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July 2010

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OFFSHORE RENEWABLES

30 Power to Spare

(Photo courtesy Marine Current Turbines)

As companies grapple with the fallout and the expected new offshore O&G rules in the wake of the Gulf of Mexico oil spill and clean-up, a business niche which is rapidly ramping up — and in dire need of maritime industry expertise — is that of producing energy from offshore renewable sources: wind, waves and tidal. Read, starting on page 32, of Marine Current Turbines effort to design, test and install the world's first commercially viable tidal turbine.

by Peter L Fraenkel, BScEng, CEng, FIMechE, FEI, Technical Director - Marine Current Turbines Ltd

WRITERS Bryant, DeSimone, Spielmann, Cairns, Fraenkel

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The plots, sub-plots and undercurrents of the ongoing oil spill disaster in the Gulf of Mexico makes the entirety of William Shakespeare's work look positively pedestrian. Not an hour passes without some significant turn of events, and monitoring the situation has become sport for many.

Suffice it to say that the changes eminating from this single incident — from the political, technological and professional angles, to name just a few — will be severe and ongoing for a generation.

Last month on **MaritimeProfessional.com** — and reproduced in part on page 14 — **Joe Keefe** examines the disaster, adding insight and analysis regarding the near- and long-term future of BP. While the future of BP is certainly central to this unfolding drama, even more critical is the direction and future of offshore oil and gas exploration in and around U.S. waters, an industry which directly and indirectly generates hundreds of thousands of jobs and billions annually.

Last month in New York, on the heels of a successful Posidonia exhibition in Greece, I attended *MarineMoney's* New York City marine finance summit. **Jim Lawrence** and company did their standard excellent job of attracting a veritable "Who's Who" of shipping, finance and legal types. While talk in the conference room and the sidelines revolved mainly around traditional, big shipping issues, there were many discussions on how the looming ecological disaster in the Gulf would affect all maritime business.

Charles Fabrikant, Chairman, President and CEO of Seacor Holdings chaired a panel entitled: "Making Sense out of the U.S. Gulf Accident." From his perspective and that of his panelists, one of the topline concerns could be the increased liability — or the potentially catastrophic elimination of liability limits in oil discharge incidents. *The question is: will regulations become so tough; insurance demands so onorous; that we in effect shrink our industry and severely limit the number of companies able to explore?,* Fabrikant pondered.

One of the panelists, **Robert J. MacKenzie**, Managing Director, Energy & Natural Resouces Research, FBR Capital Markets, offered a more dire view: "The blowout was a tragic but preventable accident. The big question now is 'what is the future of oil and gas production in the Gulf of Mexico.' **If the political perception is one that this will drag on for years, you will see a mass exodus of rigs and supply boats from the Gulf of Mexico by year's end."**

The panel came to a consensus that the accident and aftermath could drive the cost of doing business so high that it will effectively drive many of the small and medium-sized players out of the market. In concluding, Fabrikant offered an ominous — but by his own admission, a highly unlikely — thought: "If Congress were to remove all liability limits, I think it would effectively shut down offshore oil and gas production (in the GOM)."

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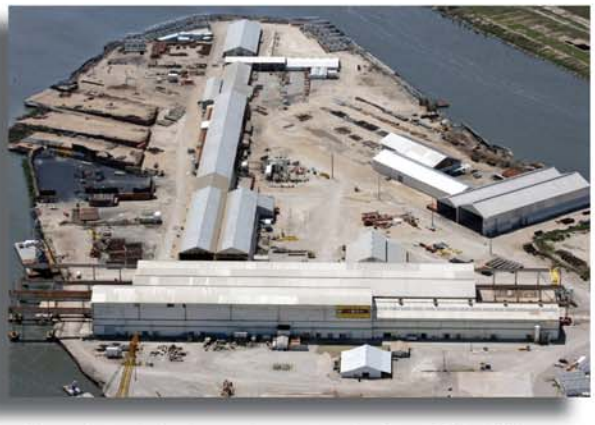

Above photos depict the ongoing construction of two 300' x 100' power barges at Signal's Orange facility.

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USCG/ASME Workshop on Marine Technology Standards

The American Society of Mechanical Engineers (ASME), in coordination with the United States Coast Guard (USCG), is sponsoring a two-day public workshop on marine technology and standards on July 29 and 30, 2010, in Washington DC. Topics for the 2010 workshop include application of various marine technologies to promote green ships, such as safe and economical use of hydrogen (H2) fuel cells to power ships with zero carbon dioxide (CO2) emissions and compressed natural gas (CNG) powered ships with reduced CO2 emissions. The two-day workshop will be held at The Liaison Capitol Hill, An Affinia Hotel, located at 415 New Jersey Avenue, NW., in Washington, DC, approximately 3 blocks from Union Station. For more information, and to register for the workshop, please visit www.uscg.mil/marine_event.

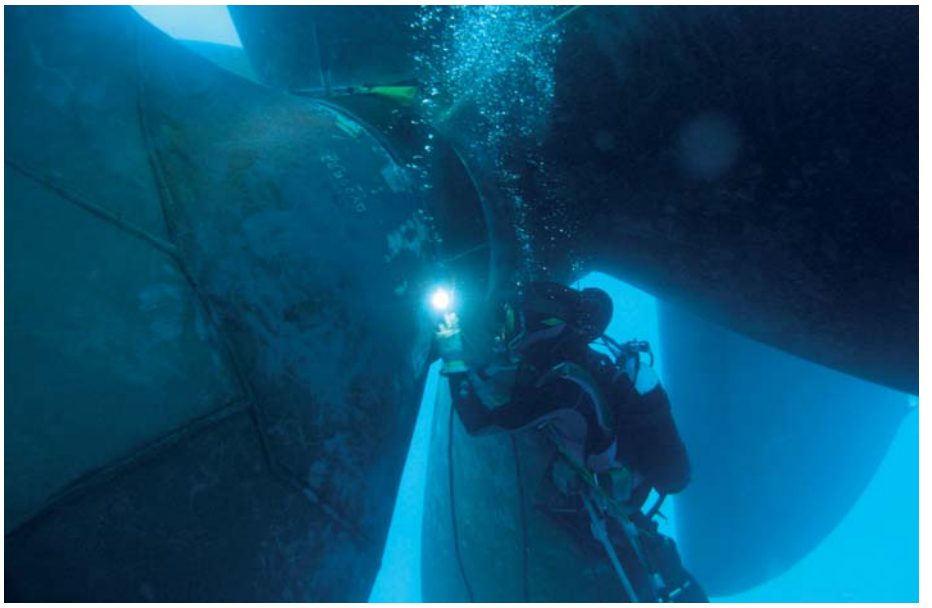
Beijing Plan to Scrap Old Ships

China will provide subsidies to help shipping companies retire aging oil tankers and some single-hull ships before they would normally be taken out of service, a move that will affect 2,000 vessels in operation and help trim excess capacity throughout the industry, according to reports on www.MarketWatch.com. Vessels of greater than 1,000 tons, as well as single-hull oil tankers of 600 tons or more, will be eligible to receive payouts of up to 1,500 yuan ($220.80) per ton under the government's incentive plan, according to reported statements by the Ministry of Transportation, the National Development and Reform Commission, and the Ministry of Industry and Information Technology. Under the incentive plan, replacement vessels must be manufactured by Chinese shipbuilders. The incentive scheme will expire at the end of the first half of 2012. (SOURCE: www.MarketWatch.com)

Hydrex

Underwater Stern Tube Seal Replacement in Mississippi

To stop oil from leaking from the stern tube seal assembly of a general cargo vessel, a Hydrex diver-technician team was mobilized to perform permanent repairs on the vessel during its scheduled stop in Gulfport, Miss., last month. The team together with the diving equipment was mobilized from the Hydrex office in Tampa to set up a diving station at the berthing location. By the time all necessary preparations had been made, the team had been reinforced with additional technicians from the headquarters in Antwerp and was ready to assist the vessel as soon as it arrived at Gulfport. The operation started with a thorough underwater inspection of the stern tube seal assembly, followed by the removal of the rope guard. This revealed a protection ring which was removed to create more space for the renewal of the seals. Next the split ring was also disconnected and brought to the surface to be cleaned. **A consequent inspection of the running surface of the stern tube seals showed that it was severely worn and no longer functional.** After a discussion with all parties involved, it was decided to remove the spacer ring and create a new running area. The Hydrex flexible mobdock was installed around the stern tube seal assembly and a dry underwater environment was created in which the diver-technicians could remove the damaged seals one by one and replace them with new ones.



A Hydrex diver-technician team was mobilized to perform permanent repairs on the vessel during its scheduled stop in Gulfport, Miss.

After these were bonded the entire assembly was put together again and wear-down measurements were carried out with positive results. The flexible mobdock was then removed. Finally the protection ring and the rope guard were reinstalled, concluding the repair. During the first inspection of the stern tube seal assembly it had become evident that the propeller blades of the vessel were damaged. The leading edges of all four blades were therefore grinded by the Hydrex divers to bring the propeller's efficiency back to its optimal condition.

Unique MSC Ship

Training to deliver fuel to shore from eight miles out

The crew of Military Sealift Command (MSC) offshore petroleum distribution system ship MV Vice Adm. K.R. Wheeler trained recently to do something that no other ship in the world can do: pump fuel to shore from a tanker as far as eight miles out to sea. The training took place June 21-26 off the coast of Pohang, Republic of Korea, and gave the ship's crew, operators and shoreside support personnel an opportunity to practice the first and final phases of a complex evolution that allows the unique, MSC-chartered Wheeler to quickly and efficiently deliver fuel to soldiers and Marines operating ashore where port facilities are inadequate or non-existent.

The 349-foot long ship is designed to operate as an at-sea pumping station, receiving fuel pumped to it from a commercial or military tanker at sea, and in turn, pumping that fuel to shore. The exercise provided an opportunity to practice deploying and re-deploying the eight miles of yellow, flexible pipe that Wheeler carries aboard its weatherdeck wrapped around five, 35-ft.-tall spools. No liquid was pumped during the training exercise.

"Our units have never supported Wheeler or a mission like this before," said Navy Lt. Sal Lopez of MSC's Fort Worth, Texas-based Expeditionary Port Unit 113, one of the two MSC Reserve units participating in the exercise. "This is a great opportunity to train in something completely new." Sailors from EPU 109, which is based in Jacksonville, Fla., also participated.

By the afternoon of June 24, all eight miles of the pipe had been deployed and Wheeler immediately began to retrieve the pipe. By June 26, the entire pipe was back on board the ship. In a real world scenario, Wheeler's crew can run the full length of pipe ashore, run a float hose to a tanker and be ready to pump fuel at a rate of about 1,400 gallons per minute - up to 1.7 million gallons in 20 hours.

(U.S. Navy photo by Ed Baxter, Sealift Logistics Command Far East)

Offshore petroleum distribution system ship MV Vice Adm. K.R. Wheeler deploys yellow, flexible pipe to the seabed off the coast of Pohang, Republic of Korea, June 23.

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Evergreen Orders 10 Ships

The Evergreen Group placed orders with Samsung Heavy Industries for 10 8,000-TEU L-class environmentally advanced container ships. The first vessel is due for delivery in 2012 and will join Evergreen Line global containership fleet. Six of the new vessels will be built for Evergreen Marine Corporation and four for Evergreen International S.A. (Panama). The ships are being built at a cost of $103 million each. The new ships will be constructed under the innovative Greenship design concept developed by Evergreen Group Chairman Dr. Chang Yung-Fa nearly 10 years ago and first introduced in 2003. The features have been built into every Evergreen Line vessel since then. The Greenship program has taken environmental protection and compliance to a superior level. With an overall length of 334.8 m (1100 ft) and a beam of 45.8 m (150 ft.), the new ships will have cruise speed of 24.5 knots.

ABB Azipod: Performance in Harsh Environs

ABB received an endorsement from two leading Russian customers on the performance of Azipod propulsion in the harshest environments in the marine sector. The impending fourth anniversary of the delivery of the ice breaking tug Polar Pevek has prompted the vessel's technical management company OOO Polarus to offer its approval of Azipod propulsion technology as the "right choice" for extreme ice conditions. Delivered by Aker Langsten in June 2006, the 940 dwt Polar Pevek is owned through the GC Rieber Shipping/Primorsk Shipping Corp joint venture Polar Pevek Ltd, registered in Cyprus. The DnV Ice 10 IB offers 115 tons of bollard pull ahead, and 95 tons astern. At 74.6m long, the vessel features generators, main switchboard, propulsion drives and two 5 MW Azipod units, all of which have been supplied by ABB. Already operational in the Sakhalin field for the last five years has been Fesco Sakhalin, operated by Far East Shipping Company. The 3,950 dwt, DnV Ice 10 IB provides a further endorsement of Azipod technology in ice conditions.

DPS 4D

Kongsberg Maritime Debuts new system in Houston

Ocean Rig's semi-submersible drilling rig Leiv Eiriksson has navigated the Bosphorus Strait using the new DPS 4D Differential Positioning System developed by Kongsberg Maritime's specialist position reference and satellite positioning division, Kongsberg Seatex. Leiv Eiriksson is one of the first vessels to apply DPS 4D, which uses the latest advances in GPS/GLONASS technology, aided by inertial technology using Kongsberg Seatex's new Motion Reference Unit, MRU 5+, to optimize signal tracking, integrity and availability for Dynamic Positioning (DP) applications under challenging GNSS conditions. Ocean Rig reports that DPS 4D provided continuous, accurate position data during the transit of the Bosphorus Strait, demonstrating integrity and availability of position data at all times. "The Bosphorus Strait is well recognized as being a hazardous area for navigation," said Stein Egil Svendsen, Marine Manager at Ocean Rig. "Despite the bridges and other obstacles, which actually interrupted other satellite-based reference systems onboard, we were able to reference our position continuously, only because we had DPS 4D. The availability of position data helps to improve safety and efficiency of operations and I'm confident that DPS 4D will enhance future navigation and maneuvering operations for Leiv Eiriksson." Kongsberg DPS 4D uses all available satellite navigation signals by combining GPS/GLONASS and MRU 5+ into a single system. The MRU 5+ measurements effectively bridge gaps in the satellite signal caused by physical obstructions, ionospheric activity and shadowing from nearby objects which may reduce signal availability. RAIM (Receiver Autonomous Integrity Monitoring) enhanced by data from MRU 5+ also provides an assessment of the reliability of position and velocity data under challenging GNSS conditions. DPS 4D is also designed to use all frequencies in systems available today as well as future GNSS signals and future global satellite navigation systems such as Galileo. Kongsberg DPS 4D has an intuitive and easy to use Human Machine Interface (HMI) developed in close co-operation with end-users. The primary goal of the HMI is to enable the operator to instantly identify and react safely to critical situations. Operators need to assess the quality of their position so user-defined visual presentation using multiple layers of information is available.

Joint Venture on CO2 Ship Design

Maersk Tankers, HHI, DNV Collaborate on innovative ship project

Maersk Tankers, HHI & DNV Maersk Tankers, Hyundai Heavy Industries (HHI) and Det Norske Veritas (DNV) have agreed to collaborate on the design and risk assessment of tankers for shipping CO2.

Maersk Tankers is already in a partnership with Maersk Oil and Finnish utilities Fortum and Teollisuuden Voima (TVO), aimed at developing a joint carbon emissions abatement project in the area of Carbon Capture and Storage (CCS).

"Shipping CO2 in tanker vessels is a cost effective and flexible way to get CO2 from power plants to offshore storage sites, which makes it a suitable solution for large CO2 emission sources such as coal-fired power plants, especially in the emerging phase of CCS." said Anders Schulze, Head of CO2 Shipping in Maersk Tankers.

Maersk Tankers and HHI already have the initial blueprints to build tanker vessels for the transport of CO2 from emission sources to storage sites. The vessels will be semi-pressurised and semi-refrigerated, keeping the CO2 liquid. HHI has designed the vessels together with Maersk Tankers, based on years of experience with transportation of liquefied petrochemicals and natural gas, and in accordance with global standards.

"The further development of the CO2 carrier design shall mainly focus on the safety and the Green ship requirements while emphasising the high energy efficiency of the vessel. HHI's technical cooperation with Maersk Tankers and DNV explains well HHI's policy of constant pursuit of new technology and also its dedication to finding solutions to the environmental issues in the shipbuilding segment." says Mr. Jae Keun Ha, Senior Vice President of HHI.

DNV will provide feasibility studies, risk identification in addition to general support for compliance with applicable class Rules and the current Gas Carrier Code as well as its latest developments specifying CO2 in more detail. These tasks will also include evaluations and support to ensure that the vessel is fit for purpose and fits well into the specific CCS chain.

"The overall technical features of these CO2 carriers have similarities with LPG carriers and offshore shuttle tankers. Many of the applicable safety standards to be applied are therefore basically well known. Studies will, however, have to be carried out to ensure that all features and specialities have been adequately addressed and that the vessels' interface with the rest of the CCS chain is in harmony with the intentions." says Jan Koren, DNV's Segment Director Tankers.

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Strategic Marine to Build Crew Boat Trio

The sister ship to the 40m Crew Boat sold to Tiong Woon.

Strategic Marine has been awarded a contract to build three 28 m Crew Boats, bringing the company's current order book to more than $200m.

The vessels will be built at Strategic Marine's Singapore Yard and will be delivered to Indonesian company PT. Baruna Raya Logistics in February, April and May 2011.

PT. Baruna Raya Logistics is a major operator of offshore service vessels and provides logistics support for offshore exploration, drilling, construction, production and other activities related to the offshore petroleum and the mining industry.

The company currently has about 60 vessels bearing Indonesian flags and registries.

The 28m vessels will be designed by Strategic Marine and Southerly Designs of Western Australia and incorporate a central deck house with seating for 60 rig crew. They will have fixed pitch propellers, reach speeds of 22 knots and have 55 sq. m. of clear deck space. Each of the vessels will be powered by two marine diesel engines to deliver a total 2400bhp.

www.strategicmarine.com

One for the four 30m crew boats previously delivered to Baruna Raya.

One Large Supply Vessel

Incat Crowther has set its sights on the title of the world's largest ever Fast Supply Vessel, as it has been contracted to assist with the design of a 225-ft. aluminum monohull DP-2 Fast Supply Vessel. The development of the vessel, to be built by Gulf Craft, has been a joint effort between the Louisiana shipyard and Incat Crowther.

The vessel will be designed to take advantage of Gulf Craft's experience from its 45 year history of building vessels for the offshore oilfields. The yard has had significant input into the design of the vessel, including the development of the outboard profile and general arrangement, and also the specification, selection and arrangement of the vessel's equipment. The vessel will be operated by Gulf Offshore Logistics LLC.

The DP2 certified vessel is distinguished by its 4380 sq. ft. (407 sqm) cargo deck – set to be the largest ever on a Fast Supply Vessel, according to the designer. The deck is nearly 150 feet long and is designed to carry 500 long tons of deck cargo.

Forward of the cargo deck is the two-deck superstructure. On the upper deck is the wheelhouse, featuring both a forward control station and an aft-facing DP station with 360-degree visibility. The main deck cabin features 84 business class seats, a toilet and luggage bins, as well as stairs down to the crew accommodation in the hulls.

Below decks is the crew accommodation, featuring a spacious galley and mess area, laundry and toilet facilities and berths for eight crew. Forward of the crew accommodation is the thruster room, housing three Thrustmaster TT200ML tunnel thrusters.

Aft of the crew accommodation, the ship's tank spaces, including fuel and water for both the ship's operation and cargo. The vessel has capacity for 51,320 gal. of cargo fuel oil, and 66,290 gal. of cargo fresh water. The combination of this liquid cargo with the deck cargo gives the vessel a maximum deadweight of nearly 600 long tons.

An electrical room is situated amidships, featuring three Caterpillar C9 gensets and the vessel's main switchboard. The vessel will be powered by four Caterpillar 3516C engines, each rated at 3004bhp @ 1800 rpm. Each engine will drive a Hamilton HT-900 water jet, giving the vessel a top speed in excess of 35 knots, and a service speed of 25 knots while carrying 250 long tons of deadweight.

Gulf Craft is due to deliver the vessel in 2012, with repeat orders expected. Meanwhile, Incat Crowther continues to evolve and expand its portfolio with products that bring new capability and efficiency to its customers, all based on the proven experience of over 35 years.

Main Particulars

Length, o.a.	225 ft. (68.6 m)
Length, w.l.	200.3 ft. (61 m)
Beam, o.a.	36 ft. (11 m)
Draft (hull)	6.8 ft. (2 m)
Depth	14.2 ft. (4.3 m)
Deck Cargo	500 long tons
Ship's Fuel Oil	25,860 gallons
Ship's Fresh Water	6,270 gallons
Cargo Fuel Oil	51,320 gallons
Cargo Fresh Water	66,290 gallons
Crew	8
Passengers	84
Max. Deadweight	580 long tons
Speed (Max)	35 knots (50 LT DWT)
Speed (Service)	25 knots (250 LT DWT)
Main Engines	4 x Caterpillar 3516C
Power	4 x 3004bhp @ 1800rpm
Propulsors	4 x Hamilton HT-900 Waterjets
Generators	3 x Caterpillar C9, 250kW, 60hz
Class	ABS
Flag	USA

Westport Shipyard Launches Composite 43m Cutter

Westport's launch of the Global Response Cutter (GRC-43) from its composite patrol vessel series (CPV) represents a significant milestone while marking a return to the company's commercial roots. The composite GRC-43 offers many advantages to the world's Coast Guards and Navy's, including but not limited to superior weight to strength/distinct thermal advantages/non-corrosive properties while in parallel significantly reducing maintenance costs/increasing operational on station time, and life cycles of the patrol vessels. The GRC43 was built/modeled to the US Coast Guard requirements using American Bureau of Shipbuilding (ABS) rules for high speed craft. The program's intent is to offer a series built patrol vessel to U.S. agencies, (Navy/Coast Guard/Special Operations/Homeland Security) and foreign military. "This is a fully executable program that ensures a high quality "off the shelf" platform ensuring the vessels predictable operation in unpredictable environments," said Philip Purcell, Vice President of the Shipyard.

Westport recently launched the Global Response Cutter (GRC-43).

Black Magic

Sauter Carbon Offset Design introduces Black Magic, a vessel the company describes as a zero carbon vessel that points to the way future tankers is designed to reduce their GHG emissions by 6 billion tons over the next 20 years. Black Magic is a 4,000 ton Solar hybrid Vessel that reduces GHG emissions by 75 to 100% by harnessing energy from the sun, wind and waves. It features Mercedes Benz/MTU Bluetec engines.

The currently available green technology present in Black Magic includes:

- Mercedes Benz & MTU Bluetec diesel electric power generation;
- Hydro and aerodynamic advances in wave piercing pentamaran hull design;
- Azimuth counter rotating CLT high torque propeller systems;
- KER & Power sailing regeneration;
- State of the art fully rotational Wing Sails;
- Maximum solar cell deployment. (2,000 square meters);
- Computerized energy management, maintenance & guidance.

Solar cells, power sailing regeneration and plug-in power sources charge a lithium ion storage system that runs all hotel services including AC, day and night. The same lithium UPS allows Black Magic to achieve her maximum speed of 16 knots and navigate harbors and inland water ways with zero emissions.

U.S. Barge Delivers for Harley Marine

U.S. Barge recently delivered another high capacity petroleum barge to Harley Marine Services. Barge Sixty-Five Roses is a unique design from Elliott Bay Design Group. With new efficiency and voluntary environmental features incorporated into the design, the barge continues Harley's pattern of continuous improvement. Barge Sixty-Five Roses is a 422 x 76-ft. tank barge with capacity of 83,600 barrels. Outfitting requirements include two vertical turbine cargo pump systems, a cargo heating system, a vapor recovery system, two hose cranes, and five hydraulic mooring winches. There are provisions for the future addition of a self-contained vapor processing unit. All outfitting was completed in house by U.S. Barge.

U.S. Barge's facility is ideally arranged for construction of very large barges. Their buildway is 800 ft. long and served by a 600-ton gantry crane. The company owns 150,000 sq. ft. of covered fabrication bays with high ceilings and overhead crane service. The hull was designed for optimal performance under tow and reduced fuel consumption.Harley Marine Services invested in a tow tank testing program with a goal of reducing their carbon footprint. Barge Sixty-Five Roses represents the flagship in this new line of barges. U.S. Barge is owned by Vigor Industrial LLC. The company offers turn-key delivery of state-of-the-art OPA 90 compliant barges.

www.usbarge.com

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Too Big to Fail: Part Deux

After losing control of the blowout and spill, BP has also lost control of the PR message. With only one thing left to lose, what comes next might turn into the real disaster for the U.S. Gulf Coast, the oil industry and the energy models that fuel the American economy. About six weeks ago, I asked, "Is BP too big to fail?" I also questioned the viability of any firm – no matter how big – that instantaneously loses 20 percent of its stock price while at the same time trying to fight a live oil spill and clean up the growing mess that it has caused. A lesser company might be looking for ways to fold its tents in the face of all that, but BP soldiers on with its unpleasant task. At mid-week, BP even had enough cash reserves to buy 32 of Hollywood actor Kevin Costner's oil vacuum gizmos. And yet, today's offshore situation in the Gulf is at least twice as grave as originally reported. Failing a quick fix that does not appear to be coming, today's problems will seem trivial in comparison to what is about to come. And, I am not just talking about tar balls on the beach. By close of business on Friday, the value of BP stock and associated market cap had dipped, more than once, to as little as one half of its 52-week high. In stark contrast, at this point in the 1989 EXXON VALDEZ crisis, that oil major's stock price had rebounded nicely and although still being painted as a villain in the media, EXXON had weathered the worst of the storm, stopped the spill and they were well underway with the cleanup. On day 52 of the BP Spill Crisis, even political cartoonist Gary Trudeau had turned his sights on BP and begun lampooning their failed PR effort in his Doonsbury comic strip. Trudeau is a lot of things, but he is rarely off the mark with what is important. His humorous efforts to paint the BP spin machine as a collection of empty rhetoric has hit home hard, especially given the grossly inaccurate estimates of spilled oil and lack of transparency from the oil major.

Notwithstanding the pathetic state of my own stock portfolio in this latest downward trend in the broad markets, I also find myself rooting for BP to succeed. You should be doing the same thing. From the financially unwashed standpoint of having witnessed firsthand (as spouse of a banking executive) what can happen to a too-big-to-fail top five bank from my own living room, let me explain what might transpire next: A continued downward spiral in BP's stock value – not necessarily an unrealistic scenario given today's news – will eventually trigger a shortage of cash to do business. I don't care how much cash and "proven" reserves that they are currently sitting on. Credit will tighten considerably and then dry up completely. No one wants to throw good money after bad. The potential end result for BP, looking at what happened to some of this nation's biggest banking conglomerates in the past two years, is not hard to imagine. BP has bigger things to worry about than suspending its second quarter dividend in order to calm political criticism in the U.S. As a minimum, that money is better spent fighting the blowout and associated spill. To be sure, the gesture will go a long way towards creating some much needed good will. Taking the long view in the face of the crisis that to this day defies an accurate estimate of present and future damages, the suspension of a few quarterly dividends may well be an integral part of the firm's ultimate survival. And, as the U.S. Coast Guard issues stark orders to BP to position additional containment equipment to combat the growing spill, the cost estimate of $20 billion given by experts for the disaster just weeks ago will probably be eclipsed many times over before it is all said and done. Through it all, BP executives and public relations people have failed to contain the ongoing story, partly due to underestimated spill volumes, arguably poor transparency, and a claims process that is falling short for many folks. Last week, BP executives foolishly continued to argue – and in a very public forum – over the seriousness of the underwater oil plumes. On the other side of the ledger, critics from both the left and right have assailed the Obama administration for not doing enough in the wake of the disaster. If BP is unable to make it financially through this unprecedented mess, those critics may soon get their wish. Obama will have to do plenty. My general sense today is that most financial pundits still think that BP is "too-big-too-fail." I hope that they are right. From my viewpoint, though, BP today more closely resembles a failed U.S.-megabank than perhaps its oil major cousin, EXXON. And, if BP doesn't very soon get firm control of the situation, it will be the taxpayers once again who will be footing the final bill. The loss of the deepwater rig "Horizon" and the aftermath spawned by the spill and cleanup effort has already proven to be a game changer here in America. Offshore operating rules are sure to be radically changed and the six-month moratorium on new drilling and exploration is affecting employment in the oil patch and on the Gulf Coast. Heads are already starting to roll and we haven't even begun to see the political fallout which will almost certainly permeate our society for decades to come. My money is on BP to survive and eventually conquer this entire mess. And, in case you didn't already know it, so is yours.

Posted by **Joseph Keefe** on **MaritimeProfessional.com**

U.S. Commercial Thinking

Change of Course

The industry in the US is always keen to accept, if not develop, technological advances, but is slow to adapt its thinking and management style. Recent events, not least the recent Great Recession, have forced a change of outlook and brought about fresh ideas. The most intriguing suggestion has come from former NYK America executive vice-president Peter Keller, who calls for container lines to pool ships, in the same way as they share container chassis in storage yards. He calls container vessels "a generic commodity" that is uniform in shape and design, with only the sizes differing. He recognizes the logistical problems, but says that an example to follow is that of railway companies and the creation of TTX Co.

Industry insiders note that a container vessel sharing system would be vastly more complicated than rail wagons as the ships are owned and flagged in a number of countries, which would cause headaches for the different legal and financial systems, as would fluctuating exchange rates.

Nonetheless, the principle is sound. Two ports have translated a new way of thinking into practice. Virginia has (almost) cemented a reverse takeover of the AP Moller-Maersk terminal in Portsmouth, paying $1b for a 20-year lease. Until recently, the new thinking was that port authorities would be landlords, leasing terminals to private operators. Along came the recession and sharp drops in terminal bids. Virginia did some very commendable reshuffling and came up with a much better idea, which will go very well on the resume of Jerry Bridges, formerly the boss at Oakland. APM found itself holding a pair of deuces against the aces of the VPA, as the port owns the other terminals and had sown up long-term contracts with all the other lines serving the port, which left APM with only its own services at a new facility. Regional pride also played a part in the port's calculations. It is desperate to knock NY/NJ off the pedestal as the biggest port on the East Coast. Over at Portland, Oregon has teamed up with International Container Services, of the Philippines, which will run the container/break-bulk facility at Terminal 6. Payment is $8m as a lump sum plus an annual rent payment of $4.5 million over 25 years. For those see nothing unusual in the arrangement, the name DP World might jog their memories. Congress ran a hissy fit, orchestrated by the current Secretary of State, over terrorists sneaking in through foreign-owned terminals. Portland, and others, have seen through the political posturing and know a good commercial venture when they see one.

Posted by **Martin Rushmere**

New Developments in Sensor Technology

Making possible the growth in Condition CM/CBM to improve reliability and maintenance on board ships is the development of computers connecting to compact sensors using, wired or wireless communications. The Silicon Valley-based SRI International, has developed advanced Vibration Imaging Technology (VIT). SRI recently granted Sensors Inc. a global manufacturing and distribution license to develop a diagnostic system using their VIT. The system uses a special camera and patented software enabling a computer to detect and analyze vibrations on the surface of objects in its field of view. No special lighting or physical connection to the object(s) is required. The opportunities for monitoring marine propulsion and auxiliary applications are indeed large. The system is so sensitive that images can be monitored pixel by pixel and any variation is immediately detected. Used to monitor the mechanical health of machinery with rotating parts, abnormal vibrations are immediately recognized by the system and may indicate intervention or shut down is required. The growth in Condition Monitoring / Condition Based Maintenance (CM/CBM) to improve reliability and maintenance on board ships is well documented. Making this all possible is the development of computers connecting to compact sensors using, wired or wireless communications. Usually the sensor is physically attached to the object and often it is an accelerometer. For some time now, the Silicon Valley-based SRI International, originally Stanford Research Institute, as one of the world's leading independent research and technology development organizations, has been developing advanced Vibration Imaging Technology (VIT). SRI recently granted Sensors Inc. a global manufacturing and distribution license to develop a diagnostic system using their VIT.

The system uses a special camera and patented software enabling a computer to detect and analyze vibrations on the surface of objects in its field of view. No special lighting or physical connection to the object(s) is required. Although initial interest is in automotive applications the opportunities for monitoring marine propulsion and auxiliary applications are indeed large.

The system is so sensitive that images can be monitored pixel by pixel and any variation is immediately detected. It can even pick up vibrations so small that would not be registered by an accelerometer. Noise is produced by vibration and long before an abnormal noise is reported the vibrations creating the noise would be detected by the vibration imaging software. Used to monitor the mechanical health of machinery with rotating parts, abnormal vibrations are immediately recognized by the system and may indicate intervention or shut down is required.

As this system becomes more widely available, being able to monitor equipment without wired connections and monitoring a whole area by camera will widen the scope of CM and bring further enhancements to its increasing popularity.

Posted by **Keith Henderson**

Offshore Brazil

OGX Continues Positive Exploratory Campaign

Since last year OGX Petróleo e Gás has been having excellent results in its exploratory campaign in the Campos Basin. OGX Petróleo e Gás, which is the Brazilian O&G company responsible for the largest private sector exploratory campaign in Brazil, announced that it had identified two oil-bearing intervals, one in the Aptian section of well 1-OGX-10-RJS and another in the Eocene section of well 1-OGX-13-RJS, which are located in the BM-C-42 and BM-C-41 blocks, respectively, in the shallow waters of the southern part of the Campos Basin, where they have been drilling the majority of their exploratory wells, with a very high percentage of success. OGX holds a 100% working interest in both blocks.

In well OGX-10, the Hawaii prospect, an oil column of approximately 110 m and net pay of approximately 40 m was identified in the carbonate reservoirs of the Aptian section. The well is in its final stage of log analysis. Therefore the rig, Sea Explorer, provided by Pride International, has been moved to well OGX-7A, the Huna prospect, in order to conduct additional tests.

Regarding well OGX-13, the second appraisal well for the Vesuvio accumulation, a net pay of approximately 10 m was encountered in sandstone reservoirs in the Eocene section. Preliminary information indicates that this well was drilled in one of the structure's boundaries, making an important contribution towards delineating of the Vesuvio accumulation. Drilling activities have been concluded at OGX-13. As a result, the rig Ocean Lexington, provided by Diamond Offshore, has been moved to the Peró prospect, located in the block BM-C-40.

The drilling of well OGX-10, situated approximately 79 km off the coast of the state of Rio de Janeiro at a water depth of approximately 158 m, commenced on March 2, 2010. At OGX-13, situated approximately 87 km off the coast of the state of Rio de Janeiro at a water depth of approximately 138 m, drilling started on May 5, 2010. Continuing their exploratory campaign, OGX is also having success at their new prospects located in the Santos Basin. Based on tests completed at well 1-OGX-11D-SPS, it has concluded that the previously announced discovery of hydrocarbons at the Natal prospect in the Santos Basin refers to an accumulation of liquid hydrocarbons with associated gas.

Following the announcement released on May 24, 2010, mentioning evidence of hydrocarbons, gas and condensate in the Santonian section of well OGX−11D, new studies including logging tests, lateral core sampling, pre−tests and a cable test have been conducted, which led to the conclusion that the discovery refers to an accumulation of liquid hydrocarbons with associated gas. The total oil column and net pay identified in the sandstone reservoirs of the Santonian section have increased to approximately 180 m from 42 m and 75 m from 34 m respectively, exhibiting excellent levels of permo−porosity. The liquid hydrocarbons encountered are of high quality, with an API of approximately 41°. The drilling of the well is still in progress and is expected to continue to a final depth of 6,100 m, targeting deeper objectives. The well, located in the BM-S-59 block, is situated 104 kilometers off the coast at a water depth of approximately 170 m. The rig, Ocean Quest, provided by Diamond Offshore, initiated drilling activities on April 9, 2010. OGX also holds a 100% working interest in this block. The latest news is that OGX has identified an oil-bearing interval in the Albian section of well 1-OGX-14-RJS, located in the BM-C-40 block, in the shallow waters of the Campos Basin. OGX holds a 100% working interest in this block.

"This discovery represents another very important step for OGX since hydrocarbons were detected in an area to the north of our recent discoveries in Campos in which the Company had not drilled previously," commented Paulo Mendonça, General Executive Officer of OGX.

Posted by **Claudio Paschoa (Rio de Janeiro)**
on MaritimeProfessional.com

IRS Membership in IACS

An End to Dual Class?

Indian ships may prefer to get classed only by the Indian Register of Shipping (IRS) now that it has been granted full membership of the International Association of Classification Societies

The acceptance of Indian Register of Shipping (IRS), a non-government organization, as a full fledged member of the International Association of Classification Societies (IACS) Council at the meeting held in Hamburg last week will put an end to the dual classification model which Indian shipping companies have been abiding by since the formation of IRS in 1975. It has been a long wait for IRS now that it has become the 11th member of IACS. It had been pursuing IACS membership since 1991 but had to contend with merely being associate member. The associate membership category was abandoned in October last when IACS introduced a single class of membership following an investigation into its practices by the European Commission after complaints of uncompetitive behavior.

Today, 95 percent of Indian ships are classed by IRS. Because IRS did not have full membership, Indian vessels were also being classed by one of the IACS member. A spokesman of the Indian National Shipowners' Association (INSA) stated, "We were instrumental in setting up IRS in 1975 and we continued to support IRS all along even though they had not been able to provide the required level of service not having the extensive office network like all the other Class societies. Getting IACS full membership will strengthen IRS and help it to grow."

A spokesman of Mercator Lines Limited said, "Indian ship owners preferred getting their ships classed by IRS also as we want to support our own country's classification society. Hence, most Indian ships have a dual class viz with IRS and one other foreign society. Now this dual class will not be necessary when one can undertake all the necessary service required with one classification society."

Posted by **Joseph Fonseca (Mumbai)** on MaritimeProfessional.com

A Thinking Man's Game

Rearranging the tow is more than playing a game of Tetris. Sometimes it's like playing chess with Bobby Fischer.

On the upper Mississippi at Lynwood, it was time for the Theresa Wood to drop off two empty barges. To rearrange the tow, the deckhands pulled apart and remade 22 lines; set the sounder and speakers at the head of the tow and ran the cords back to the boat; and remade the steering coupling, reinforcing the connection between the first and second set of barges, where the largest amount of stress is absorbed. The process took three or four hours. The dispatcher tells the boat when and where barges need to be picked up and dropped off, but the Captain decides where those barges are placed in the tow. Are the barges empty or full? Empty barges act as sails, pulling the boat around with the wind. Empties have to be placed as far out on tow as possible, or on the sides. Are the barges boxes or rakes? Boxes have squared-off edges and rakes are contoured at one end to allow water to flow underneath. The Captain tries to build a tow as units with a rake at either end and boxes in between. But often there aren't enough rakes and you end up with the raw edge of a box barge sticking out and a rougher ride. How long is the barge? Most barges are 200 feet long, but a few are 195 feet. You can only put 195-foot rakes at the head of the tow, unless you have enough of them to put them all the way across the very first row of the tow. Otherwise, the tow won't fit together.

Safe navigation is priority, so no matter what kind of chess master you may be, you still may end up needing to drop off a barge that's sitting in the very middle of your tow.

Posted by **Raina Clark**, managing editor for MarineNews magazine. Raina recently sailed for a week on working towboats on the Mississippi River. Follow her trail on **MaritimeProfessional.com**

Low Bridge

Everybody Down

About the Author

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In 1905, Thomas Allen wrote the Erie Canal Song, memorializing the men and women and their mules that hauled barges through that canal. After the 363-mile long Erie Canal opened in 1825, bridges were built to link the communities on the north and south sides of the route from Albany to Buffalo. The bridges were usually built with a clearance underneath barely sufficient for the barges to pass. Since most passengers rode on the top of the barge, they had to lie flat or descend to the main deck when such a bridge was encountered. The low bridges not only inconvenienced passengers, they also limited the size of barges that could operate on the Erie Canal. We are increasingly facing a similar problem in various commercial ports in the world.

The container ship Emma Maersk has a design air draft of 191 feet. Other ships in current operation have even greater air drafts. The cruise ship Oasis of the Seas has an air draft of 236 feet. While the current economic crisis has slowed fleet growth, there is no indication that ships have reached their maximum design size.

Portions of two of the largest ports in the United States have effectively been isolated from modern ship traffic due to the low clearance afforded by bridges crossing waterways that provide access to important terminals. These partially-closed ports are: the Port of New York and New Jersey on the Atlantic Coast and the Port of Long Beach on the Pacific Coast. The obstructive bridges were constructed years ago and were considered adequate in all respects, including ship clearance, when designed and built. The problem is that many modern ships, including numerous container ships, now have air drafts meeting or exceeding that of the bridges in those ports.

Bayonne Bridge

The Bayonne Bridge opened in 1931 and connects Bayonne, New Jersey with Staten Island, New York. It carries four lanes of NY 440/NJ 440 and spans the Kill Van Kull. When it opened, it was the longest steel arch bridge in the world (and remains the fourth longest to this day). It has an air draft of 151 feet (156 feet at low tide) and a span width of 1,675 feet. Ships with an air draft slightly greater than that of the bridge may lower or fold down antennas and masts; take on ballast; and/or wait for low tide. Ships for which these options are insufficient are effectively locked out of the Kill Van Kull waterway above the bridge. As ships grow larger (particularly as a result of the on-going expansion of the Panama Canal), more and more ships will be locked out. The New York-New Jersey Port Authority is actively considering replacing the span. Three options are on the table: (1) jack up the current span to provide a clearance of 215 feet for ships; (2) construct a new bridge that would also provide improved clearance; and (3) replace the bridge with a tunnel (either bored or immersed). The jack-up option would cost $1.3 billion and would be completed in 2019. The bridge replacement option would cost $2.15 billion and would be completed in 2022. The bored tunnel option would cost $2.2 billion and would be completed in 2024. The immersed tunnel option would cost $3.0 billion and would also be completed in 2024.

The container ship Emma Maersk has a design air draft of 191 feet. Other ships in current operation have even greater air drafts. The cruise ship Oasis of the Seas has an air draft of 236 feet. While the current economic crisis has slowed fleet growth, there is no indication that ships have reached their maximum design size.

Gerald Desmond Bridge

The Gerald Desmond Bridge opened in 1968 and connects Long Beach and Terminal Island, California. It carries four lanes of Interstate highway I-710 and spans the Cerritos Channel. It is a steel arch bridge with an air draft of 155 feet and a span width of 410 feet. Ships unable to transit under the bridge are effectively locked out. The Port of Long Beach is developing plans for replacement of the current bridge with a new cable-stayed bridge with 200 feet of vertical clearance. The cost of this replacement bridge is estimated to be $800 million. The current timeline calls for completion of the project in 2016.

Three other US bridges presenting potential height constraints

While the Bayonne Bridge and the Gerald Desmond Bridge have the two lowest air drafts of any fixed bridges over major navigable waterways in the United States (indeed, in the world), there are three other US bridges that are presenting increasing height constraints on vessels wishing to make port calls. The Talmadge Bridge in Savannah and the Vincent Thomas Bridge in Los Angeles both have air drafts of 185 feet. The Arthur Ravenel Jr. Bridge in Charleston has an air draft of 186 feet. The bridges in Savannah and Charleston were recently constructed and their height constraints were knowingly accepted. The Los Angeles bridge, completed in 1963, was designed before modern megaships were envisioned. It is another candidate for alteration or replacement.

Truman-Hobbs Act

Under federal law, a bridge may only be constructed over a navigable waterway if a permit is obtained beforehand. Since 1967, the US Coast Guard has served as the federal bridge permitting authority. All bridges are considered to be obstructions to navigation and are tolerated only as long as they serve the needs of land transportation while allowing for the reasonable needs of marine navigation. Whenever any bridge is found, in the opinion of the Coast Guard (on behalf of the Secretary of Homeland Security) to unreasonably obstruct the waterway, the Coast Guard may commence a process that could result in an order directing the removal of the obstructive bridge. In the case of a railroad or publicly-owned highway bridge, the owner thereof may be eligible to obtain a federal contribution of a portion of the cost of alteration. The owner must bear such part of the cost attributable to the direct and special benefits which will accrue to owner as a result of the alteration, including expected savings in repairs and maintenance, expected increase in carrying capacity, costs attributable to the requirements of highway and railroad traffic, and actual capital costs of the used service life. The federal government will bear the balance of the costs, including that part attributable to the necessities of marine navigation. This statute provides a possible option for spreading some to the cost of bridge replacement across a wider group.

Foreign waterways

While US ports present the most obvious examples of air draft-constrained waterways, they are not alone. The Kiel Canal was completed in 1895 and has an air draft at several bridges crossing the Canal of 130 feet. When the Kiel Canal was completed, no warship of the German Navy required greater clearance. Now that air draft is the major limitation preventing modern commercial vessels from making further use of the Kiel Canal. Some cruise ships have been designed to squeeze through. The MS Norwegian Dream, for instance, is fitted with special masts and funnels that can be lowered for passage. The German sail training bark Gorch Fock was designed so that its topmasts can be lowered easily for transit of the Canal.

Panama Canal

There are two fixed-span bridges crossing the Panama Canal. The Bridge of the Americas at Balboa was completed in 1962. It has an air draft of 201 feet at high tide. The Centennial Bridge in the Gaillard Cut was completed in 2004 and has an air draft of 262 feet. Even after the current project to widen and deepen the Panama Canal, potential users may find themselves constrained by the air draft of the Bridge of the Americas.

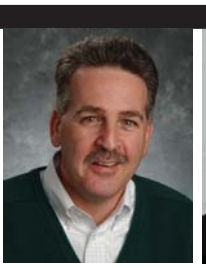
Conclusion

Ships, particularly container ships, have gotten larger. While the focus of this growth has been on cargo capacity and water draft, ports have ignored the increasing air draft issue at their peril. Ships with design air drafts of 180 feet are no longer rare. Any bridge with an air draft of 180 feet or less will constrain transits by a number of modern commercial vessels. For a port that strives to become a hub in the new hub-and-spoke maritime transportation system, the minimum air draft should be closer to 200 feet, and possibly higher.

When it comes to Towing, Sub-Chapter

"M" is for Safety

About the Author



By Richard DeSimone (left), President, Travelers Ocean Marine and Kord Spielmann (right), Technical Director, Travelers Ocea Marine Risk Control

A train derails after a towed barge collides with a bridge, killing dozens. A towboat fails to move a barge out of the way of a tanker, causing the worst oil spill ever on the lower Mississippi River. In both cases, lack of training, equipment malfunctions and other problems with the towboats were identified as causes of the accidents. When an industry stares calamity in the face, it isn't hard to get everyone onboard with cracking down on unsafe practices. Unfortunately, that consensus can dissipate as memories of such incidents begin to fade and policymakers move slowly through the many steps that it takes to create new regulations.

None of us who are involved in the marine industry should let that happen to the proposed U.S. Coast Guard program of mandatory inspections for towing vessels, known as Sub-Chapter "M". It is important that we all become a part of the process.

Why Inspections are Needed

The Coast Guard has long been the first line of protection for passengers on vessels. Its inspections are designed to ensure that someone who buys a ferry ticket or goes on a cruise enters an environment that can carry them safely to their destination. Historically, however, the presumption has been that towing vessels belong to companies that can be expected to manage their own risks. A company that runs vessels aground, or destroys goods in the process of towing barges, won't be in business for long. Keeping vessels operational and employing crew that are properly trained are in a company's own best interest, even without the prodding of a government inspector.

Nonetheless, accidents have happened that have a broader impact than on a towing company's liability and reputation. The 1993 Big Bayou Canot train derailment near Mobile, Alabama, is one bleak example. A towboat pilot, disoriented by fog and unfamiliar with his radar, strayed off course, entered a non-navigable stretch of water and allowed a barge he was towing to slam into a railroad bridge. Unbeknownst to the pilot, who thought the barge had merely run aground, the impact caused a kink in the rail line on the bridge overhead. Minutes later a high-speed passenger train derailed and slammed into the bridge superstructure, killing 47 passengers and crew and injuring 103 others. Human safety is not the only consideration. Increasingly, towing accidents can impact the environment as well. The 2008 Mississippi River spill dumped an estimated 280,000 gallons of oil into a fragile ecosystem. The towboat pilot was an unlicensed apprentice filling in for an absent captain. The apprentice was trying to fix his malfunctioning radar when a tanker warning alerted him to move a barge he was towing. He was unsuccessful; the steering system jammed and the wing meter was broken. The tanker split the barge in half, causing millions of dollars in damage and spilling oil into the river. The two accidents are dramatic examples of how things can go wrong much too quickly when tow boats are operating in an unsafe manner, either because of crew training or malfunctioning equipment. While these are two of the worst, a list of every significant mishap in the past few years would be lengthy.

Fortunately, many different organizations are now focusing on safety. American Waterways Operators, for example, has its voluntary Responsible Carrier Program, a certification initiative that helps members understand and comply with the standards involved in safe operation. Maritime insurers are another source for encouraging safe practices. Underwriters look for signs that equipment is well-maintained and that crew members are properly trained before they will offer insurance coverage. Insurance carriers also provide risk control services that can help vessel operators identify best practices and improve operating conditions. The most prominent effort to make towing operations safer is centered on giving the U.S. Coast Guard responsibility for towboat inspections. In fact, even before the regulations – known as Subchapter M – are finalized and put into place, the Coast Guard has already implemented a voluntary Towing Vessel Bridging Program. This program provides Coast Guard dockside inspections that can help vessel owners prepare for the day when regulatory inspections become effective. The Subchapter M regulations will be a key component in the creation of an overall marine safety management system, according to Squicciarini. Like all federal regulations, Subchapter M will go through a thorough public vetting process, including a time for public comment. Even as the regulations are being written, however, there are opportunities for industry members to get involved. The Towing Safety Advisory Committee, which provides input to the Coast Guard, is one avenue. Here vessel owners and operators can put forth their concerns about regulations, helping policy makers find the right balance between effective safety measures and practices that may be too onerous, making operating a business unduly costly or difficult.

Insurance companies that are active in maritime coverage are also involved, encouraging vessel operators to take advantage of the A.W.O. Responsible Carrier Program and the Coast Guard Bridging program. As insurers, we are in a strong position to provide information from our business experience about what works, and what is not effective when it comes to safe operations. Safety should be everyone's goal. Loss of human life, property damage and environmental pollution are not only tragic, but they are also bad for business, whether you are the towboat operator, the owner of the goods or the insurer handling the claims in the aftermath of an accident. By working together, we can help the Coast Guard create an effective Sub-Chapter "M" program that helps the towing industry grow and thrive.

Sources: Story on Mel Oliver, http://www.newsinferno.com/archives/4059 Story on railroad derailment, http://tech.mit.edu/V113/N44/train.44w.txt.html

A Comparison of U.S. and Canadian Progress Towards the Development of

Renewable Marine Energy

By Joan Bondareff, Of Counsel, Blank Rome LLP

Both the U.S. and Canada have vast ocean resources that they can tap into for renewable energy, including offshore wind, tides, waves, and hydrokinetic energy projects. According to a recent report from the Canadian Department of Fisheries and Oceans, renewable energy from Canada's oceans has the potential to contribute a significant portion of Canada's current and future energy demands. The U.S. Federal Energy Regulatory Commission (FERC) estimates that up to 20% of the U.S. energy supply could come from renewable marine sources. In 2009, President Obama and Prime Minister Harper agreed to a Clean Energy Dialogue Action Plan to share information and resources on bioenergy and carbon capture and storage. This was expanded in 2010 by a Cabinet-level Declaration of Intent for Cooperation in Energy, Science and Technology. But, each country understandably has its own set of priorities, programs, and incentives. These are briefly reviewed and contrasted below.

A Review of U.S. Programs

Unlike Canada, the U.S. has no single agency responsible for the development of offshore energy. The Department of Energy (DoE), under the leadership of Secretary Chu, does seem to have taken the lead on policy development and R&D. But, the Department of Treasury has a role in administering tax credits and other financial incentives, while the Minerals Management Service (MMS) of the Department of the Interior has a role in certain sources of energy on the Outer Continental Shelf (OCS), and the independent FERC has a role in licensing other forms of renewable energy. In April 2009, MMS and FERC reached a historic agreement on how to divide their respective responsibilities which should accelerate development. Henceforth, MMS has exclusive jurisdiction with regard to the production, transportation, or transmission of energy from non-hydrokinetic renewable energy projects on the OCS, including wind and solar. MMS also has exclusive jurisdiction to issue leases on the OCS for hydrokinetic projects (wave, tidal, and ocean current). FERC has exclusive jurisdiction to issue licenses for the construction and operation of hydrokinetic projects on the OCS. If you are a developer of a hydrokinetic project on the OCS, you first have to go to MMS for a lease, and then to FERC for the operating permit.

U.S. Financial Incentives

The American Recovery and Reinvestment Act of 2009 (ARRA), popularly known as the stimulus bill, gave a kick start to renewable energy. For example, DoE got $36.7 billion in funds to jumpstart the clean energy economy, and as of March 17, 2010, had obligated $25.9 billion. This included $750 million to help accelerate the development of renewable energy, and an additional $93 million to support wind energy projects.

Section 1603 of ARRA became very popular and was very successful according to a recent report from the U.S. Department of Energy's Lawrence Berkeley National Laboratory. Section 1603 started out as a provision to increase tax benefits, but ended up as a grants program. Administered by Treasury, Section 1603 authorized $2.6 billion in grants in lieu of tax credits, and most companies took advantage of the grants program. Wind power projects received 86% of the funds but most of this went to onshore projects. Production tax credits for marine energy projects have been in place since the Energy Policy Act of 2005 and remain in effect through December 31, 2013. These credits were also made more flexible by ARRA. It remains to be seen whether they are extended further in a tax extenders bill currently pending in the U.S. Congress.

DoE recently announced a new Funding Opportunity focused on the development of marine and hydrokinetic energy technologies. A total of $38.6 million is being made available over a four year period to promote these technologies. The states are stepping up with matching funds. For example, the State of Oregon's Oregon Wave Energy Trust announced that it would match up to 20% of the DoE grants for projects that significantly take place in state waters.

U.S. Progress To Date

It took MMS almost nine years to approve the nation's first offshore wind project, the Cape Wind project off Cape Cod. Opposition to this project was certainly driven by the NIMBY syndrome, among other reasons. Now that it has been permitted, perhaps it will facilitate the permitting of other offshore wind projects. We can't afford another nine years to bring these kinds of projects online if the U.S. is to meet any reasonable alternative energy goals.

Under the leadership of Interior Secretary Salazar, in 2009, MMS established a renewable energy program. Since then, MMS has published a final rule (74.FR 19638, April 29, 2009) to grant leases and easements for renewable energy on the OCS, and awarded the first-ever exploratory lease for renewable wind energy production on the OCS offshore New Jersey and Delaware. In addition, MMS has established a cooperative federal-state program and is in the process of facilitating the following representative projects:

- In California, Oregon, and Washington : MMS has received expressions of interest in several renewable energy projects, including wind and wave projects;
- In Delaware: MMS offered one interim lease to Bluewater Wind Delaware for installation of a meteorological tower;
- In Florida: MMS is working with three potential hydrokinetic (ocean current) energy generation developers on a limited basis; no leases issued;
- In Hawaii: The State is developing a proposal for an inter-island power cable to transmit electricity from renewable energy projects (wind) between the islands of Lanai and Molokai to a power center in Oahu and possibly Maui;
- In Maine: There are several initiatives for developing offshore renewable energy especially in State waters;
- In Maryland: The State has issued a Request for Expressions of Interest regarding the potential for offshore wind energy development;
- In New Jersey: MMS issued three interim leases –one to Deepwater Wind LLC, one to Bluewater Wind New Jersey Energy LLC and one to Fishermen's Energy of New Jersey LLC;
- In Rhode Island: The State is completing its Ocean Special Area Management Plan (SAMP) this year and selected Deepwater Wind Rhode Island LLC to build in areas designated by the SAMP;
- In Virginia: MMS has received two unsolicited applications for projects offshore Virginia.

As is apparent, several states have taken the initiative to promote offshore marine and renewable energy through financial incentives and state ocean management planning. FERC has seen an increasing interest in new hydrokinetic projects, i.e., the generation of electricity from waves, currents, tides, or inland waterways. According to a 2008 report from the Northwest Hydroelectric Association, FERC has issued preliminary permits for these types of projects in numerous States, including Alaska, California, Oregon, and Washington. For example, last year FERC issued a three-year, exclusive permit to GreenWave Energy Solutions LLC to study wave energy off Mendocino, CA. GreenWave plans to spend between $1M-$2M on the initial phase and between $20M-$40M on the actual installation of wave energy devices in the water and the generation of power.

FERC has also issued licenses for projects in Washington and Minnesota. In 2008, FERC developed a white paper to streamline its hydrokinetic pilot project licensing procedures. This new process enables FERC to complete pilot project licensing in six months.

The U.S. Government, under the Obama Administration, is making progress on the development of offshore marine renewable energy through a series of new regulations, cooperative relationships among various agencies, and financial incentives.

This despite the lack of comprehensive energy legislation or the identification of a single permitting agency. However, most of these projects financed or permitted to date are in the development stage and, to the author's knowledge, none so far have been connected to the power grid.

A Review of Canadian Programs

As the Invest in Canada website boasts, Canada is bordered by three oceans and is exceptionally rich in tidal current and wave energy resources. Canada became active in the ocean energy field when it constructed the 20 MW tidal energy plant at Annapolis Royal on the Bay of Fundy in Nova Scotia. The plant has been in operation since 1984 and "is the only one of its kind in North America." Canada has taken a lead in marine fabrication and operations; turbines to harness currents and tides; operation of tidal generation stations; remote sub-sea tools; offshore wave generators and wave energy-driven desalinization technology, among other equipment for offshore energy development. Canadian scientists have identified a total of 190 sites with potential power in excess of 42,000 MW, which is the equivalent of roughly 63% of Canada's current electricity demand. If even half of these sites could be developed and connected to the grid, Canada would be far ahead of the U.S. in developing renewable energy.

Canadian Financial Incentives

Canada promotes the development of renewable energy through the application of the following incentives:

- A 50% Accelerated Capital Cost Allowance for Clean Energy Generation;
- Underwriting R&D activities;

• The ecoEnergy for Renewable Power Initiative – a $1.48B investment to increase Canada's supply of clean electricity from renewable sources including wind, biomass, hydro, geothermal, solar and ocean energy; and
• The ecoEnergy Technology Initiative – a $230M investment in clean energy S&T to fund research and development and demonstration of next-generation energy technologies.

Canadian Progress to Date

In addition to the Technology Initiative, Canada has allocated some of its $1 billion Clean Energy Fund to the following: an offshore wave energy demonstration project off Vancouver Island, British Columbia ($2.5M-$5M); and a project to validate the performance of tidal current turbines in the Minas Passage of the Bay of Fundy ($10M-20M), expected to be the first Canadian deployment of commercial-scale tidal turbines. According to the May/June 2010 issue of North American Clean Energy, Canada is about to implement the first grid-connected tidal energy project in Canada. This project, developed by New Energy along with its partner Canoe Pass Tidal Energy Corporation, will be located in Canoe Pass, off the east coast of Vancouver Island, north of Campbell River, British Columbia. Current plans call for the connection to the grid to occur in the third quarter of 2010.

Canada is naturally blessed with an ocean environment conducive to the development of tidal and wave energy. It has more than 20 years experience with tidal energy production from the Bay of Fundy. This experience is extremely helpful to bringing other projects on line. Canada and its Provinces have made a strong commitment to developing these renewable energy sources and is putting its financial resources behind this commitment. Canada has also committed to a 17% greenhouse gas reduction from 2005 levels by 2020, and has set an objective for 90% of its electricity to be supplied by non-emitting sources by 2020.

Conclusions

Canada appears to be far ahead of the U.S. in terms of setting specific goals for the development of marine renewable energy, and in terms of operational connections of offshore projects to the grid. However, a recent report from The Pembina Institute, a non-profit think tank focused on alternative energy, concluded that Canada was falling even further behind the U.S. in sustainable energy investments per capita. For instance, the Institute found that the U.S. was spending $18 per capita versus $1 per capita by Canada on such renewable energy sources as solar, wind, biomass, geothermal, and the smart grid. The U.S. certainly has a significantly larger population than Canada and therefore a more complicated energy delivery system. The U.S. can make more progress when it makes a national commitment to renewable energy, as the EU has done, levels the playing field for these new forms of energy, including a steady supply of feed-in or other tax credits, and develops the technological basis for connecting these offshore energies to the electric grid. The Smart Grid is a first step in this direction as is new comprehensive energy legislation being advocated by the Obama Administration and under consideration in Congress.

Sherwin-Williams

Long history, promising future developing advanced marine and offshore coating solutions

From the time that Henry Sherwin delivered to the world the first one-component paint, ready for use when the customer opened the can, Sherwin-Williams, created in 1866, has long enjoyed its role of a coatings innovator. Though the company's history in the protective and marine coatings is decidedly less than its cumulative 144 years in business, it is this corporate history and its philosophy of investing in products and systems to deliver the highest quality coatings solution has provided the company a fast acceptance and solid reputation in demanding industry and protective coating applications.

"We are well known for our architectural coatings, but we are meaningful in the industrial and protective coating space," said Peter J. Ippolito, president and general manager, Sherwin-Williams Protective & Marine Coatings. Entering the marine, offshore and petrochemical sectors with the same innovation and vigor was the plan from the outset, and refined in 2008 when – at the start of what would prove to be a historic economic meltdown – the company made the strategic decision to launch its Global Finishes Group.

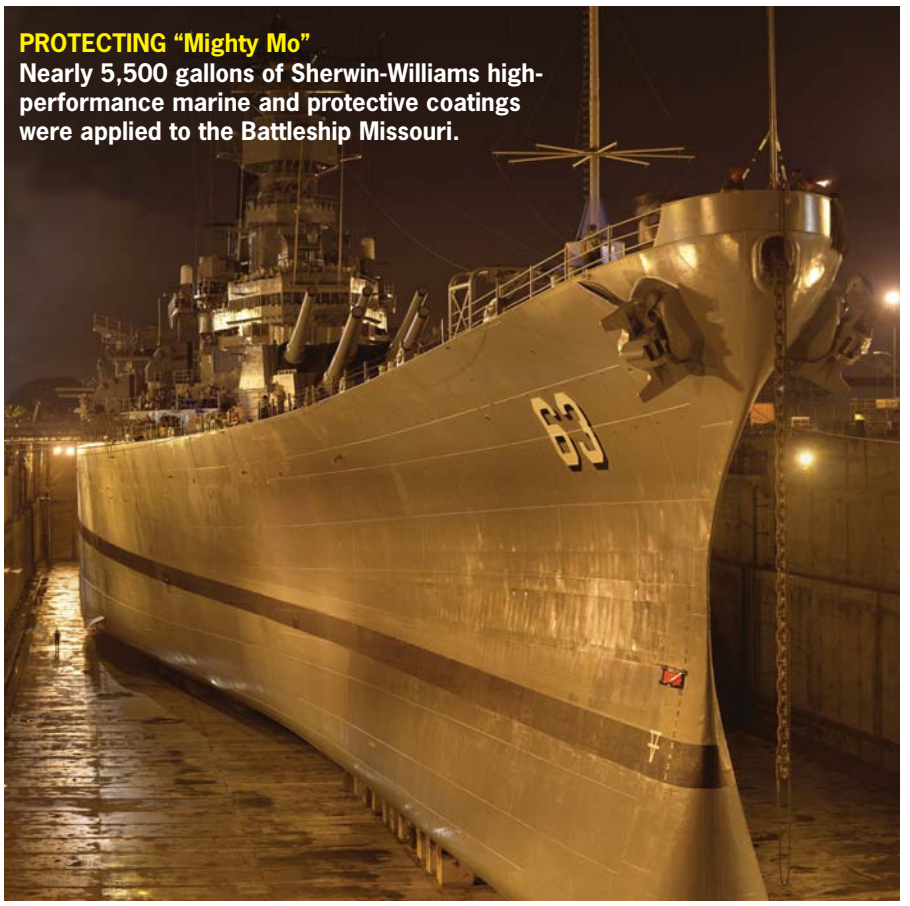
"During the toughest of economic times, we decided to invest rather than retreat, investing in additional points of distribution and acquisitions," said Ippolito. A key acquisition was that of Euronavy in December 2008, and the ability to sell the Euronavy ES301, an innovative solvent-free anticorrosive epoxy designed for application over marginally prepared surfaces. "We recognized then that rough times were on the horizon, but a downturn in the economy is good for a company that is honest with themselves," said Ippolito. "We conducted a top to bottom self evaluation, to ensure that we become more efficient and effective."

The Euronavy Way

"Many people see us as a 'U.S.' company, but we own technology that was developed outside of the U.S. and we are now brining that technology back to the U.S. as a benefit to shipbuilders and shipowners," said Bruce A. Toews, Global Director, Petrochem & Offshore. "We are always looking to bring to our industry's truly innovative products … that has always been our hallmark."

Euronavy ES301 is designed to be a durable surface-tolerant coating that can be applied with no dew point restrictions over damp steel surfaces and over flash-rust, helping to reduce application time and costs. Coating can occur immediately after hydroblasting or other water preparation methods without drying. In addition to a number of technical advantages, Solvent free Euronavy ES301 is environmentally compliant, with low VOCs (<150 g/l), and is HAPS free.

Today the company boasts that its Euronavy ES301 Epoxy protects more than 120 million square feet of steel in offshore and marine applications around the world.



PROTECTING "Mighty Mo"
Nearly 5,500 gallons of Sherwin-Williams high-performance marine and protective coatings were applied to the Battleship Missouri.

"Euronavy ES301 is one of the most innovative and versatile coating options available today in the offshore and marine markets," said Brad Rossetto, Vice President, Marketing, Sherwin-Williams Protective & Marine Coatings. "This premier technology can be applied on damp surfaces in humid conditions with minimal surface prep."

Notably, the coating was honored by the Steel Tank Institute as its Product of the Year for 2009 for application on the Gulf of Mexico's Thunder Horse Field Offshore drilling platform. Coating was required due to hurricane damage and the need to refurbish the top deck plate steel. Coating restrictions required painting at night, with application in a moist, humid environment that included salt spray and salt fog. Surface profiles were nearly smooth due to restrictions against abrasive blasting. Service life, even in the extreme conditions of the Gulf Coast, is expected to exceed 10 years.

"Euronavy fits our high technology profile," summarized Ippolito, "and we are going to look into making high technology product acquisitions where we think it fits."

Brazil

While the company may be painted in some corners as a 'U.S.' company, a quick run through Sherwin-William's marine and offshore project reference list shows a body of work around the world, with a strong concentration in one of the world's fastest emerging shipbuilding countries, Brazil. Sherwin-Williams has broad experience working with Brazil's Petrobras in the coating and refurbishment of a wide variety of marine structures, from tankers to FPSOs to rigs. In fact, the company earlier this year led a workshop regarding the global marine industry's response to compliance with IMO Performance Standard for Protective Coatings (PSPC) in Rio de Janeiro, Brazil.

During the event, the most recent IMO PSPC Type Approvals granted were revealed, including the first-ever approval of an alternative coating system comprised of a zinc-free organic shop primer – the ES301 system applied over PE31 pre-construction primer.

"Responding to IMO PSPC using traditional coating materials and typical methods of surface preparation will result in higher costs and lengthy building schedules," said Brad Rossetto, Vice President, Marketing, Sherwin-Williams Protective & Marine Coatings. "For an emergent ship builder nation such as Brazil, knowledge of innovations in the coatings industry is crucial to growing global market share."

In addition to Sherwin-Williams Brasil, organizations that provided speakers included: ABS; Estaleiro Atlântico Sul, the largest shipyard in the Southern Hemisphere, launching its first vessel May 3; Exova, the first laboratory to be PSPC certified; Petrobras, Brazil's largest oil company, which pioneered the concept of combining hydroblasting and solvent-free humidity- and surface-tolerant coatings such as Euronavy ES301 throughout its operations; and Transpetro, Latin America's largest ship owner.

U.S. Navy & Protecting 'Mighty Mo'

Early in 2010 Sherwin-Williams Protective & Marine Coatings won a $24m, five-year U.S. Navy contract to supply marine coatings per Just-In-Time (JIT) delivery to four U.S. Navy shipyards. The company was one of two low bidders in the first national comprehensive JIT coatings contract awarded by the Fleet and Industrial Supply Center (FISC), based in Norfolk, Virginia. The overall value of the contract, awarded over five years, is approximately $34.5 million. "We have a long tradition of supplying innovative coatings to the Navy," said Rossetto. "For example, Sherwin-Williams is currently providing coatings for active vessels such as the supercarrier U.S.S. Theodore Roosevelt, as well as historic warships such as the U.S.S. Missouri, the battleship on which Japan unconditionally surrendered to the United States, ending World War II."

On June 4, the Battleship Missouri Memorial welcomed its four-millionth visitor since its grand opening in 1999. The historic ship was moved from its pier-side home in Pearl Harbor, Hawaii, on Octo-

ber 14, 2009 to Pearl Harbor Naval Shipyard's Dry Dock 4, where it underwent a 12-week, $18m repair and renovation project. The ship returned to its permanent home pier near the U.S.S. Arizona and reopened to visitors on January 30. Visitors continue to flock to the Missouri at a rate of approximately 1,400 per day, taking advantage of the rich historical experience that this and other Pearl Harbor historic sites have to offer.

"Nearly 5,500 gallons of Sherwin-Williams high-performance marine and protective coatings were applied to the Battleship Missouri to preserve more than eight acres of surface area," said Ron Chavez, Chief Engineer, Battleship Missouri Memorial. "We required a quality product for the underwater hull in particular, since following dry docking the steel would be submerged for decades to come. We identified Sherwin-Williams' Dura-Plate UHS Epoxy and SeaGuard Vinyl Antifoulant as providing the best combination of quality and price, fitting the bill for the job. Thanks to the support of those such as Sherwin-Williams, the Battleship Missouri will stand the test of time as a floating memorial and historic attraction in Pearl Harbor."

Sherwin-Williams also provided technical expertise and worked closely with the shipyard and BAE Systems Hawaii Shipyards, the project's lead contractor. The Missouri's return from dry docking comes just in time to commemorate the 65th anniversary of the end of World War II this summer. On Sept. 2, the Battleship Missouri Memorial will commemorate the anniversary of Imperial Japan's surrender to the Allied Powers.

Euronavy ES301

Examples of some high-profile Euronavy ES301 applications include:

- Ballast tanks, bilges and other areas on U.S. Navy vessels; the only system approved for U.S. Navy ballast tanks when hydroblasting is used as surface preparation
- Refurbishment of oil rig PSS Chemul (Mobile, Ala.), plus general offshore platform and ship maintenance for PEMEX (Mexico)
- Platform, ship and equipment maintenance for Petrobras in the U.S.A., Europe, Singapore and Brazil
- Ballast and cargo tank repairs on the Transpetro (Brazil) fleet
- Hull conversion on Aker Floating Production Storage and Offloading (FPSO)
- Refurbishment of Transocean's Discoverer 534 and Seven Seas Drill ships and tank repair of Nordic jack up (Malaysia)
- Platform maintenance of the Alaska Star and Olinda Star oil rigs
- Critical areas of Type 209PN submarines for the Portugese Navy.

Canada Maritime Prospects

NSPS strategy encompasses 3 streams of activity: large ship construction, small vessel construction and repair, refit and maintenance.

Artists Impression MSPV. (Photo credit Irving)

(Photo credit Irving)

By Peter Cairns (Vice-Admiral, retired)

One year ago a government sponsored Shipbuilding Summit was held in Gatineau Quebec, across the river from the nations capital. The purpose of this gathering (about 300 people attended) was to "get input from key shipbuilding stakeholders into the development of comprehensive and viable options that could establish a long-term, sustainable shipbuilding strategy".

At that summit the Shipbuilding Association of Canada (SAC) outlined a plan to build a sustainable shipbuilding Industry in Canada. The plan was predicated on one basic assumption. A viable shipbuilding industry is strategic to the Maritime Defense of Canada.

The SAC plan was essentially a recommendation to allocate Navy and Coast Guard shipbuilding projects to those yards best qualified to do the work. The plan also had the goal of reducing the peaks and valleys here to fore inherent in the intermittent nature of government procurement. To do this would require a logical long-term build strategy. All things considered, if adopted, a major change in government ship procurement would result.

Fast-forward One Year

On June 3, the Government announced the National Shipbuilding Procurement Strategy (NSPS). The announcement was not accompanied by a 21-gun salute and fireworks but more by an audible sigh of relief. For many, it is the firm government commitment that they have needed and waited for these many years.

What is the NSPS? As announced the strategy encompasses three streams of shipbuilding activity – large ship construction, small vessel construction and repair, refit and maintenance projects.

Under the strategy the government intends to establish a long-term strategic relationship with two shipyards to build large ships. One yard will build combatants and the other will build non-combatants. To become one of these two shipyards the bidders will be required to meet the government's qualification standards by their responses to a government issued Request for Proposal.

The two selected shipyards will enter into a long-term relationship with the government to build its large ships.

What constitutes a large ship vice a small ship has yet to be clearly defined. The cut-off point is generally believed to be 1000 tons displacement. Similarly the exact listing of those ships that are considered combatants vice non-combatants needs to be clarified. It is thought that the Joint Support Ship (JSS) will be considered a non-combatant while the Arctic Offshore Patrol Ship (AOPS) will be a combatant. The building of small ships will be by competitive procurement amongst other Canadian shipyards. The two shipyards selected for the construction of large ships and their affiliated companies will be precluded from building any of the smaller vessels.

Repair, refit and maintenance contracts will be done in the normal fashion by publicly announced requests for proposal. In the announcement the government projected that it will take two years to implement the strategy. Everyone who is interested in the project considers this too long. Shipbuilders want to begin yesterday. Somehow industry and the government must shorten the process. "You have waited this long, another two years will not matter" is not what anyone wishes to hear. Of course the devil is in the detail and there is a lot of detail yet to be promulgated. The announcement deals expressly with shipyards but what about systems integrators, suppliers and the like. When a shipyard attempts to qualify to be one of the "selected two" does he come to the table by himself or with a team? This is just one of the many questions that will need clarification in the near future. The projected expenditures in government shipbuilding over the next 20 to 30 years are in the $Can 30 to 50 billion range. A lot of money is at stake and this work will be fiercely sought after.

Allied Olympics

(Photo credit Allied Shipbuilders)

Current Shipbuilding Programs

In September 2009 Irving Shipbuilding was awarded a $Can 194 million contract for nine mid-shore Patrol Vessels for the Coast Guard. The first vessel is scheduled for delivery in 2011 and all nine will be delivered by 2013. These ships are about 43 meters in length and will have a maximum speed of 25 knots.

The replacement for the Navy's Operational Support Ships (AOR) is now called the Joint Support Ship (JSS). The original plan was to build three of these vessels but too much requirement chasing too little money has put these ships on hold. It is understood that the requirement is being reworked but regardless it is unlikely that the Navy will be able to afford more than two. Depending on whom you speak to the reworked requirement is being called either a JSS minus or an AOR plus.

The Navy's Arctic Offshore Patrol Ship (AOPS) is suffering similar budgetary pressures. The requirement for six to eight vessels has now become six and the top speed has been reduced.

Both the JSS and the AOPS will be part of the new shipbuilding strategy and as such will be delayed until the strategy is implemented.

Meanwhile the Frigate life extension and mid-life refits are beginning. These are large projects in both workload and monetary terms. The contract for seven ships has been awarded to Halifax Shipyards in Nova Scotia and the other five to Victoria Shipyards in British Columbia.

Lockheed Martin Canada has been awarded the combat systems integration contract.

(Continued on page 40)

From crew recruiting and retention to optimizing operational efficiency, vessel operators increasingly count on

SatCom Solutions

Modern communication systems between vessel and shore are being utilized today for everything from dealing with at-sea mechanical and medical emergencies to providing an invaluable social link between crew and their family and friends, a key tool in mariner recruitment and retention. Operating at sea is fraught with challenges, and this holds true for the satcom sector, but today technology and competition has pushed the comms link for ships and boats at sea ever closer to the shore based standard. This month Maritime Reporter visited with a number of leading product and service providers for a look inside emerging technologies and services. Participants included: ***Christian Bergan****, Director of Maritime Vertical, iDirect;* ***James Collett****, Senior Director, Maritime Business, Inmarsat;* ***Jim Dodez,*** *Vice President, Marketing & Strategic Planning, KVH Industries;* ***Patrick Fisher****, Director Satellite Services ,Mackay Communications, Inc.;* ***Michiel Meijer****, Maritime Marketing Manager, Stratos Global; and* ***Dan Mercer****, Vice President & GM, Europe, Middle East, Africa & Russia, Iridium.*

Put in perspective the way in which maritime uses SatCom services today versus just 10 years ago.

Fisher, Mackay 10 years ago Satellite Communication was basically an analog system consisting mostly of voice and fax transmissions. Data was just beginning to be desired within the maritime industry and fleet software applications were hardly thought of at all. Today we are working in a digital world, requiring more software applications and larger and faster transmission speeds. The transition to digital has put more emphasis on vessel communication efficiency and budgets. The variety of satellite products offerings to the industry has grown to the point that a radio operator position is now being replaced by entire IT departments.

Meijer, Stratos The rate of usage of satellite communication services, in sheer number of voice minutes, emails and data transmitted has grown at a tremendous rate. The main drivers for the increased traffic in past 10 years are: the adoption of crew calling; email for business and private use; and the adoption ship-management applications to support planned maintenance, purchase, safety and other onboard business processes. Despite the enormous growth in traffic, communications costs have not increased significantly. This is due to improvements in efficiency and quality of satcom services. We have witnessed ship managers migrate in droves to L-Band broadband satcom services, such as FBB and Iridium Open Port, in their quest to reduce communications costs.

Dodez, KVH The biggest changes over the past five years has been the introduction of a new generation of smaller, more powerful technology. As a result, mariners can now enjoy the benefits of significantly lower equipment and per-megabyte service costs.

Where do you see opportunities for growth in your sector?

Mercer, Iridium There are many areas for potential growth, particularly in tracking devices: the tracking of workers, assets, ships and equipment; which utilize Short Burst Data (SBD). Also, we see many opportunities with our Iridium OpenPort, as there still is room for growth in voice and data. Iridium OpenPort has three voice lines, and no other single system can do that. This helps to provide a better quality of life for the mariners. When you look at the whole, (satellite communications) maritime business is about $400 to $500m per year.

Dodez, KVH Broadband communications in the maritime market have been either prohibitively expensive or, in the case of maritime VSAT, have required equipment so large that it was only practical on the largest vessels. With our mini-VSAT Broadband service, KVH has brought the size and cost of maritime VSAT down and made it suitable for much smaller vessels. We've also made it easy to use mini-VSAT Broadband as a complement to existing services, particularly on commercial vessels, with additional capacity for emerging applications like internet access, onboard cell service, and crew calling plans for improved crew morale.

In your opinion, what has been the biggest driver for improved satellite communication services between ship and shore?

Collett, Inmarsat The market is far more competitive than it was only 15 years ago, but this competition has been positive in helping to bring new services to the market.

Meijer, Stratos Recruitment and retention of well-trained seafarers, which traditionally has been among the chief concerns of ship managers, has temporarily decreased in importance due to the economic slowdown. But, I expect it will reemerge as the most critical priority soon. There has been a dramatic increase in the importance that ship managers assign to the quality of communications systems they offer to crewmembers. One of the most effective ways to improve shipboard life for seafarers is to provide dedicated voice, email and GSM communications systems that are powerful, economical, easy to use, and available away from the bridge. An increasing number of ship managers are providing crewmembers with free email services and prepaid voice services. While there are still charges for voice calling, some ship managers are offering crewmembers a monthly stipend toward their voice calling expenses. To meet this rapidly evolving requirement, Stratos recently introduced AmosConnect Crew CommCenter, the latest version of its popular AmosConnect Crew satellite communications solution.

Fisher, Mackay Simply put, faster throughput has allowed more software applications to be available to the Fleet. Tasks that were once done on shore are now being handled by the vessels themselves.

What trends do you see today that you believe will fundamentally change the market in the coming decade?

Meijer, Stratos Ship managers and owners are asking their communication

Case Study
MPC Steamship • Thomas Höenig, IT Manager

In late 2009, Hamburg, Germany-based MPC Steamship successfully deployed the FleetBroadband from Stratos onboard the Yangtze River bulk-carrier vessel, which operates worldwide. MPC is a fast-growing commercial shipping company managing 17 container vessels and bulk carriers. With plans to double its fleet by 2011, MPC is evaluating and deploying the industry's latest communications solutions to ensure peak vessel performance and crew satisfaction. In the coming years, MPC expects to deploy FleetBroadband from Stratos on the remainder of its existing fleet and the new service will be automatically installed on all new ships. MPC successfully integrated FleetBroadband from Stratos with AmosConnect from Stratos to manage all email, fax, SMS and interoffice communications. The FleetBroadband service also powers numerous other applications onboard the Yangtze River, including remote management, which allows headquarters office personnel to help manage the ship's computers. It also includes database synchronization and access to the onboard voyage data recorder. In the future, MPC also has the option to use FleetBroadband for engine-performance analysis and emissions monitoring. MPC Ships IT Manager Thomas Höenig said, "Once deployment was completed, it became very clear that FleetBroadband is the future of maritime communications. It truly brings the vessel and the office closer together. FleetBroadband from Stratos also enables the vessel to establish one static IP address, meaning the vessel is reachable anywhere in the world where there is an Internet connection."

providers to become more integral to their day-to-day operations. Therefore, we at Stratos have become acutely aware of the shore-based applications they are running. We constantly ask questions such as: How can we integrate those new applications onto the vessel?; What other value-added services can we provide to the ship manager, in terms of electronic chart updates and weather information to reduce their operating costs? So I think there is more of a partnership being formed between the larger operators and satcom suppliers such as Stratos.

Bergan, iDirect While crew welfare remains the single largest VSAT service driver, maritime companies increasingly acknowledge that broadband connectivity is a necessity to achieving substantial gains in business productivity. High-value commercial maritime segments like oil & gas, offshore supply and cruise lines have effectively been the proving grounds for using VSAT service this way, and have paved the way for wider adoption by the nearly 100,000 vessels in today's mainstream commercial shipping segment.

What are the leading technical challenges to making SatCom services faster and more reliable?

Mercer, Iridium The primary challenge has nothing to do with the (satcom) technology itself, rather the adoption of new technology in general in this (maritime) market. You have very few progressive IT managers, and many of the older companies conduct "business as usual." Security and robustness is the most important prospect in serving the maritime community.

Meijer, Stratos At the heart of the matter is the ability to provide a highly reliable satellite. The FBB service is accessed globally on the Inmarsat-4 (I-4) satellites, which are among the world's largest and most advanced communications satellites. The I-4s were designed with IP communications in mind, and are optimized to deliver high-quality and reliable data communications. Inmarsat satellites operate in the L-Band radio frequency, which is unaffected by harsh weather conditions. In addition to satellite reliability, it is critical to be able to get the most value from the broadband connection by adopting services for traffic control, IP optimization and IT security.

What challenges (outside technical) do you face to increase your penetration in this market?

Meijer, Stratos The merging of shipping companies is resulting in large organizational structures that require increasingly sophisticated management systems. The only way to meet these challenges is with a unified and standardized technological solution that seamlessly and cost-effectively integrates all maritime operations on land and at sea. These solutions include voyage management, remote management and IT management, which help reduce fuel and operations costs and improve crew and customer satisfaction.

Bergan, iDirect One of the main obstacles preventing broader adoption of VSAT in the mainstream commercial maritime market is cost education. Before maritime companies upgrade to VSAT, they must understand the ROI by examining the payback period and opportunity cost compared to their current communications infrastructure. For example, VSAT hardware tends to be costlier than L-band hardware, and installation may take longer. This can create a perception that VSAT coverage is more expensive than L-band coverage. Yet today, equipment costs have fallen significantly. Antenna sizes are smaller and less expensive, and installation

INMARSAT

James Collett

Last year we had a 7% revenue growth in maritime. The rate of adoption of FleetBroadband was very high last year, as the service went 100% global. We are now starting to see fleetwide adoption of the service.

IRIDIUM

Dan Mercer

There are many areas for potential growth, particularly in tracking devices: the tracking of workers, assets, ships and equipment; which utilize Short Burst Data (SBD).

MACKAY

Patrick Fisher

The transition to digital has put more emphasis on vessel communication efficiency and budgets.

STRATOS

Michiel Meijer

An increasing number of ship managers are providing crewmembers with free email services and prepaid voice services.

KVH

Jim Dodez

This year we're also introducing new ways for people onboard our mini-VSAT Broadband equipped vessels to access the system through crew calling and internet café cards, and even using their own cell phones.

times are much quicker. On the other hand, VSAT service fees are often dramatically less expensive than the fees most vessels now accrue on L-band systems. So when VSAT hardware costs are amortized and combined with monthly service fees, the result can be much lower costs than L-band systems.

Collett, Inmarsat The adoption of technology. An added dimension has been the financial and industry crisis of the last couple of years. A large part of the industry still does not have the budget for "always on" internet. In this marketplace, you have to closely tailor your products to the user's needs. For example, over the years, voice was the communication mode of choice for crew "calling," but today, with the new generation, the demand is for internet and email access.

How is your company investing today to better serve the maritime market?

Dodez, KVH KVH is investing to complete the rollout of the most powerful, seamless global maritime VSAT communications network available. Together, KVH and ViaSat are currently providing two-way mobile broadcast services from eight secure teleports around the globe utilizing eight full transponders on seven of the world's most powerful communications satellites. Each of our satellite hubs hosts over $1 million worth of ViaSat ArcLight technology to deliver spread spectrum services to our mini-VSAT Broadband subscribers, creating a seamless global network that covers virtually all of the world's shipping lanes.

Collett, Inmarsat FB150 was launched last June (2009), and now, just a year later, we are close to 1,500 users. This presents a significant opportunity for smaller vessels to have a less expensive broadband option. The FB150 was also notable as it went from concept to launch in less than one year, the fastest that we have ever launched a product.

Mercer, Iridium First and foremost, we are "re-seeding" the satellite constellation. We have always had the issue that we have a finite life on our constellation. Today we have 66 satellites (and seven spares) providing global, canopy coverage. The total cost of Iridium NEXT, including all costs associated with development, manufacture and launch of the constellation, is anticipated to be approximately $2.9b.

Fisher, Mackay Vessel management tools to control communication costs, and trouble shoot onboard satellite equipment problems. The vessels can no longer afford to wait to get into port to fix a communication problem. The tools we provide a vessel to manage cost and on board problems make our customers more efficient users of all the new technology. We are investing in trained IT and customer support personnel to help teach customers to be more self reliant with their equipment and applications.

Bergan, iDirect iDirect has engineered several features that integrate with its VSAT platform to address mobility challenges for the maritime industry such as bandwidth segmentation, traversing satellite beams, smaller antenna sizes and more effective network management. To help make VSAT faster and more reliable to the broader commercial market, iDirect also has invested R&D into improving spread spectrum technology to enable VSAT to run over smaller antennas, such as those on mega yachts. We've incorporated Adaptive Coding and Modulation (ACM) into our technology platform, which preserves signal quality from rain fade and other weather-related issues.

MTN Scores a Goal

Everyone in the maritime communication industry talks about creature comforts for the crew, and Miramar, FL-based MTN Satellite Communications – a VSAT provider for more than 20 years has come through, inking the deal to exclusively broadcast FIFA World Cup soccer games on ships. Many European-based cruise companies were apparently concerned that ridership could retreat during the tournament, with fans opting to stay on land to catch the matches live. Enter MTN, which nabbed the deal to broadcast all of the FIFA games live as they are happening.

"K" Line Selects Globe Wireless

Globe Wireless was selected by "K" Line – one of the largest ships owner/operators in the world – to provide a turnkey implementation of the Inmarsat FleetBroadband service. "Our recent appointment as an Inmarsat FleetBroadband Distribution Partner with Inmarsat, combined with the Globe Total IP Solution and our ability to Touch-the-Ship directly anywhere in the world make Globe Wireless the logical choice for a project of this scale," said Frank J. Coles, President & CEO of Globe Wireless.

Schlumberger Launches Mini-VSAT

Schlumberger launched of its SeaConnect VSAT service for the offshore industry. The company is touting the new service as a world first, providing VSAT services using an innovative portable marine 60-cm C-band antenna and related technologies. **www.slb.com/seaconnect**

Baron QuikLink Available

Baron Services offers Baron QuikLink, a subscription-based global weather data service. Supplying graphical weather information in small, targeted downloads over a data connection, QuikLink features the World Marine data package, which provides a 23-region coverage area and pricing tiers starting at $49.99 per month. **www.baronservices.com**

Marlink Launches @SeaDirect VSAT

Marlink launched @SEAdirect, a new, entry-level-band VSAT service. Designed to be low-cost, the service provides multiple data rates of up to 1024/256 kbps, offering Internet, e-mail, and voice capability for increased operational efficiency and crew communication at sea. Marlink's introduction of the new @SEAdirect service confirms the company's commitment to offering the most comprehensive product portfolio on the market, with a solution to meet any customer requirement.

Vizada VoIP Interconnection

Vizada is offering shipping companies the opportunity to reduce the cost of shore-ship communications to Inmarsat FleetBroadband terminals by activating a voice over IP (VoIP) connection on its network.

Harris to Acquire CapRock

Harris Corporation announced a plan to acquire privately-held CapRock Communications for $525 million in cash, subject to post-closing adjustments. "Acquiring CapRock expands our international presence and customer base, while increasing the breadth of our assured communications offerings. We see increasing demand for outsourced managed communications services that include secure high-availability networks, creating growth opportunities across a variety of markets," said Howard L. Lance, chairman, president and CEO of Harris. "The acquisition provides an entry into the energy market, while expanding our present offering for the government and maritime markets to include managed satellite communications solutions."

Thuraya XT Satellite Handheld

Thuraya's "Thuraya XT" provides the highest data speed of any satellite phone on the market, according to the manufacturer. "When we designed the XT we ensured users could make calls and have access to quick data services simultaneously. We provide circuit switched (9.6 kbps) as well as packet switched data services (up to 60 kbps), which is currently the fastest in the market," said Thuraya's Product Management Manager, Rashid Baba. www.thuraya.com

Ship Equip Reaches Milestone

Ship Equip reached a milestone, announcing the 1000th order for its SEVSAT system. The SEVSAT solution (which stands for Ship Equip VSAT) is designed to provide reliable and cost-effective satellite communications for a wide variety of vessels at sea. Core markets for Ship Equip include shipping, commercial fisheries, offshore oil/gas and megayachts. Ship Equip's 1000th SEVSAT order came as part of a recently signed large fleet contract for 67 vessels.

Speedcast, Eutelsat, iDirect Partner

VT iDirect said that Hong Kong-based SpeedCast Limited and Eutelsat Communications have expanded the reach and capabilities of its global maritime broadband service to address a broader market of end customers. The service now extends across more than 20 Ku-band beams covering nearly all major shipping lanes and offshore markets. SpeedCast and Eutelsat have also introduced a regional service using a 60 cm Ku-band marine antenna for smaller coastal and regional vessels.

Intellian Opens Innovation Center

Intellian opened a facility in South Korea for R&D, manufacturing, shipping and training. The **Intellian Innovation Center** is a new 71,000 sq. ft., four-story building. It can accommodate manufacturing quantities of up to 1,000 antenna units per month and more efficient production of 1-m and larger antennas including the Intellian w-Series, VSAT models and 2.4-m c-band antennas. It will house the company's quality control, engineering, product development, RF design, mechanical design engineering, production, purchasing and administration teams. The facility includes a field testing lab equipped with window access to the sky for antenna development and testing inside the building; four labs with new vibration machines that conduct shock and aging tests, along with equipment that tests technology against temperature, humidity, salt, mist, etc.

Email: sales@intelliantech.com

The World's First Commercial Tidal Turbine

Marine Current Turbines

Artist's impression of SeaGen array.

By Peter L Fraenkel, BScEng, CEng, FIMechE, FEI, Technical Director, Marine Current Turbines Ltd

MCT (Marine Current Turbines Ltd) has recently started round the clock power generation from an entirely new and clean energy source, tidal currents. This resource does not depend on weather but on the movements of the moon around our planet, so it is totally predictable. We have achieved this using a turbine called SeaGen, the world's largest and first commercial scale marine renewable energy system. It has twin rotors each 53ft in diameter, which together have a rated power of 1.2MW for all currents exceeding 2.4m/s (or about 5 knots).

The significance of this milestone in marine renewable energy development is that we have arrived for the first time at the stage where we can show that the sea can be tamed and made to yield its kinetic energy, thereby opening up a potentially huge and important source of future energy. Until this happened getting usable kinetic energy out of the sea remained mostly in the realm of science fiction.

SeaGen was installed in May 2008 in Strangford Narrows, Northern Ireland, where extremely energetic tidal flows occur. This location has been deemed by the authorities to be environmentally important and sensitive so considerable caution was applied in licensing the use of a tidal turbine. In particular there was concern to ensure no harm came to seals, porpoises and other wildlife. So the operations were constrained initially by a need for marine mammal observers who could shut the machine down if they judged a seal to be at risk. After some two years of strictly supervised operation it has become clear that any adverse environmental impact from SeaGen seems to be negligible, so early in 2010 permission was granted to run the turbine night and day and unattended, with its own control systems automatically keeping it safe. Today SeaGen is unique in being accredited by the UK electrical supply regulator, OFGEM as an official power station feeding the National Grid – the world's first to be driven by tidal currents. SeaGen is capable of delivering over 5MWh per tide , implying a potential capability of over 6GWh per annum from the single system. This gives a capacity factor of 66% which is approximately double what would be expected from a wind turbine. Hence SeaGen is punching well above its weight, with an energy delivery capacity about the same as from a 2.5MW wind turbine.

However, as with most such pioneering developments, SeaGen could not have been successfully developed straight "off the drawing board"; there was a significant R&D program going back nearly 20 years. In 1992 the author and colleagues started work on a proof of concept tidal turbine. This was the world's first tidal turbine. This was tested on Loch Linnhe, a Scottish sea-loch, during 1994-5. It successfully proved the concept but it also showed that mooring and anchoring even quite small floating devices in a tide race is technically challenging.

Having evolved what looked like a potentially workable technology, the partners involved in the Loch Linnhe project agreed to seek finance for a more ambitious project to develop a 300kW commercial scale system mounted on a monopile. Work began on this project, which became known as Seaflow in 1998.

The 300kW Seaflow system was installed 2 miles off Lynmouth in SW England in May 2003. It was, and remains the only full size marine renewable device (tidal or wave) to have been successfully installed and to have survived and functioned in exposed genuinely offshore conditions for an extended period. It was finally decommissioned and removed in November 2009.

SEAGEN; A 1.2MW Commercial Demonstrator

SeaGen represents the commercial technology developed from these previous efforts. It differs primarily from Seaflow in having two rotors instead of one. The first has twin 600kW power trains and is a "first of kind" for the commercial technology to follow. The reason for having twin rotors is that they capture twice the energy of one rotor, but at less than twice the cost.

It is the area of rotor normal to the flow that dictates the energy capture capability. Unlike with wind turbines where it is possible to increase energy capture simply by increasing the size of a single rotor, the limited depths of water limit the rotor diameter to about 60 or 70% of the water depth and this makes it necessary to grow the system sideways if more swept area is required.

Another reason for using twin rotors is that the power trains (rotor, gearbox and generator) are each mounted outboard of the pile on a wing-like cross arm in such a way that the rotors do not get disturbed by the pile wake when operating on the tide downstream of the pile. Because the cross arm has a specially developed streamlined profile it has a much less disruptive wake than the pile.

SeaGen's rotor blades are pitch controlled, that is they can have the angle of attack to the flow adjusted by a computer controlled servo-driven system, just like a modern wind turbine. This not only allows the structural loads to be limited,

and provides a means to safely stop and park the rotors in full flow, but it also allows efficient bi-directional operation without needing to yaw the rotors. This is achieved by reversing the blade pitch (through 180 degrees pitch angle) which reverses the rotor (essentially like reverse thrust on a propeller-driven aircraft). This is one of MCT's patented features.

The cross arm carrying the pair of rotors can also be raised above the surface of the sea using a patented hydraulic jacking system similar to that also used earlier for Seaflow so that maintenance is relatively quick, safe and easy.

The SeaGen demonstrator's twin rotors are each 53ft in diameter and MCT already has a design option to use 59ft diameter rotors and it is expected that this design could be stretched to permit up to about 80ft rotors to be used. Beyond that size diminishing returns set in as the loads increase disproportionately to the extra energy captured.

Two blades per rotor have been used, rather than the wind-industry standard of three, mainly because by parking the rotors horizontally they need not be lifted so high when raised above the surface. Also, even making allowance for a marginal reduction of efficiency for two blades compared with three, a twin bladed rotor is more cost-effective than a three-bladed one as it is cheaper to build.

SeaGen has a more sophisticated rotor design than Seaflow. The efficiency has been found to be around 48% which is 80% of what is theoretically possible from a perfect rotor. A major difference between tidal stream turbine rotors and wind turbine rotors are the load cases. Much higher forces are generated in water, so a lot of carbon-fibre has had to be used in this construction.

SeaGen carries a superstructure housing moulded from fiberglass composite material which stands on a work-platform fitted to the top of the pile, and which provides the entry point for personnel and also encloses the pile from the weather. The interior of the pile and this housing provide space for the power electronics, transformer and the hydraulic lifting mechanism needed to raise the cross-arm and turbine rotors above the water. The interior is climate controlled with de-humidification and cooling through a heat-exchanger in the pile below water level. At full power about 80kW of waste heat needs to be dissipated from the electrical ancillary components. An important point is that the power conditioning equipment on board enables SeaGen to deliver fully grid compliant electricity; it connects straight into the grid.

Installation was originally planned to be similar to that for Seaflow, to use a jackup barge to drill a socket in the seabed and then to grout a monopile foundation into the socket. In the event, by the summer of 2007 when we were getting ready to install SeaGen it proved impossible to hire a jack-up barge as all suitable vessels were contracted following a boom in both the offshore oil and gas industry and the offshore wind industry. Therefore it was decided to scrap the monopile solution and build a four-footed jacket type foundation for SeaGen.

The plan was to install the assembled structure from a floating moored crane barge and to ballast it sufficiently to stand safely with sufficient seabed friction to keep it stable even in a strong current (without of course running the rotors). A temporary platform on top of the pile enabled four pin piles to be drilled into place through the four footings. Hydraulic jacks were provided to level the

structure and the footings were then grouted to the pinpiles. At this point the temporary drilling platform was removed using a smaller crane barge and the superstructure housing was fitted. These extensive modifications were carried through very rapidly with SeaGen being ready for installation by end of March 2008. Nevertheless the installation methodology was unproven and a radical change, so hardly surprisingly there were numerous difficulties that caused delays in the installation. Carrying out any kind of installation works in a raging tide race is not something anyone has ever tried before and is a far from easy process and MCT has virtually unique experience in this field. The installation was successfully completed by mid-May 2008 and the system was fully commissioned by July of that year.

Operational Experience

As mentioned earlier a remarkably high capacity factor is obtained under the conditions prevailing at Strangford. Generally the system has performed reliably but as is only to be expected there have been a number of teething troubles. The most spectacular was a smashed rotor only days after the system was first commissioned. This was caused by a control system error prompted by a combination of very unusual circumstances that had not been foreseen; this problem cannot now recur. Other problems have mostly been caused by the need to tune the control system so that it is sensitive enough but not over-sensitive, which is normal for any system of this kind. There have also been a few problems with failure of small electrical components such as connectors and sensors. These are gradually being dealt with and reliability is consequently improving.

Future Plans

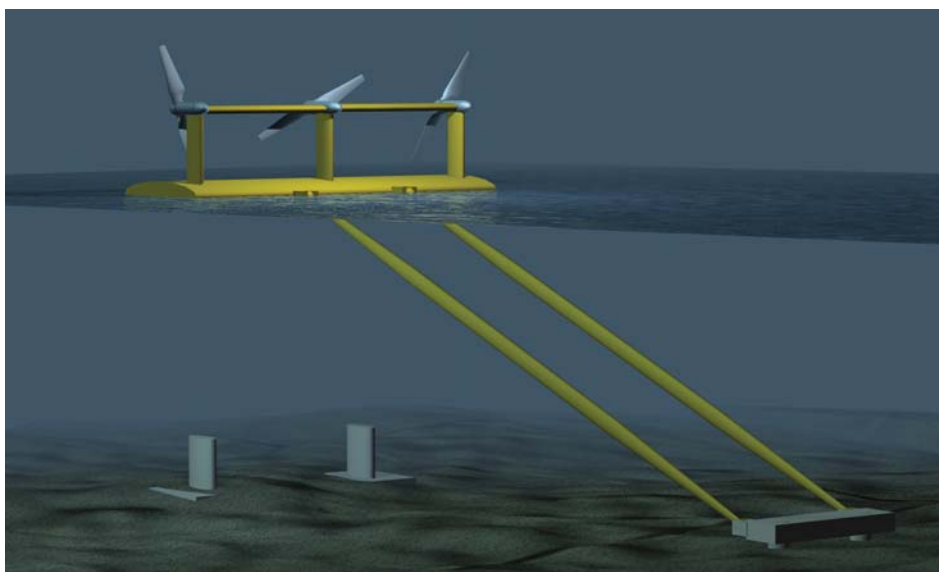
MCT has developed a project pipeline, a series of projects using SeaGen technology. To this end the company secured a 100MW concession from the UK regulatory authority, the Crown Estate, and is working on several other projects which will involve about 500MW of installed capacity initially. Expectations are that early and small projects will cost about US $10million per MW because as with all new technologies costs start high. However this starting point at about twice the cost of offshore wind is not bad if sites yielding about twice the energy per MW of offshore wind can be found, such as the Strangford site. The expectation is that costs will fall from economies of scale and learning curve effects quite fast to less than US$ 5million/MW at which point this technology becomes seriously competitive.

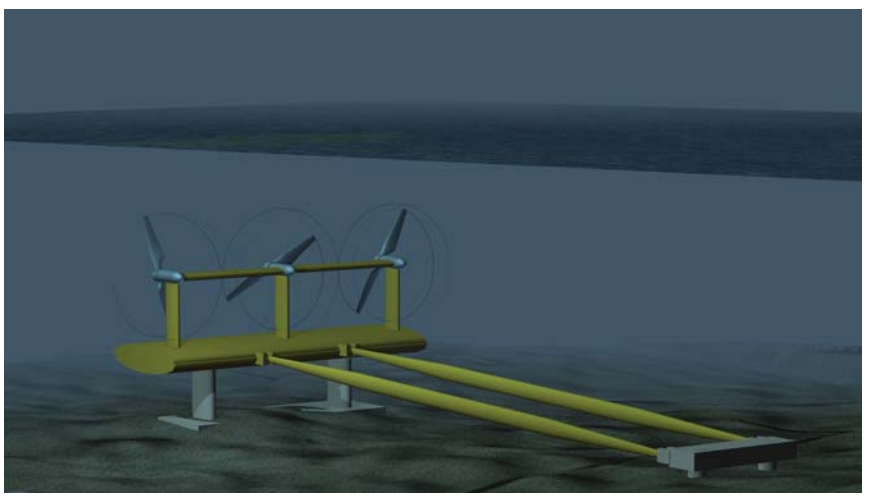
SeaGen lowered in a fast current.

SeaGen, already described and ready for testing and demonstration is what MCT terms "First Generation Technology". It is expected to yield a tried and tested power train and rotor which might then be deployed in different ways to overcome some constraints, notably that SeaGen is limited in its present form to water depths in the range 20 to 50m. Technology will be needed both for shallower water, such as in rivers and estuaries and also for much deeper water at sea.

The developed package of rotors and power trains can be scaled down quite easily to 8m diameter or less, but then a twin rotor device becomes marginally economic as it is so low powered. Conversely, the rotors can also be scaled up to around 24m in diameter, but beyond that diminishing returns set in due to gearbox and rotor costs getting disproportionately expensive. So MCT believes that the way forward is to deploy horizontal arrays of smaller or bigger rotors - for example six 8m rotors would sit in 12m of water and produce 660kW while at the other extreme, six 24m rotors in 40 to 50m depth of water would deliver over 8MW. In both cases it is to be expected that a six rotor system will be more cost effective than the equivalent three twin-rotor systems.

The main engineering issue is to develop a suitable structure to deploy a row of turbines. MCT has developed a concept and is starting work on detailed design. This has been patented and has the advantage of being fully submerged when operational, so it will generally be out of sight and also relatively immune from ice (an issue in countries like Canada with strong currents but harsh winters where there are plans to trial it). It can also be raised to the surface for maintenance when necessary. MCT has labelled this as "Second Generation Technology" and it is expected it will follow about two to three years behind SeaGen.





Future technology mounting, in the operational position (above) and raised for maintenance (left).

Offshore Wind Project Report

Sheringham Shoal Goes Offshore

On June 24, the first foundation was installed at sea for the Sheringham Shoal offshore wind project. Construction work on land is already well underway, and the 88-turbine wind farm is scheduled to start operation in 2011. The first of 90 monopile foundations was installed off the Norfolk coast by the heavy lift vessel "Svanen". Over the next nine months, the vessel will install the remaining 89 foundations ready for the mounting of two substations and 88 wind turbines.

"On land, we're already well ahead, the substation is nearing its final form, and the onshore cable is nearly finished. Now that offshore installation is getting underway, this is a big day for us," said Project manager in Statoil, Elly Kristine Bjerknes

The first foundation for the 317MW Sheringham Shoal Offshore Wind Farm has now been installed on the wind farm site. The monopile was installed by the twin-hulled heavy lift vessel Svanen, which has been used for similar operations at other offshore wind farms.

(Photo Credit: Statoil)

Substantial dimensions

A monopile foundation consists of a tubular steel monopile, driven 32-36 m into the seabed, and weighing from 400 to 600 tons. A transition piece is fitted to the top, forming the support for the turbine tower itself. Each piece is 22m high and weighs about 200 tons. Installation of a submarine export cable is scheduled to begin in August, and submarine infield cables that connect the turbines and substations together in an intricate matrix on the seabed will start in October.

The first of 90 monopile foundations was installed off the Norfolk coast by the heavy lift vessel "Svanen".

"Sheringham Shoal is a pioneering project for Statoil, since it's our first wind farm," says Bjerknes. "We are a small but effective team working on this, and we have had excellent help and support from other sectors of the organization. We really feel that we're crossing energy frontiers," she says.

Rapid progress

Project Director Rune Rønvik says that this is a major milestone marking the culmination of many years' planning. "The license for the wind farm site was granted in 2004 and so it's a great achievement to now be at the stage where we are starting a continuous process to install the 90 required foundations," he said. The Sheringham Shoal Offshore Wind Farm is owned equally by Statoil and Statkraft through the joint venture company Scira Offshore Energy Limited. Statoil is the operator for the project during the development phase. Scira will be the operator of the wind farm.

Facts about Sheringham Shoal

- **315 MW** of installed capacity
- Located off the coast of Norfolk, England
- Covers an area of approximately 35 sq. km
- **88 wind turbines**, each with a 3.6 MW capacity
- Turbine blade length 52 m (170 ft.)
- Turbine tower height 80 m (262 ft.)
- Wind turbines are placed on foundations on the seabed
- Two offshore substations
- Two 132 kV marine cables to come ashore at Weybourne
- **21.6 km underground cable** will connect the wind farm to the National grid at a new substation

(Source: Statoil)

Seither Tapped to Lead SNAME

The Society of Naval Architects and Marine Engineers named Erik Seither as its next Executive Director of the Society. Seither will become the 12th person to serve in the capacity since the organization's founding in 1893. He will assume the helm of SNAME HQ on July 6, succeeding Phil Kimball, who has held the position since 1998.

He comes to the Society from Det Norske Veritas, for whom he worked for the past eight years in senior maritime marketing management positions in North and South America.

Stark to Head GICA

James Stark was named Executive Director of the Gulf Intracoastal Canal Association (GICA), effective July 6, 2010. GICA's mission is to ensure the Gulf Intracoastal Waterway is maintained, operated and improved to provide the safest, most efficient, economical and environmentally-sound water transportation route in our nation. Stark most recently has been consulting on the response and recovery operations associated with the Deepwater Horizon Spill in the Gulf of Mexico.

Obituary: John A. Gurrad

John A. Gurrad, MOL (America) Inc.'s former Vice President for Business Planning and e-Commerce, passed away on June 2, 2010. Gurrad's 37-year career in the shipping industry included 10 years at MOL as vice president in Concord, Calif. He joined MOL in August of 1998 and retired in October 2008. Gurrad was 68. Prior to joining MOL, Gurrad spent 19 years with APL (1979-1998) in Oakland, Calif., eventually serving as Assistant to the Chairman of the Board (1995-1998).

W R Systems Appoints Brown

WR Systems, Ltd., a supplier of high-tech, engineering based maritime systems, appointed Simon Brown as Director of International Marine Business. Brown will expand and develop an international distributor base for current WRSystems navigation and marine IT-based products, as well as direct business development to increase the profile of the company in the global marine industry. Brown is a resident of Manchester, United Kingdom.

This newly created position forms part of WRSystems' strategy to capitalize on their unique capabilities within the commercial maritime sector.

EBDG Adds Staff

Elliott Bay Design Group (EBDG) added to its staff in both Seattle and New Orleans. Marine designer Jason Haik is joining EBDG's Seattle office, bringing 12 years of marine experience and extensive skills in AutoCAD, ShipConstructor and Rhino. Joining the team in EBDG's New Orleans office is Joel Wiik, a structural designer with four years of shipyard design experience.

Bourbon: $2b Through 2015

French company announces plan to operate 600-vessel fleet by 2015

ThePlan	Fleet as of Dec. 2009	Horizon 2012 Strategic Plan Under construction	Bourbon 2015 Strategy Newbuildings	2015: Total # Vessels
Deep water	82	22	30	134
Shallow water	52	44	50	146
Total supply vessels	134	66	80	280
Crewboats	223	33	64	320
Total fleet	**357**	**99**	**144**	**600**

For *Maritime Reporter* readers who still wax nostalgic regarding the Reagan-era plan to build a "600-ship" U.S. Navy fleet, another is on the horizon. A $2b vessels newbuild program to renew the old and obsolete continental offshore fleet and meet demand in deepwater was recently announced by Bourbon. "With this plan covering 2011 to 2015, Bourbon wants to achieve leadership under the flag of excellence" said Jacques de Chateauvieux, Chairman & CEO of Bourbon. "It relies on innovative and cost efficient vessels and above all, on the women and men who deliver Bourbon services every day, striving to achieve the highest safety and operations standards, personally committed and united to attain excellence". By adding 80 supply vessels and 64 crewboats through a $2b investment plan in newbuildings, Bourbon will be operating a fleet of 600 vessels for deepwater and shallow water logistics services by 2015.

Van Kuyk Joins OMM

John Van Kuyk, a business development manager with more than 25 years experience in the offshore oil and gas industry, has been brought in as the new Business Development Manager with subsea cable specialists, Offshore Marine Management.

GNMTC Orders Cruise Ship

GNMTC signed a contract with STX France to build a new cruise ship. The 139,400 ton vessel will be 333 x 38 m and include 1,739 passenger cabins and 732 crew cabins. Delivery of this ship is scheduled for December 2012. Founded in 1975, GNMTC is a Libyan State owned company which operates a fleet of 24 vessels specialized in the transport of crude oil, oil products and LPG, all over the world.

L-3 M&PS Promotes Pope

L-3 Marine & Power Systems announced today that it has promoted Brian Pope to the position of senior vice president of business development. Pope will continue to report directly to Robert Leskow, corporate vice president and president of the Marine & Power Systems group.

Colonna's Expands

Colonna's Shipyard announced a major expansion, the new West Yard Marine Travelift Facility. Situated on approximately 10 acres, this facility will accommodate the simultaneous repair of up to 15 vessels including tugs, barges, ferries, workboats, and yachts. Featuring the world's largest mobile hoist, a 1000 metric ton Marine Travelift, the West Yard is designed as a rapid response facility.

Bethel, Pennella Honored as 2010 AOTOS Recipients

The United Seamen's Service (USS) 2010 Admiral of the Ocean Sea Awards (AOTOS) will be presented to Thomas J. Bethel, National President of American Maritime Officers (AMO) and William A. Pennella, Vice Chairman and Executive Vice President of Crowley Maritime Corporation. One of the maritime industry's most prestigious awards will be presented at a gala industry dinner and dance to be held at the Sheraton New York Hotel and Towers, New York City, on November 12, 2010.

"Tom Bethel and Bill Pennella represent strong leadership in the maritime industry and will be honored for their significant contributions to American seafarers and American commerce," said Richard Hughes, Chairman of the USS AOTOS Committee and President of the International Longshoremen's Association, AFL-CIO. "Notably, both Crowley and AMO, provided much-needed humanitarian relief services to Haiti after January's devastating earthquake."

American Maritime Officers (AMO) is affiliated with the Seafarers International Union of North America, AFL-CIO. AMO is one of the nation's largest unions of U.S. merchant marine officers with contracts covering domestic deep-sea, Great Lakes and inland waters merchant vessels and U.S-flagged ships serving internationally in commercial trades and military support services.

Thomas J. Bethel has served the union in several capacities since coming ashore in 1983, including Executive Vice President, Assistant Vice President, executive board member and representative. He has also served for eight years as senior member of the legislative staff of AMO in Washington, D.C.

Bethel, a marine engineer, is a specialist in collective bargaining, shipping charters awarded to U.S.-flagged vessel operators by the Maritime Administration and Military Sealift Command, and maritime policy, legislation and regulation.

Crowley is a 118-year-old privately held family and employee-owned company which provides diversified transportation and logistics services in domestic and international markets by means of six operating lines of business: Puerto Rico/Caribbean Liner Services, Latin America Liner Services, Logistics Services, Petroleum Services, Marine Services and Technical Services.

William A. "Bill" Pennella began his maritime career in 1968 with Sea-Land Service. He held various management positions with Global Terminal and Container Services and United States Lines before joining Crowley in 1987.

Over the past 23 years, Pennella has continued to lead the growth of Crowley Maritime Corp. through his positions as Vice Chairman and Executive Vice President. As a member of the company's board of directors, he has been instrumental in the acquisition of several Crowley subsidiaries including Titan Salvage, Jensen Maritime Consultants, Customized Brokers and Marine Transport Lines. Pennella is a graduate of Rutgers University with degrees in Psychology and Business and is currently a member of the Advisory Board for The United States Merchant Marine Academy.

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HamiltonJet HT810

HamiltonJet completed assembly of the second model in its new HT series – the HT810. It follows on from the HT1000 and partially bridges the gap between the HM811 model and the larger HT1000. Not only does the HT810 mixed flow pump offer both improved efficiency and cavitation performance, with its new reverse duct design it has a reduced transom footprint for a jet of its size, enabling reduced jet centers required in narrow hulls or multi-jet installations. The HT810 is also supplied with a factory-built transition duct, eliminating the requirement for this to be fabricated by the boat builder and ensuring accurate geometry for the intake flow. The first pair of HT810s will be installed in a 34m vessel in Taiwan, powered by MTU 16V4000 M90 engines and be capable of over 30 knots.

www.hamiltonjet.com

Smart Landing System

TMEIC GE's Maxview Smart Landing system entered service on a new ship-to-shore crane, operated by DP World (Canada) Inc. Operational data from the first 15 months proves that the semi-automatic system has met the company's performance goals for preventing high-speed landings. Performance results show that on average, when the Maxview Smart Landing system was in use, during pick-ups high-speed landings were reduced to 0.6 percent from 35 percent of total landings, average landing speed dropped to 6.2 percent from 13.2 percent, and average kinetic energy imparted during landing was reduced by 85%.

Email: mh@tmeic-ge.com.

Wireless Comms Sensors

From Omega comes The Dilbert Blue Cat New Horizons in Wireless Communications (Version No. 26) catalog contains 68 full color pages of cutting-edge technology showcasing top-selling Wireless Sensors, Transmitters and Receivers, Ethernet Web Based Measurement and Control Devices for Monitoring & Recording Data over the Internet. Wireless Solutions include Temperature, Pressure, pH, Humidity, Flow and Process applications for Test & Measurement, Automation and Industrial Manufacturing. **www.omega.com**

3050 GNSS Receiver

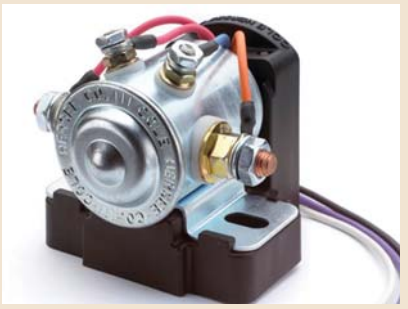
The C-Nav 3050 GNSS units received type approval for shipborne operation.

- **Sub-meter precise point positioning;**
- **10 cm accuracy worldwide when operated with C-Nav correction subscription service**
- **Tracks GPS, GLONASS, Galileo, C-Nav, other SBAS (WAAS/EGNOS)**

C-Nav3050 type approval is fully recognized by the USCG under the EU/USA MRA rules and complies IMO MSC.112(73) and A694(10) and EU Marine Equipment Directive.

Email c-nav@cctech.us

Smart Battery Isolator



Cole Hersee introduces its new Smart Battery Isolator 48525 and 48530. Ideal for marine applications, the smart battery isolator prevents loads on the auxiliary battery from draining the starting battery. The smart battery isolator provides a more flexible solution than traditional isolators, as it is not specific to an alternator type.

Email: info@colehersee.com

Hand-Held Combustion Gas Analyzer

The new E1100 Hand-Held Combustion Analyzer is a rugged unit for boiler, burner, engine, turbine, furnace, and other combustion applications. Pre-calibrated and field replaceable sensors allow for easy diagnostics and replacements to reduce "down-time" and costly repair charges.The E1100 also includes: O2 (0-25%) and CO (0-8000 ppm) Sensors; Efficiency, Excess Air, and CO2% Calculated Values; and Stack Gas & Ambient Air Temperature Measurements.

Email: bfreed@e-inst.com

Bioremediation Products

EnSolve Biosystems introduced a new line of products — EnSolve ShoreClean – designed to facilitate cleanup of oil from shorelines, beaches, marshes and open waters. The products are designed to release concentrated levels of naturally occurring oil-degrading microbes and nutrients into the waters and beaches along the contaminated shoreline. The microbes break down the particles of oil, converting it to water and trace amounts of carbon dioxide. The ShoreClean products include booms and bags, which are filled with oil-consuming microbes and slow-release nutrients. The floating booms contain a natural oleophilic and hydrophobic sorbent. **www.ensolve.com**

BR24PC Software Development Kit

Simrad Yachting announced its BR24PC Software Development Kit (SDK) for the commercial, military, marine and surveillance markets. Approved third parties can obtain a license to the BR24PC SDK and create PC-based software that uses Simrad Yachting's Frequency Modulated Continuous Wave (FMCW) radome technology. Potential applications include on- and offshore security, unmanned vessels, military (stationary and moving), river navigation, boundary surveillance, fish-farm monitoring and oilrig ship-docking management.

www.simrad-yachting.com

Dual Range Digital Torquemeter

The MCRT 79700V has two ranges with independent outputs eliminating the cost and inconvenience of swapping between two or more conventional torquemeters when production is switched between different products. The MCRT 79700V Series Dual Range Torquemeters from S. Himmelstein accurately measure torque even if the ratio of peak to average torque is high.

www.himmelstein.com

Sound Damping Sandwich Steel

Antiphon AB introduced a new product for structure borne sound damping; antiphon MPM (metal-polymer-metal) foiled, a sheet metal laminate with a thin foil on one side. The core material is two zinc coated sheet steel laminated with an acoustic inner layer to obtain the best structure borne sound damping. MPM foiled makes it possible to use laminated sandwich systems in more visible environments and also to choose MPM foiled deliberately as a decoration material where sound damping is wished for. MPM foiled is used when the demands for appearance as well as function are high. Aluminium is also an option as core material. MPM foiled has the same qualities as the traditional MPM and is used to reduce vibrations and structure borne sound without increasing the weight of the construction and at the same time replace already existing materials. MPM foiled is available in a wide variety of foil surfaces, colours and patterns. MPM foiled is delivered with a peelable protective film. **www.antiphon.se**

BRAND NAME/ Model Series	Bore	Stroke	Cyl#	kW/cyl	RPM	BMEP
ADD						
30V	300.0	480.0	6 - 18	548.3 - 572.2	720 - 750	26.9 - 27.0
Akasaka				www.akasaka.co.jp		
T26	260.0	440.0	6	104.2	350 - 400	13.4 -15.3
K26/S/SK	260.0	480.0	6	159.2 - 171.5	410 - 420	18.3 - 19.2
U28A (K)	280.0	380.0	6 - 8	230 - 306	720	16.4 - 21.8
K28/B	280.0	480.0	6	172	380	18.3
K28S	280.0	500.0	6	196	410	18.6
A28/A28S	280.0	550.0	6	183.8 - 196	320 - 340	20.3 - 20.4
K31	310.0	530.0	6	220	370	17.9
K31S	310.0	550.0	6	245.2	380	18.6
A31	310.0	600.0	6	220.8	290	20.2
AX33	330.0	620.0	6	270.0	310	19.7
A34C	340.0	620.0	6	270.0	310	18.6
A34S	340.0	660.0	6	294.2	280	21
S35	350.0	640.0	6	318.7	280	22.2
A37	370.0	720.0	6	318.3	250	19.7
A38/S	380.0	740.0	6	343.3 - 367.7	240 - 250	20.4 - 21.0
A41/S	410.0	800.0	6	404.2 - 441.2	230 - 240	20.0 - 20.9
A45/S	450.0	880.0	6	490 - 551.5	210 - 220	20.0 - 21.5
Alaska Diesel Electric - Lugger/Northern Lights				www.northern-lights.com		
L4/6-106	106.0	127.0	4 - 6	16.7 - 33.8	2000 - 2500	8.1 - 15.1
L6125H	125.0	150.0	6	43.5 - 58.3	1800 - 2300	15.7 - 16.5
L6140AL2	140.0	165.0	6	61.7 - 87	1800 - 2100	16.3 - 19.6
L6170	170.0	170.0	6	86 - 111	1800 - 2100	14.9 - 16.4
Anglo Belgian Corp.				www.abcdiesel.be		
DX	242.0	320.0	3 - 8	46 - 110.4	600 - 750	6.0 - 12.5
DZ	256.0	310.0	6 - 16	135 - 250	720 - 1000	16.5 - 18.8
Baudouin				www.moteurs-baudouin.fr		
S108	108.0	120.0	4 - 6	16.0 - 50.3	2100 - 2500	7.9 - 26.2
S111	111.0	145.0	6	34.3	2000	14.7
R120	120.0	145.0	6	29.5 - 41.7	1800 - 2000	12.0 - 15.2
R123	123.0	156.0	6	43.0	1800 - 2000	15.5
M26	150.0	150.0	6 - 12	29.4 - 79.7	1800 - 2000	7.4 - 18.0
C25:33LP	250.0	330.0	6 - 9	240 - 333	720 - 1000	24.7 - 26.3
Bergen				www2.rolls-royce.com		
B32:40	320.0	400.0	6 - 16	500	750	24.9
Beta Marine				www.betamarine.com		
120	104.0	132.0	6	14.9	2600	6.1
Bez Motory				www.bezmotory.cz		
C28	275.0	330.0	6	234.2	750	19.1
BF24	89.9	94.6	4	18.4 - 25.8	3500	10.5 - 14.7
BF32	89.9	100.8	5	29.4	3500	15.8
BD423	90.0	90.0	4	13.8 - 25.8	2670 - 3600	10.8 - 15
FSD425	93.7	90.5	4	20.3 - 25.8	3800 - 4000	9.7 - 13.0
BV6606	108.0	120.0	6	10.8 - 40.3	2000 - 2400	5.9 - 13.4
BV4404	108.0	120.0	4	14.3 - 33	2000 - 2400	7.8 - 15
BV7406	108.0	134.0	6	10.9 - 42.8	1800 - 2400	5.9 - 17.4
BV8406	111.0	145.0	6	11.3 - 49	1660 - 2100	5.8 - 19.9
Boni Marine				www.bonimotorimarini.it		
BD1260	130.0	158.0	6	15.9 - 58.8	1520 - 2000	6.0 - 16.8
Bogorodskiy						
YMZ	130.0	140.0	6 - 8	12.4 - 18.9	1500 - 1850	4.2 - 7.9
3D20	150.0	160.0	6	22.1 - 28.2	1800 - 2200	5.2 - 5.4
Bukh + Steyr						
SOLAS	85.1	94.0	4 - 6	26.5 - 30.0	3800 - 4100	15.6 - 16.8
Caterpillar				www.cat-engines.com		
3000	100.0	127.0	6	15.5 - 25.5	2100 - 2600	7.2 - 13.2
3126	110.0	127.0	6	52.2	2800	18.5
C7 / ACERT	110.0	127.0	6	31.2 - 56.5	2400 - 2800	12.9 - 20.1
C9 ACERT	112.0	149.0	6	62.5 - 70.5	2500	20.4 - 23.0
C12 / ACERT	130.0	150.0	6	42.2 - 87.7	1800 - 2300	14.2 - 23.0
3400C	137.0	152 - 165	6 - 12	31.3 - 72.2	1800 - 2100	8.5 - 16.9
3400E	137.0	152 - 165	6 - 12	26.4 - 87.0	1200 - 2300	11.8 - 20.2
C15 ACERT	137.0	165.0	6	99.5 - 106	2300	21.3 - 22.7
3412D	145.0	162.0	12	33.7 - 54.3	1800 - 2100	8.4 - 13.1
C18 / ACERT	145.0	183.0	6	56.5 - 141.2	1800 - 2300	12.5 - 24.4
C32 / ACERT	145.0	162.0	12	41 - 118	1600 - 2300	10.2 - 23.0
3500	170.0	190.0	8 - 16	56.0 - 108.8	1200 - 1800	12.3 - 17.4
3500B	170.0	190.0	8 - 16	68.3 - 139.9	1200 - 1925	15.8 - 20.2
3500B HD	170.0	215.0	12 - 16	87.4 - 125	1200 - 1600	16.7 - 19.2
3500C	170.0	190.0	8 - 16	72.3 - 102.5	1200 - 1800	15.1 - 21.6
3500C HD	170.0	215.0	12 - 16	112 - 158	1600 - 1800	17.3 - 21.6
C280	280.0	300.0	6 - 16	288.3 - 338.8	900 - 1000	20.7 - 22.8
3600	280.0	300.0	6 - 18	287 - 400	900 - 1050	20.0 - 24.7
CRM				www.crm-spa.it		
ASSO	150.0	180.0	12	83.6 - 122.6	2020 - 2300	15.4 - 20.1
BR	150.0	180.0	18	67.4 - 98.1	2050 - 2080	12.4 - 16.1
Cummins Marine				www.cummins.com/marine		
KTA19/M	159.0	159.0	6	52.7 - 87.0	1500 - 2100	12.9 - 17.8
KTA38/M	159.0	159.0	12	50.8 - 93.3	1500 - 2050	12.9 - 17.3
KTA50/M	159.0	159.0	16	68.6 - 87.4	1500 - 1950	14.9 - 17.0
QSK19-M	159.0	159.0	6	82.0 - 99.5	1800 - 2100	13.1 - 19.7
QSK38-M	159.0	159.0	12	74.6 - 87.0	1800 - 1900	15.7 - 18.4
QSK50-M	159.0	159.0	16	74.6 - 83.9	1800 - 1900	15.7 - 17.7
QSK60-M	159.0	190.0	16	93.3 - 116.5	1600 - 1900	16.5 - 19.5
QSD	94.0	100.0	4 - 6	40.0 - 42.8	3800	15.1 - 19.5
B	102.0	120.0	4 - 6	24.3 - 39.2	2500 - 2800	10.6 - 17.1
QSB5.9	102.0	120.0	6	28.2 - 58.8	2600 - 3000	13.3 - 24.0
Cummins MerCruiser				www.cmdmarine.com		
QSC8.3	114.0	135.0	6	58.8 - 60.2	2500 - 3000	17.1 - 21.0
C	114.0	135.0	6	31.7 - 53.5	1800 - 2600	15.3 - 17.9
QSL	114.0	145.0	6	17.7 - 49.7	1400 - 2100	10.2 - 19.2
QSM11	125.0	147.0	6	36.7 - 87.7	1800 - 2300	13.5 - 25.3
DAEWOO						
102/100	102.0	100.0	4	22 - 26.8	3000 - 3600	10.8 - 11.3
102/118	102.0	118.0	6	16 - 24.7	1500 - 2700	9.6 - 13.3
111/139	111.0	139.0	6	19.5 - 44.2	2100 - 2500	7.9 - 15.8
123/155	123.0	155.0	6	39.2 - 49	2000 - 2100	12.8 - 15.5
Daewoo Doosan				www.doosaninfracore.co.kr		
V 158TI	128.0	142.0	8	44.1 - 73.5	1800 - 2300	16.4 - 21.0
V 180TI	128.0	142.0	10	44.1 - 60.3	1800 - 2300	15.3 - 18.6
V 222TI	128.0	142.0	12	44.2 - 73.6	1800 - 2300	16.4 - 21.0
Daihatsu Diesel				www.dhtd.co.jp/index.html		
DKM-20	200.0	300.0	6 - 8	156 - 159	900	22.1 - 22.5
6DKMS-25	250.0	360.0	6	245	750	22.2
6DKM-26	260.0	380.0	6	269.7	750	21.4
6DKMS-28	280.0	385.0	6	306.4	750	20.7
DKM-28	280.0	390.0	6 - 8	313 - 319	720 - 750	20.8 - 22.1
DKM-36	360.0	480.0	6 - 8	551.5	600	22.6
913	102.0	125.0	6	16.0 - 18.7	2150	8.7 - 10.2
FM 1013	108.0	130.0	4 - 6	18.0 - 32.5	1900 - 2300	8.9 - 16.8
DEUTZ				www.deutz.de		
FM 1015	132.0	145.0	6 - 8	33.8 - 50.0	1800 - 2100	10.3 - 16.0
DEUTZ						
TCD 2015	132.0	145.0	8	45.0 - 62.5	1900 - 2100	14.3 - 18.0
710	230.0	280.0	8 - 20	155 - 186.5	720 - 900	10.6 - 11.2
38TD8-1/8	206.4	254.0	6 - 12	261.1 - 217.6	750 - 900	20.5
Fairbanks Morse				www.fairbanksmorse.com		
ALCO 251	228.0	267.0	6 - 18	127.3 - 191.4	900 - 1200	17.5 - 18.9
FNM				www.cfnm-marine.com		
82.55/90	82.6	90.0	4 - 5	22.3 - 36.8	4000 - 4200	16.9 - 23.1
GE Diesel				www.getransportation.com		
V228	229.0	267.0	8 - 16	149.1 - 210	900 - 1050	18.2 - 21.9
V250	250.0	320.0	12 - 16	227 - 291	900 - 1050	19.3 - 21.2
GRENAA				www.grmo.dk		
FS24	240.0	300.0	3 - 6	55 - 126	750	6.5 - 14.9
LS24	240.0	350.0	6	130 - 200	600 - 1000	15.2 - 16.4
GUANGZHOU				www.gdfdiesel.com		
230Z	230.0	300.0	6 - 8	135 - 176	750 - 900	17.1 - 22.6
300	300.0	380.0	6	49 - 54	400	5.5 - 6
320Z	320.0	440.0	8 - 12	202 - 283	450 - 525	15.2 - 18.3
G32	320.0	480.0	6 - 8	444	600	23.0
GUASCOR				www.guascor.com		
F180	152.0	165.0	6	30.7 - 79.3	1500 - 2000	6.8 - 17.7
F240	152.0	165.0	8	53.3 - 79.4	1500 - 1800	12.3 - 17.7
F360	152.0	165.0	12	49.0 - 79.4	1500 - 2000	12.3 - 17.7
F480	152.0	165.0	16	58.4 - 79.5	1500 - 1800	13 - 17.7
HANGZHOU						
WD615	126.0	130.0	6	15.2 - 34.3	1500 - 2575	6.5 - 14.8
HANSHIN				www.hanshin-dw.co.jp		
6L24GSH	240.0	400.0	6	79.7	400	13.2
LH26	260.0	440.0	6	147.0	420	18.0
LH26/A	260.0	440.0	6	171.5	450	19.6
LC26	260.0	440.0	6	104.2	400	13.4
MUH	280.0	340.0	6	294.2	780	21.6
MX	280.0	380.0	6 - 8	303.4 - 306.5	730	21.3 - 21.5
LH28	280.0	460.0	6	171.5	395	18.4
LH30L	300.0	600.0	6	220.5	300	20.8
LH31	310.0	530.0	6	220.5	370	17.9
LH32L	320.0	640.0	6	245.2	280	20.4
LH34LA	340.0	640.0	6	269.7	280	19.9
LA34	340.0	720.0	6	294.2 - 306.5	260 - 265	21.2 - 21.7
LH36L/LA	360.0	670.0	6	294.2 - 367.8	240 - 270	20.7 - 21.3
LH41L/LA	410.0	800.0	6	404.5 - 441.3	225 - 240	20.4 - 20.9
LH46L/LA	460.0	880.0	6	490.3 - 551.5	200 - 220	20.1 - 20.6
HEDEMORA DIESEL				www.hedemoradiesel.se		
VA	185.0	210.0	12 - 18	91.7	1350	14.4
VB	210.0	210.0	12 - 18	116.7	1350	14.3
HIMSEN				www.hyundai-engine.com		
H21/32	210.0	320.0	6 - 9	160 - 200	720 - 1000	21.7 - 24.1
H25/33	250.0	330.0	6 - 9	290.0	900	23.9
HINO						
W04C/6D	104.0	113.0	4 - 6	23.3 - 39.3	3000	9.7 - 16.3
W04D	104.0	118.0	4	17.3 - 20.5	3000	6.9 - 8.2
P09B	117.8	130.0	6	56.0	2300	20.6
HS MARINE				www.hs-marine.de		
90/90	90.0	90.0	4	27.5	3300	17.5
FM 1011	91.0	112.0	4	18.8	3000	10.3
FM 1012	94.0	115.0	4 - 6	20.8 - 25	2500 - 2650	12.6 - 14.2
101/126	101.0	126.0	4 - 6	18.8 - 25.8	2500	8.9 - 12.3
FM 1013	108.0	130.0	6	28.3 - 39.2	2300	12.4 - 17.2
HYUNDAI-SEASALL				http://www.hyundai-seasall.com		
V6S	84.0	89.0	6	27.0 - 30.6	3200 - 3800	19.6 - 20.5
I4D	87.0	92.0	4	27.6 - 31.3	3200 - 3800	18.1 - 18.9
ISOTTA FRASCHINI				www.isottafraschini.it		
1300	130.0	126 / 142	6 - 12	36.7 - 116.7	1800 - 2800	13 - 26.5
1700	170.0	170.0	8 - 16	87.5 - 146.9	1800 - 2000	15.1 - 21.8
VL 1716 T2	170.0	185.0	16	122.5 - 168.8	1800 - 2000	19.4 - 24.1
VL 1716 HPCR	170.0	185.0	16	147.5 - 162.5	2030 - 2100	20.8 - 22.1
ISUZU						
JBT	93.0	102.0	4	20.3 - 21	3100 - 3200	11.3 - 11.4
JGT	95.4	107.0	4	23.5 - 26.8	3100 - 3200	11.9 - 13.1
BGM	101.5	125.0	6	18.3	2800	7.8
BDT	102.0	118.0	4	24 - 26.8	2700 - 2800	11.1 - 11.9
BG1	105.0	125.0	4 - 6	25.7 - 36.8	2600 - 2800	10.9 - 14.5
HE1	110.0	125.0	6	39.2 - 42.8	2700 - 2800	14.6 - 15.4
SD1	117.9	145.0	6	41.7 - 46.5	2200 - 2300	14.4 - 15.3
RB1	132.9	160.0	6	53.8 - 59.3	1940 - 2000	15 - 16
FPT				www.ivecomotors.com		
N40 250	102.0	120.0	4	31.3 - 46.0	2800	13.7 - 20.1
N60 370	102.0	120.0	6	33.2 - 45.3	2800	14.5 - 19.8
NEF	104.0	132.0	4 - 6	15.3 - 68.7	2500 - 3000	5.9 - 24.5
CURSOR C78	115.0	125.0	6	24.5 - 67.5	2000 - 2600	11.3 - 24.0
C90	117.0	135.0	6	55.2 - 76.0	2500	18.2 - 25.1
CURSOR C13	135.0	150.0	6	40.5 - 101.2	1800 - 2400	12.6 - 23.5
VECTOR	145.0	152.0	8	62.5 - 110.4	1800 - 2300	16.6 - 22.9
JOHN DEERE				www.johndeere.com/marine		
POWERTECH 4.5L	106.0	127.0	4	19.5 - 28	2300 - 2600	8.9 - 11.5
POWERTECH 6.8L	106.0	127.0	6	19.7 - 37.3	2200 - 2600	8.8 - 15.4
POWERTECH 8.1L	116.0	129.0	6	29.2 - 46.7	2100 - 2400	12.2 - 17.1
POWERTECH 9.0L	118.0	127.0	6	40.3 - 62.2	2100 - 2400	16.6 - 22.4
POWERTECH 12.5L	127.0	165.0	6	42.3 - 65.3	1800 - 2100	13.5 - 17.9
POWERTECH 13.5L	132.0	165.0	6	51.0 - 93.2	1800 - 2200	15.1 - 22.5
KELVIN				www.britishpolarengines.co.uk		
6137	137.0	156.0	6	27.0 - 40.3	1800 - 2200	6.4 - 11.7
KEL140-6M	140.0	165.0	6	59.0	1800	15.1
140-6	140.0	165.0	6	59.0	1800	15.1
TBSC8	165.0	184.0	8	49.9	1350	11.5
TA	165.0	184.0	6 - 8	28.0 - 41.7	1200	7.2 - 10.8
KEL170-6M	170.0	170.0	6	93.3	1800	15.2
KOLOMNA				www.dieselkolomna.com		
V13/14	130.0	140.0	6 - 12	19.2 - 27.5	2000 - 3600	5.9 - 7.8
N14/14	140.0	140.0	8 - 12	38.0 - 45.8	2100 - 2350	10.1 - 10.6
D49	260.0	260.0	4 - 20	182.5 - 267.5	1000	15.9 - 23.2
D42-30/38	300.0	380.0	4 - 8	275 - 491.7	750	16.4 - 29.3
KOMATSU				www.komatsy.co.jp/product/compocat/		
91	91.9	115.0	6	25.5	3000	13.4
95	95.0	115.0	6	17.3 - 30.7	3000 - 3100	8.5 - 14.5
105A1	105.0	125.0	6	22.7 - 38.6	2520 - 2600	9.7 - 16.5
105A2	105.9	130.0	6	40.7 - 49.7	2520 - 2600	16.9 - 20
108	108.0	130.0	6	42.3 - 51.5	2520 - 2700	16.9 - 19.2
117	117.9	150.0	6	58.2 - 64.4	2200 - 2300	19.4 - 20.5
117	117.9	150.0	6	55.2 - 50.3	2130 - 2200	17.3 - 18.4
122	121.9	150.0	6	67.4 - 74.6	2200 - 2300	21 - 23.0
125	125.0	150.0	6	61.3 - 68.4	2200 - 2300	18.2 - 19.4
132	132.9	165.0	6	70.5 - 85.8	2100 - 2200	17.6 - 20.4
137	137.9	165.0	6	83.4 - 94.4	2100 - 2200	19.3 - 20.9
140	140.0	165.0	6 - 12	55.2 - 94.3	1900 - 2100	11.1 - 16.8
170	170.0	170.0	6	111.6 - 122.6	2000	17.3 - 19.1
LOMBARDINI MARINE				www.lombardinimarine.com		
82.0	90.4	4 - 5	23.5 - 29.4	4000	14.8 - 18.5	
MAK				www.mak-global.com		
M20C	200.0	300.0	6 - 9	170 - 190	900 - 1000	24.0 - 24.2
M25C	255.0	400.0	6 - 9	290 - 333	720 - 750	23.5 - 26.1
M32C	320.0	480.0	6 - 9	480 - 500	600	24.9 - 25.9
VM32C V	320.0	420.0	12 - 16	480 - 500	720 - 750	23.7
M43C	430.0	610.0	6 - 9	900 - 1000	500 - 514	23.7 - 27.1
VM43C	430.0	610.0	12 - 16	900 - 1000	500 - 514	23.7 - 27.1
MAKITA				www.makita-corp.com		
M28M	280.0	480.0	6	174.1	395	17.6
M30M	300.0	480.0	6	183.9	375	17.4
L30M	300.0	600.0	6	223.8 - 248.7	300 - 330	21.1 - 21.0
M31M	310.0	550.0	6	223.8 - 248.7	320 - 355	20.2 - 20.0
L31M	310.0	600.0	6	223.8 - 248.7	290 - 320	20.4 - 20.3
M32M	320.0	550.0	6	223.8 - 248.7	315 - 350	19.3 - 20.2
M33M	330.0	600.0	6	248.7 - 286	290 - 330	20.0 - 20.0
LS33L	330.0	640.0	6	186.5 - 245.2	250 - 290	16.3 - 18.5
LS35L	350.0	680.0	6	211.4 - 282	245 - 275	15.8 - 18.8
LS38L	380.0	740.0	6	261.1 - 343.2	230 - 255	16.2 - 19.2
LS42L	420.0	840.0	6	317.1 - 416.8	205 - 227	15.9 - 18.9
MAN DIESEL				www.manbw.de		
D28	128.0	142.0	6 - 12	36.8 - 79.7	1800 - 2300	12.9 - 22.7
D28 CR	128.0	142.0	6 - 12	75 - 110.3	2300	21.4 - 31.5
S26MC	260.0	980.0	4 - 12	275 - 400	212 - 250	14.8 - 18.5
L35MC	350.0	1050.0	4 - 12	440 - 650	178 - 210	14.7 - 18.4
S35MC	350.0	1400.0	4 - 12	505 - 740	147 - 173	15.3 - 19.1
S35ME-B9	350.0	1550.0	4 - 8	595 - 870	142 - 167	16.9 - 21.0
S35MC-C9	350.0	1550.0	4 - 8	665 - 810	142 - 155	18.8 - 21.0
S40ME-B9	400.0	1770.0	4 - 8	770 - 1135	124 - 146	16.7 - 21.0
S40MC-C9	400.0	1770.0	4 - 8	885 - 1080	124 - 136	19.2 - 21.4
L42MC	420.0	1360.0	4 - 12	640 - 995	141 - 176	14.4 - 18.0
S42MC	420.0	1764.0	4 - 12	730 - 1080	115 - 136	15.6 - 19.5
S46MC-C	460.0	1932.0	4 - 8	880 - 1380	108 - 129	15.2 - 20.0
L50MC	500.0	1620.0	4 - 8	640 - 1330	111 - 148	10.9 - 17.0
S50MC	500.0	1910.0	4 - 8	690 - 1430	95 - 127	11.5 - 18.0
S50MC/ME-C	500.0	2000.0	4 - 9	690 - 1660	95 - 127	12.2 - 20.0
S50ME-B7/8	500.0	2000.0	5 - 9	690 - 1660	95 - 127	12.2 - 20.0
S50ME-B9	500.0	2214.0	5 - 9	1210 - 1780	99 - 117	16.8 - 21.0
L60MC	600.0	1944.0	4 - 8	920 - 1920	92 - 123	10.9 - 17.0
L60MC/ME-C	600.0	2022.0	4 - 9	1520 - 2340	105 - 123	15.2 - 20.0
S60MC	600.0	2292.0	4 - 8	980 - 2040	79 - 105	11.5 - 18.0
S60MC/ME-C	600.0	2400.0	4 - 8	1090 - 2380	79 - 105	12.2 - 20.0
S60ME-B8	600.0	2400.0	5 - 8	1610 - 2380	89 - 105	16.0 - 20.0
S65ME-C	650.0	2730.0	5 - 8	1960 - 2870	81 - 95	16.0 - 20.0
L70MC	700.0	2268.0	4 - 8	1355 - 2830	81 - 108	11.5 - 18.0
L70MC/ME-C	700.0	2360.0	4 - 8	2090 - 3270	91 - 108	15.2 - 20.0
S70MC	700.0	2674.0	4 - 8	1350 - 2810	68 - 91	11.5 - 18.0
S70MC/ME-C	700.0	2800.0	4 - 8	1490 - 3270	68 - 91	12.2 - 20.0
K80MC/ME-C	800.0	2300.0	6 - 12	2470 - 3610	89 - 104	14.4 - 18.0
K80ME-C MK9	800.0	2600.0	6 - 12	3280 - 4530	94 - 104	16.0 - 20.0
S80MC	800.0	3056.0	4 - 9	1740 - 3640	59 - 79	11.5 - 18.0
S80MC/ME-C	800.0	3200.0	6 - 8	1860 - 4180	57 - 78	12.2 - 20.0
S80MC/ME-C MK9	800.0	3450.0	6 - 9	3050 - 4510	66 - 78	6.0 - 20.0
K90MC/ME-C	900.0	2300.0	6 - 12	3130 - 4570	89 - 104	14.4 - 18.0
K90ME-C MK9	900.0	2600.0	6 - 12	4150 - 5730	94 - 104	16.0 - 20.0

BRAND NAME/ Model Series	Bore	Stroke	Cyl#	kW/cyl	RPM	BMEP
K90MC/ME	900.0	2550.0	4 - 12	2210 - 4570	71 - 94	11.5 - 18.0
K90ME MK9	900.0	2870.0	6 - 12	4090 - 5720	84 - 94	16.0 - 20.0
S90MC/ME-C	900.0	3188.0	6 - 9	3188 - 5270	61 - 78	15.2 - 20.0
K98MC/ME-C	980.0	2400.0	6 - 14	4140 - 6020	94 - 104	14.6 - 19.2
K98MC/ME	980.0	2660.0	6 - 14	4100 - 6230	84 - 97	14.6 - 19.2
K108ME-C	1080.0	2660.0	6 - 14	5340 -6950	90 - 94	14.6 - 18.2
MAN DIESEL						
21/31	210.0	310.0	6 - 9	215	1000	24.1
23/30A/AE	225.0	300.0	6 - 8	133.3 - 160	825 - 900	16.3 - 17.9
27/38	270.0	380.0	6 - 9	340	800	23.4
28/32A	280.0	320.0	6 - 16	245	775	19.2
28/33D	280.0	330.0	12 - 20	405 - 450	900 - 1000	26.6
32/40	320.0	400.0	6 - 20	500	720 - 750	24.9 - 25.9
32/44CR	320.0	440.0	6 - 20	560	720 - 750	25.3 - 26.4
40/54	400.0	540.0	6 - 9	700 - 720	500 - 550	23.2 - 24.8
48/60B	480.0	600.0	6 - 18	1200	500 - 514	25.8 - 26.5
48/60CR	480.0	600.0	6 - 18	1200	500 - 514	25.8 - 26.5
58/64	580.0	640.0	6 - 9	1390	428	23.0
MAN DIESEL						
PA4-185	185.0	210.0	6 - 18	123.3	1500	17.5
PA4-200	200.0	210.0	8 - 16	165.6	1500	20.1
PA6STC	280.0	290.0	12 - 16	323.3	1050	20.7
PA6BSTC	280.0	330.0	12 - 20	405	1050	22.8
MARINEDIESEL www.marinediesel.nu						
GEP6.5	103.0	97.0	8	15.6 - 38.6	3500 - 4200	6.6 - 13.6
MATSUI DIESEL www.matsui-j.co.jp						
MU323	230.0	380.0	3	24.5 - 99.4	420	9.1 - 19.7
ML624G/A/H/S/C	240.0	400.0	6	42.9 - 110.3	420 - 420	6.9 - 17.7
ML624	240.0	400.0	6	42.9 - 61.3	420	6.9 - 13.1
ML626GSC	260.0	480.0	6	61.3 - 161.6	310 - 410	10.8 - 18.6
ML627GSC	270.0	480.0	6	73.6 - 186.4	300 - 410	10.7 - 19.9
MS28BGFC	280.0	500.0	6	184	390	18.4
MA28GSC	280.0	540.0	6	85.8 - 183.9	290 - 365	10.7 - 18.0
MA29GSC	290.0	540.0	6	85.8 - 208.4	290 - 375	10.0 - 19.0
MA31GSC	310.0	600.0	6	122.6 - 220.7	260 - 320	12.5 - 19.5
MA32GSC	320.0	600.0	6	122.6 - 245.2	270 - 320	11.3 - 19
MA33GSC	330.0	600.0	6	269.7 - 281.8	330 - 340	19.1 - 19.4
MEGATECH www.megatechpower.com.br						
MWM	93.0	103.0	4 - 6	29.2 - 35.4	3200 - 3900	13.9 - 19
OM364/6	97.5	133.0	4 - 6	15.9 - 49.0	2600 - 2900	7.4 - 20.4
OM906 LA EUI	102.5	130.0	6	53.9	2600	23.2
OM926 LA EUI	106.0	136.0	6	61.3	2900	21.1
MB 447LA	128.0	155.0	6	46.6 - 73.6	1800 - 2300	15.6 - 19.2
MB 447PE	128.0	155.0	6	88.3	2400	22.1
OM447	128.0	155.0	6	27 - 42.9	1800 - 2200	7.4 - 13.5
MB 457PE	132.5	155.0	6	98.1	2400	22.9
MERMAID www.mermaid-marine.co.uk						
J444TA	102.0	132.0	4	23.3	2200	11.8
MITSUBISHI www.mhi.co.jp/index.html						
S6M	117.0	135.0	6	61.3	2550	19.9
S6B	135.0	150.0	6	38.5 - 53.5	2000 - 2200	10.8 - 13.6
S6N	160.0	180.0	6	36.8	1430	8.5
SA2	150.0	160.0	12	52.8 - 71.5	1940 - 2100	11.6 - 14.4
SA3	150.0	175.0	6	60 - 81.7	1800 - 1960	12.6 - 16.2
SR	170.0	180.0	6 - 16	73.1 - 100.8	1600 - 1800	13.5 - 16.4
SR2	170.0	220.0	6	74.2 - 94.2	1350 - 1500	13.2 - 15.1
SU	240.0	260.0	6 - 16	165 - 202.3	1060 - 1200	15.9 - 17.2
Mitsubishi Heavy Industries www.mhi.co.jp/index.html						
UE33LSII	330.0	1050.0	4 - 8	306.7 - 567.5	162 - 215	12.5 - 17.3
UEC35LSE	350.0	1550.0	5 - 8	695 - 870	142 - 167	16.7 - 21.0
UEC40LSE	400.0	1770.0	5 - 8	910 - 1135	124 - 146	16.8 - 21.0
UE37LA	370.0	880.0	4 - 8	280 - 520	158 - 210	11.4 - 15.7
UE37LSII	370.0	1290.0	5 - 8	420 - 772	158 - 210	12.5 - 17.3
UE43LSII	430.0	1500.0	4 - 8	570 - 1050	120 - 160	12.5 - 18.1
UE45LA	450.0	1350.0	4 - 8	477.5 - 889	119 - 158	11.5 - 15.7
UE50LSII	500.0	1950.0	4 - 8	144.5 - 1445.1	95 - 127	12.5 - 17.3
UE50LSE	500.0	2050.0	5 - 8	1160 - 1660	99 - 124	13.9 - 20.0
UE52LA	520.0	1600.0	4 - 8	640 - 1180	100 - 133	11.3 - 15.7
UE52LS	520.0	1850.0	4 - 8	720 - 1320	90 - 120	12.2 - 16.9
UE52LSE	520.0	2000.0	4 - 12	930 - 1700	95 - 127	13.8 - 19.4
UE60LA	600.0	1900.0	4 - 8	840 - 1550	83 - 110	11.3 - 15.7
UE60LS	600.0	2200.0	4 - 8	950 - 1770	75 - 100	12.2 - 17.1
UE60LSII	600.0	2300.0	4 - 8	1075 - 1986	79 - 105	12.5 - 17.3
UE60LSE	600.0	2400.0	5 - 8	1530 - 2255	90 - 105	15.0 - 19.0
UE68LSE	680.0	2690.0	5 - 8	2010 - 2940	81 - 95	15.2 - 19.0
UE75LSII	750.0	2800.0	4 - 9	1595 - 2940	63 - 84	12.5 - 17.0
UE85LSC	850.0	2360.0	5 - 12	2115 - 3900	76 - 102	12.5 - 17.1
UE85LSII	850.0	3150.0	4 - 9	1980 - 3860	54 - 76	12.6 - 17.0
MTU www.mtu-online.com						
MD700	94.0	100.0	4 - 6	24.5 - 39.2	3800	11.1 - 17.8
2000	130.0	150.0	8 - 16	50 - 93.2	1800 - 2350	15.9 - 23.6
SERIES 60	133.0	168.0	6	43.5 - 102.5	1800 - 2300	12.4 - 22.9
2000CR	135.0	156.0	8 - 16	50 - 112	1800 - 2450	14.9 - 25.5
396	165.0	185.0	8 - 16	80 - 186.7	1500 - 2100	15.2 - 23.1
4000	165.0	190.0	8 - 16	87.5 - 170	1600 - 2100	16.1 - 23.9
4000	170.0	190.0	8 -20	145 - 215	1500 - 2170	20.2 - 28.5
4000	170.0	210.0	8 - 16	93 - 140	1600 - 1800	14.7 - 19.6
1163	230.0	280.0	12 - 20	300 - 370	1200 - 1300	25.8 - 29.3
8000	265.0	315.0	20	360 - 455	1150 - 1200	21.6 - 27.3
MWM BRASIL www.mwm.com.br						
229	102.0	120.0	6	13.5 - 20.8	2500 - 3000	6.6 - 15
NANNI DIESEL www.nannidiesel.com						
H4	83.0	92.0	4	21.2 - 31.3	3000 - 4000	17.0 - 22.2
	90.0	110.0	4	21.2 - 24	2600	11.8 - 15.8
T6 /TDI	94.0	100.0	6	37.4 - 39.3	3600	18.0 - 18.8
V6	94.0	100.0	6	33.1 - 42.9	3800	15.1 - 19.5
N4.100	94.0	110.0	4	18.4	2800	10.3
N4.115	100.0	120.0	4	21.2	2600	10.4
T4 /TDI	96.0	103.0	4	28.5 - 36.8	3400 - 3600	12.8 - 17.4

BRAND NAME/ Model Series	Bore	Stroke	Cyl#	kW/cyl	RPM	BMEP
Niigata www.nigata-eng.co.jp						
NSAK	132.9	160.0	12 - 16	40.4 - 44.1	1950 - 2000	11.2 - 11.9
NSE	150.0	165.0	6	67.3 - 76	1950 - 2100	14.2 - 14.9
NSD	150.0	210.0	6	79.7 - 88.2	1450 - 1500	17.8 - 19
NSDL	160.0	235.0	6	91.8 - 101.7	1400 - 1450	16.7 - 17.8
16FX	165.0	185.0	8 - 16	125 - 139.2	1950 - 2000	19.4 - 21.1
20FX	205.0	220.0	12 - 16	250 - 270.8	1650 - 1695	25 - 26.4
MG22	220.0	280.0	6 - 18	171.5 - 220.7	1000	19.3 - 24.4
MG25	250.0	350.0	6	220.5	750	20.5
MG26	260.0	275.0	6 - 18	230.1 - 245.2	750 - 1000	18.9 - 21.1
M26	260.0	460.0	6	104.2 - 171.5	400 - 440	12.8 - 19.1
MG28	280.0	370.0	8 - 18	294.1 - 367.8	750	20.6 - 24.4
M28	280.0	480.0	6	171.5 - 220.5	390 - 450	17.8 - 19.9
M31	310.0	530.0	6	220.5	290 - 360	18.4 - 20.1
M31L	310.0	600.0	6	220.5	290	20.1
MG34	340.0	450.0	6 - 18	441.2 - 555	600	21.6 - 24.4
MG41	410.0	560.0	6 - 18	661.8	500	21.5
OMD www.desari-srl.it						
811	93.0	92.0	4	18.7 - 24	3600	9.9 - 12.8
	94.4	100.0	4	16.8 - 30	3800	7.6 - 13.5
	115.0	130.0	6	17 - 42.2	2200 - 2400	6.9 - 17
OPTIMIZER www.amgeneralcorp.com						
6500	103.0	97.0	8	14.9 - 32.6	3400 - 3600	6.5 - 13.5
PENINSULAR DIESEL www.peninsularengine.com						
103.0	97.0	8	14.9 - 31.7	3400 - 3600	6.5 - 13.1	
PERKINS www.perkins.com						
1000	100.0	127.0	4 - 6	16.0 - 27.5	2500 - 2600	7.4 - 13.2
1100	105.0	127.0	4 - 6	16.0 - 37.2	2400	7.3 - 16.9
RUMO www.rumo.ru						
DRA650/1150	220.0	280.0	6 - 8	117.5 - 171.9	750 - 1000	17.6 - 19.4
SCANIA www.scania.com						
DI 12M	127.0	154.0	6	49 - 85.8	1800 - 2300	15.4 - 23.3
DI 16M	127.0	154.0	8	48.3 - 73.6	1800 - 2200	15.5 - 20.1
SEATEK www.seatek-spa.com						
620 PLUS	127.0	135.0	6	76.0	2600	20.5
660 PLUS	127.0	135.0	6	80.8	3100	18.3
725 PLUS	127.0	135.0	6	88.8	3100	20.1
820 PLUS	127.0	135.0	6	100.5	3100	22.7
850+ ELETTRONICO 23.6		127.0	135.0	6	104.2	3100
880CR	127.0	135.0	6	107.9	3100	24.4
950+ BiTurbo	127.0	135.0	6	93.3 - 116.3	2800 - 3200	23.4 - 25.5
SISU DIESEL www.sisudiesel.com						
44CTIM	108.0	120.0	4	25.0	2200	12.4
49CTIM	108.0	134.0	4	33.3	2200	14.8
66CTIM	108.0	120.0	6	32.0	2200	15.9
74CTIM	108.0	134.0	6	39.2	2200	17.4
84CTIM	111.0	145.0	6	50.3	2100	20.5
SKL Diesel www.skl-motor.de						
29/24	240.0	290.0	6 - 9	195 - 236.3	750 - 1000	23.8 - 24.0
SOLE www.soleddiesel.com						
SV-230	94.0	100.0	6	28.2	3800	12.8
SN	99.2	102.0	4	19.0	3600	8
SDZ	108.0	130.0	4 - 6	22.1 - 29.5	2300	9.7 - 12.9
STEYR www.steyr-motors.com						
M1	85.1	94.0	4 - 6	15.0 - 31.8	2600 - 4500	12.2 - 17.7
TRANSMASH www.barnaultransmash.ru 3D23						
150.0	150.0	6		37.3	2200	7.7
3D20	150.0	160.0	6	22.1 - 29.2	1800 - 2200	5.2 - 5.63D12
150.0	180.0	12	18.3	1350	5.1	
BM	150.0	180.0	8 -12	46.1 - 79.7	1500	11.6 - 20.0
VETUS www.vetus.nl						
DT	101.0	126.0	4 - 6	18.8 - 21.0	2500	8.9 - 10.0
DTA	101.0	126.0	4 - 6	23.0 - 25.8	2500	10.9 - 12.3
VF4	82.0	90.4	4	25.8 - 31.1	4000	16.2 - 19.6
FM 1013	108.0	130.0	6	28.3 - 35.0	2600	11.0 - 13.6
VM www.vmmotori.it						
83/92	83.0	92.0	4	21.3 - 23.8	4000	12.8 - 14.3
94/100	94.0	100.0	4 - 6	11.0 - 42.8	3200 - 3800	6.3 - 19.2
VOLGA DIESEL www.vdm-plant.ru						
21/21	210.0	210.0	6	50.8 - 54.3	1000	8.4 - 9.0
VOLKSWAGEN MARINE www.vw-marine.com						
79.5 / 95.5	79.5	95.5	4	21.3 - 24.0	4000	13.4 - 15.2
81.5 / 95.5	81.5	95.5	5 - 10	14.8 - 24.2	2600 - 4000	11.5 - 14.6
83.0 / 95.5	83.0	95.5	8	32.3	4200	17.8
91.4 / 83	91.4	83.0	6	27.5	4200	14.4
VOLVO PENTA www.penta.volvo.se						
D3	81.0	93.2	5	16.2 - 32.4	3000 - 4000	12 - 20.2
D4	103.0	110.0	4	33.0 - 55.3	2800 - 3500	15.4 - 20.7
D5	108.0	130.0	4	18.0 - 29.5	1900 - 2300	8.9 - 12.9
D6	103.0	110.0	6	34.3 - 53.3	3500	12.8 - 19.9
D7	108.0	130.0	6	18.0 - 32.5	1900 - 2300	9.0 - 14.5
D9	120.0	138.0	6	36.8 - 70.9	1800 - 2600	15.7 - 20.9
D11	123.0	152.0	6	82.2	2300	23.7
D12	131.0	150.0	6	49 - 95	1800 - 2300	16.2 - 24.5
D13	131.0	158.0	6	110.3	2300	27
Wärtsilä www.wartsila.com						
20	200.0	280.0	4 - 9	180 - 200	1000	24.6 - 28.0
26	260.0	320.0	6 - 16	310 - 340	900 - 1000	22.9 - 25.5
32	320.0	400.0	6 - 18	500.0	750	24.9
38B	380.0	475.0	6 - 16	725.0	600	27
46	460.0	580.0	6 - 16	1000	500 - 514	24.2 - 24.9
46F	460.0	580.0	6 - 12	1200.0	600	24.9

BRAND NAME/ Model Series	Bore	Stroke	Cyl#	kW/cyl	RPM	BMEP
64	640.0	900.0	6 - 8	2150	327 - 333	26.7 - 27.2
RTA/RT-flex35	350.0	1550.0	5 - 8	695 - 870	142 - 167	16.7 - 21.0
RTA/RT-flex40	400.0	1770.0	5 - 8	910 - 1135	124 - 146	16.8 - 21.0
RTA48T	480.0	2000.0	5 - 8	820 - 1360	99 - 124	11 - 18.2
RTA/RT-flex48TD	480.0	2000.0	5 - 8	1020 - 1455	102 - 127	13.3 - 19
RTA/RT-flex50(B)	500.0	2050.0	5 - 8	1160 - 1660	99 - 124	13.9 - 20.0
RTA/RT-flex50(D)	500.0	2050.0	5 - 8	1220 - 1745	99 - 124	14.7 - 21.0
RTA52UB	520.0	1800.0	5 - 8	1120 - 1600	110 - 137	12.8 - 18.3
RTA58T	580.0	2416.0	5 - 8	1200 - 2000	84 - 115	10.9 - 18.3
RTA/RT-flex58TB	580.0	2416.0	5 - 8	1530 - 2180	84 - 105	13.7 - 19.5
RTA/RT-flex60CB	600.0	2250.0	5 - 8	1690 - 2420	91 - 114	14.0 - 20.0
RTA62U	620.0	2150.0	5 - 8	1165 - 2220	82 - 113	10 - 18.2
RTA62UB	620.0	2150.0	5 - 8	1600 - 2285	92 - 115	12.9 - 18.4
RTA/RT-flex68TB	680.0	2720.0	5 - 8	2150 - 3070	76 - 95	13.7 - 19.6
RTA/RT-flex68TD	680.0	2720.0	5 - 8	2190 - 3130	76 - 95	14.0 - 20.0
RTA72U	720.0	2500.0	5 - 8	1640 - 2990	70 - 97	10 - 18.3
RTA72UB	720.0	2500.0	5 - 8	2155 - 3080	79 - 99	12.8 - 18.3
RTA/RT-flex82C	820.0	2646.0	6 - 12	3620 - 4520	87 - 102	15.2 - 20.0
RTA/RT-flex82T	820.0	3375.0	6 - 9	3620 - 4520	68 - 80	15.2 - 20.0
RTA84C	840.0	2400.0	6 - 12	2840 - 4050	82 - 102	12.6 - 17.9
RTA84TB	840.0	3150.0	5 - 9	2130 - 3880	54 - 74	9.9 - 18.0
RTA/RT-flex84TD	840.0	3150.0	5 - 9	2940 - 4200	61 - 76	13.3 - 19.0
RTA/RT-flex96C	960.0	2500.0	6 - 14	4000 - 5720	92 - 102	13 - 18.6
WEICHAI www.weifang-diesel.com						
226	105.0	120.0	4 - 6	18.4 - 22.6	1500 - 2100	10.3 - 14.1
WD615	126.0	130.0	6	14.7 - 34.5	1500 - 2350	7.2 - 12.8
WESTERBEKE www.westerbeke.com						
108C-6	91.9	101.6	6	13.3	3600	6.6
Century	105.0	125.0	6	15.5 - 21.5	2200 - 2400	7.2 - 10.8
YAMAHA						
ME420	94.0	100.0	6	31.1	3700	14.5
ME580	104.0	113.0	6	26.7	3000	11.1
YANMAR www.yanmar.com						
BY	84.0	90.0	4 - 6	20.7 - 33.0	3600 - 4000	13.8 - 19.8
JH3	84.0	90.0	4	17.5 - 23.0	3400 - 3800	12.4 - 14.5
6LP	94.0	100.0	6	31.1 - 39.0	3800	14.1 - 17.7
4LH	100.0	110.0	4	20.5 - 42.9	3100 - 3300	11.0 - 18.1
6LY	100.0	110.0	6	35.5 - 45.4	3100 - 3300	15.9 - 19.1
6CH	105.0	125.0	6	16.2 - 34.8	2600	6.9 - 14.8
6LY	106.0	110.0	6	42.8 - 58.9	3100 - 3300	17.1 - 22
6CX	110.0	130.0	6	53.9 - 65.2	2750 - 2900	17.9 - 21.8
6GH	117.9	140.0	6	46.7 - 54.7	2300	15.9 - 18.7
SY	127.0	154.0	6 - 8	82.8 - 88.3	2300	22.1 - 23.6
6HA	130.0	150.0	6	25.6 - 44.7	2100	7.3 - 12.8
6HY	132.9	165.0	6	61.3 - 85.8	1950 - 2200	16.5 - 20.4
LA	148.0	165.0	6 - 12	51.3 - 74.6	1800 - 1900	12 - 16.6
L	150.0	165.0	6 - 16	67.4 - 83.4	1650 - 1950	14.9 - 17.6
6AY	155.0	180.0	6	101.7	1900	18.9
N	160.0	200.0	6	55.2	1350	12.2
S	165.0	210.0	6	24.5 - 55.2	1200 - 1300	5.5 - 11.3
GL	240.0	290.0	6 - 12	147.0	750	17.9
6G250L	250.0	290.0	6	162.0	750	18.2
6T260L	260.0	330.0	6	184.0	750	16.8
N260	260.0	360.0	6	245.2	750	20.5
EY	260.0	385.0	5 - 6	233 - 368	720 - 750	18.3 - 28.3
ZL	280.0	340.0	6 - 12	221.0	750	16.9
N280	280.0	380.0	6 - 8	239 - 306.5	1720	7.1 - 9.1
N330	330.0	440.0	6 - 8	367.8 - 413.8	1620	7.2 - 8.4
MF33	330.0	620.0	6	196.2 - 269.7	300	14.8 - 20.3
ZICHAI www.zichai.com						
17/20	170.0	200.0	6	36.7 - 58.3	1000 - 1200	9.2 - 14.5
ZVEZDA www.zvezda.spb.ru						
16/17	160.0	170.0	42 - 112	20.5 - 70.9	1500 - 2200	4.8 - 12.4
18/20	180.0	200.0	6 - 12	41.7 - 91.7	1450 - 1850	6.8 - 13.5

About the Diesel Engine Directory

This table of diesel engines was created from the World Marine Engine Database and reflects the engine series in current production/available worldwide.

Output ratings vary according to emission requirements.

Every care has been taken in the preparation of this data, however Worldmarine Ltd. and the publisher cannot be held responsible for any errors or omissions.

(Continued from page 24)

Under the contract, Lockheed Martin Canada must procure, install and integrate the modernized combat systems and provide the long-term in-service support of the command and control system.

The Coast Guard also awarded a contract for five more 47-foot motor lifeboats to Victoria Shipyards. This will make a total of 29 that they will have delivered.

As part of a federal government stimulus package there were assorted repair and overhaul contracts awarded to shipyards across the country.

Commercial Shipbuilding

Life has not been easy for commercial shipbuilders. Each project is hard fought. That said the smaller yards still build tugs, fireboats and other utility vessels competitively for the international market. Canada's larger shipowners are lured to places such as the heavily subsidized shipyards in China for cheap ships. The fact is that the shipbuilding market place is not a free market place and countries such as Canada will never be able to compete on any grand scale.

That is why the domestic small ship market is so important to Canadian shipyards. Canada has a large ferry system. Most of these ferry companies are provincially governed. At this time the Newfoundland government is replacing several of its ferries at the Kiewit shipyard in Marystown. The Quebec government has made it known that they will soon be replacing some of their ships.

Vancouver shipyards in the last year have furnished BC Ferries with a small car/passenger ferry and not to be outdone Victoria Shipyards has delivered a new "Seabus" to the cross-harbor ferry run between Vancouver and North Vancouver. The decision by the Ferry companies to move the acquisition of their larger ferries to offshore builders is a disturbing trend. A major cause for concern is the financial difficulties being experienced by Davie Yards in Quebec. They are in what the United States readers would call Chapter 11 while they rework their finances and business plan. They have until about the 25th of September before they are required to appear in court with their proposed way ahead.

Conclusion

Canada's shipbuilding and Marine technology industries are on the verge of something big. The dollar figures are large. However looking beyond the expenditures is what is important. Twelve years ago shipbuilding was looked upon as a smoke stack industry. That never was the case. Finally it is being recognized for what it actually is, a complex high technology industry. Shipbuilding and its marine technology partners are a vital cog in the maritime defense of Canada. The shipbuilding industry can be counted upon to play its part in the new shipbuilding strategy.

MLBs

(Photo credit: Victoria Shipyards)

BUYER'S DIRECTORY

This directory section is an editorial feature published in every issue for the convenience of the readers of MARITIME REPORTER. A quick-reference readers' guide, it includes the names and addresses of the world's leading manufacturers and suppliers of all types of marine machinery, equipment, supplies and services. A listing is provided, at no cost for one year in all issues, only to companies with continuing advertising programs in this publication, whether an advertisement appears in every issue or not. Because it is an editorial service, unpaid and not part of the advertisers contract, MR assumes no responsibility for errors. If you are interested in having your company listed in this Buyer's Directory Section, contact Mark O'Malley at momalley@marinelink.com

AUTOMATION AND COMMUNICATION SYSTEMS

L-3 Maritime Systems, 9 Malcolm Hoyt Drive, Newburyport, MA 34232, USA

AUTOPILOT SYSTEMS

AG Marine, 5711 34th Ave NW 2nd floor, Gig Harbor, WA

BARGE FABRICATION

Signal International LLC, 1011 S.Hwy 6, Ste 108, Houston, TX 77077, USA

BOAT BUILDING AND DESIGN

Rivolta Group, 1765 Ringling Blvd. Suite 300, Sarasota, FL , tel:941 954-0355, fax:941 954-0111, Rrivolta@rivolta.com contact: Renzo Rivolta, www.rivolta.com

Textron Systems, 1010 Gause Blvd., Slidell, LA , tel:985 661-3621, fax:985 661-3631, dmirelez@tmls.textron.com contact: Daniel Mirelez, www.textron.com

BOATBUILDER

Washburn Doughty, P.O. Box 296, E. Boothbay, ME 04544, USA

BOW AND STERN THRUSTERS

Omnithruster Inc., 2201 Pinnacle Parkway Twinsburg, Ohio 44087, Cleveland, OH 44139, USA , tel:330 963-6310, fax:330 963-6325, widmer@omnithruster.com contact: Kurt Widmer, www.omnithruster.com

BRAKE SYSTEMS

Hilliard Corporation, 100 West 4th Street Elmira, New York 14901-2148, NY , tel:607 733-7121, fax:607 732-8979, rdoud@hilliardcorp.com contact: Rob Doud, www,hilliardcorp.com

BRONZE VALVES

William E.Williams Valve, Inc., 3852 Review Avenue, L.I.C., NY , tel:718 392-1660, fax:718 729-5106, sales@williamsvalve.com contact: Kevin Cole, www.williamsvalve.com

BULKHEADS/MJ DOORS

Advanced Structures Corporation, 235 W. Industry Court, Deer Park, NY , tel:631 667-5000, fax:631 667-5015, advstrcorp@aol.com contact: Susan Stark, www.AdvancedStructuresCorp.com

CAD/CAM SYSTEMS

Autoship Systems Corp.,, 409 Granville Street Suite 1451, Vancouver, BC V6A 1E1, Canada

CENTRIFUGES

Westfalia Separator, Inc., 100 Fairway Ct., Northvale, NJ , tel:201 784-4395, fax:201 767-3416, Francis.Kennedy@geagroup.com contact: Frank Kennedy, www.wsus.com

CHARGE AIR COOLERS

3 Star Atlantic Radiator Ultra Sonic Cleaning Division, 4358 N.Dixie Highway, Oakland Park, FL 78634, USA , tel:954 566-7403, fax:954 561-5946, MCross9241@aol.com

CONTROL SYSTEM-MONITORING/STEERING

Omega Engineering, One Omega Dr., Stamford, CT 06907, USA , tel:203 359-1660, fax:203 968-7192, kkwait@omega.com contact: Dan Jackson, www.omega.com

CORDAGE

Yale Cordage, 77 Industrial Park Road, Saco, ME , tel:207 282-3396, fax:207 282 4620, info@yalecordage.com contact: Dick Hildebrand, www.yalecordage.com

CRANKSHAFT REPAIR

In-Place Machining, 3811 N. Holton St., Milwaukee, WI 53212, USA

DECK FITTINGS

Baier Marine, 1914 N 34th Street Suite 502, Seattle, WA , tel:206 709-1500 ext. 223, fax:206 632-2441, sales@baiermarine.com contact: Alex Smith, www.baiermarine.com

DECK MACHINERY- CARGO HANDLING EQUIPMENT

Smith Berger Marine, 7915 10th Ave. S., Seattle, WA 98108, USA

DIESEL ENGINE- SPARE PARTS & REPAIR

Goltens Worldwide, PO Box 1176, Marion, MA , tel:508 728-3128, fax:508 536 6025

Motor-Services Hugo Stamp, 3190 SW 4th Avenue, Ft. Lauderdale, FL 33315, USA , tel:954 763-3660, fax:954 763-2872 , www.mshs.com

DOOR LOCKS

The Brass Works Inc., P.O. Box 566, Deland, FL , tel:386-943-8857, fax:386-943-8810, info@marinedoorandcabinethardward.com

DOORS- MARINE & INDUSTRIAL

Walz & Krenzer, Inc, 91 Willenbrook Rd.Unit B4, Oxford, CT , tel:203 267-5712, fax:203 267-5716, sales@wkdoors.com contact: Melissa Shepstone, www.wkdoors.com

ELECTRIC MOTORS AND CONTROLS

Ward Leonard, 401 Watertown Road, Thomaston, CT

ELECTRIC PROPULSION

Avtron Industrial Automation, 7900 E.Pleasant Valley Road, Independence, OH , tel:216 642-1230/ext 1263, fax:216 642-6037, mduskey@avtron.com contact: Mark R. Duskey, www.avtron.com

ELECTRICAL SERVICES

PMI Industries, Inc, 5300 St. Clair Avenue, Cleveland, OH

ENGINE AND COMPONENT ALIGNMENT

Dynamold, Inc., 2905 Shamrock Ave., Fort Worth, TX 76107, USA , tel:817-335-0862, fax:817-877-5203, pmpeck@dynamold.com contact: Michael Peck, www.dynamold.com

EPIRB

Whiffletree Corporation Inc., PO Box 27, Bridgton, ME , tel:207 647-3300, fax:207 647-3700, glcl@bellatlantic.net

FENDERING SYSTEMS/ BUOYS - DOCK & VESSEL

Schuyler Rubber Co., 16901 Woodred Rd.NE, Woodinville, WA 98072, USA , tel:425 488-2255, fax:425 488-2424, Greg@schuylerrubber.com contact: Greg Armfield, www.schuylerrubber.com

FILTRATION

Boll Filter, 9822 General Drive. Ste. 180, Plymouth, MI 48170, USA , tel:734 451-4680, fax:734 451-4681, Latorre@bollfilterusa.com contact: Michele Latorre, www.bollfilterusa.com

FURNITURE

Wright Computer Products Inc., PO Box 565, Woodbury, NJ

GALLEY EQUIPMENT

Jamestown Metal Marine Sales, Inc., 4710 Northwest 2nd Ave., Boca Raton, FL 33431, USA
Maritime Associates International, 3832-010 Baymeadows Rd. #407, Jacksonville, FL 32217, USA
US Outfitters, 10752 Deerwood Park Boulevard South Waterview II Suite 100 Jacksonville, FL 32256, Jacksonville, FL

HATCHES & DOORS

Baier Marine, 1914 N 34th Street Suite 502, Seattle, WA , tel:206 709-1500 ext. 223, fax:206 632-2441, sales@baiermarine.com contact: Alex Smith, www.baiermarine.com

Maritime Associates International, 3832-010 Baymeadows Rd. #407, Jacksonville, FL 32217, USA
US Outfitters, 10752 Deerwood Park Boulevard South Waterview II Suite 100 Jacksonville, FL 32256, Jacksonville, FL

HORNS/WHISTLES

Kahlenberg Brothers Co., P.O. Box 358, Two Rivers, WI 54241, USA , tel:920-793-4507, fax:920-793-1346, EKahlen@Kahlenberg.com contact: Erick Kahlenberg, www.Kahlenberg.com

HVAC

Jamestown Metal Marine Sales, Inc, 4710 Northwest 2nd. Ave., Boca Raton, FL 33431, USA

INTEGRATED BRIDGE SYSTEMS

L-3 Maritime Systems, 9 Malcolm Hoyt Drive, Newburyport, MA 34232, USA , tel:978 462-2400, fax:978 462-4497, Jon.Miller@L-3com.com contact: Jon Miller, www.L-3com.com/MPS

INTERIORS

Jamestown Metal Marine Sales, Inc., 4710 Northwest 2nd Ave., Boca Raton, FL 33431, USA
Maritime Associates International, 3832-010 Baymeadows Rd. #407, Jacksonville, FL 32217, USA

Thermax Marine-Panel Specialists, Inc., 3115 Range Rd., Temple, TX 76501, USA , tel:813 340-3940, fax:813 264-2507, thermax@panelspec.com contact: John Hutchinson, www.thermaxmarine.com

US Outfitters, 10752 Deerwood Park Boulevard South Waterview II Suite 100 Jacksonville, FL 32256, Jacksonville, FL

JOINER PANELS/FURNITURE

Maritime Associates International, 3832-010 Baymeadows Rd. #407, Jacksonville, FL 32217, USA
US Outfitters, 10752 Deerwood Park Boulevard South Waterview II Suite 100 Jacksonville, FL 32256, Jacksonville, FL

LIFEBOATS/RAFTS

DBC Marine Safety Systems, 101-3760 Jacombs Rd., Richmond, BC V6V 6T3, Canada

LIFESAVING EQUIPMENT

C.M. Hammar AB, August Barks Gatan 15, 421 32 Vastra Frolunda , Sweden

LIGHTING SYSTEMS/ EQUIPMENT

Maritime Associates, P.O. BOX 1788, Crystal Bay, NV 89402, USA

LUBRICANTS

ExxonMobil Marine Lubricants, 3225 Gallows Rd, Fairfax, VA , www.exxonmobilmarinelubes.com

Kobelco Eagle Marine, Inc., 366 Fifth Avenue, Suite 712, NY, NY 10017, USA

MARINE & OFFSHORE SIGNAGE

Maritime Associates, P.O. BOX 1788, Crystal Bay, NV 89402, USA

METEOROLOGICAL INSTRUMENTS

R. M. Young Company, 2801 Aero Park Drive, Traverse City, MI , tel:231-946-3980, fax:231-946-4772, vsherman@youngusa.com

PARTS LOCATOR SERVICE

Inventory Locator Service, 8001 Centerview Parkway Suite 400, Memphis, TN 38018, USA

PARTS/SERVICE AND REPAIR

Westfalia Separator, Inc., 100 Fairway Court, Northvale, NJ 07647, USA , tel:(201) 784-4335, fax:(201) 784-4399, Klaus.Brinkrode@geagroup.com contact: Klaus Brinkrode, www.wsus.com

PASSIVE FIRE PROTECTION

Microtherm, 3269 Regal Drive, Alcoa, TN , tel:865 681-0155, fax:865-681-0016, ABostrom@microtherm.us contact: Alyssia Bostrom, www.microtherm.us

PROPELLERS

Kahlenberg Brothers Co., P.O. Box 358, Two Rivers, WI 54241, USA , tel:920-793-4507, fax:920-793-1346, EKahlen@Kahlenberg.com contact: Erick Kahlenberg, www.Kahlenberg.com

PROPULSION EQUIPMENT

Motor-Services Hugo Stamp, 3190 SW 4th Avenue, Ft. Lauderdale, FL 33315, USA

PROPULSION EQUIPMENT AND SERVICES

Sound Propeller Systems, LLC, 9130 15th Pl.S Suite A, Seattle, WA , tel:206 392-0021, fax:206 392-0026, nhansen@soundpropsys.com contact: Norm Hansen, www.soundpropellersystems.com

PROPULSION ORDER TELEGRAPHS

Prime Mover Controls, 3600 Gilmore Way, Burnaby, BC V5G 4R8, Canada

RIGID INFLATABLE BOATS

Pennel & Flipo Inc., P.O. Box 1695 Mount Pleasant, SC 29465 , tel:843-270-4191, fax:843-883-3000, orca@pennelusa.com

Wing Inflatables, P.O. Box 279, 1132 Samoa Blvd., Arcata, CA 99521, USA

SATELLITE COMMUNICATIONS

Intellian Technologies, 9261 Irvine Blvd., Irvine, CA , tel:949 916-4411, fax:949 271-4183, sales@intelliantech.com contact: John Minetola, www,intelliantech.com

SEALS

Kobelco Eagle Marine, Inc., 366 Fifth Avenue, Suite 712, NY, NY 10017, USA , tel:212-967-5575, fax:212-967-6966, hawkins@kobelco-eagle.com contact: David Hawkins, www.kobelco-eagle.com

SEATING

H.O. Bostrom, 818 Progress Ave., Waukesha, WI 53186, USA , tel:262.542.0222, fax:262.542.3784, sales@hobostrom.com contact: Mike Oemichen, www.hobostrom.com

SHAFT HORSEPOWER SYSTEMS

Hillhouse Industrial Marine, 296 Knox Mountain Road, Sanbornton, NH , tel:603 566-4330, fax:603 934 5388

SHIPBOARD SURGE SUPPRESSORS

Wright Computer Products Inc., PO Box 565, Woodbury, NJ , tel:856 845 6767, fax:856 384 1145, wcpinc@verizon.net contact: David Wright Sr., www.wcp-usa.com

SURFACE PREP TOOLS

Aurand Mfg., 1210 Ellis St., Cincinnati, OH 45223, USA

TANK GAUGING AND SENSORS

Electronic Marine Systems, 800 Ferndale Pl., Rahway, NJ 07065, USA , tel:732 382-4344, fax:732 388-5111, emsmarcon@aol.com contact: Tom Priola, www.emsmarcon.com

TANK LEVELING INDICATORS

King Engineering Co, PO Box 1228, Ann Arbor, MI 48106, USA

Technical Marine Service,Inc., 6040 North Cutter Circle, Suite 302, Portland, OR 97217-3956, USA , tel:503-285-8947, fax:503-285-1379, SBrox@tms-usa,com contact: Steve Brox, www.Levelcom.net

WASTE WATER TREATMENT

Marinfloc AB, Industrivagen 10, Verekil , tel:+46 (0) 304-606 300, fax:+46 (0) 304-100 51, pl@marinfloc.com

WINCHES & FAIRLEADS

Skookum, P.O. Box 280, Hubbard, OR 97032, USA

Employment/Recruitment • wwwMaritimeJobs.com

Diesel Mechanic/Port Engineer
Job Location: USA, Seward, Alaska

Diesel Mechanic/Port Engineer
Kenai Fjords Tours, Seward, AK

Diesel Mechanic/Port Engineer
Kenai Fjords Tours, Seward, AK

Position: DIESEL MECHANIC/PORT ENGINEER
Department: Kenai Fjords Tours Operations
Reports To: Operations Manager
FLSA Status: Non-Exempt

Supervises
Assistant Port Engineer

General Function

Oversee and coordinate the repair, maintenance and improvement of Company owned vessels and vehicles to minimize loss of revenue and cost of repairs. Responsible to ensure vessels and vehicles provide comfortable and safe transportation for customers and employees and comply with applicable laws and regulations. Develop and implement cost effective maintenance and repair schedules for all vessels and vehicles to ensure comfortable and safe transportation.

Major Activities (Typical Duties/Responsibilities)

1. Supervise, coordinate and/or conduct all maintenance and repair activities on Company vessels and vehicles (the "fleet").
2. In conjunction with the Operations Manager, manage the maintenance and repair plan for the Company's fleet, while being mindful of costs, as well as customer and employee safety and comfort.
3. Determine key maintenance and repair parts and maintain on site adequate supplies of each to ensure periodic and/or routine maintenance occurs with minimal disruption to fleet operations, particularly during operational tourism season (typically April through September).
4. Develop favorable relationships with parts and service vendors to ensure prompt service response; coordinate scope of work with vendors to ensure maximum purchasing power.
5. Responsible for maintenance of the Phoenix Avenue warehouse including petroleum storage, tool storage and general security.
6. Coordinate with the Land Facilities Maintenance Technician to ensure that the Phoenix Avenue warehouse is maintained with safety and functionality in mind. Ensure compliance with all applicable local, state and federal laws, rules and regulations.
7. Oversee maintenance activities performed by the fleet crew, including training senior deckhands to recognize maintenance and/or repair issues as soon as possible.
8. Train all appropriate Company staff regarding the value and importance of scheduled routine maintenance and repairs.
9. Provide technical assistance to the Land Facilities Maintenance Technician regarding the Fox Island fresh water system.
10. Ensure vessels and vehicles are maintained within applicable U.S. Coast Guard and U.S. Department of Transportation standards.
11. Assist, as necessary, in investigating hull and/or machinery casualties to determine cause, remedy and future preventative measures.
12. Assist with land facilities maintenance and deckhand duties as required.
13. Maintain accurate and timely records of engineering costs for each vessel and/or vehicle, such as repairs, supplies, labor, etc.
14. Supervise the Assistant Port Engineer and ensure the employee is appropriately trained and qualified to perform delegated tasks.

Skills/Abilities

•Thorough understanding of operation of diesel and gas internal combustion engines, associated cooling systems, both A/C and D/C electrical systems, hydraulic systems, fresh and seawater plumbing systems and marine electronics.
•Excellent troubleshooting and analysis skills regarding mechanical, hydraulic and electrical failures.
•
Identify and recommend cost effective, durable solutions to often complex mechanical problems.
•Physical ability to climb ladders, lift up to 100 lbs on a regular basis, enter and operate in confined spaces, operate power tools, operate in environment with a breathing apparatus, and operate Company vehicles.

Minimum Experience

Experience in hydraulics, marine engines, generators, plumbing, and electrical. Caterpillar certified, 3512 marine diesel experience preferred. SEC certification or extensive experience in commercial vehicle maintenance. Parts inventory and purchasing experience. Aware of general principles of inventory management.

Required Contacts

•All CIRI Alaska Tourism Corporation executives, managers and staff
•All CIRI Alaska Tourism Corporation maritime employees
•Vendors and contractors
•Marine insurance carriers and/or surveyors
•General public

Tabetha Toloff
CIRI Alaska Tourism Corporation/Kenai Fjords Tours
2525 C Street, Suite 500
Anchorage AK 99503 USA
Phone: 907-263-5541
Fax: 907-263-5508
Email: ttoloff@ciri.com
Web: http://www.ciri.com/content/careers/jobs.aspx

Tankerman
Job Location: USA, Alameda, CA

JOB TITLE: Tank Barge Operator
LOCATION: Alameda, CA / San Francisco Harbor
GENERAL JOB DESCRIPTION:
Responsible for the safe and efficient transfer of petroleum products between barges, ships, and facilities including completion of bills of lading and gauge reports. The job responsibilities include, but are not limited to the following: cargo pumps, operate tank/pipeline valves, operate manual and hydraulic booms. Communicate with foreign crews and oil facility personnel. Adjust and secure barge lines. Complete loading and discharge gauge reports. Load 55 gallon drums. Inspect vessel for Coast Guard and state regulatory compliance.
SKILLS AND ABILITIES:
The job responsibilities include but are not limited to the following:
-Must have physical ability to maneuver cargo hoses, handle barge lines and board vessels by use of an accommodation ladder, Jacob's ladder or tugboat.
-Must possess good communication skills by voice and/or visual hand signals.
-Ability to do accurate paperwork. Knowledge of basic

arithmetic skills (add, subtract, multiply, and divide).
-Knowledge of Coast Guard and state requirements for transfer operations.
-Knowledge of company safety practices
-Must be able to read, speak, and understand English over telephone and/or radio.
-Must be able to perform the functions and possess the stamina to work long hours.
-Ability to think and respond quickly to emergency situations (oil spills, mechanical failures, etc.).
-Ability to be self-motivated.
-Ability to maintain professional relations with customers.
-Ability to check oil and water in any equipment on board before putting in use.
-Ability to do general barge maintenance and cleanliness.
-Ability to test hydrostatic cargo hoses and piping.
-Ability to change engine oil and filters.
-Ability to splice barge lines and boom running gear.
EQUIPMENT AND MACHINERY USED:
Air purifying respirator, Self Contained Breathing Apparatus (SCBA), air monitoring equipment, hearing protection, VHF radio, hand tools, tow lines, high level alarms and thermometer.
Operates diesel engines, cargo pumps, hydraulic booms, cargo gear, gate valves, and butterfly valves.
JOB CONDITIONS AND ENVIRONMENT:
-Must be able to work independently and without direct supervision.
-Exposure to all weather conditions (rain, ice, snow, heat, wind, heavy seas, etc.)
-Ability to adapt to a variety of schedules and hours
-Able to work weekends, holidays, and at night. Willing to take call outs.
-Must not be afraid of heights.
-Valid state driver's license.
WORK EXPERIENCE:
Previous experience as a tank barge operator on oil barges required.
EDUCATION/TRAINING:
Must have a valid Coast Guard Merchant Mariners Document with Tankerman endorsement.
Must have a valid first aid certificate.
Must have CPR training.
Complete HAZWOPER training within 90 days of hire.
Participate in onboard drills with tug crews when job permits.
OTHER DUTIES:
Check oil and water in any equipment on board before putting in use.
General barge maintenance and cleanliness.
Hydrostatic testing of cargo hoses and piping.
Change engine oil and filters.
Splice barge lines and boom running gear.
Human Resources
Harley Marine Services
910 SW Spokane Street
Seattle WA 98194
Fax: 206-428-7194
Email: jobs@harleymarine.com
Web: http://harleymarine.com/jobs.html

Sales Manager & Project Management Support
Job Location: USA, Petaluma, California

Primary Objectives:
This position has been created to expand Moose Boats external sales and marketing
efforts while simultaneously ensuring greater continuity from contract receipt to vessel
delivery.
To lead the development of Moose Boats sales and marketing functions. The Sales Manager will be primarily responsible for:
1) Product sales, marketing and sales administration.
2) Development and nurturing of long-term client relationships with both public and
private entities requiring Moose Boat products.
3) Partnering with the Management Team to identify organizational goals and to
hold one another accountable for performance.
4) Preparation and implementation of an annual comprehensive Sales Plan with
specific targets identified for key metrics to be defined collectively by senior
management group.
5) Assist General Manager in maintaining Federal Supply Schedule contract.
6) Other special projects as determined by the Company.
In addition to a sales role, responsibilities around project management support will ensure
continuity from the contracting period through the delivery stage. Project Management
support responsibilities include:
1) Share production of and updates to project work orders under the supervision of
the Production Manager.
2) Coordinate communication, as directed by General Manager, between Moose Boats design & production staff and customer throughout vessel construction to
better facilitate adherence to contract, clarify technical requirements, and update
customers as needed on construction progress.
3) Develop and maintain database of Warranty and After-Sales-Support history on
each delivered boat under the supervision of the General Manager.
4) Develop and maintain a promotional image catalog for Marketing use under the
supervision of the Design Director.
KEY TASKS
• Work collectively with the Management Team to develop the Sales Plan, to keep
it updated on an ongoing basis, to push the implementation of the plan, and to
monitor and report on progress toward the plan.
• Adhere to goals for key metrics such as: quantity of monthly new client contacts,
volume of client follow-up calls and annual sales targets as designated in Sales
Plan.
• Conduct adequate market research to determine where potential lies for new
business, target specific customers and identify the competition and incorporate in
the plan above.
• Call on target customers, end users in the plan, and effectively present Moose
Boat products and equipment. Work with the customer's management, technical
and operations staff to identify and develop applications and projects.
• Maintain and continue to develop ongoing customer contacts to enhance and
extend sales networks and to promote and close equipment sales and to ensure
repeat sales.
• Monitor all active projects and quotations in a timely manner, including reporting
to management.
• Understand thoroughly and stay informed on the customer decision-making
process and the customer budgeting/capital approval cycle to direct effectively
sales efforts, presentations, competitive responses and enhance forecast accuracy.
• Participate, as directed by President and Vice President, in negotiating a selling
price to the customer, complete with payment terms, that is acceptable to Moose
Boats.
• Collect all relevant project details (financial, technical, and competitive), keep the
sales database up-to-date accordingly and generate needed quotations and
proposals.
• Work closely with the Management Team to maximize efficiency in travel and
time and expenses by planning trips to product shows, existing customers and to
target customers identified in the new business development plan.
• Negotiate delivery quotations acceptable to the customer and Production Dept. in
conjunction with the Management Team.
• Identify marketing shows and meeting beneficial to Moose Boats and ensure a
favorable presence at targeted venues throughout the U.S.
• Work closely with the General Manager and other members of the Management
Team to share responsibilities, as required, to market and sell product, including
initial customer contact, attendance at shows, handling customer inquiries, when
needed, and assisting with customer follow up and service, as needed.
• Support Production and Design staff in translating contracts into work orders for
incoming projects.
• Enhance strong customer relationships and manage customer requests for
changes.
Qualifications:
• A proven track record in the selling of capital equipment items (minimum value
US $200,000) or high-end maritime product sales is essential;
• Familiarity with the marine industry, civil and law enforcement sector is highly
desirable;
• Military or law enforcement background a plus;
• A sound engineering background with an understanding of controls systems is
preferable;
• Excellent interpersonal, communication and sales skill desirable;
• Experience in maintaining and customizing SalesForce databases;
• Ability to share effectively a lead role as a member of the Management Team in a
small organization with a hands-on approach to getting things done.
To Apply:
Please direct of letters of interest and resumes to Abbie Walther – Vice President &
General Manager abbie@mooseboats.com or via fax 707-778-9827.
Abbie Walther
Moose Boats
274 Sears Point Road
Petaluma CA 94952 USA
Phone: 707-778-9828
Fax: 707-778-9827
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Interested firms can receive more information by contacting Dennis Fox via e-mail: **dfox@whoi.edu.**

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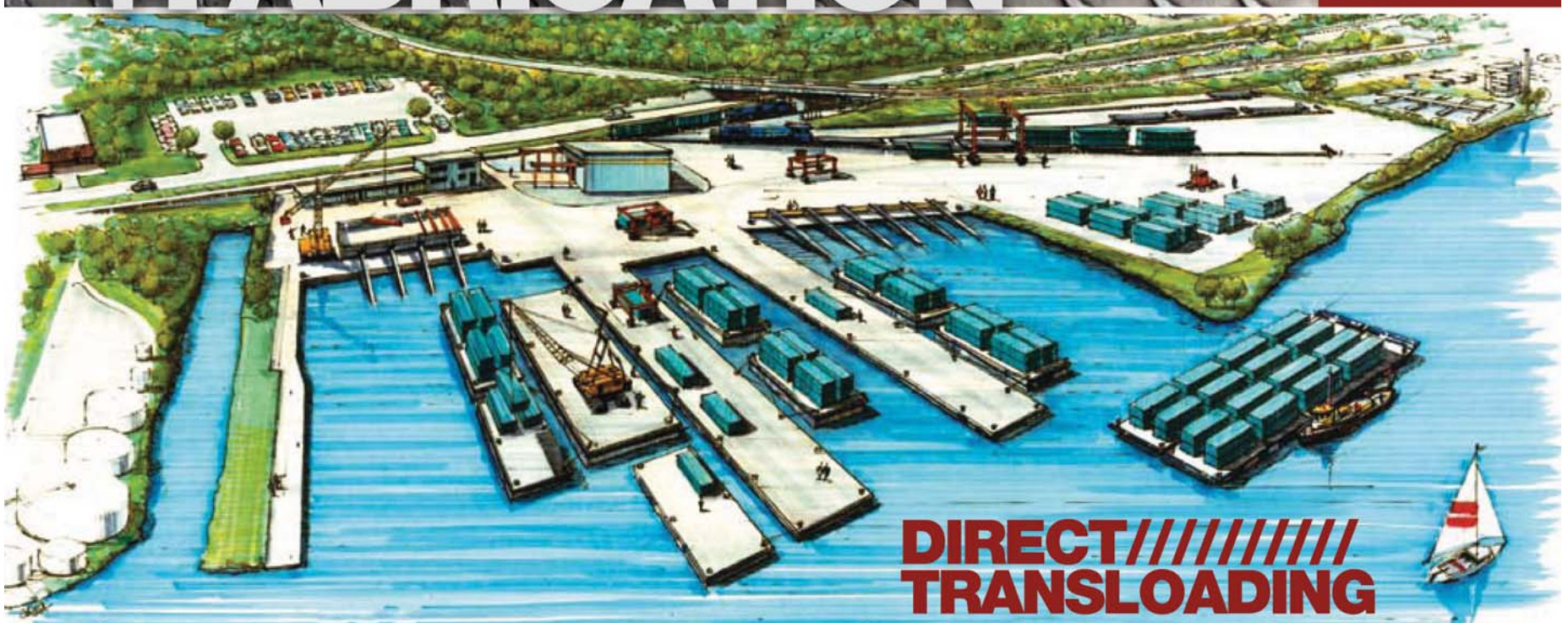

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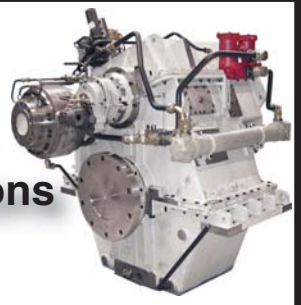

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