CDU Kulluk (which precipitated the subsequent grounding) did not occur in Arctic waters; therefore, drilling in Arctic waters should proceed as before. I propose that both are right – and wrong. Oil and gas drilling in places like the Gulf of Mexico or the North Sea is complicated. That is why only a handful of companies undertake the effort. There are two major differences between offshore drilling in the Gulf of Mexico and the North Sea on the one hand and the Arctic on the other. First, the environment in the Arctic is harsher. That, though, is mostly a matter of degree. The Gulf of Mexico is subject to hurricanes and the North Sea experiences fierce storms, particularly in winter. The second difference is that there is no meaningful infrastructure in the Arctic. When you get into trouble in the Gulf of Mexico or the North Sea, the Coast Guard or its counterpart is close at hand. Other government agencies are also nearby. Fishing vessels, support vessels, passing freighters, recreational vessels, and salvors are all in the vicinity. Oil spill responders, helicopters, and aircraft are standing by. None of this is true in the Arctic. People who work in the Arctic are largely on their own. There is no local fire and rescue service. There is no local hardware store that you can run to if you forgot a part or a tool breaks. What you have is whatever you brought with you. Therefore, it is incumbent upon those who venture into the Arctic, especially for difficult tasks such as offshore drilling, to take not only everything that need, but more than you think you will need.

Wear both the belt and the suspenders!

Posted by Dennis Bryant on MaritimeProfessional.com

The Selendang Ayu Injustice

On 6 December 2004, the bulk carrier Selendang Ayu was en route from Seattle, Washington to Xiamen, China carrying 66,000 tons of soybeans. It also had approximately 340,000 gallons of bunkers and other petroleum products (lubricants, etc.) on board. During a winter storm in the Bering Sea, the ship suffered a major engine casualty. Despite the best efforts of the engineering crew, the engine could not be restarted. The master sent a distress message to the US Coast Guard. There were no vessels in the vicinity capable of taking the Selendang Ayu under tow. Winds and waves pushed the ship south toward the Aleutian Chain. The Coast Guard Cutter Alex Haley arrived on scene on 8 December but, due to the intensity of the storm, was unable to deter the movement of the much larger Selendang Ayu. The Selendang Ayu grounded off the north shore of Unalaska Island later that day. Using two helicopters, the Coast Guard began evacuating the 18 crewmembers. One helicopter, with three aviators and seven Selendang Ayu crewmembers, was struck by a

rogue wave as it hovered over the deck of the bulk carrier. The helicopter crashed into the sea. The second helicopter was able to rescue the aviators (who were wearing survival suits), but the mariners drowned. The Selendang Ayu broke its back in the fierce winter storm, spilling its entire cargo of soybeans and its bunkers and other oils. Several thousand seabirds died as a result of the oil spill. The owners of the Selendang Ayu spent millions on the environmental response effort and then millions more on the removal of wreck from the isolated shore (full removal was insisted upon by the State of Alaska, which had previously allowed wrecks in similar locations to deteriorate in place). Millions were also paid in natural resource damage claims. None of these expenditures were wholly inappropriate. The US Department of Justice, though, decided that criminal prosecution of the owners was necessary. After opening the case, it could find insufficient evidence of either intentional or negligent criminal conduct. Not deterred, DOJ filed charges against the owners for vio-

This marks the only time in modern history that the Department of Justice has charged a shipowner solely for violation of strict liability crimes.

lation of the Refuse Act of 1899 (for discharging soybeans in navigable waters of the United States) and for violation of the Migratory Bird Treaty Act (for "taking" migratory seabirds that had ingested the spilled oil). The interesting aspect of these two charges is that the courts have interpreted these statutes as "strict liability" crimes. This means that there is no usual criminal defense. The owners were unable to argue that they did not intend the grounding to occur; nor could they argue that they were not negligent with regard to the grounding. Neither argument constitutes a defense. Left with no choice, the owners entered a plea of guilty and paid a criminal fine of \$9 million. This marks the only time in modern history that the Department of Justice has charged a shipowner solely for violation of strict liability crimes. I, for one, hope there is no recurrence of this practice by the federal government.

Posted by Dennis Bryant on MaritimeProfessional.com

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Monthly Change Secondhand Vessel Values by Year & Size

VesselsValue.com provides data driven ship valuations for tankers, bulkers and containerships. These graphs show how vessel value depends on age for the major types. Vessels are assumed to have typical size and specification for age and high built quality at a top tier shipyard.

		VesselsValue.com											
31 January 2013		VV Mini Matrix - Monthly Change											
Built	Vlcc	Tankers				Bulkers				Containers			
		Suez	Afra	LR1	MR	Cape	Pmax	Supra / Hmax	Handy	Post Pmax	Pmax	Handy	Fmax
2013	-0.4%	+0.2%	-3.8%	-4.9%	-4.0%	+3.9%	+4.2%	-6.4%	+2.5%	+0.9%	+0.8%	+2.3%	+0.0%
	310k	160k	110k	75k	50k	180k	80k	60k	30k	7,000	4,250	1,400	750
2008	-1.8%	+0.9%	-3.5%	-4.8%	-4.0%	+3.5%	+1.6%	-6.1%	+1.9%	+1.1%	+1.3%	+2.5%	+0.0%
	310k	160k	110k	75k	50k	180k	80k	55k	30k	7,000	4,250	1,400	750
2003	-5.7%	+1.1%	-2.9%	-4.1%	+1.2%	+0.9%	+0.7%	-4.2%	+0.0%	+1.4%	+1.5%	+4.2%	+0.0%
	305k	155k	105k	70k	45k	175k	75k	50k	30k	6,500	4,000	1,400	750
1998	-10.5%	+1.4%	-1.0%	-1.3%	+2.9%	-2.9%	+2.1%	-1.0%	+0.0%	+1.8%	+1.7%	+5.7%	+0.0%
	300k	150k	105k	65k	45k	170k	75k	48k	30k	6,500	4,000	1,400	750
1993	+5.9%	+5.8%	+5.1%	+5.2%	+5.7%	+5.5%	+4.9%	+1.4%	-1.7%	-4.8%	-5.3%	-6.3%	+0.0%
	290k	145k	100k	65k	40k	150k	70k	45k	30k	4,500	3,750	1,400	750
1988	+6.4%	+6.0%	+5.1%	+5.2%	+4.9%	+5.7%	+5.9%	+2.2%	-4.7%	N/A	-3.8%	-6.1%	-5.6%
	260k	140k	100k	65k	40k	140k	65k	42k	30k	-	3,750	1,400	750

Wärtsilä-powered FPSO Completes Full Load Tests

The new P-63 Floating Production Storage and Offloading (FPSO) vessel featuring Wärtsilä 50DF dual-fuel engines, the first such ship to use gas engines to produce more than 100 MWe of power, has successfully completed all the required full 100% load tests. The tests were carried out at the Cosco shipyard in Dalian, China and the vessel will commence operations in Brazil's offshore oil fields in 2013. The Wärtsilä dual-fuel engines can be run on treated well gas or treated crude, as well as marine diesel oil (MDO), which means that virtually no MDO will need to be shipped to the P-63, helping to reduce operating costs and lowering CO2 emissions. In real terms, it is estimated that the level of carbon emissions will be reduced by as much as 93,000 tons per year.

Wärtsilä was contracted by the Brazilian industrial group QUIP, to provide a turnkey package for this vessel. The package includes three main power modules, each comprising two 18-cylinder Wärtsilä 50DF engines in V-configuration, alternators and all required auxiliary equipment, as well as commissioning, start-up, and operational supervision.



GE Upgrades Royal Fleet Ships



Royal Fleet Auxiliary Ships Wave Knight and Wave Ruler receive new Integrated Platform Management Systems

GE's Power Conversion business has started fitting the latest generation of Integrated Platform Management System (IPMS) to the Royal Fleet Auxiliary (RFA) ships Wave Knight and Wave Ruler. The technology is designed to extend the life and versatility of the IPMS fitted to the two ships, helping the RFA to maintain at-sea supply capabilities in supporting the Royal Navy's global maritime operations.

The IPMS includes machinery control and surveillance, damage surveillance and control, electrical power control and management and Replenishment at Sea (RAS) functions.

The current update is a planned pro-

gram in which GE will coordinate with the RFA and with the selected shipyard to decommission the previous generation equipment and replace it in phases to suit each ship's ongoing operational commitments. The work is expected to be completed by early 2014.

The new IPMS complements the electric power and propulsion system on the ships as it was originally delivered by GE (at that time Alstom Power Conversion) during the construction in 2002. The IPMS update will maintain the core functionality of the original design and will manage component and system level obsolescence while providing an opportunity to enhance the system with new

features including GE's distributed information recording and display (DIRAD) system, which is set to be installed.

The DIRAD system is essentially an electronic damage control incident board system. It uses straightforward graphics to display damage control and firefighting incidents of all types in stations distributed throughout the ship. DIRAD will be embedded within Wave Ruler's IPMS operator human machine interface as a part of the current update program, thereby giving the RFA a trial fit for evaluation.

GE acquired Power Conversion (then known as Convertteam) in September 2011.

www.ge-energy.com/electrifyingchange



Dometic

Radome Environmental Control Unit

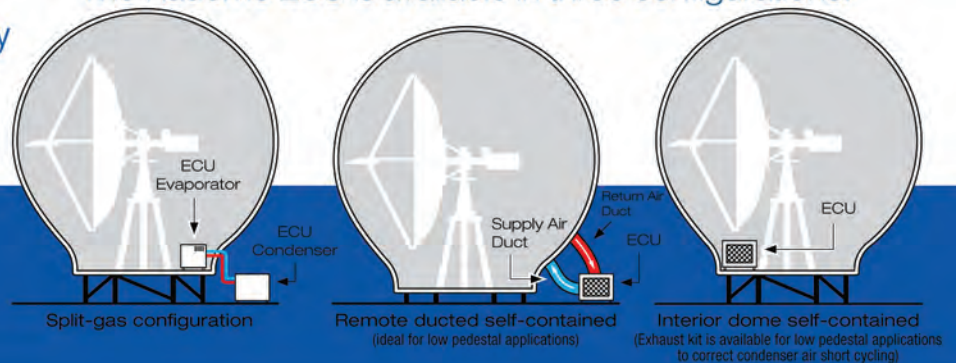
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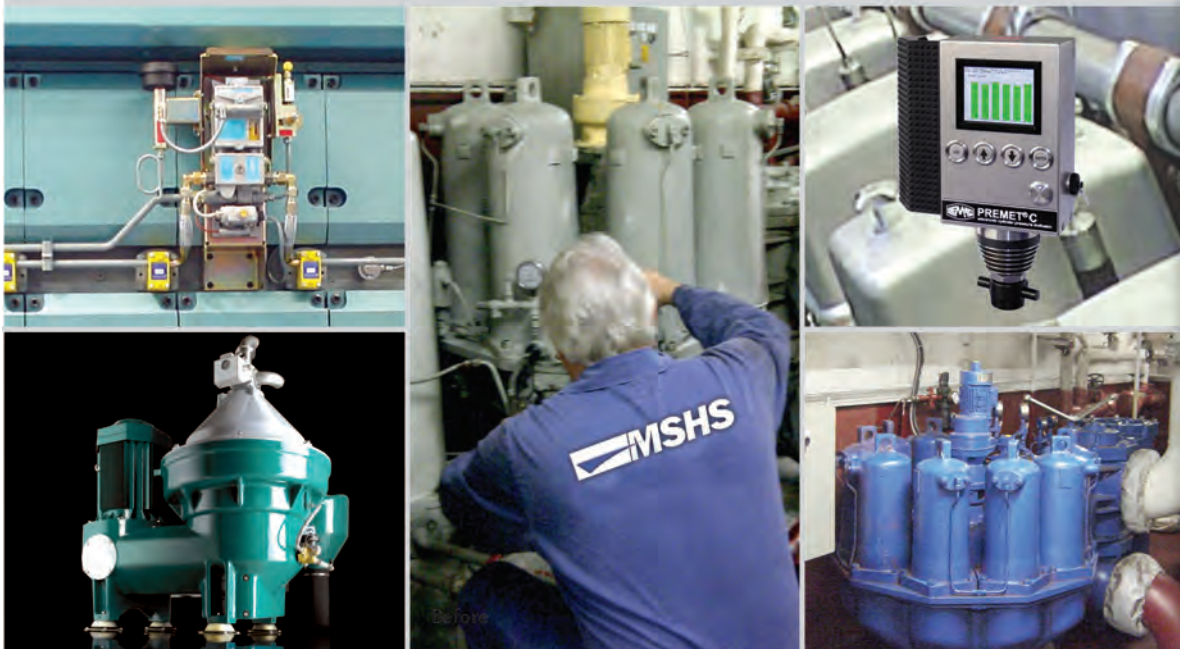


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Trond K. Johannessen

President & CEO, Hatteland Display

Trond K. Johannessen, President & CEO, Hatteland Display, shares with MR his insights on the evolution and future direction of this Marine Electronics subsector, modern marine displays.

By Greg Trauthwein, Editor

Please tell us how you came to lead Hatteland Display.

As so often in life, it was a coincidence that I got introduced to Hatteland Display in 2008 by a former colleague from McKinsey & Company that had contacts in the Board of Hatteland Display. One thing lead to another and in early 2009 I started as CEO and my former colleague as CFO.

When you took over the President and CEO post what did you see as the company's main strengths?

It became clear to me very early that Hatteland Display had a very strong brand and a clear position as the market leader in maritime displays. This coupled with a very skilled organization with strong innovative capabilities constituted a strong platform for further development.

Weaknesses?

Almost immediately after I joined Hatteland Display in February 2009 the financial crisis hit us with full force. We experienced a significant drop in both revenues and order intake. In this situation it became clear that the company had a few operational challenges that needed to be dealt with. We had to streamline our development processes and take a close look at the manufacturing processes to improve efficiencies.

From the outset, what were your short and long term goals with the company, and to date, how has reality stacked up to goals?

The short term goal was to build a platform for growth and the long term goal to realize growth in both sales and profits. The way to make this happen was to further strengthen the number one position in the market by having the most innovative, best value and highest quality products in the market. In short we have delivered on these goals in an

excellent way. We have experienced growth in a difficult market and our new SeriesX product platform is clearly shaping the future of marine displays and computers.

Similarly, how have your goals changed?

I would not say that our goals have changed. I believe we need to continue to build on the strong platform we have and continue to stay ahead of competition as technologies evolve. If we manage this we will continue to grow.

I am familiar with Hatteland Display for many years, but perhaps some readers are not. Can you give a brief overview of the company, its product and service offerings today?

Hatteland Display is a leading manufacturer of type approved marine displays and panel computers for the professional market. Our customers are

the major system integrators and OEMs of everything from bridge solutions to automation systems. Our products are on board merchant vessels, naval vessels and leisure boats. We supply customized hardware and do not have our own software systems except for necessary firmware and API software. One of our key strengths is to be able to cost effectively customize state-of-the-art hardware in relatively small volumes for customers. Hatteland Display is located on the west coast of Norway with sales offices around the world and a well established manufacturing and logistics network in Asia.

If you could pin it down to one or two topical items, what are the main drivers in the marine electronics display business today?

On the market side one of the key drivers is the implementation of mandatory ECDIS for most vessel categories before 2018. This will lead to a

Meet the Hatteland Family ...



On the market side one of the key drivers is the implementation of mandatory ECDIS for most vessel categories before 2018. This will lead to a massive installation of navigation technology on ships that have been using paper charts up until today.

Some industry experts estimate that more than 80,000 new ECDIS systems will be delivered before 2018.

massive installation of navigation technology on ships that have been using paper charts up until today. Some industry experts estimate that more than 80,000 new ECDIS systems will be delivered before 2018. **On the technology side** our industry continues to adopt consumer technologies for professional maritime use. Displays with multi-touch technology are very popular currently and more and more software applications are released with support for this technology. We also see that panel computers are increasing in popularity. Where one used to have one computer and one display we now very often deliver a all in one panel computer instead.

What has Hatteland Display introduced over the past year that have been geared to meet these needs?

■ We spent our time during the financial crisis and invested a lot of money in a brand new product platform that we have named SeriesX. Many see our SeriesX platform as a step-change in product development for maritime use. Touch-screen technology, clean design with no physical buttons, optical bonding and integrated display and computer are key features of the SeriesX platform that comes in sizes from 7 to 26-in. The 24-in. SeriesX product in a panel computer version is currently setting the standard in the retrofit ECDIS market and has already been selected as the preferred product by a large number of ECDIS providers.

During your tenure, how has the com-

pany changed the most?

■ Difficult question and perhaps better answered by someone else than me. In just a few words I think we have become more professional, both in the way we work towards customers, but also in our internal operations.

In general, how has business been in the past 12 months, and specifically by region, vessel or market sector, what looks to be "hot" in the coming 12 months.

■ During the last 12 months business has been quite good. We have realized growth in both sales and profits and successfully launched a whole range of new products. We have also had successful negotiations around new large projects that, together with the new products introduced make us quite optimistic about the future. It is clearly the products applicable for the mandatory ECDIS opportunities together with our smaller automation displays that are the hottest at the moment.

How is Hatteland Display investing today to ensure its future?

■ Innovation is key to long term survival in our industry and therefore we continue to invest in product development over the coming months. Moreover, we are continuing to invest in our supply chain in Asia to be able to have even more cost effective products in the future.



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The Stolt Valor was the latest in a long line of stricken ships that had troubles finding a suitable port of refuge. The ship is shown here arriving at the Arab Shipbuilding and Repair Yard (ASRY) in Bahrain.

Places of Refuge

By Dennis Bryant



(Photo: ASRY)

The concept of force majeure has been broadly accepted since mariners initially encountered the perils of the sea. Persons and governments ashore have been obligated, at least by natural law, to accept and succor those in distress at sea. Concomitant with force majeure is the notion of providing a ship in distress with a place or port of refuge. A place of refuge is where a ship could go to avoid or ameliorate the peril and then depart at the earliest opportunity. While the original need for force majeure and a place of refuge was to reduce the risk to the lives of those on board the ship, the concept naturally extended to the ship itself and any cargo it might be carrying.

Moral and legal support for the concept that a coastal state was obligated to provide, upon a valid force majeure request by a ship master, a place of refuge were lost as a result of two unrelated but nearly contemporaneous events: first, the development and deployment of reliable long-range helicopters for maritime rescue purposes; and second, the grounding of the tanker TORREY CANYON in international waters off the southwest coast of England.

The Sikorsky HH-52A Seaguard helicopter entered into service in 1962. With a speed of 98 miles per hour, a range of 474 miles, the ability to carry up to ten passengers, and the ability to land on and take off from water, it and those helicopters that followed quickly reduced the need to allow vessels to

enter a place of refuge if the only risk was loss of life.

On 18 March 1967, the tanker TORREY CANYON, carrying approximately 120,000 tons of crude oil, ran aground in international waters off Land's End, Cornwall, Britain. The crew was promptly rescued, but the oil started spilling into the sea and washing up on the shores of Britain and France. Under then-existing international law, Britain had no authority to act without the approval of the flag state. Britain did not wait. After fighting the spill unsuccessfully for three days, Britain ordered the Royal Air Force and the Royal Navy to bomb the ship in an attempt to ignite the oil. This technically amounted to an act of war.

Rather than sanction Britain for its actions, the international community retroactively endorsed them by adopting the International Convention relating to Intervention on the High Seas in Cases of Oil Pollution Casualties, 1969 (Intervention Convention). The Intervention Convention establishes a regime within which a coastal nation can take action against a foreign vessel on the high seas threatening to pollute its coasts or its waters. While consultation with the flag State of the vessel and other States that might be affected by the casualty is strongly encouraged, such consultation is not required in an emergency. The coastal State is also encouraged to consult with the owner and operator of the ship, but again this consultation is not required in an emergency. Not only

can the coastal state take unilateral action against a ship on the high seas that might pollute its waters, it can prohibit entry into the territorial sea or internal waters. While arbitrary denial of an entry request (based on force majeure) is discouraged, it is not prohibited – and there is no review mechanism.

On December 30, 2000, the tanker CASTOR was underway in the western Mediterranean Sea en route from Constanza, Romania to Lagos, Nigeria, carrying 29,470 tons of unleaded gasoline. During a fierce winter storm, the ship developed a 22-meter long crack across its main deck between frames 72 and 73, approximately midway along its 183.5 meter length. For the next 24 days, the tanker fruitlessly sought permission to enter sheltered coastal waters of nations littoral to the Mediterranean. Its requests were rebuffed successively by Morocco, Spain, Gibraltar, Algeria, Tunisia, France, Italy, Malta, and Greece. Finally, on January 22, 2001, the cargo remaining on board was successfully lightered during a high seas transfer in international waters near Malta. On February 19, 2001, the CASTOR entered a shipyard in Piraeus, Greece for gas-freeing, inspection, and repair.

The CASTOR incident was the most notorious case of coastal states denying entry and a place of refuge to vessels in distress, but it was by no means isolated. On July 21, 1991, the tanker KIRKI lost its bow in heavy weather while about 24 miles offshore Western Australia. Cargo oil was spilled

and fire broke out on board. After the crew was evacuated, a salvage tug put a towline on the tanker. The Australian government initially directed that the tanker be towed further offshore to reduce risk of pollution to coastal waters. After the fire was extinguished, the weather abated, and the situation stabilized, the government allowed the tanker to be brought into sheltered waters where the remaining cargo was lightered. The Government of South Africa has exercised intervention powers on at least two occasions: the WAFRA in 1971 and the VENOIL in 1977. In the WAFRA incident, the tanker was ordered far offshore and then sunk with bombs and depth charges. In the VENOIL incident, the tanker was ordered offshore until oil discharges had been brought under control. Other instances could be added to this list.

In the aftermath of several marine casualties off the coast of Europe, the European Parliament and the Council issued a Directive in 2002 establishing a Community vessel traffic monitoring and information system. Among other things, the Directive provides:

Non-availability of a place of refuge may have serious consequences in the event of an accident at sea. Member States should therefore draw up plans whereby ships in distress may, if the situation so requires, be given refuge in their ports or any other sheltered area in the best conditions possible. Where necessary and feasible, these plans should include the provision of adequate means and facilities for

assistance, salvage and pollution response. Ports accommodating a ship in distress should be able to rely on prompt compensation for any costs and damage involved in this operation. The Commission should therefore examine the possibilities for introducing an adequate system of compensation for ports in the Community accommodating a ship in distress and the feasibility of requiring a ship coming to a Community port to be adequately insured.

On December 5, 2003, the IMO Assembly adopted a resolution entitled "Guidelines on Places of Refuge for Ships in Need of Assistance". The resolution includes guidelines for masters or salvors in need of places of refuge and guidelines for actions expected of coastal states. The resolution explicitly recognizes the authority of the coastal State to exercise its authority in taking responsive action appropriate to the threat presented by the ship. Among the factors to be considered by the coastal state are the seaworthiness of the ship; the nature and condition of its cargo; and provisions of financial security. Most significantly, the resolution states:

When permission to access a place of refuge is requested, there is no obligation for the coastal State to grant it, but the coastal State should weigh all the factors and risks in a balanced manner and give shelter whenever reasonably possible.

The UK Government has addressed the situation most directly. In 2003, it established the position of Secretary of State's Representative for Maritime Salvage and Intervention (SOSREP). The SOSREP has full authority to oversee all incidents in UK waters where there is a significant risk of pollution and he or the Maritime and Coastguard Agency (MCA) directs vessels to places of refuge when he judges it appropriate. On 18 January 2007, the container ship MSC NAPOLI was transiting the English Channel in heavy weather en route South Africa. It suffered a catastrophic structural failure, causing rapid flooding. A distress message was sent, seeking a place of refuge. Following quick consultation with French authorities, SOSREP Robin Middleton concluded that the best course of action was to ground the MSC NAPOLI on the beach near Portland. This was done,

with no loss of life and minimal pollution. Full salvage, including disassembly of the ship in place, took two years. The SOSREP was lauded for his decisive action.

The situation in the United States is slightly more complex. The US Coast Guard, acting primarily through its Captains of the Port (COTPs), has full authority to grant or deny claims of force majeure and requests for entry into places of refuge. If time allows, though, the Coast Guard prefers to involve the various stakeholders in a process known as a Unified Command.

The Coast Guard COTP is in charge of the Unified Command, but all stakeholders participate. In the usual situation, the stakeholders would include the ship owner/operator, the salvor, the spill response organization, the P&I representative, the classification society representative, a representative from the state or states involved, and representatives from the local community. While this has the potential to become somewhat chaotic, the overriding presence of the Coast Guard keeps things on track. A recent example is the towing of the

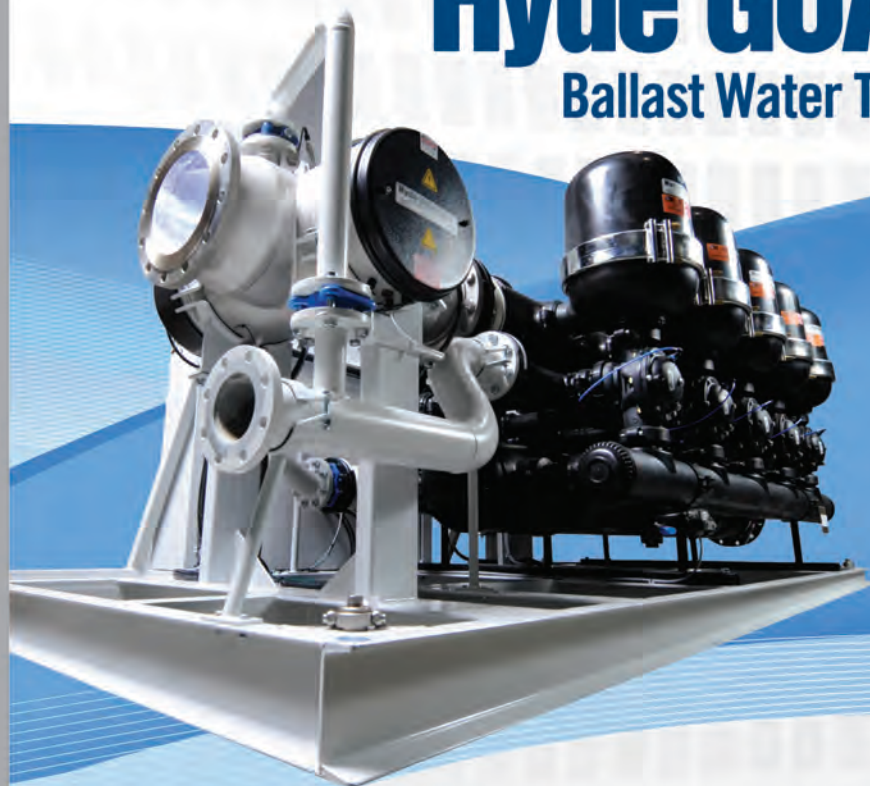
Conical Drill Unit (CDU) KULLUK across the Gulf of Alaska. The towing vessel Aiviq suffered a loss of propulsion during heavy weather and lost the tow. When the tow could not quickly be reattached, the Unified Command was stood up. The Unified Command agreed that the KULLUK should be towed to sheltered water at Sitkalidak Island. When the towline parted again, the KULLUK grounded off the island, albeit without pollution or serious damage. The Unified Command then agreed on an alternative course of action. After a fleet of vessels to address the various contingencies was assembled, the KULLUK was towed to Kiliuda Bay, Kodiak Island for detailed examination.

The United Kingdom and the United States have taken different approaches on how to respond to claims of force majeure and requests for entry into places of refuge. Experience has shown, though, that both can be equally effective. Their processes (which include frequent drills to keep participants familiar with the details) can serve as examples to other coastal States for addressing these time-sensitive issues in an orderly manner.

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Seven Viking Makes its Mark in the North Sea

The Seven Viking vessel, designed for operations in the harshest environments, was last month unveiled and named at a ceremony in Stavanger, Norway, by Subsea 7, Eidesvik Offshore and Ulstein. The next generation Inspection, Maintenance and Repair (IMR) vessel, Seven Viking, is co-owned by Subsea 7 and Eidesvik and has been built in partnership with Ulstein.

The ICE-C class vessel with a crew capacity of 90 and a top speed of 17 knots, will work for Statoil on a five year contract. It has been custom-built according to the operator's specifications to carry out tasks including inspection, maintenance and repair of subsea installations in addition to scale treatment and RFO work scopes (Ready For Operations). The vessel's Godmother is Christine Sagen Helgø, the Mayor of Stavanger. Seven Viking incorporates the X-BOW hull line design to reduce motion in transit and gives increased stability in the potentially high waves that characterize the North Sea. Despite this stability usually associated with size, this version of the Ulstein SX148 design has been crafted to be compact in stature – measuring 106.5 m long and 24.5 m wide, designed to allow it to maneuver with ease in confined spaces, such as between platforms, accessing difficult to reach areas. A customized module handling system (MHS) has been integrated for the safe launch and retrieval of subsea modules weighing up to 70 tons through the moon pool.

Damen Shipyards Norway Delivers Stan Tug 1004

Less than two months after opening its office in Stavanger, Norway, Damen Shipyards delivers a Stan Tug 1004 to the Norwegian Shipbuilding company SIMEK AS in Flekkefjord. The tug was shipped to Norway on the Wagenborg carrier MV Samira from Rotterdam Waalhaven. "Damen's Stan Tug is just the tug we need, a proven design with a touch

more towing power than the small boats we currently use," said Øyvind Iversen, director of SIMEK AS. "It will be deployed on our own shipyard to tow around large hulls. Should operational assistance be required in the nearby fjords, we may put it to use there as well." Iversen foresees a lot happening on the gas- and oil markets in the North Sea and Arctic area.



BMT Wins Fast Crew Boat Design Contract

BMT Nigel Gee won a design contract with Penguin Shipyard International, a wholly owned subsidiary of Singapore-based crewboat builder and operator, Penguin International Limited, for the design of two 25-metre mono-hull Fast Crew Boats.

Penguin is building the two BV-classed, 70-passenger Fast Crew Boats for ARCO Marine and Oilfield Services for deployment in Nigeria's offshore oil and gas industry. Delivery of the vessels is expected in the Q4 2013.

ARCO Marine presented a challenging requirement for a fast crew transfer vessel that offers high fuel efficiency, along with maximum reliability and availability. An additional challenge was posed by the design of the hull, which had to be specifically configured to match the existing infrastructure of the oil field.

BMT worked closely with Penguin throughout the tender process to develop a cost-effective design that matched ARCO Marine's requirements. The result is a flexible, economical design to help ARCO Marine expand its services in Nigeria's burgeoning offshore sector.

The 25m Fast Crew Boat has a four-engine (MAN D2842LE405),



The 25m Fast Crew Boats are powered by MAN engines driving 4 Rolls-Royce waterjets.

four-waterjet (Rolls Royce A40A3) configuration, in order to provide the maximum operational flexibility and optimum fuel efficiency at a range of speeds. The four-engine configuration also provides an element of redundancy, enabling the vessel to safely complete its role with any one propulsion train down for maintenance or repair.

Each vessel has accommodation for four crew members with an endurance of four days, a range of over 600 nm and a maximum speed in excess of 30 knots. Above the deck, the design incorporates a wheelhouse that has good all-round visibility for maximum safety in the oilfield and a fire monitor on the upper deck superstructure. Each vessel can also carry up to four tons of deck cargo.

Sarawak Slipways Builds in Aluminum

Long noted for the quality of their steel vessels, the Sarawak Slipways have recently launched an aluminum crew boat. Built to a design by Singapore-based Naval Consult Pte. Ltd., the 38 x 7.85-m vessel has a molded draft of 1.75m. With seating for 50 and accommodation for a crew of eight, the vessel is powered by three Cummins engines turning fixed-pitch propellers. The port and starboard engines are Cummins KTA38M2 models delivering 1350 hp at 1900 rpm to five-blade propellers with 1050-cm diameters. The center engine is a Cummins KTA50M2 model delivering 1800 hp at 1900 rpm to an 1150 cm diameter prop. All four are coupled to Twin Disc gears with 2.47:1 ratios. The KTA50M2 is also capable of driving a FiFi pump through a front mounted power-takeoff. Auxiliary power is provided by a pair of Cummins 6BT5.9DPM-powered 80sW generators.

All five Cummins engines were supplied by the Cummins Malaysia distributor Scott & English (Malaysia) Sdn Bhd. With three engines delivering a total of 4500 hp the crew boat can achieve a speed of 26 knots. The vessel, which is not yet named, is classed by BV.



A new Cummins-powered aluminum crew boat from Sarawak Slipways. Inset: The port-side Cummins KTA38-M2. One of three main engines on Sarawak Slipways new 4500 HP crew boat.



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Advanced Simulation Helps to Solve Ballast Water Management Problems

Ballast water management poses problems in design and operation of ships. Computational fluid dynamics (CFD) offers solutions with design, type approval and trouble-shooting.

By Tobias Zorn, Jan Kaufmann, FutureShip & Milovan Peric, CD-adapco

Computational fluid dynamics (CFD) denotes collectively techniques for solving equations describing the physics of fluid flow. CFD is by now widely known and accepted in the maritime industry, but mostly associated with flows around the hull and propellers, for example in the context of designing more fuel-efficient ships. However, CFD is in many ways far more versatile than classical model testing.

The same software can be applied to a variety of flows, including also internal flow problems.

A key advantage of CFD is the insight into flow details. As flow quantities are computed (and stored) at many

discrete locations in space (computational cells) and for many time steps, it is easy in post-processing to look at arbitrary cross-sections and zoom in and out at will.

Ballast water management systems have moved into the spotlight for ship operators with recent IMO regulations which drive the transition towards ballast water management to curb the spread of invasive species. But apart from the particularities of the new regulations, ballast water handling may pose challenges for ship operators where the advantages of CFD simulations come into play. The following case studies illustrate problems and solutions taken from industry experience.

CASE STUDY 1: TYPE APPROVAL BASED ON CFD

The ballast water of ships carries plants and animals which frequently settle in foreign sea regions, representing a danger for the indigenous aquatic environment, potentially causing great ecological, health-related and economic damage. The growing ship traffic has increased this threat considerably. The IMO "International Convention for the Control and Management of Ships' Ballast Water and Sediments" requires a ballast water management plan. Starting from the year 2016, all ships will have to base their ballast water management on ballast water treatment.

If this treatment is based on chemi-

cal approaches, rapid and effective mixing of the chemical component with the ballast water is vital to achieve a homogeneous concentration of the biocide. For type approval of new systems, simulations can be a valuable tool. In one case, FutureShip simulated the mixing of chlorine and ballast water in pipes during the ballasting operation. The CFD simulations were used to determine the required pipe length of the mixing zone to ensure homogeneous mixing. Simulations showed that the mixing in the initial design was inefficient. Very simple and cost effective modifications of the inlet geometry served to increase the turbulence level significantly with a resulting much shorter

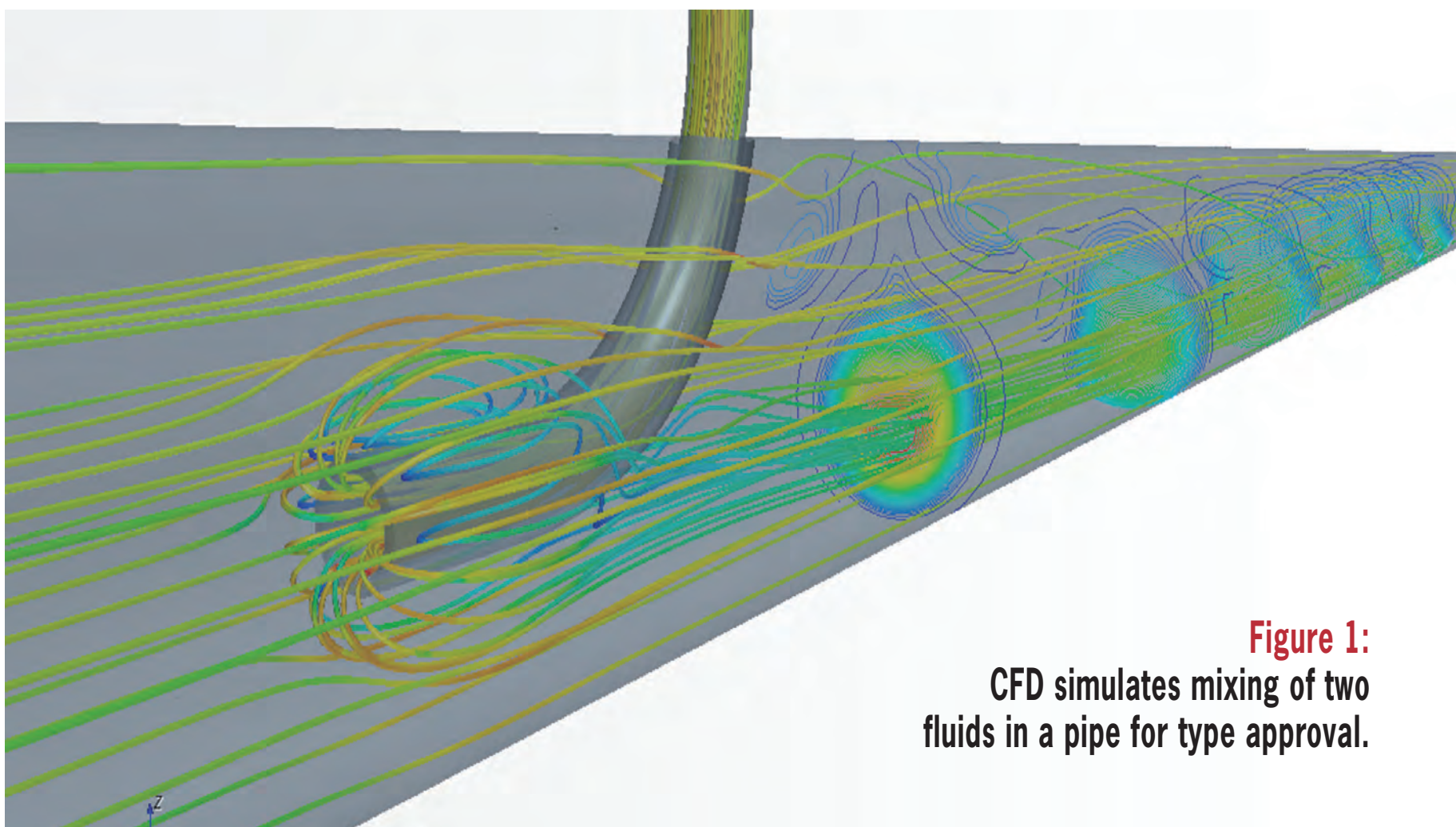


Figure 1:
CFD simulates mixing of two fluids in a pipe for type approval.

Figure 2: Sediments accumulate in ballast water tanks in areas with flow stagnation.

pipe length for complete mixing. **Figure 1** shows compute streamlines and chlorine concentration in the mixing pipe resulting from one such simulation. The authorities accepted the simulations as engineering proof for type approval.

**CASE STUDY 2:
BALLAST WATER SEDIMENTS**

Sediments tend to collect in ballast water tanks. They reduce the deadweight (payload), restrict water flow thus delaying de-ballasting, and increase draft resulting in higher fuel consumption. For a Capesize bulk carrier, the ship owner wanted to reduce sediment accumulation and tasked FutureShip with detailed analyses and suggestions for re-design in order to minimize sediment settling in the ballast tanks.

In this case, the actual sediments were not modelled. Instead, engineering insight facilitates the simulation. Sediments



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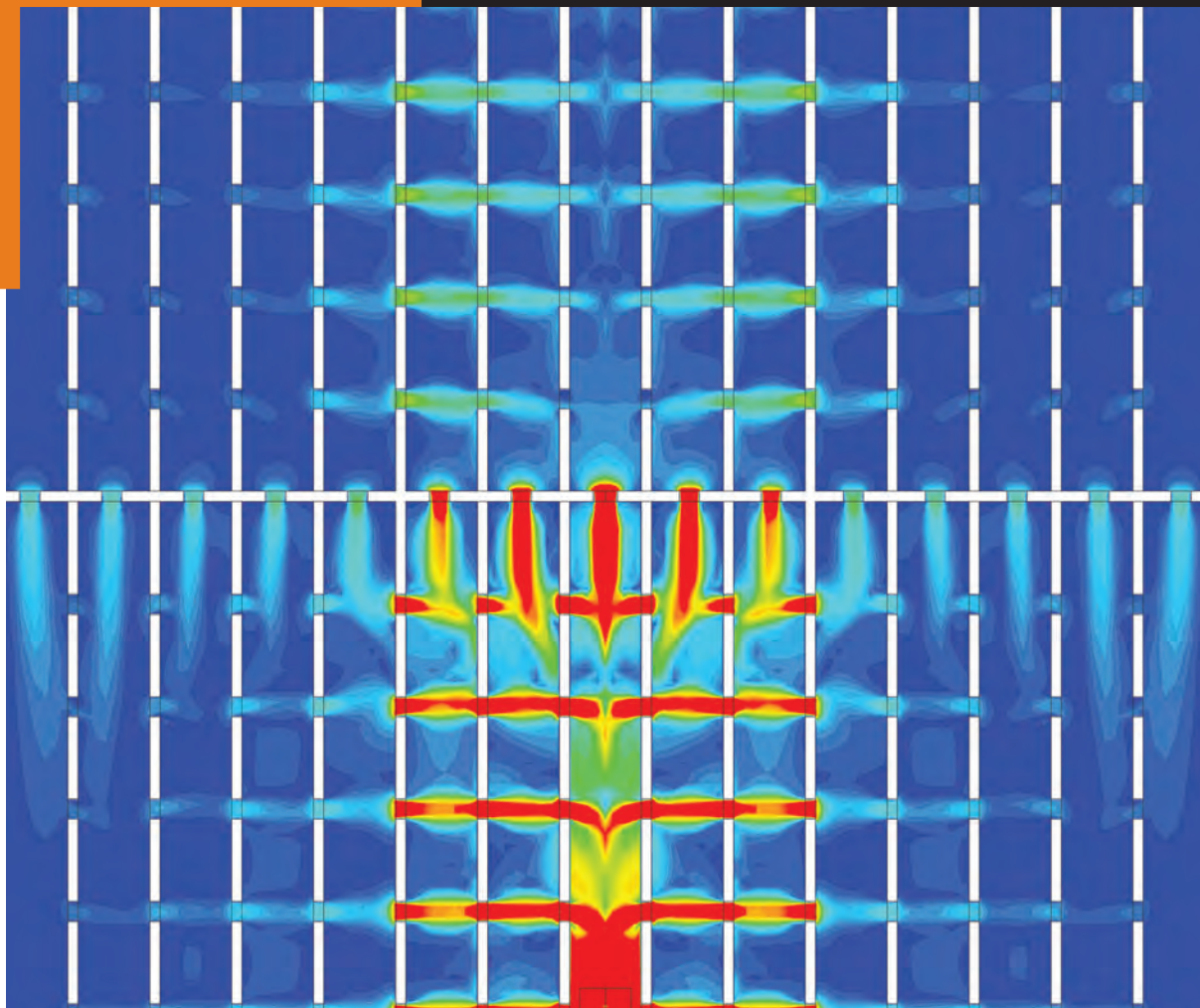


Fig.3: CFD simulation of velocity distribution in ballast water tank close to bottom wall.

settle in regions of low water speed, as found typically in areas of recirculation and flow stagnation; these are commonly referred to as dead-water regions. **Figure 2** shows sediments in a real ballast water tank. The two-phase (water and air) simulations of flow in ballast tanks first identified dead-water areas corresponding to observed sediment accumulation in the original design. **Figure 3** shows computed velocity distribution near bottom wall. Then various design alternatives for the ballast water tanks explored variations of stiffener spacing and cut-outs. The simulations identified the alternative design with least sediment settling (i.e. smallest dead-water regions) for future bulk carrier orders.

CASE STUDY 3: BALLAST WATER DE-BALLASTING

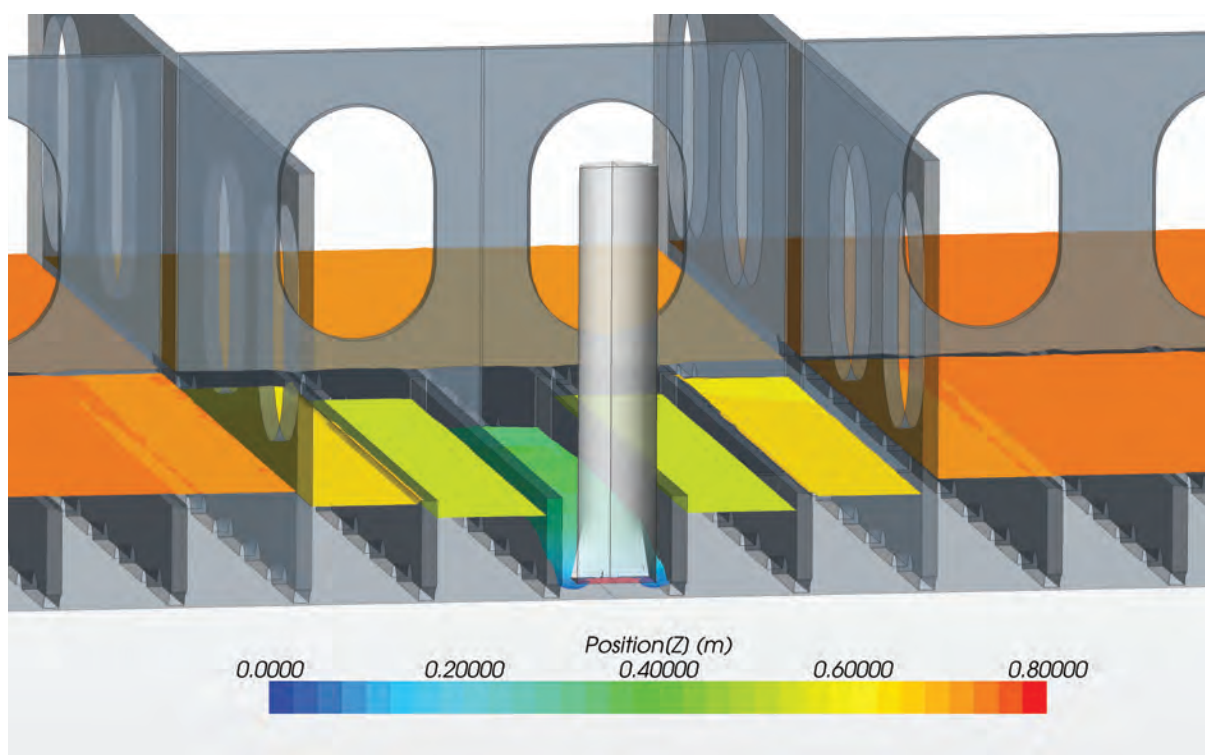
A busy coal terminal in Latin America had given strict time limits to de-ballast a bulk carrier at quay. The ballast pump was taking in air during de-ballasting, forcing the crew to stop de-ballasting intermittently. As a consequence, the vessel could not be de-ballasted in the time given by the terminal. The vessel had to leave with 3000 t of ballast water still in the tanks. As a consequence, 2600 t of cargo could not be loaded, resulting in 125,000€ damage claims and the vessel being blacklisted at the terminal.

A detailed analysis is often the first step in trouble-shooting. Once the problem has become transparent, the solution is straight-forward. In this case, the first step was thus to simulate the de-ballasting process, setting up a three-dimensional model of the ballast water tanks and mimicking the pump by a prescribed flow rate at the outlet of suction pipe. The outflux was set to the maximum pump capacity. The simulation of the two-phase flow revealed that the water level in neighboring fields was much higher than in the field with the ballast pump intake during de-ballasting. **Figure 4** shows the uneven water levels in various tanks sections. The size of the water-flow openings in the longitudinal frames was too small for de-ballasting rate of the pumps. The simulation provides information about the time-dependent flow rate through each opening and predicts the time at which air begins to be sucked by the pump. The animation of free surface motion and velocity distribution in various cross-sections gives engineers a direct insight into the physics of the flow and allows an easy assessment of the problem, aiding the design of necessary geometrical modifications. Based on the analysis of simulation data, more and larger water-flow openings for the frames in the vicinity of the pump were suggested to synchronize fluxes through openings with the pump intake flux. Size and location of the water-flow openings could then be determined such that the inflow toward the pump was above the pump rate, thus avoiding the risk of the pump taking air.

CONCLUSION

CFD simulations have proven to be a versatile and powerful tool to support design and operation of ballast water management systems. The combination of advanced computational software and expert users yields detailed insight and reliable answers.

Fig.4: Snapshot of de-ballasting simulation reveal uneven water levels due to insufficient size of cut-outs (pump intake section is almost depleted).



ACKNOWLEDGEMENTS

The authors appreciate the help and cooperation of their colleagues Volker Bertram and Jan Rüde.

CFD METHOD

The simulation employed CD-adapco's CFD software STAR-CCM+. This software is capable to simulate turbulent flow with resulting eddy formation and turbulent mixing, as well as multiple fluids with resolved liquid-gas interfaces. It is thus able to capture all important physics for the analysis of ballast water flows as presented here. The solution method is based on conservation equations in integral form with appropriate initial and boundary conditions.

The solution domain is subdivided into a finite number of control volumes which can be of an arbitrary polyhedral shape and are typically locally refined in regions of rapid variation of flow variables. The time interval of interest is also subdivided into time steps of appropriate size. The governing equations contain surface and volume integrals, as well as time and space derivatives. These are approximated for each control volume and time level using suitable finite approximations, leading to an algebraic equation system which can be solved efficiently on a multi-processor computer.

The flow is assumed to be governed by the Reynolds-averaged Navier-Stokes equations. Turbulence effects can be accounted for by a variety of models, from the simplest eddy-viscosity type models (k - or k -models are typically used) up to the Reynolds-stress models. Thus, the continuity equation, momentum equation, and between two and seven equations for turbulence properties are solved. Large-eddy simulations, which model only the small-scale tur-

bulence and resolve large-scale eddies, are also possible.

Multi-phase, multi-component systems (water-air or water-chlorine in the applications shown here) can also be simulated. The spatial distribution of the phases (liquid and gas) is ob-

tained by solving an additional transport equation for the volume fraction of each additional phase. To accurately simulate the convective transport of immiscible fluids, the discretization must be nearly free of numerical diffusion.

For this purpose, a special high-resolution interface-capturing (HRIC) scheme is used, providing a sharp resolution of free surfaces and allowing simulation of flow with trapped gas bubbles in liquid or liquid blobs in gas.

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An Emerging Global Maritime Hub Halifax, Nova Scotia

By Tom Peters, Halifax

A year after Irving Shipbuilding Inc.'s successful bid to build \$25B worth of combat vessels for the Royal Canadian Navy and ships for the Canadian Coast Guard, the largest procurement contract ever awarded in Canada, a positive economic buzz continues to grow across the province and throughout the Atlantic region. It's an optimism not generated by any other project in many years.

The multi-billion dollar package provided through the National Shipbuilding Procurement Strategy (NSPS), will give stability to the boom and bust shipbuilding industry for the next 25-to-30 years and diminish the "sunset industry" label pinned on ship-

building in 2003 by former federal Liberal finance minister John Manley.

Nova Scotia Premier Darrel Dexter sees this project as more than just three-decades of building combat ships and propping up the provincial economy. He sees it as a chance to put Nova Scotia on the world stage.

"I think that is exactly what this development is all about and one of the reasons that we set up the Halifax Marine Research Institute (at Dalhousie University) to say we have all these marine-based industries in Nova Scotia," Premier Dexter said in an interview. "We have more than 450 PhDs in Halifax in marine-related fields. We need to be able to take advantage of the expertise in marine engineer-

ing, in marine science and create a centre for excellence which will allow us to develop new technology which ultimately we will export to the world. There is no better example of how that is working than to see Chancellor (Angela) Merkel coming from Germany to Dalhousie to meet with the Halifax Marine Research Institute and to sign agreements between a German scientific institution (Helmholtz Association) and the marine institute. It is an indication of the prestige and the reputation we are developing," the premier said.

The premier put his own political reputation on the line when his government offered loans of up to \$304m to Irving to support the bid for the

contract. The province's package to Irving included a \$260m forgivable capital loan and a repayable marine industry loan worth \$44m for human resource development, technology and industrial development. The money was basically to ensure there was no additional cost to the federal government and will be used to modernize the shipyard leading up to the shipbuilding work.

"I've never had second thoughts about loaning the money for the simple reason if we had not entered into the arrangement that we did with Irving, they could not have won the shipbuilding contract. It was not a matter of if they would of have won without it (loans) it's that they could

A recent aerial photo of Irving Shipbuilding's Halifax Shipyard taken in December 2012.



(Photo: Irving Shipbuilding)

The Conference Board of Canada said following a study that the \$25b combat vessel contract would generate an additional 11,500 jobs during peak production years in Nova Scotia and the province's GDP would increase by nearly \$900m annually during those years.

not have won without that investment, and that will result in world class yard and secondly, will garner for the province \$2.4 billion in revenue through direct tax benefits," he said.

Studies have shown that the long-term benefits to the province and region will mean more than just direct tax benefits.

The Conference Board of Canada said following a study that the \$25b combat vessel contract would generate an additional 11,500 jobs during peak production years in Nova Scotia and the province's GDP would increase by nearly \$900m annually during those years.

A study by Jupia Consulting of Moncton, NB, said the shipbuilding program in Nova Scotia would grow the Canadian economy by \$1.5b and create 4,500 jobs outside the province.

There will be countless of companies, large and small, not only in Nova Scotia but throughout the region and even across Canada that will benefit from the economic spin-off.

The activity has already begun.

"It is tremendous really," Premier Dexter said. "What you see are companies identifying where they will fit in the supply chain and they are upgrading their capacities to be able to not only supply what they feel is their area but to try and broaden the amount of work they would be able to do in that supply chain. So you are seeing new investments in technology."

The contract has also generated a new training urgency.

"You are now seeing young people who are demanding more seats in community colleges," said the premier and in response the province has "made investments in new training modules for community colleges and we have a trades-based high school curriculum. We have many different avenues seeing economic activity. On peninsula Halifax, for example, we are seeing real estate prices move up in response to the anticipated work that will really begin at the shipyard next year," the premier said.

The work startup will never be too soon for the Halifax yard's shipbuilders.

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Nova Scotia Premier Darrel Dexter and Chancellor of Germany Angela Merkel.

Chancellor Merkel came from Germany to Dalhousie to meet with the Halifax Marine Research Institute and to sign agreements between a German scientific institution (Helmholtz Association) and the marine institute.

approximately 1,000 workers, recently signed a new six-year collective agreement with Irving Shipbuilding Ltd. It was a big hurdle to clear for labor said Local 1 President Karl Risser and now the union can focus on keeping the federal government true to its word and fulfilling the contract.

“The labor agreement was a big step on our behalf so now we’ve got to turn our focus back on (Prime Minister) Stephen Harper and the Conservative government and make sure they follow through on what they promised,” Risser said.

And the labor spokesman said there is concern because of the country’s fiscal situation.

“There may be some downsizing of the contract. I don’t think it will totally disappear but how many ships is definitely up for debate,” Risser said. “A lot of times governments make promises and governments can change. In 2015 there is federal election so it is all a concern to us and we have to make sure his (Harper’s) political agenda doesn’t knock-off the

rails what the province has gotten,” Risser said.

While the province gleefully rubs its hands in anticipation of the potential tax dollars and employment, the local business community has also embraced the project.

Fred Morley, chief economist with the Greater Halifax Partnership, a lead economic development organization in the city, has referred to the \$25b contract as “kind of our Hibernia,” in reference to Newfoundland’s offshore oil development.

Morley says there are still lot of “deep negotiations” to be carried out on the project resulting in a bit of a time lag when construction will start, but he says that doesn’t change the projected financial impacts at this stage. “Nothing we have seen would suggest a dramatic change in the nature of the project,” he said. “The economic spin-offs from this will be quite substantial because we have an economy that can handle a lot of the benefits and supply chain needs of this project and that will help us reap

extra benefits.”

In the past several months the shipbuilding project has attracted international attention, Morley said.

“Our observation has been over the last year that there have been “a lot of companies from around the world coming in and kicking the tires in Halifax around this project looking for opportunities, looking to become part of the project in some way,” he said.

A vast majority of those companies have been from the U.S. and Britain, he said, but certainly interest from other parts of the world.

Morley said the more than \$300m being spent on the Halifax Shipyard upgrade in preparation for the actual ship construction is in itself a major project.

“That is a fairly substantial project so a lot of the suppliers that are involved in that likely will be playing some role going forward as well. It is always good to remember that this is a big project with lot of workers and lot of suppliers. One of the big differences between the project there now

and the shipbuilding contract is the shipbuilding goes on for 25 years,” he said.

The biggest challenge, Morley says, will be “to make sure we reap the maximum benefits,” suggesting businesses need to get active, interested and involved.

One industry sector looking to certainly be involved is the aerospace and defense industry, an industry that contributes well over \$600m annually to the provincial economy with companies like L3, IMP, Composites Atlantic, Lockheed Martin and General Dynamics, to name but a few.

Glenn Copeland, President, Aerospace and Defense Industries Association of Nova Scotia (ADIANS), said, “When you are talking shipbuilding you are talking about a whole range of activity. Everybody gets locked into the cutting of steel aspect of it but there is whole range of opportunities and services that will be required.”

He said his organization, which has 63 active members, can provide a number of services from metal work

“I’ve never had second thoughts about loaning the money for the simple reason if we had not entered into the arrangement that we did with Irving, they could not have won the shipbuilding contract. It was not a matter of if they would of have won without it (loans) it’s that they could not have won without that investment, and that will result in world class yard and secondly, will garner for the province \$2.4 billion in revenue through direct tax benefits”

Nova Scotia Premier Darrel Dexter

to highly sophisticated systems.

“It is not just the combat aspect it is the whole makeup,” he said, but did suggest “about 45 to 55% of the contract values that government is looking at tendering are going to be in the combat systems and the integration associated with that.”

He said about a third to a half of the association’s membership is capable of bidding on various projects associated with the contract.

Copeland said as Irving is the lead company “you have to have your name on a contractors’ list to work with Irving to get recognized as third or fourth tier supplier.”

The ADIANS’ spokesman said he expects competition will be fierce especially with so many international

companies from countries such as Spain, England, Germany, the U.S. and Denmark looking at this project.

“A lot of those countries have existing classes of ships that they think are model designs the Canadians are looking for,” he said.

“But regardless of who gets it, (the work) they have got to do a lot of their business here in Canada at some point and basically all content has to provide industrial regional benefits,” he said.

“I speak predominately for Nova Scotia but the country as a whole is going see 100 percent of the benefits and when you think of spin-off business, those closest to the shipyard are going to reap benefits just by proximity,” he added.



(Photo: Communications Nova Scotia)



(Photo: Irving Shipbuilding)

Inside the Module Shop where Canadian Coast Guard Hero Class Mid-Shore Patrol Vessels are currently being constructed.

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Fincantieri

Italian Flair Continues to Dominate Cruise Sector

In the cruise ship sector, the Fincantieri name is no stranger, having since the early 1900s built some of the most appreciated liners, including the legendary transatlantic Rex, built in Genoa, winner of the Blue Ribbon in 1933. Nowadays, cruise remains its core and Fincantieri is famous for its gigantic cruise ships; in 2013 the company delivering three. But it has diversified in recent years to ensure its future.

By Matteo Bianchi, Italy

Recent studies calculate that the European shipbuilding industry can count approximately on the 7% of new global orders; a demand volume insufficient to saturate the production capacity. This is accompanied by a collapse in the price of new constructions, a collapse which is of course highly dependent on ship type, but generally agreed to be 35 to 45% less than the peak of 2007. At the same time, according to a governmental report, South Korea's shipbuilders almost halved their production last year (compared to the year before).

Despite that, in a country which has been particularly hard hit by the economic downturn, there is a shipbuilder that resists and, not without difficulties, even tries to expand: Fincantieri.

Fincantieri - Cantieri Navali Italiani S.p.A. was founded in Trieste the December 29, 1959, as state-owned holding company for the shipbuilding industry it took control of almost all the shipbuilding groups of the time: CRDA, OTO and Ansaldo. Nowadays it is one of the largest shipbuilder in Europe, a true leader in the construction of cruise ships and ferries.

The Italian group declared, considering the 2011 financial statements (last available), a profit for the year in excess of 10

million euro. EBITDA were at a 5.8% margin of 138 million euro, while there was a net cash surplus at 166 million euro over debt. Revenues were at 2,382 million euro.

In its eight shipyards in Italy (Monfalcone, Marghera, Sestri Ponente, Ancona, Castellammare di Stabia, Palermo, Riva Trigoso e La Spezia), two design centers, one research center and two production sites for mechanical components, Fincantieri employs more than 10,000 workers (number that rises to approximately 20,000 including the supply chain at large).

Besides the eight shipyards in Italy, Fincantieri has three shipyards in the USA (Marinette Marine, Bay Shipbuilding, Ace Marine), one, the Lloyd Werft yard, in Bremerhaven, Germany and one in the UAE, the Etihad Ship Building, a joint venture with Melara Middle East and Al Fattan Ship Industries.

Historically based on the production of merchant vessels, passenger ships and naval vessel, in recent years Fincantieri has strongly followed a strategy of diversification investing in the sectors of conversion and ships repair. Pursuing the strategy of diversification on December 21, 2011 Fincantieri acquired STX OSV, a world leader in the construction of offshore support vessels for oil and

The \$731m Costa Diadema

The building and fitting-out, which are due for completion at the end of October 2014, will employ around 3,500 workers and 400 contracted suppliers at Fincantieri's Marghera shipyard. The future flagship of Costa Cruises and of the Italian-flagged, passenger fleet, it comes in at an impressive 132,500 gt, measuring 306m long and 37.2 m wide, accommodating 4,947 guests (in 1,854 guest cabins) and 1,253 crew members.





“2012 has been an extremely difficult year, especially for shipbuilding. Total global investments have been little more than a quarter of those in 2007, resulting in a halving of the number of cruise ship orders. We’ve done our part, by securing almost all of these orders and confirming the dual challenge we set ourselves: on the one hand, to focus on sectors that offer good opportunities for development, and on the other, to maintain our leadership in our traditional sectors.”

Giuseppe Bono, Fincantieri CEO

Business Units	Production Network
Merchant Ships	Monfalcone (Gorizia), Marghera (Venezia), Genova-Sestri Ponente, Ancona, Castellammare di Stabia (Napoli), Palermo
Ships repairs & Conversions	Palermo, Trieste (shiprepair docks), La Spezia (shiprepair docks)
Naval Vessels	Riva Trigoso (Genoa), Muggiano (La Spezia), Marinette Marine (Marinette, WI, USA), Bay Shipbuilding (Sturgeon Bay, WI, USA), ACE Marine (Green Bay, WI, USA)
Marine Systems & Components	Riva Trigoso, Bari
Fincantieri Yachts	Muggiano (La Spezia)
Fincantieri Offshore	Trieste, Genova-Sestri Ponente, Ancona, Palermo

gas extraction and production, with 10 shipyards located in Norway, Romania, Vietnam and Brazil. Concluding this operation, for a total value of 900 million euro, Fincantieri doubled its size.

The entrance of Fincantieri in the offshore sector is seen as fundamental by the company management, considering that the demand of new, more ecological, and efficient support vessels for oil and gas extractions is destined to grow in consequence of the growth of the world’s energy needs, combined (after the Fukushima disaster) to the limited diversification of energy sources and the reduction of oil reserves in areas of easy access, facts that will require new methods for the exploitation of deposits of recent mapping very often located in deep waters.

The recent acquisition of STX OSV is also seen by many trusted observers as a necessary step before launching an IPO (initial public offering), as it was planned by an economic document of the Italian government in 2008; nor the management nor the Italian government ad-

mit that the dossier is still on table, since Italy is going to election in late February and the perspective of a, even partial, privatization of the company frighten the trade unions, especially because in 2011 Fincantieri presented a restructuring plan to regain competitiveness, consisting in the cut of 2500 jobs and closure of two production plants out of eight.

After strong demonstrations of the workers, Fincantieri management retired the plan and the national government apparently abandoned the idea of an IPO, but observers say the need for a restructure and reorganization is still urgent, and will reappear right after February general election.

PROUD HISTORY, PROMISING FUTURE

In the cruise ships sector, Fincantieri core sector, the company take advantage of Italy’s solid tradition; since the early 1900s the most appreciated transatlantic liners are “Made in Italy”, out of many the legendary transatlantic Rex, built in Genoa, winner of the Blue Ribbon in 1933. Nowadays Fincantieri is famous

for its gigantic cruise ships; in 2013 the company delivered three new cruise ships, among them the Carnival Breeze, the biggest cruise ship ever built by Fincantieri (128,500 tons).

At the moment the Italian company is building two new ships: Costa Diadema in the Marghera plant, Royal Princess (already launched, but it will be delivered in spring 2013); Other two are at early stages: Regal Princess and one cruise ship for P&O. In total Fincantieri has seven new cruise ships in portfolio to be delivered by 2016.

* **Costa Diadema** is worth approximately \$731m, and the building and fitting-out, which are due for completion at the end of October 2014, will employ around 3,500 workers and 400 contracted suppliers at Fincantieri’s Marghera shipyard. The future flagship of Costa Cruises and of the Italian-flagged passenger fleet. At 132,500 g, 306 m in length, 37.2 m in breadth, it can accommodate 4,947 total guests in 1,854 guest cabins, and 1,253 crew members. There

is an option for a second sister ship.

* **Royal Princess** will be the largest passenger ship in Italian shipbuilding history. In fact, at 141,000 gt, 330 m long and 38 m wide, the new ship is the largest ship ever built by Fincantieri (passing last year’s Carnival Breeze). It has 1,780 cabins, of which 1,438 have balconies (81%), and is able to accommodate 3,600 passengers, with total capacity for over 5,600 people including crew.

* **Regal Princess** is the sister ship of Royal Princess. It is being built in Monfalcone and will be delivered in 2014.

* **Unit for P&O Cruises:** Fincantieri has gained an order from the Carnival to build a 141,000-gt yet-to-be-named cruise ship, due to serve the British brand P&O Cruises. Scheduled to enter service in March 2015, the ship will have a maximum passenger capacity of 3,611 and is set to be the flagship of P&O Cruises fleet, as well as being the largest to be built for the British market.

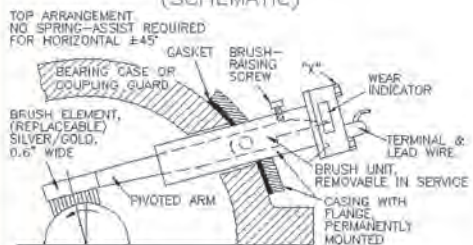


Le Soleal, is a super luxury cruise ship ordered from Fincantieri by the French shipping line Compagnie du Ponant (Bridgepoint Group), due to be delivered in June 2013.

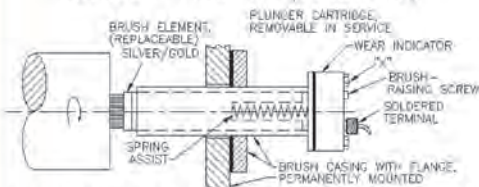
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OSX

Danilo Souza Baptista, OSX's Director of Naval Construction, sat with MR Contributing Editor Claudio Paschoa at EBX Group's new HQ in downtown Rio de Janeiro, in a meeting room overlooking Guanabara Bay with Sugar Loaf Mountain as a backdrop, to discuss its ambitious yet realistic vision to create one of the largest, most efficient shipyards in the Americas, as well as its Integrated Service Solution to the meet offshore O&G needs.



(Image: Claudio Paschoa)

OSX is a relatively new company, founded by the EBX Group in 2009. The EBX Group, is a holding composed of several companies active in different industries such as mining, oil & gas, logistics, real estate, among others. EBX was founded in 2007 by Eike Batista, a Brazilian investor and entrepreneur, who is one of the three richest men in Brazil and one of the 10 richest men in the world. Batista is considered a visionary in regards to business investment and a true believer in Brazil's growth potential.

While bringing one of the hemisphere's largest and most sophisticated shipbuilding facilities to life burst at the brim with concurrent priorities, an immediate priority according to Baptista is the 30m of the earthworks for the part of the dock where the first Pipe-Laying Support Vessel (PLSV). In order to avoid delays, the hull of the PLSV (Pipe-Laying Support Vessel) will be built on land next to the dock and then will be lifted to the water for fitting out after the completion of the dock section. The next priority is the area dedicated to produce the two FPSOs for Petrobras, offshore production and processing units slated for deepwater pre-salt production at the Santos Basin.

AN INTEGRATED SERVICE PROVIDER

As planned, the shipbuilding operations for OSX will be impressive, but OSX was envisaged not only as a shipbuilding company, but also as an integrated solutions provider. As an example, OSX is active in leasing of offshore units – such as FPSOs – for the O&G industry, and in fact it already has its own FPSO, OSX-1, on lease to sister company OGX. OSX will branch out into offshore operational services, where it operates and maintains maritime and offshore O&G equipment and assets. It is the only company of its kind in Brazil, with Ship & Module Construction, Leasing and Operation Services all under one roof.

The company was created in tandem with the long-term, favorable outlook for the maritime industry in Brazil, sparked by the enormous new O&G discoveries (Including the highly publicized deepwater pre-salt discoveries far off the Brazilian coast, as well as a number of new reservoir discoveries in shallow and deep water all along the Brazilian coast, including new discoveries in the Campos Basin, which is still where the majority (85%) of O&G Brazil's production is centered) and the requisite demand for ships, boats and rigs to serve the burgeoning markets.

Baptista emphasizes that the demand for products and services generated by OGX and the company's commitment to contract equipment and services produced in the Brazil, in accordance with the "Local Content" policy implemented by the National Petroleum Agency (ANP), led to the creation of OSX and its integrated solutions structured in three business units: chartering, shipbuilding and operational services.

OSX was born from a booming Offshore O&G prospect in its home country, a demand for an estimated 48 production units equivalent to roughly \$30B over the next decade. In addition, to keep the investment money in Brazil, local content laws are onerous (from the view of outside providers), but beneficial to the likes of OSX, as rules demand 70% local sourcing requirement for equipment and services used in the exploration, development and production of oil and gas concessions. Adding to that, The EBX Group, through its company LLX, owned a privileged, yet undeveloped coastal strip in the northern tip of the state of Rio de Janeiro, facing the all-important Campos Basin and around 400km from the Santos Basin, where the some of the most important pre-salt plays in Brazil are located. LLX is developing a major port and industrial complex in the area and had a location within this complex suitable for the construction of a large shipyard.

"This is a good example of the synergy between companies belonging to the EBX Group, where LLX is the



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landlord and we, OSX, rent out the area for our shipyard, it will be the biggest shipyard in the Americas,” said Baptista.

AÇU UCN – THE LARGEST SHIPYARD IN THE AMERICAS

While it is the aim to keep investment in Brazil, it was quickly realized that the task to build large, efficient shipbuilding construction facilities would be aided greatly through partnership with acknowledged world leaders. Hence Açu, where the OSX is currently building its formidable shipyard, boasts a strategic partnership with Hyundai Heavy Industries (HHI), widely considered to be one of the most efficient large shipbuilding outfits in the world.

The relationship includes the transfer of state-of-the-art technology and HHIs’ highly efficient shipbuilding methods, the vital “know-how” to give the fledgling yard a much needed head-start toward producing high quality end products and consistently meet specified construction deadlines. The OSX Açu UCN (Naval Construction Unit), will be located within the Superporto do Açu (Açu Superport) in municipality of São João da Barra. The competitive advantages brought about by this integration with other EBX Group projects in the region weighed strongly in the final

decision to locate the UCN in the Açu Superport area, especially assets such as the private port terminal, the steel plants and a thermal energy plant.

Covering over 3 million sq. m., the Açu UCN will be serviced by a 2,400m (7,874 ft) pier, expandable to 3,525m (11,565 ft), and a man-made internal navigation channel. Around 4,000 direct jobs will be created during the construction phase, while the construction site is currently employing more than 2,500 workers and around 10,000 direct jobs will be created for the operation of the shipyard. The yard will have Goliath cranes, capable of lifting up to 1,600 tons and at least one “Supercrane” with a 5,000 thousand ton lifting capacity. In full operation, which OSX expects to reach by 2014, the shipyard will be capable of simultaneously integrating up to 11 FPSOs and 8 WHPs (Wellhead Platforms). It will have a massive steel processing capacity of 180,000 tons/year, expandable to 400,000 tons/year.

Baptista explained that after obtaining the necessary environmental and government permits, OSX started the construction work in July 2011 and the shipyard is forecast to initiate limited operations within the first three months of 2013, when it will start building its first PLSV for Sapura Navegação Marítima S/A for

a total contract worth approximately \$263m. (Sapura is a wholly owned subsidiary of Seabras Sapura Participações S/A, which is owned by SapuraCrest Petroleum Berhad, headquartered in Malaysia, where it holds a leading position in engineering and offshore transportation & installation services for the oil and gas industry.)

When asked about being awarded contracts for two FPSOs by Petrobras, Baptista explained that OSX and venture partner and major Brazilian construction company Mendes Júnior have entered into an agreement with a pool of companies formed by Petrobras, BG Group, and Petrogal Brasil, through its subsidiary company Tupi BV, for the construction and integration of topside facilities for platforms that will operate in the pre-salt plays at the Santos Basin. The project includes construction of module units (Package I) as well as integration of two “replicant” FPSOs: P-67 and P-70. The project is expected to create approximately 3,000 direct jobs and last 60 months. Executive engineering work has already begun and construction of the modules in Package I for the two platforms is also scheduled to begin in the first quarter of 2013. These FPSOs are called ‘replicant’ because of their standard design and common construc-

tion strategy. Each FPSO will have capacity to process up to 150,000 boe per day and to compress 6 million cu. m. of gas. The agreement covers complete design, supply, construction and assembly of eight production units in Package I. It also includes assembly and integration of 10 units built by other companies for the hulls of FPSOs P-67 and P-70, besides commissioning and start-up until the first barrel of oil is extracted. As you can see, the OSXs Açu UCN will begin operations in style and there is no doubt that they are under tremendous pressure to deliver.

The Açu UCN, which is the official name of the OSX shipyard, represents a total investment of \$1.7B. OSX obtained approval from the executive board of the Merchant Marine Fund for a funding line of up to \$1.35B and a 10-year grace period to build up UCN Açu. In January 2012, the company received \$227.9m under a bridge loan from the National Development Bank (BNDES) for this purpose.

OSXs construction focus is on high aggregated value ships and rigs, such as FPSOs, WHPs, Drillships and Large Support Vessels, like PLSVs, AHTSs and RSVs. Once the Açu Superport goes operational, OSX will be able to decrease its operational costs by use of

Left: The Vision OSX’s Açu UCN.

Below: The Reality Workers building foundations at OSX Açu Shipyard.



thermal energy and use of larger steel sheets produced by its neighbors at the Açú Superport, this will also significantly reduce steel transport costs.

ITN – INSTITUTE OF NAVAL TECHNOLOGY

While the Brazilian business is booming, it is saddled with many of the same problems that vex shipbuilders globally, specifically the challenge to find, train and retain an efficient and technically qualified workforce. Particularly acute in Brazil is the fact that the major shipbuilding industry in country has been largely dormant since the early 1970s.

Baptista said to partially solve the problem, OSX now has opened an operational technical institute, working under the auspices of Senai, Brazil's foremost technical training institution. In this first phase there will be 23 courses and 3,100 potential workers will be trained by 2013. Of these 3,100, 1,000 have already been hired to work at the shipyard. This is OSX's training institute, ITN – the Institute of Naval Technology.

Aimed at promoting research and development, projects, and sponsoring initiatives focused on technological development and innovation, OSX created the ITN – Institute of Naval Technology will be developed in four phases.

In the first phase, ITN is training professionals in careers required to make up the teams that will work in the Açú Shipyard and OSX Serviços. Under a contract with the Rio de Janeiro Industrial Federation, Firjan, facilitated by Senai-RJ, the Program for Professional Qualification in Shipbuilding was created to train the initial 3,100 professionals by 2013. The initiative is ITN's first partnership and will invest approxi-



Image courtesy of OSX

OSX-1 FPSO off Rio de Janeiro.

mately \$6.5m to qualify professionals for the project. Baptista said he and all at OSX were amazed when they saw that over 19,000 candidates from Campos dos Goytacazes, São João da Barra, and other neighboring cities applied for the Program for Professional Qualification in Shipbuilding. The selection process was held in three stages. The courses are free of charge, and selected candidates receive a grant for living expenses.

Courses are offered free of charge include: Metal-Mechanics, Electricity, Metallurgy, Automation/Tooling, Oil & Gas, Automotive Operations, Civil Construction, and Management. Another interesting fact is that, of the 14,000 can-

didates approved, nearly 50 percent are women. The first 21 classes, distributed among nine different courses, began on June 25.

In order to train engineers and experienced technicians up to HHI standards, Baptista said that in a second phase on the ITN mandate 40 specialists from Korea will be working in Brazil for five

years, with some already in country supervising the yard's construction. In exchange, 80 Brazilian workers will go to the HHI shipyard in Ulsan, South Korea for extended training and trainee periods. "Eventually we will have our own ITN training facility within the shipyard area, basically a dedicated training building of around 1,800 sq. m.," said Baptista

Danilo Souza Baptista

OSX, Shipyard Operations Officer

Baptista has a degree in Mechanical Engineering from the Federal University of Rio de Janeiro and has a specialization degree in Equipment and Maintenance Engineering and Managerial development by the University of São Paulo. He began his career in 1978 as an Equipment Engineer at Petrobras where he worked for 33 years in the engineering and international areas of the company. Within the scope of his international experience, he performed roles related to project implementation in South Korea where he spent three years at Hyundai's shipyard. Baptista also worked in China, the U.S. and France. In October of 2010, Baptista joined OSX as Integration Executive Manager after retiring from Petrobras. Since August 2011, he has been OSX's Shipyard Executive Manager where he has been responsible for all activities related to the construction of the shipyard. Currently he occupies the position of Shipyard Operations Officer.

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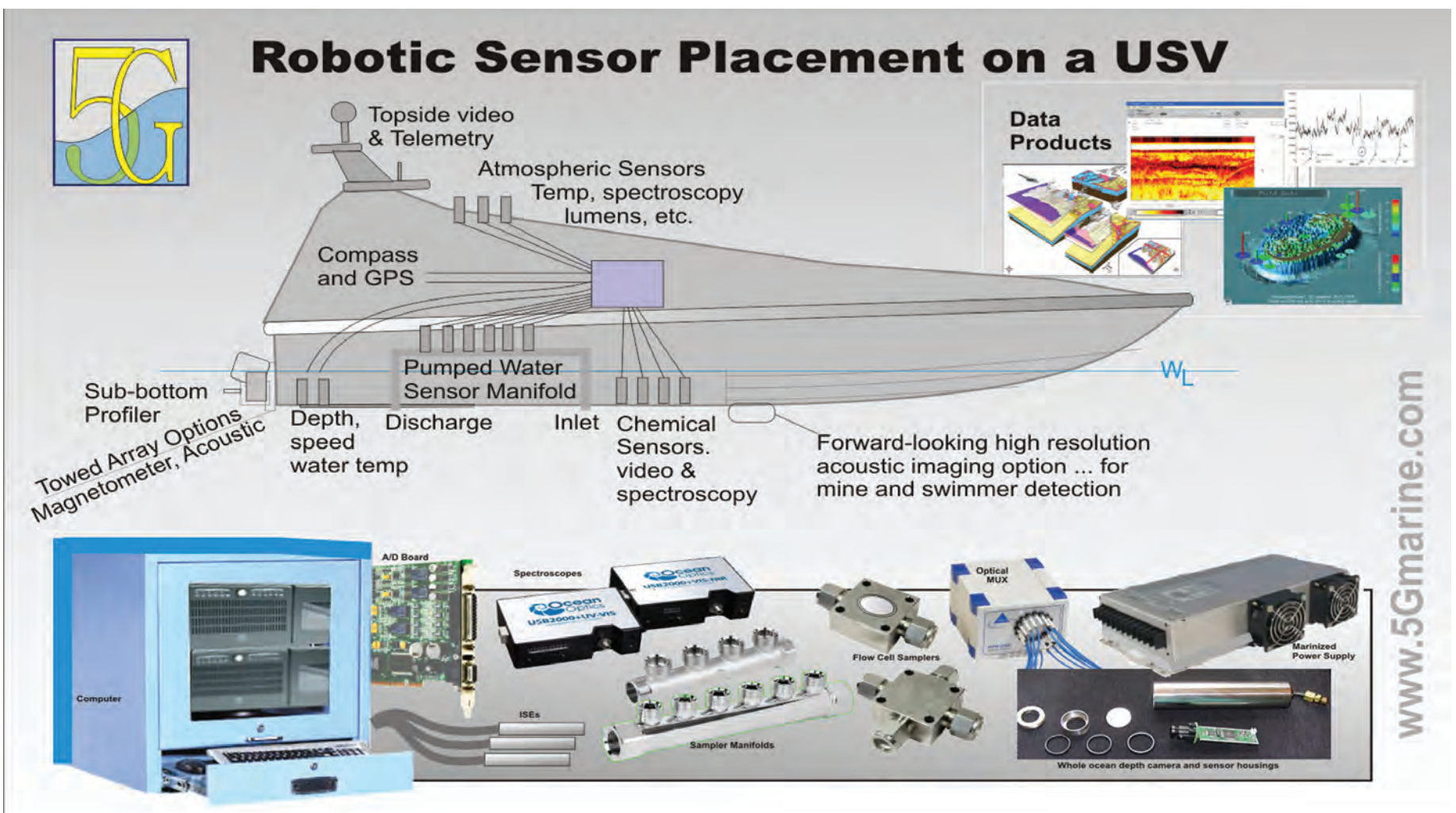
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Photo copyright R. Murphy

That was Then ... In some circles Robert J. Murphy is touted as the father of the USV. Above is the Interceptor at speed during trials at Lake Lochsola, FL, in 2007.

This is Now... The UAE is a 'hot market' for USV tech, prompting the Abu Dhabi-based Al Seer Marine and 5G International tie-up. However, military markets are the tip of the iceberg, as Murphy and company envision the platform invading a host of commercial marine markets. Below is a vision of how a **Laboratory at Sea** could be configured.



A USV Franchise

Grows Strong in Abu Dhabi

As the evolution and integration of robotics in maritime vehicles continues to reshape missions and capabilities inland, near-shore and at sea, Maritime Reporter & Engineering News last month was on hand in Abu Dhabi for the unveiling of a new Unmanned Surface Vessel family. If it delivers as designed, it will revolutionize marine robotic vehicle applications for both military and commercial purposes.

By Greg Trauthwein

Robert J. Murphy

is certainly no stranger to the world of autonomous robotic marine vehicles, having worked in the field for more than a quarter of a century, dating to the mid-1980s. But the latest turn for Murphy and his 5G International crew is perhaps the most intriguing, as he has linked up with Abu Dhabi, UAE-based Al Seer Marine to jointly develop and deliver a revolutionary family of Unmanned Surface Vessels that, if delivered as designed, will open a world of opportunities for marine robotics precisely at the time when the technology is gaining traction in military and commercial sectors.

Set to debut at this month's International Defense Exhibition and Conference (IDEX) in Abu Dhabi, the Al Seer Marine/5G offering includes three vehicles:

- **Sea Serpent**, the small 3-m "jet ski" version;
- **Boomeranger**, the larger 11-m RIB; and
- **Eclipse**, the top-of-class 11-m monohull.

THE MIDDLE EAST: AN EMERGING MARKET

As Murphy and his team work toward finishing its unique family of unmanned service vessels, the question begs: why here, why now?

The partnership between Murphy's 5G International and Abu Dhabi-based Al Seer Marine is not unlike many other budding business relationships, a matter of coincidence, timing and opportunity. For Murphy it is a chance to see his lifelong ambition come to life again on the water, with a motivated partner that has the financial and technical wherewithal. "They have a real need to protect vital coastal assets here; these unmanned surface vessels are now coming into their own, finally," said Murphy. While Murphy was born and raised in the U.S., he is no stranger to foreign ports of call. "We have had a lot of participation in this area for many years, and I think people are starting to realize that having manned vehicles at sea is not very productive. You're beating people up out there."

In Al Seer Marine Murphy's 5G has a partner with broad ambitions to not simply produce a prototype for display, but with the aim to develop, design and mass produce large number of USVs to serve local military and globally security needs.

"Our primary business is super yacht management,

operations, repair and refit," said Russel Bartlett, Operations Manager, Al Seer Marine. "It is our core business and always has been."

Making the leap from Superyacht specialist to USV manufacturer might seem a large chasm to bridge, but not in the United Arab Emirates, where business is booming on many fronts and there is a palpable push for growth and diversity across many industries, as the government invites and inspires innovation with an eye towards the future when one day energy production is not the primary driver of the country's economy.

Al Seer Marine is a small local company with an enviable core of talent and technical expertise, and some big ambitions. "We do everything from jet skis to 140 m boats," Bartlett said. In 5G it believes it has found the ideal partner to enable it to grow its business in a lucrative new direction, and in the eight months since the relationship has begun, it has not been shy to invest in facilities, technology and people to see its vision through. Bartlett explains. "About seven years ago we were approached to do a joint venture with a company, for the exact same style of project and vessel; and it never went anywhere."

Fast forward to the Spring of 2012, when Bartlett received a call from top management to essentially ask "can we do it;" meaning could the company as currently situated design, build and deliver a USV to serve the home military market.

"I told them that technically we can design and build them, but we couldn't do the integration and telemetry," Bartlett said. "So he said 'alright, find me a company who can.'"

ENTER 5G

"We did our research and came up with 5G Marine, based on their history building unmanned vessels," Bartlett said. And in keeping with trends today in the UAE, when things start to move, they tend to evolve quickly. What started in the summer of 2012 as an eight-month contract to design and deliver one boat, has been recently extended to a 14-month contract to design and deliver three boats. But to be perfectly clear, this is not a long-term development plan: from Day 1, the goal was to design, build and deliver a vessel that was "100% ready to go, where we could actually sell the boats to a customer," said Bartlett, and to ramp up operations and develop the

(All Photos this page: Greg Trauthwein)



ABOVE
The 3m, 60+ knots Sea Serpent USV.

LEFT
Members of the 5G team at the Al Seer Marine yard in Abu Dhabi, UAE. From Left: Keith Henderson, Robert J. Murphy and Aditya Nawab.

The Power



An outstanding feature of the, the 11m Eclipse monohull, is a proprietary hybrid propulsion system (pictured left). Powered by twin Fiat N67500 engines with a light commercial rating of just over 500 hp driving Rolls-Royce jets through ZF gears, the USV sports a top speed excess of 50 knots.

Featuring a pair of 13kW electric motors, the proprietary propulsion system gives the USV the ability to loiter for extended lengths of time, an intelligent system that allows the user, for example, to use only one jet at a time to hold station, effectively extending battery life and subsequently loiter time by eight to 10 hours. The hybrid system currently is available only on the Eclipse, but eventually will be available on all 3.

The Waterjets



The Batteries



The 50+ knot RIB Boomeranger.



ability to produce them en masse. “It is one thing to build one boat, quite another to build 100 of them consecutively.”

The tight time-frame and urgency was centered solely on the upcoming IDEX military technology exhibition which is a tri-service (land, sea, air) defense exhibition, scheduled to be held February 17-21 at the Abu Dhabi National Exhibition Centre (ADNEC) is centrally located in Abu Dhabi, the capital of the United Arab Emirates.

“IDEX only happens every two years,” Barlett said, “and we wanted to launch in our own country, and we didn’t want to wait an additional two years (for the next IDEX). There is a requirement for the military here, right now. So the initial program was set up to service the UAE military. As it’s turned out now, requirements outside the UAE are 100 times bigger than our own country’s requirement.”

MEET THE FLEET

In the budding relationship between Al Seer Marine and 5G International, the initial target for the vessel was the UAE military, but as the project has evolved and markets explored, the collective believe the potential outside of military circles is much larger in potential. Focused first on the UAE military, however, has helped to create an end product that is attractive to both sectors. “First and foremost, it has to be off-the-shelf, designed and built in the UAE,” said Bartlett. In part this harkens back to the government’s desire to inspire and develop home-grown technology and industry.

“We are putting together a world-class project, (and there are other competitors in the world) but not in this country,” said Bartlett. “There are of course competitors outside of the UAE, but we’ve got a better product, and we certainly have a better price.”

Today the fleet of USVs centers on

three vessels, from the Sea Serpent, a small 3-m “jet ski” version; to the Boomeranger, the larger 11-m RIB; and the Eclipse, the top-of-class 11-m monohull.

While USV technology is surely not in its infancy, in relative terms, particularly when considering dramatic strides made in aerial and ground robotics, it is still pre-puberty. To help propel its maturity, the Al Seer/5G solution takes into account not simply the vessels, but the entire package, from technical outfit to maintenance, as well as safe and efficient launch and recovery.

For example, an outstanding feature of the top model, the 11m Eclipse monohull, is a proprietary hybrid propulsion system. Powered by twin Fiat N67500 engines with a light commercial rating of just over 500 hp driving Rolls-Royce jets through ZF gears, the USV sports a top speed excess of 60 knots.

But it is when the vessel slows down that it truly shows its value.

Featuring a pair of 13kW electric motors, the proprietary hybrid propulsion system gives the USV the ability to loiter for extended lengths of time, an intelligent system that allows the user, for example, to use only one jet at a time to hold station, effectively extending battery life and subsequently loiter time by eight to 10 hours.

“A lot of the hybrid systems have been developed for recreational use to give you electric power out of the marina. But we are obviously looking for something that will provide hundreds of thousands of hours of reliable use,” said Keith Henderson, Director, 5G Marine Systems LLC, and the man that Murphy credits with identifying and bringing together the suppliers and components in quick, seamless order. “The system is robust, with only minimal moving parts and with service after 20,000 hours at sea before anything has to be replaced.”

The Fiat engines were selected be-

“There is a requirement for the military here, right now. So the initial program was set up to service the UAE military. As it’s turned out now, requirements outside the UAE are 100 times bigger than our own country’s requirement.”

Russel Bartlett, Operations Manager, Al Seer Marine, Abu Dhabi, UAE



cause of their high power to weight ratio, in part, and the fact that they have been proven to be a successful performance power plant, particularly in the international race sector. The Rolls-Royce (KaMeWa) jets were a natural for Henderson, as he points out Rolls-Royce has its own hydrodynamic test cell, helping to make their units highly efficient. The team submitted the hull design to Rolls-Royce, which in turn was able to provide speed prediction based on the engines specified as well as the gear ratio matched each boat’s waterjet. Henderson was also quick to point out the value of the ZF reversing gearbox in the autonomous environment. “By using a reversing gearbox, it not only changes the engine speed to the ideal speed for the waterjet, but also gives us the reversing capability, which is important if the waterjet gets clogged, you can back-flush it to free the obstruction. When you’re operating remotely is a very important feature.”

Close cooperation among all suppliers and the builder was a critical element to keeping the job on target, as Henderson succinctly points out: “For several of the companies, the application is a new one for them, their first for USV operation. For example, engines of these sizes are normally on vessels that are manned, so there is the remote control aspect to consider.”

“One of the key advantages in using the hybrid is first, you get a longer life

in the sea,” said Aditya Nawab, Director, M.S. Robotics, Robosys Automation and Robotics Private Ltd., who brings robotics and computer code writing expertise to the team. “Second, in mission specific times when you want the USV to loiter, the battery management system switches between the engines and the hybrid motors (to ensure maximum deployment time each mission. In addition, if on a mission it actually runs out of fuel and runs out of batteries, it can actually home itself to recharge the batteries.”

REFUEL AT SEA

You can’t spend more than five minutes with Robert Murphy before seeing that he is an inventor to the core. Born into an innovative family, and by his own reckoning, “raised in a factory,” Murphy’s mind seems to perpetually gravitate towards technical solutions. Hence, his work on the development of USVs doesn’t stop at the vessel, rather extends through its operational life, and he has patents on a number of ancillary systems, from USV launch and recovery to refueling safety, efficiently at sea.

“In 2002 I was asked by two Captains of Naval Research labs in Washington to develop a handling system for unmanned vessels,” Murphy said.

Launch and recovery of unmanned systems in optimal conditions can be dangerous, not to mention dealing with the pitch, roll and yaw of bigger ships,

and their interaction with the smaller USV’s in rough seas.

“So I designed and patented a system with International Patents in 2009 for deploying, recovering and refueling at sea manned as well as unmanned boats. We’re going to have an Autonomous Remote Control fuel station at sea, that can loiter with the same hybrid system, that can loiter for months at a time. If you have a battlefield theater where you have a lot of small boats moving around, you don’t have to go back 20 or 30 miles over the horizon to look for a fueling ship.”

The envisioned “refueling station at sea” measures 45 ft. long, with the USVs

literally docking inside and via onboard sensors delivering the appropriate quantity of fuel.

The shipboard recovery system “comes down like a little gondola, it sits in the water along side the ship; the boat come in and it locks; and the device raises the boat like an elevator,” Murphy said.

While the IDEX show this month will prove a critical litmus test for the Al Seer/5G USV collaboration, it will not fully define the collaboration, which is intent to revolutionize the business of Unmanned Surface Vessels in military and commercial markets, domestic and abroad.

Doing Business in the Middle East

While having an address in the Middle East comes with a number of preconceived notions, doing business in the UAE is as close to a seamless “Western” model that you will find. The region is booming, led primarily by the continued hunt for offshore oil and gas, but diversifying to deal with a future when the resources run dry. While the UAE is pro-business, and in fact a virtual United Nations of nationalities working together throughout the country, conducting efficient business there can sometimes be trying, as the 5G found out. “As an example, when we were bringing over a boat from Florida, it was booked to go on a particular ship,” said Keith Henderson. “A week before it was to be shipped, we received a call from the shipper to say that the department of defense has taken over that whole ship, therefore it will be another two weeks before it could get on the next ship. Bringing the Boomeranger (RIB) in via road freight was a challenge too, as it went from Finland to Turkey. Normally from there it would go by road through Syria. But the unrest in Syria precludes that. So it had to go from Turkey, to Port Said in Egypt, transship to another ship to bring it down through the canal around to Jeddah, and driven up to here. These are things that could not be foreseen when we started.”



(Source: Google Maps)

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MTN Satellite Communications launched MTN Nexus, a next-generation comms network billed as a hybrid that integrates it with new terrestrial wireless technologies as well as sophisticated computing, powerful processing and specialized optimization. Targeting the high volume cruise sector, MR thought an apt time to sit down with CEO Errol Oliver to discuss Nexus and its relevance to communications at sea.

By Greg Trauthwein

Ready for Launch

MTN Nexus target high-volume cruise market



We understand you are a maritime satcom industry veteran. Can you give our readers a briefing on your background serving this market?

I started in the oil and gas telecoms industry more than 25 years ago, working for Shell Oil Company and later CapRock Communications where I served as president and COO. I was involved in pioneering the first commercial multi-tenant satellite communications business strategy serving the oil industry in the Gulf of Mexico.

What attracted you to the top position at MTN more than 1.5 years ago?

MTN has had a great company history of many "firsts" in the satellite communications industry, which creates an excellent foundation as we invent firsts in terrestrial communications, cloud computing and future technologies that connect people moving around the world. Richard Hadsall, MTN's founder, is an industry-recognized pioneer. When I joined the team in May of 2011, I saw the great potential that MTN had thanks to its talented and passionate employees. My vision for MTN was to continue to provide the best customer service it's been known for, as well as create new communications solutions that even anticipate customer demands. I see MTN as a perfect place to earn customer loyalty by solving the problems of the industry and helping our cruise partners improve their bottom line while delighting their passengers and crew.



The Cruise Market, or more succinctly cruise passenger's need to "stay connected" was a driver for MTN NEXUS.

ENERGY CONSERVATION APPLICATIONS SOUGHT FOR U.S. NAVY

- The Naval Surface Warfare Center, Carderock Division (NSWCCD) is seeking innovative concepts from industry (maritime and non-maritime) and academia that support Navy shipboard energy conservation needs.
- Of primary interest are development efforts with the potential for rapid transition to Fleet operations for Military Sealift Command (MSC) and Navy ships.
- Broad Agency Announcement (BAA) access: <https://www.fbo.gov/> (search for N0016713BAA01)
- Technical questions: NSWCCD_OPLOG@navy.mil



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Coming into the job, what were your initial goals for the company?

■ MTN has built a name in the industry and it is known for its value, innovation, and commitment to service excellence.

But we couldn't live up to our pioneering legacy if we didn't address the issue of demand for ever-increasing – and ever-costly – bandwidth head-on. My initial goal for the company was to face that concern. I am happy to say that we launched our next-generation hybrid satellite and terrestrial network – MTN Nexus – to transform communications at sea and tackle the demand for increased bandwidth head-on.

What do you consider to be the single greatest factor that has made communications between ship and shore more efficient and cost effective?

■ The idea of simply adding more satellite capacity to a ship is not the solution. MTN saw this many years ago,

so when I joined the company, we were in position to launch a hybrid network vision to address the satellite capacity costs as well as the performance constraints of today's at-sea communications networks. A key component to MTN Nexus will be terrestrial network capabilities that enable passengers and crew to switch from satellite to Wi-Fi connectivity to increase efficiencies and improve the customer experience for users of handheld, wireless devices onboard ships. That is just the first component of MTN Nexus. In addition, this new network will deliver sophisticated computing, caching and security infrastructure to deliver connectivity and communications.

What are the trends today that will define your sector's offering to the market in the coming 5 years?

■ The way people communicate is constantly evolving. In the past few years we have seen an exponential growth in the use of mobile devices and

social media. Whereas passengers used to go on cruises to disconnect, they now want to upload pictures from their excursions on Facebook so family and friends back at home can see what they're doing. Cell phones and tablets are now preferred over laptops to surf the internet, which has been pushing the industry to shape new communication products and services to attend to this demand. The market requires apps that are optimized to be used with satellite, that deliver a mobile-friendly log interface, and that optimize bandwidth. These are some of the demands that MTN Nexus will address to reshape the industry.

Late last year MTN announced the launch of MTN NEXUS. In a paragraph, can you describe the technology and why it is significant?

■ MTN Nexus is a hybrid network that will deliver sophisticated computing, caching, and security infrastructure to deliver connectivity and communications at sea and in port.

Nexus seamlessly integrates a hybrid satellite and terrestrial wireless network, a cloud computing-based optimization platform, and new products and services enabled only through this hybrid solution. MTN Nexus addresses the industry's bandwidth demands with alternative solutions to satellite, which is a limited, expensive resource.

We understand that the MTN NEXUS spot beam technology is dependent upon the launch of Intelsat's EPIC, which is not due until 2015. With that as a back drop, why was the system announced late 2012?

■ Three elements make up MTN Nexus. Intelsat Epic is the High Throughput, Multi-Spot Beam (HTMS) element of our multi-pronged satellite network just to initially deliver maximum bit-to-hertz to the Caribbean region, which is key to our cruise industry customers. That said NEXUS incorporates the entire constellation of geosynchronous satellites to create the

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global infrastructure. As such, it is one component of the first element of MTN Nexus:

1) A hybrid satellite and terrestrial wireless network

The other two components of MTN Nexus comprise:

2) A cloud computing-based optimization platform, and

3) New products and services enabled only through this hybrid solution

We will be announcing progress on the MTN Nexus network in the coming months. They will reflect all three elements of our vision.

As this is our Cruise Shipping edition, please elaborate on how Cruise Ships have been such an instrumental driver in development of modern maritime communication solutions.

■ We built the MTN network to support cruise ships all over the world. Due to the diversity of destinations, the high communication demands of floating cities-on-the-sea, and the industry's exponential market growth, MTN has been successful at supplying this high-demand sector with critical communications solutions. That said, we are very pleased to serve our very first market – the U.S. Government – as well as the ferry, yacht, and oil & gas markets. We learn a lot from our cruise industry customers that we can translate to these other industries. It was in 1981 when Richard Hadsall installed the first licensed Ku-band stabilized vsat system on a cruise ship which revolutionized vsat for the maritime industry.

How is MTN investing today to ensure its tomorrow?

■ Our Product Innovation Team in Seattle is constantly coming up with solutions and offerings to exceed our customers' expectations. MTN hires software developers and engineers with the exceptional technology skills required to build our next-generation communications infrastructure and network, as well as the products it will enable. We intend to continue leading delivery of Internet, content and social media at sea in ways never before imagined. Our Product Innovation Team is charged with raising the bar on ways customers can connect to people, content and applications using cloud computing, mobile technology and advanced communications. As MTN has for more than three decades, we plan to continue surprising the market with exceptional advances in consumer and enterprise connectivity.

In overview, what do you count as the top challenge to running an efficient and profitable business in this sector?

■ Our key challenge is not making our business most efficient and

profitable, but our goal of making our customers more efficient and profitable. Increased connectivity demands cannot translate into increased bills. We must exercise our technology tenure and savvy to keep coming up with new ways

to connect devices and deliver higher-bandwidth content in a cost-efficient fashion. MTN is about delivering innovative ways for crew and customers to communicate in a way that brings value to the vessel.

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“Ballast water treatment is a tough financial pill for ship owners to swallow, a lot of money invested with no return other than environmental compliance”

Peter Curtis, COO, Seaspan Corporation

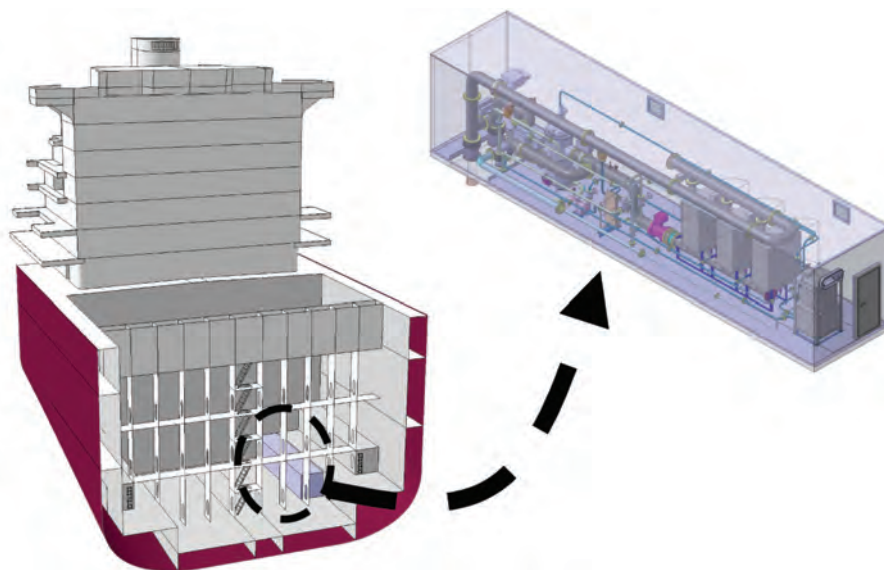
“BWTS in a Box”

As shipowners globally wrestle with the daunting costs of installing soon to be mandatory Ballast Water Treatment Systems, a recent development from Japan is worth watching, as a new ClassNK approved technology – essentially “BWTS in a Box” – promises to offer faster installation time on an existing vessel, compared to systems installed in the vessel’s engine room. Mitsui O.S.K. Lines, Ltd. received approval in concept for installation of a packaged container ballast water treatment system that can fit in a vessel’s cargo hold. The development is a joint technological development with Mitsubishi Heavy Industries, Ltd. and marks Japan’s first approval of such a system by Nippon Kaiji Kyokai (ClassNK). In the system, a commercially available BWTS is packaged in a 40-ft. container complete with electric equipment. The system as presented cures a number of potential ills, including ease of maintenance and accessibility. Characteristics of the container-type ballast water treatment system:

- (1) **Shorten the work required** such for preliminary inspection because the system is containerized, allowing for a reduction of detailed pipe fitting and adjustment at the installation stage.
- (2) **Installation time is reduced** by an estimated seven days, compared to installing a system in the engine room.
- (3) **Effective solution for vessels** with limited engine room space.

MOL and MHI started detailed engineering work and will install an experimental system with a capacity of 750 cu. m./hr. (the first ever to fit in a 40-ft container) on the MOL-owned 8,100 TEU containership MOL Competence this spring.

A container-type ballast water treatment system installed. Right: Sketch of the system, packaged in a 40-foot container.



Seaspan Selects CleanBallast

Seaspan caused a stir when it showcased its revolutionary SAVER (Seaspan Action on Vessel Energy Reduction) design of 10,000 TEU container vessels. Pursuing the aim of top-efficiency ship operation and improved operational performances, Seaspan has decided to equip its Saver class vessels with RWO’s ballast water treatment system CleanBallast. The delivery of the first plant to China’s Jiangsu New Yangzi shipyard is set for March 2013.

“Ballast water treatment is a tough financial pill for ship owners to swallow, a lot of money invested with no return other than environmental compliance. We have invested significant time and expertise to research repeatedly what our best option would be. Not just in cost, but reliability, efficacy and quality, too. We are very happy with our choice of CleanBallast,” said Peter Curtis, COO, Seaspan Corporation.

The CleanBallast technology gained official type approval from the German BSH in 2010, and was submitted for AMS and USCG approval in mid-2012. At last year’s SMM exhibition, RWO officially launched a modified version of the system, based on the technology but using considerably less footprint. The treatment principle is based on two cleaning steps, consisting of the removal of sediments and bigger particles by self-cleaning deep-filtration disc filters followed by a disinfection step using RWO’s patented EctoSys technology eliminating the remaining bacteria and organisms.

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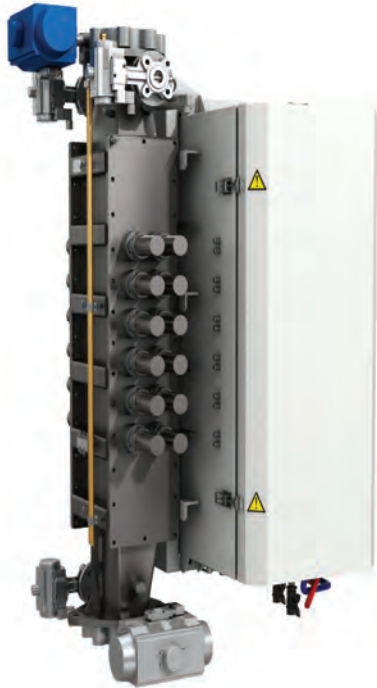
Alfa Laval PureBallast

PureBallast was among the first ballast water treatment systems to receive Ballast Water Type Approval. Operating under real-life conditions since 2003, PureBallast provides ballast water treatment that is 100% chemical-free, in contrast to “chemical-free” systems that produce chemicals during the treatment process.

The process is based on a patented form of advanced oxidation technology (AOT), developed in cooperation with Wallenius Water. Treatment occurs in a

closed chamber known as a Wallenius AOT unit, in which radicals are generated. These radicals are potent yet exist for only a few milliseconds, which means they neutralize microorganisms but are incapable of leaving the treatment system. A 40 µm mesh filter is used during ballasting operations. This blocks the intake of larger organisms, but also reduces the amount of sediment in the ballast water tanks. The number of AOT units is determined by the system’s flow rate, with individual units handling a flow of 250 cu. m./hr.. The performance of the AOT units is safeguarded by an automatic Cleaning-in-Place (CIP) system, which circulates a biodegradable solution to prevent seawater scaling within the AOT units. This solution is reusable and is replaced once annually when its pH level becomes too high. The automatic cleaning cycle occurs after each operation. The filter is also rinsed once ballasting is completed. A flow meter regulates the certified flow rate and records the volume of ballast that been treated. The water then continues through the AOT units, which treat the water to IMO established limits before it enters the ballast water tanks. The

The process is based on a patented form of advanced oxidation technology (AOT).



de-ballasting process is the same as ballasting, but bypasses the filter system (which is cleaned via automatic back-flushing). Outgoing ballast water passes through the Wallenius AOT units to eliminate any re-growth of microorganisms that may have occurred. A single PureBallast system can handle flow rates

of 250-3000 cu. m./hr.. If more capacity is required, even higher flow rates can be achieved by installing multiple systems in parallel. Container vessels, RoRo and PC/TCx account for about 1/3 of all units sold. For Alfa Laval, the 250 to 2,000 cu. m./hr. sector is strongest target market.

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Wärtsilä

Wärtsilä said its AQUARIUS UV Ballast Water Management System (BWMS) was granted Type Approval in accordance with requirements of the 2004 IMO Convention for the control and management of ships ballast water and sediments. AQUARIUS UV BWMS is reportedly the first system to have been fully endorsed and type approved by



the Flag Administration of the Netherlands and is the result of a focused development program which commenced in 2010. The AQUARIUS range became part of the Wärtsilä portfolio with the acquisition of Hamworthy plc in January 2012. AQUARIUS UV BWMS is based on a two-stage treatment process. Upon uptake, seawater is first passed through a back washing screen type filter. The filtered seawater then passes through a UV chamber where ultra-violet light is used to disinfect the water before entering the ballast tank. On discharge, water from the ballast tank is pumped through the UV chamber for a second time to complete the disinfection process prior to discharge. The filter is not used during discharge. Working in partnership with the Netherlands’ Flag Administration, independent testing facilities and Lloyds Register, Wärtsilä tested and optimized the AQUARIUS UV BWMS during both land based and shipboard trials conducted in accordance with IMO requirements. Land based tests were conducted at the NIOZ (Royal Netherlands Institute for Sea Research) test facility and ship trials onboard the ‘MV TWISTER’, an LPG carrier owned by Chemgas BV.

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Hyde produced its first system in 1999 and installed its first system on the M/S Coral Princess in 2003. The Hyde system was the first accepted into USCG STEP program in October of 2008. Hyde GUARDIAN has now been installed or specified on over 160 ships (200+ systems), and is most commonly found in use in the cruise, parcel tanker and container markets.

Hyde's GUARDIAN features a two-stage process; stacked disk filtration to remove sediment and larger organisms, and a UV disinfection unit to kill or inactivate smaller plankton, bacteria and other pathogens. During ballasting, water is processed through both filter and UV stages. All captured solids and organisms are discharged during backflushing to the location they entered. During de-ballasting, the filter is bypassed and water flows only through the UV system before discharging overboard. Hyde GUARDIAN system and ballast operation data are automatically logged.

Hyde GUARDIAN uses a high intensity ultraviolet (UV) treatment as a means of disinfection. The UV chamber is designed for minimum pressure drop, maximum retention time, and compatibility with the marine operating environment.



The medium pressure lamps produce a polychromatic output across the entire spectrum of the germicidal curve and have an expected service life of up to 8,000 hours.

The Hyde GUARDIAN Ballast Water Treatment Systems have IMO Type Approval for capacity from 60 to 6000 cu. m./hr., and a Type Approval Certificate has been issued by Lloyd's Register on behalf of the UK Maritime and Coastguard Agency to confirm compliance with Guidelines contained in IMO resolution MEPC.174(58). Other certifications include ABS, Dutch Flag State, Russian Maritime Registry of Shipping, DNV (Hazardous Area Certification) and DNV EC-Type Examination Certification.

www.hydemarine.com

N.E.I.

In 2002 N.E.I. began development of a de-oxygenation ballast water treatment system – the Venturi Oxygen Stripping (VOS). In 2007, N.E.I. obtained the world's first IMO Certification-Liberia.

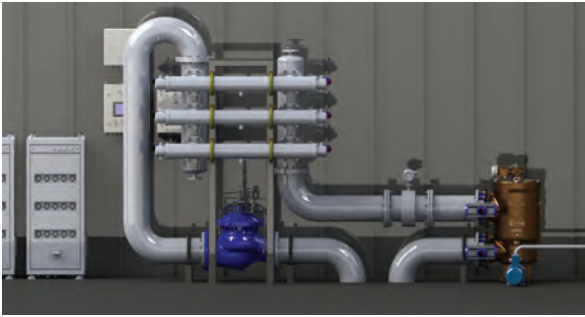
Venturi Oxygen Stripping (VOS) is a physical process, which removes Dissolved Oxygen (DO) from the ballast water during intake only (no retreatment is required during discharge). VOS does not require any filtration or active substances, and does not require changing ballast pumps due to flow restrictions. VOS leverages a highly efficient Stripping Gas Generator (similar to an Inert Gas Generator) to produce a very low oxygen gas (Stripping Gas). This gas is introduced to the ballast water via a Venturi Injector (VI). The VI generates extreme cavitation/vacuum in-line, creating a bubble emulsion in the ballast water. Within ~10 seconds, more than 95% of the DO is stripped out of solution, and simply vented to atmosphere. Any species dependent upon oxygen is suffocated, treating many controlled species within an hour. However, the oxygen levels are high enough to prohibit anaerobic life. Many organisms are treated during the venturi phase of treatment itself (due to the sheering forces intrinsic to the cavitation process).

VOS is currently Type Approved with a Treatment Rated Capacity (TRC) of 6,800 cu. m./hr.

VOS equipment has been installed on Bulklers, Tankers, and Containerships. A total of 58 systems have been sold to date; specifically, 21 Installed (3 vessels not yet commissioned), 18 commissioned vessels,

www.NEI-marine.com





Optimarin

Optimarin is a Norwegian company with a strong pedigree in the Ballast Water Management market, offering its Type-Approved Optimarin Ballast System (OBS) based on solid separation (filter) as pre-treatment and high doses of UV irradiation for inactivation of marine organisms, viruses and bacteria, without affecting the normal operation of the ship. Ballast water is UV treated both during ballasting and de-ballasting to ensure the dual UV effect. Ballast water is only filtered during ballasting. A highly touted plank in the OBS solution is the fact that it does not use or generate chemicals or biocides in its treatment or cleaning processes. OBS is designed as easy to install on board existing ships (retrofit) as well as on newbuilds, a modularized system with a relatively small footprint and weight, able to be delivered as a complete skid or as a customized solution. It accommodates a wide range of ballast water capacities and can handle flows up to 3000 cu. m./hr. (or higher upon request).

The Optimarin Ballast System is normally installed in the pump or engine room and in close proximity to the ballast pumps. The OBS can be delivered in a con-

tainer, on a skid or in separate pieces to allow for easy installation in most any available space.

In fact, according to CEO Pål Sanner, it is the unit's small size and flexibility of install that will help drive business for the company. "Serious players in the (shipping) market are the ones that will plan ahead and not get caught up in the (BWMS) bottleneck," said Sanner. "We feel we are well positioned for the retrofit market due the small footprint of the system and our ability to mass produce." Most recently the company announced a deal for three orders by Siem Offshore to supply OBS 150 cu. m./hr. systems based on Ballast Safe filter as to be installed during dry dock. This order gives Optimarin a reference list with a total of 208 sold systems.

www.optimarin.com

Svern Trent de Nora

Svern Trent de Nora has been in the ballast water treatment business since 1999; involved with all manners of water treatment for 40 years.

Electrolytic ballast water treatment systems typically pass the entire ballast flow stream through the electrolytic cells. The BALPURE system diverts a slip stream from the main ballast line or from a source of heated sea water from the discharge side of the sea water/fresh water central cooling systems on motorships or from condenser discharges on steam ships to the electrolyzers to generate a disinfecting solution in situ and on-demand to treat the ballast water. This slip stream approach allows the unit itself to

make use of available existing locations remote from the main ballast lines and gives the design engineers flexibility over how the unit is located on board.

The system can take advantage ship's "waste heat," in order heat the slip stream. Using a residual biocide is final piece of puzzle to combat regrowth.

www.severntrentdenora.com

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The Bubbler is an electro-pneumatic level transmitter that allows remote level measurement using a 4-20mA analog output. The lack of air pressure poses no operational problems, due to an automatic one-way valve which closes as soon as the pressure drops below 1 bar, this prevents back flow in the bubbling line towards the transmitter. Over pressure is also protected against by an automatic one-way valve.

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Ecochlor

Ecochlor, Inc. received Product Design Assessment (PDA) Approval from ABS for its full range of ballast water treatment systems (BWTS), systems that have the capacity to treat ballast water flow rates of up to 16,000 cu. m./hr. Prior to ABS PDA Approval, the Ecochlor BWTS received IMO G9 Final Approval in September 2010. The Ecochlor BWTS has IMO

Type Approval from Germany (BSH), as well as Type Approvals from the Liberian Administration. Ecochlor's technology was one of the first accepted into the Shipboard Technology Evaluation Program (STEP), and its application for approval as an Alternative Management System (AMS) under the recently published guidelines by the USCG has been submitted and the expectation is to be one of the first commercial systems to obtain that approval.

Ten consecutive test cycles on land and aboard ship over a two-year period resulted in no surviving organisms after treatment. With testing results of all zeros, it proved that the system could meet or exceed proposed US requirements of at least 10X IMO standards. This completed the international approvals of all of Ecochlor's Systems and confirms that they fully comply with the 2004 IMO International Convention for the Control and Management of Ship's Ballast Water and Sediments. Ecochlor holds a unique position in the shipping industry as using patented chlorine dioxide (ClO₂) treatment technology for ballast water. There is an exclusive distribution agreement with EKA Chemicals (part of the Akzo Nobel group of companies) for the EKA ClO₂ generation technology for use in the marine and shipboard environment.

The Ecochlor BWTS uses a two-step process to treat ballast water – filtration followed by disinfection with the biocide chlorine dioxide. The system's effectiveness reportedly is not impaired by variations in salinity, temperature, turbidity, organics, and vibration, which can impact other treatment options. Key system advantages are touted as small size, low power, and low maintenance characteristics.



www.ecochlor.com



Dr. Arthur Sulzer is sworn in. at SLSDC.



Vehviläinen



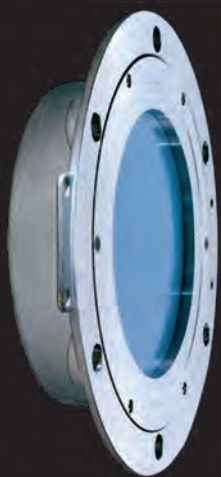
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Sulzer Sworn in at SLSDC

Dr. Arthur H. Sulzer, Captain USN(ret), President of Arthur H. Sulzer Associates, Inc., was nominated by President Obama in July, 2012 to a five-year position on the Saint Lawrence Seaway Advisory Board. He was confirmed by the U.S. Senate and sworn-in January 2013. Dr. Sulzer is a local resident of Glen Mills Pa. He is the first resident of the State of Pennsylvania to be appointed to the St. Lawrence Seaway Board since 1958. Captain Sulzer earned a B.S. in Marine Transportation and an M.S. in Transportation Management & Maintenance from the State University of New York Maritime College. He received an M.B.A. in Finance from Hofstra University and EdD. from the University of Pennsylvania.

Vehviläinen Named President, CEO at Cargotec

Cargotec's Board of Directors appointed Mika Vehviläinen (M.Sc. (Econ.), 52, as Cargotec's new President and CEO, starting March 1, 2013. Tapio Hakakari, Cargotec's Vice Chairman of the Board, will continue as the interim President and CEO until February 28, 2013.

ASSA Appoints Hepburn President

The American Shipbuilding Suppliers Association Board of Directors appointed Rick Hepburn, PE, CAPT, USN (Ret) as the second President of ASSA. Hepburn will work to achieve the ASSA vision to strengthen the capability within the U.S. for domestically producing the parts and equipment necessary for shipbuilding. ASSA will continue to work closely with the U.S. Congress, Navy, Coast Guard, Shipyards and other maritime stakeholders. Hepburn will continue as President of Hepburn and Sons LLC, an engineering con-

sulting firm offering support to Government and DoD Contractors in the fields of naval engineering, technology transition, system engineering, quality assessment, and ship design support.

Giani Appointed BV Regional Chief

Bureau Veritas appointed Daniel Giani to regional chief executive of the marine division in the U.S. and Canada, responsible for: profit and loss accountability; identifying growth opportunities; providing technical support and quality monitoring for all marine and offshore endeavors; and ensuring compliance to division guidelines and procedures.

Vigor Acquires New Floating Drydock

Vigor Industrial reached an agreement with Daoda Marine Heavy Industry Company (DDHI) to purchase a new floating drydock for \$40m. At 960 ft. long, with an inside width of 186 ft. and a lifting capacity of 80,000 long tons, it will reportedly be the largest floating drydock in the United States. "We decided now is the time to buy because demand to service large vessels is growing and large drydock capacity in proximity to the U.S. West Coast has diminished," said Frank Foti, CEO, Vigor Industrial. This new capacity will allow Vigor to service the incoming generation of the US Navy's Military Sealift Command (MSC) dry cargo/ammunition ships. The drydock will be large enough to service private vessels including post-Panamax cargo ships and cruise ships. The increased capacity will also help Vigor meet growing demand from the Arctic as oil and gas exploration and other ship operators take advantage of longer ice-free summers.

It will be delivered by March 2014.

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Simmons: Buoyant offshore in 2012.

Simmons UK Announce \$2.3B of O&G Deals in 2012

Simmons & Co in Aberdeen completed 14 deals in 2012 with a total value of \$2.3 billion, more than double the total value of deals completed by the firm in 2011. The Aberdeen office led these UK and international deals, which represent a significant share of the 48 M&A transactions completed by Simmons & Company International Group. In the subsea sector, the sale of Acteon to KKR and the divestment of GustoMSC by SBM to Parcom Capital were prominent deals. On the buy side, Simmons represented Tetra Technologies in its acquisition of Aberdeen based rig cooling specialists Optima and assisted Phoenix Equity Partners in their acquisition of Gall Thomson Environmental in the flow control sector.

TOTE Services Top Leadership Position Changing Hands

Captain Jorge Aguirre announced his retirement from TOTE Services after 33 years with the company. Aguirre spent 16 years at sea, coming ashore with TOTE Services in June of 1980 as a Port Captain at the Philadelphia headquarters of the company, then known as Interocean Management Corporation or IOM. He served as Manager of Operations, then Senior Vice President and in 2001 was made President. Following Aguirre's retirement on January 31st of this year, TOTE, Inc. VP, Retired Rear Admiral, U.S. Navy, Philip H. Greene, Jr. will assume the role of President of TOTE Services.

SIS Strengthens Oil & Gas Team

Star Information Systems (SIS) said that Erik Sarmiento Staubo has joined the company as head of oil & gas. SIS is a provider of integrated software solutions and services that allow the safe and efficient operation of ships and rigs.

MHI Signs Steam Turbine Deal

Mitsubishi Heavy Industries, Ltd. (MHI) signed an agreement with Qingdao Jieneng Steam Turbine Group Co., Ltd. of China, a major manufacturer of small steam turbines, under which the two companies will jointly establish Mitsubishi Heavy Industries Jieneng (Qingdao) Steam Turbine Co., Ltd. as a marketing and design unit for small and medium-size steam turbines and marine-use steam turbines.

LM2500 Gas Turbine for German Navy Frigate

GE Marine will provide MTU Friedrichshafen with a LM2500 gas turbine for the German Navy's fourth Baden-Württemberg-class (F125) frigate. For each new F125 frigate, MTU will provide the German Navy with one LM2500 gas turbine, two electric motors and four diesel generator-sets in combined



GE gas turbines for German Frigate.

diesel-electric and gas turbine propulsion arrangement. The keel for the first F125 frigate was laid in November 2011 at the Blohm + Voss shipyard in Hamburg. GE LM2500s also power the German Navy's Bremen- (F122), Brandenburg- (F123) and Sachsen-class (F124) frigates. The LM2500 gas turbine will be delivered to MTU's Friedrichshafen in February 2014 for placement into the propulsion module. The ship is expected to launch in 2015, and commissioned by the German Navy in 2017.

Star Cruises Signs long-term Preventive Service Contract

ABB won a long-term service contract from Star Cruises for preventive maintenance of all ABB equipment onboard SuperStar Virgo for the next five years. The approximately \$1m contract commenced in January 1, 2013. Star Cruises, the world's third largest cruise company, has led cruise development in the Asia-Pacific region, where it operates seven vessels between the ports of Singapore, Port Klang (Malaysia) and Hong Kong.

Harley Awards US Fab Deck Barge Contract

US Fab, a Vigor Industrial company, will soon begin construction on a 250 x 70 x 15.7 ft. deck barge for Harley Marine Services at Vigor's Swan Island shipyard in Portland, Oregon. This purpose built barge was designed by Jensen Maritime Consultants to transport a wide variety of cargo between Dutch Harbor and Akutan, Alaska with up to three runs per week.

STX France to Build Oasis Class Ship for RCCL

STX France SA signed a contract to build a cruise ship intended for Royal Caribbean International (RCI - subsidiary of RCCL) fleet. Third ship of the Oasis class, this ship featuring outstanding dimensions is due for delivery in mid-2016. An option for a second ship due in mid-2018 is also provided. At 361 x 66 m, the ship is one of the biggest ever built in Saint-Nazaire. Sister ships Oasis of the Seas and Allure of the Seas are marvels at sea, spanning 16 decks, encompassing 225,282 grt and carrying 5,400 guests in 2,700 staterooms.

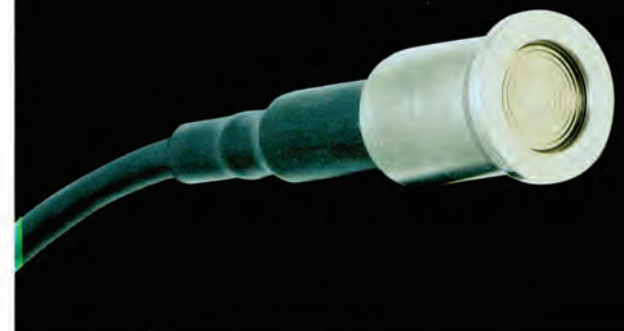
PPG PMC Business Earns Military Award

PPG Industries' protective and marine coatings (PMC) business received The Society of Protective Coatings (SSPC) 2013 Military Coatings Project Award of Excellence during the SSPC 2013 trade show at the Henry B. Gonzalez Convention Center in San Antonio, Texas. The award is given annually by SSPC to recognize exceptional coatings work performed on U.S. military ships, structures or facilities. PPG earned recognition for the perfor-

MHI signs steam turbine deal.



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ABS Releases DPS Requirements

ABS released the ABS Guide for Dynamic Positioning Systems as an update to present classification requirements to reflect industry advancements in the use of dynamic positioning (DP) systems. "The use of DP systems has been expanded not only in terms of the number of vessels outfitted with the systems, but also in the increasing advancement of DP technologies," said VP, Energy Project Development, Ken Richardson, noting that the vast majority of newbuild floating mobile offshore drilling units will have DP capability. This is seen as a significant and needed upgrade, particularly as exploration ventures into ever deepening waters. The new Enhanced System (EHS) notation encourages robust designs of DP systems by providing optional requirements. The multiple levels of EHS notation – for power, control and fire protection – provide owners with the flexibility to tailor the notation to the most important components of the system for the unit's intended operations.

New Venture to Design Offshore Rigs

Zentech will participate in a Strategic Cooperation Agreement for fully integrated jack-up drilling rig construction. Zentech joins China's CSSC Guangzhou Huangpu Shipbuilding Company and TSC Group Holdings in a new venture that involves the design of the basic rig and fully integrated drilling equipment and control package, and will be constructed at Huangpu Shipyard. The consortium expects construction of the first drilling rig to begin no later than May 2013.

Trelleborg Acquires Seatechnik

Trelleborg Marine Systems acquired Sea Systems Technology Ltd. (SeaTechnik), a leader in the design and manufacture of systems for safeguarding the transfer of LNG between (LNG) carriers and shore terminals.

Signet Nets Shipyard Award

American Equity Underwriters (AEU) presented Signet Shipbuilding & Repair (SS&R) with its 2011 Safety & Health Best Shipyard Award. The award recognizes the shipyard that is superior among all other shipyards in terms of claim frequency and severity performance among all AEU members.

GGOS Takes Delivery of ROVSV

Greatship Global Offshore Services Pte. Ltd. (GGOS), a Singapore incorporated subsidiary of Greatship (India) Limited (GIL), which is a wholly owned subsidiary of The Great Eastern Shipping Company Limited, has taken delivery of a Platform/ROV Support Vessel, Greatship Ranini, from Colombo Dockyard Plc, Sri Lanka. Greatship Ranini is a DP2 vessel, capable of supporting offshore exploration and production. GIL and its subsidiaries own and operate four PSVs, nine AHTSVs, two MPSSVs, six ROVSVs, two jack up rigs and have one 350 ft. jack up rig which is under construction in UAE.

Hyundai Heavy Wins \$600m Order

Hyundai Heavy Industries (HHI) won an order for five 14,000 TEU container-ships from Seaspan Corp. The contract includes an option exercisable by the owner for five additional same-class boxships. The container-ships will feature an EC main engine and HiBallast seawater treatment system.

Deltamarin Deal on Steel Chem Tankers

Deltamarin will be the designer for five 185 x 32.26 m, 38,000 dwt stainless

steel parcel chemical tankers for Stolt Nielsen Ship Finance Ltd, a subsidiary of Stolt-Nielsen Limited, to be built at Hudong-Zhonghua Shipbuilding (Group) Co. Ltd. in China. The design contract includes Approval Design and 3D Modelling of cargo deck and engine room areas.

Resolve, Transas Team on ECDIS Training

Resolve Maritime Academy became the first major training center in the U.S. to join the Transas Global ECDIS Training Network GET-Net. Resolve Maritime Academy, LLC is a subsidiary of Resolve Marine Group, Inc. a global leader in emergency response and vessel salvage.

TORM Chooses Transas

Navi-Sailor 4000 Dual ECDIS will be installed on five L-Class Tankers. Along with this, Transas will supply and install 1 x 'Back of the Bridge' station on each of the five vessels, and the vessels will thereby obtain 3 x fully operational ECDIS stations. Transas Navi-Sailor 4000 ECDIS 'Back of the Bridge' planning station is based on the 24" Panel PC. It includes Navi-Planner with full voyage plan functionality and ECDIS Software.



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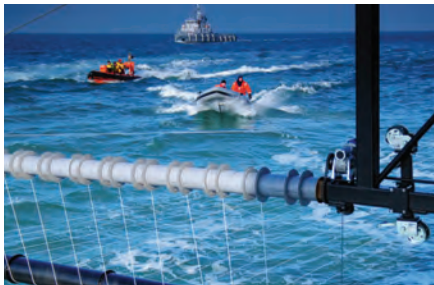
Autonomous Hull Cleaning System

SeaRobotics delivered the first HullBUG (Hull Bio-inspired Underwater Grooming) System to the Center for Corrosion and Biofouling Control at Florida Institute of Technology in Melbourne. This will be tested and further developed at the newly commissioned Large Scale Seawater Facility, which is located at Port Canaveral and funded by the U.S. Navy Office of Naval Research (ONR). HullBUG is an autonomous underwater vehicle designed to crawl on ship hulls or other underwater structures and “groom” their surface, keeping them clean of marine growth and the surfaces in a smooth condition.

Geoffrey Swain, Florida Tech professor of ocean engineering, heads the R&D project at the university, joined by John Hearin, a post-doc researcher. They and their undergraduate and graduate students have begun putting HullBUG through its paces on an 8 x 30-ft. steel plate, coated with U.S. Navy-qualified antifouling coatings, which simulates a ship's hull.

HullBUG, a small autonomous vehicle weighing 66 to 88 lbs., attaches to the hull and performs a gentle cleaning function, or grooming. Numerous embedded computers perform navigation and sensing tasks to facilitate grooming the ship hull. The capabilities to attach to ferrous, non-ferrous and fiberglass hulls and to deploy various sensors allow the HullBUG to meet several inspection challenges. Opportunities are being explored in commercial shipping, oil and gas, nuclear and conventional power generation markets.

www.searobotics.com



Tension Monitoring for Pipe-Laying Vessel

MAATS Tech Ltd. is a specialist ship design organization with expertise in the provision of turnkey carousel systems and associated equipment that are installed in special purpose vessels used for laying flexible pipe, umbilicals and power cables. On such vessels, the cable or pipe is fed through a tensioner before being loaded to and from the carousel system as part of the laying process. Maintaining the correct tension in the pipe or cable is crucial to achieving its successful seabed deployment, as well as for the avoidance of equipment malfunction and associated downtime. Straininstall was able to provide MAATS with a system comprised of bespoke load cells and amplifiers to provide real-time information on pipe/cable tension levels. Readings from the load cells are sent directly to the tensioner controls, enabling the system to increase or decrease the tension as required to ensure that the correct levels are always maintained. As the tensioners are mounted on the deck of the vessel, the use of Straininstall's marine load cells – proven in harsh environments – was an important factor in meeting customer requirements.

www.straininstall.com



Rolls-Royce 36MW Gas Turbine for Aircraft Carrier

Rolls-Royce completed the installation of the first MT30 gas turbine into the Royal Navy's new aircraft carrier HMS Queen Elizabeth, at Babcock's Rosyth shipyard in Scotland. The MT30, at 36 MW (around 50,000 hp), and is touted as the world's most powerful marine gas turbine. Two MT30s will be installed in each ship and will provide two thirds of the 109 MW needed to power the 65,000 ton ships. The MT30s are installed as part of a Gas Turbine Alternator (GTA) which also includes an alternator and gas turbine enclosure, weighing a total of 120 tons. The installation involved the lifting of the MT30 gas turbine and associated ancillary equipment - housed in a steel package known as the gas turbine enclosure - onto the ship structure. With the enclosure in place, the large alternator, which is driven by the gas turbine to produce electrical power, was then hoisted into place.

ECDIS Workbook from Transas Marine

Transas Marine published an ECDIS Workbook which can be used together with the Transas ECDIS demo software, both available for free download from the company's website.



According to the STCW 2010 Code, ECDIS training is mandatory for all Deck officers serving on board ships fitted with ECDIS equipment. The main goal of the ECDIS Demo Workbook is to provide the vessel's crew with knowledge, understanding and proficiency in the use of Navi-Sailor 4000 ECDIS and Chart Assistant Utility.

www.ecdisfit.com/request_workbook

Hartzell Air Movement



Hartzell Air Movement released its new medium pressure, adjustable pitch propeller for marine duty applications.

The new die-cast aluminum propeller has been engineered to enhance the operating performance of their Series 44M Ductaxial fan. The Series 44M with the new AM propeller is available in sizes 12 to 48 in. and produces up to 65,000 CFM and up to 4 in. of static pressure.

www.hartzell.com

P-Trap Anti-Boarding Device

GAC Maritime Security has added the P-trap anti-boarding device to its range of non-lethal vessel protection solutions. P-trap is an engine blocking system that creates a security zone around the ship to prevent other vessels from approaching too close and attempting to board. Created by Netherlands-based Westmark BV, the patented anti-boarding device creates a non-lethal secure barrier around a ship, adding an additional layer of protection from attack. A set of long, thin lines are carried on side booms extending up to 10 m from the ship's bow on both sides of the ship just below the water surface. Any vessel entering this security zone will run into these lines, which trap the propeller and disable the engines, disabling the approaching vessel. Designed to be deployed before entering high-risk areas, the P-trap provides continuous protection against multiple attacks, day and night, without the need for crew involvement and constant vigilance. GAC Maritime Security, Powered by AKE, is a partnership between global shipping, logistics and marine services provider GAC Group and AKE Group.

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Boatswain/Maintenance Technician
Job Location: USA, Galveston

Schedules and performs maintenance and modifications to small vessel fleet for the University's small vessel program. Full description available on our website: <http://tamujobs.tamu.edu>.

Vernon L Camus
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Galveston TX 77553 USA
Phone: 409-740-4490
Email: camusv@tamug.edu
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Planner/Scheduler
Job Location: USA, Portland, OR

Planner/Scheduler - 50459

Posted: January 8th | Open Until: February 8th | Location: Portland, OR
About Vigor Marine

Vigor Industrial LLC is a thriving West Coast provider of innovative industrial services. Our dynamic operations are united by a focus on quality craftsmanship, respect for each individual, and dedication to the task at hand. Our Company is committed to working in a safe and environmentally-responsible manner. Vigor Marine facilities are currently located in Bremerton, Everett and Tacoma, WA; Portland, OR; and Alameda and San Diego, CA.

Vigor Marine is one of seven companies in the Vigor Industrial family. We are a fast paced, highly successful ship repair company. With West Coast-wide operations, Vigor Marine's projects range from voyage repair to complex dry-dockings.

Job Purpose

Position is responsible for assembling and analyzing project information, and preparing understandable documents, which serve as tools to help coordinate/manage project tasks and resources at individual project and division levels.

Duties

(This is not an all inclusive list of the regular job duties. Other responsibilities within the accepted job scope will apply.)

1. Review specifications and contract documents; understand the project work, and the schedule and reporting requirements of the contract. Assume responsibility for assigned areas of responsibility.
2. Lead project team members in planning/scheduling process; obtain input and participation in schedule development.
3. Solicit input and participation by team subcontractors in planning and scheduling process. Integrate schedules from multiple providers.

tors in planning and scheduling process. Integrate schedules from multiple providers.

4. Identify correct logical relationships, constraints, etc. and propose best schedule methodology for the project. Comply with contract requirements for schedules and reporting.

5. Create and manage all required project schedules, utilizing scheduling software required, including MS Project and Primavera P3 or P6.

6. Participate with Project Management Team (PMT) to create Work Breakdown Structure for projects.

7. Participate with PMT and Estimating to develop budgets and resource loaded schedule activities. Produce labor projections, graphs, and reports.

8. Maintain, manage multiple project schedules. Solicit and input weekly progress updates.

9. Produce schedules and schedule reports as required for both internal management and reporting to external customers.

10. Produce schedule reports in support of customer invoicing.

11. Incorporate scope changes and other changes to project schedules, analyze and report impacts.

12. Communicate with project management team to ensure that scheduling and EVMS efforts are managed in accordance with the contract requirements and meet internal reporting and management needs.

13. Works with internal and external resources to resolve conflicts, problems, and coordinate schedules.

14. Maintain Drydock/Berth schedules and division wide resource loading reports

15. Assist in the development of Technical Proposals

JOB SCOPE:

Operates within general parameters, but must use sound judgment and independent decision-making when carrying our most job responsibilities. Has the ability to influence and recommend modifying existing protocols. No budget responsibility, but does monitor contract and subcontract performance to establish progress and status. Failure to meet customer expectations and requirements could result in increased costs, affect cash flow.

Please apply online at
<http://vigorindustrial.com/jobs/details/50459>

Human Resources
Vigor Industrial LLC
Email: Daava.Mills@vigorindustrial.com
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Shipyard Estimator
Job Location: USA, Cleveland, OH

Great Lakes Shipyard is seeking a highly skilled Estimator with new construction and repair cost estimating experience.

The Estimator will produce cost estimates and production schedules for New Construction, modification and repair projects at the Company's state-of-the-art facility located on Lake Erie in Cleveland, OH.

The Estimator will work with Sales, Purchasing and Project Managers to produce preliminary schedules and detailed cost estimates, for budgeting, bid preparation and proposal purposes; and will also build a database for project schedules and cost estimates. An engineering degree is preferred. Must have a working knowledge of ABS Rules, work with ABS, Lloyds, DNV, BV and others as required to meet all quality and regulatory requirements. Proficient with MS Office, MS Projects and MS Excel.

Minimum 5 years' experience working in Shipyard Production and/or as an Estimator/Scheduler in a shipyard environment. Ability to read, analyze and

interpret specs, drawings and technical, government and regulatory documents. Ability to write reports and proposals. Working knowledge of shipyard crafts. AutoCad and welding experience a plus.

We offer an excellent benefits package that includes healthcare, dental, vision, short-term and long term disability insurance, employee assistance program, 401(k) profit sharing plan, vacation time, sick time, company paid holidays and a friendly working environment.

Candidates must be able to pass background check and have E-Verify authorization.


Submit cover letter and resume with salary requirements: by email: hr@thegreatlakesgroup.com; by fax: 216-781-7472; or by mail: Attn: Mary Wells, Human Resources Manager The Great Lakes Group, 4500 Division Avenue, Cleveland, OH 44102. For more information on the Company, visit www.thegreatlakesgroup.com.
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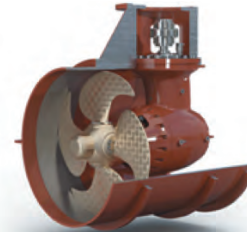
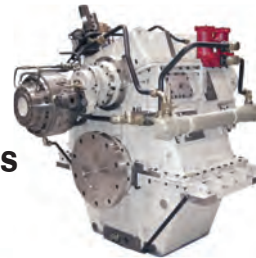
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