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December 2015

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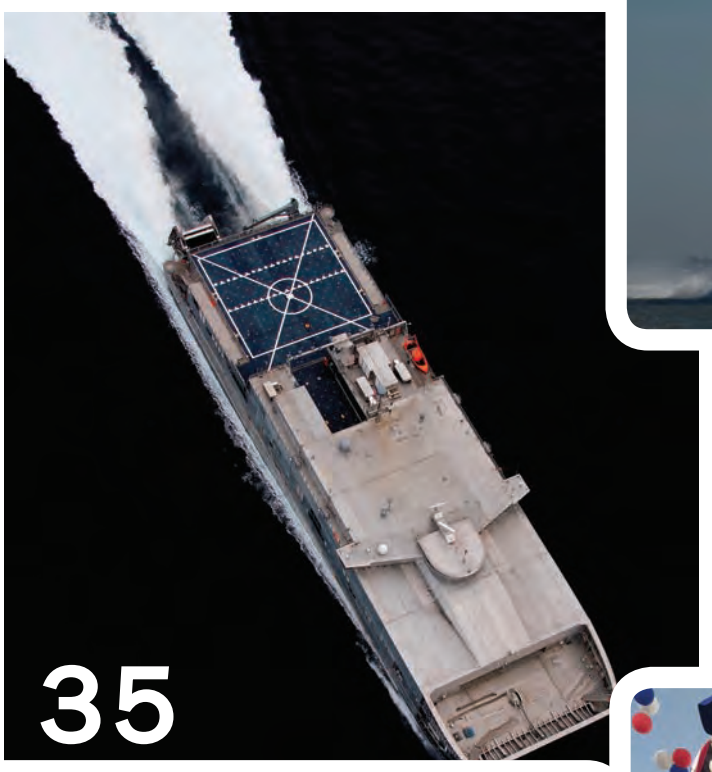

GREAT SHIPS OF 2015 GREAT SHIPS OF 2015 GREAT SHIPS OF 2015

Name	Type	Owner	Builder	Page
Alya McCall	Fast Support Vessel	Seacor	Gulf Craft	38
Anthem of the Seas	Cruise	Royal Caribbean	Meyer Werft	31
Ardmore Chippewa	Product/Chemical Tanker	Ardmore	Fukuoka	52
CMA CGM Amazon	Containership	Capital Ship	DSME (Romania)	53
Creole Spirit	LNG	Teekay	DSME	53
Industrial Grand	Multipurpose	Intermarine	Hudong Zhonghua Shipyard	52
Isla Bella & Perla del Caribe	Containership	TOTE	NASSCO	39
Island Venture	Offshore Construction	Islands Venture 5	Ulstein	32
Itarus	Nuclear Waste Carrier	RosRAO	Fincantieri	37
JS Ineos Insight	Gas Carrier	Evergas	Sinopacific	52
Maersk Tacoma	Product/Chemical Tanker	Maersk Tankers	Sungdong	36
MSC Oscar	Containership	MSC	DSME	33
Muscat Silver	Chemical Tankers	Oman Shipping Co.	Hyundai Mipo	50
Navig8 Serenity	Product/Chemical Tanker	Navig8 Ship Mgmt	Sungdong	51
New Horizon Class	PCTC	Höegh	Xiamen	30
Ohio	Product Tanker	Crowley	Aker Philadelphia	50
SBI Magnum	Bulk Carrier	Scorpio/Offen	Sungdong	51
Shoyoh	Coal Carrier		Japan Marine U.	40
Stena Germanica	RoRo Pax	Stena	(Refit)	34
USNS Trenton	EPF	US Navy	Austal USA	35

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Contents

THE COVER

In step with the Great Ships of 2015 coverage this month are a hat-trick of country reports on the maritime industries of three prolific shipbuilding nations: Vietnam, Singapore and South Korea.

Photo: The 13100 TEU Hanjin Sooho; Hanjin

The Columnists

Bryant

10

Arctic Coast Guard Forum

Eyes & Ears Up North

Dennis L. Bryant

Sirkett

12

Autonomous Shipping

New Roles for Satcoms

By Andrew Sirkett

Maitland

16

Opinion

MARPOL Merry-Go-Round

Clay Maitland

Korpus

22

Ship Design

Conflicting Objectives

By Dr. Richard Korpus

Special Advertorial Section

41

Green Marine Solutions

As the global maritime sector faces increasingly stringent environmental regulation, MR finds that technology is blazing the path toward compliance.

Lyden-Kluss

42

To Be or Not to Be Green ...

There is No Question

Carleen Lyden-Kluss

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GREG TRAUTHWEIN, EDITOR & ASSOCIATE PUBLISHER

As we draw to the close of 2015, our traditional "Great Ships" edition is always a fitting endnote to the year, a celebration of the technical wonders that are built in to the latest, and presumably greatest, ships of our time. This year's selection includes a hearty list of 20 vessels of every type, size and build location, with a healthy dose of "world-firsts" included within. We've ventured out a bit this year, with inclusion of a concept, a refit and a 'not so new' ship. As always, I welcome your comments and critique, questions and rants alike!

While this December "Great Ships" edition is our quintessential celebration of emerging marine design and technology, it would be remiss to reflect solely on the technical element, as this year there were again many 'human element' stories that hammered home the fact that the marine industry is not simply a nameless, faceless collection of vessels moving stuff from point A to point B, rather an integral thread in the fabric of world trade, commerce and society.

Hitting closest to (our) home was the tragic loss of 33 souls aboard El Faro earlier this year during Hurricane Joaquin. While the lawsuits fly and the inquiries proceed in earnest, focus should remain on the 33 lost in this one incident, and every single mariner lost or injured worldwide in 2015, as they should serve as an inspiration to continue the development of improved ships, systems and procedures to make our industry a safer place to live and work.

There are a number of emerging trends and technologies we will follow vigorously in 2016 and beyond, including:

- **Autonomous Ships & Systems:** We are far from the "unmanned ship" for sure, but those who flatly reject autonomy in the maritime sector – and the many cost and operational efficiencies proven in other transport sectors – may very well go the way of the DoDo bird.

- **BIG DATA:** Going hand-in-hand with autonomy is Big Data, and 2016 should be a landmark year. Simply put, the ability to transfer information to, fro and among maritime assets is getting faster and cheaper. As it evolves, there will be many new applications developed.

- **Green is the New Black (as in profitable):** While environmental issues are hardly new in 2016, the marine industry has turned a corner or sorts and it is increasingly evident that if you don't have the corporate will and resources to run your fleet in step with new regulations, your days are numbered.

As we say 'so long' to 2015, I thank every one of you for your continued interest and support of our media products in print, online and on your mobile devices. It is your participation, your work and your stories that drive us forward into 2016, our seventy-seventh year in business.

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Environmental Tall Tales

By Joseph Keefe, lead commentator of MaritimeProfessional.com

It has been a decidedly good year for the kyaktivists. Nevertheless, the parties are finally over. 'High fives' have been exchanged and the gleeful press releases trumpeting victory sent out far and wide. All that's left are the heavy hangovers for the environmental lobby. Today, they are back at it again, having driven to work in their gas guzzling luxury SUV's, smugly smiling all the way, sipping an $8 double shot cappuccino, all after filling up at the pump for the satisfying low price of about $2.02 per gallon. Mission accomplished.

And, there is plenty to celebrate, isn't there? For example, Royal Dutch Shell's withdrawal from the Alaskan Arctic was a welcome victory for the environmentalists, but the similar move that followed from Statoil was especially sweet. And then, who could forget the quashing of the controversial Keystone Pipeline project by the Obama administration in late November? It wasn't an unexpected move, but the seven year battle should have been over years ago. Instead, the White House didn't have the courage to do it until not one, but two midterm elections had passed.

For some so-called environmentalists, there's no law too big to be broken, no safety rule too important to ignore and simply no limit to the number of lives they can endanger along the way. Whether its dangling off a bridge impeding the progress of a deep draft oil service vessel or perhaps from the girders of an offshore oil rig in the Arctic, or better yet, blocking the entrance of a major global port as a fully loaded oil tanker, constrained by draft, attempts to navigate its way in a narrow channel, there is (apparently) no act too silly to attempt in the name of "the environment."

No Middle Ground

Over the course of the past decade, oil companies and shippers who navigate the legal system with full transparency have finally realized that there is no middle ground anywhere to be found, especially when it comes to dealing with people that have little or no regard for the safety of others and indeed, the environment itself. In every situation described above, it wouldn't have taken much for these activities to have created exponentially more damage to the environment than these 'cowboys' intended to stop – if only something had gone wrong. That it hasn't happened yet is simply a miracle. That lives haven't been lost in the oil patch, on board crude oil carriers or ashore in support missions? Quite simply, divine intervention...

With all of that said, it is way past time to take stock of the cost of these victories. That's because the environmental lobby rarely stops to assess collateral damage. And, there's plenty of it to go around. Globally, the oil industry has shed as many as 250,000 jobs in the past 18 months – with more pain to come. To be fair, that has little to do with the environmental lobby. As OPEC continues to pump out crude oil even in the face of a massive glut, the bottom line goal for our Middle Eastern friends is to put an end to the resurgence of North American energy independence. But $40 oil has other consequences, as well.

As our kyaktivist environmentalist friends top off their SUV's with cheap gasoline – Reuters reports that U.S. road miles are nearing an all-time record – the perilously low price of carbon-based energy also puts a huge damper on the renewables sector. At these prices, it just isn't economical to produce energy via wind or solar means, especially when you can see the hedge funds trending to bets on lower oil. No one wants to throw good money after bad. Ask yourself: would you pay substantially more for wind power if you could accomplish the same task with cheaper oil?

No, we'll continue to burn fossil fuels – which we would have in any event – but just a lot longer than we would have, had renewables been able to better compete in the global market place. It is why, in part, that the United States has, to date, no offshore wind farms and the rest of the world – Europe in particular – has soared ahead in this market. Wouldn't it have been nice to have had the lion's share of that manufacturing right here at home? Think about the jobs. No, they never do. Which brings me right back to the Keystone Pipeline. I get it: this is oil headed to U.S. Gulf Coast refineries that isn't domestic output in the first place. But, for my money, I'd rather buy energy from our Canadian friends than the folks in OPEC. Along the way, we'd create some pretty good jobs and we'll be transporting energy efficiently and environmentally sound. What's not to like?

A Tale of Two Conventions

Separately, I attended the Waterways Council (WCI) annual symposium in New Orleans earlier this month. It was an especially valuable trip since the event overlapped, to a certain extent, with the Clean Gulf convention. I jogged back and forth between both venues and, as a result, I'm not sure how well I covered either. That said; I was at the WCI event when Professor Will Happer of Princeton University participated in a panel on CO2 and the environment, in general. It turns out that CO2 is our friend. Stay with me here.

The War on Coal in fact was a focal point of Dr. Happer's presentation. Happer calls the Obama and EPA war on coal, and I quote, "all pain and no gain." The most telling part of the discussion revolved around a study performed by Happer's father in the 1980s. In a nutshell, the growth of Eldarica Pine trees, grown at the former site of the ARS, US Water Conservation Laboratory, USDA, in Phoenix, AZ, virtually doubled as a function of increased CO2. Happer's point? CO2 – as many environmentalists will claim – isn't the culprit. And, we already have the answer when it comes to NOx, SOx, and particulate matter. That's what scrubbers, aftertreatment and LNG are for. Happer insists: CO2 is a benefit; not a pollutant. Across town, the Clean Gulf convention beckoned and I dashed out and grabbed a cab to make it in time for the annual "State and Federal Updates" presentation. This can, of course, be a rather dry event. One after another, the state environmental coordinators get up, trudge to the podium and talk about what happened in their states over the course of the previous 12 months. This went on for a bit until Senior Environmental Scientist Philip Woods from the great state of Alabama's Department of Environmental Management got up to talk. It was a breath of fresh air.

Woods has a lot of opinions. But his take on current events really said it all. Post-event – and at my urging – Woods wrote to me and said, "When players perched higher along in the fiscal food chain, those in the Executive and Legislative seats, decided to make a change in the way money is allocated in the state, my agency discovered what it was like to be one of the less privileged. In fiscal year 2008, we received six million dollars for our yearly operating budget. In comparison with the budgets of other state environmental agencies, this was a very small amount. Yet, by 2013, that already low number was reduced by half. With each successive year, the state funding has continued to dwindle. This year, our full state appropriation is less than $300,000! How will the agency survive? That remains to be seen."

So, it turns out that not all environmental miscues come on the side of the environmental lobby. Many are self-inflicted. Woods' agency is not alone – the fiscal crisis plaguing all of the energy rich (and dependent states) is gutting all of the Gulf States. And, all that BP money? The folks trying to clean up the beaches and coastal waters have to fight every day from keeping it from going into the general coffers.

The Real Truth

Lost in all of this is the herculean job that the maritime industry and its cousins in the oil patch have done to clean up their environmental footprint over the course of past four decades. Oil pollution emanating from tankships and barges alone has decreased by more than 95% over that time frame. That's a fact. But that will never be enough for kayaktivists. Separately, global shipping fights a proposed $26 billion a year CO2 tax, while the renewable energy that could take pressure off the fossil fuel part of the equation languishes because of low energy prices. Heck, it's even dampened the lure of the white knight of LNG. What's a mother to do?

I suppose the most telling harbinger of what is to come next emanated this week from oil major Statoil. Reuters reported that Norwegian Prime Minister Erna Solberg insisted that oil prices are currently too low to spur investments sufficient to meet future energy demands. Solberg continued, "It is difficult to predict future developments in the oil market, but it is evident that the current price level is too low to generate the investments needed."

I'm all for saving the environment, being green and all the rest of it. My kids will tell you about the family "meetings" that take place whenever I find aluminum cans in the wrong trash receptacle. That said; you can count me out when it comes to endangering people's lives for 'the cause.' And, you can count me out when it comes to putting infrastructure, oil & gas and shipping assets in harm's way to accomplish that noble goal. These aren't environmentalists – they are criminals. It is way past time we started treating them as such.

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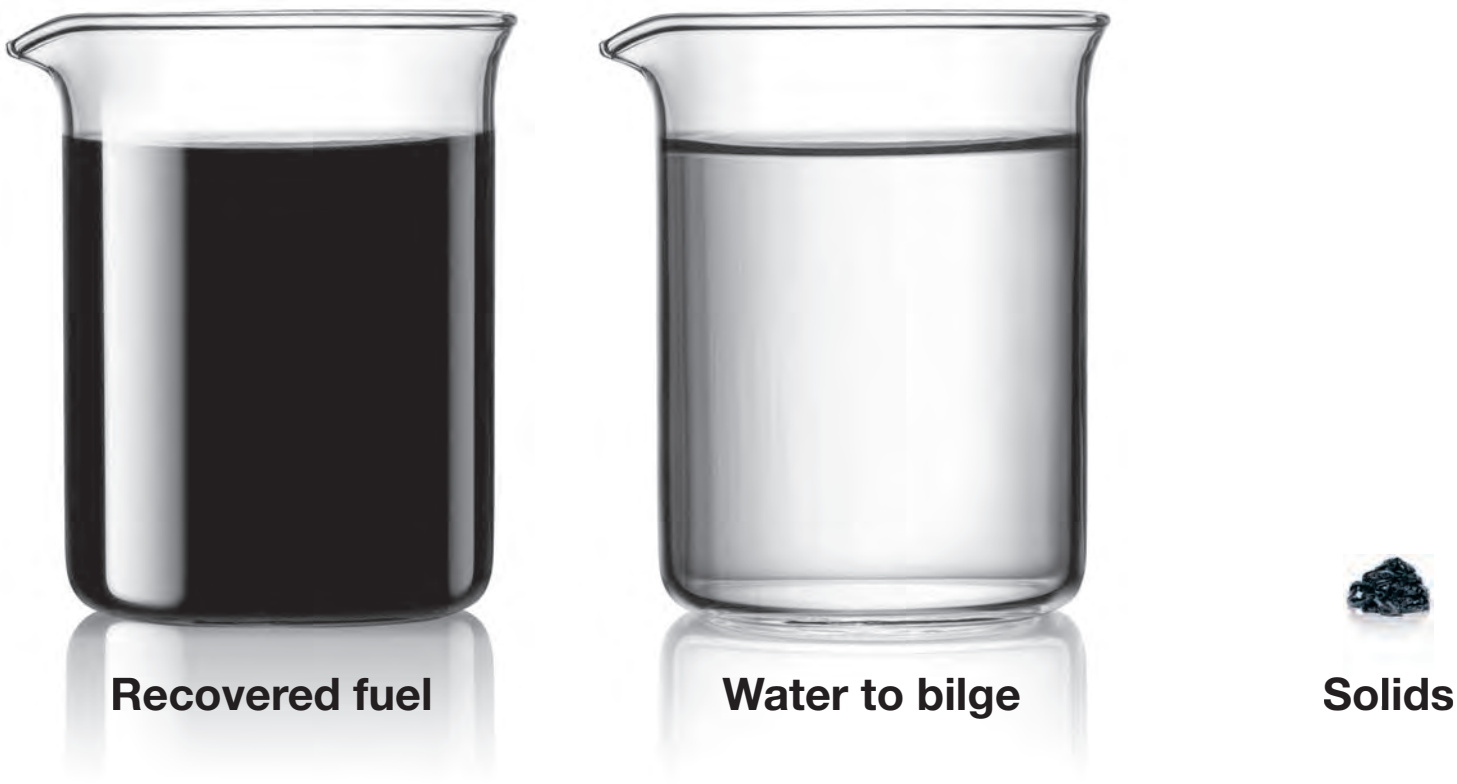

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Arctic Coast Guard Forum

Eyes and Ears Up North

BY DENNIS BRYANT

On October 30, 2015, at the U.S. Coast Guard Academy in New London, Connecticut, the heads of eight agencies fulfilling the functions of Coast Guard of Canada, Denmark, Finland, Iceland, Norway, the Russian Federation, Sweden, and the United States signed a Joint Statement formally establishing the Arctic Coast Guard Forum (ACGF). The ACGF is an independent, informal, operationally-driven organization. It is not bound by treaty, but will work in cooperation with the Arctic Council to foster safe, secure, and environmentally responsible maritime activity in the Arctic region. It will facilitate consultations of the heads and experts of the members, exchange information of mutual concern, best practices, ideas and core principles of joint cooperation development, and joint practical measures on maintaining safety and security at sea.

(U.S. Navy photo/Released)

Sailors aboard the fast attack submarine USS Seawolf (SSN 21) inspect the boat after surfacing through Arctic ice. Seawolf conducted routine Arctic operations.

Decreasing thickness and coverage of ice in the Arctic region has led to an increase in shipping, fishing, resource exploitation, and adventure tourism, issues that the new IMO Polar Code will help address. While Russia has the most extensive government presence in the region, no Arctic nation is fully prepared to address the anticipated changes. Demands for improved and expanded charting, aids to navigation, search and rescue, and pollution response far outstrip current capabilities of any one nation. Cooperation of ACGF members will ameliorate those shortages to some extent. The arrangement also puts meat on the bones of the 2011 Arctic Search and Rescue Agreement, negotiated through the Arctic Council, and provides a way forward for the Council's Task Force on Arctic Marine Oil Pollution Prevention.

The Arctic Coast Guard Forum is modeled on the North Pacific Coast Guard Forum established in 2000 and the North Atlantic Coast Guard Forum established in 2007. These fora meet regularly to share strategies, conduct exercises, and coordinate operations to address transnational threats such as drug and migrant smuggling. Particularly in the North Pacific, joint ship patrols combat illegal high seas driftnet fishing. Members conduct two annual meetings: a meeting of subject matter experts to discuss technical issues and a meeting of senior personnel to address strategic and over-arching issues. There will be two working groups: a secretariat and a "combined operations" group. Plans called for the Arctic Coast Guard Forum to have been created in Canada in 2014, but the Harper government balked due to the Ukraine situation.

There is an operational oil production platform in Russia's Barents Sea, while another is under construction in Arctic waters of the Norwegian Sea. Exploratory drilling in the Chukchi Sea recently stopped, but further drilling in Arctic waters could resume when the price of oil rises. Mining ashore in coastal areas of the Arctic regions of Russia, Greenland, Canada, and Alaska continues apace with the attendant maritime transport operations. While shipping through the Northern Sea Route across the top of Russia has decreased recently, it continues and will undoubtedly grow when ice coverage recedes. The Northwest Passage across the top of Alaska and Canada recently saw the first transit of bulk cargo from British Columbia to Europe. A major cruise line announced that it plans to send one of its non-ice-strengthened cruise ships through the Northwest Passage during the summer of 2016. Other passenger vessels have occasionally made the transit in recent years, including two in 2015.

Maritime operations in the Arctic are not (or at least should not) be for the faint of heart. The waters are not well charted. Aids to navigation are minimal to nonexistent. Search and rescue capability is sorely lacking, as are salvage assets. On 27 August 2010, the passenger vessel Clipper Adventurer grounded in Coronation Gulf, Nunavut while on a 14-day cruise through the Northwest Passage. It had struck an uncharted rock in otherwise deep and open water. The ship was holed and stuck on the rock. While there were no injuries, there was minor pollution, in addition to severe damage to the ship. A Canadian Coast Guard icebreaker on patrol in the Arctic arrived on scene two days later and safely evacuated the 128 passengers and some non-essential crew. The vessel, though, was not refloated until 14 September. Fortunately, fair weather prevailed during this entire period. One should not count on such good fortune during future marine casualties in the Arctic. During a storm on 21 October 2014, an unmanned barge carrying about 950 gallons of diesel fuel broke from the cables of a tug en route Tuktoyaktuk. The barge drifted west, passing about 10 miles offshore Alaska. The Canadian and US Coast Guard's monitored the situation, but had no assets available to bring the barge under control or to respond in the event of an oil spill. The barge was eventually recovered in Russian waters. On 1 December 2014, the South Korean trawler Oryong 501, with 62 persons on board sank in heavy weather in the northwestern Bering Sea off Russia's Chukotka Peninsula. Seven persons were rescued by other nearby vessels, but 55 died. The Russian Border Guard in Kamchatka requested assistance from the US Coast Guard, which launched search planes. Eventually, the USCG planes were replaced by planes of the South Korean Navy.

The United States has no deepwater ports in the Arctic, the nearest deepwater port being at Dutch Harbor, Alaska, part of the Aleutian Island chain. The hamlet of Tuktoyaktuk, Northwest Territories, has a partially protected port opening to the Beaufort Sea. There are several deepwater ports on the east side of the Northwest Passage, but they are lacking in infrastructure. Greenland has various deepwater ports, but these too lack significant infrastructure. Iceland's capital of Reykjavik has an excellent deepwater port and significant infrastructure, as does Norway's port of Tromsø. Svalbard, the Norwegian archipelago in the Arctic Ocean, has an excellent deepwater port, but is lacking in infrastructure. There are a number of seaports in the Russian Arctic, but only Murmansk and Arkhangelsk have significant infrastructure.

Russia is developing a search and rescue capability as it builds up its military infrastructure in the Arctic, particularly on the islands of Franz Josefs Land. Ten search and rescue centers along the Northern Sea Route are envisaged. The US Coast Guard provides limited search and rescue capability in the Chukchi and Beaufort Sea regions during the summer as part of its annual Arctic Shield

deployments. Likewise, the Canadian Coast Guard (as well as Canadian military forces) has assets in the Arctic during the summer, with limited capability during the winter. Iceland and Norway have significant search and rescue capability, albeit somewhat limited in range. The Arctic Coast Guard Forum will facilitate coordination of search and rescue efforts in transboundary areas and in those regions where national coast guards need additional assets.

Both the United States and Canada have committed to enhancement of marine surveys and charting of their Arctic waters, but it is unclear how soon these efforts will be completed. Russia has surveyed much of its extensive Arctic coastal region, although it does not always share the results. Norway and Iceland have extensively charted their coastal regions. Denmark and Greenland have surveyed and charted much of the coastal waters of southern Greenland, but adequate charts for the northern portion of this large island are lacking.

The Obama Administration published a National Strategy for the Arctic Region in 2013. The US Coast Guard quickly complemented this with its Arctic Strategy. The US Navy issued its Arctic Roadmap the following year, laying out national strategic interests in the Arctic. The Navy concedes that it must rely on the Coast Guard for surface operations in ice-covered Arctic waters. The problem is that the Coast Guard has only one operational heavy icebreaker and one medium icebreaker. The Canadian Coast Guard is in only slightly better condition as regards surface operations in ice-covered Arctic waters. Russia has, by far, the most extensive nuclear and non-nuclear icebreaker fleets in the world. President Obama recently committed his Administration to seeking funding for a new USCG icebreaker. Even if that comes to fruition, it will be some years before such a vessel is constructed and becomes operational. Canada has also committed to construction of a new polar icebreaker, but funding has yet to be identified.

The ACGF Joint Statement is operational in nature. It avoids diplomatic issues such as overlapping claims to the Arctic Ocean seabed and to territorial boundary disputes. Interestingly, it allows Members to have joint discussions on security issues, but limits these to operational aspects.

The bottom line is that only Russia has the capability to meaningfully operate in ice-covered waters of the Arctic, and even that capability is limited by lack of search and rescue, environmental response, aids to navigation, and charting assets. The Arctic Coast Guard Forum is intended to coordinate the best use of the limited assets of the eight Arctic coast guards so as to promote safety, security, and environmentally responsible maritime activity in the Arctic. Increased maritime activity in the Arctic is inevitable. The Forum provides a meaningful approach to coordinated action in this important and increasingly busy region.

The Author

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New Roles for Satcoms in Autonomous Shipping

BY ANDREW SIRKETT

Examining some questions regarding commercial autonomous and drone ships, as well as why VSAT currently presents the best solution for the communications and control of such vessels.

The topic of autonomous shipping has been much in the news recently. We have seen, for example, the announcement in September 2015 that Inmarsat has begun participating in the Advanced Autonomous Waterborne Applications Initiative (AAWA) recently launched by Rolls Royce. This initiative is designed to move autonomous shipping from the drawing board to a commercial reality.

The notion of autonomous shipping is fascinating. However many questions regarding the technology, safety and regulation are still very much 'up in the air'. We may well be about to see some rapid technological advancements in ships and how they can be navigated remotely. But many of the realities of sailing crewless ships have yet to be defined.

With that caveat in place, what is required to make autonomous shipping a reality? And, what functions would satcom systems have to fulfill in order to enable such ships to exist and operate?

'Autonomous' vs 'Drone' ships

The terms 'autonomous' and 'drone' shipping have become somewhat interchangeable in the public mind.

A 'fully autonomous' ship would sail without any operational officers or crew. At-sea navigational decisions would be made by the Navigational & Management Computer, interfaced with all electronic navigational aids, with regular and comprehensive data reporting to the ship operator's Control Center. We can speculate that such a ship might sail from the offshore anchorage of its loading port to the offshore anchorage of its destination port, unmanned. A skeleton crew would embark at the arrival port anchorage to safely navigate the ship into and out of port.

A drone ship, on the other hand, while also sailing without qualified officers and crew, would be remotely controlled from the Control Center of the shipping company, (operating in conjunction with the ship's Navigational & Management

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computer).

From the shipping company's Control Center, a drone ship-fleet may be group controlled by qualified senior navigation officers and Marine Electronic / Electrical / Mechanical Engineers. Control of each vessel would be dependent on the constant flow of critical data fed from the vessel to the Control Center.

Maritime broadband communications is considerably elevated in its operational importance, because of the volume of data required to be constantly transferred.

What Will the Role of Satcoms Be?

In order to facilitate the remote operation of drone vessels, data from multiple sources on-board will need to be constantly transmitted from the vessel to the shipping company's Control Center. These high volumes of data will require broadband-capable satcom equipment.

As a minimum, the monitoring and control data would include engine management and control, rudder control, radar scanning and avoidance, speed log, gyro heading, echo sounder depth scanning, GPS and dynamic positioning.

We can also speculate the need for bandwidth-hungry live feed from high definition cameras, providing 360 degrees of visibility from the ship's coning position, back to the Control Center.

Any satellite communication equipment used to fulfill these data transmitting and receiving requirements will need to be capable of high data throughput. For purposes of safety, two or three identical systems may need to be installed, in order to provide the all-too-important communication back-up needed, with each satcom system supported by its own independent back-up power generators.

Today's VSAT (Ku-Band or C-Band) satellite communications currently provide the most suitable means of delivering the high levels of data needed to operate autonomous and drone vessels, using maritime broadband services via satellite, for a fixed monthly cost, that can be easily budgeted for.

How Economical will it Be?

As with all businesses, managing operating costs is crucial to ensure profit-

ability. For autonomous and drone ships, with the costs of running officers and crew gone, other operating costs will significantly rise, and communication costs will be one of them. Anchoring down those communication costs with fixed charges irrespective of fluctuations in the volumes of data transferred and required to control a vessel, makes for an agreeable offering to ship operators.

There are good reasons why VSAT communications has continuously grown in popularity over the past seven years. It is precisely the ability to fix communication costs while being able to expand and contract the amount of data used on-board, which is so appealing, and the broadband service lends itself to allowing shipping companies to extend their corporate IT networks to their ships.

But just how much constant bandwidth will an autonomous/drone vessel require? And at what cost? We can gain an indication by predicting that a 4Mb dedicated service in forward and return directions will be required. Today, that bandwidth costs in the region of $60 - 80k per vessel per month. That's probably the cost of employing six to eight European navigating and engineering officers, including the Captain and Chief Engineer. Allowing for the fact that a shipping company probably employs 3 officers per position to provide cover for 12 months, then the cost efficiencies of remotely controlling vessels can start to make financial sense, despite considerable supporting costs that will also have to be introduced.

Broader Features

When considering a supplier for maritime VSAT services today, ship operators should look for providers that can offer extensive satellite coverage, offer an extensive range of broadband packages, manage their own allocation of managed bandwidth, and rely on their own numerous 'Teleports' to connect vessel networks to global internet services. Add to this, essential 24-hour dedicated support from network operation staff and worldwide regional service centres.

Certain providers are now developing partnerships with satellite operators to offer new High Throughput Satellite (HTS) services, improving bandwidth availability without increasing the service cost.

Additionally, continuous improvements in the field of data compression are playing a part in improving data transfer efficiency.

Initial Applications of Drone Ships

The commercial ship types that will be most suitable for operating autonomously or as drones, must be those transporting stable, non-hazardous cargo. So, taking the lead will be dry bulk cargo vessels with cargos, which will have neither maintenance or monitoring needs during transportation.

Unstable, flammable and explosive cargos such as gas, chemical and oil products are unlikely to be considered suitable. Not only do such cargos need to be carefully monitored, but immediate manned intervention on-board is essential to manage any potential dangers that may arise.

Few companies will take on the liability of transporting hazardous cargo within unmanned shipping. The risk of litigation and negative exposure resulting from an environmental disaster following a collision or sinking would be unthinkable.

Subsequent Applications in Other Ship-operation Markets

The subsequent expansion of autonomous and drone vessels into other shipping sectors will be totally dependent on the safety record of the early up-takers, and the precedent set with regard to the level of financial efficiencies achievable.

Looking at OSVs and workboats as an example, these ships 'could' be built for use as drones but the complexity and danger of close-quarter maneuverings of such vessels in heavy seas close to other vessels or platforms is likely to always warrant skilled navigational staff.

These types of vessel need to be manned at sea with sufficient cargo handling personnel to fulfill their functionality as workboats in support of oil, gas and windfarm platforms. I would argue it unthinkable that any ship would sail with personnel on-board but without qualified navigational officers to implement safe vessel operation and discipline on-board.

Timescales and Regulation

For the next 10 years, autonomous/drone ships are likely to be purely experimental, until existing maritime regulations are amended and new regulations are introduced to accommodate the pioneering ship technologies required.

By 2025, there may be sufficient technological development and regulatory guidelines in place to allow the first non-experimental autonomous/drone ships to be designed and planned for build and launch during the 2030s.

To move autonomous/drone ship development forward a radical review of regulations relating to, international shipping, safety of cargo at sea, and port safety must take place.

Conclusion

Industry views on autonomous/drone shipping are mixed. Interesting and exciting as it is to consider a small but growing sector of the worlds shipping being remotely navigated from port to port with no personnel on-board, the shipping community is generally conservative. A reluctance to embrace such technological advancement in ship navigation and control can be expected.

However, consideration must be focussed on ensuring that the design of these new ships not only accommodates today's existing maritime regulations but anticipates those which may need to be implemented specifically for unmanned vessels. It will, after all, be the maritime regulatory bodies that determine the speed with which autonomous/drone vessels are introduced to our seas, not the technology. Ultimately though, it will be the operational increased profitability of using autonomous/drone ships, over those which are fully crewed, which will determine whether shipping companies ever take the huge step of investing in this technology.

The Author

Andrew Sirkett is Maritime Commercial Manager at satellite communications provider NSSLGlobal Ltd.

It's time to end the MARPOL Merry-Go-Round

BY CLAY MAITLAND

Hardly a month goes by when another illegal maritime dumping violation is reported. Most violations, prosecuted in the United States, are based on false or fraudulent entries in the oil record book of a foreign-flag ship. Often, evidence of a "magic pipe" installation is found upon inspection in a United States port. While not all such reported cases are successfully prosecuted, most are, with the help of a whistleblower aboard the ship.

The steady stream of such violations is convincing evidence that prosecution alone is not an effective deterrent. Over the years, various complaints have been made: there aren't enough accessible reception facilities for oily wastes in U.S. ports, notably in the Gulf ports; or oily water separators are inadequate, or imperfectly understood by the vessel's engineers. Whether or not various explanations are accepted, the big problem from the point of view of flag state and coastal state administrators is that there is no such thing as a body of reliable statistics. A British prime minister, Benjamin Disraeli, inveighed 150 years ago against "lies, damned lies, and statistics". We've gotten better at gathering reliable data in years since. Today, we all think of ourselves as data wonks.

As Chairman of the North American Marine Protection Association (NAMEPA), I get to hear many sea stories. As I am now about to celebrate my 40th anniversary with International Registries, I have a long historical memory of oily water separator stories. It must be remembered that MARPOL was a long time being born, and it was the almost forgotten AMOCO CADIZ wreck on the French coast in 1979 that gave the Convention, and its first Annex, the necessary push to be adopted at the International Maritime Organization. The problem is that each individual oily waste dumping case lacks the dramatic impact to bring about a more effective drive to discourage these violations. So, the dumping and the oil record book misdeeds go on … and on.

Several things are needed to bring this tragicomedy of enforcement without prevention to an end. First, we need to stop kidding ourselves into believing that there is adequate access to port waste reception facilities at terminals on the Gulf coast of the United States. There isn't.

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prosecution alone is not an effective deterrent.

Over the years, various complaints have been made: there aren't enough accessible reception facilities for oily wastes in U.S. ports, notably in the Gulf ports; or oily water separators are inadequate, or imperfectly understood by the vessel's engineers.

Second, federal intervention is needed to determine why this lack of effective access exists. It may well be that it is too expensive, or politically risky, to get rid of oily and other toxic/hazardous wastes once they are ashore. It may also be too expensive, because terminals charge too much. Or, it may be that terminals reserve their services for favored clients. In other words, there needs to be a federal probe. This, properly, is the job of the U.S. Department of Justice; it isn't enough to simply prosecute a certain number of alleged MARPOL violations, and consider it a job well done. Environmental protection at sea, as ashore, can't be a "check the box" exercise in bureaucratic procedure, even if it brings a gratifying revenue stream to Uncle Sam.

We should also be concerned that by far the majority of defendants in these cases are foreign seafarers, often very far from homes and families, confined in the United States in a form of house arrest. This is not to suggest that environmental crimes should be forgiven; it is, however, important to view prosecutorial zeal with a degree of detached impartiality. In only a handful of cases has any effort been made to bring senior executives ashore to account in a court of law. We can and should be skeptical of the notion that chief engineers are saving the company they work for all those terminal discharge fees, without anyone in the executive suite knowing what's going on. So, the merry-go-round continues, while government and industry look, just a little bit, the other way. Is it too much to ask that a thorough investigation be launched by the Environmental Protection Administration (EPA), the Department of Justice (DOJ), and the Coast Guard?

All of this is another way of asking whether our laws, including OPA '90, of which MARPOL is a part, actually work as they should. When there is a major oil spill in or around U.S. waters (see: Deepwater Horizon), it's a federal case. We need to make sure that the MARPOL merry-go-round is not an excuse for a business as usual attitude.

The Author

Clay Maitland is the Co-Founder and Chairman of the North American Marine Environment Protection Association (NAMEPA) and Managing Partner of International Registries Inc. (the Marshall Islands Ship Registry).

Tankers & Bulkers

& the increased need for software solutions

BY HENDRIK BRUHNS

Tankers

IMO/adopted guidelines for the mandatory carriage of damage stability verification instruments (software, computers, etc.) onboard all (new and existing) tankers beginning in January 2016.

IMO

IMO has adopted guidelines and applicable IMO Code amendments for the mandatory carriage of damage stability verification instruments onboard new and existing tankers. Amendments to MARPOL Annex I, BCH Code, IBC Code, IGC Code and to the Survey Guidelines under HSSC to mandate the provision of a computer program capable of calculating the applicable damage stability requirements were agreed. The approval generally applies to the software, but may include hardware, for example, when the instrument receives input from sensors for the contents of tanks.

New tankers will need to comply on delivery and existing tankers will need to comply at the first scheduled renewal survey after 1 January 2016 (1 July 2016 for Gas Carriers) but no later than 1 January 2021.

The Issue

All tank vessels on international voyages must meet the International Maritime Organization's (IMO) requirements for damage stability. These regulations are contained in the MARPOL Convention for general purpose tankers, the IBC and BCH Codes for bulk chemical carriers, and the GC and IGC for gas carriers.

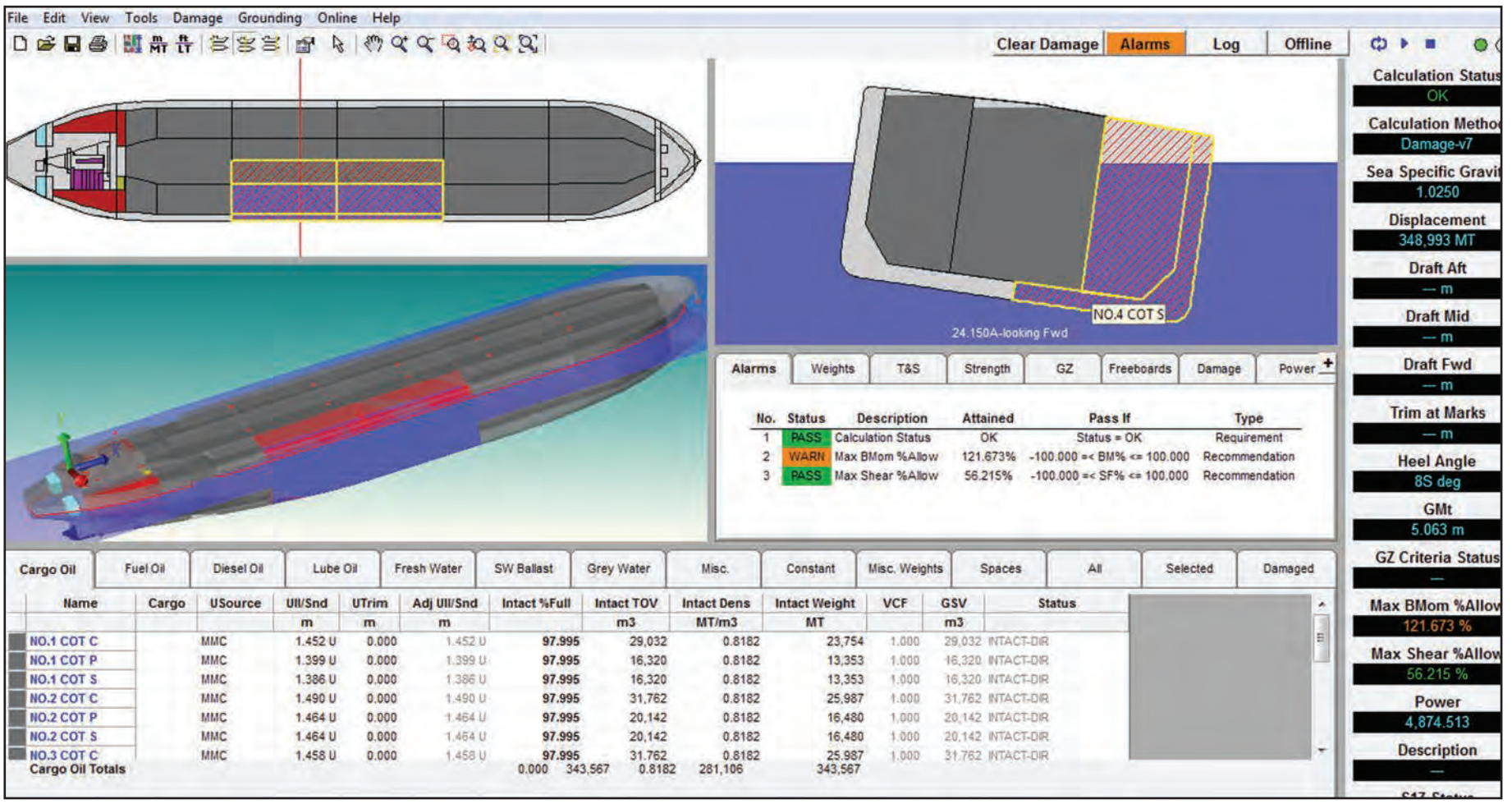
In 2005 several Port States, led primarily by the UK's Maritime and Coast Guard Agency (MCA), recognized that many tank vessels had onboard documentation to demonstrate compliance with these damage stability requirements only when the ships were loaded in accordance with the ships standard loading conditions in the approved Stability Booklet or Loading Manual. However, during actual operations many tank ships are loaded to conditions which significantly differ from these standard loading conditions. A survey by the MCA indicated that "more than 50% of vessels are operating in conditions which are not in the approved Stability Information Booklet."

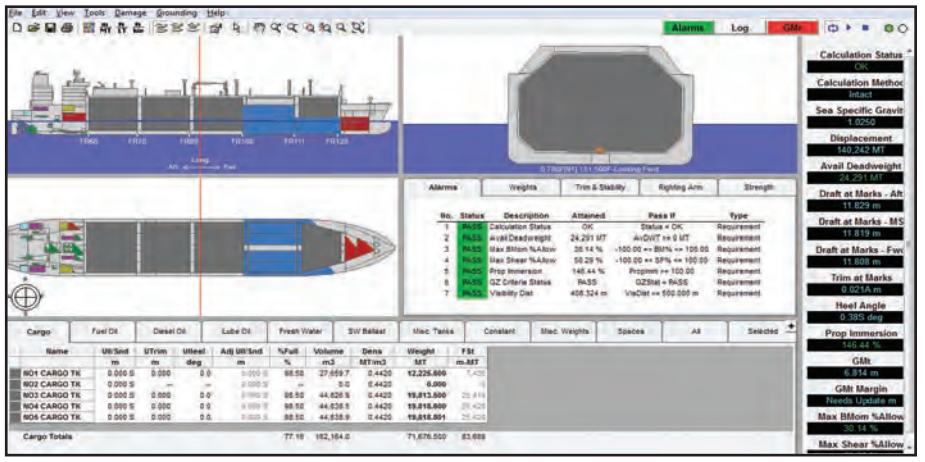
In 2010 the Paris Memorandum on Port State Control carried out a Concentrated Inspection Campaign to verify correct damage stability on oil tankers, chemical tankers and gas carriers. The reasons for this Concentrated Inspection Campaign included that inspections showed tankers frequently sailing when not complying with damage stability requirements or had no means of assessing damage stability or were sailing in a loading condition not covered by the approved Stability Booklet or Loading Manual. The Concentrated Inspection Campaign Report stated; that a significant number of tankers during a "spot check" could not show compliance with stability requirements and thus may pose a risk to the environment. It is generally understood that since most tank vessels use computer programs to evaluate stability and strength for any loading condition, there no longer is a practical incentive to stay with the standard loading conditions.

Special Dispensation

The Flag Administration may give special dispensation from the provisions of a stability instrument in the following instances:

- tankers where stability is remotely verified by a means approved by the Administration;
- tankers on a dedicated service, with a limited number of permutations of loading such that all anticipated conditions have been approved;
- tankers which are loaded within an





approved range of loading conditions; and

- existing tankers provided with approved limiting KG/GM curves covering all applicable intact and damage stability requirements.

The Administration should take into account the Guidelines for the approval of stability instruments(MSC.1/Circ.1229) when reviewing them.

Stability software should be approved, but hardware approval is not mandatory and can be covered by national standards.

Commentary on Compliance

Limiting the number of loading permutations or range of loading is not a practical operational restriction for many, if not most, tank ships. Practical reliance on gaining voyage specific approvals on a timely basis may also be a burden to both the operator as well as the national administration, and may limit operational flexibility.

Many ships are currently operating effectively and safely, using approved limiting KG/GM curves, covering all applicable intact and damage stability requirements. For this type of system the limiting KG (or required GM) curves vs. draft are pre-developed and pre-approved, and would typically be added to both the Stability Booklet and the loading computer. This would normally insure compliance with both the damage stability and intact stability requirements. However, in practice, these curves are complicated and expensive to produce, and also have other application and enforcement concerns as noted in MSC 82/18/3, "because of the need to consider all possible loading and damage combinations and any associated limiting provisions such as tank filling ratios. The resulting stability books may be complex and not easily applied by ships' officers and Port State control inspectors". For these reasons Herbert-ABS Software Solutions LLC (Herbert-ABS), generally does not recommend this approach.

The best practical solution is to fit onboard damage stability verification instruments on all tank vessels as required. A direct damage stability loading instrument provides a solution that will make it easy to demonstrate compliance with the damage stability requirements to the Port State authorities for any cargo or ballast distribution.

The Solution

The use of an approved computer program, to verify that the non-standard loading condition complies with the damage stability requirements, can be readily applied to new ship loading computers or implemented as an upgrade to existing loading computer programs.

Loading computer programs with this feature are generally referred to as "IACS Type 3 Loading Instruments" as specified in IACS URL 5 (applicable for new buildings since July 2005), which define Type 3 as "software calculating intact stability and damage stability by direct application of preprogrammed damage cases for each loading condition."

Herbert-ABS' CargoMaxTM loading computer with the Direct Damage Stability (DDS) module fully meets the requirements of IACS URL 5, Type 3, for any type of tank vessel. It demonstrates compliance with the damage stability requirements for any of the relevant regulations from IMO and national administration for any type of loading or ballast loading. It can also be used to demonstrate this compliance to Port State inspectors or vetting surveyors.

Pre-existing Onboard Software

Loading computer software previously approved for stability can be classified as one of three types as defined by IACS UR L5:

- **Type 1 software** calculates intact stability only through the use of an intact required Max GM/ KG curve.
- **Type 2 software** calculates intact stability and checks damage stability using a combined intact and damage stability required GM/Max KG curve.
- **Type 3 software** calculates intact stability and damage stability by direct application of preprogrammed damage cases for each loading condition (DDS). Determining which software type an ex-

isting CargoMaxTM falls under may not be clear through the existing approval documentation.

It is not always straight forward to determine the URL5 type. The first place to check is the software's class approval letter. If the approval letter states that the approval is for 'intact strength only' then the software was not previously approved for stability and is not classified as a URL5 type software. While the loading program likely has either an intact only or intact/damage required GM curve, the stability portion of the program was not reviewed or approved by the classification society. If the approval letter mentions stability approval, then the software can be classified as one of the three types.

Most recent approvals mention the software type in the approval letter. However for software delivered prior to 2004 as well as for some more recent deliveries, the approval letters do not mention the type. If this is the case, the software type can be determined by review of the loading program and the vessel's Trim and Stability booklet or Loading Manual. In the loading program documentation, an inspection of the Required GM curves and calculation options could reveal the type. If the option to 'Calculate Direct Damage Required GMr' is available, then this software has Direct Damage Stability calculations enabled (DDS) and is considered Type 3. If not, then the software likely utilizes either an intact only or intact/damage required GM (or max KG) curve. The name of the curve can sometimes be taken from the program by looking at the Trim and Stability summary. If the curve is labeled 'Damage' then this program is a Type 2. The type of Required GM curve used can usually be found in the ship's Trim and Stability Booklet. If the Required GM curve is derived based on intact stability criteria only, the software is Type 1, but if the Required GM curve incorporates both intact and damaged stability, then the software is Type 2.

Bulkers

Damage Stability Requirements for Bulk Carriers

Introduction:

The great majority of bulk carriers are designed to the reduced B-60 freeboard, Type B freeboard, minus 60% of the distance to the Type A freeboard. With this reduced freeboard, the ICLL66 convention, Reg, 27, requires compliance with a fairly conservative damage stability standard only at the summer loadline draft. These regulations specify a 1-compartment damage, with the holds loaded at their 100% homogeneous load VCG, and a permeability of 0.90. This is usually considered by a 'design only' requirement and once the damage analysis for all 1-compartment damage is met for this design case, operationally, the ship is not required to meet any damage stability requirements.

There are two other interesting cases where other damage stability regulations apply:

Bulk Carriers with Type B Freeboards

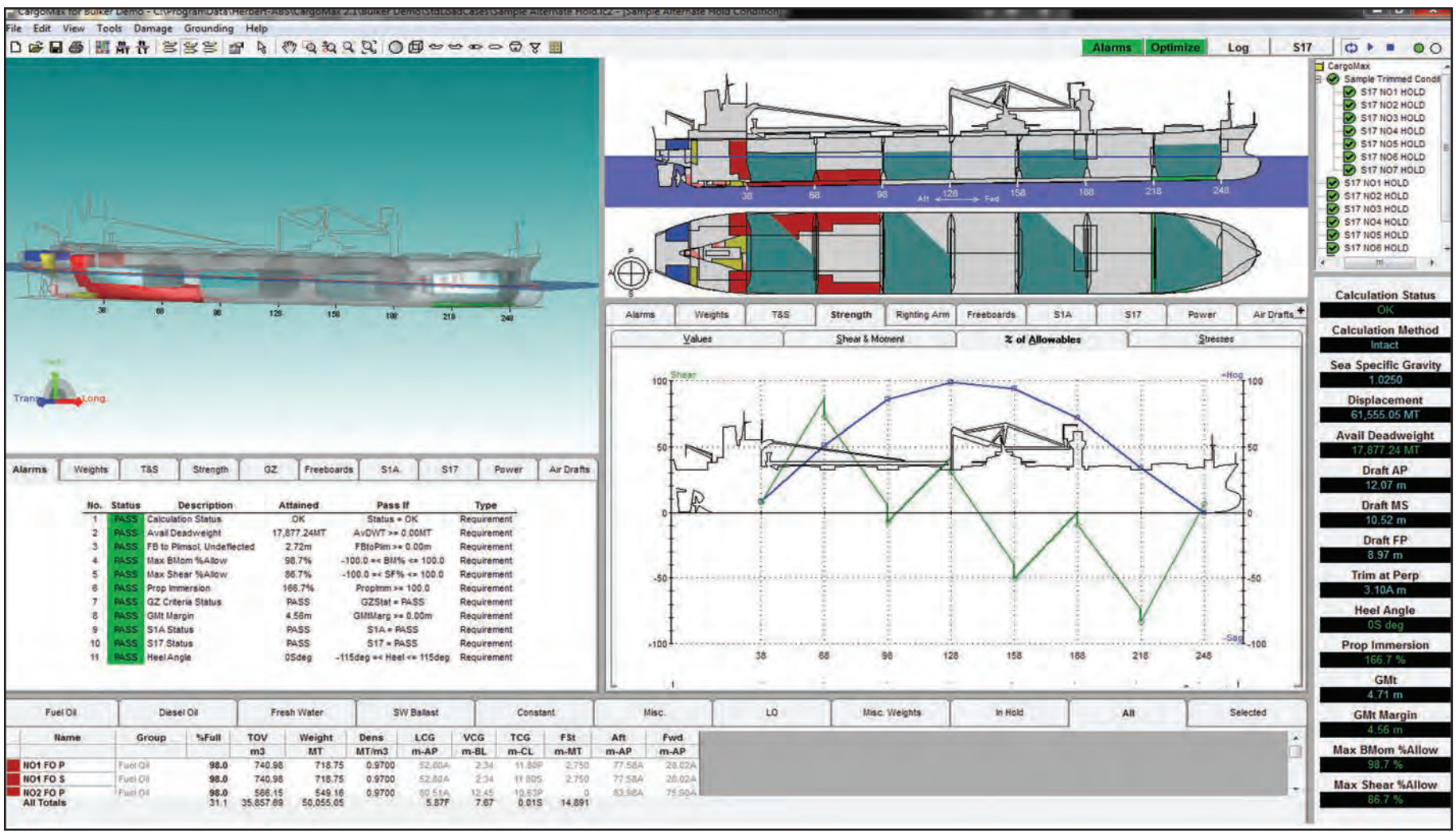
Type B ships constructed before February 1992 were not required to meet any damage stability standards. However, all Type B ships constructed after February 1992 are required to meet the SOLAS Ch. II-1, Part B-1 probabilistic regulations, unless they are covered by other regulations (such as Reg. 27 of the ICLL).

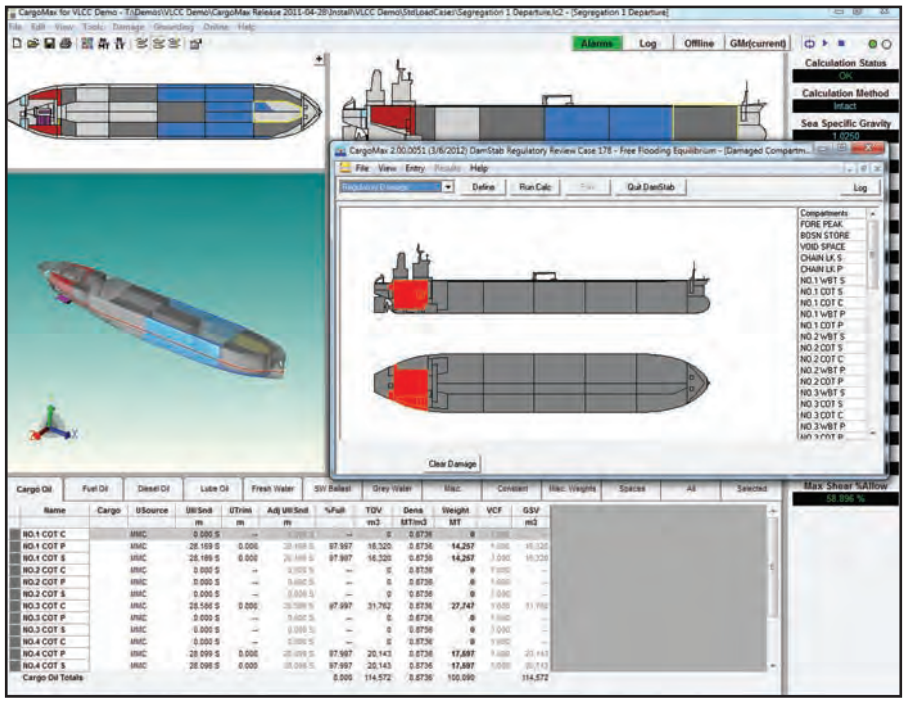
New retroactive requirements for bulk carriers came into force as part of SOLAS Ch. XXI. Regulation 4 of this chapter covers the new damage stability requirements, which must be met for bulk carriers constructed after July 1999, flooding each individual cargo hold. This can be considered the damage stability equivalent of the S17 hold flooding structural requirements.

It should be noted that ships meeting ICLL Reg. 27, the B-60 freeboard ships, are exempt from the new Reg. 4 requirements, so this essentially only applies to the minority of bulk carriers with only Type B freeboards.

The Reg. 4 requirements were originally considered to be a 'design only' requirement, in order to fulfill the obligation of producing a design study to demonstrate compliance with Reg. 4, which included damage of each individual cargo hold (at a permeability at 0.90), at the loadline draft, at a GM of 0.40m, and a range of trims. This was not recommended by class and they commented as follows:

"Separate design calculations in accordance with SOLAS Reg. XII/4 are not recommended as it may introduce trim limits not defined by the designer/ shipyard. Please note that the underlying principle is that the loading computer software shall reflect the re-





quired onboard documentation.

In compliance with classification society recommendations, the "Bulk Carrier DDS" was put to use, which includes a direct damage stability simple run through damage cases for each bulk cargo hold to verify compliance with Reg. 4 damage stability, thereby meeting the ICLL Reg. 27 stability standard. This procedure has been implemented in CargoMaxTM and when required done simultaneously with the S17 hold flooded strength calculations.

Bulk Carriers with Type B-60 Freeboards and Deckloads

Since bulk carriers with deckloads can have a VCG even higher than the conservative 100% full homogeneous CG required by ICLL Reg. 27, these damage requirements are considered to be inadequate and need to be supplemented by the SOLAS B-1 probabilistic requirements, see IACS LL65.

The B-1 probabilistic requirements are generally considered less conservative than the Reg. 27 deterministic requirements. Nonetheless, attention needs to be paid to provision 4 of IACS LL65, which states:

"The KG used for demonstrating compliance with the criteria in 3a (the ICLL Reg. 27 calculations) shall be the same as that used for the criteria in 3b (probabilistic B-1 calculations) at the subdivision loadline."

This means that even if the B-1 calculations with a higher VCG (lower Req. GM) are met, the relatively conservative VCG (high GM) from the Reg. 27 calculations at the deep waterline must still be used. In essence this stipulates that since ships cannot have cargo with a VCG higher than the homogeneous cargo hold, they are prevented from having any significant deckload at the deep waterline. Depending on the Partial Draft Req. GM to meet the B-1 damage requirements, ships can get progressively more deckload at lighter and lighter drafts.

Class has conceded that the Reg. 27 calculations might be easily met for some ships, and the ship in question could meet the ICLL damage stability criteria with a cargo VCG even higher than the homogeneous fully loaded holds. In this case class states:

"Redoing the ICLL Reg. 27 calculation with a lower GM (higher VCG) than required by the standard initial condition in order to use this lower GM for the subdivision draft GM in the probabilistic calculations is an acceptable solution."

The Author

Hendrik Bruhns, Naval Architect, President of Herbert-ABS Software Solutions LLC. Previously he headed the Stability Department of Germanischer Lloyd and has participated in and chaired numerous Committees at IMO.

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Conflicting Objectives in Ship Design

Enviro, Safety Regulations Conspire to Complicate the Marine Classification Business

BY DR. RICHARD KORPUS (PICTURED) & SAHAR FAZLI

"ABS is first and foremost a safety company," says Richard Korpus, "but safety can arise on many different fronts. It can refer to the safety of a high-valued asset, for the people who work on that asset, for the environment where the asset operates, or even for the financial security of the owners and operators of that asset."

Dr. Korpus is Chief Scientist, Computational Fluid Dynamics (CFD) for the American Bureau of Shipping. In this role Korpus supports the Chief Technology Officer (CTO) and underlying organizations through a focus on developing and applying CFD technology. He believes CFD has the potential to change how some of the most challenging problems in marine and offshore classification are solved in the future.

"This organization has a reputation as an industry leader, and we're using CFD to extend that reputation by offering state-of-the-art services new to the classification business," said Korpus. In this article, the reader is introduced as to how CFD is changing ABS' marine technology business by providing designers, owners and operators a means to improve vessel fuel efficiency, lower environmental impact, and maintain the highest level of safety.

CFD Supports a Proactive Business Model

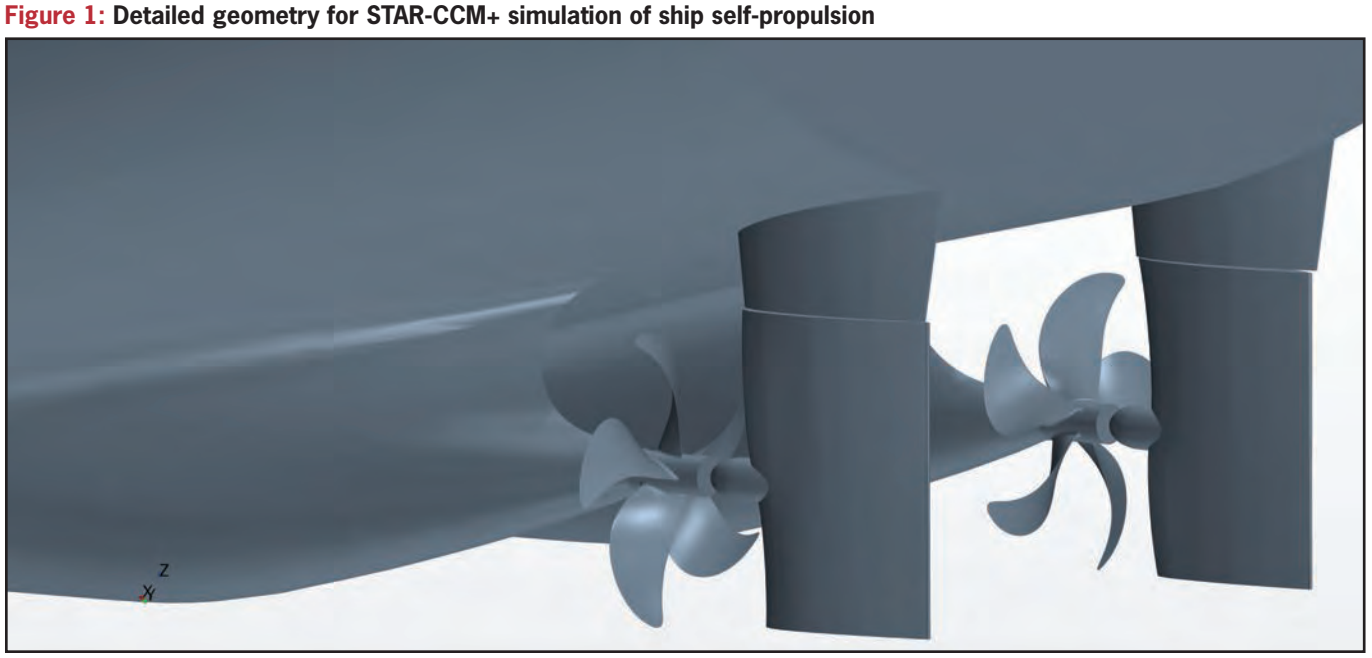
Shipping is the lifeblood of the world economy carrying 90% of international trades worldwide. A variety of organizations, including the International Marine Organization (IMO), national Coast Guards, and regional Port Authorities, impose regulations to ensure the safety of cargos, people, and the environment. These regulations change regularly, and a Classification Society needs to react quickly. When combined with ship owners' continued motivation to minimize operating cost, it is becoming essential that every sector of the marine industry find efficient design strategies to satisfy environmentally-friendly and safety regulations. The net effect is an enhanced competitiveness where innovative solutions are essential to survival. Examples of new challenges include: optimizing hull resistance and propulsive power; deployment of biodegradable oils to lower the risk of water contamination; development of Energy Saving Devices (ESDs); and methods to "scrub" engine emissions. Each of these innovations comes with its own business and technical challenges, and ABS has chosen to respond proactively by investigating solutions before their clients encounter difficulties. CFD is an essential part of that process.

One timely example is the increasingly demanding environmental regulation known as the Energy Efficiency Design Index (EEDI). The index is a means to enforce reductions in greenhouse gas emissions, but in conjunction with owners' desires to minimize fuel consumption may push designers to install less powerful propulsion engines. Since total installed power is an important variable for the safety of ships in bad weather, the requirements for low emissions and safe power margin could come into conflict. ABS is taking a proactive role in helping to avoid such conflicts by using CFD to quantify minimum safe levels of power.

Being proactive (as opposed to reactive) requires an engineering approach built on pre-established CFD "best practices" to minimize response time. Best practices typically focus on a single class of CFD application, but at ABS these are motivated by the more practical business objectives of class customers. Practices exist to guide development of ships and platforms to be more environmental, safer, fuel efficient, and cost-effective. Typical CFD-related service offerings include:

- Guide hull and propeller design to minimize operating cost
- Ensure safe power margins are maintained as installed power is decreased
- Ensure adequate maneuvering and dynamic stability margins are maintained
- Assist propeller shaft and stern tube design to avoid bearing damage
- Assist selection and improvement of Energy Saving Devices (ESDs)
- Provide structural load estimates due to sloshing liquid cargoes
- Provide structural load estimates imposed by extreme wind and wave events
- Guide cargo distribution to minimize motion, structural loading, or slamming in a seaway
- Advise operators about the most fuel efficient cargo distribution and operating trims
- Develop procedures to minimize boil-off of Liquefied Natural Gas (LNG) cargos
- Guide redesign to accommodate the trend towards slow steaming.

Figure 1: Detailed geometry for STAR-CCM+ simulation of ship self-propulsion



Best practices help ABS customers and prospective clients look ahead before committing to a particular design. They allow assessment of a design's performance, or its compliance with environmental and safety regulations (such as EEDI), at an early stage of a project. An additional advantage is that Best Practices homogenize the quality of ABS' CFD products and services. Even though they have been using CFD (including STAR-CCM+®) for many years, Best Practices ensure that ABS engineers from different offices, different levels of CFD experience, or with different customer requirements all deliver the expected level of accuracy in a predictable period of time. Consistent quality of results is guaranteed without

spending extra man-hours repeating grid refinement, time step, or turbulence modeling studies.

An example is provided in the next section where best practices for propeller optimization are demonstrated.

Design Optimization

In order to improve a ship's operating efficiency it is necessary to simultaneously address its hull resistance, propulsive efficiency, and engine performance. Each affects the other, and the process is even more challenging when multiple optimization objectives are contradictory in nature. For instance, reducing the main engine size can improve overall efficiency in terms of lower fuel consumption and greenhouse gas emissions, but conflicts with safety-oriented requirements for reserve power. Without adequate reserve power a vessel might have maneuvering problems as wind and wave loads increase in bad weather. In such a case optimization requires a subtle balance between economy and safety -- or at the very least inequality constraints to ensure minimal acceptable values for each objective.

Propeller Design by Full Scale Simulation

Propeller design is one of the most important factors affecting operating efficiency, and yet it has been performed more or less the same way for decades. The problem is indeed difficult because the propeller operates in a hull viscous wake that varies both spatially and temporally. Traditionally a model test is performed without the propeller present. The wake is measured and then extrapolated to full-scale. The result is averaged circumferentially at each radius to provide a steady inflow, and the propeller designed for that condition. But with modern CFD and optimization, it is no longer necessary to tolerate the inaccuracies of extrapolation or steady inflow assumptions. The propeller can be designed or optimized at full scale, in situ behind the ship, even when the wake is unsteady and varies in three dimensions. A design developed using full-scale, unsteady CFD will be more efficient due to accurately accounting for propeller/hull interaction, and can be made to produce less unsteady force (vibration), off-axes loading, and cavitation.

Figure 1 shows a typical self-propelled ship simulation and Figure 2 the types of propeller inflow (hull wake) that results from different modelling assumptions. Figure 2 demonstrates the severity of inaccuracies that are expected when using un-propelled or model-scale test data to predict actual propeller inflow. Note that the model scale wake looks nothing like the full-scale equivalent. Similarly, the normal wake (without propeller) looks nothing like the effective wake (with propeller). A model test provides data like that shown in the upper left figure, but the operating condition for which a propeller should be designed is like that in the lower right.

To demonstrate the advantages of design by CFD, engineers at ABS leveraged STAR-CCM+'s sliding mesh and overset grid techniques to simulate full-scale

Figure 2: CFD predictions of wake: scale effect (left) and propeller effect (right)

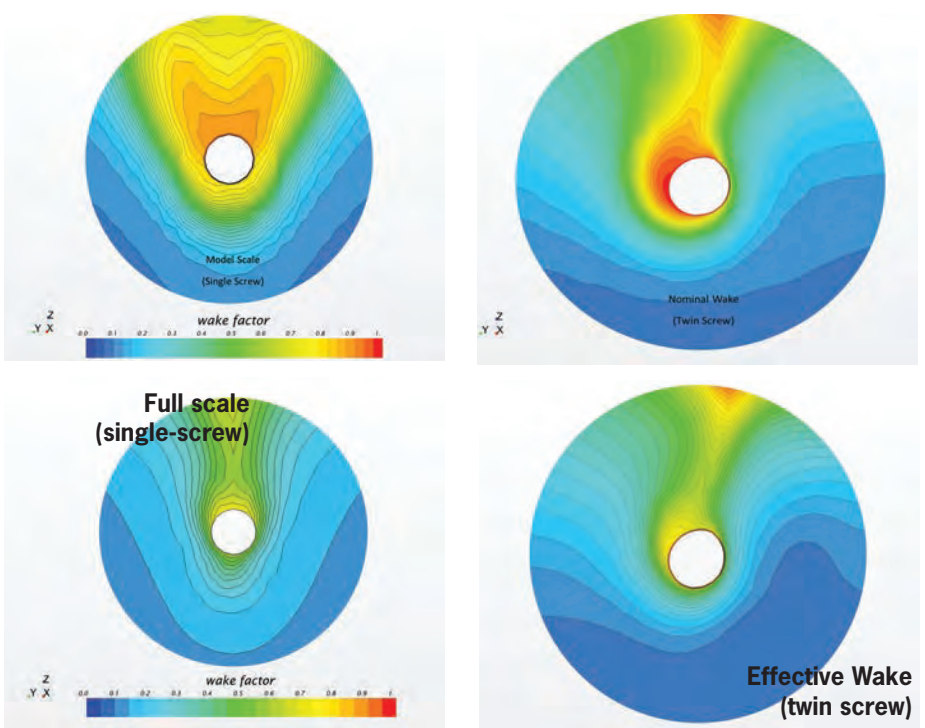


Figure 3: HEEDS' automated process for propeller design optimization

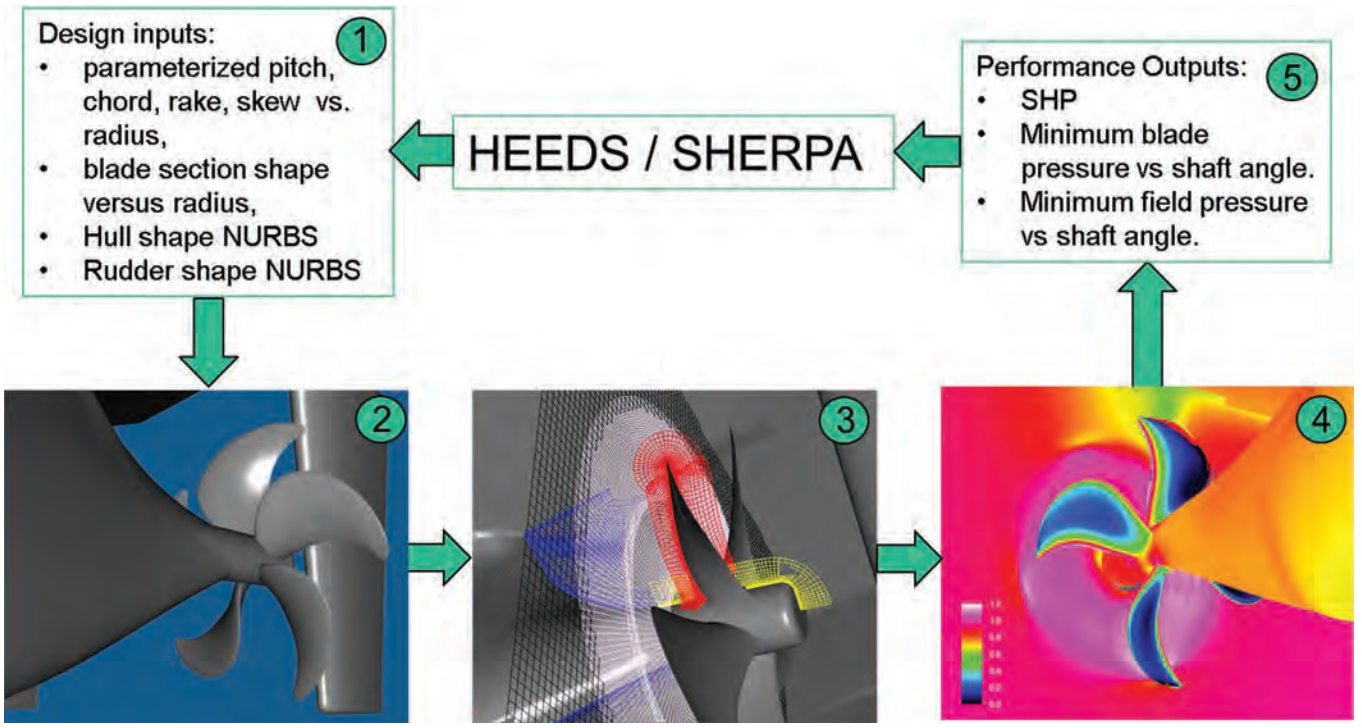
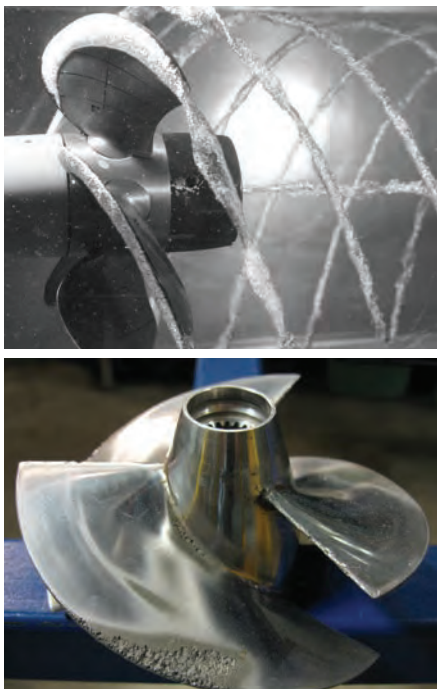


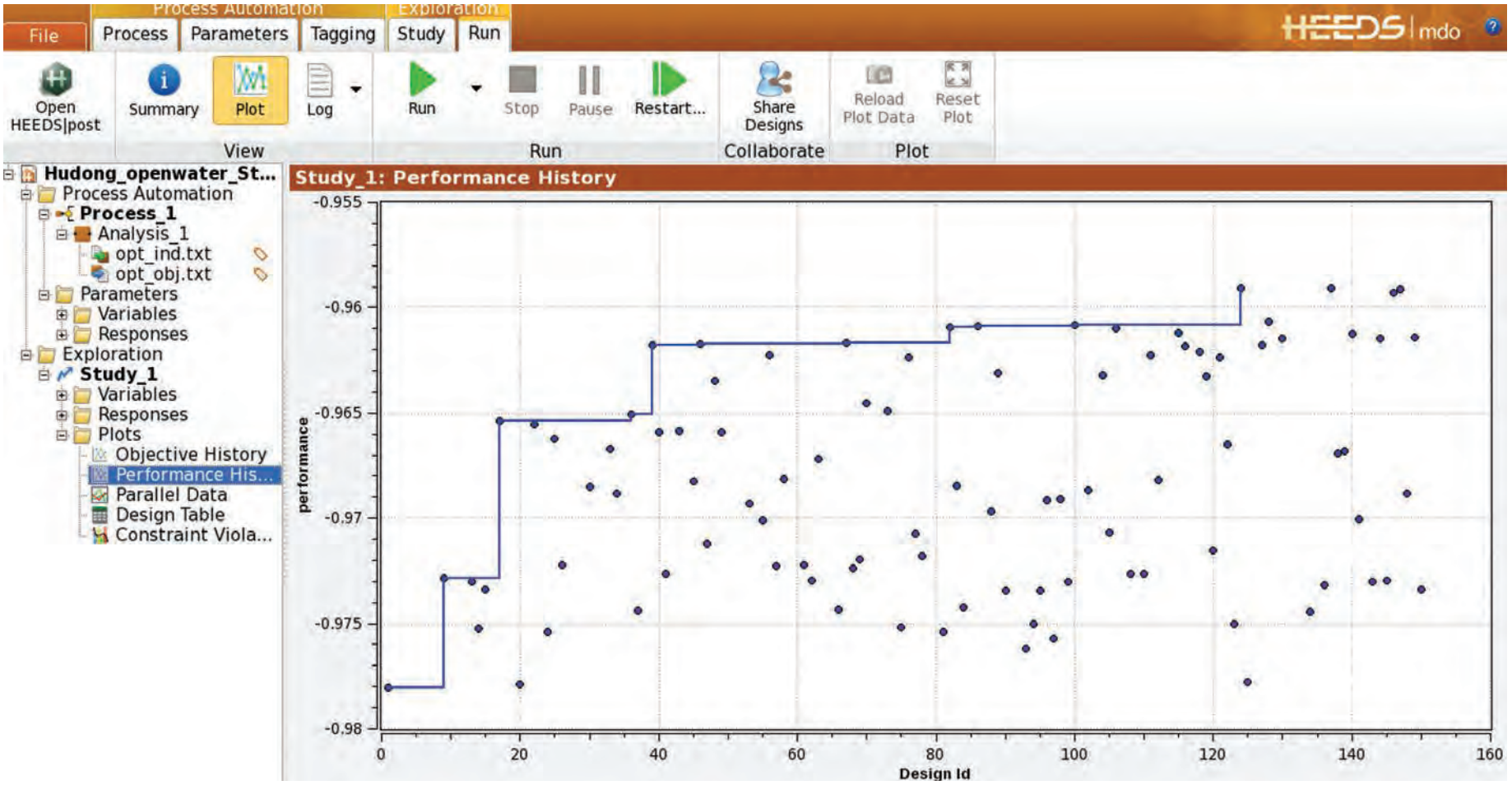
Figure 4: Tip vortex and blade back cavitation (left), and cavitation damage (right)



"For more than 100 years ship designers have built ships using the evolutionary approach – one small improvement per design generation. **Within the last few years CFD has provided a ground breaking technology to enable the revolutionary approach – true optimization for every design generation."**

Dr. Richard Korpus

Figure 5: HEEDS summary of propulsive performance for 150 sample designs



propellers rotating in the actual full-scale unsteady hull wake. CD-adapco's HEEDS optimization package was employed to search through design space, and a variety of parameterizations tested including radial distributions of pitch, chord, rake, and skew. HEED's SHERPA algorithm is employed to find the design with minimal shaft power at a prescribed thrust. The individual software elements are shown in the schematic of Figure 3.

For a real-world design, the story is more complicated because of the phenomenon of cavitation. If pressure falls below the thermodynamic boiling point, water evaporates to vapor. With low enough pressure (such as might be found on a propeller blade at high lift coefficients) this can happen at any temperature. When pressure again increases the process reverses and vapor condenses, sometimes violently. The more violent condensations can actually erode away a solid metal blade. It is also notable that not all "good" designs are created equal. Two blades with equal total lift and drag might exhibit different levels of cavitation depending on the local distributions of pressure. Figure 4 shows an example of cavitation and cavitation damage. ABS design optimizations avoid this problem by checking minimum blade surface pressure for every design and passing the results back to HEEDS for providing an inequality constraint. Excessive cavitation is avoided by not allowing minimum blade pressure to get any less than that of an acceptable baseline design.

Single Objective Approach

The method is demonstrated for a twin-screw LNG carrier at a single speed and cargo load. The hull is left unchanged, and propeller parameterized for varying radial distributions of pitch and chord. Once the base design is solved, HEEDS' SHERPA algorithm uses a combination of population-based and gradient-based optimization methods to explore the whole design space. Each design is tested at multiple shaft speeds, and the objective function (shaft horsepower) is chosen for the speed which delivers the prescribed thrust. Minimum blade surface pressure is found over one complete revolution at the thrust balance point, and the result returned to HEEDS to provide the cavitation inequality constraint.

The level of improvement possible is dependent on how a design is parameterized and on how many design evaluations are permitted. In the present example the radial distributions of pitch and chord are defined by just five parameters and SHERPA is allowed just 150 design evaluations. The baseline propeller was taken from a high-end designer who had already optimized the unit using existing analysis technology. Results are summarized in the HEEDS output shown in Figure 5.

UNITED STATES BANKRUPTCY COURT • SOUTHERN DISTRICT OF NEW YORK

In re OIC RUN-OFF LIMITED and THE LONDON AND OVERSEAS INSURANCE COMPANY LIMITED Debtors in Foreign Proceedings.	In a Case Under Chapter 15 of the Bankruptcy Code Case No. 15-13054 (SCC)

NOTICE OF FILING AND HEARING ON PETITIONS SEEKING RECOGNITION OF FOREIGN MAIN PROCEEDINGS PURSUANT TO CHAPTER 15 OF THE UNITED STATES BANKRUPTCY CODE

PLEASE TAKE NOTICE that on November 16, 2015, Dan Yoram Schwarzmann and Paul Anthony Brereton Evans (the "Petitioners"), the duly authorized foreign representatives of the above-captioned debtors (together, the "Companies") commenced cases (the "Chapter 15 Cases") by filing petitions (the "Petitions"), pursuant to Chapter 15 of title 11 of the United States Code (the "Bankruptcy Code") in the United States Bankruptcy Court for the Southern District of New York (the "Bankruptcy Court").

PLEASE TAKE FURTHER NOTICE that by an Order dated November 19, 2015, the Chapter 15 Cases are being jointly administered for procedural purposes only and all pleadings filed in the Chapter 15 cases should bear the above-referenced caption.

PLEASE TAKE FURTHER NOTICE that the Petitioners are requesting recognition of foreign main proceedings, as well as a permanent injunction and related relief.

PLEASE TAKE FURTHER NOTICE that the Petitioners seek, among other things, entry of an order giving full force and effect in the United States to a crystallization scheme of arrangement (the "Amending Scheme") proposed by the Companies and sanctioned pursuant to Part 26 of the Companies Act 2006 of the United Kingdom, by the High Court of Justice of England and Wales, a permanent injunction and related relief.

PLEASE TAKE FURTHER NOTICE that in addition to the Petitions, the Petitioners filed, among other things: (i) the list required to be filed with each of the Scheme Companies' Petition pursuant to Rule 1007(a)(4) of the Federal Rules of Bankruptcy Procedure (the "Bankruptcy Rules"); (ii) the Statement of Foreign Representative required to be filed with each of the Scheme Companies' Petition pursuant to section 1515 of the Bankruptcy Code; (iii) the Verified Petition under Chapter 15 of the Bankruptcy Code for Recognition of Foreign Proceedings, a Permanent Injunction and Related Relief; (iv) the Memorandum of Law in Support of Verified Petition under Chapter 15 of the Bankruptcy Code for Recognition of Foreign Main Proceedings, a Permanent Injunction and Related Relief; and (v) the Declaration of Joseph Bahlsen Bannister, English Counsel (collectively, the "Supporting Documents").

PLEASE TAKE FURTHER NOTICE that pursuant to the Order Limiting Notice, Scheduling Hearing and Specifying the Form and Manner of Service of Notice, dated November 19, 2015, the Bankruptcy Court has scheduled a hearing (the "Recognition Hearing") for January 11, 2016 at 10:00 a.m. (EST) before the Honorable Shelley C. Chapman in Courtroom 623 of the Bankruptcy Court, One Bowling Green, New York, New York 10004-1408 to consider the Petitions and any responses or objections thereto.

PLEASE TAKE FURTHER NOTICE that any party in interest wishing to submit an answer, objection or response, if any, to the Petitions must do so pursuant to the Bankruptcy Code and the Local and Bankruptcy Rules, including, without limitation, Bankruptcy Rule 1011, in writing describing the basis therefore and filed with the Court electronically in accordance with General Order M-399 by registered users of the Court's electronic case filing system, and by all other parties in interest, on a CD-ROM, preferably in Portable Document Format (PDF), Word Perfect or any other Windows-based word processing format, with a hard copy to the Chambers of the Honorable Shelley C. Chapman, United States Bankruptcy Judge, and served upon Chadbourne & Parke LLP, 1301 Avenue of the Americas, New York, New York 10019 (Attention: Francisco Vazquez) as counsel for the Petitioners so as to be received on or before 4:00 p.m. (EST) on January 4, 2016.

PLEASE TAKE FURTHER NOTICE that all parties-in-interest opposed to the Petitions or the Petitioners' request for relief must appear at the Hearing at the time and place set forth above.

PLEASE TAKE FURTHER NOTICE that if no response or objection is timely filed and served as provided above, the Bankruptcy Court may grant the recognition and relief requested by the Petitioners without further notice or hearing.

PLEASE TAKE FURTHER NOTICE that certain policyholders of the Companies may have a policy written through a broker facility (which includes brokers covers, broker lineslips and binding authorities) and may not know the identity of the insurance company. A full list of known broker facilities is available on the Petitioners' website (www.oicrun-offltd.com). These include, among others, the following: A.B.C. Excess (Aircraft Builders Council); A.B.C. Master Agreement (Aircraft Builders Council); A.I.A.A. Aviation Excess of Loss Reinsurance Agreement (American International Aviation Agency Inc); Alexander Howden Reinsurance Brokers Limited Marine Excess of Loss Pool; C.T. Bowring & Co Aviation Liability Line Slip (B500 Contract); C.T. Bowring General Non Marine Master Cover; C.T. Bowring Marine Master Cover; Hull & Co (UK) Ltd Line Slip HC.013; London Special Risks Liability Line Slip No. LSR056; Price Forbes Brokers Cover; Price Forbes Line Slip; Sedgwick Collins Lloyds Brokers Line Slip; Sedgwick Offshore Resources Master Drilling Rig Line Slip (M.D.R.C); Steel Burrill Jones Oil & Gas Line Slip; Willis Faber & Dumas Brokers Line Slip.

PLEASE TAKE FURTHER NOTICE that at the hearing, the Court may order the scheduling of a case management conference to consider the efficient administration of the case.

PLEASE TAKE FURTHER NOTICE that the Recognition Hearing may be adjourned from time to time without further notice other than an announcement in open court at the Recognition Hearing of the adjourned date or dates or any further adjourned hearing.

PLEASE TAKE FURTHER NOTICE that the details regarding the filing and processing of claims are set forth in the Amending Scheme, and no claims should be filed in these Chapter 15 Cases.

PLEASE TAKE FURTHER NOTICE that copies of the Petitions, the Supporting Documents, and the Amending Scheme Documents are available (1) on the Bankruptcy Court's Electronic Case Filing System, which can be accessed from the Bankruptcy Court's website at https://ecf.nysb.uscourts.gov/ (a PACER login and password are required to retrieve a document), (2) on the Petitioners' website, www.oicrun-offltd.com, or (3) upon written request to the Petitioners' counsel addressed to: Chadbourne & Parke LLP, 1301 Avenue of the Americas, New York, New York 10019, Telephone (212) 408-5215, Facsimile (212) 541-5369, Attention: Francisco Vazquez, fvazquez@chadbourne.com.

CHADBOURNE & PARKE LLP • *Counsel for the Petitioners* • 1301 Avenue of the Americas
New York, New York 10019 • (212) 408-5100 • Attn: Howard Seife, Esq. and Francisco Vazquez, Esq.

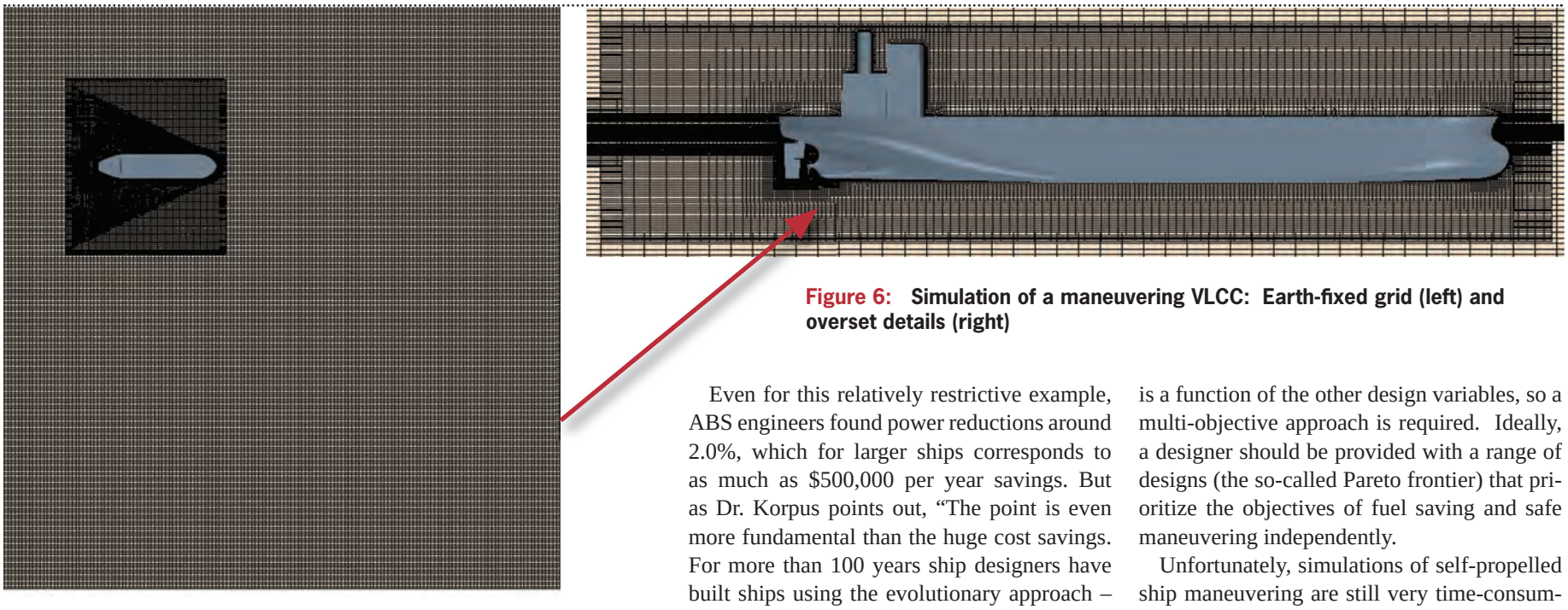
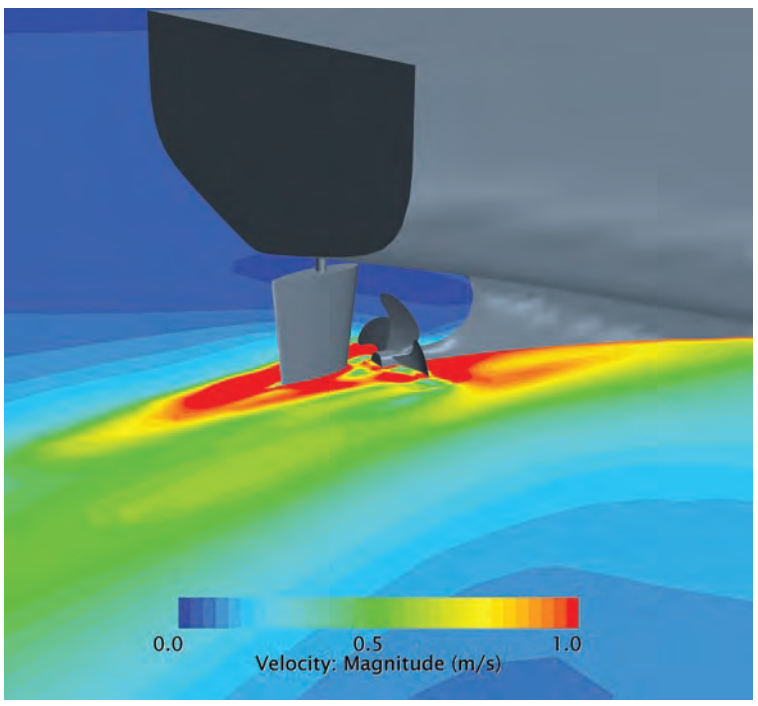


Figure 6: **Simulation of a maneuvering VLCC: Earth-fixed grid (left) and overset details (right)**

Figure 7: **Velocities at depth of shaft during steady turning.**



Even for this relatively restrictive example, ABS engineers found power reductions around 2.0%, which for larger ships corresponds to as much as $500,000 per year savings. But as Dr. Korpus points out, "The point is even more fundamental than the huge cost savings. For more than 100 years ship designers have built ships using the evolutionary approach – one small improvement per design generation. Within the last few years CFD has provided a ground breaking technology to enable the revolutionary approach – true optimization for every design generation."

Multi-Objective Optimization

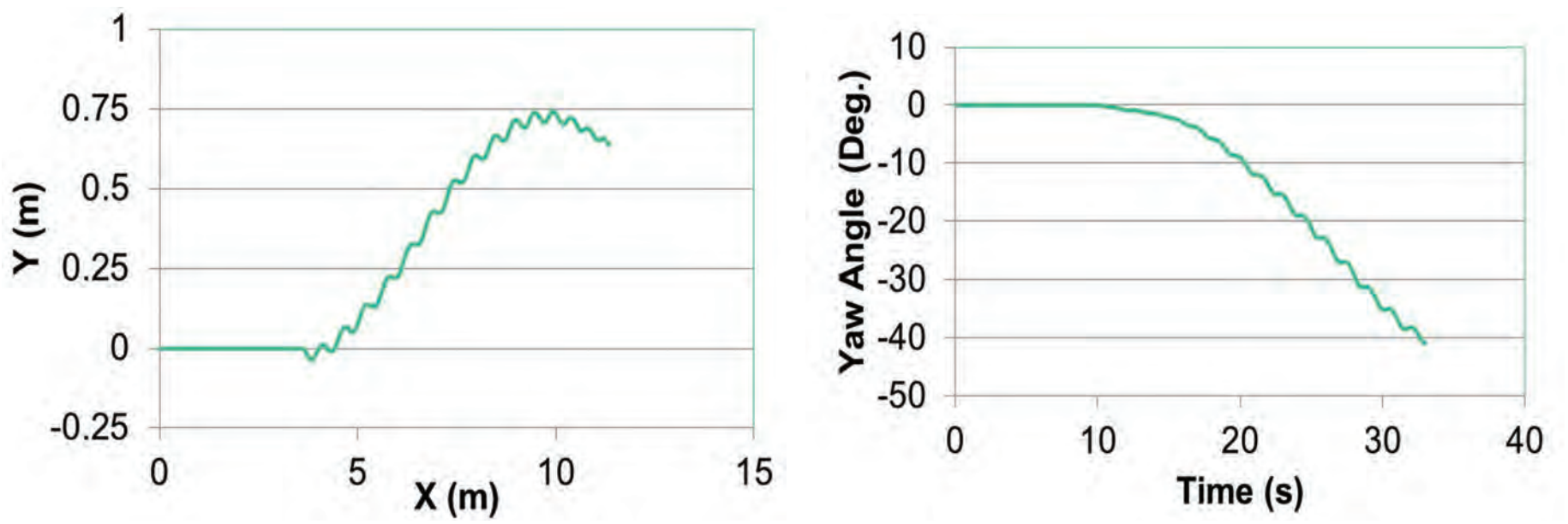
The single-objective approach provides an effective philosophy to identify substantial fuel savings, but does not account for the above mentioned issue of reserve engine capacity for maneuvering in extreme weather. Ship engines spend most of their life operating at a power less than their Maximum Continuous Rating (MCR). But if the propeller and engine are optimized simultaneously, a power plant will be selected with just enough power to satisfy the design condition. Normal operations will require 100% MCR and nothing is left for bad weather. Conventional design wisdom applies a 15% "sea margin" to cover such contingencies, and one might be tempted to just add that margin after the optimization is complete. But in reality the required margin is a function of the other design variables, so a multi-objective approach is required. Ideally, a designer should be provided with a range of designs (the so-called Pareto frontier) that prioritize the objectives of fuel saving and safe maneuvering independently.

Unfortunately, simulations of self-propelled ship maneuvering are still very time-consuming. Even a single maneuver at a single speed in a single wind and sea condition requires many days of computer run time. It is impractical (at this point in time) to incorporate heavy weather maneuvering into a multi-objective optimization. In lieu of this, it is crucial to have a precise understanding of the minimum power margin required in adverse conditions, and also for how that minimum is affected by the other optimized variables. To provide this knowledge the CFD group at ABS conducts maneuvering simulations in various sea conditions and power settings. Typical rudder motions are applied and STAR-CCM+'s DFBI capability is used to predict the ship's trajectory. A given level of power is considered safe if the vessel can turn and accelerate under the prescribed rudder motion. The goal is to build a database of acceptable sea margins that can be applied until the multi-objective approach becomes more viable.

Alternative to Multi-Objective

Developing this database requires a huge

Figure 8: **Typical maneuvering trajectory (left) and yaw angle (right)**



number of simulations. A variety of different ship types and sizes need to be tested over a range of weather conditions. In each case a range of power settings have to be applied to identify the point at which a vessel can no longer maneuver in the prescribed weather condition. The approach is demonstrated using a generic Very Large Crude Carrier (VLCC) trying to turn in 5.5 meter beam seas and 37 knots of side wind. Figure 6 shows the overset grid in a large background earth-fixed domain with a total of 7M trimmed hexahedral cells. The simulation starts with the ship at low speed and straight rudder to build fully-developed Kelvin and viscous wakes. The vessel is free to move in six degrees-of-freedom so the effects of added resistance and lost propulsive efficiency are included. Once the wakes are developed (and propeller forces stabilized), the rudder is put over 20 degrees and the power increased to full.

Simulations are conducted at different power levels under both full load and ballast draft conditions. If the prescribed maximum power is acceptable, the vessel accelerates under the influence of its own propulsive and rudder forces. At power levels below some point the ship can no longer overcome forces and moments imposed by the wind and waves, and just blows sideways. Figure 7 shows an example where the power is sufficient for a complete turn, whereas Figure 8 shows the trajectory from a vessel with lower maximum power. Note that in Figure 8 the vessel is seen to drift three-quarters of a boat length to leeward before starting to recover distance back to windward. The small high speed oscillations superimposed on top of the curves are due to vessel motions over individual waves. It is interesting that even though the turn rate (yaw angle versus time) becomes steady about half way through the simulation, the vessel is only just managing to halt its slide to leeward near the end of the simulation. The maximum power used for this second example might be considered close to the minimum safe amount.

Summary

CFD has become a practical tool in all from the technical point of view, but from the business point of view as well. It enables a proactive approach to solving client problems, and provides the means to revolutionize a maritime industry that is traditionally evolutionary in nature. ing a reality, and even though some problems may still be time-consuming (e.g. maneuvering in a seaway), CFD can be expected to play an increasingly prominent role in the marine and offshore business sectors.

The Author

Dr. Richard Korpus is Chief Scientist for the American Bureau of Shipping (ABS), where he is responsible for integration and quality control of CFD services worldwide. Since joining ABS in 2013, Dr. Korpus has matured CFD into an essential part of ABS' technology offerings, and developed new client services to ensure ABS remains ahead of the competition. CFD is now used over a wide range of marine and offshore applications to support customer requests to increase operating efficiency, enhance environmental performance, and improve safety..

Gray Water & Bilge Water

Taking Steps to Clean Up the Ocean Environment

BY JOHN PAPARONE

The fact that improperly-treated gray water pollution is still being dumped off ships in a so-called modern and highly-regulated shipping industry is hypocritical at best.

Graywater – which comes from ship accommodation areas (shower/sink), laundry, galley and food pulper – can contain classical pollutants such as nonylphenols, metals, nutrients, surfactants, pathogens, oil, grease, detergent and soap residue. Graywater is sometimes mixed with sewage, depending on the ship design.

Graywater can have varying levels of harmful contaminants. In fact, untreated graywater characteristics are similar to, and in some cases, have higher concentration of constituents than domestic sewage entering land-based wastewater treatment plants (EPA-800-R-11-001). So while the industry is ripe with large-scale environmental initiatives, in particular fuel emissions, ballast water, underwater noise, etc., the graywater issue is still quietly being pushed under the rug.

For example, there are no MARPOL restrictions on graywater discharge in open waters beyond four nautical miles from shore (except Alaska and the Great Lakes as per Annex IV). And despite the U.S. Environmental Protection Agency's (EPA) Clean Water Act (CWA) and its Vessel General Permit Program (VGP), in some cases, regulations are adding to shipowners' capital expenditures.

The VGP, which states that commercial vessels over 79 ft. must adhere to both federal and state discharge regulations with regard to "incidental discharges," – was renewed in 2013 for another five years. However, the regulation is somewhat cumbersome, because some states have been allowed to add their own requirements to the CWA, which subsequently become part of the VGP program. This means vessels calling on U.S. ports may face varying discharge measures, causing shipowners to have to weigh the additional cost of different treatment systems.

The EPA's best management practices for dealing with graywater only scratch the surface. The organization stipulates that phosphate-free, minimally-toxic soaps and detergents are to be used, alongside degreasers which have low concentrations of toxins, as well as biodegradable products. But there is no specific or enforceable standard. Additionally, various certifications fail to take maritime contamination into account. Many "green" certified products still contain toxic ingredients in the formulations, although in reduced quantities. In fact, if they were transported in a tote on board ship and went overboard, they would have to be reported as a toxic spill.

Bilge water treatment and discharge is another area of environmental concern, and although it gets much more regulatory and industry attention, more can be done to reduce its negative impact on our waters.

Bilge water is the most common source of oil pollution from cruise ships (National Association of Attorneys General, 2000), and it may contain various oxygen-demanding substances, volatile organic compounds, semi-volatile organics, soaps, detergents, solvents, dispersants and degreasers (EPA Cruise Ship Discharge Assessment Report, Dec, 2008, EPA 842-R-07-005).

Various international treaties/agreements have essentially required the presence of Oil Water Separator (OWS) systems aboard ship and limit the discharge of bilge water oil content to 15 ppm (parts per million) or less. An OWS contains an Oil Content Monitor to detect oil levels and limit the discharge as mentioned, and significant consequences, including criminal penalties, can occur if regulations are not followed.

However, the way an OWS is designed, it's extremely difficult to assess the content (whether efficient separation is taking place) or its overall condition. Bilges often contain a mix of old and new lube oil, fuel oil, soap, soot, tank and heat exchanger cleaners, anti-freeze, hydraulic oil, paint chips, solvents, and mud, so without knowing if these toxins are being properly separated is a huge environmental issue (Martin-Ottoway, Marine Vessel Environmental Performance Assessment Guide, 2010).

The California Cruise Ship Environmental Task Force Report of 2003 identified several problems associated with OWS systems that included cleaning solvents not being removed from bilge water and routinely discharged with liquids into the ocean. Oftentimes this combination of hazardous materials is illegally discharged because the bilge alarm and oil content monitor are not designed to detect these substances. Hence, not all bilge discharges that meet current regulations are free from harmful contaminants.

The solution lies in a combination of chemistry and mechanical devices – chemistry to reduce or eliminate "unwanted" hydrocarbon contamination, such as solvents, which currently go undetected, and mechanical improvements that provide the capability of discerning additional hydrocarbon products. Bioremediation products and technology are available to help address this as well as the graywater issue. Most harmful contaminants, in addition to reduced oil levels, can be removed prior to OWS processing.

In the case of graywater discharge, regulations should be considered for separating gray and black water into tanks or systems. Graywater should be treated in holding tanks with approved biologicals, a filtration system similar to an OWS could be used to ensure minimal pollution discharge, and an approval process for chemicals should be introduced on board ship for housekeeping, galley and laundry activities. This should be specifically designed for maritime applications, as opposed to typical "green" certifications, of which there are many. Maritime waste flow goes into the ocean, NOT into a wastewater treatment facility as on land.

Above all, for both graywater and bilge water, organizations that have substantial maritime experience in these areas, such as CEFAS, should be consulted to develop a scheme that will compliment mechanical devices to assure cleaner discharges into the marine environment.

In other words, a willingness to put together viable requirements that are realistic, achievable and stretch our environmental and sustainability consciousness should be seriously considered. Otherwise what contribution are we really making when our oceans and the environment are at stake?

The Author

John Paparone, Principal of Environmental Solution, Inc., a veteran owned business, sells and distributes more than 30 EPA-approved products to marine and other industries.

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Great Ships of 2015

Great Ships of 2015

With Contributions from: Greg Trauthwein, Joe Keefe, Eric Haun, Henrik Segercrantz & William Stoichevski

Image: Höegh Autoliners Shipping

New Horizon Class PCTC

The New Horizon class multi-purpose Pure Car Truck Carrier (PCTC) design for Norway's Höegh Autoliners is innovative in many ways. The PCTC class of vessels is the world's largest, and also the first Post (old) Panamax PCTC's for Höegh. In all six vessels have been ordered from China's Xiamen Shipbuilding Industry Co., Ltd. for delivery this and next year. The first vessel, named Höegh Target, was delivered in early July.

There are 14 cargo decks with a total deck space of 71,400 sq. m. allowing 8,500 car equivalent units (ceu). Flexibility is provided through five hoistable decks. The ramps are also hoistable. The higher door opening enables 6.5 meters high and 12 meters wide cargo to be loaded. Cargo weighing up to 375t can be loaded over the stern ramp and 22t over the side ramp.

The design has been developed in close cooperation with Deltamarin. Designed to minimize its impact on the environment, latest energy saving technology on the market has been implemented on. The hull form, developed through extensive model testing, optimizes high cargo capacity with low fuel consumption both regarding sea and wind resistance. Höegh Autoliners estimates the new class emits 50 percent less CO2 per car transported than a standard car carrier. With an attained EEDI (Energy Efficiency Design Index) of about 39% below the IMO reference line, the New Horizon class PCTC is compliant with Phase 3 of the EEDI regulations.

The class incorporates a modern electronically controlled slow speed MAN 6S60ME-C main engine, with a power of 11,735 kW, with NOx monitoring and an online engine performance system. At sea, the main engines also produce the auxiliary power. Latest type of ballast water treatment systems and LED lights are used. Information technology controls the operation of the vessel throughout each voyage. Latest underwater paint and anti-fouling reduces the drag. The New Horizon uses environmentally friendly refrigerants and is prepared for larger diesel and low sulphur fuel oil tanks, as well as having reserved space for future scrubber installation.

Shipowner	Höegh Autoliners Shipping AS
Length, o.a.	199.9 m
Length, b.p.	193 m
Breadth, molded	36.5 m
Draft, max.	10.3 m
Draft, design	9.35 m
Air draft	46.5 m
Gross tonnage	76,420 GT
Deadweight	22,068 dwt
Cargo capacity	8,500 ceu
Deck area	71,400 m2
Number of cargo decks	14
Number of hoistable decks	5
Max load	375 tons
Max cargo height	6.5 m
Main Engine	1 x MAN 6S60ME-C engine, 11,735kW
Auxiliary generator engines	2x 9L21/31 + 1x 5L21/31 CSSC Marine Power Co.
Emergency generator engine	1xQSM11, Cummins Inc.
Propeller	MAN Kappel propeller
Auxiliary boilers	1x exhaust gas boiler Mission OS-2000, Alfa Laval Aalborg 1x oil fired boiler, Alfa Laval Aalborg
Tunnel thruster	TCT-220A Nakashima Propeller
Speed service	18 knots
Ramps, Doors, Hoistable decks	TTS Marine
Crew, max	23
Classification	DNV GL
Class notation	+1A1 Car carrier BIS BWM(T) Clean COAT-PSPC(B) E0 Ice(C) MCDK NAUT(OC) TMON
Flag	NIS (Norway International Register)

Image: Royal Caribbean Cruises, Ltd.

Quantum Class Cruise Ships - Anthem of the Seas

With a gross tonnage of 168,666, somewhat smaller than the world's largest Oasis class vessels, Royal Caribbean Cruises Ltd. (RCCL) took delivery of the first vessel in its new class of vessels, the Quantum of the Seas in 2014 and Anthem of the Seas in April 2015. The third vessel, Ovation of the Seas, is to be delivered from the Meyer Werft in Germany in spring 2016, with which a fourth vessel was ordered in May. These huge cruise ships are designed and equipped with the latest available technologies, both for the 'hotel side' of the vessel as also technically, in order to provide a safe, clean, efficient and fuel saving ride for its 4,180 passengers – **'the world's smartest cruise ships,'** according to Harri Kulovaara, EVP.

These cruise ships are fitted with ABB's latest electrical 20.5MW pod drives of the Azipod XO type. The two pods are powered by four Wärtsilä medium speed diesel-generators providing a total power of 67,200 kW. There are four tunnel thrusters forward. The vessel is fitted with a smart onboard advisory and decision support system, by Eniram with automation by Metso, and with Napa's flooding decision-making solution. An advanced safety centre is placed behind the L-3 Systems' Nacos bridge. Both safety and energy efficiency is improved, and operational data is also sent ashore. Further energy is saved by advanced air conditioning, and by applying a micro-bubble system where air is blown underneath the hull to reduce water resistance.

The vessel has 16 passenger decks, 2,090 staterooms of which 1,570 with balconies. The inside staterooms are fitted with a 'Virtual Balcony', a wall-size TV screen showing the view outside. There are 19 eating places onboard, a large theater forward and the pool area with fitness center on the decks highest up. The 'NorthStar' glass-walled observation capsule, attached at the end of a 41m crane arm, lifts up to 14 guests. The supplier of this gadget is MacGregor. Among the many amenities onboard is also the 'SeaPlex' multifunctional gym, or basket court, or dance hall, located on deck 15.

Anthem of the Seas is now sailing from Cape Liberty, NJ.

Shipowner	Royal Caribbean Cruises, Ltd.
Length o.a.	347.06 m
Length b.p.	320.1 m
Breadth, waterline	41.4 m
Draft max.	8.82 m
Gross tonnage	168,666 GT
Deadweight, approx.	12,000 dwt
Passengers double occupancy	4,180
Passengers max.	4,905
Machinery	Diesel-electric, Azipod drives
Main engines	2 x Wärtsilä 16V46F 2 x 19,200kW and 2 x Wärtsilä12V46F 2 x 14,400kW medium speed diesel engines
Propulsion	2 x ABB Azipod XO pod drives (2 x 20.5MW)
Emergency diesel engines	Caterpillar 3516C HD
Tunnel thrusters forward	Brunvoll FU115 4 x 3,500kW
Boilers	Alfa Laval 4x XW-569, 2 x OM-TCi 10000
Classification	DNV GL
Class notation	+1A1 Passenger ship BIS COMF(V-1) ECO F(M) Fuel(1010 kg/m3, 0 °C, 380 cSt) LCS(DC)
Flag	Bahamas

Images: Jan Einar Saunes

ECO's Offshore Construction Vessel

Owner:	Island Ventures II LLC (Island Offshore/Edison Chouest)
Length o.a.	159.8m
Breadth	30 m
Draft max.	9 m
Deadweight, approx.	13,800 dwt
Machinery	Diesel-electric propulsion 6.6kV, 60Hz, 19,400ekW
Speed, max.	14 knots
Redundancy/DP	3-split, dual redundancy, DP3 Construction
Moon Pool	11.2 m x 12 m
Offshore crane	400t, reach 19m, max depth 4,000m
Deck	9,000t/2380sq.m.
Fuel oil	2435 cu.m.
Fresh water	1190 cu.m.
Ballast/Drill water	10,525 cu.m.
Brine	1045 cu.m.
Helideck	26.1m, 12.8t
Tasks/Details	Vessel is prepared for well operations including well interventions. Vessel outfitted according to SPS Code for 200 people onboard. Built according to highest present standard for energy awareness and emissions.
Classification	ABS
Class notation	+A1, Circle E, Offshore Support Vessel (Supply-HNLS), ROV, AMS, ACCU, DPS-3 SKP (a,b,c,d,e,f), HAB(WB), HDC, HLC, CRC, BWT, MLC-ACCOM, NIBS, POT, ENVIRO, GP, UWILD, HELIDK, SPS
Main engines	Caterpillar
3 Main Azimuth Thrusters	Schottel
2 x Bow thrusters:	Brunvoll
2 x Retractable thrusters:	Brunvoll
Switchboards	UPC
Offshore cranes:	NOV 400T OG 140T.
DP and integrated bridge:	Marine Technologies
Design	ULSTEIN DESIGN & SOLUTIONS AS DESIGN SX-165
Main generator	ABB AS
Main diesel genset	Pon Power Scandinavia
Umbilical LARS	Ulmatec Stromek
Lifeboats, Davit, FRB	Harding Safety AS

Ulstein's Largest Offshore Construction Vessel

Designer: Ulstein Design & Solutions AS
Builder: Ulstein Verft AS
Owner: Island Ventures 5 LLC

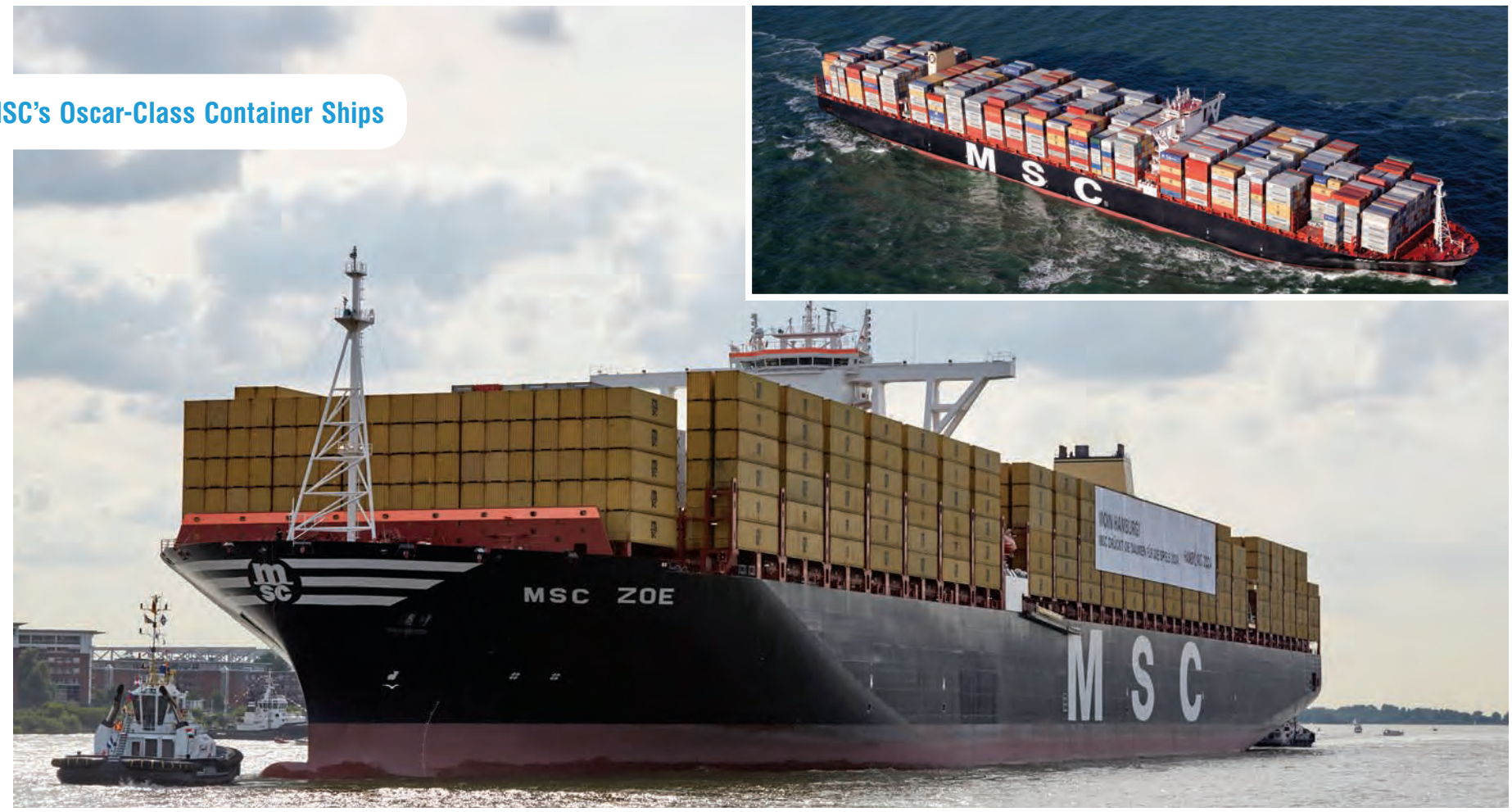
Ulstein Verft in Norway builds its largest offshore construction vessel ever, an ULSTEIN SX165 design, for U.S.-based Edison Chouest Offshore (ECO) and Island Offshore of Norway, through the company Island Ventures II LLC. A sistership is being built in the U.S. at Edison Chouest Offshore's own LaShip shipyard in Houma, La. This contract includes options. The first vessel, Island Venture, was to be launched in August, and will be managed by Edison Chouest. The vessels, the largest for Ulstein so far, measure 145.7m in length and are 28m wide. The vessels can accommodate 200 people. Onboard, there are two cranes with a lifting capacity of 400 tons and 140 tons respectively. The bigger crane is fitted with a 3,000 m long cable. In a centrally located hangar, there is a record large moon pool measuring 10.2 x 12 m, and two smaller moon pools for the operation of ROVs. The diesel-electric machinery is split into three separate engine rooms to provide redundancy. NOx emission on the vessels is reduced with a SCR catalyst system.

ABB supplies the complete electrical power and propulsion system package comprising medium voltage generators, switchboards, transformers, frequency converters and propulsion motors. ABB's advanced power system is capable of running the system in closed ring in DP3. ABB's remote diagnostic system (RDS) is used, which helps to reduce repair time of installations and improve operational safety, and capable of providing immediate 24/7 assistance from a global technical centre. ABS has been selected to class this next-generation OCVs.

ABB supplied the main switchboard 6.6kV and the frequency converters for the three main propeller motors (3 x 3300Kw), the retractable thrusters (2 x 2500Kw) and 2 Bow tunnel thrusters (2 x 2200Kw). ABB supplied also the Integrated Automation System.

"What regards the vessel to be built in the USA, the building project is on hold, due to the market situation."

MSC's Oscar-Class Container Ships



Images: Mediterranean Shipping Company S.A.

MSC's Oscar-Class Container Ships – The World's Largest

MSC Oscar, delivered in January this year, is the first in a new series of world's currently largest container ships ordered by (MSC) Mediterranean Shipping Company from Daewoo Shipbuilding & Marine Engineering (DSME) in South Korea. Followed by MSC Oliver in March, MSC Zoe in August, and MSC Maya in September, the vessels are part of a huge 20 vessel charter agreement aimed at boosting global container shipping efficiency as well as the competitive position of MSC, the world's second biggest operator. Capable of carrying 19,224 TEU (954 more than the 18,270 TEU of Maersk's Tripple-E) the vessels measure slightly under 400m in length and are 59m wide. The price tag is above $140m. The container capacity was raised from the initial 18,400 TEU through supplementing it with additional tiers of containers on top, a design made possible by applying the classification company DNV GL's RSCS (Route Specific Container Stowage) class notation.

The superstructure is placed a third from the bow for good view. The fuel tanks are placed underneath to clear adjacent areas for container cargo. The single main engine is a super long stroke MAN B&W 11S90ME-C (10.2) electronically controlled two-stroke diesel engine producing 62.5MW power. Different engine running modes can be selected automatically, based on operating conditions. According to the owner the 'MSC Oscar is the most energy efficient vessel on the planet consuming 35% less fuel and carbon dioxide'. The vessels uses a torsion box design of its U-shaped hull and hatch coamings, with steel plates up to 100mm thick. The size makes the Oscar-class among the first Post-New-Panamax vessels.

Image: Victoria Edström - Stena Line

Stena Germanica's SuperGreen Methanol Conversion

Stena Germanica's SuperGreen Methanol Conversion

Sweden's Stena Line is converting its RoRo passenger ferry Stena Germanica to operate on methanol as its main fuel, as the world's first commercial vessel to utilize this fuel alternative. A test engine was first run at Wärtsilä's factory in Trieste. The vessel, built in 2001 at Astilleros Españoles, Puerta Real, Spain, and was later lengthened. One engine was last winter converted for dual-fuel operation at the Remontova shipyard in Poland. The vessel is back on her route operating between Gothenburg in Sweden and Kiel in Germany. Burning methanol as fuel results in cleaner exhaust gases. The conversion project, which cost some $24m, supported by EU funding under the Pilot Methanol EU project, was done in close cooperation between Stena and Wärtsilä, which fitted the engine with dual-fuel methanol and diesel injection nozzles. Stena Line, Stena Teknik, Stena Bulk, Stena RoRo and Stena Oil have all been involved with their respective areas of expertise. Collaboration partners included also classification company Lloyd's Register, the Port of Kiel and Gothenburg, methanol supplier Methanex Corporation and ship designer ScandiNAOS.

"Stena Line is soon going to assess the results of the tests done with the first engines. So far the results have been very encouraging, and according to expectations. The intention is to have all four engines converted for methanol within this year," Jesper Waltersson, Head of Communication at Stena Line told Maritime Reporter. According to Carl-Johan Hagman, CEO at Stena Line, methanol is the most interesting of the fuel alternatives Stena is looking at, believing it is the fuel for the future aimed at transforming shipping, despite its current drawbacks, among them its current cost. Stena is working on transforming it from a chemical to a usable fuel. Methanol meets the 0.1 percent sulfur oxide emission restriction imposed on ship exhaust gases in the Baltic and North Sea sulfur oxide emission control areas (ECA), in force since the beginning of year 2015.

Methanol is a biologically degradable colorless liquid which can be produced from natural gas and also from coal, bio mass or carbon dioxide. The use of methanol reduces sulfur oxides (SOx) by 99 percent, nitrogen (NOx) by 60 percent, particulates by 95 percents, and carbon dioxide (CO2) by 25 percent from the exhaust gases compared to those from the use of heavy fuel oil.

The four Wärtsilä 8ZAL40S medium speed engines of the vessel are to be converted for dual-fuel operation, with MGO marine gas oil as backup fuel. According to Stena Line, the harmful emissions are comparable with those from using liquefied natural gas as fuel, but methanol is easier to handle and requires less demanding infrastructure. Methanol has a low 11 deg. flash point why double-walled pipes were used to prevent leakage, with nitrogen gas used in the methanol tanks to make sure there is no oxygen in the tanks. Also the fire detection and extinction systems were enhanced.

Stena Line has since 2005 worked on a fuel saving program and has on average succeeded in reducing its fuel consumption by 2.5 percent per year. Stena Line is one of the world's largest ferry operators and operates some 35 vessels on 22 routes in northern Europe.

Shipowner	Stena Line
Length o.a.	240.1 m
Breadth mld.	28.7 m
Draft design	6.15 m
Gross tonnage	51,837 GT
Deadweight approx.	10,690 dwt
Passenger capacity	1,300
Cabin berths	1,300
Lane meters	3,800 m
Private cars	300
Main Engines	4 x Wärtsilä 8ZAL40S medium speed engines. Total power 23,000 kW. Two CPP propellers
Speed	22 knots
Classification	Lloyd's Register
Flag	Sweden

The USNS Trenton, is the fifth ship in a 10-ship, $1.6 billion U.S. Navy contract for which Austal USA is the prime contractor. A Spearhead-class Expeditionary Fast Transport (EPF) – formerly known as the Joint High Speed Vessel (JHSV) – EPF 5 is one of five ships in this class currently providing high-speed, high-payload transport capability to U.S. combatant commanders. The EPF's large, open mission deck, habitability spaces, flight deck, and command and control spaces provide the capability needed to support a wide range of missions – including engagement, intra-theater mobility, humanitarian assistance, and disaster relief missions being conducted today. The EPF is also suited to support a range of future missions such as special operations support, command and control, and medical support. With its ability to access small, austere, and degraded ports with minimal external support, the EPF provides unique options to the warfighter. The Spearhead-class EPF is a multi-mission, affordable, flexible transport ship capable of rapidly maneuvering combat-configured company sized units – providing the capability to move personnel along with their equipment and vehicles. The USNS Trenton is a fast intra-theater transport with a slewing ramp for austere port access and a CH-53K-capable flight deck. It has dedicated accommodations for embarked forces including C4I planning space, airline-style seating for 312 and dedicated berthing for embarked troops. Over the past three years, the five EPFs already in service have sailed the coastal waters of five continents – Asia, Africa, North America, South America and Europe. They represent a global fleet providing humanitarian services and supporting training exercises all over the world.

USNS Trenton (EPF 5) Main Particulars

Hull	Catamaran
Length	338 ft
Beam	94 ft
Draft	< 15 ft
Displacement	600 short tons
Speed	35-40 kts
Crew Berthing	41
Troop Berthing	104
Troop Seating	312
Mission Bay Size	20,000 sq. ft
Propulsion	4x MTU 20V8000 diesel engines 4x Wartsila waterjets

USNS Trenton (EPF 5)
One Hull, Endless Possibilities

Maersk Tacoma

50,000 DWT Product/ Chemical Tanker

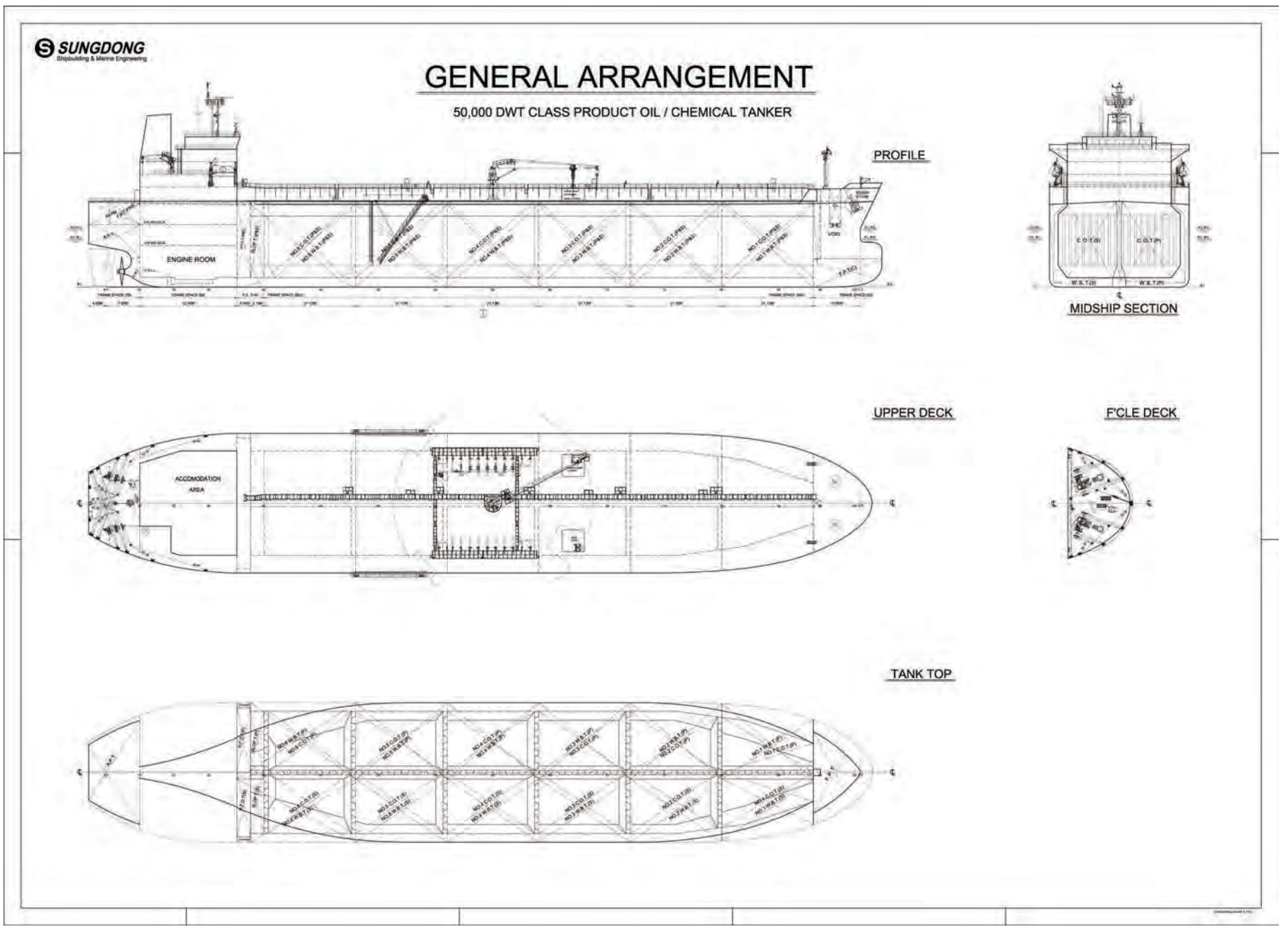
Maersk Tacoma is the first vessel in a series of four MR product oil/chemical tankers, built by SungDong Shipbuilding & Marine Engineering for Maersk Tanker A/S. The vessel features a double side skin and has a flush deck, bulbous bow, transom stern, open water type stern frame, semi-balanced rudder and single propeller driven by a slow speed diesel engine. The main engine MCR of MAN 6G50ME-B9.3 Tier II is de-rated to 7,317kW at 88.6rpm for economy fuel oil consumption.

The speed of the vessel at design draft (11m) is 15.1knots at 85% of MCR (6,219kW) with 15% sea margin based on well-optimized hull form and propeller design which had been analyzed by CFD. Electric power is generated from three diesel generators driven by alternator with 800kW output and steam is generated by two auxiliary boilers of water tube type with capacity of 18,000 kg/h and composite boiler with oil fired section 1,200 kg/h and exhaust gas section.

The vessel has six pairs of cargo oil tanks, two slop tanks, fore and aft peak tanks, segregated water ballast tanks, fuel oil tanks and fresh water tanks. Cargo tanks are divided by plane type transverse and longitudinal bulkhead. Cargo handling is performed by three cargo oil pump of 600 cu. m./hr., driven by steam turbine. Water ballast is handled by two ballast pump, driven by steam turbine and electric motor. And this vessel has one ballast water treatment by in-direct electrolysis type environmental friendly.

The vessel was designed and built in full consideration of the latest environmental guidelines, such as fuel oil protection, Inventory of Hazardous Materials for ship's recycling, performance standard for protective coating(PSPC) and IMO Tier II NOx requirement. The vessel also has marine gas oil tank to satisfy emission requirement at Sulfur Emission Control Areas (SECA). Additionally, the vessel is fully complied with IBC code for carrying chemical cargoes and the number of applicable chemical cargoes is about 500.

Shipowner	Stena Line
Name of Ship	Maersk Tacoma
Type	50,000 DWT Product Oil/ Chemical Tanker
Shipbuilder	SungDong Shipbuilding
Shipowner/Operator	Maersk Tankers A/S
Date of Delivery	April 2015
Length, o.a.	183m
Length b.p.	174m
Beam	32.2m
Depth	19.1m
Draft	Td: 11m, Ts: 13.3m
DWT	49,828
GT	29,445
Speed	15 knots
Flag	Singapore
Classification	LR
IMO No.	9708617
Maine Engines	MAN B&W, 6G50ME-B9.3 Tier II, 7,317kW x 88.6rpm
Generators	Hyundai
Propulsion/Propellers	6.7 m SILLA FPP
Fuel Consumption(t/d)	23.7
Cargo capacity (cu. m.)	54,085
Ballast control system	Emerson, electro-hydraulic
Water Ballast Treatment System	Samsung



Fincantieri Launches Nuclear Waste Vessel for Russia

New semisubmersible floating platform will be used to transport special material decommissioned by the Russian Navy

Itarus, the new semisubmersible floating platform built to transport Russia's nuclear materials, was launched at a ceremony on November 19 at Fincantieri's shipyard in Muggiano, La Spezia. Built by Fincantieri for the Russian RosRAO, the Federal State Unitary Enterprise for radioactive waste management, the vessel will be used for the transportation of nuclear submarine reactor compartments decommissioned by the Russian Navy from the storage area of Sayda Bay to the Nerpa Shipyard (and vice-versa), facing the Kola Peninsula in the Barents Sea. Measuring just over 79 m long and about 29 m wide with a deadweight capacity of 3,000 metric tons, the vessel's maximum draft is 24.5 m, achievable during the cargo docking, by means of 45 ballast tanks for a total capacity of 25,000 cu. m. of ballast water, fed by four pumps of 2,000 cu. m. per hour capacity. The vessel will be equipped with living areas, to host a crew of six on board. Itarus was constructed in the Integrated Shipyard of Riva Trigoso and Muggiano with the support of the facility of Palermo, supervised by the Russian Maritime Register of Shipping.

The contract to build the unit was signed by the Italian Ministry of Economic Development, RosRAO (the Russian Federation national nuclear corporation) and Fincantieri in November 2013 during the Italy-Russia Business Forum in Trieste. It follows the 2003 cooperation agreement between the Russian and Italian government for the decommissioning of nuclear submarines and the safe management of radioactive waste and nuclear fuel, defined within the framework of the Global Partnership, started in the 2002 G8 summit in Canada.

Itarus' godmother is Rosaria Fausta Romano, General Director of the Italian Ministry of Economic Development's department for the electricity market, renewables and energy efficiency, nuclear. Other attendees at the launching ceremony included, among others, by Angelo Fusco, Fincantieri's Senior Vice President Italy Naval Vessels Business Unit; as well as Oleg Kryukov, Rosatom's Director for Public Policy on Radioactive Waste, Spent Nuclear Fuel and Nuclear Decommissioning.

Image: Fincantieri

The delivery of Alya McCall is significant in that it is the first vessel in a fleet of new class monohull Fast Support Vessels (FSV) for SEACOR Marine.

Alya McCall is the first vessel in the SEACOR Express Plus class and features striking lines not ordinarily found in traditional monohull FSV designs.

Gulf Craft in Franklin, La. built the 206 x 43 x 9.25 ft. vessel. Alya McCall features seating capacity for 100 personnel and has a top speed of 38 knots.

The performance is enabled by five Cummins QSK 60, EPA Tier 3 compliant diesel engines, each producing 2680 bhp. The engines are coupled to Twin Disc MGX 61500 SC reverse reduction gearboxes that drive Hamilton HT-810 water jets.

A cardan shafting system by Driveline Service of Portland connects the gearboxes to the waterjets.

Superior station-keeping capability is provided through the combination of three Thrustmaster 30TT200 electric-mechanical tunnel thrusters in working in conjunction with the azimuth-like waterjets, all of which are controlled by a Kongsberg DP-2 dynamic positioning system.

Electrical power is derived from three Cummins QSM11 gensets, each producing 290 ekW. Dual FFS firefighting pumps and remoted controlled monitors provide Fifi-1 equivalent firefighting capacity for combatting off-ship fires. A Naiad Dynamics ride control system is also fitted to improve passenger and crew comfort while underway.

The vessel is certified by the USCG under the provisions of 46 CFR Subchapter T and by the American Bureau of Shipping as a High-Speed Craft with DP-2 and Fire-Fighting Capability notations.

Profile

Upper Deck

Main Deck

Hull Plan

Alya McCall Main Particulars

Length o.a.	206 ft./62.8m	Deck Size	136.5 x 26.5 ft.
Length w.l.	194 ft./58.9m	Deck Area	3530 sq. ft./328 sq. m.
Beam	32ft./9.8m	Deck Cargo	300 LT
Draft	9.25 ft./2.8m	Speed (Max)	38 knots
Depth	15ft./4.6m	Main Engines	5 x Cummins QSK 60
Construction	Marine Grade Aluminum	Power	5 x 2 680 hp / 5 x 1998 kW @ 1900rpm
Fuel Oil	83,500 gal.	Gearboxes	5 x Twin Disc MGX 61500 SC
Fresh Water	7,500 gal.	Propulsion	5 x Hamilton HT-810 Waterjets
Grey Water	600 gal.	Generators	3 x Cummins QSM 11, 290 ekW
Black Water	600 gal.	Bow Thrusters	3 x Thrustmaster 30TT200ML
Lube Oil	700 gal.	Flag	USA
Waste Oil	500 gal.	Class/Survey	USCG Subchapter T, Oceans
Bilge Oil	500 gal.		ABS +A1 HSC Crewboat +AMS +DP2 FiFi Capable
Passengers	100		
Crew	16		

Isla Bella & Perla del Caribe

World's First LNG Fueled Containerships

Shipbuilding history was made in 2015 when NASSCO delivered Isla Bella and launched Perla del Caribe for TOTE, the culmination of one of the most exciting and anticipated newbuild programs in U.S. shipbuilding history, the world's first LNG fueled containerships.

The Perla del Caribe and her sister ship, christened Isla Bella, were purpose-built for the Puerto Rican trade for TOTE Shipholdings and will be operated by TOTE subsidiary Sea Star Line out of Jacksonville, Fla. In moving to natural gas, the Marlins will reduce NOx emissions by 98 percent, SOx by 97 percent, carbon dioxide by 72 and particulate matter by 60 percent over the Ponce Class ships - the company's vessels currently serving the trade.

"TOTE is one of six lines of business that together create a national transportation network, moving cargo by land, sea and air," said Tim Engle, President of Saltchuk, TOTE's parent company at the launch ceremony of Perla del Caribe.

"The Marlin Class ships are the most fuel efficient, eco-friendly containerships in the world. As the first of their kind, these ships represent the next generation of US-built ships and we at General Dynamics NASSCO are proud to be leading in that effort," said Fred Harris, president of General Dynamics NASSCO.

The Perla del Caribe will enter service in the first quarter of 2016 between Jacksonville, Florida and San Juan, Puerto Rico. Isla Bella, the first Marlin Class vessel, launched in April of 2015 and will enter service later this year.

SHOYOH 97,000 dwt "ECO" Coal Carrier

SHOYOH is the first vessel of three eco-designed coal carriers built by Japan Marine United Corporation (JMU) Kure Shipyard. SHOYOH is designed mainly for carrying thermal coal to coal-fired power station in Japan. Particulars and specifications of the vessel are optimized for Japan's port condition. The vessel achieved high fuel-efficiency and safer/easier operation with following technologies.

- **Contra-rotating propeller (CRP) system for high propulsion performance**

CRP consists of two contra-rotating propellers positioned in tandem. The aft propeller recovers waste energy by means of rotating flow occurring behind the fore propeller and changes it to thrust. Since the first application to a 37,000dwt bulk carrier in 1989, JMU has installed CRP system to over 20 vessels. For further improvement of the propeller efficiency, the CRP of SHOYOH has tip raked geometries.

- **Semicircular duct and Rudder bulb**

Semicircular duct and rudder bulb are fitted in front and back of the propellers respectively. Semicircular duct generates thrust and increases the wake gain by guiding slower flow to propeller disc. Rudder bulb streamlines the flow and reduces separation losses from the propeller hub.

- **Exhaust gas power turbine generator (PTG)**

Some amount of exhaust gas of main engine is by-passed to gas power turbine, generates electricity and saves fuel consumption of diesel generator.

- **Heavy ballast water tank**

Center water ballast tank is arranged at mid-ship for exclusive use in heavy ballasting condition in order not to arrange floodable hold(s).

Complete separation of water ballast tank and cargo hold helps for safer and easier ballast water loading/unloading operation, prevention of hold structure corrosion by sea water and easier maintenance during voyage. The vessel has been designed and built under the survey of ClassNK in accordance with IACS Common Structural Rules for Bulk Carriers (CSR-B). SHOYOH has BC-B notation, which enable her to load, not only coal, but also heavy cargoes, such as iron ore at homogeneous loading in all cargo holds.

SHOYOH Main Particulars

Length o.a.	239.9m
Length b.p.	234.5m
Breadth molded	43.0m
Depth molded to upper deck	20.5m
Assigned summer draft	13.053m
Gross	60,876
Deadweight (scantling)	97,114mt
Speed, service	14.2 kt
Cargo capacity Grain:	115,800 cu. m.
Bunkers, Heavy oil	3,330 cu. m.
Bunkers, Diesel oil	460 cu. m.
Water ballast	53,000 cu. m.
Fuel consumption, Main engine	33.4 tonnes/day
Classification society and notations	ClassNK
Main engine	Wärtsilä 6RT-flex58T-D
Type of fuel	HFO, MDO, DMA
Output of engine	9,680 kW x 90.0 min-1

Contra-Rotating Propeller (CRP) System on the 97,000 dwt Coal Carriers SHOYOH.

Photos: Japan Marine United

Green Marine *Solutions*

Examining the role of technology in meeting emerging environmental regulations

42 Introduction: ***NAMEPA***

43 ***Environmental Solution*** & Eco-Managing Marine Spills

44 ***Cosmodyne*** & Boil-Off Gas Management Systems

45 ***C-Rate Solutions*** & Energy Storage

46 ***Ecochlor*** & Ballast Water Management

47 ***CR Ocean Engineering*** & Exhaust Gas Scrubbers

48 ***Optimarin:*** BWT Compliance ... Kill or be Killed

49 ***DNV-GL*** and ECO Insights for Fleet Performance Management

Photo: Greg Trauthwein

To be or not to be Green ...
There is no Question

North American Marine Environment Protection Association®
NAMEPA

Today's maritime climate (all puns intended) is fraught with opportunities and challenges. On the one hand, many sectors of the marine industry still struggle in the wake of the Great Recession (with some notable petroleum and cruise line exceptions) while also facing multiple regulations intended to protect our marine environment. On the other, there remains confusion and discord on how implementation should be achieved.

Unifying regulations are required for a global industry such as ours. I believe the shipowning community would be satisfied, if not pleased, to invest in technology and training to meet regulatory requirements if the regulations were consistently applied and enforced. No commercial operator wants to play on an uneven playing field, investing in equipment that may not be approved in future years, or a port state that isn't enforcing said regulations.

There exists a need for investment in developing technologies. Traditionally, only the largest shipowners and cruise lines have had the financial resources to fund experimental technology. More financing for research and development is needed, either through the capital markets, governments, educational facilities or foundations that are willing to invest in this area (think how the Ford Foundation and others saved Detroit. It could happen in shipping).

Innovation is the key to addressing these issues. In an industry that does not change quickly, we need to adapt to a faster pace of development driven, in part, by our Internet age. In a culture that is looking at driverless cars (and ships) we need to be responsive to the public's demand for protecting our environment.

Communications are instantaneous and global. Social media has connected activists with the public in unprecedented numbers—and they are good at it. If we are not demonstrate strong initiatives to address environmental concerns, our influence over regulatory factors will diminish. It only takes one incident, or negative sound bite, to influence public opinion against our industry. We need to be vigilant about unifying our regulations and developing technologies to support them.

When you examine some of the current regulations, many key factors stand out:

MARPOL I

After nearly 25 years of active enforcement by the Department of Justice, and the vast improvements in technologies, why, then, do we continue to see Oily Water Separator violations? This is a puzzling question, and makes one think that training is at the root of the problem? Excellent products exist on the market, complete with enforcement mechanisms and tools. Yet there are ongoing efforts to violate MARPOL I by dumping oil at sea.

MARPOL V

The relatively recent bolstering of this Annex has turned the focus onto the need for the development and deployment of waste stream solutions. Ships need to have safe and affordable options for disposing of their wastes at port. It is not feasible to either move a vessel, or to charge unreasonable rates for disposal because of a "captive" audience. It seems to me that there is a market opportunity here…

MARPOL VI

After many years of staying under the radar, shipping's role in carbon emissions took the stage this month in Paris at the UNFCCC (United Nations Framework Convention on Climate Change) meeting in Paris. Despite shipping's strides in the past few years to reduce its carbon footprint, as well as having the only global, legally binding energy efficiency measures, the impact of the industry's carbon output (roughly the same as Germany's) was illuminated, with groups actively advocating for shipping to be held accountable for greater reductions. At COP21, the IMO representative Edmund Hughes said he could see "no technological or innovative response that could be applied to a large bulker operating in the North Atlantic in deep winter. These vessels were effectively mobile power stations and no change could be envisaged in the next 20-30 years." Clearly this is not going to be acceptable to the global climate community and will lead to harsh pressure on our industry going forward.

Other areas of opportunity and challenge pertain to ballast water management, bio-fouling, aquatic noise, implementation of the Maritime Labor Convention (yes, crew welfare IS an environmental issue when we look at safety at sea), non-vessel source pollution and others. The maritime agenda is full.

Happy Holidays,

Carleen Lyden-Kluss
Co-Founder/Executive Director
North American Marine Environment Protection Association (NAMEPA)

The Author

Carleen Lyden-Kluss is Co-Founder/Executive Director of the North American Marine Environment Protection Association (NAMEPA) and CEO of Morgan Marketing & Communications. She was recently selected as an IMO Ambassador.

How to Be Pro-Active When Eco-Managing Marine Spills

As ships and rigs continue to become larger, the threat of major disasters at sea is never far from the horizon. When they happen, toxic environmental spills can be challenging on many levels for maritime companies, and for the industry as a whole.

Shipping companies and maritime facilities are increasingly coming under more media and industry scrutiny when the worst-case scenario happens. And while regulations are helping everyone better manage toxic waste, a lot can still be done.

Bioremediation is one way that can solve not only the big spill problems but everyday ones, too. Bioremediation is the process of using naturally-occurring, safe and beneficial micro-organisms to degrade environmentally-harmful contaminants and turn them into non-toxic compounds. It has been used since before the days of the Exxon Valdez disaster.

Yet the use of "qualified" bioremediation products is still somewhat lacking. According to Environmental Solution, Inc.'s (ESI) owner John Paparone, that's because many people aren't properly informed as to the pros and cons of what's on the market today.

"Most maritime companies make the common mistake of using popular 'green' products which actually have some toxic properties in them," Paparone explains."In fact, if some of these formulas fell overboard during a ship disaster, they would have to be reported as a toxic spill."

So how does the typical consumer know what to look for to ensure cleaning products have the right kind of

ingredients? "They need to look for a neutralpH rating, which is key, and they should also be non-toxic, non-caustic and non-corrosive," says Paparone. "These are the only type of products Environmental Solution, Inc. distributes."

The process of bioremediation is nature's way of solving contamination problems at the root of the cause. Tiny micro-organisms literally "eat" away at hydrocarbons, leaving surfaces like asphalt and workshop floors skid-free, countertops and floors shiny and clean, and hydraulic equipment looking like new.

ESI's products are manufactured by Envirologic Bio-based Technologies, Inc., a global leading innovator in the field of environmental biotechnology for over 20 years. In fact, customers have included the U.S. Military Sealift Command and Maersk Line Ltd.

Bioremedial products offer the eco-friendly aspect, plus there is no need for expensive haul-away operations. Most products can be used in place, whether in soil, on a surface or in a collection tank. And because they are highly-concentrated, all that's needed to begin using them is to simply add water – making them extremely safe for people to use.

The product/water ratio guidelines are in the product information literature available for each of ESI's products. For example, adding one 5-gallon cubitainer of Fleet-Kleen™ cleaner/degreaser to 50 gallons of water, creates a 55-gallon drum with contaminant-eating microbes in it, which work continuously to break down hydrocarbons.

"If you use these products as part of your regular maintenance routine, you can keep hydrocarbons at bay and keep your equipment and storm water drains clear of toxic build-up," says Paparone."In an industry that is so highly regulated, people need to continually address the problem on their ships, rigs, shipyards and other facilities. Incorporating the use of these products into your daily cleaning is certainly more cost-effective than having to clean up after the fact."

Improving best practices in this area is critical, says Paparone. It's a matter of educating the industry, not just in general, but in providing information on how bioremediation products can be used for every company and their particular situation. "Bioremediation may not be a household word in the maritime industry quite yet, but we're getting there."

SHIPBOARD-READY BOIL-OFF GAS MANAGEMENT SYSTEM

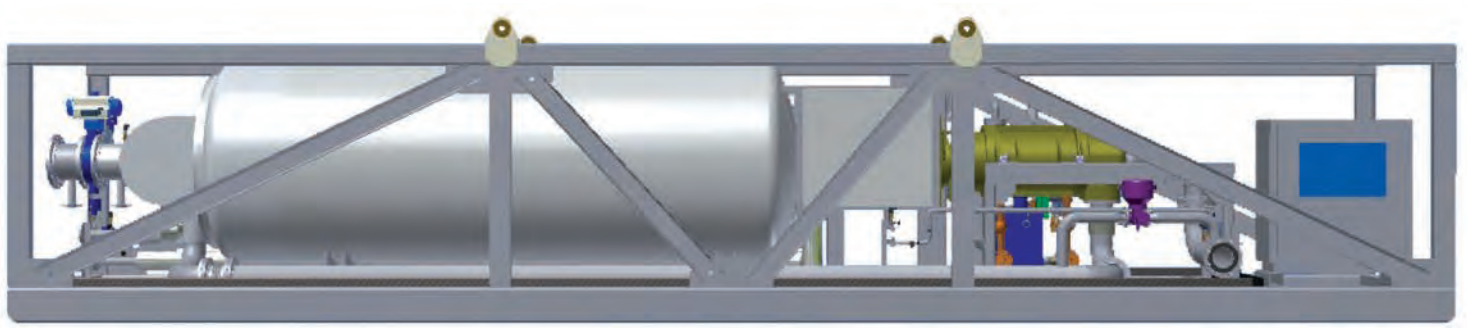
Cosmodyne's shipboard ready systems automatically control boil-off gas generated from anystorage tank containing LNG or other cryogenic liquids. The system works with tanks in most applications including pressurized tanks or those operated at atmospheric pressures.

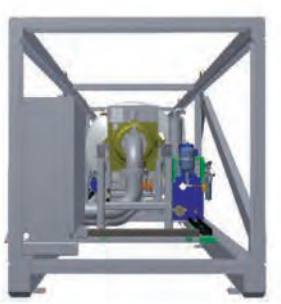
Cosmodyne offers two boil-off gas options that utilize a simple nitrogen based refrigeration cycle. The first option sub-cools a stream of LNG that is passed through a client's spray header to collapse pressure. The second option re-liquefies the boil-off gas and the resulting LNG stream returns to the client's tank.

Founded in 1958, Cosmodyne is a leading manufacturer of cryogenic plants with more than 450 placed in operation around the globe. Cosmodyne natural gas liquefiers have been used to provide LNG fuel for high horsepower uses like marine, rail, mining, trucking, and oilfield applications, virtual pipelines, and utility peak shaving. Cosmodyne is part of the Cryogenic Industries family of companies which include ACD, LLC and Cryoquip, LLC. For more information, visit us at www.cosmodyne.com.

By listening to our clients needs, we've designed a simple, compact and safe solution with the following key features:

- Refrigerant cooling provided with environmentally friendly and safe nitrogen refrigerant
- All major components designed and manufactured in Cosmodyne's shops
- Comes packaged as two distinct, pre-piped, pre-wired modules: cold box-refrigeration skid (no motors) and the nitrogen compressor skid
- Optional air-cooling or sea-water closed-loop cooling system can be provided if client does not have a source of fresh cooling water
- All equipment can be located in gas safe area. There are no motors in skid containing the heat exchanger. All LNG systems are double-contained; annular space can be purged with nitrogen
- System requires a supply of low voltage power, sea water and a small amount of nitrogen make up (for seal losses)





C-Rate Solutions

The Vision

I have been driven by the compulsion to enjoy what I do every day. This has led me to an unusual career, often driven by impulse but always with the goal of finding a way to make an impact; to make every minute count. My experiences in sailing and delivering boats were something that came in handy when I became a boatbuilder in Canada in the early 90's. Once you have had to fix boats while underway, you develop an appreciation for how they can be designed to be more easily serviced. The same goes for practical operation of a boat-design and build is better if you have actually used one in a practical sense.

This fundamental ability to apply practical experience to design has had a major impact on how we have become thought leaders in the battery industry.

Our deep and fundamental understanding of the issues that are related to energy on board-how it is used, how it was then designed into vessels, the business rules and design rules that define the most fundamental determination of payback and value add. We then designed the first battery backwards from this point, incorporating every possible requirement and point of performance needed to address the needs of the marine industry. It was this combination that led to our early success.

After my departure from my first energy storage company, we were inundated with interest from parties that wanted us to help them achieve success in the energy storage industry. These companies were manufacturers of quality energy storage systems and also end users/integrators looking to find their way through the myriad of

CEO, Brent Perry

systems popping up. Our solution was to create C-Rate Solutions; a consulting/advisory/representation firm that could help these companies find success. The focus of this company is to ensure that the arrow finds its bull's eye, matching all parties together to support the growth of the energy storage industry.

One of the more compelling moments in my life was when my 12-year-old daughter saw an early version of our battery system-she said she was proud of what we were doing for the environment. It is a great feeling to know that what you are doing is actually creating the playing field for the next generations to take better care of the world they are inheriting from us.

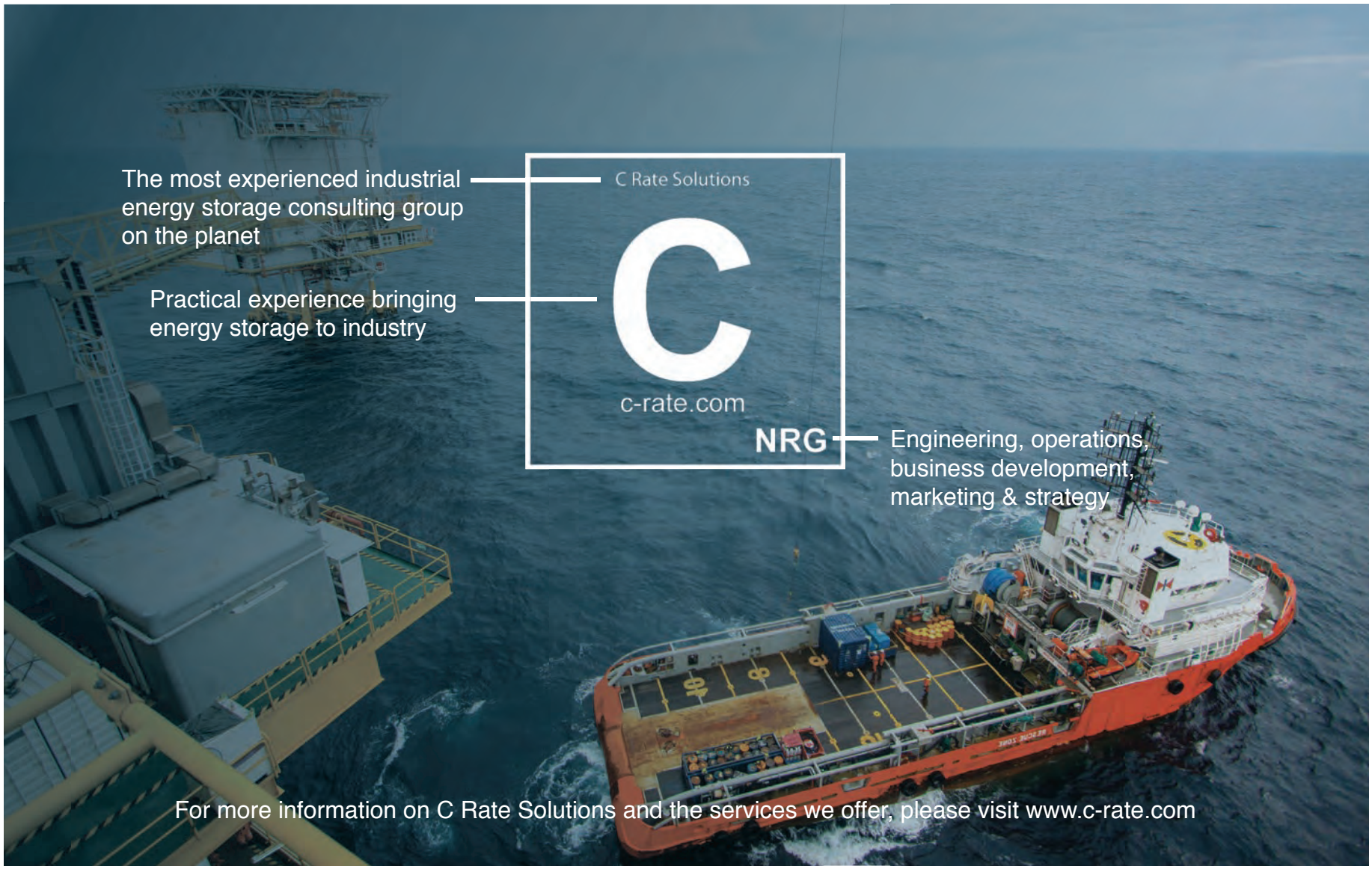
While we are aware all decisions must survive the commercial test of financial viability, we have also found ourselves in a position where we can make a measurable difference to the quality of life that affects all of us. Tonnes fewer emissions, millions less kg of fuel needed, better and more reliable systems-we are supporting the creation of a legacy.

C-Rate Solutions is here to support the expansion and growth of the industry and to help governments, approval agencies and all manner of industry participants to navigate this industry with the focus of global growth and maximum impact to the environment and business, wherever it happens to take place.

You can never guarantee success but we have all the tools and all the right people. With decades of combined practical experience bringing energy storage products to real world heavy industrial applications, our team is one of the most experienced groups today.

At the end of the day we will be able to talk to our kids and grandkids and say, "We made a positive change." And that matters.

Brent speaks at a variety of conferences including the COP21 in Paris. He discusses topics ranging from marine propulsion design to battery safety.



Chlorine Dioxide is NOT Chlorine

By Ricky Dixon, Director of Sales, North America

It is perplexing how many ballast water treatment consultants think that chlorine dioxide (ClO_2) is actually chlorine. More than one person has commented to me, "but it has chlorine in the name"! In response, I refer them to water (H_2O), which has H_2 in the namebut is not hydrogen gas. Chlorine dioxide has been used safely in land-based industrial and municipal applications for over 70 years.

The most significant difference between ClO_2 and chlorine is in its activity when placed in water. Chlorine reacts when placed in water to form hypochlorous acid(s). Chlorine dioxide does not have a reaction and it remains a dissolved gas in water; it is also 10 times more soluble (especially cold water) than chlorine.

The distinctions in reactivity are very important.

Chlorine dioxide, while completely soluble in water, only attacks living cells, not organics. ClO_2 penetrates the bacterial cell wall and reacts with essential amino acids in the cytoplasm of the cell to kill the organism. Thus, ClO_2 is very effective against biofilm, which can enhance regrowth of bacteria. Industries have long recognizedthe excellent biofilm removing properties of ClO_2 and it has been used to disinfect extensively in even the nastiest of environments.

While chlorine can be a good, low-cost bactericide, it is not as good as ClO_2. The reason is because chlorine reacts with almost any organic compound, such as humid acids, bath oils, algae, ammonia, etc. Not only does this tendency reduce chlorine's effectiveness in dirty water, but also forms undesirable by-products such as chloramine (combined chlorine) and trihalomethanes (THMs); THMs, have been cited as possible carcinogens.

Another important distinction between the two chemicalsis that chlorine can be an effective biocide where pH is less than 8, whereas ClO_2 retains its useful oxidative and biological properties throughout a much broader pH range from 2 to 10 pH. In addition, ClO_2 has 2.5 times the disinfectant capability of chlorine.

In 1944, drinking water treated with ClO_2 was first introduced; 12 years later it was utilized as a drinking water disinfectant on a much larger scale. It is now approved by the United States Environmental Protection Agency and the World Health Organization.

Current land-based applications include:

- **Mouthwash**
- **Oil and gas water treatment**
- **Municipal drinking water**
- **Food processing (wash water for vegetables)**
- **Zebra and quagga mussels in water intakes**
- **Mold**
- **Cooling towers**
- **Ballast water treatment**

Ecochlor's proprietary ballast water treatment technology

In 2001, the founders of Ecochlor proposed the use of ClO_2 as a safe and effective treatment for shipboard ballast water. A patent was issued to encompass US and International protection for the use, generation and control of an active substance (ClO_2) for the elimination of aquatic invasive species in ballast water. Using this ClO_2 technology, the Ecochlor® Ballast Water Treatment System (BWTS) is completely effective on all potential aquatic invasive species including zooplankton, phytoplankton, algae, microorganisms and even pathogens and viruses, regardless of turbidity, salinity or temperature.

The Ecochlor® BWTS is a two-step process that includes filtration and treatment with ClO_2. The heart of the treatment system is agenerator that delivers a dilute solution of ClO_2 to treat the incoming ballast water. The fully automated, compact generator has few moving parts and is the same physical size for all systems. The operation is quite simple and when the system is off, there are no stored chemicals in the generator.

Ecochlor's first system was placed in operation in 2004 and it has been proven effective and reliable for over 11 years at sea.

CROE MARINE EXHAUST GAS SCRUBBERS

THE SMART SOLUTION FOR MARPOL COMPLIANCE

Under the strict, new emissions requirements that went into effect on January 1, 2105 as part of MARPOL Annex VI regulations, vessels sailing in specific areas identified as Environmental Control Areas (ECA) in the North Sea/Baltic and US, Canada and Caribbean have to use fuel containing no more than 0.1% Sulfur. In January of 2020 (pending review in 2018) the sulfur regulation will expend to all other areas of the world requiring fuels to be limited to no more than 0.5% Sulfur content in those areas. Fortunately, IMO/MARPOL has provided an alternative path to MARPOL compliance by using Marine Exhaust Gas Cleaning Systems also known as Scrubbers.

Many ship owners and operators have already chosen to use Scrubbers allowing their ships to continue using heavy fuels with full confidence of meeting MARPOL compliance. By doing so, they save fuel costs while helping to clean the planet.

CR OCEAN ENGINEERING (CROE®) is a global leader in the supply of Marine Exhaust Gas Scrubbing Systems to the marine industry. The CROE® systems can be retrofitted into existing ships or installed into newbuild ships. The small diameter and short height of the CROE® scrubbing system makes it the preferred system for many ship applications.

The CROE® scrubber reduces particulates and SO2 emissions from the exhaust gas from heavy fuel burning engines, generators and boilers. The CROE® system can easily reduce the SO2 stack emissions to below the 0.1 sulfur fuel equivalence as required by the MARPOL regulations even when operating in the low alkalinity areas of the eastern Baltic. The typical scope of supply includes the scrubber tower, the primary circulation tank, the pumps, automated valves, instrumentation, continuous emissions monitors, washwater cleaning system, washwater monitors and control panel.

In today's very competitive shipping industry owners and operators need to take advantage of every avenue that is available to them. Installing the CROE® scrubbers and using the lower cost fuels can make a significant difference in a company's competitiveness.

Owners contemplating exhaust gas scrubbing as an alternative to distillate fuel are typically confronted by the divergent interests of engine manufacturers, consultants, marine architects and others — most lack the depth of technology experience necessary to assure a seamless transition during the process of compliance.

CR Ocean Engineering, LLC's expertise lies in the technology that is at the heart of any effective exhaust gas cleaning system. We are prepared to guide owners to the most efficient and economical solution to MARPOL compliance.

CR Ocean Engineering Marine Exhaust Gas Scrubbers are available in three standard configurations, customizable to the ship's needs:

a) As a once through scrubber, also known and Open Loop;
b) As a recirculating scrubber, also known as Closed Loop;
c) As a combination of both designs, also known as Hybrid.

They can be retrofitted into existing ships and are also the perfect choice for new builds.

Should you need more information, please contact Nick Confuorto: nconfuorto@croceanx.com

BWT compliance - Kill or be killed?

Tore Andersen, Optimarin, CEO

From 1 January 2016 vessels will not be able to discharge ballast in US waters unless their ballast water treatment (BWT) systems are compliant with stringent demands from the USCG. Experts believe that now, more than ever, it is imperative that shipowners make the right BWT choice.

"There's so much confusion surrounding the issue of ballast water treatment now," opines Optimarin CEO Tore Andersen, the head of a firm that brought the first ever commercial BWT system to market back in 2000. "The IMO Ballast Water Management (BWM) convention is close to ratification, but yet to be rubber-stamped, and meanwhile the USCG has taken the bold move to act unilaterally to protect the environment with its own regulations. "So let's cut through that uncertainty and state a fact: All shipowners that discharge ballast must get a BWT system, preferably an environmentally friendly one, if they want their ships to operate in the future. "And, if they want to sail in US waters, then they must act now."

Two standards, one answer

The fact that there are effectively two sets of regulations regarding BWT standards has muddied the waters for shipowners, making it difficult to find the solution they need. Classification societies are well aware of this, but aren't as keen to go on record to explain the situation. An environmental solutions expert at one of the world's leading classification bureaus agreed to speak, but only on the condition of anonymity. "Ballast water gets by far the most questions of any issue we deal with," theynote with a smile, "and it's easy to understand why. "There's a major difference between USCG and IMO regulations. Basically this centres on standards. "USCG judges (BWT) systems on the basis of 'living/dead' organisms in ballast water, whereas IMO views them in terms of 'viable/unviable'. In other words, for USCG approval systems have to kill the organisms, while for IMO they don't, but must ensure they don't reproduce. "USCG tests this using the FDA/CMFDA method, which uses a dye to identify living organisms, while the IMO does not list one specific methodology. The MPN (Most Probable Number) test is the norm here, having been used for almost 40 years, but procedures vary from laboratory to laboratory. This is an issue for USCG – it wants a simple, reliable and reproducible testing method. "Until this is established, and there are hurdles in doing so, both with validation and law making, FDA/CMFDA will remain the USCG standard."

No alternative

Some may now be feeling lost in a sea of abbreviations. So, here's the lowdown – USCG regulations are much more exacting. Which means fewer systems will make the grade. For the time being USCG is temporarily accepting the use of Alternate Management System (AMS), whereby vessels with solutions that have already been approved by another flag state can discharge ballast in US waters. However, USCG approved AMS systems will only be accepted for a period of five years after the vessel's compliance date, and, if they haven't met the USCG's own stringent standards by that point, will have to be changed. That burden of potential cost and uncertainty is not one today's shipowners, operating in a climate of squeezed margins and aggressive competition, may be willing to accept. They need to be sure.

Unfortunately, the systems that many industry observers seem to prefer for their simplicity, ease of operation and environment credentials (utilising no chemicals) are struggling with USCG approval. "UV systems are easy to operate, don't require chemical storage and are a good option-for the industry," opines the classification specialist. "But caution is needed." They explain that the majority have been made with the 'viable' standard in mind and therefore lack the power – "and you might require a lot more power" – to tackle the tougher FDA/CFMDA test. "That's where Optimarin has been smart," they state. "They're focusing on USCG current requirements and approval. And the first UV system to get this will have a real market advantage."

The power to deliver

BWT specialist Optimarin - which has sold over 350 of its systems to shipowners across the world, with more than 270 installed - is coming to the end of a USD 3million USCG approval programme. Its technology is the first UV system to meet the USCG marine water requirements, successfully satisfying the FDA/CFMDA criteria. Further tests of remaining water salinities are scheduled for spring 2016, after which point approval is expected later in the year. "Passing the initial tests puts us in pole position in the market for final approval and is a great endorsement of our system's effectiveness," comments a happy Andersen. "Each of our system lamps has a 35kw capacity. This power instantly kills any potentially harmful invasive organisms and that's exactly what USCG wants to see. "We're delighted to be leading the way in our segment - something that we put down to decades of work, sector expertise and investment." With the deadline fast approaching, both Andersen and the regulation expert offer similar, sage advice to shipowners. Andersen notes: "Install a system that is reliable, simple to maintain, easy to install (make sure any supplier can show a history of retrofit success) and proven within the marketplace. This is still a relatively young sector, so it pays to go with a name you can trust." His classification peer, meanwhile, has regulations front of mind: "It's simple," they say. "The industry has to comply, so choose a system that will be compliant."

Optimarin

- ***Optimarin installed the world's first commercial system on the cruise ship Princess Regal in 2000.***
- ***The type approved Optimarin Ballast System (OBS) is certified by a comprehensive range of classification organisations, including DNV GL, Lloyd's, Bureau Veritas, MLIT Japan, and American Bureau of Shipping.***
- ***Shipowners that have chosen the OBS solution include Saga Shipholding, MOL, Grieg Shipping Group, Gulf Offshore, Farstad Shipping, NYK, Nor Line, and Evergreen Marine Corp, amongst others.***
- ***Optimarin's OBS, which is already AMS accepted, is the only UV system to have satisfied the USCG's marine water FDA/CMFDA tests so far. The system is now on course for full USCG approval in 2016.***

For further information, please see www.optimarin.com

DNV·GL

In a market where everyone's seeking to eliminate unnecessary costs, DNV GL's extending new tools that deliver improved fleet performance through the use of big data. **ECO Insight** guides ship owners and operators to take actions that improve performance and reduce operational expenses.

Smart performance management solutions save fuel, cut emissions, and lower operational costs. By making fleet performance visible and easy to understand owners and operators see significant cost and time savings without the need for additional overhead.

Setting the right priorities requires insight into your fleet's performance data as well as the ability to compare your data to industry benchmarks. In the most simplified terms, DNV GL's **ECO Insight** guides decision making without impacting operations.

"In some cases, this is as simple as evaluating the speed of a vessel or the course that the vessel takes. When looking at these traffic patterns, or tendencies, and then comparing this data to the industry we're able to find new areas of cost savings that the owners and operators were unaware of," explained Bjorn-Harald Bangstein, Regional Manager of DNV GL's Maritime Advisory team.

When applied to fleets of all sizes and mixed varieties (owned, managed, or chartered in) owners and operators find the tool easy to use and quick to deliver immediate improvement actions.

For more information about how **ECO Insight** can improve your fleet's performance, please contact:

Bjorn-Harald Bangstein
Bjorn-Harald.Bangstein@dnvgl.com
Tel: (281) 396-1681

ABOUT DNV GL

Driven by its purpose of safeguarding life, property and the environment, DNV GL enables organizations to advance the safety and sustainability of their business. Operating in more than 100 countries, our 16,000 professionals are dedicated to helping our customers in the maritime, oil & gas, energy, and other industries to make the world safer, smarter, and greener.

IN THE MARITIME INDUSTRY

DNV GL is the world's leading classification society and a recognized advisor for the maritime industry. We enhance safety, quality, energy efficiency and environmental performance of the global shipping industry – across all vessel types and offshore structures. We invest heavily in research and development to find solutions, together with the industry, that address strategic, operational or regulatory challenges.

www.dnvgl.com

Shell's 'Project Silver': Oman Shipping's Muscat Silver

Oman Shipping Company (OSC) recently performed a naming ceremony for two new product and chemical tankers – the Muscat Silver and Rustaq Silver at the Hyundai Mipo Dockyard in Ulsan, South Korea. The delivery is significant as it is the first delivery for OSC in a series of 10 MR tankers to be built over the next year. All vessels will be chartered to Shell International Trading and Shipping Company Ltd. for its Project Silver, which consists of 50 new-builds. The ships will each operate worldwide with 20-strong crews - including a number of Omani officers. The Muscat Silver and Rustaq Silver are both 183 x 32.2 x 19.1 m, with capacity of 37,900 metric tonnes at the design draft and 49,800 metric tonnes at the scantling draft. They both have a gross tonnage of 29,354 tonnes and net tonnage of 12,195.

"The delivery of the Muscat Silver boosts OSC's fleet to 44 ships," said OSC General Manager Wasam Al Najjar. "This is just the beginning of our expansion too with the next nine ships due to be delivered within 12 months, which is testament to OSC's capacity and ambition."

Incorporated in 2003, OSC is owned by the Omani Government through the Ministry of Finance (80%) and Oman Oil Company (20%). Launched with the acquisition of six LNG Vessels, OSC has since diversified into the crude oil, chemical, LPG, dry bulk, container and general cargo markets.

OHIO *First of Four Jones Act Tanker from Aker Philadelphia*

Crowley Maritime took delivery of Ohio the first of four Jones Act product tankers from Aker Philadelphia Shipyard, Inc. (APSI), earlier this year. The newbuild is significant as it signifies the first time a product tanker has been constructed with consideration for the future use of LNG for propulsion. The remaining three product tankers being built by APSI for Crowley are currently under construction and have planned deliveries through 2016.

"We are excited to offer our customers cutting-edge technology available in these new tankers, which not only embraces operational excellence and top safety, but also offers the potential to be powered by environmentally friendly LNG in the future," said Crowley's Rob Grune, SVP and general manager, petroleum and chemical transportation.

The new 50,000 dwt product tankers are based on a Hyundai Mipo Dockyards (HMD) design which incorporates numerous fuel efficiency features, flexible cargo capability, and the latest regulatory requirements. The vessel is 600 ft. long and is capable of carrying crude oil or refined petroleum products.

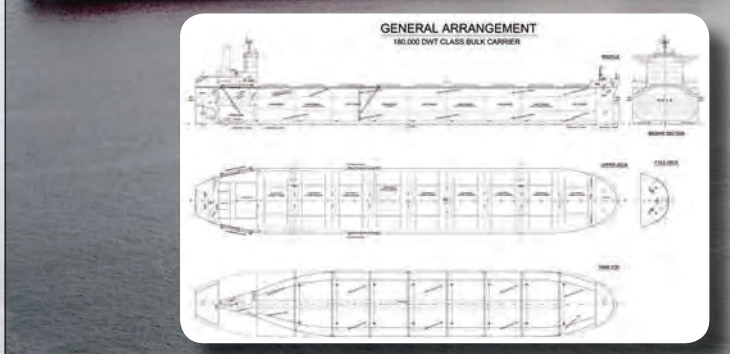
Crowley's Seattle-based, naval architecture and marine engineering subsidiary Jensen Maritime provided construction management services for the product tankers.

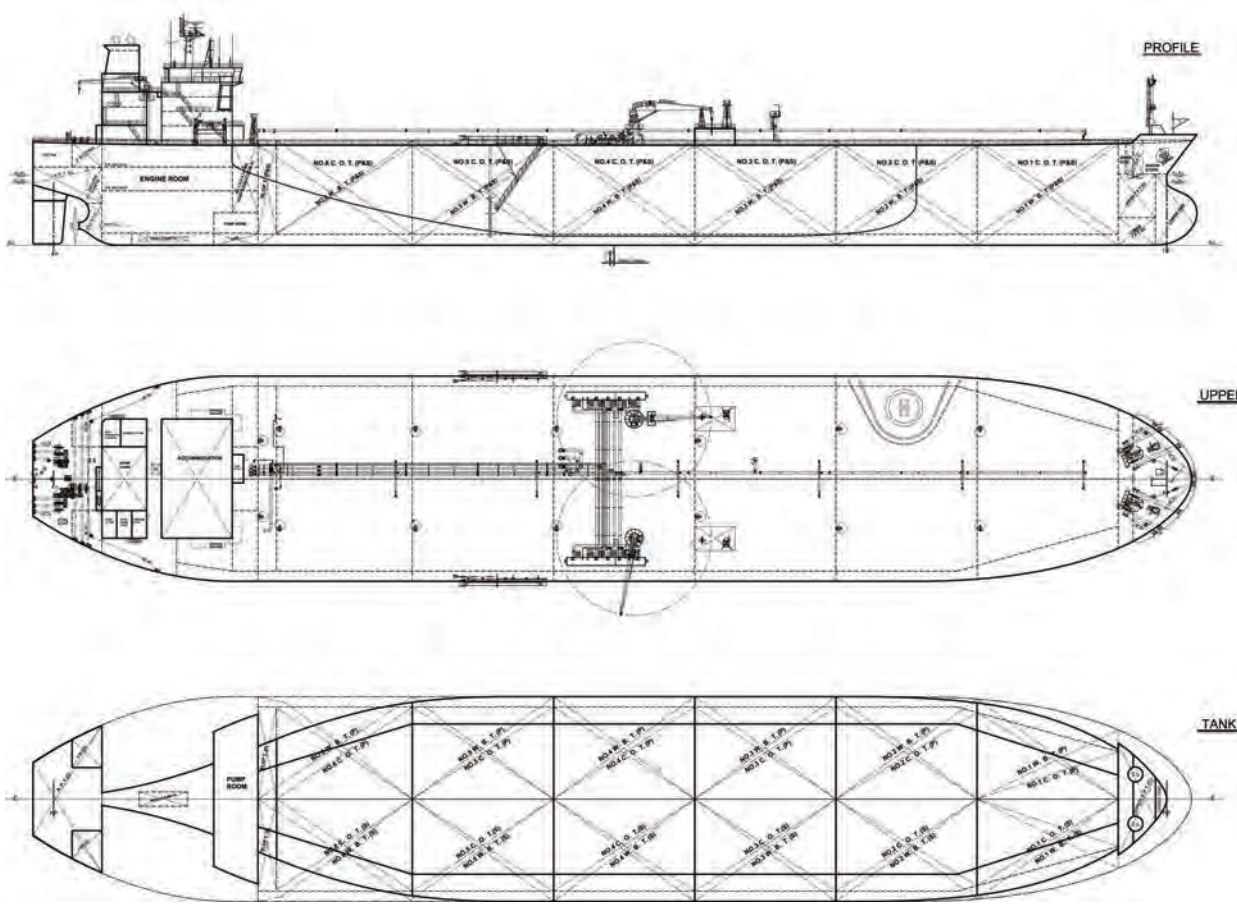
SBI Magnum:
180,000 Bulk Carrier

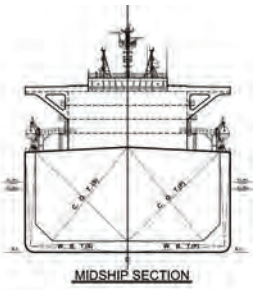
SBI Magnum is the 1st vessel of a series of 4 vessels which is ordered from Scorpio Bulkers Inc. for the carriage of dry bulk cargos such as Iron Ore and Coal. Sungdong Shipbuilding and Marine Engineering has been continuing its efforts to develop the most efficient ship of this type. SBI Magnum has been designed to maximize the efficiency of propulsion system by applying the G(Green ultra long stroke)-type Engine. And through the development of an optimized hull form, the fuel efficiency has been improved more than 10% compared with the builder's earlier hull form. By controlling the non-uniform flow on the stern area through installation of energy saving device, propulsion power has been reduced about 5%. SBI MAGNUM had been designed and approved to pass New Panama Canal which will be completed by 2016. In addition, by carrying out the trim optimization model test for this vessel, it is possible to sail at optimized ship condition and to enhance the fuel efficiency.

SBI MAGNUM Main Particulars

Type	180,000DWT Bulk Carrier
Shipbuilder	SUNGDONG Shipbuilding
Shipowner	Scorpio Bulkers Inc.
Ship Operator	Offen Tankers
Date of Delivery	Oct. 2015
Length, o.a.	292m
Length b.p.	283.5m
Beam	45m
Depth	24.8m
Draft	Td: 16.5m, Ts: 18.3m
Deadweight Tonnage	180,000t
Gross Tonnage	92,900t
Speed	14.5 knots
Flag	Marshall Islands
Classification	LR / KR
IMO No.	9729178
Main Engines	MAN B&W 6G70ME-C9.2 Tier II
Output	21,840kW x 83rpm
Propulsion/Propellers	HHI, FPP, 9m
Fuel Consumption	45.5 tons/day
Water Ballast Treatment System	Samsung







Navig8 Serenity
115,000 DWT Product/ Chemical Tanker

Navig8 Serenity is the first vessel in a series of 10 LR II product oil carrier, built by Sungdong Shipbuilding & Marine Engineering for Navig8 Shipmanagement Pte., Ltd.. The vessel is built under the survey of Korean Register of Shipping and designed in accordance with IACS common structure rule (CSR). The vessel features a double side skin and has a flush deck, bulbous bow, transom stern, open water type stern frame, semi-balanced rudder and single propeller driven by a slow speed diesel engine. The main engine MCR of MAN 6G60ME-C9.2 Tier II is de-rated to 11,350kW at 80rpm for economy fuel oil consumption. The speed of the vessel at design draft (13.6m) is 14.5 knots at 85% of MCR (9,648kW) with 15% sea margin based on well optimized hull form and propeller design which had been analyzed by CFD. Electric power is generated from three (3) diesel generators driven by alternator with 960kW output and steam is generated by two(2) auxiliary boilers of water tube type with capacity of 25,000kg/hr. and one exhaust gas economizer with capacity of 1,200 kg/hr. The vessel has six pairs of cargo oil tanks, two slop tanks, fore and aft peak tanks, segregated water ballast tanks, fuel oil tanks and fresh water tanks. Cargo tanks are divided by plane type transverse and longitudinal bulkhead.

Photo: Bureau Veritas

1 *JS Ineos Insight*

The first ethane-powered ship, JS Ineos Insight, the lead ship in a series of eight 27,500-cu.-m. multi-gas Dragon-class vessels being built at Sinopacific, China, for Denmark's Evergas, was named in July 2015. The new vessels will be configured for the transport of ethane, LPG or LNG, with options for ethane, LNG and conventional diesel power, and will be classed by Bureau Veritas.

The Dragon vessels were originally designed with a dual-fuel LNG/diesel power utilizing two 1,000-cu. m. LNG tanks on deck powering two Wärtsilä 6L20 DF main engines with a total of 2,112 kW power and two shaft generators with a total of 3,600 kW power. The ability to also burn ethane was added to allow use of the cargo gas as the vessels are destined initially for transport of ethane from the U.S. to the U.K. Ineos refineries. Evergas, a wholly owned by Greenship Gas and JACCAR Holdings, has a large new-building program of ethylene, ethane and LNG multi-gas carriers.

2 *Industrial Grand*

Intermarine has begun Fleet of the Future deliveries with the addition and maiden voyage of the Industrial Grand. The 20,000 dwt, 545-ft. multipurpose vessel features three cranes with a combined lifting capacity of up to 900 metric tons. Industrial Grand is the first of 20 new eco-friendly lifters that will join Intermarine's core fleet during the next 30 months. The vessel will travel from Shanghai, China, to the U.S. Gulf Coast to deliver a large and complex petrochemical processing tower. The cargo delivery includes a 720.5 metric ton lift of 48.6 meters in length which was loaded using vessel's gear.

"The Industrial Grand represents a glimpse into the future, harnessing eco-friendly technology and increased lifting capacity," said Al Stanley, President and CEO of Intermarine. "This innovation aligns with delivering the appropriate fleet to meet our customers' cargo needs and allows us to provide the value, reliability and creative solutions that customers have come to expect from Intermarine."

The deliveries will mark the beginning of a series of eco-friendly deliveries and add to the range and capabilities of Intermarine's core fleet of more than 50 vessels. The Industrial Grand will be joined by her sister vessel, the Industrial Glory when she joins the service from the shipyard in May 2015.

3 *Ardmore Chippewa*

Ardmore Shipping Corporation took delivery of the Ardmore Chippewa on November 13, 2015. Ardmore Chippewa is a 25,233 dwt, Eco-design IMO 2 product and chemical tanker that was constructed at the Fukuoka Shipbuilding Co., Ltd. shipyard in Nagasaki, Japan, and is the final in a series of four Fukuoka newbuildings delivered to Ardmore in 2015.

"We are pleased to welcome the Ardmore Chippewa to our fleet of modern, fuel-efficient MR product and chemical tankers, successfully completing our initial newbuilding program at a time when charter markets

3

5

4

Photo: Teekay

continue to demonstrate sustained strength," said Anthony Gurnee, CEO of Ardmore. "I would also like to extend our sincere thanks to Fukuoka, as well as our staff and service partners, for their hard work and commitment throughout the four-year process of building and delivering this state-of-the-art fleet."

4 *Creole Spirit Sails for Sea Trials*

Teekay's first M-type, Electronically Controlled, Gas Injection (MEGI)-powered LNG vessel, Creole Spirit, has sailed out from the Daewoo Shipbuilding & Marine Engineering (DSME) shipyard for sea trials. Creole Spirit is Teekay's first of nine LNG newbuildings equipped with dual fuel two stroke MEGI engines from MAN Diesel & Turbo. The engines were installed shortly after the ship's keel was laid in March. The vessel is expected to enter service in January 2016 on a contract charter with Cheniere. According to Teekay, Creole Spirit will be the most efficient LNG ship on the water with the lowest unit freight cost in the world fleet.

5 *CMA CGM Amazon*

9,100 TEU Containership (1st in a series of 4)

CMA CGM AMAZON represents first step in DMHI's portfolio for the construction of post-panamax and bigger containerships. CMA CGM AMAZON, delivered by Daewoo-Mangalia Heavy Industries S.A. (DMHI) in June 2015, was built under the supervision of Lloyd's Register and was the first container vessel of a series of four ships built for Capital Ship Management Corp., and chartered to CMA CGM Group.

The vessel, the biggest of her type ever built into the Black Sea and the Mediterranean Sea area, measures 299.9 m overall and 48.4 m Breadth with a capacity of 9100 TEU, powered by a Wärtsilä W9X82 main engine that meets the latest regulation for energy efficiency and environmental protection, including the following specific items.

- Nominal containers, maximized by on deck with ninth tier's containers in empty in accordance with IMO visibility requirement at the scantling draft.
- Bulbous bow, developed for the improvement of operating performance over wide range of draft.
- Pre-swirl stator and full-spade rudder with rudder bulb, installed as an energy saving device.
- Silyl acrylate type self-polishing anti-fouling, applied for painting performance.
- Latest Ballast Water Treatment System.
- Ship performance monitoring system with the function of fuel consumption calculation, interfaced with the CAMS and connected to the INMARSAT FB for performance monitoring in the shore office.
- AMP room, provided on upper deck (starboard) and two (2) sets of fixed type cable reel unit and necessary accessories including peripheral appliances for AMP system in order to receive shore power, each one on STBD and port outside of the accommodation.

Photo: VINASHIN

Vietnam

Maritime Capabilities get a Natural Boost

By Joseph R. Fonseca

Leaning against the western mountain range, the long, extenuated country of Vietnam is blessed with three thousand km of Eastern shoreline that covers the entire Indo-Chinese coast. With such an auspicious topography it is natural to find most Vietnamese living relatively near the open sea.

Vietnam has experienced rapid economic growth during the last two decades. It has transformed itself from a closed, state-controlled economy into a mixed economy with an increasingly dynamic and competitive private sector and export-driven industries. The maritime cluster, particularly the shipbuilding industry and maritime transport industries, have been a central part of the economic growth and receives preferential treatment in the Vietnamese government's development strategy.

Vietnam has also emerged as an important oil and gas producer which has stimulated development in the offshore segment. Foreign direct investments have contributed significantly to the economic growth with the country's maritime cluster attracting considerable foreign investments from all over the world.

Vietnam's shipbuilding industry features among the top five countries in terms of order book after China, South Korea, Japan and the Philippines. The country's government has declared the sector one of its priorities and is investing in increasing its output capacity as well as the technology level of the sector.

Within Vietnam, the VINASHIN shipbuilding group is dominant with a market share of 70-80% and strong government backing. However, the focus is on producing smaller tonnage vessels include tankers, bulkers and multipurpose vessels. In the past five years with the increasing number of foreign buyers being entertained the ship size being ordered has continued to grow. Foreign investments play an important role. Although production is relatively inefficient, wage costs are low so that the country can remain competitive. However, financial stability is a concern.

Besides Vinashin, the Vietnamese shipbuilding sector consists of naval shipyards, shipyards of oil and gas company PetroVietnam, as well as private shipbuilding and marine equipment companies which are mainly operating under foreign ownership or co-ownership. In all, about 150 shipyards are in operation of which some 30 undertake exports. The shipbuilding industry is said to provide over 100,000 jobs directly and about up to one million indirectly.

The main strengths for Vietnam's shipbuilding industry are based on the country's vast labor force available at low wage levels and the government's commitment to developing the sector. Industry weaknesses relate to poor management skills, extending to yard management, supply management, financial management and market strategy. Each of these areas may be affected by institutional factors, especially the strong political interference in the sector.

The Vietnamese shipbuilding cluster is divided into three sub-clusters – the northern, central and southern clusters. The northern cluster, Hai Phong, is concentrated on bulker-building, the central cluster specializes in both tankers and bulk, and the southern cluster in the Vung Tau area is an offshore shipbuilding cluster with a strong presence of international companies, such as Rolls-Royce, STX, and Ezra Holdings. Vung Tau also plays a significant role in Vietnam's offshore oil industry. It is the only petroleum base of Vietnam where crude oil and natural gas exploitation activities dominate the city's economy and contributes principal income to Vietnam's budget and export volume

As the majority of the large shipyards in Vietnam are managed by Vinashin, operating in a parent-subsidiary model, foreign companies usually enter the Vietnamese market by setting joint ventures resulting in creation of new entities or by acquiring shares in local shipyards.

Vietnam National Shipping Lines (Vinalines) has a central position in the sector, currently owning some 30% of the Vietnamese fleet). Vinalines is also owned, regulated and financially supported by the state, covering some 70

Vietnam Facts

Area:
Total: 331,210 sq km
Land: 310,070 sq km
Water: 21,140 sq km
Country comparison to the world: 66

Coastline:
3,444 km (excludes islands)

Maritime claims:
Territorial sea: 12 nm
Contiguous zone: 24 nm
Exclusive economic zone: 200 nm
Continental shelf: 200 nm or to the edge of the continental margin

Population:
94,348,835 (July 2015 est.)

Life expectancy at birth:
Total population: 73.16 years
Country comparison to the world: 132

Country name:
Conventional long form:
Socialist Republic of Vietnam
Conventional short form: Vietnam
Local long form:
Cong Hoa Xa Hoi Chu Nghia Viet Nam
Local short form: Viet Nam

GDP
$512.6 billion (2014 est.)
Country comparison to the world: 38

Waterways:
47,130 km (30,831 km weight under 50 tons) (2011)
Country comparison to the world: 4

Merchant Marine:
Total: 579
By type: barge carrier 1, bulk carrier 142, cargo 335, chemical tanker 23, container 19, liquefied gas 7, passenger/cargo 1, petroleum tanker 48, refrigerated cargo 1, roll on/roll off 1, specialized tanker 1

Registered in other countries: 86 (Cambodia 1, Kiribati 2, Mongolia 33, Panama 43, Taiwan 1, Tuvalu 6) (2010)
Country comparison to the world: 20

Ports and Terminals:
Major seaport(s): Cam Pha Port, Da Nang, Haiphong, Phu My, Quy Nhon
River port(s): Ho Chi Minh (Mekong)
Container port(s) (TEUs): Haiphong (1,018,794), Saigon New Port (3,071,777)

Source: The World Factbook 2013-14. Washington, DC: Central Intelligence Agency, 2013

Photo: VCG

member companies in the fields of shipping, port operations and maritime support services, among others.

Vietnam has also been building up its port capacity in recent years and several ports are currently either under construction or are being upgraded.

Among them being Cai Mep-Thi Vai in Ba Ria Vung Tau province, Cai Lan in Quang Ninh province, and Van Phong in Khanh Hoa province.

However, the large number of ports, offer a capacity which is far greater than the current demand.

Government supports the industry through various schemes. Several financial incentives are in place, including:

- Exemption on export taxes,
- Refund/exemption of import tax for imported equipment and material that is used on exported ships,
- Restrictions on second hand ship imports, as a measure to enhance the attractiveness of local purchase. that financial incentives given by the government have contributed to the capacity growth and capability increase of the sector in the past years

Vinashin has also established several joint ventures with foreign companies including Dutch Damen, Finnish Cargotec and Korean Hyundai. As an example, Norwegians are actively involved in the Vietnamese maritime industry and the governmental organization 'Innovation Norway' is providing support for companies entering the Vietnamese market. In addition, Finland has a long history with the Vietnamese shipbuilding industry within development cooperation. The Pha Rung shipyard, located in the northern shipbuilding cluster, has been developed as a cooperation project between Vietnam and Finland since the 1980s. Originally, Pha Rung was operating as a repair shipyard but nowadays it is also involved in new-building activities and operates under Vinashin Group.

Various studies conducted clearly show that the Vietnamese Maritime Sector has grown tremendously in a short time.

However, in the coming years there could be a setback if market conditions remain weak.

Singapore Facts

Area:
Total: 697 sq km
Land: 687 sq km
Water: 10 sq km
Coastline: 193 km
(192nd in the world)

Natural resources:
Fish, Deepwater Ports

Population:
5,674,472 (July 2015 est.)

Life expectancy at birth:
Total population: 84.68 years
Country comparison to the world: 3

GDP
$82,800 (2014 est.)
country comparison to the world: 7

Merchant marine:
Total: 1,599
By type: bulk carrier 247, cargo 109, carrier 6, chemical tanker 256, container 339, liquefied gas 131, petroleum tanker 436, refrigerated cargo 13, roll on/roll off 5, vehicle carrier 57

Foreign-owned: 966 (Australia 12, Bangladesh 1, Belgium 1, Bermuda 25, Brazil 9, Chile 6, China 29, Cyprus 6, Denmark 149, France 3, Germany 32, Greece 22, Hong Kong 46, India 21, Indonesia 60, Italy 5, Japan 164, Malaysia 27, Netherlands 1, Norway 153, Russia 2, South Africa 13, South Korea 3, Sweden 11, Switzerland 3, Taiwan 77, Thailand 33, UAE 10, UK 6, US 36)

Registered in other countries: 344 (Australia 2, Bahamas 7, Bangladesh 7, Belize 4, Cambodia 3, Cyprus 1, France 3, Honduras 11, Hong Kong 13, Indonesia 46, Italy 1, Kiribati 9, Liberia 22, Malaysia 13, Maldives 4, Malta 4, Marshall Islands 30, Mongolia 3, North Korea 1, Panama 92, Philippines 1, Saint Kitts and Nevis 10, Saint Vincent and the Grenadines 5, Sierra Leone 9, Thailand 1, Tuvalu 19, US 16, Vanuatu 2, unknown 5) (2010)
country comparison to the world: 6

Ports and terminals:
Major seaport(s): Singapore
Container port(s) (TEUs): Singapore (31,649,400)
LNG terminal(s) (import): Singapore

Source: The World Factbook 2013-14. Washington, DC: Central Intelligence Agency, 2013

By Joseph R. Fonseca

Stimulus Aids Maritime Singapore

With a thriving ecosystem of maritime and port services, Singapore is an island city-state off southern Malaysia, where the international maritime community congregates, and where ideas and opportunities abound. This vibrant industry is home to more than 5,000 establishments ranging from shipping to port related activities, employing more than 170,000 people. In fact, the maritime industry contributes about 7% to Singapore's GDP.

In response to the government effort to attract investment from abroad, the first foreign company to set-up base was Japan's second largest shipbuilding group IHI. Seeing the healthy investment climate, a line of investors followed. To cater to the labor demand, the government and shipyards selected promising Singaporean students and sent them to study naval architecture and engineering abroad. Over the past three decades this has seen the creation of a workforce that contributed significantly to the development of Singaporean maritime cluster.

Singapore is rightly called an international maritime center because it is a thriving international center for shipbuilding, ship repairs and conversions and a leader in the building of rigs and offshore structures and in the conversion of FPSO (Floating Production and Storage and Offloading) units. In terms of new-builds, Singapore is also a niche player in building customized and specialized vessels such as offshore supply and support vessels. The country is also in the forefront for ship repairs and ship conversion.

Known for its cost competitiveness, container shipping friendly fee regime and infrastructure, Singapore is considered the best Seaport in Asia.

Photo: Keppel Offshore & Marine

Because of its facilitation of support services, timely investments guarantees and the high level of services the country is well placed to meet all future demands. At any given time there are about 600 to 1,000 vessels in Singapore ports or anchorage locations. Annually around 120,000 vessels call at Singapore.

The shipbuilding industry is led by two large shipyard groups, SembCorp Marine Ltd and Keppel Offshore & Marine. Both operate within the entire value chain from ship repair to rig building and offshore production. In addition to these two key players, more than 40 medium-sized shipyards are located in this dense city state supported by a host of companies offering a wide spectrum of services including ship owning, designing, engineering, marine equipment supplies, navigation, managing, broking, finance, insurance, arbitration testing and certification.

The shipbuilding sector actually improved its performance in 2012 and launched a total of 110 vessels, comprising mainly relatively small-sized specialized vessels. The rig building order book hit a new high with secured deals worth $14.1 billion and completion dates stretching up to 2019.

Singapore is also expanding and consolidating the existing five terminals to eliminate the need for inter-terminal haulage as well as to provide more advanced processes. Last year, the container throughput recorded 33.9 million TEU, the highest ever and vessel arrival tonnage rose by 1.9 percent to 2.37 billion gross tons.

Singapore prides itself as the world's top bunkering port with the registered bunkering sales volumes of almost 43 million tons. The collapse of OW Bunker, a leading marine fuel trader from Denmark, in November last year appeared to have no major impact on the local bunkering sector. Singapore remained the world's top bunkering port last year, although sales volumes declined marginally to 42.4 million tons from 42.7 million tons a year earlier.

However the cruise business market is at an emerging phase. Singapore is already the homeport of Costa Cruises and Star Cruises, and Royal Caribbean International as well as Princess Cruises. Singapore may thus turn into a future cruise passenger hub as well.

The Singapore Registry of Ships (SRS) was established in 1966. Today, Singapore is reputed for its quality ship registry and is ranked among the world's top ten largest ship registries, with a fleet of more than 4,500 registered vessels. The total tonnage of ships gained 11.7 per cent to 82.2 million gross tonnes last year and continues to be the preferred choice of flag for many international ship owners. Singapore's efficient infrastructure and business-friendly environment continues to attract ship owners worldwide to register their vessels under the Singapore flag.

The Maritime and Port Authority of Singapore (MPA) was established in 1996. As Port Authority, MPA regulates and manages port and marine services and facilities the activities within the Singaporean waters. This includes vessel traffic and navigational safety and security, through regulations on operational efficiency and on the environment.

Singapore has introduced incentives for shipowners and operators to set up their operations in the country. Prominent among these being the International Shipping Enterprise (AIS) scheme introduced in 1991 to attract more foreign maritime auxiliary service providers in Singapore – this went a long way in the creation of a comprehensive international hub.

Singapore is increasingly engaged in challenging projects, consequently, more knowledge-intensive skills and higher engineering content are required from the workforce. As a result, manpower and mechanization constitute key challenges for the industry, followed by the related problems of training, foreign worker employment and work safety. Today, foreign workers comprise about 75% of the employees in the Singaporean yards.

The global demand for oil and gas will only grow, and as the exploration and production is shifting to more challenging environments, oil companies require newer, safer and more efficient rig units. At the same time, the existing global offshore fleet is ageing and is in need of renovation and replacement. Singaporean rig-builders with their proven track records are in a good position to meet the demand for new rigs.

Maritime Korea finds its place in the Sun

Photo: DSME

By Joseph R. Fonseca

The development of the cluster in South Korea's large water area and over 2,413 km (1,508 miles) long coastline has to a large extent been responsible for the country's rise to prominence as a major marine power. Today, South Korea ranks high in the world in terms of shipbuilding industries, shipping and ports.

Over the past few decades, shipbuilding contributed significantly towards South Korea's economic development. From the late 1970s to the 90s, it did remarkably well with its low-cost shipbuilding propelling it to sail past Japan to gain the top rank in the world in 1993 in terms of its new shipbuilding orders with a share of nearly 38% of the world market. South Korea eventually became the world's dominant shipbuilder with a 50.6% share of the global shipbuilding market as of 2008. In 2011, South Korea built 13 million gross tons of ships which created a total value of more than $462 billion, and hence, the shipbuilding industry has become the nation's number one export industry representing more than 15% of its total exports. But then there was a paradigm shift. In 2014, out of the global new orders of 41 million CGT that were placed, Korean ship builders succeeded in claiming 29.8 % leaving the top place to the Chinese who claimed 38.8% orders.

There are nine shipbuilders who dominate the South Korean ship building scenario according to Korea's Offshore & Shipbuilding Association (KOSHIPA), a non-profit organization established in the late '70s when South Korea embarked on its task of developing its shipbuilding industry. They are Hyundai Heavy Industries, Daewoo Shipbuilding & Marine Engineering, Samsung Heavy Industries, Hyndai Samho Heavy Industries, Hanjin Heavy Industries & Construction, STX Offshore & Shipbuilding, Hyndai Mipo Dockyard, SLS Shipbuilding, and Dae Sun Shipbuilding & Engineering.

While many smaller shipbuilders had joined the Korea Shipbuilding Industry cooperative, almost all of the major and medium-to-large companies joined KOSHIPA. South Korea has been actively cooperating with international players in the maritime industry which has resulted in providing more opportunities for the nation to maintain its competitive advantage and to improve its industrial structure.

South Korean shipbuilders have expanded to different regions of the world. Among the subsidiaries abroad, STX's shipyard in Dalian, China, Hanjin's Subic Shipyard in the Philippines, Daewoo's Mangalia Shipyard in Romania and Hyundai's Vinashin Shipyard in Vietnam are doing exceptionally well. Other forays abroad included the STX group which entered Azerbaijan shipbuilding industry and Samsung Heavy Industries (SHI) that acquired stakes from shipbuilders in Brazil and other countries in Latin America.

Shipping and port industry too play as vital a role in the nation's economy as shipbuilding does mainly because almost all of the country's imports and exports are transported by sea.

The size of the shipping companies' fleet is well developed. Even though the maritime industry leverages its high quality labor force and technological supremacy, the operating costs have continued to spiral due to higher fuel and labor costs.

South Korea's Hanjin Shipping and Hyundai Merchant Marine (HMM) feature in the list of top 20 leading container shipping operators in the world whereas, the next two operators, STX Pan Ocean and Korea Lines Corporation (KLC)

Left:
Hanjin Sooho (13100 TEU Class)
(Photo: Hanjin)

Below:
Hyundai Heavy Industries Ulsan Shipyard, South Korea
(Courtesy: HHI)

who held the third and fourth positions according to fleet size began experiencing losses and have been since auctioned.

Among Korea's around 20 major and minor ports, Busan, Kwangyang and Incheon are the biggest ports which are also free trade zones. Busan Port with its throughput of over 16 million TEU, features among the world's top 20 container terminals in terms of throughput.

The South Korean government has made different development plans for each port based on its own features and advantages. The strong support from the government is expected to accelerate the development of the port sector.

The maritime industry is in an advantageous position enjoying governmental support, knowhow of high technology, high production efficiency, as well as extensive international cooperation. Moreover, the shipyard training centers and maritime education in the universities guarantee a continuous support of skilled and professional manpower.

Marine equipment market for companies affiliated with Korea Marine Equipment Association (KOMEA) was worth $7.4 billion in 2013, a significant drop from $9.1 billion recorded in 2012. This comprised of Engine & Machinery segment worth $3.25 billion, outfitting segment worth $2.4 billion, Electric & Electronics segment was worth $1.2 billion and Hull segment worth $399 million.

Considering the fact that South Korea is already quite advanced in terms of technologies, it might be appropriate for the nation to keep its path on developing high complexity and eco-friendly shipbuilding.

The Arctic region has become a new market area for South Korean maritime industries.

In August 2013, South Korea came out with their plan on Arctic policies. With full support from the government, South Korea sees their primary mission as developing and taking advantage of shipping through the Arctic region. The Arctic shipping routes, on the one hand, can bring South Korea large market potential and shortened distance between Asia and Europe.

South Korea and Norway are jointly engaged in developing Arctic shipping and are expected to open a new shipping route between Europe and Asia. From this perspective, South Korea's focus on the Arctic shipping may also provide maritime companies in the Central Baltic Sea region with technological expertise more business opportunities, especially in the field of ice-breaker designing and manufacturing.

S. Korea Facts

Country Abbreviation: ROK

Area:
Total: 99,720 sq km
Land: 96,920 sq km
Water: 2,800 sq km
Country comparison to the world: 109
Coastline: 2,413 km

Maritime claims:
Territorial sea: 12 nm; between 3 nm and 12 nm in the Korea Strait
Contiguous zone: 24 nm
Exclusive economic zone: 200 nm
continental shelf: not specified

Population: *49,115,196*
(July 2015 est.)

GDP
$1.781 trillion (2014 est.)
country comparison to the world: 14

Waterways:
1,600 km (most navigable only by small craft) (2011)

Merchant marine:
Total: 786
By type: bulk carrier 191, cargo 235, carrier 8, chemical tanker 130, container 72, liquefied gas 44, passenger 5, passenger/cargo 15, petroleum tanker 55, refrigerated cargo 15, roll on/roll off 10, vehicle carrier 6

Foreign-owned: 31 (China 6, France 2, Japan 14, Taiwan 1, US 8)

Registered in other countries: 457 (Bahamas 1, Cambodia 10, Ghana 1, Honduras 6, Hong Kong 3, Indonesia 2, Kiribati 1, Liberia 2, Malta 2, Marshall Islands 41, North Korea 1, Panama 373, Philippines 1, Russia 1, Singapore 3, Tuvalu 1, unknown 8) (2010)
country comparison to the world: 14

Ports and terminals:
Major seaport(s): Busan, Incheon, Gunsan, Kwangyang, Mokpo, Pohang, Ulsan, Yeosu
Container port(s) (TEUs): Busan (16,163,842), Kwangyang (2,061,958), Incheon (1,924,644)
LNG terminal(s) (import): Incheon, Kwangyang, Pyeongtaek, Samcheok, Tongyeong, Yeosu

Source: The World Factbook 2013-14. Washington, DC: Central Intelligence Agency, 2013

Optimizing Ship Performance via Monitoring Systems

Ship owners want to operate ships efficiently to keep fuel consumption, and as a consequence, atmospheric emissions levels low. Ship owners and crews obtain a reliable monitoring of the atmospheric emissions controlling the fuel consumption for main engine and auxiliary engines, mainly. By using ship performance monitoring systems (SPM), it is demonstrated that the ships can save 6% in fuel consumption, which translates into large financial savings and emission reductions.

What is a SPM?

SPM is one computer and data logger interfaced with several sensors onboard allowing the continuous recording of the inputs for analysis of the ship performance status. The required inputs (minimum) for the SPM are:

- Power delivered to propeller
- Fuel consumption of main engine
- Environment conditions

The SPM offer numerical values and graphical information, and the latest SPM systems offer the option to make a statistical analysis of the main performance. The SPM should generate fuel reports per day and per voyage.

Performance Indicators Calculated by SPM

The performance indicators are those variables calculated automatically for the SPM and give useful information about the actual vessel performance. The main performance indicators to be analyzed are the M/E specific fuel rate (SFR), Ship overall efficiency (SOE), propulsion efficiency, EEOI and propeller slip.

► Specific Fuel Rate, SFR

The SFR is defined as the quantity of fuel consumed by M/E (by weight) to produce one unit of power in one unit of time. Many factors affect the SFR including engine design, load factors that depend on engine use characteristics, and auxiliary technologies. A small improvement in SFR shows significant cost savings in fuel. Thus, if the SFR improves, the atmospheric emissions will decrease in consequence. Technically, the most optimal performance range to operate the M/E is between 75-85% of its Maximum Continuous Rate.

► Overall Ship Efficiency

This parameter indicates the amount of fuel necessary to sail one nautical mile. To evaluate this performance indicator with design data, it is necessary look at two reference curves made from design data, these are “SFR vs Power” (see figure 1) and “Power vs Ship’s speed” (see figure 5).

► Propulsion Efficiency

This performance parameter is showing how many kilowatts are being used to sail one nautical mile. This parameter will decrease with the passage of the time due to the hull will lose efficiency (degradation of coating, accumulation of fouling, etc.). In addition, reduction on propeller performance and on the M/E efficiency will cause variations on this performance indicator.

► Energy Efficiency Operational Index

The EEOI is the ratio of mass of CO2 emitted per unit of transport work. The EEOI should be a representative value of the energy efficiency of the ship operation over a consistent period, which represents the overall trading pattern of the vessel. It is required to define a rolling average indicator using a minimum number of voyages that is statistically relevant.

► Propeller Slip

The propeller slip is defined as the difference between the theoretical distance that the propeller should travel in one revolution and the actual distance the vessel travels. Other definition may be the difference between the speed of the vessel and the speed of the engine. Any change on ship’s speed and/or propeller revolutions cause change on the propeller slip. Therefore, analysing the value of the propeller slip, they can evaluate the hydrodynamic status of the ship. With bad weather condition or strong sea current, the evaluation of the performance indicator would be no reliable or that could falsify the results obtained.

Statistical Analysis in SPM

Per definition, statistical analysis refers to the setup methods used to process large amounts of data. It is particularly useful when dealing with unsteady data. It is important to implement filtering to avoid useless data that could invalidate the long trend analysis. The filtering should take into account the weather condition, main engine power and ship’s cargo condition. It is necessary classify the data to make a reliable study. All the statistical analyses must be compared against some reference bases. These references are the design data of the ships, and benchmark data collected after delivery and/or after any major maintenance or repair of the ships.

SPM System

In order to show and explain the benefits of using a ship performance monitoring systems, profiled here is the software offered by the Norwegian company, Kyma a.s. With head office in Bergen, Kyma a.s, is a leaders on ship performance monitoring systems. It offers products with the evaluation of the ship performance status. One product is the Kyma Ship Performance (KSP). KSP offers to the crew different information in order to evaluate the ship performance at any time and during the ship’s life. It is shown numerical data, reference curves and short trend data. The logging time used by Kyma is every 15 seconds; it means that the numbers on the KSP are updated every 15 seconds with the average data recorded during this logging time.

Numerical data give to the crew clear information about the actual status of the ship and the total values per voyage. It is also represented the short trend data graphically. These graphics show the behaviour of any parameter for a short period (from minutes to 14 days). Other information available on KSP are the reference curves (design condition), these baselines are:

- FO consumption vs. Ship´s speed

Figure 1 Real example of reference curve from main engine shop test

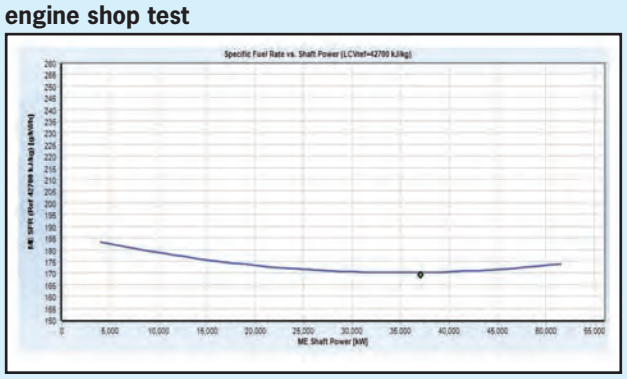


Figure 2 KSP Display program screen

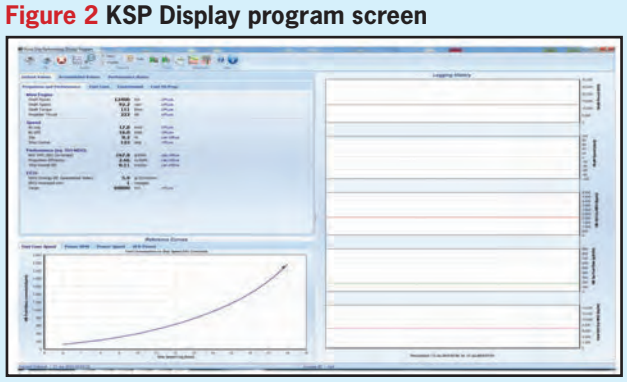
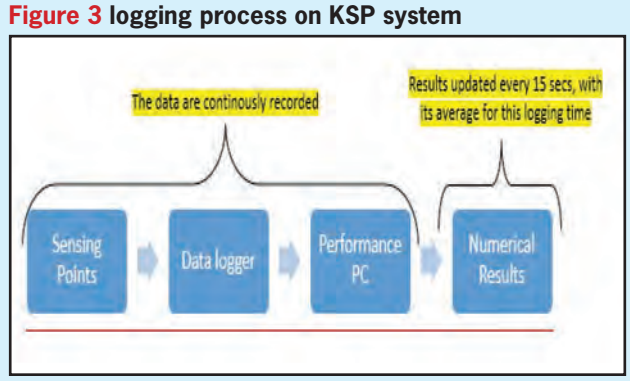


Figure 3 logging process on KSP system



- Shaft Power vs. RPM
- Shaft Power vs Ship´s speed
- SFR vs. Power

Baseline "FO consumption vs. Ship´s speed"

This baseline could be used to see if ship is being operated following the terms of the time charter parties (TCP) agreements. In addition, looking this baseline the crew can analyze if the ship is sailing in the most optimal mode to achieve the TCP agreement.

Baseline "Shaft Power vs. RPM"

There are basically, two conditions to be considered if the RPM are out of the optimal condition.

1. **Higher RPM:** It might indicate that the propeller is too small or too light. Thus, it is necessary more revolutions to develop the require power, it could cause problems of cavitation.
2. **Lower RPM.** It might indicate that the propeller is too heavy or the propeller has a lot of fouling on the blades, raising its resistance. Less revolution than the design indicates that the torque on the propeller shaft is too high then the propulsion system could be overloaded.

Baseline "Shaft Power vs. Ship´s speed"

The speed used here is the ship´s speed log. The performance system must correct the baseline in function of the ship's cargo condition.

This baseline allows to the crew to see if the ship can reach the desire speed using the exact power as the design report specifies. It is hard to reach the baseline over the time due to the hull performance is getting worse with the time passage, and then speed loss appears. The best way to evaluate and analyse this speed loss is by means of statistical analysis.

Baseline "SFR vs. Shaft Power"

This baseline is made with the M/E workshop test report data. The SFR used from the main engine workshop report is the value corrected at reference lower heating value of 42,700 kJ/kg. It is used as referent value because the ships will use different low heating values (different fuels type, different fuel qualities, etc.) then it is required to standardize the baseline. The reference value for low heating value determinate by ISO is 42,700 kJ/kg. See figure 1 for reference.

Report capability of KSP

The KSP makes automatically daily reports (noon-to-noon) and voyage reports. Alternatively, the KSP has the option to run "trial reports". This option gives to the crew the chance to evaluate the ship performance during one determinate period.

Statistical Analysis on KSP

In the KSP, there is a tool called "Diagnostic toolbox". This shows all the trend data from the ship during her lifetime.

The three main performance indicators are:

- Speed Log deviation / the hull status.
- RPM deviation / propeller condition.
- M/E SFR deviation / M/E consumption.

The green lines are the trend events (major events that will modify the ship performance), for example, dry docking periods. The blue lines are info events (they have not influence on the trend analysis) such as "leaving port", "Change HFO-MDO", etc. To make an accurate analysis, it is important to include the trend events carried out on the ships. Is also essential to establish the reference level that allow seeing the deviation of the trend data to be analyzed. The solution commonly adopted is to compare with two reference bases, one constant and one dynamic.

1. **Constant:** this is the reference curves in KSP. This data designates the "zero level." This level is constant for all the ship life.
2. **Dynamic:** this level corresponds with the benchmark periods. The benchmarking automatically result after any "Trend event". The benchmark is created by taking the average of a number of daily observations starting after trend event. The observations are if the performance indicators are on the wind limits and the ship is not on maneuvering or abnormal sailing mode.

Conclusion

With a ship performance monitoring system installed on board the vessels, the energy efficiency can be optimize keeping monitored the fuel consumption, in consequence, the atmospheric emissions. In addition, with the statistical analysis included on the ship performance system, they can evaluate the overall trend of the ship over the time, it allows that they can take decisions to improve the performance and keep it as high as possible. As many international organizations published, using ship performance monitoring systems is possible to reduce between 3-6% fuel consumption per ship. Therefore, if the ship-owners use ship performance monitoring systems for all their ships, the effects on the cutback on operational costs, reduction on fuel consumption and atmospheric emissions will be very significant.

The Author

Carlos Gonzalez is a marine engineer (MSc) and is starting a PhD about green ships and economies of scale. He is currently working as a marine engineer and project manager for Kyma a.s.

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- www.imo.com

Figure 4 Reference curve Shaft Power vs. RPM in KSP Display

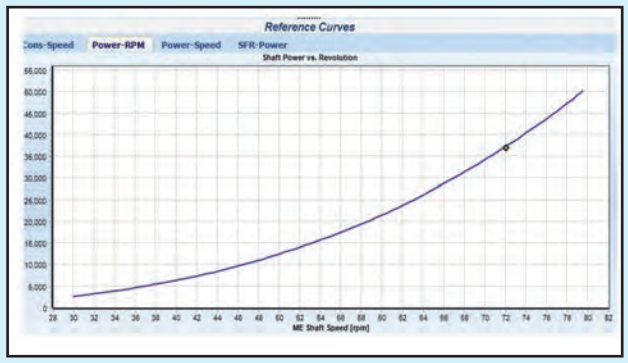


Figure 5 Reference curve Shaft Power vs. Ship´s speed by Log in KSP Display

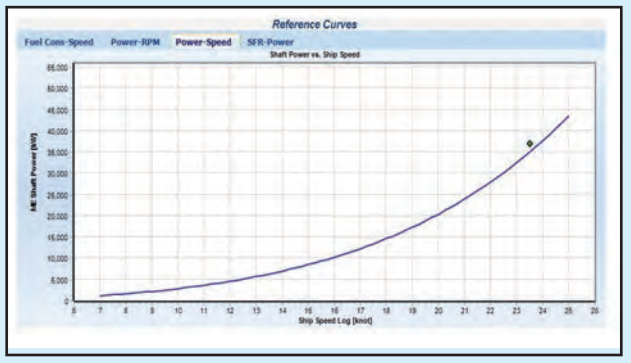
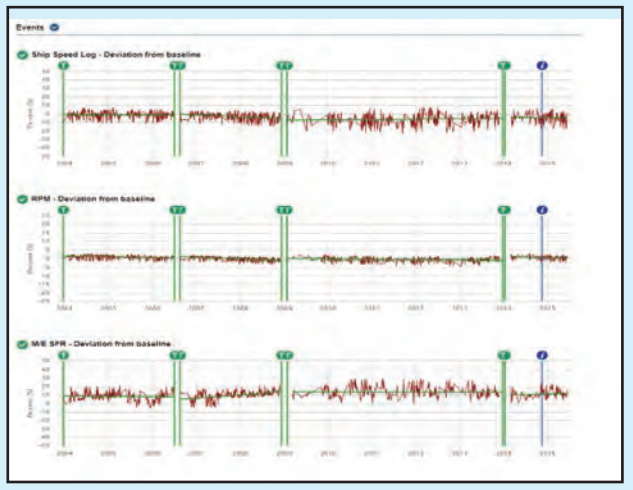


Figure 6 Overall trend data for Hull, propeller and main engine performance



Next-Gen LNG Carrier Design

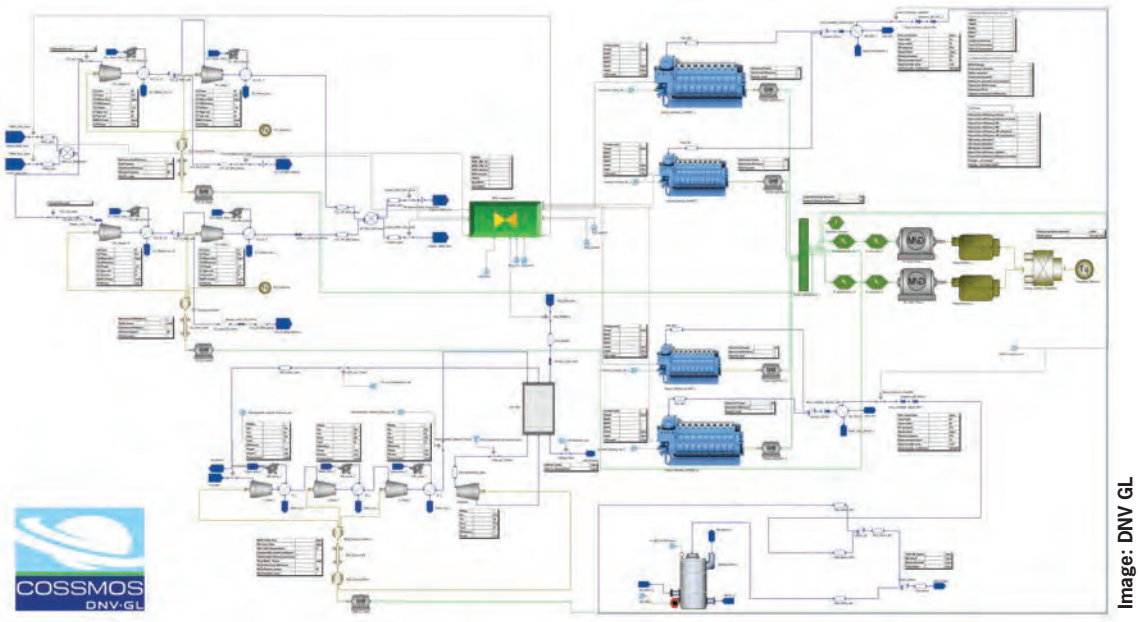


Image: DNV GL

LNGreen: Next-generation LNG carrier concept by DNV GL, HHI, GTT and GasLog

The LNGreen joint industry project brings together a group from DNV GL, GTT, Hyundai Heavy Industries (HHI) and GasLog to develop a state-of-the-art next-generation LNG carrier. The project is envisioned to combine the knowledge and experience of the project members to deliver a vessel concept with improved environmental footprint, energy efficiency, boil-off rate and cargo capacity.

LNGreen investigated the improvement of efficiency and performance of LNG carriers by considering actual operational conditions and optimization in terms of hydrodynamics, machinery and system configuration, DNV GL said, adding that these developments were based on its integrated systems engineering approach COSSMOS, computational fluid dynamics calculations (CFD) and a containment system design, tailored to a specific operational profile and anticipated trades.

The total efficiency was assessed using an integrated systems approach. LNG carrier machinery systems are highly complex featuring tightly integrated sub-systems and components, like the BOG compression trains, gas management system, reliquefaction (if any), propulsion and/or generating engines, exhaust gas economizers and boilers. The primary fuel, i.e. boil-off gas, has variable properties depending on LNG cargo type and in-voyage boil-off rate conditions. In addition, the ships usually operate on a number of trading routes. Their operating profiles vary in terms of speed, propulsion, electrical and heat demand. The above features require a rigorous model-based approach, using DNV GL COSSMOS, to assess the integrated machinery system under realistic operating conditions as experienced by GasLog.

HHI and DNV GL carried out the hydrodynamic performance evaluation by comparing CFD simulations. Different CFD codes were applied for the comparison of resistance and self-propulsion performance but different scale effects were also considered. In addition, added resistance caused by wind and waves was investigated in order to ensure that the required power is sufficient for operation in the targeted environmental conditions.

Cargo containment optimization was investigated by GTT and HHI. The tank shape, necessary reinforcements and boil off rate calculations, were examined to develop alternative cargo tank designs that could yield additional cargo capacity. With a starting design point of 174,000 cu. m. cargo capacity, cargo tank optimization by GTT and HHI allowed for a cargo capacity increase to 182,800 cu. m.

For more information from the partners, visit

www.dnvgl.com
www.gtt.fr
www.hhi.co.kr
www.gasloglтd.com

Meet The 'Gobbler'

In collaboration with Naval Architects Laurent Giles Ltd, a team of boatbuilders has developed a fiberglass response vessel that is designed to rapidly and effectively recovers spilled oil. The boat, introduced earlier this year, underwent tank testing over a continuous six month period – in sea states varying from calm to 2.5 meters. With a final design that is Lloyds Register approved for use 60 nautical miles from shore or the mother ship, the vessel and project have full backing of Lloyds Registry and the "Clean Seas" Environmental Program. The vessel's creators have also applied for U.S. Coast Guard approvals. Billed as a revolutionary way to help combat oil spills, UK-based Gobbler Boats Ltd. has proven that the vessel that can remove light and heavy oils from water surfaces in offshore and coastal environments. Carrying nine unique patents, granted and pending in the UK and United States, the Gobbler is small, easily transportable, lightweight, highly maneuverable, environmentally friendly, safe and simple to operate with minimum crew/operational costs. Ideal for operations at new oil field sites with no pipelines ashore, it is especially useful around storage/transfer barges when "over-spills" occur.

Gobbler fits the hold space of transport aircraft for rapid transit to isolated locations, and the vessel can be carried by commercial or passenger vessels and larger ocean going oil spill vessels, for immediate response to incidents at sea. Because the vessel does not carry recovered oil on board, the U.S. Coast Guard has ruled that mandatory surveys for similarly sized craft do not apply. The important waiver saves both time and money for cash strapped municipalities and spill co-ops. The vessels are currently built in the UK, but addressing Jones Act issues, a manufacturing facility in Arizona is also planned.

Gobbler at a glance ...

Recovery Rate:	16 tph
Recovery Capacity:	2,674 bpd
LOA:	8.85 meters
Endurance:	120 nm
Bladder Capacity:	up to 3,500 gallons
Tons:	3.25 tonnes
Top Speed:	23 KT
Fuel Capacity:	360 liters
Design Approval:	LR

South African Boatbuilding ...

Transnet National Ports Authority announced a milestone in its $98 million tug building contract when the first of its nine new tugboats was launched at the Durban premises of contractor, Southern African Shipyards.

"This is the largest single contract TNPA has ever awarded to a South African company for the building of harbor craft," said TNPA chief executive, Richard Vallihu.

The tug was named 'MVEZO' in reference to the small village in the Eastern Cape of South Africa where former President, the late Nelson Mandela, was born. The boa's sponsor was Lauriette Sesoko, TNPA GM Commercial & Marketing, who officially named the vessel.

"The building of MVEZO and the eight other tugs in this project, demonstrates that this country has the expertise to compete in the global shipbuilding industry and to use the maritime economy to unlock the economic potential of South Africa, in line with the government's Operation Phakisa initiative," said Vallihu.

MVEZO is expected to be delivered to the Port of Port Elizabeth in February 2016, followed by a new boat every three months until all nine are delivered in 2018.

The $98M Project

The tug building project kicked off in August 2014, and given the tight delivery schedule five tugs

Photos courtesy of Southern African Shipyards

Tugboat Honors Mandela Birthplace

are under construction simultaneously at any given time. TNPA programme manager Eugene Rappetti, Senior Manager for Marine Operations, said TNPA had 29 tugs presently in service nationally, but the requirement for bigger, strong tugboat fleets had increased in line with bigger commercial vessels calling at South African ports more frequently.

"TNPA's new fleet will include nine tugs that are 31 m long with a 70 ton bollard pull. The older tugs have 32.5 to 40 ton pulls. The increased bollard pull of these new generation tugs meets international standards and they also feature the latest global technology.

The tugs have Voith Scheider propulsion which makes them highly maneuvrable and able to change the direction and thrust almost instantaneously while guiding large vessels safely into our ports," he said.

Southern African Shipyards, which owns and operates the largest shipyard in Southern Africa, also built TNPA's previous 12 tugs. Subcontractors on the project include Barloworld Equipment, Siemens, Voith Schneider, as well as local contractors such as Bradgary Marine Shopfitters.

"We have also committed to ensuring that each tug has a minimum of 60% locally manufactured components, while partnering with international companies on the remaining aspects that cannot be manufactured here, for example the engines and propulsion units," said CEO Maharaj, noting that the project helped to create 500 direct and 3500 indirect jobs.

TNPA's new tug MVEZO was launched and named at the Southern African Shipyards premises in Durban, South Africa. The sponsor was Lauriette Sesoko, TNPA GM Commercial & Marketing, who officially named the vessel, flanked by Charles Maher, Southern African Shipyards GM: Marketing.

MARITIME REPORTER AND ENGINEERING NEWS

EDITORIAL CALENDAR

		BONUS DISTRIBUTION
JANUARY Ad Close: Dec. 21	**Ship Repair & Conversion Edition** Market: Passenger Vessel Operation Optimization Technical: Marine Salvage & Recovery Product: Maritime Propulsion: Gears, Thrusters, Waterjets & Propellers Country Reports: Spain & Portugal	**PVA Maritrends** Jan. 22-26 Washington DC
FEBRUARY Ad Close: Jan. 21	**Cruise Ship Technology Edition** Market: U.S. Navy Technology Technical: BIG DATA: Satellite, Data, Tracking & Communications Product: Marine Coatings & Corrosion Control Country Report: Italy	**Cruise Shipping Miami** March 14-17, Miami, FL **Asia Pacific Maritime** March 16-18, Singapore **ASNE DAY** March 2-3, Arlington, VA **NACE Corrosion** March 6-10. Vancouver **PSOCE 2016 Florida** March 17-19, Tampa, FL
MARCH Ad Close: Feb. 22	**Green Marine Technology** Market: Training & Education: Maritime Simulation Centers & Technology Technical: Workboat Fleet Maintenance & Repair Product: Green Marine Fuels & Lubricants and Emission Technologies Country Report: Japan	**CMA Shipping** Mar 21 -23 Stamford, CT **Workboat Maintenance** April 12-14, New Orleans, LA **Sea Japan** April 13-15, Tokyo
APRIL Ad Close: Mar. 21	**The Offshore Annual** Market: Port & Ship: Loading and Unloading Technology & Equipment Technical: Satellite Communication Product: Deck Machinery, Winches and Ropes Region Reports: Scandinavia: Denmark, Finland, Norway & Sweden	**OTC** May 2-5, Houston, TX **Inland Marine Expo** May 10-12, St. Louis **Portsecure 2016** May 18-20, Toronto
MAY Ad Close: Apr. 21	**The Marine Propulsion Edition** Market: RIB & Patrol Boat Report Technical: Workboat Design & Construction Product: Marine Electronics: Navigation Radar & ECDIS Country Reports: Greece & Turkey Special Report: U.S. Coast Guard Annual	**Posidonia** June 6-10, Athens **Sea-Air-Space** May 16-18, National Harbor, MD **SeaWork** June14-16 Southampton, UK **CIMAC CONGRESS** June 6-10. Helsinki
JUNE Ad Close: May. 20	**Annual World Yearbook** Market: Maritime Simulation & Training Centers Technical: Dredging Vessel Technology Product: Pumps, Valves, Pipes & Insulation Country Reports: U.K. & Ireland	**Marine Money Week** June 21-23, New York, NY
JULY Ad Close: Jun. 21	**Marine Communications Edition** Market: Tugboat, Towboat & Barge Technical: Oil Spill Response & Recovery Product: Marine Electronics Equipment & Supplier Guide Country Report: Singapore	JULY SPECIAL CONTENT ELECTRONIC EDITION www.whitepapers.marinelink.com
AUGUST Ad Close: Jul. 21	**The Shipyard Edition** Market: Offshore Deepwater: Structures and Systems Technical: Heavy Lifting Solutions: Maritime Cranes, Winches, Windlasses & Capstan Product: Ballast Water Technologies Country Report: The German Maritime Cluster	**SMM HAMBURG** September 6-9, Hamburg, Germany
SEPTEMBER Ad Close: Aug. 22	**Maritime & Ship Security** Market: Caring for the Mariner: Onboard Amenities Technical: Maritime Propulsion: The Hybrid Drive Solution Product: Clean Water Technologies Region Report: U.S. West Coast Maritime	**Shipping Insight** October, Stamford, CT
OCTOBER Ad Close: Sep. 21	**Marine Design Annual** Market: Ship Classification Societies Technical: Marine Firefighting, Safety & Salvage Product: CAD/CAM Country Report: The Netherlands	**SNAME** November 2-4, Bellevue, WA **Arctic Technology Conference** October 24-26, St. John's
NOVEMBER Ad Close: Oct. 21	**Workboat Edition** Market: The 'LNG-as-Fuel' Revolution Technical: Deck Machinery, Winches & Ropes Product: Marine Coatings Special Report: Gulf of Mexico Builder and Supplier Guidebook	NOV. SPECIAL CONTENT ELECTRONIC EDITION www.whitepapers.marinelink.com **Workboat Show** Nov. 30-Dec. 2, New Orleans, LA
DECEMBER Ad Close: Nov. 23	**Great Ships of 2016** Market Report: The Autonomous Ship: Command & Control Technical: Shipyard Automation: Welding & Cutting Equipment Product: Marine Engine Guide Country Reports: China & Korea	**Surface Navy Association 2017** Crystal City, VA

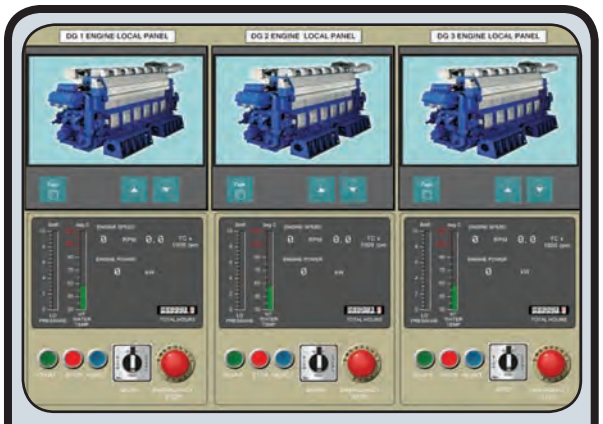


Image: Transas

Transas: High Voltage Training Breaker

In response to recent STCW requirements, Transas launched a high voltage training solution for marine engineering and electrical training.

The new rules require training to be conducted using real equipment, leading Transas to partner with ABB for the development of a real hardware high voltage generator breaker cabinet compatible with the Transas ERS 5000 TechSim simulators with high and medium voltage systems. The Transas High Voltage Training Breaker is designed to train high voltage switchboard operations, electricity and work planning, identification of hazards, emergency procedures, definition of circuit condition, and many other operations. Transas said it also allows users to gain knowledge of circuits/power feeds/emergency shutdown and isolation devices, familiarize with company protocols, the use of high voltage test equipment and Personal Protective Equipment (PPE), as well as to understand safety as a personal responsibility.

www.transas.com

Quiet, Camouflaged STS Cranes Delivered in Oslo

Two quiet eco-efficient Konecranes Ship-to-Shore (STS) cranes have been handed over to the Port of Oslo, Norway. They have been painted with a specially designed color scheme so that they blend in with the surrounding seashore and landscape. The Oslo Sjursoya container terminal is located close to densely populated areas in Oslo. The terminal takes its environmental responsibility very seriously, especially its noise emissions and carbon dioxide footprint. The cranes are equipped with LED lights for improved eco-efficiency. They have twin-lift operation for maximum handling capacity, a lifting capacity of 64 tons, and an outreach of 40m.

Optimarin

Racing Toward USCG Approval

Optimarin reports it has become the first UV system supplier to meet USCG marine water requirements, positioning the company for full USCG approval in 2016. In a series of land-based tests, both the standard MPN (regrowth) method and the more exacting FDA/CMFDA, or 'instant kill', benchmark were successfully assessed, the company said. Optimarin's system uses UV irradiation and back-flushing filters to wipe out invasive organisms that stow away in ballast. Systems employing UV lamps have so far proven their ability to meet the MPN standard, rendering organisms unable to reproduce, but, Optimarin noted that until now, none has achieved the instant kill capability demanded by USCG. "We've been developing our system since founding the company in 1994 and we believe, and testing shows, we have a market leading solution for vessels in our segment," said Tore Andersen, CEO, Optimarin.

Testing of Optimarin's system was carried out by DNV GL at the NIVA test facility in Norway. Further tests of remaining water salinities are now scheduled for spring 2016, after which point approval is expected later in the year, according to Optimarin, who is investing $3 million in the comprehensive approval program.

He explained, "Each of our lamps has a 35kw capacity. This, quite literally, kills any potentially harmful invasive organisms straightaway. Other systems may neutralize them in a way where they die eventually, but ours does it before they are deposited back into the water. USCG is pushing for these stringent demands, challenging the industry to meet requirements and safeguard the environment."

Andersen added that this technical efficacy, in addition to the firm's established success with retrofits, delivers "complete peace of mind" for shipowners forced to comply with both USCG regulations and the upcoming ratification of the IMO's Ballast Water Management Convention.

www.optimarin.com

Image: API Services

Laser Scanning

Historic Vessel Gets the Laser (scan)

The original Mohican, in service from 1894 to 1907, was a 93-ft. wooden hull vessel. The ship was replaced in 1907 by a steel-hulled vessel christened the Mohican II in the summer of 1908, thus beginning the first of her 107 years of continuous service on Lake George. This naming convention also began the custom of reusing names of former lake boats, which survived until the construction of the Lac du Saint Sacrement in 1989.

Originally, the Mohican's two propellers were driven by Fletcher steam engines, the steam being generated by the burning of two tons of coal each day. She proceeded under steam power through the World War II years, at which time she was the only passenger vessel plying Lake George. When Wilbur Dow purchased the Steamboat Company in November of 1945, he determined that diesel would be a more efficient means of propulsion and that the conversion to diesel engines would free large areas on the Mohican's second deck for passenger usage. The conversion was completed in 1946. In June 2008, the Mohican was placed on the National Register of Historic Places, the third active passenger vessel to be so designated. In May of 2015, the Mohican began her 107th year of operations on Lake George.

As part of the efforts to preserve the historic vessel and ensure the ship can continue to run for years to come, API Services laser scanned the Mohican's hull, offerinf sub-millimeter accuracy ranging from range 1 meter to 180 meters. In the course of one afternoon, the Mohican exterior was fully digitized. A 3D model of the hull shell plate will be generated from the digitization and provided to the naval architects at Dejong and Lebet, Inc. to help create drawings for the rip out and replacement of the original hull plating.

New York's Lake George Steamboat Company recently commissioned API Services to laser scan the hull the oldest boat in its fleet, the 107-year-old Mohican.

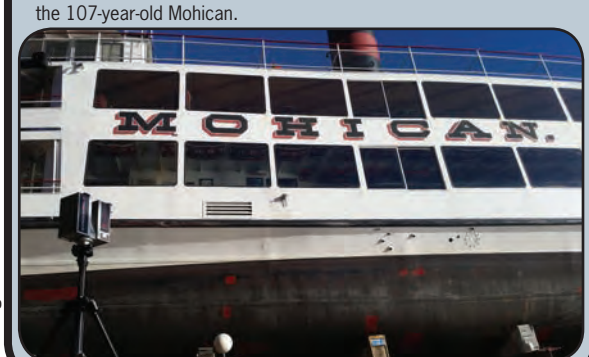


Image: API Services

Wärtsilä Propulsion for Antarctic Icebreaker

Wärtsilä Transverse Thruster

A new Polar Logistics Vessel being built for Terre Australes et Antarctiques Françaises (TAAF) and the French Polar Institute (IPEV), and which will be operated by the French Navy, is to be powered by Wärtsilä propulsion solutions.

The ship has been contracted by Chantiers Piriou (Concarneau, France), based on a concept design issued by Marine Assistance (France) and is scheduled to be delivered in the first half of 2017. The 72-m polar logistics and patrol icebreaker vessel will carry out its first supply mission to the Dumont d'Urville station in Antarctica in winter 2018. The stainless steel propellers to be supplied by Wärtsilä conform to the Bureau Veritas (BV) icebreaker 5 ice class rules.

The full scope of supply comprises four in-line Wärtsilä 20 main engines, two Wärtsilä stainless steel CPP propellers and shaft lines, two Wärtsilä reduction gears, four Wärtsilä NOR emissions after treatment systems, and one Wärtsilä tunnel thruster. The Wärtsilä NOR (NOx Reducer) systems will enable the ship to comply with the International Maritime Organization's (IMO) Tier III emission regulations.

The ship will have accommodation for 60 persons, a cargo capacity of 1,200 metric tons, and is fitted with a helideck large enough to accommodate two helicopters. The Wärtsilä equipment is planned for delivery in mid-2016.

Digital Alpha ChartTable

JRC and Alphatron Marine announced a new digital AlphaChartTable, comprised of a 46-in. touch display where routes can be planned on a more realistic 'paper chart' scale.

By use of the digital chart table, navigators are now given an intuitive and user friendly interface to plan optimal routes by touch operation. The software gathers and overlays the data officers require, including ENC's, weather data, tidal information, digital publications, and other services like piracy updates – all on a single 46-inch display.

The console is designed as a natural fit to existing bridge designs. The display can be electronically tilted to a 35-degree angle, allowing optimal routing in the most ergonomic position. In addition to the AlphaChartTable powered by NAVTOR, the console has a built-in Navtex and GPS navigator, while at the same time leaving room for the paper chart for back up purposes.

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Canfield


Martin


de Rubertis


Smith


Roth

Brann

Obituary: Martin J. Canfield

July 22, 1956 – November 2, 2015

Martin Jay "Marty" Canfield, 59, of Iola, Kansas, died Monday, November 2, 2015, at the Allen County Regional Hospital. Marty was born July 22, 1956, in Independence, Missouri. He served in the U.S. Navy for 11 years, and following his time in the service, he traveled working at nuclear power plants before becoming a field service engineer for Boiler Controls. Marty was in the marine engine room automation industry for more than 20 years servicing ships all over the world, working for G.R.Bowler, Inc. Marine & Industrial Controls, managing its VA shop for 13 years.

Martin, Carlson Join Harley Marine

Harley Marine Services announced that Don Martin has been named Vice President and General Counsel and Steve Carlson has joined the company as Vice President of Engineering. Prior to joining Harley Marine, Martin was the Vice President and General Counsel for Delta Western and Hawaii Petroleum.

de Rubertis Joins EBDG

EBDG recently announced the hire of Human Resources Generalist, Carolyn de Rubertis in its Seattle office. De Rubertis brings more than 20 years of experience to her role.

Smith to Lead OMSA

The Offshore Marine Services Association (OMSA) announced the appointment of Aaron Smith as President and Chief Executive Officer. Smith's appointment follows the resignation of Ben Billings, who led OMSA since 2013. Smith was instrumental in the development of OSVDPA, a dynamic positioning certification authority for the OSV industry. Prior to that, he served in Washington, D.C. as Deputy Chief of Staff to Congressman Jeff Landry.

Mayhall Joins Bollinger

Bollinger Shipyards has added Joe Mayhall to its corporate sales and marketing team. Mayhall is a veteran of new construction and ship repair sales and has worked in increasingly responsible positions, overseeing blue water ship repair and new construction sales in the oilfield and passenger vessel markets as well as coordinating advertising and marketing.

Roth Joins Signal

Signal International, LLC has named Ryan Roth, P.E. as vice president of sales and marketing for their Signal Ship Repair division in Mobile, Alabama. Since joining the organization in August 2010, Roth has held several positions as engineering manager, estimating manager, and director of business development for Signal. He is a licensed professional engineer and holds a Bachelor of Science in Mechanical Engineering from Auburn University, as well as a Master of Business Administration from the University of North Carolina at Chapel Hill.

Brann Joins The Shearer Group

The Shearer Group, Inc. (TSGI) has added to its naval architecture, marine engineering and marine surveying practice. Harrison Brann joined TSGI in October of 2015 as a naval architect. Harrison graduated with a bachelor's degree in naval architecture and marine engineering from Virginia Polytechnic Institute and State University. Prior to ABS, Harrison worked at ICI Services Corporation as an associate naval architect working on systems design and integration for various marine projects.

Crowley Honors Ridge, Roca

In two recent ceremonies, Crowley Maritime Corporation awarded two employees with the firm's highest honor, the 2014 Thomas Crowley Award. David Ridge, director, marine operations, was presented with the award at the company's Anchorage, Alaska, office. Kyra Roca, vice president, customer care, was presented with the award at the company's Jacksonville, Fla., office. Ridge, a 30-year Crowley employee, was selected for the award because of his reputation for high performance. Roca was selected for the award because of her remarkable team-building capabilities and leadership skills. The exclusive employee recognition program was created in 1985 and only 60 of the company's more than 5,300 employees have received the award.

Danos Names Four Vice Presidents

Adding to its leadership team, oilfield service provider Danos has promoted James Callahan, Mark Danos, Stacey Gisclair and Reed Peré to executive roles within the company. As vice president of finance, James Callahan is responsible for overseeing the company's domestic and international administration, finance and accounting activities. Mark Danos serves as vice president of project services, supervising the company's project management, construction and fabrication divisions. Mark Danos is a third-generation owner of the company and member of its board of directors. Stacy Gisclair brings over two decades of human resources experience to her position as vice president of human resources. Vice President of Production Services Reed Peré is responsible for the quality of work and adherence to safety policies of the company's global production workforce.

Baksht Succeeds Swent as Ensco CFO

Ensco plc has named Jon Baksht the company's new chief financial officer based in London, succeeding Jay Swent, who will retire at year end. Baksht was most recently vice president - finance after joining Ensco as vice president - treasurer. His professional career includes experience in investment banking and consulting. Baksht has an MBA from the Kellogg School of Management at Northwestern University and a BS in electrical engineering from the University of Texas.

Leung Joins Nautisk in Asia

Nautisk said it is strengthening its presence across one of its core global locations with the appointment of two new managers in Asia. Alan Leung will take up the role of Regional Sales Manager in Hong Kong to help with Nautisk's business expansion in the region, with particular focus on Hong Kong, the company said. Over the next 12-18 months, Leung will be tasked with growing Nautisk's business in Asia and driving sales activities, while managing key accounts and dealing directly with customers.

SCA Taps Brooks

Rear Admiral Jeff Brooks (Ret.) has been named Senior Defense Advisor at the Shipbuilders Council of America. He joined SCA in October and will focus on advocating, communicating and representing the ship repair industry to all stakeholders and to the U.S. Navy. Throughout his 38-year Navy career, Admiral Brooks served in key maintenance assignments, culminating in promotion to two-star flag rank and the Navy's top maintenance position as Fleet Maintenance Officer.

Crowley Breaks Ground on $48.5 San Juan Terminal

Crowley Puerto Rico Services has broken ground on a $48.5-million construction project for a new pier at its Isla Grande Terminal in San Juan, Puerto Rico. The project includes the development of a new 900-foot-long, 114-foot-wide concrete pier and all associated dredging to accommodate Crowley's new liquefied natural gas (LNG)-powered, Commitment Class ships. In all, Crowley is investing about $500 million in its Puerto Rico. The firm has served the Puerto Rico market since 1954, longer than any other carrier in the trade.

MAN D&T Acquires Cryo's Marine Fuel & Bunkering Business

Fuel gas supply specialist further enhances MAN Group's system scope offering in marine LNG propulsion

Cut MAN-1: (MR November)

MAN-Chief Dr. Uwe Lauber: "We now have one of Europe's most advanced

maritime test centers”

MAN Diesel & Turbo Sverige AB, a wholly owned subsidiary of MAN Diesel & Turbo SE (part of MAN and Volkswagen Group), acquires the marine fuel gas supply system (FGSS) business from the Sweden based Cryo AB, part of the Linde Engineering Division and a manufacturer of cryogenic equipment for the storage, distribution and handling of liquefied gases. It will be integrated into the company’s four-stroke marine business.

“Natural gas is rapidly gaining importance as a fuel for marine applications, which is why this acquisition is of major strategic relevance for us”, says Dr. Uwe Lauber, CEO of MAN Diesel and Turbo SE. “It allows us to further shape our profile in the dual-fuel and gas propulsion segment and to gain access to market leading supply system technology. Many of our customers are looking for a one-stop solution for comprehensive engine and fuel gas supply systems. Thanks to Cryo’s expertise we can offer this solution in the future and position ourselves ahead of the competition.”

Gibbs & Cox Acquires Donald L. Blount & Associates

Gibbs & Cox, Inc. has acquired Donald L. Blount and Associates, Inc. (DLBA), a Chesapeake, Va.-based firm renowned for its naval architecture and marine engineering services for commercial and government clients worldwide. “With this key strategic acquisition, Gibbs & Cox continues our strategy aligned to provide high performance marine craft solutions to our military and paramilitary clients,” said Rick Biben, Gibbs & Cox CEO and President, “as well as continued expansion of our commercial market areas in engineering, design and construction management of vessels including mega yachts, commercial craft, and production boats.”

“DLBA’s new association with Gibbs & Cox will significantly enhance DLBA’s depth and breadth in providing timely and quality high performance marine solutions to our world-wide market, while continuing to foster and maintain our important and close relationships with our clients,” said Don Blount, President, DLBA. “This new relationship with Gibbs & Cox will provide our clients with the assurance of new technology application and expert staff reachback from one of the largest, premier naval architecture and marine engineering firms in the world.”

The transaction is scheduled to be closed in February 2016.

Mackay Acquires CMC Electronics’ Commercial Marine Business

Mackay Communications, Inc. acquired CMC Electronics’ commercial marine business on October 30, 2015, from Canadian parent, Esterline, a leading supplier of aviation systems. Esterline divested their marine sector to concentrate efforts on its core aviation business.

CMC Electronics’ maritime brand traces its roots to the Canadian Marconi Company (CMC); originally the Marconi Wireless Telegraph Company of Canada (circa1903). Mackay Communications’ Marine Division is a turnkey supplier

Leung

Brooks

Arnold

Hapag Lloyd

Hapag-Lloyd: Third straight profitable quarter

of communications and maritime electronic solutions and global service. The acquisition of CMC Electronics' commercial marine business mutually compliments their product offerings, enhances access to diverse market segments, and will provide customers with quality 24/7 services at all major ports throughout North America. A new regional division, Mackay Marine Canada, will blend Mackay's Vancouver office and CMC Electronics' marine locations; resulting in five Mackay offices in Vancouver (British Columbia), Quebec City (Quebec), Halifax and Yarmouth (Nova Scotia), and St. John's (Newfoundland). Mackay Marine Canada will continue to represent leading brands Canadian customers are familiar with, strengthened by Mackay's worldwide network and extensive portfolio.

Ingram Earns EPA Award

Ingram Barge Company was honored today with a SmartWay Excellence Award from the U.S. Environmental Protection Agency as a true industry leader in freight supply chain environmental performance and energy efficiency. **Chuck Arnold, Ingram's VP of Business & Strategic Development** said, "For Ingram and for our barging customers, it means moving more cargo over greater distances using less energy and water and creating less waste." Ingram Barge Company is the first barge carrier in the history of the Partnership to receive this distinction, representing the best environmental performers of SmartWay's nearly 3,000 Partners.

Batra Joins Glander

Glander International Bunkering hired Ankita Batra as Bunker and Lubricant Trader for the India office. Ankita Batra joins Glander International Bunkering with a post graduate in the domain of Energy Trading from the University of Petroleum and Energy studies, Dehradun. Ms. Batra speaks Hindi and English and is familiar supplying in the ports of India, Singapore and Fujairah.

GE Parnters for Royal Navy Business

GE announced its partnership with VolkerStevin Ltd. to provide technical solutions to the Defense Infrastructure Organization (DIO) for the Royal Navy. Through this partnership, GE is set to design, manufacture and commission a Rotary Frequency Converter (RFC) which enables efficient, safe and reliable power transfer from the national grid to HMS Queen Elizabeth, the first of the Royal Navy's new aircraft carriers, based at Portsmouth Naval Base, UK.

Hapag-Lloyd: Three Straight Quarter of Profits

Hapag-Lloyd AG recorded its third consecutive profitable quarter, marked by higher transport volumes and reduced shipping costs in the third quarter of 2015. For the first nine months of 2015, the shipper posted a €6.8 billion revenue, up €1.9 billion compared to the same period a year ago, attributing much of the increase to its December 2014 merger with the shipping business of Cia. Sud Americana de Vapores SA (CSAV). Hapag-Lloyd also recorded a net profit of €160.4 million in the first nine months of 2015, compared to a loss of €224 million for the same period in 2014. Helping to offset declining freight rates, the shipper said its transport expenses and costs of purchased services have decreased through 2015 for its fleet of 175 containerships mainly due to reduced bunker prices and consumption, as well as synergies and cost savings realized from the merger.

Norautron Group acquires Hatteland

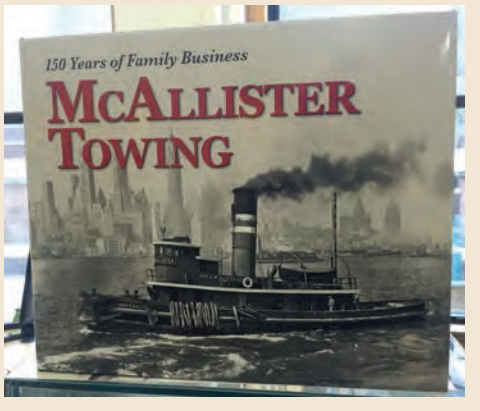
Norautron Group entered into an agreement to acquire 100% of Hatteland Display from Herkules Capital. Hatteland Display's history dates back to 1989, and the company is now a leading designer and manufacturer of high-end rugged displays, panel computers, and computers for all segments of the professional marine industry. The company has established strong relationships with major systems integrators through a growth strategy based on technological leadership and innovation. Including Hatteland Display, the Norautron Group will have an estimated annual turnover of $207m and will be a significant player within several segments of the electronics industry, with positions in markets for complete products and components.

Bow 2 Stern Royston Distributor

Royston appointed a new US-based distributor, Houma, La.-based Bow 2 Stern Technologies LLC. The new distributor will provide sales and technical service support for the Enginei system, which uses powerful data collection software to significantly expand the range of fuel, engine performance and voyage data used for crucial fuel analysis and optimization decisions. Bow 2 Stern Technologies, LLC will service the Gulf Coast from Texas to Florida and up the Mississippi River to St. Louis, MO. The move to establish formal distribution arrangements in the USA follows the successful installation of an Enginei system earlier this year on a vessel operating in the Seabulk Towing fleet.

McAllister Celebrates 150 Years in Print

"Early in 1864, a young man names James McAllister stood on board a sailing vessel where he served as a mate. The boat was about to set sail from the Red Bay of Cushendall … (James) did not know that this would never be home again." The opening lines from the first chapter of the new book, *McAllister Towing – 150 Years of Family Business*, begin a voyage through the history of a tugboat and marine transportation firm that runs five generations deep, taking readers on a journey of deepsea adventure, family tragedy and company triumph. The book includes never-before published material and photographs illuminating how Americans lived and worked in the maritime industry over the last century and a half, telling the tale of immigrants finding a narrow foothold in New York Harbor and building better lives for themselves, their families and thousands of employees. The book reveals the rivalries, feuds, near bankruptcies and battles for ownership that nearly sank the McAllister business over the years, woven through stories of peril, survival and achievement of McAllister Towing, who tows barges, ferries passengers and provides ship docking services in dozens of ports along the U.S. East Coast. *McAllister Towing – 150 Years of Family Business* is available at Amazon.com, McAllister's webstore and select bookstores and museums throughout the country.



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Blank Rome LLP - Admiralty & Maritime Law, 600 New Hampshire Avenue, NW, Washington, DC , USA , tel:(202)772-5927, fax:(202) 772-5858, Grasso@BlankRome.com contact: Jeanne M. Grasso, www.BlankRomeMaritime.com

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COMMUNICATIONS

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- Air system

As an inspected vessel we require the 3rd Assistant Engineer be familiar with ISM Safety Management Systems and documentation requirements. This position participates as a leader in emergency drills.

The SS Ocean Phoenix is a physically, mentally and emotionally demanding work place. Crew are expected to be physically fit, lift 50 lbs without assistance and climb stairs and ladders on a regular basis. You must be able to follow orders and work as a team.
You must have a current USCG MMC, USCG 3rd Assistant Engineer License (Unlimited Steam and Motor), STCW 95 and TWIC. You must have experience with steam plants, either ship or shore plant.

Description:
The SS Ocean Phoenix is a 680' fish processing vessel operating at sea for approximately 7 months per year. There are two fishing seasons, winter and summer with port work available in Seattle when the ship is not operating at sea. Both fishing seasons take place in the Bering Sea and the ship departs and returns to Seattle.
We are in need of a 3 Assistant Engineer, Unlimited to join the Engine Department. Work is available beginning in January for a contract period of 75-90 days. You can work as little as 5 months per year or as much a 9 months per year. We can be somewhat flexible in scheduling.

If you are interested in employment please submit your resume. If convenient, you may apply in person at Premier Pacific Seafoods, 333 First Ave W, Seattle, WA 98119.

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All applications for employment with Military Sealift Command must be submitted through **www.sealiftcommand.com/start-the-process**. To begin the process you must submit an Information Request Form (IRF). Your IRF submission will create a secure online profile after which you will receive an email to verify your account. Once verified, you will be able to complete the application process. Applications for this position can only be submitted during the announcement open period. Please note the email address you create will be used by the Command to correspond with you. In addition to meeting the minimum conditions of employment, you will be required to scan and upload .jpg or .pdf files of the following documents:

How To Contact Us: If you require technical support, please use the support tab located in the top right corner of the Start the Process page **www.sealiftcommand.com/start-the-process**. This will generate an email a message for you to submit your issue. Emails will be responded to during business hours M-F 0800 – 1700 CST. If you have any questions regarding the position or to follow up on an application submitted, please email us at **civmar@sealiftcommand.com** or call our toll-free recruitment hotline at **1-888-891-4072**.

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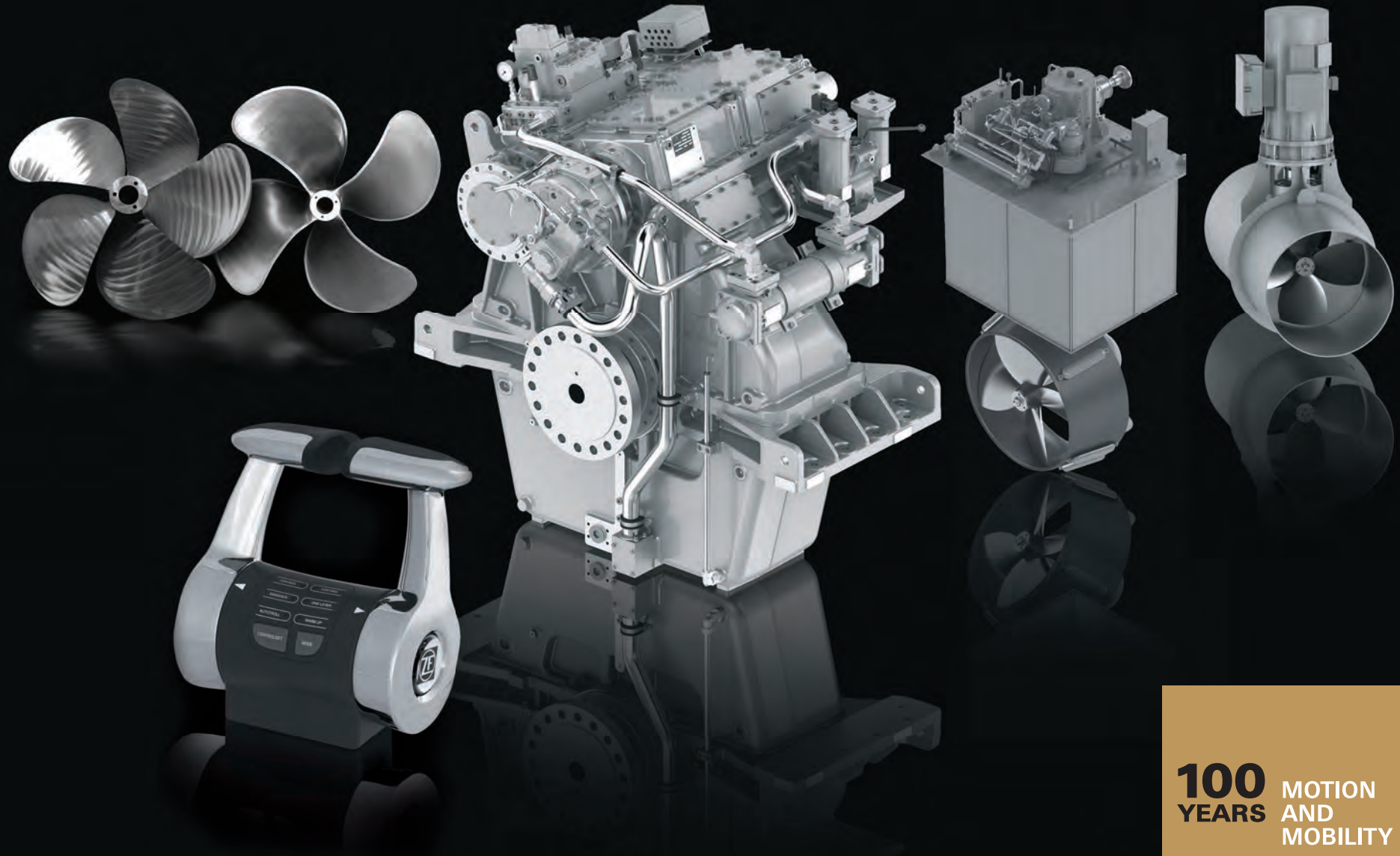

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