December 2005

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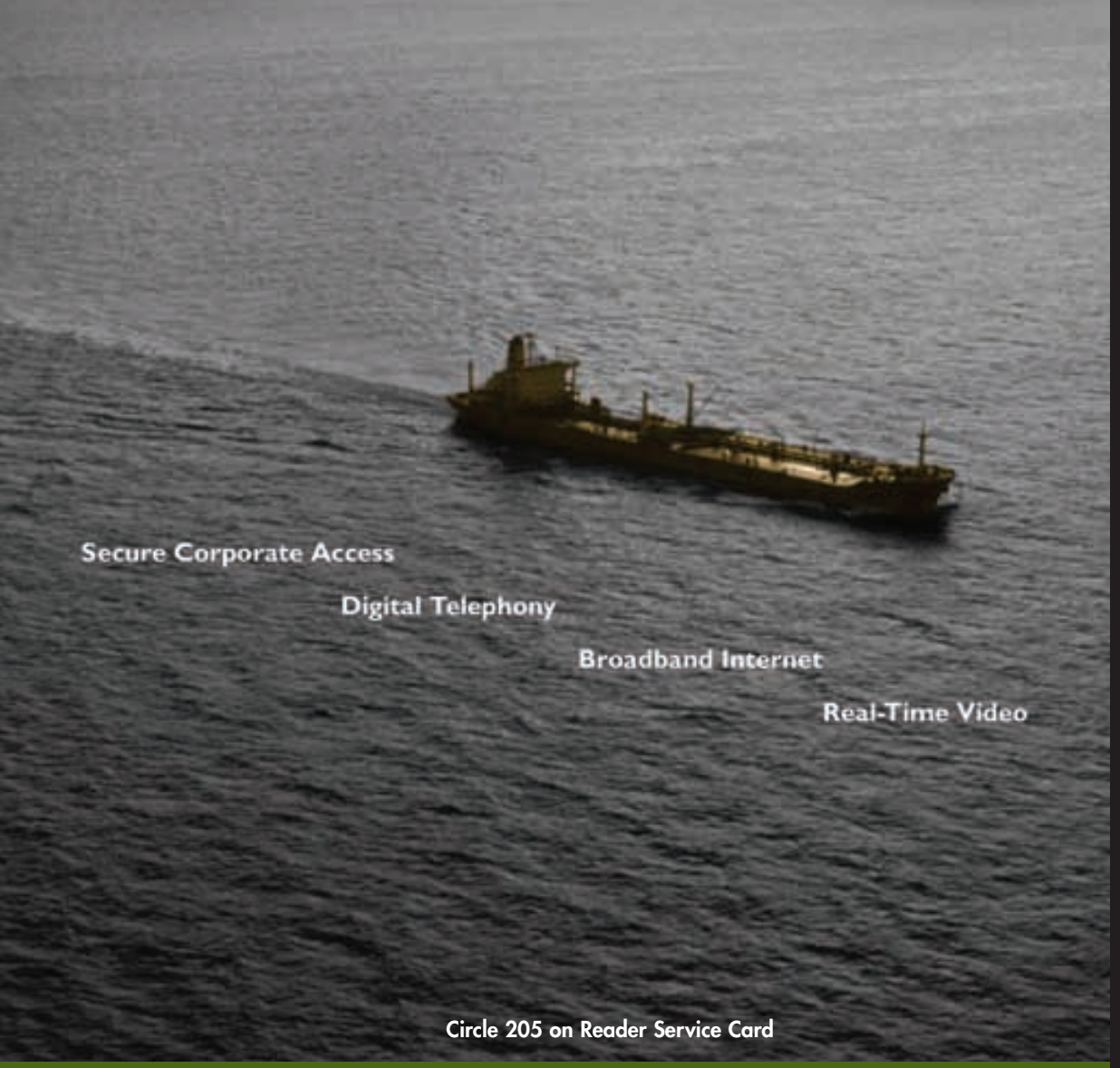

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Editor's Note

The annual selection of Great Ships of 2005 represents yet another milestone, as this edition features a record 25 ships produced around the globe. Sure to spark debate, the field of 25 is as impressive for it's sheer breadth as it is for the diversity of task.

Traditionally, passenger vessels are not included in this annual year end report, if for no other reason than Passenger Vessels are the feature focus of the January edition of MR. However, we simply could not leave out the Benchijigua Express, a massive 127-m trimaran from Austal Ships in Australia that is powered by four MTU 8000s which produce 32,800 kW, driving the vessel to 40+ knots while carring 1,350 passengers and 341 cars.

Size is also a factor in the selection of MSC Pamela, which to date is the world's largest containership, capable of transporting 9,200 TEU. While the dimensions (336.7 x 45.6 m) are indeed impressive, and the ship provides an amzaing 26 knot service speed via a MAN B&W 12K98MC0C engine producing 93,120 bhp, it is also chock full of minute engineering detail designed to ensure its safe and efficient voyage. Of the 25 vessels featured in this year's lineup, nine are of the container vessel class.

The efficient carriage of liquefied gas is without doubt a strong growth niche in the shipbuilding business, and the segment is represented well in this year's presentation of Great Ships with three vessels. Included is Gaz de France's new 74,000 cu. m. capacity ship, a ship which has opened a new technical chapter in LNG marine transportation with the incorporation of adual-fuel reciprocating engine/electric drive system. The ship is equipped with four, six-cylinder Wärtsilä 50DF dual-fuel engines, give a total power output of 22.8 MW.

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On the Cover

On the Cover: Pictured on this month's cover are a selection of "Great Ships" featured in this month's edition, starting on page 17.

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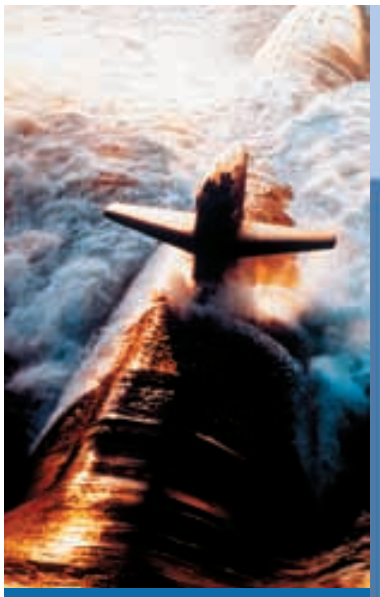

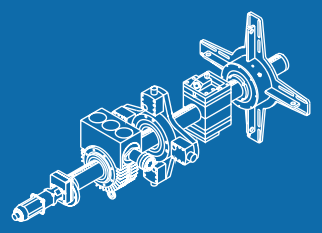

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Shipwrecked Turkey Now Safe for Christmas?

Same casualty, different outcome: The stuffed dog, above, seemed to fare the fall off a Southampton containship better than the distressed stuffed turkey, below!

C4, the consultancy arm of regs4yachts, has a broad range of expertise; from superyachts to shipwrecked turkeys. Recently a containership inbound to Southampton lost some containers overboard in bad weather. One was full of soft toys. As the container sank those toys brave enough struck out for the long swim to the beach. Some made it, some succumbed to the perils of the sea. C4 was instructed by insurers to ascertain the impact of the toys on the beach. Was the beach littered with expired shipwrecked toys, was a rescue mission required or was a rubbish skip more appropriate? C4 stormed onto the beaches at first light. The insurers were grateful for C4's liaison with the local authorities and its immediate, comprehensive no-nonsense report but not as grateful as a grinning dog, an overjoyed monkey and a turkey that were rescued from the pounding surf. Having recovered from the trauma of shipwreck the turkey made a full recovery only to be faced with the uncertainty that all turkeys face: Christmas!

Missile Defense System Transport

The world's largest heavy transport vessel the Blue Marlin of Dockwise Shipping in Breda, the Netherlands was tasked to carry the 30,000-ton U.S. missile defense system SBX (Sea-Based X-band Radar). After a successful loading operation at the Kiewit Offshore Services yard in Ingleside, Texas, the 76,410 dwt Blue Marlin departed on Friday, November 18, late afternoon for her voyage to the Pacific via South America.

In order to save valuable time as well as for safety of the unit, the Boeing Company and the American Missile Defense Agency (MDA) made the decision to contract Dockwise for dry transport.

The SBX has a length of 389 ft. (121 m), a beam of 238 ft. (76 m) and a height of 252 ft. (86 m). The SBX is a unique combination of an advanced X-band radar mounted on a mobile, ocean-going platform that will become part of the U.S. Ballastic missile defense system, components of which are deployed throughout the coastal and island regions of the Pacific Ocean.

Cat (the "Meow" kind) Sails the Atlantic

Illustration: John Guzman

When Emily the cat went missing a month ago, her owners looked for their wandering pet where she had ended up before — the local animal shelter. But last month they learned Emily sailed to France, according to an Associated Press report. Lesley McElhiney figures her cat went prowling around a paper warehouse near home and ended up in a cargo container that went by ship across the Atlantic Ocean and was trucked to Nancy, a city in northeastern France near the border with Germany. Employees at a French lamination company found her in the container, checked her tags and called Emily's veterinarian back in the U.S. The pet doctor faxed the cat's vaccination records to French authorities to help remove her from quarantine, but the family is wondering exactly how they will retrieve the pet. Emily will need a health certificate from France to return home, and she will have to go through quarantine again on entering the U.S.

(Source: The Associated Press)

USV Industry Day Held in Washington, D.C.

By Edward Lundquist

The U.S. Navy's Unmanned Surface Vehicle Industry Day, held at the Washington Navy Yard October 18-20, called for industry ideas and solutions to support the anti-submarine warfare (ASW) mission packages for the Littoral Combat Ship.

The conference was hosted by the Program Executive Office for Littoral and Mine Warfare. The service is requesting assistance from industry for research and development (R&D) of Unmanned Surface Vehicle (USV) for ASW applications.

"The Navy's goal is to procure up to four (prototype) USVs in the near term and as many as 52 USVs for ASW Mission Packages in the far term," said Capt. Walt Wright, Program manager for the LCS Mission Modules.

"We're seeking a single USV design to support all ASW mission systems," Wright said. "This will support a common USV effort for all LCS Mission Packages.

Acquiring a USV for the LCS ASW Mission Package is a top-level requirement, according to Ken Michaud, assistant program manager for the ASW mission package. Industry has some flexibility, Michaud said. "Our Objective is to articulate the governments needs and to establish the hard and soft boundaries in the trade space that industry can balance to meet the Navy's near term needs in support of the ASW Mission Package."

The USV will be used for sensor mission systems. The three ASW systems currently being considered for application from USVs are the Unmanned Dipping Sonar (UDS); the Umanned Towed Array System (UTAS); and the Multi-Static Off-Board Source (MS-OBS).

"Up to four prototype USVs will be procured under this contract," Michaud said. "The program plans to award a contract in January 2006 for two ASW USV prototypes with an option for two additional units. The first two units will be required by March 2007. The option for two additional prototype units may be awarded by June 2006 for delivery by August 2007."

The Navy wants industry to focus on the platform and core control sensors and systems. The communication radio sets and host control stations will be government furnished equipment (GFE). The LCS and ASW Mission System Integration requirements define the trade Space. The Navy and industry will work together to identify requirements and best achieve the ASW mission capabilities, meeting or exceeding the requirements wherever possible. "We will provide industry trade space to meet the top level Requirements," Michaud said. "We're seeking a low risk solution."

The top level requirements and Request for Proposals ("Technology developments leading to demonstrations of improved capabilities in unmanned ground, sea surface, underwater, and air robotic systems" - Announcement number N66001-04-X-6001) are available online:

https://e-commerce.spawar.navy.mil/command/02/acq/navhome.nsf/homepage?readform

"Innovative design in the trade space is required to balance USV requirements and LCS programmatic objectives within the available timeframe," said Chris. Hillenbrand, Unmanned Surface Vehicle Customer Advocate, USW Weapons and Vehicles Product Area.

According to program office officials, the LCS "sea frame" will be a major factor for mission module design. The mission packages must fit within the seaframe volume allocation. The davits must be able to lift the vehicles, and the systems must mate up to the standard interfaces. The communication links must utilize the VRC-99 radio to talk to the operator.

"We want to open up the USV's design to the greatest extent possible while still being bound by the LCS sea frame and ASW mission system's requirements," Hillenbrand said.

Moore Honored by SNAME

Arnold P. Moore, engineering vice president at Northrop Grumman Corporation's Ship Systems sector, received the 2005 William M. Kennedy Award from the Society of Naval Architects and Marine Engineers (SNAME). The award honors his outstanding service and contribution in the development of systems and planning for shipbuilding and ship repair. "Our company is fortunate to have someone with the expertise, ingenuity and impeccable leadership skills of Arnie Moore, planning and developing the shipbuilding platforms that will define the U.S. Navy and U.S. Coast Guard's future capabilities," said Philip Teel, president of Northrop Grumman Ship Systems. "Arnie's ability to manage extensive engineering resources across several different ship classes is a testament to his extensive knowledge of marine engineering and naval architecture. We join SNAME in congratulating him on his career achievements." Moore was recognized for the key planning and production control initiatives he has led over the past 23 years at Northrop Grumman Ship Systems. During his tenure with the shipyard he has held key leadership roles in the detail design of the Ticonderoga-class cruisers, the Wasp- and San Antonio-classes of amphibious assault ships, the Israeli Navy SA'AR 5 corvette, the Arleigh Burke-class destroyer and the Coast Guard's national security cutter.

Voith Expands Marine Portfolio

Voith Turbo Marine entered into a commercial cooperation with AIR Fertigung-Technologie GmbH & Co. KG and aims to expand its portfolio in the market for marine propulsion systems made from CFK. Based in Hohen-Luckow (Mecklenburg Ante-Pomerania), AIR was founded in 1993 by employees of Rockstock University and has since then presented significant and internationally acclaimed developments in propeller technology both for ships' propulsion systems and wind power stations. The company currently produces Contur-Propellers made from fiber compound plastics, which automatically adjust the propeller pitch independent of the thrust coefficient, so that optimum propulsion efficiency is achieved across the entire load range of the ship.

Additionally, AIR works at the innovative drive concepts Inline Thruster and Vector-Prop, which will shortly be launched in the marketplace and have already attracted a high amount of attention from interested shipbuilders and owners. AIR CEO and company founder Dr. Dirk Büchler estimates that the annual sales planned in this context will amount to approximately two million Euro.

Bainbridge Commissioned

Illustration: Peter Hsu, Anteon

William Bainbridge was born on May 7, 1774 in Princeton, New Jersey. Bainbridge entered the merchant marine at the age of 15, and at 19, became a commander of a merchant ship. He married Miss Susan Hyleger, daughter of a merchant and granddaughter of the governor of St. Uestatia ,at the island of St Bartholomew in 1798. Bainbridge was given command of the schooner Retaliation with a rank of lieutenant-commander in 1798 by the Navy. In 1812, the United States went to war with Great Britain. Bainbridge was given command of the Constitution. On December 29, the Constitution engaged the HMS Java, badly damaged the Java with all her mast shot off. During this engagement, one of the fallen mast from the Java damaged the wheel of the Constitution. Bainbridge had her wheel removed and replaced with the wheel from the Java and sailed home. Commodore William Bainbridge on his return was awarded the Congressional Gold Medal. Bainbridge passed away on July 28 1833 from pneumonia and enterred in Christ Church in Philadelphia. Four previous ships were named after Bainbridge: The first, a 259 ton Brig, commissioned on December 16,1842. The second, the first destroyer DD-1 was commissioned on February 1903. The third was a Clemson Class Destroyer, DD-246 was commissioned February 1921 and the fourth, a Nuclear-Powered Guided Missile Cruiser DLGN/CGN 25 was commissioned October 6,1962. The new Aegis Guided Missile Destroyer- USS Bainbridge (DDG 96), an Arleigh Burke Class destroyer, is the 25th 'Best built" by Bath Iron Works, Bath Maine and the 46th of the class, was commissioned on November 12, 2005 at Port Everglades , Fla. Ms Susan Bainbridge Hay is the fifth "Susan Bainbridge" descended from and named after the wife of Commodore William Bainbridge. The USS Bainbridge (DDG96) first Commanding Officer is Commander John M. Dorey, USN.

Kramek Named President-Elect of SNAME

The Society of Naval Architects and Marine Engineers (SNAME) named Robert E. Kramek president elect of the organization at its recent Annual Maritime Technology Conference & Expo in Houston, Texas. Kramek, President and Chief Operating Officer of ABS, one of the world's leading classification societies, will commence his term January 1, 2007, succeeding current SNAME President Dr. Roger H. Compton. Admiral Kramek is a former Commandant of the United States Coast Guard (USCG) from which he retired as a Four Star Admiral. "SNAME provides an essential forum for the exchange of ideas, information and innovation between naval architects and marine engineers in the United States," says Kramek. "It is also one of the foremost technical bodies in the world that works closely with its counterparts in the other leading maritime nations. The continuing challenge facing the leadership of the Society is to effectively align its focus with the needs of the maritime industry while at the same time best serving the immediate needs of its members." Admiral Robert E. Kramek graduated with honors from the United States Coast Guard (USCG) Academy with a B.S. in engineering in 1961 and attended postgraduate schools at the University of Michigan, Johns Hopkins University and the University of Alaska. He has received Master of Science Degrees in Naval Architecture and Marine Engineering, Mechanical Engineering and Engineering Management. He is a Fellow of the Society of Naval Architects and Marine Engineers (SNAME), a member of the American Society of Naval Engineers (ASNE), a member of the U.S. Navy League, and a life member of the Reserve Officers Association. Along with these memberships he serves on the Board of Trustees of the Webb Institute and the Board of Advisors for the University of Michigan's School of Engineering among many other professional commitments. Mr. Kramek also attended the U.S. Naval War College in Newport, Rhode Island, graduating with Highest Distinction. He completed the prestigious "Capstone" Program at the National Defense University's Institute of Higher Defense Studies. He has been honored as a Distinguished Alumnus at the U.S. Coast Guard Academy, the U. S. Naval War College, and the University of Michigan. Mr. Kramek is a recipient of the Reserve Officers Association Minuteman Hall of Fame award, the NAACP Meritorious Service Award, and an Honorary Doctorate in Public Administration from the Massachusetts Maritime Academy.

Robert Kramek is a naval architect and marine engineer. He is a Fellow of the Society of Naval Architects and Marine Engineers (SNAME), a member of the American Society of Naval Engineers (ASNE), a member of the U.S. Navy League, and a life member of the Reserve Officers Association. Along with these memberships he serves on the Board of Trustees of the Webb Institute, the Board of Advisors for the University of Michigan's School of Engineering, the Board of Visitors of the Joint Military Intelligence College, the Houston Texas Council of the United Services Organization (USO), the

Advisory Board of the Navy League, and is a director of the Coast Guard Foundation and is a companion of the Naval Order. He has received numerous military awards including Distinguished Service medals from the Department of Defense, Transportation and the United States Coast Guard. He is also a recipient of the American Pilots Association Navigation Safety Award, the Seamen's Church Institute Distinguished Service Award, the U.S. Navy League Distinguished Service Award, the Society of the Naval Order Sea Service Award and was recently inducted into the United Nations Maritime Hall of Fame.

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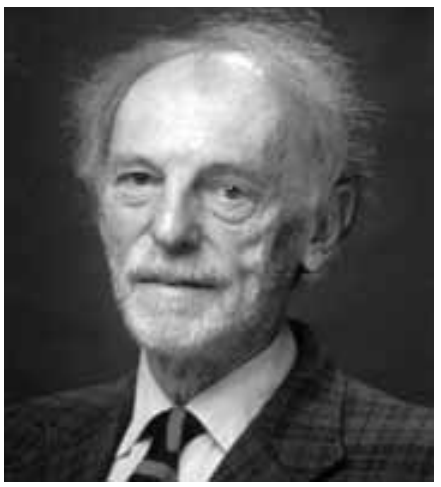
Wehausen, Leader in Marine Hydrodynamics, Dies

John V. Wehausen, professor emeritus of engineering science at the University of California, Berkeley, and one of the world's leading researchers in hydrodynamics, has died at the age of 92.

"Many of us in the marine academic field consider John Wehausen to be a pioneer in marine hydrodynamics," said Ronald Yeung, a UC Berkeley professor of mechanical engineering who chaired the campus's former Department of Naval Architecture and Offshore Engineering and considered Wehausen a mentor. "His background as an applied mathematician allowed him to set the framework for mathematical analysis of important ocean- and ship-related problems. This became increasingly important as practitioners sought to build offshore drilling systems that could reach depths of up to 2,000 meters and ships that could reach speeds over 50 knots yet survive the worst storms at sea."

Wehausen contributed original research in the areas of wave resistance, floating-system motions, ship maneuverability and ship-generated solitary waves. In 1960, he published one of his most influential works, the comprehensive review article "Surface Waves," coauthored by the late UC Berkeley professor Edmund V. Laitone. The article was originally published in the Encyclopedia of Physics and to this day is still used as an important resource for



understanding the dynamics of water waves. At UC Berkeley, Wehausen helped form the Department of Naval Architecture in 1958 with support from the Office of Naval Research. At the time, only three other U.S. institutions — Massachusetts Institute of Technology, the University of Michigan and the Webb Institute — offered accredited degree programs in naval architecture. The department eventually evolved in 1996 into a graduate group in ocean engineering within the Graduate Division. This fall, it became a major field of study within the UC Berkeley Department of Mechanical Engineering.

In 1937, Wehausen began his first teaching position as an instructor in mathematics at Brown University. He went on to hold other teaching positions at Columbia University and the University of Missouri from 1938 to 1944. During World War II, he worked for the U.S. Navy in operations analysis from 1944 to 1946 before joining the David Taylor Model Basin, a Navy research and development lab in Bethesda, Md. now known as the Hydromechanics Directorate at the Naval Surface Warfare Center.

His three-year tenure at the David Taylor Model Basin would prove formative. There, Wehausen met and was greatly influenced by renowned German ship hydrodynamicist Georg Weinblum. Wehausen's interest in water-wave theory and ship hydrodynamics can be traced to this time period.

Wehausen served as head of the Mechanics Branch of the federal Office of Naval Research from 1949 to 1950, and was then selected as executive editor of the journal Mathematical Reviews, a position he held from 1950 to 1956. In 1956, he was recruited by UC Berkeley, where he developed the graduate degree program in naval architecture. The rigorous curriculum would eventually become a model for similar programs around the world.

He retired from UC Berkeley in 1984, but remained active in research. He was a member of the National Academy of Engineering and a fellow of the Society of Naval Architects and Marine Engineers, which awarded him a Davidson Medal for outstanding scientific accomplishment in research.

ACR Electronics, Inmarsat Announce Agreement

ACR Electronics reached an agreement to sell more than 1,000 GlobalFix 406 EPIRBs (Emergency Position Indicating Radio Beacons) to Inmarsat.

Inmarsat has already announced the closure of Inmarsat E services on December 1, 2006, withdrawing the L-Band EPIRBs currently in service and replacing them with the new 406 MHz EPIRBs with GPS capability. The replacement program will commence January 1, 2006. ACR was selected to fulfill the contract, which may reach $1.3 million.

Hägglunds Grows

John Duncan, President of Hägglunds North American operations said "We are currently enjoying remarkable growth and in response have created five new sales regions headed by newly appointed Regional Sales Managers. The new Regional Sales Managers are:

- Kevin Sexton, based in Allenton, Pa, will be responsible for New Jersey, Pennsylvania and New York.
- Jack Shepherd, based in Hartford, Conn., will be responsible for Connecticut, Rhode Island, Massachusetts, Vermont, New Hampshire and Maine.
- Shane Roden, based in Denver, Colo., will manage Colorado, Utah, Wyoming and Montana.
- Doug Clark, based in Edmonton, Alberta, will manage Alberta and Saskatchewan.
- Lars Lattstrom, based in Rock Hill, SC, will now be responsible for Delaware, Maryland, West Virginia, Virginia, and North and South Carolina.

In addition, Gary Sauder has been selected to head Hagglunds Aftermarket Sales.

Exmar Orders LNG Ship

EXMAR confirmed a long-term charter party with Excelerate Energy LP, the liquefied natural gas shipper and marketers based in Woodlands, Texas, for another liquefied natural gas regasification vessel (LNGRV). The vessel will be built by Daewoo Shipbuilding & Marine Engineering Co. Ltd (DSME), and will be constructed incorporating the GTT membrane containment system together with Excelerate's Energy Bridge technology. It will have a capacity of approximately 150,900 cu. m., with delivery in the 2Q 2009.

ARC Reflags Two Ships For MSP Use

American Roll-On Roll-Off Carrier (ARC) conducted a ship naming ceremony to rename and reflag two Lloyd's Register-classed ships, enabling them to be used in the Maritime Security Program (MSP). The two ships are now named Integrity and Courage. Ed Waryas, Vice President of Marine Business for Lloyd's Register North America attended the ceremony, as the ships' classification society played an important role in the process of renaming and reflagging them."

Marine Environmental Engineering Technology

Symposium - January 23-25, 2006

Common Issues, Common Solutions will focus on current and emerging environmental challenges impacting the ship operators from both the commercial and government sectors of the international maritime community. This is an opportunity for members (including engineers, operators, managers, and regulators) to exchange information regarding technology and management gaps and work toward solutions for today's, and tomorrow's, environmental challenges. For information, visit www.navalengineers.org/Events/MEETS2006

Alfa Laval Showcases PureVent in Rotterdam

Alfa Laval showcased its PureVent at the recent Europort 2005 exhibition in Rotterdam, a system that is designed to be an environmentally sound solution to clean crankcase gas.

Reducing emissions from ship fuel exhaust has been an environmental focus for the marine industry. Much less attention, however, has been given to the gas vented from the engine crankcase although it also represents an environmental concern.

To address this, Alfa Laval together with Wärtsilä have developed PureVent, a compact air separator that effectively removes oil mist from crankcase gases with 99 percent efficiency.

Circle 1 on Reader Service Card

K-Line Technology

The first Europort Maritime exhibition in Rotterdam played host to the latest developments in shipboard integration from Kongsberg Maritime. The new K-Line technology, officially launched earlier this year, consists of separate systems for Navigation (K-Bridge), Automation (K-Chief), Dynamic Positioning & Joystick (K-Pos), Prop and Thruster Control (K-Thrust), Tank Gauging (K-Gauge) and Safety (K-Safe). Each system can be installed as a standalone sub-system or as a greater whole ship-wide network based vessel management system. The system has been designed to provide fully redundant operation of a

ship's major operating systems. If one area suffers downtime then the redundancy will provide operation as normal. The same graphical user interface (GUI) throughout the systems means that costs can be saved in operator training.

Circle 2 on Reader Service Card

ISPS Announcement Service

The Royal Dirkzwager ISPS application connects WebInfo, WebAgent and a specially designed terminal gate application to provide an integrated visitors' registration system. Potential vessel visitors can announce themselves in the WebInfo application, which sends the request to the agent.

After agent approval, the visitor's information is sent to the terminal gate application, where it interfaces with several access control systems. After the visitor's identity is verified, access is granted.

The application is designed to simplify ISPS port regulations and can interface with other applications or function as a solo system.

Circle 3 on Reader Service Card

PCL 600 Cutting Robot Line

The Robotic Profile Cutting Line (PCL) is designed to cut bulb flats, angle bars, T-bars and flat bars. Together with standard macros that cover the majority of production demands, the macro editing software enables the user to define individual new shapes. The machine can be connected to several CAD systems and can generate different kinds of management information.

Circle 4 on Reader Service Card

Cummins QSK19 Meets EPA Tier 2 Requirements

Cummins Marine introduced the QSK19 engine for marine propulsion and auxiliary applications. It is the first of a new line of Quantum System marine products from 19-60 liters of displacement. The entire Quantum System engine family features an in-cylinder combustion process, designed to meet 2007 EPA Tier 2, European Union and CCNR Phase II emissions regulations.

The QSK19, with ratings from 373-597 kW (500-800 bhp), is designed for high-hour, demanding applications such as towing, cargo and passenger transport, and fishing and ship's service power. The engine is Type Approved and meets the latest SOLAS requirements, and will be built and marinized at Cummins Industrial Center in Seymour, Indiana.

Cummins QSK19

The engine features Cummins' Modular Common Rail Fuel System (MCRS), which is designed to allow multiple injection events to precisely control engine fueling. Quantum System electronics are driven by a CM 850 controller. Integrated information systems and panels help maximize engine efficiency and performance while providing diagnostic and prognostic data. A single connection in the customer interface box simplifies the link between the engine electronics and vessel systems.

A combination of features onboard the engine is designed to enhance reliability and durability as well as increase engine life. A single piece cast iron piston, hardened cylinder liners, and premium ceramic surfaced rings increase the life of the power cylinder. The elimination of injector load on the camshaft and overhead rocker levers reduces wear on these major components. Additionally, a robust marinization features a water cooled triple-wall exhaust manifold and turbocharger with a titanium compressor to ensure the engine performs in demanding marine environments. The exhaust system design provides the added benefit of improved fuel economy while eliminating potential exhaust leaks.

Minimal changes to the footprint, mounts, ratings and optional equipment from the current K and KV engines aim to ensure less complexity for new installations and repowers.

The engine sub-system enhancements require no added service. Additionally, Cummins Marine offers many alternatives to help reduce or eliminate maintenance and downtime; for example, the two-stage Fleetguard fuel filtration is designed to utilize larger elements for longer filter life; the Cummins Centinel Oil Management System is designed to increase oil change intervals by up to 4000 hours; and the Eliminator filter, which replaces disposable lube filters, has been scaled in size for the new QSK19 engine. Working together or individually, the Centinel and Elminator are designed to reduce the possibilities of oil contamination during oil-related service events; helping to balance the needs of the environment with the expectations of marine operators.

Circle 99 on Reader Service Card

My Time Is *NOT* Your Time

In the 1920s, Rudy Valle had a major hit with his recording of the song "My Time Is Your Time." Life was simpler then. After all, the dispute between the Julian calendar and the Gregorian calendar had been resolved some 200 years before. As mechanical clocks came into widespread use at about the same period, people started scheduling their days by reference to the clock, rather than the sun - hence the term "o'clock" when telling time. Time zones were officially established by international treaty in the 1880s. In the United States, time zone boundaries are designated by the Secretary of Transportation. The dates for daylight savings time are controlled by Congress (daylight seems to be the only thing these legislators can save). Timekeeping in general, as with so many other things, revolved around the sun. That changed with the arrival of the Atomic Age.

Scientists discovered that certain atoms vibrated with amazing consistency. Engineers started developing highly accurate clocks based not on a pendulum, but on these vibrating atoms. They soon discovered that there was a difference between these atomic clocks and the rotation of the Earth on its axis. It seems that, for a variety of reasons that are not germane to this article, the rotation of Earth is slowing down, although not consistently. It takes slightly longer today for the Earth to rotate 360 degrees on its axis (a full solar day) than it took on the same day last year. The difference is so slight that I, for one, did not notice. Mechanical clocks do not detect this slowing either. But atomic clocks do register the difference. In 1967, before the implications of the slow lengthening of the solar day were fully appreciated, the General Conference on Weights and Measures decided, in the interest of scientific accuracy, to change the definition of the second from "1/86,400 of a mean solar day" to "the duration of 9,192,631,770 periods of the radiation corresponding to the transition between the two hyperfine levels of the ground state of the cesium 133 atom." Soon, it was apparent that the atomic clocks and the Earth were getting out of synchronization. The process of adding leap seconds (generally at the end of various years) commenced in 1972. To date, 22 leap seconds have been added in an attempt to keep the atomic clocks and the Earth in sync. Why does, or should, the mariner care?

Because life is no longer simple.

Technologies that mariners have grown to rely on themselves rely on atomic clocks to perform their missions. LORAN-C and especially the Global Positioning System (GPS) utilize atomic clocks to synchronize their highly precise signals. These atomic clocks do not utilize leap seconds. LORAN-C clocks are calibrated to zero-hour on January 1, 1958. There is now a 22 second difference between the LORAN-C clocks and Coordinated Universal Time (UTC). GPS clocks are calibrated to zero-hour on January 6, 1980. There is now a 13 second difference between GPS clocks and UTC. At the speed

ships normally travel, 13 seconds or even 22 seconds may not make a significant difference. But, these technologies, particularly GPS, are used for more than just keeping track of the position of ships. In addition, the technologies have become increasingly complex, leading to unintended and unanticipated consequences.

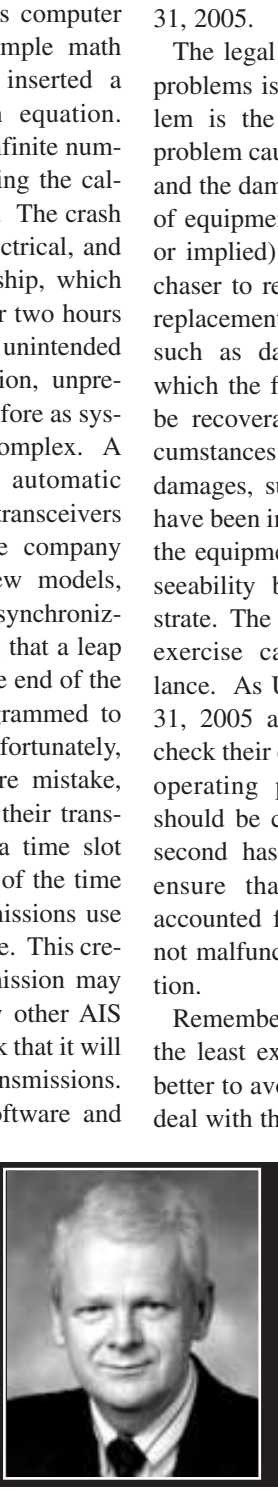
The quest for greater and greater precision has led to greater and greater confusion. There are now multiple time scales in widespread use and most users don't know or advertise which time scale they are utilizing. The most utilized time scale based largely on the Earth's rotation is referred to as Greenwich Mean Time (GMT), but, since 1925, it is actually Universal Time (UT). The basic unit of atomic time is the International System (SI) second (defined above). The atomic time scale based on the SI second is referred to as the International Atomic Time (TAI). The combined rotational-atomic time scale is referred to as the Coordinated Universal Time (UTC), which is the time scale in the widest use today. It combines the familiarity of the rotational time with the accuracy of atomic time. The problem, as discussed above, is the difference between the rotational and atomic times and solution, albeit not fully satisfactory, is the leap second.

When a leap second was added most recently (on December 31, 2003), some GPS receivers malfunctioned - displaying the time as 62:28:15. Another leap second is scheduled to be added on December 31, 2005. Hopefully, GPS receivers will be able to accommodate the event more smoothly this time.

Increasingly, GPS signals are incorporated into electronic navigation systems, automatic identification systems, and other intricate interactive systems. Failure to smoothly accommodate the leap second may lead to unexpected errors arising in some of the outputs of these systems. There is the potential, albeit remote, that an entire system may come down. One is reminded of the predicament of the USS YORKTOWN (CG-48). On September 21, 1997, this Aegis cruiser was in the North Atlantic on a solo cruise. A petty officer in the Engineering Department was placing a routine order for supplies, using the ship's computer system. While doing a simple math problem, he inadvertently inserted a zero as the divisor in an equation. Dividing by zero yields an infinite number. The computer, attempting the calculation as directed, crashed. The crash shut down all electronic, electrical, and propulsion systems on the ship, which became dead in the water for two hours and 45 minutes. The law of unintended consequences is, by definition, unpredictable and can come to the fore as systems become increasingly complex. A Swedish manufacturer of automatic identification system (AIS) transceivers has become afflicted. The company recently introduced two new models, which utilize UTC time for synchronizing transmissions. Knowing that a leap second would be added at the end of the year, the models were programmed to account for the change. Unfortunately, due apparently to a software mistake, the models now commence their transmissions in the middle of a time slot rather than at the beginning of the time slot. As a result, the transmissions use two time slots, rather than one. This creates the risk that the transmission may not be properly received by other AIS devices. There is also the risk that it will interfere with other AIS transmissions. The company is making software and equipment upgrades available to eliminate the erroneous transmissions, which will self-correct when the leap second takes effect at midnight on December 31, 2005.

The legal consequences of these time problems is still unknown. If the problem is the result of a manufacturing problem caused by the equipment maker and the damages are limited to the piece of equipment itself, warranties (express or implied) will generally allow a purchaser to recover the costs of repair or replacement. Consequential damages, such as damages to equipment with which the failed product interacts, may be recoverable, depending on the circumstances. Recovery of more remote damages, such as a collision that may have been indirectly caused by failure of the equipment, will be difficult as foreseeability becomes harder to demonstrate. The best course of action is to exercise caution and increased vigilance. As UTC midnight on December 31, 2005 approaches, mariners should check their equipment to ensure that it is operating properly. The equipment should be checked again after the leap second has been inserted in order to ensure that all equipment properly accounted for the leap second and did not malfunction as a result of the insertion.

Remember, the problem may arise in the least expected manner. It is much better to avoid problems than to have to deal with their consequences.



Dennis L. Bryant, Senior Maritime Counsel at the law firm of Holland & Knight, Washington, D.C., is a contributing editor of MR/EN.

Maritime Reporter & Engineering News' annual presentation of "Great Ships" has again set a new benchmark, with 25 ships receiving the honor as a result of the rigorous process to identify and present ship's details. Nearly 40 percent (9 of 25) of the award winners this year are in the Container Vessel category, as technological innovation has mushroomed in this niche with the race to build the largest, fastest and most efficient containership. While size does matter in the case of MSC Pamela, currently the world's largest capacity containership, able to carry an incredible 9,200 TEU, sporting the world's largest marine diesel, an MAN B&W 12K98MC-C unit which generates 93,120 bhp, the small also prosper, as evidenced by the inclusion of the 812 TEU Geeststroom built by Damen.

Benchijigua Express • RoPax • Austal

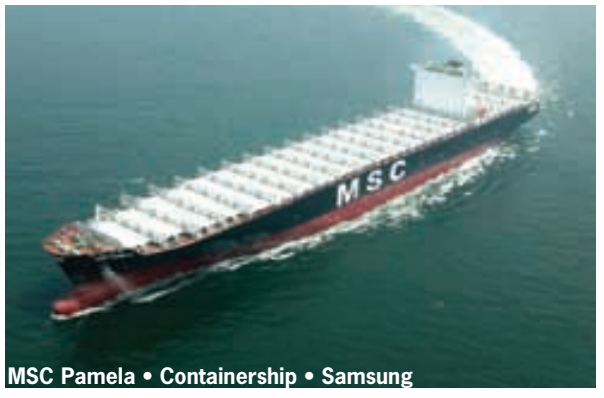
RoPax Ferry

A new milestone in both high-speed ferry operations and in Australian lightweight shipbuilding technology was marked by the 2005 service debut of the 127-m trimaran **Benchijigua Express**. Demonstrating designer and builder Austal Ships' ability to marry technical innovation with production competitiveness and close attention to the practical requirements of operators, the vessel signified an advance in size, payload and power in the company's Auto Express ro-pax offering. The new multihull ferry confers a capability to maintain speeds of 40-knots with a capacity for 1,350 passengers and 341 cars, or 400 freight lane-meters plus 123 cars. The project was shaped by the vital competitive importance to contractual owner Lineas Fred Olsen of ensuring all-weather scheduling dependability on high-speed operations in the waters around the Canary Islands, prone to rough sea conditions, while meeting passengers' growing expectations as to ride quality. This led to the adoption of a hull configuration which departs from the norm, resulting in what is claimed to be the world's largest trimaran. Using a trimaran hull shape, effectively a stabilized monohull, has enabled the designers to separate the regulatory stability requirements from the seakeeping, comfort and desired motion requirements. The shipowner also required increased engine power without embracing gas turbine technology and its perceived higher operating costs.

Benchijigua Express has been allocated to the traffic from Los Cristianos, on Tenerife, to the islands of Gomera and La Palma. It was anticipated that the superior seakeeping performance of the trimaran would improve passenger comfort by up to 40 percent compared to Fred Olsen's existing fast ferries, and that the vessel would yield higher levels of operability in adverse weather conditions. The new addition to the fleet hoisted overall efficiency in terms of passenger capacity, deadweight and freight lane meters by around 35 percent. The most potent model of diesel engine ever offered by power systems supplier MTU Friedrichshafen, the Series 8000, is at the heart of the groundbreaking trimaran. The nomination of four 20-cylinder, 8000 vee-type engines to power the ferry at laden service speeds of around 40-knots was a resounding endorsement of the German-developed, high-speed diesel in a target market. The installation provides an initial plant capacity of 32,800-kW, although the contractual agreement provides for rating increases in accordance with anticipated growth in transport volume on the intra-Canary Islands traffic.

The MTU plant is distributed between two separate engine rooms in the vessel's central hull, and drives a

Page	Ship Name	Ship Type	Ship Owner	Ship Builder
17	Benchijigua Express	High-speed RoPax ferry	Lineas Fred Olsen	Austal Ships
18	MSC Pamela	Containership	MSC	Samsung Heavy Industries
18	Hatsu Shine	Containership	Hatsu Marine	Mitsubishi Heavy Industries
20	Nordwelle	Containership	Oldendorff	STX Shipbuilding
20	Colombo Express	Containership	Hapag Lloyd Container Line	Hyundai Heavy Industries
20	Savannah Express	Containership	NVA	Daewoo Shipbuilding & Marine Engineering
20	MSC Busan	Containership	Reederei Claus-Peter Offen	Hanjin Heavy Industries & Construction
22	CMA CGM Excellent	Containership	Reederei Rudolf Schepers	Hanjin Heavy Industries & Construction
24	P&O Nedlloyd Mondriaan	Containership	P&O Nedlloyd B.V.	IHI Marine United
24	Geeststroom	Container Carrier	Geest North Sea Line	Damen Shipyards
26	Gaz de France Energy	LNG	Gaz de France	Chantiers de l'Atlantique
26	Energy Advance	LNG	Tokyo LNG Tanker	Kawasaki Shipbuilding
27	LNG Enugu	LNG	Bergesen DY ASA	Daewoo Shipbuilding & Marine Engineering
28	Jeanne-Marie	LPG	Geogas Shipping S.A.	Daewoo Shipbuilding & Marine Engineering
28	Jean Anne	RoRo	The Pasha Group	VT Halter Marine
28	Saffety Ulusoy	RoRo	UND	Flensburger Schiffbau-Gesellschaft
28	Maersk Dunkerque	RoRo Passenger Ferry	Norfolkline/A.P Moller Group	Samsung Heavy Industries
28	British Cormorant	Tanker	BP Shipping	Samsung Heavy Industries
29	North Point	Tanker	Pietro Barbaro S.p.A.	STX Shipbuilding
30	Perseverance	Tanker	Transpetrol Service N.V.	STX Shipbuilding
30	Altair Trader	VLCC	Fortitude Shipping Navigation	Mitsui Engineering & Shipbuilding
30	Andromeda Voyager	VLCC	Kristen Navigation Inc.	Daewoo Shipbuilding & Marine Engineering
30	Universal Queen	VLCC	Hyundai Merchant Marine Co.	Hyundai Heavy Industries
31	Viktor Titov	Ice Classed Tanker	Primorsk Shipping Ltd.	Hyundai Heavy Industries
33	Spar Lyra	Handymax Bulk Carrier	Spar Shipping	Chengxi Shipyard



MSC Pamela • Containership • Samsung


Nordwelle • Containership • STX Shipbuilding


Colombo Express • Containership • Hyundai

total of three Rolls-Royce Kamewa waterjets. The two prime movers in the aft machinery space are each coupled to a steerable, 125SII-type waterjet, while the two located in the forward engine room deliver their combined power to a 180BII-model, booster waterjet. The three drivelines use Renk transmissions, with lightweight composite shafts fitted between the waterjets and gearboxes and on the output shaft of the furthest forward engine. While the 20V8000 has a rated output of 8,200-kW, the understanding entered into between the contractual parties allows for an increase in unit power to 9,100-kW during the first quarter of 2006. The propulsive power concentration in the ferry would then amount to 36,400-kW. The design has been offered to the naval market from the outset at up to 9,000-kW.

Containerships

MSC Pamela is touted as the world's largest containership deployed in the Euro-Asian route. Measuring 336.7 x 45.6 m, the mammoth ship carries 9,200 TEU. Some key engineering design features for MSC Pamela includes its ability to load 10 tiers within the cargo hold. It has divided the wing ballast tanks into top and bottom separate tanks to solve the excessive stability problem that was typically experienced in large container vessels. Apart from the large loading capacity, MSC Pamela has a record in service speed of 26 knots, with the largest marine diesel - an MAN B&W 12K98MC-C unit with an MCR rating of 93,120 bhp (68,520 kW) at 104 rpm. The main cargo space comprise nine holds with eight holds forward and one aft ward of the machinery room. The vessel has a nine tier accommodation space located at the three-quarters aft directly above the machinery space. The height of each tier has been designed to facilitate the loading of seventh tier containers on the No.5 hold, keeping in view of the visibility requirements IACS UI SC181.

Container capacity in the holds is 4,652 TEU, with either 4,058, or 4,526 TEU carried on deck, depending on whether stacks are six or seven tiers high.

Maximum stowage on deck is 18 rows of seven tiers, and in the holds 16 rows of 10 tiers. There shall be no restriction on the position of the high cube containers (i.e. flexible loading). Two hatch covers can load 45 ft. containers directly on top while others can load 45 ft. containers from the third tier on the hatch cover.

Lashing bridges to secure and access containers are fitted throughout the deck between the hatches. A total of 700 FEU self-contained air-cooled type reefer containers can be stowed second and third (near accommodation only) tier on the hatch cover. Dangerous goods can be loaded in holds 1 to 3, 5, 6 and on deck

To adjust the heel, No.5 and 6 wing water ballast tanks will be served as heeling tanks, using a heeling pump.Electric supply is from four STX MAN 3,000 kW diesel-driven sets in an arrangement controlled by a power management system.

Combining a highly circumspect approach to environmental issues with economies of scale, the design embodied by **a new generation of Evergreen post-Panamax containerships found first form during the fall in the 7,024-TEU Hatsu Shine.**

Testament to the longstanding relationship between the Taiwan-based organization and Mitsubishi Heavy Industries, Hatsu Shine leads a class of 10 entrusted to the Japanese builder's Kobe yard. She and the subsequent three vessels in the series have been assigned to Evergreen's U.K. subsidiary Hatsu Marine, while the remaining six newbuilds are presently slated for Evergreen International Services.

While the earlier E- and U- types of post-Panamax

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Samsung's shipbuilding technology
navigates through the seas of the world!

BP BRITISH CORMORANT

NORFOLKLINE
MAERSK DUNKERQUE

3J-RASGAS LUSAIL

MSC PAMELA

Taking pride in being selected as the shipbuilder of three world's best ships this year, Samsung Heavy Industries intends to lead the global shipbuilding industry by building stronger, more practical ships.

MSC PAMELA (9,200TEU Container ship)	Samsung, who recently built a world's largest 9,200 TEU container vessel, continues to replace its own world record every year in building of large container vessels.
BP BRITISH CORMORANT (113,000 DWT Tanker)	It was the first in a six-ship double-hulled series of Aframax Tankers constructed for BP Shipping of the United Kingdom.
NORFOLKLINE MAERSK DUNKERQUE (Ro-Ro Passenger Ferry)	The vessel has a capacity of 780 passengers, 120 freight vehicles and 200 cars. High speed performance, interior outfitting of high European standard, environment friendly systems, redundant propulsion and steering systems, low noise and vibration with comfort class notation
3J-RASGAS LUSAIL 145,600 m3 LNG Carrier	The Lusail has a record in service speed of 20.2 knots with Main Steam Turbine with an MCR rating of 39,500 SHP (29,040 kW) at 90 RPM. For good maneuverability, one(1) bow tunnel thruster of 2,500 kW (Kawasaki) and High performance rudder developed by Samsung is adopted.

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SAMSUNG

SAMSUNG HEAVY INDUSTRIES

Circle 234 on Reader Service Card


Savannah Express • Containership • Daewoo

MSC Busan • Containership • Hanjin

CMA CGM Excellent • Containership • Hanjin


P&O Nedlloyd Mondriaan • Containership • IHI Marine

Geeststroom • Container Vessel • Damen

boxship, rated at 6,332-TEU and 5,364/5,652-TEU respectively, have made their mark on the incoming S-class, the new breed is particularly distinguished in its incorporation of a range of technical features exceeding current and impending environmental criteria.

Over-and-above the compliance with international limits on NOx (oxides of nitrogen) exhaust emissions achieved with the potent Sulzer 10RTA96C prime mover and the auxiliary engines, all incorporating Wärtsilä's low-NOx technology, Hatsu Shine offers a 'cold-ironing' capability. Evergreen anticipates that many ports will follow Los Angeles' lead in requiring vessels to shut down shipboard diesel generators while in port, and switch to shoreside power.

The S-type employs a double-hull and affords increased protection to the fuel tanks through location within the transverse bulkhead spaces, thereby minimizing the risk of pollution or fire as a consequence of grounding or collision. A significant additional design move has been to provide separate tankage for low sulphur fuels, enabling fuel supply switchover when sailing in restricted areas such as the Baltic Sea.

A high capacity oily water separator enables the oil content of waste water to be cut to just 15-ppm (parts per million), and much larger than usual bilge oil separator holding tanks obviate the need for discharge when operating in sensitive areas, and maximize volumes that can be retained for ultimate removal to specialized facilities ashore. Similar arrangements have been made for sewage and so-called gray water, including that from the cargo hold bilges. The amount of water collected in the holds has become more of an issue with the advances in containership size.

With an overall length of 300-m and beam of 42.8-m, Hatsu Shine is able to carry 17 rows of containers across on deck and 15 rows across within the holds, and confers added flexibility through 839 reefer plugs for temperature-controlled boxes. The 10-cylinder RTA96C main engine develops 74,700-bhp (54,900-kW) to provide for a service speed of 25.3-knots, and was built by Mitsubishi under license from Wärtsilä.

M/V Nordwelle was built to a basis STX Shipbuilding design developed around what has become a popular size of 2,600 TEU Class Container Vessel. MacGregor lift away pontoon type hatch covers consist of three panels, each 40 ft. long. 1,634TEU containers can be stowed on hatch covers and upper deck with 12 rows. A 6.5ton Provision crane (3 m to 18.2 m) is installed on the same level of the E deck.

The propulsion machinery is comprised of a STX MAN B&W 8S70MC-C main engine producing 33,760 bhp (24,880 kW) at 91 rpm, driving a 7.8 m, fixed pitch propeller. The ship also features four diesel alternator sets and one Kawasaki 1,200 kW CPP bow thruster. To avoid vibration problems, the propeller is a highly skewed five blade unit, and was run through much model testing in parallel with various studies for design optimization. The ship's service speed is 22.4 knots at 90% MCR on the fully loaded draft.

The 8,600 TEU class containership Colombo Express, built at Hyundai Heavy Industries (HHI), was delivered to Hapag-Lloyd Container Line, Germany on March 30, 2005. The vessel is the first of eight 8,600 TEU container ships and has an overall length of 335 m, width of 42.8 m and depth of 24.5 m with a design draft of 13 m. The ship is powered by a HYUNDAI-B&W 12K98ME model, developing an MCR of 68,640 kW at 94 rpm, driving the ship to a service speed of 25.2 knots with 20 percent sea margin without power take off. The Hyundai containership features a wide beam, a feature designed to ensure better stability when loading and unloading. The vessel is also designed to have superior propulsion efficiency against the various draft which will be caused by loading scheme. The vessel has nine holds, seven of which are arranged forward of the engine room (20 ft. container/30 bay) and two are backward (20 ft. container/10 bay) and a maximum of 15 rows and 9 tiers of containers can be stowed in the holds. Two air changes per hour are provided to No.1-4 hold in which dangerous cargoes of SOLAS classes 2 to 8 can be carried.

The containership is girderless type and can carry the maximum 15 rows in holds and 17 rows on deck of containers. Total TEU capacity is 8,606 of which 3,887 TEU are in holds and 4,719 TEU are on deck, with 730 FEU reefer sockets provided. Pontoon type hatch covers close the nine holds. Each hatch cover is made up of three panels with maximum panel weights kept below 40 tons to suit handling by port cranes. The vessel is arranged to carry 20, 40 and 45 ft. containers, with recessed open hold for 20 ft. containers arranged at aft mooring deck. Cargo holds are provided with 40 ft./20 ft. fixed cell guide. Athwartship lashing bridges for 40 and 45 ft. containers are arranged with necessary fittings so that containers on hatch cover/stool on upper deck can be lashed up to 5/6 tiers.

The containership is provided with both optimum section profile of rudder and tip-raked propeller to reduce cavitation. For durability of outside shell, tin-free self-polishing anti-fouling paint of five-year lifetime and ICCP is applied to the vessel. The vessel is classed and registered as GL +100A5,E, Container Ship, +MC, AUT, IW, NAV-OC, SOLAS II-2 REG. 19.

The 8,400 TEU Savannah Express was designed as double skinned construction in way of cargo holds except No.1 hold.

It is fully welded flush deck type with forecastle and has a raked stem with bulbous bow, a transom stern, a full spade rudder and a fixed pitch propeller directly driven by a B&W 12K98ME-C engine with MCR output of 93,360 PS at 94 rpm.

Savannah Express is designed to carry 8,400 TEU containers including 700 FEU reefer containers. 45 ft. containers on hatch cover are arranged from the third tier on deck. The number of loadable containers with 14 tons /TEU is approx. 6,680 TEU at the scantling draft of 14.5 m. The vessel was designed to exchange ballast water by flow through method for wing ballast tanks and pump in-pump out method for double bottom ballast tanks.

MSC Busan is the fourth in a series of nine 8,100TEU container ships, the largest ever built by Hanjin. This Super Post-panamax container vessel is built with DAM construction method which was developed and applied for the first time in the world to such large scale shipbuilding, a process designed to overcome the physical hindrance of 300 m dock length. At the final stage of hull erection, a DAM is applied to the joint area of the bow section and main hull, allowing two parts to be assembled together while ship afloat in the dock.

MSC Busan is 325 m long with a beam of 42.8 m and full load draft of 14.5 m. Its service speed on its 13-m design draft is 25.96 knots at 90 percent MCR with a

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20 percent sea margin. Its maximum cruising range is 22,000 nautical miles and its maximum carrying capability of container is 8,089 TEU.

This vessel is designed as raked stem with bulbous bow, transom stern without curvature and flush deck with forecastle. The main hull structure - which consist of deck, side shell, longitudinal framing system, and E/R double bottom - except fore and aft ends of hull, have been longitudinally and/or transversely framed. All accommodation space, including navigation-bridge and propulsion machinery space, have been located semi-aft, but vibration and noise is designed in order to avoid resonance, for the duel benefit of the comfort of the crew and for the long life of the ship's equipment. Accommodations are provided for 28 officers and crew, including six for a Suez-canal crew.

Main propulsion is provided by one NSD 12RTA 96C-B, two stroke single acting airless injection, crosshead, direct reversible, turbocharged type, with a maximum power of 93,360 PS at 102 rpm and service power of 84,024 PS at 98.5 rpm.

Of the 8,089 TEU, 3,852 TEU are situated in holds, with 4,237 TEU on deck. There are 550 FEU reefer sockets provided. There is a maximum of 15 rows with 9 tiers containers can be loaded in 8 holds, and 17 rows with 7 tiers containers to be carried on hatch covers.

Cell guides have been provided for 40 ft containers (40' x 8' x 8'-6") in every hold and 20 ft. containers (20' x 8' x 8'-6") have been stored inside of 40 ft container cell guides. The ship can have 26,100 cu. m. of ballast water, 10,900 cu. m. of heavy fuel oil, 490 cu. m. of diesel oil, and360 cu. m. of fresh water.

The ship has been constructed under the special supervision of and according to the full requirements and recommendation of the Classification Society Germanischer Lloyd and is designed +100A5 "Container Ship", "SOLAS ?-2, Reg.19", +MC, AUT, IW, BWM-F.

Also from Hanjin comes the CMA CGM Excellent, a 212 x 32.2 m containership, with a full load draft of 12 m. Its service speed on its 10.8 m design draft is 22.66 knots at 90 percent MCR with 15 percent sea margin, and its maximum cruising range is 15,000 nautical miles and its maximum carrying capability of container is 3,398 TEU. This vessel is designed as raked stem with bulbous bow, transom stern without curvature and flush deck with forecastle. The main hull structure consist of deck, side shell, longitudinal framing system, and E/R double bottom, except fore and aft ends of hull have been longitudinally and/or transversely framed.

All accommodation space including navigation-bridge and propulsion machinery space have been located semi-aft, but vibration and noise is designed in order to avoid resonance, for the comfort of he crew and for the long life of ship's equipment. Comfortable accommodations are provided for 25 officers and crew, including six Suez canal crew.

The main propulsion is provided by a single MAN B&W 8K80MC-C, two stroke single acting airless injection, crosshead, direct reversible, turbocharged type, with a maximum power of 28,880 kW at 104 rpm and service power of 25,992 kW at 100.4 rpm.

Fully 3,398 TEU containers of 1,399 TEU are housed in the hold, and 1,999 TEU on deck, can be loaded on the vessel and beside the 300 FEU reefer sockets pro-

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vided. There is a maximum of 11 rows with seven tiers containers that can be loaded in six holds, and 13 rows with six tiers containers to be carried on hatch covers.

Cell guides have been provided for 40 ft. containers (40 x 8 x 8.5 ft.) in every hold except No. 1. bay and 20 ft. containers (20 x 8 x 8.5 ft.) have been stored inside of 40 ft. container cell guides.

The ship can carry 13,320 cu. m. of ballast water, 3,540 cu. m. of heavy fuel oil, 210 cu. m. of diesel oil, and 210 cu. m. of fresh water. It has been built under the special supervision of and according to the full requirements and recommendation of the Classification Society Germanischer Lloyd and is designed +100A5 "Container Ship", "SOLAS ?-2, Reg.19", +MC, AUT, IW.

IHI Marine United Inc. delivered the 7,500 TEU containership P&O Nedlloyd Mondriaan to P&O Nedlloyd B.V. through Reederei Blue Star GmbH at its Kure Shipyard. The P&O Nedlloyd Mondriaan is a new generation of post Panamax size containership and features larger capacity and good stability, installation of common rail electronically-controlled DU-Sulzer 12RT-flex 96C high power engine, a hull form for efficient speed and good fuel consumption, about 700 reefer container receptacles, lashing bridges for simple and secure lashing of on-deck containers, and integrated bridge system with one-man operation design. In order to realize good propulsion performance, economical operation and good maneuverability of the ship, IHIMU has designed the ship with its technical/engineering know-how, CFD analysis, 3-D/FEM ship model analysis, walk-through simulation and apparatus installation simulation CIM system, Ajisai, which IHIMU originally developed.

Last in the container vessel class, but certainly not least, is Geeststroom. Geest North Sea Line has taken a significant step forward in its plans to expand its intermodal door-to-door capacity with the introduction into service of Geeststroom, the first of two 812 TEU containerships that were ordered in 2003 from the Damen Shipyards Group by the German shipowner Jorg Kopping. More than twice the size of the largest ship in the Geest fleet, it is employed on Geest's routes between Rotterdam and Tilbury and Rotterdam and Hull. Geeststroom and her sister, Geestdijk, due for delivery in April 2005, have been built specifically for long-term charter to the Dutch shortsea and intermodal specialist. Designed to meet Geest's particular requirement for a vessel able to carry a full load of 45 ft. pallet-wide containers or a mix of 45 footers plus heavy 20 ft. tanks and 30 ft. bulk containers, the two ships were constructed by Damen Shipyards Galatz in Romania. Geest is committed to the expansion of European shortsea shipping and, in particular, to greater use of intermodal options including rail and inland waterway transport in Europe. However, to be competitive with 13.6m road trailers, the company had to replace its entire container fleet with 45 ft. palletwide containers. Until this vessel was delivered, no-one had built a containership specifically designed around the 45ft box and so any vessel we have chartered has always been a compromise. Geeststroom has changed that. The owner, Mr. Kopping, said "Geest is not only interested in 45ft containers. Many of its quay-to-quay customers are NVOs with shippers' owned equipment operating tanks and dry bulk units. Consequently, Geest also required a ship with a good deadweight able to accommodate heavy 20 ft. and 30 ft. containers."

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LNG/LPG

As the final bastion of steam turbine propulsion in mercantile shipping, the boom in the LNG carrier sector has not only given a fillip to the Japanese producers of such specialist plant, but has also sparked the uptake of alternative powering solutions. The recent entry into service of the first LNG tanker installed with a dual-fuel electric propulsion system, and the nomination of the concept for a clutch of subsequently-contracted, larger gas carriers, are likely to have forever altered the established order in deepsea LNG carrier powering. Steam turbine systems have monopolized large, single-screw LNG carrier propulsion over the past four decades due to factors of reliability, familiarity and the ease with which the boilers in such installations can use the gas boil-off which continuously emanates from the LNG cargo. Mitsubishi and Kawasaki have both augmented their offering with steam turbines suited to a new generation of higher capacity LNGCs. However, technological advances in main engines and innovation in propulsion systems, coupled with growing ship size and evolving trade requirements, draught limitation implications for hull and propeller design, and heightened expectations as to unit cost efficiency and operating flexibility, have prompted shipowners to consider new options.

The 74,000-cu. m. Gaz de France Energy, which was recently completed by Chantiers de l'Atlantique and phased into service carrying Algerian gas to France, has opened a new technical chapter in LNG marine transportation. It is the first LNGC to incorporate dual-fuel reciprocating engine, electric-drive system, and has also given form to GTT's CS1 membrane cargo containment technique, offering improved qualities and operating advantages and reduced costs compared with earlier systems. Both the propulsion concept and CSI cargo system have also been specified for two vessels of 153,500-cu. m. ordered from Chantiers de l'Atlantique. Gaz de France energy is equipped with four six-cylinder Wärtsilä 50DF dual-fuel engines, giving a total power output of 22.8-MW, and driving gensets delivering electrical energy to a pair of Alstom propulsion motors and all other shipboard consumers. The follow-on, larger newbuilds, Provalys and Gaselys, will each have three 12-cylinder 50DF dual-fuel engines plus one six-cylinder model, giving a power concentration of 39.9-MW.

Kawasaki Shipbuilding Corporation delivered Energy Advance, a large LNG carrier with LNG carrying capacity of 145,000 cu. m., to Tokyo LNG Tanker Co., Ltd. Kawasaki developed the LNG carrier of this class, which can visit any LNG terminal ports worldwide, with similar dimensions to the conventional 130,000 cu. m. class. The carrier is the fourth newbuilding of the 145,000 cu. m. class and second delivery to Tokyo LNG Tanker. The four LNG cargo tanks are of the independent spherical MOSS type. The heat insulation is the Kawasaki panel system that demonstrates a high heat insulation effect. This insulation system maintains the boil off gas rate at approximately 0.1% a day. The cargo tanks are installed inside the compartment built with double side shells and double bottom to ensure safety so that the cargo tanks are not damaged directly. The wheelhouse is equipped with advanced integrated navigation equipment, which has improved ship opera-

tion. Windows around the wheelhouse provide a panoramic view of 360 degrees, allowing one-man operation during oceangoing navigation.

Cargo-handling operation is carried out at the cargo-handling room located in front of the accommodation quarters, where the Kawasaki IMCS (integrated Management Control System) is installed for monitoring and controlling the cargo handling operation as well as monitoring engine conditions. The Kawasaki IMCS is very easy to use since it was developed by incorporating experience and suggestions from many operators.

The 145,700 cu. m. Liquefied Natural Gas (LNG) Carrier LNG Enugu, which Bergesen DY ASA ordered to DSME for the world-wide transporting LNG, is registered in Bermuda and was delivered on October 28, 2005. The ship is designed and constructed to meet the requirement of Lloyd's Register (LR) with the class notation +100A1, Liquefied Gas Tanker, Ship type 2G, Methane in Membrane tanks, Maximum vapor pressure 0.25 bar, Minimum temperature -163 oC, ShipRight (SDA) *IWS, LI, +LMC, UMS. NAV1, IBS with descriptive notes "Pt. Higher Tensile, ETA, ShipRight (FDA, CM, BWMP(S), SCM, TCM). LNG Enugu has a continuous upper-deck with aft sunken deck, a raked stem with bulbous bow, a bow thruster, a semi-balanced rudder and fixed pitch propeller driven by marine steam turbine. Four cargo tanks are designed as GTT membrane type (GT No 96 E-2 system) and are designed to keep the LNG at -163 oC under the condition of maximum daily boil-off rate less than 0.15% of fully loaded cargo volume. Primary/secondary barriers of 36 percent nickel-steel alloy (Invar, 0.7mm thickness), which have a low thermal expansion coefficient, are installed in cargo tanks and plywood boxes filled with expanded perlite are used for the primary/secondary insulation.

Through the cargo tank length, underdeck passageways are arranged port and starboard in trunk space and also center passageway (pipe duct) with trolley system is arranged in the double bottom. These passages are used as pipe & cable passages and for inspection/maintenance. A six-tier deckhouse located aft provides accommodation for 40, including Suez crews. The vibration levels in living areas are designed especially low at normal operating condition.

Cargo handling systems are designed to be capable of loading or discharging the LNG using eight cargo pumps with capacity of 1,650 cu. m./h and four stripping/spray pumps.

Liquefied cargo handling equipments such as two sets of main cargo pumps, one set of spray/stripping pump, one set of capacitance type level gauge including back-up capacitance type top/bottom sensor and one set of float type level gauge are fitted in tripod mast construction which forms a complete assembly unit per cargo tank by incorporating all outfittings and piping in cargo tanks. Vapor cargo handling equipments such as two high duty compressors, two low duty compressors, one main vaporizer, one forcing vaporizer and two boil-off/warm-up heater are arranged in cargo machinery room which is effectively arranged so as to be readily accessible, easy operation and maintenance.

The main propulsion unit is a Cross compound steam turbine (MCR: 33,700 PS x 86 RPM) with high pressure tur-

Jean Anne • RoRo • VT Halter Marine


LNG Enugu • LNG • Daewoo

Jeanne-Marie • LPG • Daewoo

Maersk Dunkerque • RoRo • Samsung


British Cormorant • Tanker • Samsung

bine and low pressure turbine, double reduction gear, main condenser including astern turbine. Two sets of dual fuel burning main boilers to supply the steam for main turbine, turbo generator, main feed water pump and other steam driven machinery are designed to be capable of burning of heavy fuel oil and also gas fuel by the low duty compressor through boil-off/warm-up heater for the use of boil-off gas.

The 78.6K LPG Carrier Jeanne-Marie was designed for the transportation of liquefied gases such as propane, butane and a mixture of propane and butane. It has a continuous upper deck with aft sunken deck, a raked stem with bulbous bow, a transom stern, a semi-balanced rudder and a fixed pitch propeller directly driven by a slow speed diesel engine. It was built to have four independent self-supporting prismatic cargo tanks which was designed for a maximum vapor pressure of 0.25 bar, a minimum temperature of -48 °C and a maximum cargo specific gravity of 0.61. The cargo handling system consists of four externally insulated cargo tanks, loading/discharging and cargo reliquefaction system capable of handling two grade of refrigerated cargoes simultaneously. The engine room is separated from cargo spaces by means of fuel oil tanks.

RoRo

Jean Anne, is the U.S.' first American Flagged, Jones Act compliant Pure Car Truck Carrier (PCTC). At 579 ft. long and a beam of 102 ft., the vessel is one-half as long as a nuclear aircraft carrier and almost as wide. The vessel can carry up to 4,000 cars on her 10 car decks and has three hoistable decks to carry Over High and Wide (OHW) vehicles such as busses, 18-wheelers and even military vehicles such as M-1 tanks. The OHW vehicles enter the ship on a 100-ton ramp on the aft end of the ship while autos enter from lighter ramps on the sides of the Jean Anne. VT Halter Marine, Pascagoula, Miss built the $60 million vessel. The building of the ship is quite a milestone for the company, not only because of the Jean Anne's size and complexity, but problems encountered along the way including a bankruptcy. A sidebar is included detailing the building process.

The vessel is owned by The Pasha Group, Corte Madera, Calif. and will be operated by Pasha and Strong Vessel Operators, Stamford, Conn. Jean Anne will be on a route between San Diego, Calif. and three ports in the Hawaiian Islands. With a top speed of 20 knots, the vessel can make a round trip in two weeks including loading in San Diego, unloading and loading in three Hawaiian Island ports and return. The vessel has a huge amount of space as her 13,000 deadweight tons testify. Inside the vessel is a lot like being in a 10-story parking garage only this garage travels at 20 knots. Propulsion power for the vessel comes from a MAN B&W 7S50MC-C slow speed diesel supplying 14,825 hp at 127 RPM. A 72-ft. shaft connects the engine output to a LIPS 226-in. diameter propeller. The main engine occupies part of the aft end of the second, third and fourth decks. Three MAN B & W 6L23/30H engines power 920 kW generators and there is a fourth emergency generator rated at 170 kW located on the 11th deck. Both LIPS bow and stern thrusters are a part of the propulsion package to aid in maneuvering such a large ship. To get 4,300 cars, or fewer cars and OHW vehicles requires every square in. of the garage, even the ramps that connect the decks have parked cars when the vessel is full. All but the top or 11th deck is reserved for auto transport. The top deck has a large enclosed space near the bow for such varied purposes as crew staterooms, lounge, refrigerated and dry space for food, galley, mess and a hospital.

Flensburger Schiffbau-Gesellschaft (FSG) has emerged as one of the world's most prolific producers of large RoRo vessels. The latest trailership deliveries to UN RoRo express the strong link forged between FSG and the Turkish operator. Assigned to the service connecting northern Italy with the Istanbul area, **the 29,000-gt Saffet Ulusoy and Marmara** are the first pair in a new class of four freight carriers of 3,735 lane-meters, representing the third series of RoRos ordered from Flensburg for UN's eastern Mediterranean mainline traffic. UN Ro-Ro has made its name in the trailership sector, having created a direct channel for Turkish trade with western Europe, by offering Turkish hauliers an alternative to the overland route through Bulgaria and Serbia.

Although built to the same main dimensions as the Und Ege series delivered years ago, the Saffet Ulusoy class signifies a further increase in payload to 3,735 lane-meters, mainly through provision for additional trailers on the weatherdeck. The design also denotes an anticipative approach towards developments in trailer weights. UND was founded by the Turkish Trucker Association 12 years ago, at a time when all transports went by the Balkan states on land routes to Central-Europe. Due to the political instabilities and risks involved on the transport routes, however, UND became one of the first shipping companies to implement the "From Road to Sea" concept. Daily services with the very efficient Flensburger RoRo-Freight Ferries from Istanbul to Trieste were the result. Today the company transports on its ferries in average 200,000 trucks a year.

Samsung in September delivered Maersk Dunkurque, the first new generation RoRo passenger ferry of three vessels for Norfolkline. The vessel was specially designed for operation between Dover and Dunkerque through the English Channel.

The new vessel has a capacity for 780 passengers, up to 200 cars and 120 freight vehicles. New features include separate loading decks for freight and private cars and exclusive facilities, also on separate decks for tourist passengers and freight drivers.

The vessel is built to meet the highest environmental standards and fulfill Lloyds Registers Environmental Protection notation: no visible smoke from any engines, low noise and vibration impact with satisfaction of PCAC notation. The vessel is equipped with an environmentally friendly waste disposal system and additional protection around the oil tanks in order to avoid possible oil leaks. Furthermore, the vessel is especially applied redundancy design concept of PSMR & ICC on propulsion & control system with separate subdivision of each M/E, A/E and steering gear. Three fixed decks (No. 3, 4, 5) are used for vehicles. Vehicle access of each deck is over bow and stern with total providing 2,900 lane meters for trailers and 200 private cars. The lanes are 3.3 m wide with 4.9 m clear height for trailer on deck 3 and deck 4 and 2.4m clear height for private car on deck 5. Dangerous cargoes are loaded on forward and aft open

deck of deck 3. Public spaces were designed with a grade of European high standards by steen Friis Design and the interior outfitting work was carried out by Kesson. For accommodating passengers, deck 6 provides main public spaces with various types of lounges, cinema, shop and 402 seats of large free flow restaurant. Deck 7 provides reception counter and 135 seats of bistro, bistro lounge, VIP lounge and Business center. For the use of truck drivers, separate public spaces are offered with 100 seats of trucker's restaurant, 80 seats of trucker's TV lounge and sleeping room with comfortable reclining seats. For the use of crews, the luxurious accommodation facilities and public spaces are arranged to the separate area on deck 7. Total seven (7) lifts are fitted to get the separate traffic flow for passenger, trucker, crew and service.

The hull form was developed by utilizing Samsung's own model basin facilities and verified by MARIN. Trial results arrived in 26 knots of service speed and it is the fastest speed among the Channel operating Ro-Ro passenger ferry.

Tankers

British Cormorant is the first in a six-ship, double-hulled series of Aframax Tankers constructed for BP Shipping by Samsung Heavy Industries. The ship incorporates a number of technical features to ensure high levels of environmental protection and high performance. The main features are Ice Class hull form, improved strength, improved service lifetime for coatings by increased paint specification. The hull structure has been designed in accordance with the requirements of ABS Safehull and LRs ShipRight(SDA, FDA, CM). FEA for the hull structures has been carried out for the different loading conditions as recommended by the Class. Ice Class 1A for hull strengthening and propulsion system is applied according to New Finnish-Swedish ICE class Rule and FMA Rules and Guidelines. The fatigue life of the hull structure has been designed for a period of not less than 40 years. The Structural Quality of the hull structure has been maintained with the use of higher tensile steel to 45 percent of the total hull structural steel weight. The vortex generator including local reinforcement in the hull, deckhouse and casing is installed for the improvement of vibration. British Cormorant is powered by an MAN B&W 7S60MC-C engine developing (MCR) 15,820 kW (21,490 bhp) at 105 rpm. The service speed is 15.4 knots at main engine output of 14,230 kW (19,340 bhp) including 15 percent power margin.

The ship has a total of 12 cargo oil tanks with a combined capacity of 121,200 cu. m. at 98 percent loading. In addition, there are two slop tanks fully coated in tar epoxy with a capacity of 3,700 cu. m. The cargo pumping system allows for a maximum discharge rate of 8,400 cu. m./hr. The maximum loading rate is 10,200 cu. m./hr. Three grades of oil can be handled simultaneously through a two-valve segregation arrangement. All cargo tanks are fitted with radar type level gauging system and various fixed gas warning devices monitoring hydrocarbon gas levels in tanks, pump room and ballast spaces. All tanks are remotely monitored from the cargo control room.

STX Shipbuilding developed an advanced 51K product oil tanker — North Point — for North Atlantic trading route with six pairs of cargo tanks, one pair of slop tank and one residue tank and delivered it to the Pietro Barbaro S.P.A in Italy on May 24, 2005. The Italian-flagged vessel is classed by Registro Italiano Navale with the Ice class 1A and ice-strengthened. It is in compliance with the marine environmental and safety criteria for industry vessels in Exxon Mobil affiliate service.

North Point is laid out a single-deck and forecastle, and features a double hull structure. Transverse bulkheads on stools are corrugated, and there are no


North Point • Product Tanker • STX Shipbuilding


Perseverance • Product Tanker • STX Shipbuilding


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structural obstacles inside of cargo tanks. Deck beams are arranged externally on top of the cambered deck, the tanks present a flush internal surface. The side and bottom in the double hull are given water ballast and all heavy fuel bunkers are surrounded by cofferdam. North Point is designed primarily to carry oil products, crude oil and IMO Type III chemicals. More than 200 commodities, including Sodium hydroxide solution, can be loaded in cargo tanks which are coated with 300 microns of phenolic epoxy. The piping system have six cargo segregations, with 12 cargo tanks connected with a hydraulic motor driven, submerged pump rated at 600 cu. m./hr. Two slop tanks are served by two 300 cu. m./hr. pumps. Water ballast capacity is 23,461 cu. m., carried in tanks coated with a light colored tar free epoxy, and handled by two 750 cu. m./hr. hydraulic submerged pumps. The ship is fitted with a STX-MAN B&W, type 6S60MC-C direct reversible, single acting two stroke exhaust gas turbocharged and air cooled cross head diesel engine, with an output of MCR 13,560 kW at 105 rpm, driving a fixed pitch propeller for a fully loaded service speed of 16.62 knots at 75% MCR with 15% sea margin. Three sets of diesel-driven alternators powered by STX built diesel engines supply the electrical power. The steam is generated by a 18,000 kg/h Aalborg oil-fired boiler, and a 1,200 kg/h composite boiler. Control of the vessel is from either engine control room or wheelhouse, using a STX/Lyngso Marine bridge system.

STX strengthened to achieved the first DNV Ice Class 1A notation of panamax product oil tanker. Perseverance is noteworthy for the inclusion in the specification of the requirements of DNV Ice Class 1A notation for navigation in ice, necessitating specific consideration of hull form, structure and the propulsion system, and of the adoption of a -20 degree ambient temperature basis. For hull construction, higher tensile steel having 32 kg/?, 36 kg/? minimum yield stress is used for the hull structural members including the Ice Class region.

This Vessel applied the completely enclosed navigation deck to voyage on iced sea.

Perseverance has been constructed to endure 25 years fatigue life time with a double hull forming common side and center double bottom water ballast tanks, and she has a cargo space divided into 15 tanks (six port + six starboard, two slop tanks and one residue tank) by a centerline and eight transverse bulkheads. This vessel can carry four different (16.5%, 16.5%, 33%, 33%) cargoes with double segregation without any restriction for loading condition in regard to shear forces and bending moments.

In addition, pure Epoxy paint is coated for all the cargo tanks including slop and residue tanks. The cargo handling system is designed based on the individual cargo oil pumping system. The cargo oil pumping system is of submerged high pressure hydraulically driven pump in each cargo tank, slop tank and residue tank, with each of a capacity 900 cu. m./hr., 300 cu. m./hr., 100 cu. m./hr.

Loading and discharging is accomplished through a deck manifold at midships P&S. All cargo tanks are heated by heat exchanger on deck which are branched from the one steam supply main line and one drain main line on the upper deck. Those heating systems are capable to heat main cargo tank from 44°C to 66°C in 96 hours, slop and residue tank from 33°C to 66°C in 24 hours. For cleaning purposes, each a tank cleaning machine in cargo tanks which are connected by tank cleaning main line on upper deck is fitted with butterfly valve, capable of using either sea/fresh water.

Mitsui Engineering & Shipbuilding Co., Ltd. (MES) delivered the 299,985 VLCC Altair Trader for Fortitude Shipping Navigation SA of Panama at the Chiba Works. Although MES delivered two Malaccamax VLCCs two years ago, the Altair Trader is designed with the new hull form called the Mitsui Malacca Doublemax. Both the deadweight and the cargo tank capacity are maximized for efficient transport of crude oil of typical specific gravity.

The owner and MES have anticipated that the double hull construction will become mandatory for bunker tanks in the future IMO rules, so that the double hull of the bunker has been implemented for the vessel. Thus marine pollution prevention is fully considered in the hull construction together with double hulls for the cargo tanks. Moreover, the vessel equips the MIPD-Wing (Mitsui Integrated Propeller Boss with Wing), which is a newly developed device to improve propeller propulsion efficiency. The service speed and fuel oil consumption efficiency have been improved together with both advanced bow and stern forms. The main engine adopts the electronic-control lubrication system for engine cylinders to decrease ship operation costs, and the steam turbo generating system is also employed, which recovers thermal energy from the exhaust gas of the main engine.

Andromeda Voyager. What is unusual and innovative about this VLCC? The vessel has a fully welded upper deck with aft sunken deck, a raked stem with bulbous bow, a transom stern with open water type stern frame, a semi-balanced rudder and a fixed pitch propeller directly driven by a B&W 6S90MC-C engine with MCR output of 40,000 PS at 76 rpm.

It is built with four longitudinal bulkheads and transverse bulkheads to have five pairs of side cargo tanks, five center cargo tanks, two slop tanks and wing and double bottom tanks for water ballast.

Design fatigue life at critical connections of hull structure shall generally be 30 years in accordance with the requirement of ABS. In addition, the design fatigue life for only longitudinal stiffener's end connections in cargo area shall be 40 years in compliance with ABS Safehull Phase A requirement. The Vessel is capable of carrying and handling three grade of crude oil simultaneously with double valve segregation.

The 309,000 dwt VLCC Universal Queen built at Hyundai Heavy Industries Co., Ltd. (HHI) was delivered to Hyundai Merchant Marine Co., Ltd (HMM), South Korea on November 11, 2005.

The ship has one continuous freeboard deck from stem to stern with sunken deck-type stern deck, transverse bulkheads and four (4) longitudinal bulkheads in way of the cargo space. Special attention has been paid to the ship's maneuverability resulting in a large rudder being fitted. Universal Queen is designed to carry three grades of cargo simultaneously, handled by three steam turbine cargo pumps, each delivering 5,000 cu. m./hr. and housed in a pump room at the forward of engine room. The cargo and ballast valve's control systems are hydraulic medium pressure.

The cargo and ballast control systems of the ship are electro-hydraulically operated. Cargo control and

monitoring covers ullage measurement, operation of pumps, inert gas systems with manual control also available. Radar beam type level gauges have been fitted to cargo tanks, with electro pneumatic type level gauges used in the ballast tanks.

The ship has five center cargo oil tanks, five pairs of side cargo oil tanks, one pair of slop tanks and water ballast tanks surrounding cargo oil tanks. Double bottom and double hull construction are throughout cargo oil tanks with longitudinal framing. The vessel is equipped with an advanced navigation system which supports integrated bridge operations of the ship such as route planing, maneuvering for collision and grounding avoidance and navigation monitoring. The vessel measures 333 m long, with a width of 60 m and depth of 29.6 m and a design draft of 20.5 m. It is powered by a Hyundai-Sulzer 7RTA84T-D main engine with an MCR output of 28,720 kW at 76 rpm, enabling it to sail at a service speed of 15.6 knots. Electric power is supplied by three main diesel generators with an output of 1,050 kW and one 300 kW emergency generator. The ship is classed by DNV, +1A1, Tanker for Oil ESP, Nauticus (Newbuilding), EQ, VCS-2 and KR of Shipping registered as + KRS 1-Oil Tanker, ESP, +KRM 1-UMA, IGS, COW.

The 100,000 DWT Ice Classed Viktor Titov, built at Hyundai Heavy Industries Co., Ltd. (HHI), was delivered to Primorsk Shipping Co., Ltd. on November 14, 2005. The Viktor Titov is a new type of ice classed vessel, energy-saving high grade Aframax tanker and the third of Sakhaline I project's five new Aframax (three ships for Primorsk, two ships for Sovcomplot).

The Viktor Titov has adopted a new hull form, optimized to operate in both ice and open sea, and 42 m breadth to achieve lower sea margin in rough seas. In addition, the vessel has adopted electronically operat-

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Circle 202 on Reader Service Card

Circle 223 on Reader Service Card

Circle 201 on Reader Service Card

Circle 236 on Reader Service Card

ed main engine together with controllable pitch propeller to improve maneuverability and efficiency in ice operation. Structural design of the Viktor Titov is focused to take into consideration operation in ice by performing detail structural analysis (cargo hold/fore-end hold structure fine mesh analysis, detail secondary members' fine mesh analysis) and vibration analysis (hull vibration analysis, Transv. web vibration analysis) through the entire ship range. Bow impact analysis and fatigue strength analysis were also carried out. The hull design of the ship satisfies DNV rule fully, and DNV's CSA-1 structural strength and fatigue strength notations. In addition, the ship has adopted DAT-30 notation to cope with the harsh weather in Sakhalin area.

Viktor Titov is adopting advanced cargo handling called "Computerized Cargo Control System" which supports a one-man cargo operation. This system presents the simultaneous conveniences of safety, integrated monitoring and control throughout the whole loading/discharging operation cycle by means of the latest technologies. The ship has 12 cargo oil tanks with a total capacity of 117,000 cu. m. or 721,130 barrels at 98 percent, and two slop tanks fully coated with anti-abrasive epoxy with a total capacity of 2,300 cu. m. or 14,176 barrels at 98 percent. The cargo pumping system allows maximum unloading rate of 7,500 cu. m./hr. with three main cargo pumps and a maximum loading rate of approximately 9,000 cu. m./hr. through the cargo manifolds. The ship also is equipped with bow mooring and loading system. Horizontal fixed coupling bow loading system with slipway is applied to get any drip of oil at the sea.

The ship is equipped with the fixed gas warning systems which are continuously monitoring for hydrocarbon gases both in pump room and ballast spaces, and O2 + H2O in pump room, with safety functions relayed to bridge. For monitoring the discharge of oily water, one Seil Ceres, S-3000 type monitor which complies with MARPOL requirements is installed and controlled from the cargo control room. The Viktor Titov is adopting the machinery fixed vibration monitoring system for essential rotating machinery. The vessel also has adopted the Ice Impact Monitoring system which is capable of monitoring loads in the bow structure of the tanker resulting from ice impacts at both the loaded and ballast water lines. The data acquisition is installed to measure and compute the stress at critical point in the structure in harmony with the underlying assumptions of the ships Ice Passport. The system capable of calculation and displaying, on computer workstation on the bridge, the associated instantaneous ice impact loads and provided data recording, alarm, trend and predictive features. Viktor Titov is powered by a seven-cylinder, turbo-charged, Hyundai-B&W 7S60ME-C main engine, electronically controlled type, developing an MCR of 22,300 bhp at 105 rpm and a NCR of 20,070 bhp at 101.4 rpm, enabling a service speed of 15.2 knots. The main engine is arranged for operation on heavy fuel oil with a maximum viscosity of 700 cSt and drives a four-bladed 7.4 m, controllable pitch propeller.

The ship is classed +1A1, Tanker for Oil ESP, NAUTICUS(Newbuilding), E0, VCS-2, ICE-IA for Hull ICE-IC for others(FMA) , DAT(-30), Bow Loading, SPM, HL, CLEAN.

Bulk Carrier--Handymax

Truly a 'maid-of-all-work' for the deepsea commodity trades, the 53,000-dwt Spar Lyra brought the innovative Diamond 53 bulk carrier concept to reality during the early stages of 2005, combining added-value in design with keenly competitive acquisition costs. Subsequent tranches of orders sealed during the year have lifted the newbuild sales tally for the double-hull, handymax type to 35, involving yards in China, Vietnam and India, while the Diamond program has been given further dimension through the development of a 34,000-dwt version for the handysize market. Conceived by the UK-based Graig Group and the Danish naval architecture and marine engineering consultancy Carl Bro, the Diamond 53 has broken new ground in bulkship design, combining an omniscient

approach to trading needs, future regulatory requirements and through-life maintenance, with intended construction in low-cost, internationally-emergent shipbuilding areas. Even in the absence of any mandatory requirement for a double-hull, the Diamond solution offers compelling long-term benefits to fleet operators. Spar Lyra leads a long series of Diamond 53s from Chengxi Shipyard, China, eight of which are to the account of the Bergen-based operator Spar Shipping. Bulker specialist Spar has secured long-term, 'blue chip' charters against all eight newbuilds, and has assigned technical management and manning of the vessels to Fleet Management of Hong Kong.

Built to a Panamax breadth of 32.26-m and a length overall of approximately 190-m, the Diamond 53 offers a total grain-equivalent cargo volume of 65,700-cu. m. in five flush-sided holds. The hatchways are exceptionally wide for a handymax bulker, and the holds are plumbed by four 36-t Tsuji deck cranes. The design was prepared following extensive consultation with Det Norske Veritas over structural and regulatory issues, and with key operational input from Graig, so as to ensure a balance between technical needs and commercially practical requirements. Compared with a conventional handymax bulker, employing a single-skin, side shell structure, the Diamond's double hull dispenses with exposed side frames in the cargo holds. A flush face is accordingly presented to the cargo, making for ease of discharge and cleaning, and promising significantly lower inspection and maintenance costs. A strong and robust structure is implicit in the double-hull configuration, which forms a second barrier to accidental water ingress. High-tensile steel usage has been strictly limited, giving a clear orientation to mild steel in the interests of long-term integrity. Fire main, hydraulic and compressed air piping and valves, together with electric cables, are protected in a wing tank pipe duct in the Diamond 53 design, rather than being located on the weatherdeck, as in conventional bulkers. Ballast, stripping and bilge piping and valves are positioned in a double bottom pipe duct, rather than being submerged in double bottom ballast tanks. Power is via a MAN B&W two-stroke diesel, 6S50MC-C type, producing 9,480-kW for a laden service speed of 14 knots.

Viktor Titov Main Particulars

Length, o.a.	247 m
Length, b.p.	234 m
Breadth, molded	42 m
Depth, molded	21.6 m
Draft, design molded	14.5 m
Draft, scantling molded	14.5 m
Gross tonnage	60,430
Net tonnage	28,500
Deadweight at design draft	100,800
Deadweight at scant. draft	100,800
Main engine	Hyundai-B&W 7S60ME-C
MCR	22,300 bhp at 105 rpm
NCR	20,070 BHPat101.4 rpm
Propeller	7.4 m
Speed (15% sea margin)	15.2knots
Model test	Hyundai Maritime Research Institute
Flag	Cyprus
Cargo capacity	117,000 cu. m.
Heavy oil	3,000 cu. m.
Diesel oil	300 cu. m.
Water ballast	46,000 cu. m
Daily fuel (main engine)	59.5 tons/day
Classification	DNV, +1A1, Tanker for Oil ESP, NAUTICUS (Newbuilding), EO, VCS-2, ICE-1A for Hull ICE-1C for others (FMA), Bow Loading, SPM, HL,CLEAN
% high-tensile steel	approx. 30%
Alternators	Hyundai-HIMSEN 7H21/32
Boilers	Aalborg Industries
Mooring equipment	Rolls-Royce Marine Korea
Complement	38 (plus 6 Suez/Repair crew)
Bridge control	Hyundai Kongsberg
Fire detection system	Consilium
Integrated bridge system	Hyundai Transas
Incinerator	Hyundai Marine Atlas
Sewage plant	Jonghap

Universal Queen Main Particulars

Length o.a.	333 m
Length b.p.	324 m
Breadth (molded)	60 m
Depth (molded)	29.6 m
Scantling draft (molded)	21 m
Design draft (molded)	20.5 m
Model test	Hyundai Maritime Research Institute
Flag	Panama
DWT, scantling	309,400
DWT, design	300,100
Speed, service	15.6 knots at 86.8% MCR with 15% sea margin
Cargo capacity	353,181 cu. m.
Heavy oil	10,149 cu. m.
Diesel oil	600 cu. m.
Water ballast	105,782 cu. m.
Daily fuel consumption	97.8 ton/day
Classification	DNV +1A1, Tanker for Oil ESP, NAUTICUS (Newbuilding), EQ, VCS-2 and KR of Shipping registered as +KRS 1-Oil Tanker, ESP, +KRM, 1-UMA, IGS, COW
Main engine	Hyundai-Sulzer 7RTA84T-D
Output	28,720 kw x 76 rpm at MCR
Output	24,934 kw x 72.5 rpm at NCR
Propeller	four blade, 10 m
Boilers	Hyundai Heavy Industries
Hose handling crane	Shin Young - TTS
Mooring equipment	10 x Rolls-Royce Marine Korea
Cargo tanks	Number: 15+2 slop tanks
Grades of cargo carried	3 grades of crude oil
Cargo Pumps	Hyundai-MHI
Cargo control system	Damcos
Complement	30 (plus 6 Suez/Repair crew)
Bridge control system	Norcontrol
Fire detection system	Consilium
Fire extinguishing systems, cargo tank deck	NK
Fire extinguishing system, engine room	Kashiwa
Radars	JRC
Sewage plant	Jonghap

Andromeda Voyager Main Particulars

Flag	Greece
Class	ABS
Length, (o.a)	333 m
Length, (b.p.)	320 m
Breadth, (molded)	60 m
Depth, (molded)	30.5 m
Draft, (designed)	21 m
Draft, (scantling)	22.6
GT	160,000 grt
DWT, (at design draft)	292,600
DWT, (at scantling draft)	320,500
Speed (90% MCR, 15% SM)	16.2 knots
Accommodation	7 tiers including sunken deck
Main engines	B&W 6S90MC-C
Total installed power	MCR: 29,340 kW x 76 rpm
Auxiliary engines	3x Wartsila 8L20C
Propellers	FPP
Generators	3 sets of Diesel Generator(1,200 kW),
Deck machinery	10 sets including 2 windlasses
Coatings	Anti-abrasive epoxy (Water Ballast TKs), Tar free epoxy (Cargo TKs)
Cargo pumps	3 x 5,500 cu. m./h x 140 mTH (S.W.base)
Radars	X and S band
Depth Sounders	2 sets of Transducer
Radios	1 x MF/HF, 1 set x VHF
Auto Pilot	1 set of adaptive type
GPS	2 x DGPS
GMDSS	A1, A2 and A3
SatCom	B, C & mini-M type
Boilers	2 x 40,000 kg/h
Mooring equipment	mooring rope (42mm dia. X 275 m x 20 sets, steel wire)
Heat exchangers	85% for tubular type, and 90% for plate type
Motor starters	Direct-on-line starting type
Steering control	Adaptive type
A/C	Air handling unit = 1 set x 100%, Condensing unit = 2 sets x 70%, each
Lifeboats	2 sets x 36P
Liferafts	1 set x 6P + 4 sets x 18P
Davits	Hinged gravity ytpe
Firefighting	High expansion foam system
Waste management	1 set of Incinerator (approx. 1,000,000 kcal/h)
Tank Capacities(100 percent full)	
Cargo Tanks including slop tanks	355,000 cu. m.
Water Ballast Tanks	102,000 cu. m.
Heavy Fuel Oil Tanks including sett. and serv. Tanks	8,500 cu. m.
Diesel Oil Tanks including sett. and serv. Tanks	370 cu. m.
Fresh Water Tanks	600 cu. m.

Perseverance Main Particulars

Flag	Singapore
Class	DNV
Length, o.a.	228 m
Length, b.p.	219 m
Breadth, molded	32.24 m
Depth, molded	20.3 m
Draft, designed	12.22 m
Draft, scantling	14.25 m
GT	42,661
DWT, at design draft	60,042
DWT, at scantling draft	73,788
Speed	16.35 knots
Main engines	MAN B&W 7S60MC (MK7)
Total installed power	15,820 bhp @ 105 rpm
Propellers	FPP, 7.2 m diameter
Deck machinery	2 x Windlass, 6 x Mooring Winch, Cargo Crane
Cargo control	Hydraulic Valve, Remote Control
Ballast control	Hydraulic Valve, Remote Control
Radars	3 x Furuno (FAR-2835S, FAR-2825, FR-2125)
Depth Sounders	Furuno FE-700
Radios	Furuno
Auto Pilot	Yokogawa
DGPS	Furuno GP-90
GMDSS	Furuno RC-1800F
AIS	Furuno FA-100
Weatherfax	Furuno FAX-210
SatCom	Inmarsat-C/Felcom-15
Fire detection system	Consilium C316
Tank Capacities (100% full)	85,771.5 cu. m.
Water Ballast Tanks including peak tanks	30,415.7cu. m
Heavy Fuel Oil Tanks including sett. and serv. tanks	2,223.5 cu. m.
Marine Gas Oil Tanks including sett. and serv. tanks	210.2 cu. m.
Fresh Water Tanks	345.6 cu. m.

North Point Main Particulars

Flag	Italy
Class	RINA
Length, o.a.	183 m
Length, b.p.	173.9 m
Breadth, molded	32.2 m
Depth, molded	19.1 m
Draft, designed	11 m
Draft, scantling	13.27
GT	30,050
DWT, at design draft	39,209
DWT, at scantling draft	50,921
Speed	16.62 knots
Main engines	MAN B&W 6S60MC (MK7)
Total installed power	18,420 bhp @105 rpm
Propellers	FPP, 6.8 m diameter
Bow Thrusters	KTE-Nakashima
Engine controls	STX-Lyngso
Deck machinery	Windlass, Mooring Winches, Cargo Crane
Cargo pumps	12 sets, submerged centrifugal, 600 cu. m./hr.
Radars	Sperry Bridge Master E
Depth Sounders	Sperry ES5 100
Auto Pilot	C.Plath VHSC/G-TMC
DGPS	Sperry LMX420
AIS	Sailor UAIS1900
Weatherfax	JRC JAX-9A
SatCom	Sailor Inmarsat-C, Nera Inmarsat F77
Fire detection system	Saracom Type: T2000
Tank Capacities (100% full)	54,063 cu. m.
Water Ballast Tanks including peak tanks	23,461.3 cu. m.
Heavy Fuel Oil Tanks including sett. and serv. tanks	1,289.6 cu. m.
Diesel Oil Tanks including sett. and serv. tanks	186.1 cu. m.
Fresh Water Tanks	420 cu. m.

British Cormorant Main Particulars

Length, o.a.	251.5 m
Length, b.p.	239.0 m
Breadth, molded	43.8 m
Depth, molded	21.3 m
Draft, designed	13.6 m
Draft, scantling	15.0 m
DWT at design draft	99,942.9
DWT at scantling draft	113,781.7
Speed	15.4 knots (90% MCR)
Main engines	7S60MC-C
Total installed power	21,490 bhp
Engine controls	Lyngso Marine DMS-2100
Coatings	International Paint
Radars	Sperry Marine Bridge Master E
Depth Sounders	Furuno FE-701
Auto Pilot	Sperry Marine Navipilot-4000
AIS	Furuno FA-100
GPS	Leica MX-420
GMDSS	Ships Electronic HT4550
SatCom-B	NERA Saturn BM Class1
Fire detection system	Consilium Marine CS3000
Classification	LR

Maersk Dunkerque Main Particulars

Flag	UK
Classification	LR +100A1, RoRo Cargo and Passenger Ship, IWS, EP(BGPR) + LMC, UMS, CCS, ICC, NAV1, IBS, IFP, PSMR, PCAC2,2
Descriptive notes:	ShipRight (FDA, SDA, CM), SERS, SCM, LI
Length, o.a.	186.6 m
Length, b.p.	172 m
Breadth, molded	28.4 m
Depth, molded	9.70 m
Draft, designed	6.75 m
Draft, scantling	6.90 m
DWT at design draft	6,160 tons
DWT at scantling draft)	6,740 tons
Gross tonnage	36,000 gt
Vehicle Capacity, Lane length	total 2,900 lane meter (120 trailer + 200 private cars)
Speed	26 knots with 15% sea margin
Main engines	MAN B&W 8L 48/60 B x 4 sets
Total installed power	38,400 kW
Propeller, Material	Rolls-Royce, CPP, 5.4 m diameter
Gearbox	Renk
Thrusters	Kawasaki
Engine remote controls	Rolls-Royce
Bearings	Kemel
Radars, Maker	Furuno
Echo Sounder	Furuno
Auto Pilot	EMRI
AIS	Furuno
GPS	Furuno
GMDSS	Furuno
SatCom	Sea Link
Mooring equipment	Hydralift-BLM
Passengers	780 Passenger
Fire detection system	Consilium Marine AB
Heat exchangers	Alfa Laval
Lifeboats	Fassmer

Saffety Ulusoy Main Particulars

Length, o.a.	193 m
Breadth	26 m
Draft	6.5 m
Main engine power	2 x 8,100 kW
Crew	24
Service speed	21.5 knots
Trailer	255 Trailer (each 13.6 m long)
Lane meters	3,735 m

MSC Pamela Main Particulars

Designer	Samsung Heavy Industries
Delivery Date	July 15 2005
Classification	GL
Length, o.a.	336.7 m
Length, b.p.	321 m
Breadth, molded	45.6 m
Depth, molded	27.2 m
Draft, designed	13 m
Draft, scantling	15 m
DWT at design draft	83,200 mt
DWT (at scantling draft)	108,200 mt
Speed	25.2 knots
Main engines	12K98MC-C
Total installed power	93,120 bhp x 104 rpm
Bow Thrusters	Kawasaki 3,000 kW
Generators	4 x 2,750 kW
Coatings	Tin Free SPC Anti-Fouling Paint
Ballast control system	Pleiger Fareast
Radars	2x Furuno (FAR-2827W, FAR-2837SW)
Auto Pilot	Furuno
AIS	Furuno FA-100
GPS	2 x Furuno GP90
GMDSS	2 x Furuno RC-1800F
SatCom	2 x Inmarsat-C (Furuno/Felcom15), Inmarsat F-77 (Furuno/Felcom70), Inmarsat Mini-M (Furuno/Saracom)
Classification	GL
Mooring equipment	Rolls-Royce
Fire extinguishing systems	NK
Fire detection system	SARACOM
Motor starters	AZCUE pumps
Lifeboats	Beihai
Liferafts	Viking

Hatsu Shine Main Particulars

Length, o.a.	300 m
Breadth	42.8 m
Draft, service	14.2 m
Corresponding deadweight	78,200 t
Capacity	7,024 TEU
Main engine	Sulzer 10RTA96C
Output	54,900 kW (74,700 bhp)
Service speed	25.3 knots

Nordwelle Main Particulars

Flag	Cyprus
Class	KR
Length, o.a.	210 m
Length, b.p.	198.8 m
Breadth, molded	30.1 m
Depth, molded	16.7 m
Draft, designed	11.5 m
Draft, scantling	11.5 m
GT	26,611
DWT, at design draft	34,741
DWT, at scantling draft	34,741
Speed	22.4 knots
Main engines	MAN B&W 8S70MC-C (MK7)
Total installed power	33,760 bhp @ 91 rpm
Propellers	FPP, 7.8 m diameter
Bow Thrusters	Kawasaki
Anti heeling system	Framo
Cargo control system	Computer Controlled
Ballast control system	Hydraulic Valve Remote Control
Radars	2 x JRC (JMA-9932SA, JMA-9922-9XA)
Auto Pilot	Tokimec
DGPS	JRC JLR-7700MKII
SatCom	Inmarsat-C, Model JUE-75C
Fire detection system	Consilium CS3004
Tank Capacities (100% full)	48,554.7 cu. m.
Water Ballast Tanks including peak tanks	9,465.6 cu. m.
Heavy Fuel Oil Tanks including sett. and serv. tanks	4,005.9 cu. m.
Diesel Oil Tanks including sett. and serv. tanks	159.3 cu. m.
Fresh Water Tanks	274.2 cu. m.

Colombo Express Main Particulars

Length, o.a.	335 m
Length, b.p.	319 m
Breadth (molded)	42.8 m
Depth (molded)	24.5 m
Design draft	13 m
Scantling draft	14.6 m
DWT at design draft	84,500 mt
DWT at scantling draft	103,800 mt
Flag	Germany
Classification	GL
Model test	Hyundai Maritime Research Institute
Speed (90% MCR with 20% sm)	25.2 knots
Container capacity	8,606
Heavy oil	10,600 cu. m.
Diesel oil	500 cu. m.
Water ballast	24,800 cu. m.
Fuel Consumption, main engines	248.8 tons/day
% high-tensile steel	approx. 60%
Main engine	Hyundai-B&W 12K98ME
Output	8,640 kW x 94 rpm at MCR
Propeller	6 blade, 9.1 m diameter
Main engine driven alternators	SAM
Electronics/Thyrister Converter Type	
Boiler	VKK
Mooring equipment	Hatlapa
Hatch covers	MacGregor
Ballast control	Pleiger Far East
Complement	30 (+6 Suez Canal/Repair crew)
Bowthruster	Kawasaki
Output	2,500 kW
Bridge control system	SAM Electronics
Fire detection	Consilium
Fire extinguishing	NK
Radars	SAM Electroics
Sewage plant	Hamworthy

Savannah Express Main Particulars

Flag	Germany
Class	GL
Length, (o.a)	332 m
Length, (b.p.)	317.2 m
Breadth, (molded)	43.2 m
Depth, (molded)	24.5 m
Draft, (designed)	13 m
Draft, (scantling)	14.5 m
GT	94,483 grt
DWT, (at design draft)	89,500
DWT, (at scantling draft)	107,500
Speed	24.5 knots
Accommodation	30
Main engines	B&W 12K98MC-C
Total installed power	68,520 kW x 104.0 rpm
Propellers	1 set x FPP
Bow Thrusters	1 set x 3,000 kW
Generators	4 sets x Diesel Generator (3,000 kW, each), 1 set x Emergency DG(550 kW)
Deck machinery	12 x winches, electro-hydraulic, high-pressure type
Ballast control system	Behrens Pumpen
Radars	1 set x X-band & 1 set x S-band
Depth Sounders	2 sets
Radios	1 set x MF/HF, 2 sets x VHF
Auto Pilot	1 set
GPS	2 sets x DGPS
GMDSS	A1, A2 and A3
SatCom	INMERSET type F & standard C type
Boilers	1 x Auxiliary (6,000 kg/h) 1 x Exhaust-gas (5,500 kg/h)
Fire extinguishing systems	CO2
Heat exchangers	Tubular type & Plate type
A/C	Air-handling unit : 1 set x 100%, Condensing unit : 2 sets x 65%
Lifeboats	2 sets x 32P, conventional type
Liferafts	4 sets x 16P, 1set x 6P
Waste management	Sludge purifying system
Tank Capacities(100 percent full)	
Water Ballast Tanks including peak tanks	27,500
Heavy Fuel Oil Tanks including sett. and serv. Tanks	11,000
Diesel Oil Tanks including sett. and serv. Tanks	300
Fresh Water Tanks	400

MSC Busan Main Particulars

Delivery	September 28, 2005
Classification	Germanischer Lloyd
Length, (o.a.)	324.8 m
Length, (b.p.)	309.2 m
Breadth, (molded)	42.8 m
Depth, (molded)	24.6 m
Draft, (designed)	13 m
Draft, (scantling)	14.5 m
DWT (at design draft)	87,570 dwt
DWT (at scantling draft)	105,010 dwt
Speed (90% MCR, 20% SM)	25.96 knots w
Main engines	NSD 12RTA96C-B
Total installed power	93,360 ps x 102 rpm (90% MCR)
Bow Thrusters	Nakashima
Generators	Hyundai/HFC 5712 - 14K - SB
Engine controls	KTE
Coatings	IPK
Ballast control system	900cu. m./hr.
Radars	Furuno S-BAND RADAR FAR-2837S-36AF, X-BAND RADAR FAR-2827-24AF
Depth Sounders	Furuno/FE-700
Auto Pilot	Yokogawa/PT-500AA-P-K4T
AIS	Furuno/FA-100
GPS	Furuno DGPS/GP90D x 2sets
GMDSS	Furuno/GMDSS CONSOLE RC-1800T(FS-5000) Furuno / VHF FM-8500 x 2SETS Furuno / SATCOM-C FELCOM-15 x 2sets Furuno / NAVTEX NX-500
SatCom	Furuno / SATCOM-F FELCOM70
Classification	Germanischer Lloyd, + 100A5 "Container Ship", SOLAS ?-2, Reg.19, +MC, AUT, IW, BWM-F
Mooring equipment	KOCKS
Fire extinguishing systems	NK
Fire detection system	Fire detection system SARACOM / T2000

CMA CGM Excellent Main Particulars

Delivery	October 20, 2005
Classification	Germanischer Lloyd
Length, (o.a.)	222.5m
Length, (b.p.)	212 m
Breadth, (molded)	32.2m
Depth, (molded)	19.3m
Draft, (designed)	10.8m
Draft, (scantling)	12m
DWT (at design draft)	36,900 dwt
DWT (at scantling draft)	44,100 dwt
Speed (90% MCR, 15% SM)	22.66 knots
Main engines	MAN-B&W 8K 80MC-C
Total installed power	28,880 kW x 104 rpm (MCR)
Bow Thrusters	Brunvoll
Generators	MAN B&W 8L23/30H
Engine controls	HYUNDAI
Bearings	Blohm + Voss
Coatings :	HEMPEL
Ballast control system	Behrens 500 cu. m./h
Radars	Furuno/ S-BAND RADAR FAR-2837S-36AF, X-BAND RADAR FAR-2827-24AF
Depth Sounders	Furuno/ FE-700
Auto Pilot	Tokimec/ PR-6414A-DW-SS2
AIS	Furuno/ FA-100
GPS	Furuno DGPS / GP90D x 2sets
GMDSS	Furuno/ GMDSS CONSOLE RC-1800T(FS-2570) Furuno/ VHF FM-8800S x 2SETS Furuno/ SATCOM-C FELCOM-15 x 2sets Furuno/ NAVTEX NX-700
SatCom	Furuno/ SATCOM-F FELCOM70
Classification	Germanischer Lloyd, + 100A5 "Container Ship", SOLAS ?-2, Reg.19, +MC, AUT, IW
Mooring equipment	Towimor
Fire extinguishing systems	NK
Fire detection system	Saracom / T2000
Heat exchangers	Donghwa Entec

LNG Enugu Main Particulars

Flag	BERMUDA
Class	LR
Length, (o.a)	285.4 m
Length, (b.p.)	274.4 m
Breadth, (molded)	43.4 m
Depth, (molded)	26 m
Draft, (designed)	11.35 m
Draft, (scantling)	12.35 m
GT	97,561
DWT, (at design draft)	73,000
DWT, (at scantling draft)	83,060
Speed	19.75 knots
Accommodation	6 tiers
Main engines	Marine Steam Turbine
Total installed power	MCR: 33,700 PS x 86 rpm
Propellers	Fixed Pitch Propeller
Bow Thruster	Electro motor driven
Anti heeling system	None
Generators	2 sets x 2,650 PS
Deck machinery	2 windlasses, 9 mooring winches, 30 x 15 m/min
Coatings	Ballast tanks: Tar free epoxy 2 x 400 mic
Cargo pumps	8x 1,650 cu. m./h x 145 mlc
Cargo control	Integrated automatic system
Ballast control	Integrated automatic system
Radars	X and S band
Radios	1 set MF/HF, 3 sets VHF
GPS	2 sets x DGPS
GMDSS	A1, A2 and A3
Plotters	INS & ECDIS
SatCom	B & C type
Boilers	(2) x 57,500 kg/h
Mooring equipment	Universal roller fairlead, Closed chock, Bollard
Fire extinguishing systems	High expansion foam
A/C	High pressure, single duct and central heating/cooling system
Lifeboats	2 sets x 60 persons, totally enclosed type
Liferafts	6 sets x 20 persons, 1 set x 6 persons
Firefighting	CO2
Tank Capacities (100 percent full)	
Cargo Tanks	145,000
Water Ballast Tanks including peak tanks	54,500
Heavy Fuel Oil Tanks including sett. and serv. Tanks	3,700
Diesel Oil Tanks including sett. and serv. Tanks	300
Fresh Water Tanks	300

Jeanne-Marie Main Particulars

Flag	French
Class	BV
Length, (o.a)	224.5 m
Length, (b.p.)	213 m
Breadth, (molded)	36 m
Depth, (molded)	22.3 m
Draft, (designed)	11.3 m
Draft, (scantling)	11.7 m
GT	approx. 46,600 (international GT)
DWT, (at design draft)	49,950
DWT, (at scantling draft)	52,950
Speed	17.3 knots
Accommodation	6 tiers
Main engines	Sulzer 7RTA62U-B x 1 set
Total power	MCR : 21,770 PS x 115 rpm
Auxiliary engines	3 sets x 1,180 kW
Propellers	Fixed pitch propeller
Deck machinery	2-windlass/mooring winch, 8-mooring winch(20x 15 tons)
Coatings ballast tanks:	tar free epoxy 2 x 400 mic
Cargo pumps	one(1) long shafted multi-stage centrifugal pump per each tank half
Radars	X and S band
Depth Sounders	Echo sounder
Radios	1 set x MF/HF
GMDSS	A1, A2 and A3
Plotters	INS and ECDIS
SatCom	B & C type
Boilers	1 set x 2,500 kg/h
Fire extinguishing systems	CO2 system
Fire detection system	Conventional type
Lifeboats	2 sets x 36 persons
Liferafts	4 sets x 18 persons, 1 set x 6 persons
Davits	hinged gravity type
Firefighting	CO2

Benchijigua Express Main Particulars

Length o.a.	126.7 m
Beam	30 m
Capacity, passengers	1,350
Capacity, RoRo	341 cars, or 400 freight lane meters plus 123 cars
Main engines	4 x MTU 20V8000 diesels
Power	4 x 8,200 kW
Speed	40+ knots

Spar Lyra Main Particulars

Length o.a.	190 m
Length b.p.	183.25 m
Breadth, molded	32.26 m
Depth, molded	17.5 m
Draught, scantling	12.5 m
Deadweight, all-told	53,000 dwt
Deadweight, cargo capacity	50,500 dwt
Gross tonnage	31,000 gt
Cargo volume(grain)	65,700 cu m
No. of holds	5
Deck cranes	4 x 36t
Main engine power	9,480 kW
Speed, at 12.5m scantling draft	14 knots
Speed, at 6.1m ballast draft	15.3 knots
Class	DNV

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Island Boats, 6806 Highway 90 East, New Iberia, LA 70560
Metal Craft Marine Inc., 347 Wellington St., Kingston, Ontario K7K 6N7, Canada
Sea Ark Marine, P.O. Box 210, Monticello, AR 71655-0210
William E. Munson Co., 18130 Sunset Way, Edmonds, WA 98026

ANCHORS & CHAINS
GJ Wortelboer Jr. B.V., P.O. Box 5003 , 3008 AA Rotterdam, Netherlands

ANTIFOULING
Hempel Coatings , 600 Conroe Park N. Dr, Conroe, TX 77303

ATTORNEYS
Gordon & Elias LP, 5821 SW Freeway Suite 422, Houston, TX 77057

AUCTIONEERS
Henderson Auctions, 13340 Florida Blvd., Livingston, LA 70754

AUTOPILOT SYSTEMS
AG Marine Inc., 5711 34th Avenue, Gig Harbor, WA 98335-8548
ComNav Marine Ltd., 13511 Crestwood Pl., Ste 15 15, Richmond, BC V6V 2G1, Canada
Mackay Communications, 2721 Discovery Dr., Raleigh, NC 27616-1851

BALLAST
Ballast Technologies, 4620 S. Coach Dr., Tuscan , AZ 85714
Redland Genstar Inc., Executive Plaza IV, Hunt Valley, MD 10912-1031

BEARING- RUBBER, METALLIC, NON-METALLIC
Cooper Bearing, 5795 Thurston Ave., Virginia Beach, VA 23455
Craft Bearing, 5000 Chestnut Ave., Newport News, VA 23605
Duramax Marine LLC, 17990 Great Lakes Parkway, Hiram, OH 44234, 440-834-5400, 440-834-4950, Contact: Richard Spangler
Thordon Bearings, 3225 Mainway, Burlington Ontario L7M 1A6, Canada

BOATBUILDER
AMERICAN MARINE HOLDINGS GOVERNMENT SERVICES, 1838 Turnbull Lakes Drive, New Smyrna Beach, FL 32168
Blount Marine, 461 Water St., Warren, RI 02885
Gladding Hearn, 1 Riverside Ave., Somerset , MA 02725
Sea Ark Marine, P.O. Box 210, Monticello, AR 71655-0210
Washburn Doughty, P.O. Box 296, E. Boothbay, ME 04544

BOLLARDS
Maritime International, Inc., 204 Ida Rd., Broussard, LA 70518

BRIDGE SUNSCREENS
Martek Marine Blinds, Unit 46, Century Business Centre, Maversway, Rotherham, South Yorkshire S63 5DA, UK

BROKERS
Merrill Marine Services, Inc., 7909 Big Bend Blvd, Webster Groves, MO 63119, 800.394.6674, 800.230.5377 , pete@merrillmarine.com, Contact: Peter C. Merrill , www.merrillmarine.com

BULKHEAD SEALS/PANELS
CSD North America, 880 Candia Rd., Unit 10, Manchester, NH 03109
Thermax, 3115 Range Rd, Temple, TX 76501

CAD/CAM SYSTEMS
Autoship Systems Corp.,, 611 Alexander Street, Suite 312, Vancouver, BC V6A 1E1, Canada, 604-254-4171, 604-254-5171, sales@autoship.com, Contact: Ross Muirhead, www.autoship.com
Cadmatic , Ostra Strandgatan 72 (Vita Huset), FI-20810 Turku, Finland
Creative Systems Inc., P.O. Box 1910, Port Townsend, WA 98368

CAPSTANS
Coastal Marine Equipment, 20995 Coastal Parkway, Gulfport, MS 39503-9517, 228-832-7655, 228-832-7675, sales@coastalmarineequipment.com, Contact: Ralph Waguespack, www.coastalmarineequipment.com
Superior Lidgerwood Mundy, 1101 John Ave., Superior , WI 54880

CARGO MANAGEMENT
Autoship Systems Corp.,, 611 Alexander Street, Suite 312, Vancouver, BC V6A 1E1, Canada, 604-254-4171, 604-254-5171, sales@autoship.com, Contact: Ross Muirhead, www.autoship.com

CARGO MONITORING & CONTROL SYSTEM
Hermatic Inc., 4522 Center St., Deerpark, TX 77536

CAST IRON REPAIR
In-Place Machining, 3811 N. Holton St., Milwaukee, WI 53212

CHAINS
G.J. Wortelboer, Postbus 5003, 3008 AA Rotterdam, Netherlands

CLASSIFICATION SOCIETY
American Bureau of Shipping, 16855 N. Chase Drive, Houston, TX 77060

CLOSED CIRCUIT TELEVISION
Hernis Scan Systems A/S, Postboks 619, NO_4809 Arendal, Norway

CNC PLATE CUTTING
Advanced Fabricating Inc, PO Box 3721, Galveston, TX 77552

COATINGS/ CORROSION CONTROL/PAINT
Chugoku Marine Paints, P.O. Box 73, , 4793 , Netherlands
Ferro Corp., 1301 North Flora St., Plymouth, IN 46563
Flow International Corp., 23500 64th Ave., South Kent, WA 98059
Mascoat Products, 4310 Campbell Rd, Houston, TX 77041
Mr.Longarm, Inc., P.O.BOX 377, Greenwood, MO 64034-0377
NAPASCO, INC., 213 Main Project Road, Shriever, LA 70395, 985-449-0730, 985-449-0740, napasco@napasco.com, Contact: Pam Bartell, www.napasco.com
Sherwin Williams, 101 Prospect Ave., Cleveland, OH 44115
Sigma USA, P.O. Box 816, Harvey, LA 70059
Soken Trade Corp./ Noxudol, 15934 S. Figueroa Street, Gardena, CA 90248

COMMUNICATIONS
Inmarsat Ltd, 99 City Rd., London EUY 1AX, UK
L-3 Communications, 6000 Fruitville Road, Sarasota, FL 34232
Mackay Communications, 2721 Discovery Dr., Raleigh, NC 27616-1851
Pipeline Communications and Technology, Inc., 2800 Woodlawn Dr. Ste. 264, Honolulu, HI 96822
World-Link Communications, 74 Main St., Framingham, MA 01701
Xantic, PO Box 30012 , 2500 GA The Hague, Netherlands

COMPOSITE SHAFTS
Centa Corp., 815 Black Hawk Drive, Westmont, IL 60559, 630-734-9600, 630-734-9669, bobl@centacorp.com

COMPUTER/ COMPUTER SOFTWARE
Creative Systems Inc., P.O. Box 1910, Port Townsend, WA 98368
ShipConstructor, 304-3960 Quadra Street, Victoria, BC V8X 4A3, Canada
Spec Tec , Professor Koth's Vey, 1366 Lysaker, Norway

CONSOLE- GMDSS
Mackay Communications, 2721 Discovery Dr., Raleigh, NC 27616-1851

CONSULTANTS
Captain R.J. Underhill & Associates, P.O. Box 1030, Groves, TX 77619
Elliot Bay Design Group, 5301 Shishole Ave. NW, Ste. 200, Seattle, WA 98107
Hornblower Marine Services, P.O. Box 112476, Campbell, CA 95011-2476

CONTROL SYSTEM-MONITORING/STEERING
Amot Controls, 8640 N. Eldridge Parkway, Houston, TX 77041
Electronic Marine Systems, 800 Ferndale Pl., Rahway, NJ 07065
Electrowave U.S.A., 6125 W. Sam Houston Pkwy., Ste 406, Houston, TX 77041
G.R. Bowler, 2261 Lake Rd., Ontario, NY 14519
Kobelt Manufacturing Co., Ltd., 8238-129 Street, Surrey, BC V3W0A6, Canada
L-3/TANO-EDI, 759 Hill Street, New Orleans, LA 70121, 504-831-9800, 504-833-4119, guy.hardwick@l-3com.com
MMC International, 60 Inip Dr, Inwood, NY 11096
Prime Mover Controls, 3600 Gilmore Way, Burnaby, BC V5G 4R8, Canada
Totem Plus Ltd, P.O. Box 164 , Herzliya 46100, Israel

CORROSION CONTROL
Apex Engineering Products, 1241 Shoreline Dr., Aurora, IL 60504
Furuno USA Inc., 4400 NW Pacific Rim Blvd, Camas, WA 98607
Ultra Strip, 3515 SE Lionel Terrace , Stuart, FL 34996

COUPLERS- TUG & BARGE
Intercontinental Engineering , PO Box 9055 , Kansas City, MO 64168

COUPLINGS
American Vulkan, 2525 Dundee Rd, Winter Haven, FL 33884
Centa Corp., 815 Black Hawk Drive, Westmont, IL 60559, 630-734-9600, 630-734-9669, bobl@centacorp.com
Mapeco Products, 91 Willenbrock Rd., Unit B, Oxford, CT 06478
MMC International, 60 Inip Dr, Inwood, NY 11096

CRANE - HOIST - DERRICK - WHIRLEYS
Davit Sales, PO BOx 232, Jefferson Valley, NY 10536
E. Crane, 241 Executive Dr., #3, Marion, OH 43302

CRANE TESTING
Imes Inc., 5139 Brook Street Suite E, Mont Claire, CA

CRANKSHAFT REPAIR
In-Place Machining, 3811 N. Holton St., Milwaukee, WI 53212
Walz & Krezner, 91 Willenbrock Rd., Oxford, CT 06478

CUTTING & WELDING MACHINES
Bug-O-Systems, 3001 W. Carson St., Pittsburgh, PA 15204
ESAB Cutting Systems, 411 South Ebenezer Road, Florence, SC 29501

DECK MACHINERY- CARGO HANDLING EQUIPMENT
Allied Shipbuilders Ltd., 1870 Harbour Road, Vancouver V7H 1A1, Canada
Burrard Iron Works Ltd., 220 Alexander Street, Vancouver, BC V6A 1C1, Canada, 604-684-2491, 604684-0458, sales@burrardironworks.com
Coastal Marine Equipment, 20995 Coastal Parkway, Gulfport, MS 39503-9517, 228-832-7655, 228-832-7675, sales@coastalmarineequipment.com, Contact: Ralph Waguespack, www.coastalmarineequipment.com
Davit Sales, PO BOx 232, Jefferson Valley, NY 10536
Global Incorporated, P.O. Box 24, 160 Cannery Road, Somerset, PA, PA 15501
Intercontinental Engineering , PO Box 9055 , Kansas City, MO 64168
Markey Machinery, P.O. Box 24788, Seattle, WA 98124
Nabrico Marine Products, 1050 Trinity Road, Ashland City, TN 37016
Norwegian Maritime Equipment AS, BOX 244, NO-5480 HUSNES, Norway
Rapp Hydema, 4433 27th Ave. West, Seattle, WA 98199, (206) 286-8162, (206) 286-3084, scotta@rappus.com
Skookum , P.O. Box 280, Hubbard, OR 97032
Smith Berger Marine, 7915 10th Ave. S., Seattle, WA 98108
Superior Lidgerwood Mundy, 1101 John Ave., Superior , WI 54880
W.W. Patterson, Inc, 3 Riversea Rd, Pittsburgh, PA 15223

DESALINATION - REVERSE OSMOSIS
Reverse Osmosis of S.F., Inc., 150 SE 29th Street, Ft. Lauderdale, FL 33316
Reverse Osmosis of South Florida, Inc., 150 S.E. 29th St., Fort Lauderdale, FL 33316

DESIGN PUBLICATIONS
SNAME, 601 Pavonia Ave, Jersey City, NJ 07306

DIESEL ENGINE OVERHAUL
Detroit Diesel Corporation, 13400 Outer Drive West, Detroit, MI 48329-4001
Motor-Services Hugo Stamp, 3101 S.W. 3rd Ave., Ft. Lauderdale, FL 33315

DIESEL ENGINE- SPARE PARTS & REPAIR
Chris Marine AB, Box 9025, 200 39 Malmo, Sweden
Cummins Marine, 4500 Leeds Ave., Ste 301, Charleston, SC 29405
Man B&W Diesel, 17 State St., NY, NY 10004
Man B&W Diesel A/S, Telglholmsgade 41, Copenhagen SV DK-2450, Denmark
Man B&W Diesel AG, Stadtbachstrasse 1, Augsberg D-86153, Germany
Marine Exhaust Systems of Alabama, P.O. Box 698, 757 Nichols Ave., Fairhope, AL 36533
Marine Turbo & Diesel Inc., 1090 7th St., Richmond, CA 94801
Motor-Services AB, Box 2115 , Ronninge S- 144 04, Sweden
Motor-Services Hugo Stamp, 3101 S.W. 3rd Ave., Ft. Lauderdale, FL 33315
Scardana Americas Bkg., 502 Empire St. , Greenfield Park J4V 1V7, Canada
Wartsila Diesel, 201 Defense Hwy, Annapolis , MD 21401

DIESEL FUEL DECONTAMINATION
Algae X International, P.O. Box 4011, Fort Myers Beach, FL 33932

DIESEL FUEL INJECTORS
Interstate Diesel, 4901 Lakeside Avenue, Cleveland, OH 44114-3996, 800-321-4234, 216-881-0805

DIGITAL TORQUE METER SYSTEMS
Instruments, Computers & Controls, 78 Londonderry Tpke, Hookset, NH 03106

DISPLAY TECHNOLOGY
Barco Simulation, 600 Bellbrook Avenue, Xenia, OH 45385

DOOR LOCKS
The Brass Works Inc., P.O. BOX 566, DeLand, FL 32721, 386-943-8857, 386-943-8810, info@marinedoorandcabinethardware.com

DOORS- MARINE & INDUSTRIAL
Joiner Systems, 1925 52nd Avenue, Lacine, Quebec H8T 3C3, Canada
Juniper International, 72-15 Metropolitan Ave., Middle Village, NY 11379
Manly Marine, P.O. Box 86788, N. Vancouver, BC V7L 4L3, Canada
Mapeco Products, 91 Willenbrock Rd., Unit B, Oxford, CT 06478
USA Sliding Doors, Inc., 801 Hosmer Road, Churchville, NY 14428, 585-538-4160, 585-538-2806, info@usaslidingdoors.com, Contact: Mr. Robert Weiland, www.usaslidingdoors.com
Walz & Krezner, 91 Willenbrock Rd., Oxford, CT 06478

DRAFT INDICATORS
King Engineering, PO BOX 1228, Ann Arbor, MI 48108-1625, 734-662-5691, 734-662-6652, marine@king-gage.com, Contact: Mike Welch, www.king-gage.com

DRILLS
Anchor Lamina, 38565 Country Club Drive, Farmington Hills, MI 48331

DRIVES
Allied Systems, 2300 Oregon St., Sherwood, OR

DRIVESHAFTS
The Cline Company, 600 Buncombe St., Greenville, SC 29602

DRUG TEST KITS
Sun State Specialty K-9s, 1500 Beville Road, Daytona Beach, FL 32114

EDUCATION
DM Consulting, 12316 Dormouse Road, San Diego, CA 92129, 858-705-0780, 858-538-5372, jstiglich@aol.com

ELECTRIC MOTORS
Ward Leonard, 401 Watertown Rd, Thomaston, CT 06767

ELECTRICAL EQUIPMENT
MMC International, 60 Inip Dr, Inwood, NY 11096

ELECTRICAL SERVICES
QCI Marine Offshore, 6754 Willowbrook Park Dr, Houston, TX 77066

ELECTRONIC CHARTS
C- Map Commercial, 133 Falmouth Rd, Mashpee, MA 02649

EMPLOYMENT
All American Marine, P.O. Box 191237, Tillman's Corner, AL 33619

ENGINE ROOM LIGHTING/ MONITORING & CONTROL
GMT Electronics, 171 Main St., South River, NJ 08882

ENGINEERING PUBLICATIONS
SNAME, 601 Pavonia Ave, Jersey City, NJ 07306

ENGINES
Markisches Werk Halver Gmbh, Box 1355, Halver D-58543, Germany

EVAPORATORS
Alfa -Laval Separation, Inc., 955 Mearns Rd., Warminster, PA 18974
Sasakura Engineering , 7-32 Takeshima, 4-Chome, Nishiyodogoaw KY Osaka555, Japan

EXHAUST
Marine Exhaust Systems of Alabama, P.O. Box 698, 757 Nichols Ave., Fairhope, AL 36533

EXPANSION JOINTS
Silex Inc., 6659 Ordan Dr., Mississauga, ON L5T 1K6, Canada

EXTRUDED RUBBER PRODUCTS
Clean Seal Inc., PO Box 2919, South Bend, IN 46880

FASTNERS
Superbolt, PO Box 683, Carnegie, PA 15106

FENDERING SYSTEMS/ BUOYS - DOCK & VESSEL
Duramax Marine LLC, 17990 Great Lakes Parkway, Hiram, OH 44234, 440-834-5400, 440-834-4950, Contact: Richard Spangler
Maritime International, Inc., 204 Ida Rd., Broussard, LA 70518
Schuyler Rubber Co., 16901 Woodred Rd., Woodinville, WA 98072
Trelleborg Engineered Products, P.O. Box 98, Clearbrook, VA 22624
Urethane Products, 9076 Rosecrans Ave, Bellflower, CA 90706
Viking Fender Co., 1160 State St., Perth Amboy, NJ 08861

FIBERGLASS GRATING AND HANDRAIL
Strongwell, 400 Commonwealth Avenue, Bristol, VA 24201

FILTERS/FILTER SYSTEMS
Algae X International, P.O. Box 4011, Fort Myers Beach, FL 33932
Boll Filter, 9822 General Drive. Ste. 180, Plymouth, MI 48170
Hellan Strainer, 3249 East 80th St., Cleveland, OH 44104
US Filter , 2 Milltown Ct., Union , NJ 07083
Vigilant Marine, 170 N. Maple Street Suite #104, Corona, CA 92280

FIRE & SAFETY PRODUCTS
Brookdale International, 1--8755 Ash St., Vancouver, BC V6P 6T3, Canada
DBC Marine Safety Systems, 101-3760 Jacombs Rd., Richmond, BC V6V 6T3, Canada
IFSTA/Fire Services Program, 9030 N. Willis, Stillwater , OK 74078-8045
IMSSCO Corporation, 2040 Harbor Island Drive, Ste. 201 A, San Diego, CA 92101

FLANGES
Jesse Engineering, 5225 7th St., E. Tacoma, WA 98424

FLOW CONTROLS
EIM Controls, 13840 Pike Road, Missouri City, TX 77489

FUEL INJECTORS
Interstate Diesel, 4901 Lakeside Avenue, Cleveland, OH 44114-3996, 800-321-4234, 216-881-0805

GALLEY EQUIPMENT
AR Larsen Co., 15040 NE 95th St., Redmond, WA 98052
Cospolich Refrigeration, 14695 Highway 61, Norco, LA 70079
Jamestown Metal Marine Sales, Inc., 4710 Northwest 2nd Ave. , Boca Raton, FL 33431

GANGING & SAMPLING
Hermatic Inc., 4522 Center St., Deerpark, TX 77536

GAS GENERATION SYSTEMS
Air Products AS, Box 8100, Vagsbygd, NO-4675 Kristiansand S, Norway

GEARS & GEAR REPAIR
Karl Senner Inc., 25 W Third, Kenner, LA 70062

GENERATOR CONTROLS
Detroit Diesel Corporation, 13400 Outer Drive West, Detroit, MI 48329-4001
Governor Control Systems, 3101 SW 3rd Avenue, Ft. Lauderdale, FL 33315

GLASS
Garibaldi Glass, 7344 Winston Street, Burnaby, British Columbia V5A 2G9, Canada
ProCurve Glass Technology, LLC, 3535 Davisville Rd., Hatboro, PA 19040

GOVERNORS
Governor Control Systems, 3101 SW 3rd Avenue, Ft. Lauderdale, FL 33315

GROUNDING & EARTHING BRUSHES
Sohre Turbomachinery, 132 Gilbertville Rd., P.O. Box 889, Ware, MA 01082-0889

HATCHES & DOORS
Juniper International, 72-15 Metropolitan Ave., Middle Village, NY 11379
Manly Marine, P.O. Box 86788, N. Vancouver, BC V7L 4L3, Canada

HEAT EXCHANGERS
Alfa -Laval Separation, Inc., 955 Mearns Rd., Warminster, PA 18974

Duramax Marine LLC, 17990 Great Lakes Parkway, Hiram, OH 44234, 440-834-5400, 440-834-4950, Contact: Richard Spangler
Tranter PHE, Inc, PO Box 2289, Wichita Falls, TX 76307

HEAVY FUEL TREATMENT
Algae X International, P.O. Box 4011, Fort Myers Beach, FL 33932

HIGH SPEED FERRY BUILDERS
Incat Australia Pty. Ltd, 18 Bender Marine, Hobart 7009, Australia

HMI CONTROLS DISPLAY
Azonix-Dynalco, 3690 NW 53rd St., Ft. Lauderdale, FL 33309

HOISTS
Coastal Marine Equipment, 20995 Coastal Parkway, Gulfport, MS 39503-9517, 228-832-7655, 228-832-7675, sales@coastalmarineequipment.com, Contact: Ralph Waguespack, www.coastalmarineequipment.com

HORNS/WHISTLES
Airchime Manufacturing Co., 5478 267th St., Gloucester Industrial Estate,, Langley, BC V4W 3S8, Canada
Kahlenberg Brothers Co., P.O. Box 358, Two Rivers, WI 54241

HOSES/HOSE FITTINGS
JGB Enterprises, Inc., 115 Metropolitan Dr., Liverpool , NY 13088

HVAC
Jamestown Metal Marine Sales, Inc, 4710 Northwest 2nd. Ave., Boca Raton, FL 33431
QCI Marine, 6754 Willowbrook Park Drive, Houston, TX 77066

HYDRAULIC SYSTEMS
Anchor Lamina, 38565 Country Club Drive, Farmington Hills, MI 48331

IMAGING EQUIPMENT
EMX, Inc., 4200 Dow Road, Suite C, Melbourne, FL 32934

INFRARED IMAGING EQUIPMENT
Flir Systems, 16505 SW 72ND AVE, Portland, OR 97224

INSPECTION EQUIPMENT
Staveley Instrument, 421 N. Quay St., Kennewick, WA 99336

INSULATION
Superior Energies Inc., 3115 Main Ave., Groves, TX 77619

INSURANCE SERVICES
WQIS, 80 Broad St., 21st Floor, New York, NY 10004

INTERIORS
Jamestown Metal Marine Sales, Inc., 4710 Northwest 2nd Ave. , Boca Raton, FL 33431
Lit Industries, 516 Costner School Rd., Bessemer City, NC 28016-9801
QCI Marine Offshore, 6754 Willowbrook Park Dr, Houston, TX 77066, 281 885 1300, 281 885 1349, Lbobbit@qcimarine.com, Contact: Larry Bobbit, www.qcimarine.com

JOINER- WATERTIGHT DOOR-PANELING-CEILING SYSTEM
Joiner Systems, 1925 52nd Avenue, Lacine, Quebec H8T 3C3, Canada
Walz & Krezner, 91 Willenbrock Rd., Oxford, CT 06478

K-9 DETECTION
Sun State Specialty K-9s, 1500 Beville Road, Daytona Beach, FL 32114

KEEL COOLERS
Duramax Marine LLC, 17990 Great Lakes Parkway, Hiram, OH 44234, 440-834-5400, 440-834-4950, Contact: Richard Spangler
RW Fernstrum, 1716 11th Avenue, Menominec, MI 49858, 9068635553, 9068635634, seanf@fernstrum.com, Contact: Sean Fernstrum, www.fernstrum.com

LASER ALIGNMENT
Ludeca, Inc., 1425 NW 88th Ave, Miami, FL 33172

LEAK REPAIR
Indumar Products Inc., 2500 Tanglewilde, Suite 260, Houston, TX 77063

LIFEBOAT TESTING
Imes Inc., 5139 Brook Street Suite E, Mont Claire, CA
Water Weights, Inc., 5139 Brook St., Ste E, Mont Clare, CA 91763

LIFEBOATS/RAFTS
DBC Marine Safety Systems, 101-3760 Jacombs Rd., Richmond, BC V6V 6T3, Canada
Viking Life Saving Equipment, 1400 NW159th Street Suite 101, Miami, FL 33169
Willard Marine Inc., 1250 N. Grove St., Anaheim, CA 92806
Wolong International, 151 Chin Swee Road #03-14, Manhattan House, 169876, Singapore

LIFESAVING EQUIPMENT
C.M. Hammar AB, August Barks Gatan 15, 421 32 Vastra Frolunda, Sweden
Steams Manufacturing Comapny, P.O. Box 1498, St. Cloud, MN
Viking Life Saving Equipment, 1400 NW159th Street Suite 101, Miami, FL 33169

LIFT EQUIPMENT TESTING
Water Weights, Inc., 5139 Brook St., Ste E, Mont Clare, CA 91763

LIGHTING SYSTEMS/ EQUIPMENT
ACR Electronics Inc., 5757 Ravenswood Rd., Ft. Lauderdale , FL 33310-5247
L.C. Doane, P.O. Box 975, Essex, CT 06426
Maritime Associates, P.O. BOX 1788, Crystal Bay, NV 89402, 775-832-2422, 775-832-2424, maritimeas@charter.net

LINE & NET CUTTERS
Spurs Marine, 201 S.W. 33rd St., Ft. Lauderdale, FL 33315

LUBRICANTS/LUBRICATION SYSTEMS
Benjamin R. Vickers & Sons Ltd., Airedale Mills, 6 Clarence Road, Leeds, W. Yorkshire LS10 IND, UK

MACHINERY MAINTENANCE, REPAIR & TESTING
Mackay Communications, 2721 Discovery Dr., Raleigh, NC 27616-1851

MANEUVERING EQUIPMENT
Schottel GMBH & Co. KG, Mainzer Str 99 , D-56322-Spay/Rhine, Germany

MARINE DECKING & FLOORING
Lonseal Flooring, 928 East 238th Street, Carson, CA 90745

MARINE ELECTRONICS
ACR Electronics Inc., 5757 Ravenswood Rd., Ft. Lauderdale , FL 33310-5247
GMT Electronics, 171 Main St., South River, NJ 08882
Hatteland Display, Bogstadveien, 19, , N-0355 Oslo, Norway
Jotron Electronics, Box 85 , NO-328OT Jodalyng Norge, Norway
Marine Electronic Solutions, 1522 Crabapple Cove, Jacksonville, FL 32225
Reson Inc., 100 Lopez Road, Goleta, CA 93117
Saab Marine Electronics, Box 13045, 402 5Goteborg, Sweden

MONITORING
Martek Marine Ltd., Century Business Park Manvers Way, Rotherham, South Yorkshire 560 5DA, UK

MARINE ENGINEERING
Elliot Bay Design Group, 5301 Shishole Ave. NW, Ste. 200, Seattle, WA 98107

MARINE EQUIPMENT
Scardana Americas Bkg., 502 Empire St. , Greenfield Park J4V 1V7, Canada
Tidewater Skanska, Inc., PO Box 57, Norfolk, VA 23501, 757-547-2153, 757-547-4806, sby@tidewaterskanska.com
Waterman Supply, P.O. Box 596, Wilmington, CA 90748

MARINE FURNITURE
Deansteel Mfg., 111 Merchant St., San Antonio, TX 78204

MARINE HARDWARE
HMS Marine Hardware, 333 W. Merrick Road, Valley Stream, NY 11580-5219

MARINE MANAGEMENT
Hornblower Marine Services, P.O. Box 112476, Campbell, CA 95011-2476

MARINE POWER PLANT SYSTEMS
Auramarine Ltd., Box 849 , FI-20101 Turku, Finland

MARITIME TRAINING & SCHOOLS
Marine Safety International, Marine Terminal , Laguardia Airport, NY 11371

MONITORING SYSTEMS
Governor Control Systems, 3101 SW 3rd Avenue, Ft. Lauderdale, FL 33315
Mackay Communications, 2721 Discovery Dr., Raleigh, NC 27616-1851
Michael J. Erland, 7001 Flewllyn Rd, Ottawa, Ontario K2S 1B6, Canada
Prime Mover Controls, 3600 Gilmore Way, Burnaby, BC V5G 4R8, Canada
Reson Inc., 100 Lopez Road, Goleta, CA 93117

MOORAGE FACILITY
Sea Ark Marine, P.O. Box 210, Monticello, AR 71655-0210

MOTOR PROTECTION
Marine Safe Electonics, 261 Milway Ave. #12, Concord, Ontario L4K 4K9, Canada

NAMEPLATES AND PLACARDS
Horizons ISG, 18531 South Miles Road, Cleveland, OH

NAV/COMM EQUIPMENT
C- Map Commercial, 133 Falmouth Rd, Mashpee, MA 02649
Chartco, New North Road, Hainault, Ilford Esex 166 2UR, UK
Electronic Marine Systems, 800 Ferndale Pl., Rahway, NJ 07065
Furuno USA Inc., 4400 NW Pacific Rim Blvd, Camas, WA 98607
Mackay Communications, 2721 Discovery Dr., Raleigh, NC 27616-1851

NAVAL ARCHITECTS, MARINE ENGINEERS
A.K. Suda, Inc., 3004 19th St., Metairie, LA 70002-4989
Aker Marine, 1818 CORNWALL AVE, VANCOUVER, BC V6J 1C7, Canada
Band, Lavis, & Associates, Inc., 900 Ritchie Hwy, Suite 203, Severna park, MD 21146
Bay Engineering, 253 N. First Ave., Sturgeon Bay, WI 54235
BMT Fleet Technology, 311 Legget Dr, Kanata, ON K2K 1ZB, Canada
Bristol Harbor Group, Inc., 103 Poppasquash Rd., Bristol, RI 02809
C. Baxter & Associates, P.O. Box 9006, Mobile, AL 36609
CDI Marine Co., 9550 Regency Square Blvd, Ste 400, Jacksonville , FL 32222
Computer Sciences Corporation-Advance Marine Center, 1201 M St. SE., Washington , DC 20003
Jamestown Marine Services, Inc., 1084 Shennecossett Road, Groton, CT 06340
JMS Naval Architects & Salvage Engineers, 1084 Shennecossett Rd., Groton, CT 06340, 860-448-4850, 860-448-4857, jms@jmsnet.com, Contact: Blake Powell, VP, www.jmsnet.com
John J. McMullen Associates, 4300 King St., Suite 400, Alexander, VA 22302
John W. Gilbert Associates, 75 Terry Drive, Suite 200, Hingham, MA 02043
Kvaerner Masa Marine Inc., 201 Defense Highway, Ste 202, Annapolis, MD 21401
MCA Engineers, Inc., 2960 Airway Ave., #A-103 , Costa Mesa, CA 92626
MIL Systems, 200-1150 Morrison Drive, Ottawa, Ontario K2H 8S9, Canada
Nautical Designs, Inc., 2101 S. Andrews Ave., Ste 202, Fort Lauderdale, FL 33316
The Glosten Associates Inc., 600 Mutual Life Bldg., 605 First Ave., Seattle, WA 98104
Vizag marine Consultants, 8913 Riverview Park Drive, Raleigh, NC 27613
VUYK Engineering, P.O. Box 204, , 9700 AE Groningen, Netherlands
Washburn Doughty, P.O. Box 296, E. Boothbay, ME 04544

NAVIGATION
AG Marine Inc., 5711 34th Avenue, Gig Harbor, WA 98335-8548
ComNav Marine Ltd., 13511 Crestwood Pl., Ste 15 15, Richmond, BC V6V 2G1, Canada
D & B Technologies, 1458 OCEAN SHORE BLVD #132, ORMOND BEACH, FL 32176-3613
Nauticast AG, Mariahilfer Strasse 50/211, A-1070 Vienna, Austria

OIL/WATER SEPARATORS
Alfa -Laval Separation, Inc., 955 Mearns Rd., Warminster, PA 18974
MMC International, 60 Inip Dr, Inwood, NY 11096

PAINT APPLICATOR
Mr.Longarm, Inc., P.O.BOX 377, Greenwood, MO 64034-0377

PARTS LOCATOR SERVICE
Inventory Locator Service, 8001 Centerview Parkway Suite 400, Memphis, TN 38018, 901-794-5000, 901-794-1760, ppugh@ilsmart.com

PIPE FITTINGS/CUTTINGS/CONNECTING/ SYSTEMS
Jesse Engineering, 5225 7th St., E. Tacoma, WA 98424, 253-922-7433, 253-922-2536, tmorgan@jesse-wallace.com
RAMCO Manufacturing Co., 365 Carnegie Ave., Kenilworth, NJ 07033

PIPE LEAK REPAIR
CSD North America, 880 Candia Rd., Unit 10, Manchester, NH 03109

PNEUMATIC LINE THROWERS
Restech Norway A/S, Box 624, NO-8001 BODO, Norway

PORT DEVELOPMENT
Sasakura Engineering , 7-32 Takeshima, 4-Chome, Nishiyodogoaw KY Osaka555, Japan

PORTABLE FOAM APPLICATORS
IMSSCO Corporation, 2040 Harbor Island Drive, Ste. 201 A, San Diego, CA 92101

PORTABLE VENTILATORS
Americ Corp, 785 Bonnie Lane, Elk Grove Village, IL 60007

PREVENTATIVE MAINTENANCE
Marine Safe Electonics, 261 Milway Ave. #12, Concord, Ontario L4K 4K9, Canada

PROPULSION EQUIPMENT
ABB Turbocharger, Inc., 1460 Livingston Ave., North Brunswick, NJ 08902
Alstom Power Conversion, 3 Ave. Des Trois Chenes, 90018 Belfort Cedex, France
Brunvoll A/S, P.O. Box 370, N-6401 Molde, Norway
Cummins Marine, 4500 Leeds Ave., Ste 301, Charleston, SC 29405
CWF Hamilton Co., P.O. Box 709 , Christchurch, New Zealand
Fincanteri, Diesel Engine Div., GMT, Bagnoli della, Rosandra 3334 Trieste, Italy
Harbormaster Marine, Inc., 31777 Industrial Rd., Livonia, MI 48150
Karl Senner Inc., 25 W Third, Kenner, LA 70062
Kawasaki Heavy Indust., World Trade Center Bldg., 4-1 Hamamastu-cho, 2-chome, Minato-ku Tokyo 105-6116, Japan
LA.ME Srl. Marine Division, Via della Fornace 4, Opera (MI), Italy
Man B&W Diesel, 17 State St., NY, NY 10004
Man B&W Diesel A/S, Telglholmsgade 41, Copenhagen SV DK-2450, Denmark
Man B&W Diesel AG, Stadtbachstrasse 1, Augsberg D-86153, Germany
Mapeco Products, 91 Willenbrock Rd., Unit B, Oxford, CT 06478
Markisches Werk Halver Gmbh, Box 1355, Halver D-58543, Germany
Napier Turbochargers, P.O. Box 1, Waterside , South Lincoln LN5 7FD, UK
Nya Berg Propulsion AB, Box 1005, 430 90 Ockero, Sweden
Philadelphia Resins, P.O. Box 309 , Montgomeryville, PA 18936
Rolls-Royce Commercial Marine, 10255 Richmond Ave., Ste 101, Houston, TX 77042
Schottel GMBH & Co. KG, Mainzer Str 99 , D-56322-Spay/Rhine, Germany
Ultra Dynamics Marine, LLC. (UltraJet), 1110A Claycraft Road, Columbus, OH 43230
Voith Schiffstechnik GMBH & Co., P.O. Box 2011, 89510 Heidenheim, Germany
Wartsila Corporation, Box 244, FI-65101 Vasa, Finland
Wartsila Lips, 3617 Koppens Way, Chesapeake, VA 23323
ZF Marine Group , Ehlerst. 50, 88046 Friedrichshafen, Germany

PROPULSION MONITORING
Azonix-Dynalco, 3690 NW 53rd St., Ft. Lauderdale, FL 33309

PUMP-REPAIR-DRIVES
Scardana Americas Bkg., 502 Empire St. , Greenfield Park J4V 1V7, Canada

PUMPS
Mack Boring & Parts Company, 2365 Rout 22, Union, NJ 07083

RADARS-ARPAS
Furuno USA Inc., 4400 NW Pacific Rim Blvd, Camas, WA 98607

REFUELING EQUIPMENT
Global Incorporated, P.O. Box 24, 160 Cannery Road, Somerset, PA, PA 15501

REMOTELY OPERATED VEHICLES
VideoRay LLC, 415 Engleview Blvd., Exton, PA 19341

RIGID INFLATABLE BOATS
Willard Marine Inc., 1250 N. Grove St., Anaheim, CA 92806

ROPE-MANILA-NYLON-HAWSERS-FIBERS
Marlow Ropes, South Road, Halisham, East Sussex BN27 3JS, UK

ROTATING EQUIPMENT
Seatworthy, 22 Main Street, Centerbrook, CT 06409

RUDDER BEARINGS & BUSHES
Duramax Marine LLC, 17990 Great Lakes Parkway, Hiram, OH 44234
Orkot Composites, 2535 Prairie Rd, Unit D., Eugene, OR 97402
Thordon Bearings, 3225 Mainway, Burlington Ontario L7M 1A6, Canada

SAFETY PRODUCTS
Brookdale International, 1--8755 Ash St., Vancouver, BC V6P 6T3, Canada
D & B Technologies, 1458 OCEAN SHORE BLVD #132, ORMOND BEACH, FL 32176-3613, 407-647-7500, 407-647-7505, HOTEYE@HOTEYENOW.COM
DBC Marine Safety Systems, 101-3760 Jacombs Rd., Richmond, BC V6V 6T3, Canada
Lalizas SA, 21 Haidariou St., 545 Piraeus, Greece
Steams Manufacturing Comapny, P.O. Box 1498, St. Cloud, MN
Stearns Mfg. Co., PO Box 1498, St. Cloud, GA 56302-1498
Viking Life Saving Equipment, 1400 NW159th Street Suite 101, Miami, FL 33169
Walport USA , 39-5A Dover Rd South, Toms River, NJ 08757

SALVAGE
American Salvage Association, 801 North Quincy Street, Arlington, VA 22203
Titan Maritime Industries Inc., P.O. Box 350485, Ft. Lauderdale, FL 33004

SALVAGE ENGINEERS
Jamestown Marine Services, Inc., 1084 Shennecossett Road, Groton, CT 06340

SANITATION DEVICE- POLLUTION CONTROL
Envirovac Inc, 1260 Turret Dr., Rockford , IL 61111
EVAC Environmental Solutions, 1260 Turret Dr., Rockford , IL 61111
Headhunter Inc., 3380 SW 11th Ave., Ft. Lauderdale, FL 33315
Hydroxl Systems, 9800 McDonald Park Rd, Sidney, BC V8L 3S8, Canada
Microphor, 452 E. Hill Rd., Willits, CA 95490
Severn Trent Da Nora, LLC, 1110 Industrial Boulevard, Sugar Land, TX 77478

SATELLITE COMMUNICATIONS
Eurocom Industries AB, Box 7071, DK-9200 Aalborg SV, Denmark
Furuno USA Inc., 4400 NW Pacific Rim Blvd, Camas, WA 98607
KVH Industries Inc., 50 Enterprise Center, Middletown , RI 02842
Nera Satcom AS, Box 91, NO-1375 Billingstad, Norway
Petrocom, 5300 West Sam Houston Parkway North, Houston, TX 77041
Seawave, 76 Hammarlund Way (Tech 3), Middletown, RI 02842, 401-846-8403, 401-846-9012, TFalvo@seawave.com
Stratos , Donovan Business Park, St. Johns, NL Canada A1C 5X3, Canada
Thrane & Thrane Inc., 509 Viking Dr. Suites K, L & M, Virginia Beach, VA 23452, 1-866-SATCOMS or +1-757-463-9557, +1-757-463-9581, writeus@tt.dk, Contact: Tom Kelly, www.tt.dk/us

SCARIFIERS
Desmond-Stephan, P.O. Box 30, Urbana, OH 43078

SEALS
Duramax Marine LLC, 17990 Great Lakes Parkway, Hiram, OH 44234
Orkot Composites, 2535 Prairie Rd, Unit D., Eugene, OR 97402
Thordon Bearings, 3225 Mainway, Burlington Ontario L7M 1A6, Canada

SEATING
H.O. Bostrom, 818 Progress Ave., Wankesha, WI 53186

SECURITY
EMX, Inc., 4200 Dow Road, Suite C, Melbourne, FL 32934
LSI Lockmaster Security, 1044 S. Main Street, Nicolasville, KY 40356
Smiths Detection, 30 Hook Mountain Road PO Box 410, Pine Brook, NJ 07058, 973 830-2131, 973-830-2200, susan.cooper@smithsdetection.com, Contact: Susan Cooper, www.smithsdetection.com

SENSORS
Electronic Marine Systems, 800 Ferndale Pl., Rahway, NJ 07065

SHAFT SEALS
Duramax Marine LLC, 17990 Great Lakes Parkway, Hiram, OH 44234

SHAFTS
Centa Corp., 815 Black Hawk Drive, Westmont, IL 60559, 630-734-9600, 630-734-9669, bobl@centacorp.com

SHIP DELIVERY
Redwise Maritime Services BV, P.O. Box 20, 3740 AA Baarn, Holland Eemweg 8, Netherlands, +31 (0)35 54 80 500, +31 (0)35 54 80 511, info@redwise.nl

SHIP MANAGEMENT
Eurasia Group , 22A Floor Chinachem Exchange Sq., , 1 Hoi Wan St., Quarry Bay, Hong Kong

SHIP REPAIR
HALIFAX SHIPYARD, 3099 BARRINGTON ST, HALIFAX, NS, Canada
Manitowoc Marine Group, 1600 Ely St., Marinette, WI 54143-2434
Mark Van Schaick BV, Nieuwe Waterwegstraat, 3115 HE Schiedam, Harbour 535/Port Of Rotterdam, Netherlands
OCEAN TECHNICAL SERVICES, MILITARY OCEAN TERMINAL BAYONNE UNIT #8-FOOT OF 32ND STREET, BAYONNE, NJ 07002
United Marine Enterprises Inc., P.O. Box 22077, Beaumont, TX 77720

SHIP SIMULATORS
Kongsberg Maritime AS, PO Box 1009, 3194 Horten, Norway

SHIPBUILDING-REPAIRS, MAINTENANCE, DRYDOCKING
Atlantic Marine, Inc., P.O. Box 3202 , mobile, AL 36652
Austal USA, 100 Dunlap Dr., Mobile, AL 36633
Blount Marine, 461 Water St., Warren, RI 02885
Bollinger Lockport & Larose, P.O.Box 250, Lockport, LA 70374
Curacao Drydock Co., Box 3012 , Wilmestad, Curacao, Netherlands Antilles
Damen Shipyards, P.O. Box 1 Gorinchem, 4200AA Holland, Netherlands
Detyens Shipyards Inc., 1670 Drydock Ave., Bldg 236, North Charleston, SC 29450
Fincantieri Canterieri Navali Italiani Spa, Merchant Shipbuilding Div., 34123 Trieste, Italy

In-Place Machining, 3811 N. Holton St., Milwaukee, WI 53212
Leevac Industries, LLC, P.O. Box 1190, Jennings, LA 70546
Manitowoc Marine Group, 1600 Ely St., Marinette, WI 54143-2434
Motor-Services AB, Box 2115 , Ronninge S- 144 04, Sweden
Newport News Shipbuilding, 4101 Washington Ave., Newport News , VA 23607
United Defense, 1525 Wilson Blvd., Ste 700, Arlington, VA 22209-2444
United Marine Enterprises Inc., P.O. Box 22077, Beaumont, TX 77720
VT Halter, PO Box 3029, Gulfport, MS 39505
Washburn Doughty, P.O. Box 296, E. Boothbay, ME 04544

SHIPYARDS
Alabama Shipyard, P.O. Box 3202, Mobile, AL 36652
Atlantic Marine, Inc., P.O. Box 3202 , mobile, AL 36652
Derecktor Shipyard, 311 E. Boston Post Rd., Mamaroneck, NY 10543
Detyens Shipyards Inc., 1670 Drydock Ave., Bldg 236, North Charleston, SC 29450
Leevac Industries, LLC, P.O. Box 1190, Jennings, LA 70546
Offshore Inland, 3521 Brookdale Dr. S., Mobile, AL 36618
United Defense, 1525 Wilson Blvd., Ste 700, Arlington, VA 22209-2444

SIGNS & LABELS
Horizons ISG, 18531 South Miles Road, Cleveland, OH

SILENCERS
EM Products & Cowl Silencer Div. Phillips and Temro Ind., 5380 Cottonwood Lane, Prior Lake, MN 55372, (952) 226-8105, (952) 440-3400, hentig@phillipsandtemro.com, Contact: Bob Hentig, Sales Mgr. Marine Products, www.phillipsandtemro.com
Silex Inc., 6659 Ordan Dr., Mississauga, ON L5T 1K6, Canada

SILICON BRONZE
Atlas Metal Sales, 1401 Umatilla St., Denver, CO 80204, 800-662-0143, 303-623-3034, jsimms@atlasmetal.com, Contact: Jerry Simms, www.atlasmetal.com

SIMULATION TRAINING
Barco Simulation, 600 Bellbrook Avenue, Xenia, OH 45385
Calhoon MEBA Engineering School, 27050 St. Michaels Road, Easton, MD 21601
Marine Safety International, Marine Terminal , Laguardia Airport, NY 11371
Maritime Institute of Technology, 5700 Hammonds Ferry Rd., Linthicum Heights, MD 21090
Poseidon Simulation AS, Box 89, NO-8370 Leknes, Norway
Transas Marine Overseas Ltd., 12 Obukhovskoy, Oboroni, St. Petersburg 193019, Russian Federation

SLIDING DOORS
Walz & Krezner, 91 Willenbrock Rd., Oxford, CT 06478

SOFTWARE
Creative Systems Inc., P.O. Box 1910, Port Townsend, WA 98368
Design Maintenance Systems, Inc, 340 Brooksbank Ave, Ste.100, North Vancouver,BC VTJ 2C1, Canada
Loadmaster International , St. Varvsgarten 11B SE, 211 19 Malme, Sweden
Pipeline Communications and Technology, Inc., 2800 Woodlawn Dr. Ste. 264, Honolulu, HI 96822
Resergence Software Inc. ., 2021 Lakeshore Dr., Ste 21D, New Orleans, LA 70122

STEERING GEARS/ STEERING SYSTEMS
Jastram Engineering, 467 Mountain Hwy, North Vancouver, BC V7J 2L3, Canada
Kobelt Manufacturing Co., Ltd., 8238-129 Street, Surrey, BC V3W0A6, Canada
Offshore Inland, 3521 Brookdale Dr. S., Mobile, AL 36618

STERN TUBE BEARINGS/ BUSHES
Duramax Marine LLC, 17990 Great Lakes Parkway, Hiram, OH 44234, 440-834-5400, 440-834-4950, Contact: Richard Spangler
Orkot Composites, 2535 Prairie Rd, Unit D., Eugene, OR 97402
Thordon Bearings Inc., 3225 Mainway, Burlington, Ontario L7M 1A6, Canada

STERN TUBE SEALS
Superbolt, PO Box 683, Carnegie, PA 15106

STRAINERS
Hellan Strainer, 3249 East 80th St., Cleveland, OH 44104

SURFACE PREP TOOLS
Aurand Mfg., 1210 Ellis St., Cincinnati, OH 45223
Flow International Corp., 23500 64th Ave., South Kent, WA 98059

SURVIVAL EQUIPMENT
Brookdale International, 1--8755 Ash St., Vancouver, BC V6P 6T3, Canada

TANK LEVELING INDICATORS
Ian Conrad Bergan, 3119 North Davis Highway, Pensacola, FL 32503, 850-434-1286, 850-434-1246, sales@icbergan.com, Contact: Ron Monell, www.icbergan.com
Ian-Conrad Bergen, 3119 North Davis Highway, Pensacola, FL 32503, 850-434-1286, 850-434-1246, sales @icbergeb.com, Contact: Ron Monell
King Engineering Co, PO Box 1228, Ann Arbor, MI 48106
Saab Marine Electronics, Box 13045, 402 5Goteborg, Sweden
Technical Marine Service, Inc., 6040 North Cutter Circle, Suite 302, Portland, OR 97217-3956

TESTING SERVICES
BMT Fleet Technology, 311 Legget Dr, Kanata, ON K2K 1ZB, Canada
Wyle Laboratories, 7800 Govern's Dr. S.W., Huntsville , AL 35807

THRUSTER SYSTEMS
Omnithruster , 2201 Pinnacle Parkway, Twinsburg, OH 44087, 330-963-6310, 330-963-6325, widmer@omnithruster.com, Contact: Kurt Widmer, www.omnithruster.com

TOWING EQUIPMENT
Allied Shipbuilders Ltd., 1870 Harbour Road, Vancouver V7H 1A1, Canada

TRAINING
Calhoon MEBA Engineering School, 27050 St. Michaels Road, Easton, MD 21601
DM Consulting, 12316 Dormouse Road, San Diego, CA 92129, 858-705-0780, 858-538-5372, jstiglich@aol.com
International Maritime Training, 910 SE 17th St., Ste 200, Fort Lauderdale, FL 33316
LSI Lockmaster Security, 1044 S. Main Street, Nicolasville, KY 40356
Massachusetts Maritime Academy, 101 Academy Drive, Buzzards Bay, MA 02532
SUNY Maritime College, 6 Pennyfield Ave, Bronx, NY 10465-4198
USMMA- Global Maritime and Transportation School, 300 Steamboat Rd., Kings Point, NY 11024

TRANSMISSIONS
Karl Senner Inc., 25 W Third, Kenner, LA 70062

TRAVEL SERVICES
Griffin Americas, 3648 Greenbriar Drive, Houston, TX 77098

TURBOCHARGERS
ABB Turbo Systems AG, CH 5401, Baden, Switzerland

TURBOCHARGERS- REPAIRS
Motor-Services Hugo Stamp, 3101 S.W. 3rd Ave., Ft. Lauderdale, FL 33315
Napier Turbochargers, P.O. Box 1, Waterside , South Lincoln LN5 7FD, UK

ULTRASONIC TESTING
M.A.C.E, 5910 NE 15th Ave., Fort Lauderdale, FL 33331
Panametrics-NDT, 18 Woerd Avenue, Waltham, MA 02453

UNDERWATER SURVEILLANCE SONAR
C-Tech LTD, P.O.Box 1960, Cornwall Ontario K6H6N7, Canada

VACUUM TOILET SYSTEM
Envirovac Inc, 1260 Turret Dr., Rockford , IL 61111
Jets Vacum Sewage System, P.O. Box 14, N-6060 Hareid, Norway

VALVE ACTUATORS
EIM Controls, 13840 Pike Road, Missouri City, TX 77489

VALVES & FITTINGS
Leslie Controls, 12501 Telecom Dr., Tampa, FL 33637

VENTILATION SYSTEMS / PRODUCTS
Delta T Systems, 858 West 13th Court, Riviera Beach, FL 33404
Dry Air Technology, 313 North Oak St., Burlington, VA 88233

VIBRATION ANALYSIS
Ludeca, Inc., 1425 NW 88th Ave, Miami, FL 33172
Maritech, LLC, 100 Powermill Rd., Acton, MA 01725

VISCOMETERS
Cambridge Applied System, 196 Boston Ave. , Medford, MA 02155

VOYAGE DATA RECORDERS
Rutter Technologies Inc., 22 Pearl Place, P.O.BOX 427, St. John's NL A1C 5N8, Canada

WASTE WATER TREATMENT
RWO , Leerkampe 3, D- 28259 Bremen, Germany
Severn Trent Da Nora, LLC, 1110 Industrial Boulevard, Sugar Land, TX 77478

WATER JET CLEANING
Flow International Corp., 23500 64th Ave., South Kent, WA 98059
Gardner Denver Water Jetting Systems, 12300 N. Houston Rosslyn Road, Houston, TX 77086

WATER PURIFIERS
Alfa -Laval Separation, Inc., 955 Mearns Rd., Warminster, PA 18974
Gardner Denver Water Jetting Systems, 12300 N. Houston Rosslyn Road, Houston, TX 77086
Offshore Marine Labs, 2000 West 135th St, Gardena, CA 90249
Reverse Osmosis of S.F., Inc., 150 SE 29th Street, Ft. Lauderdale, FL 33316
Reverse Osmosis of South Florida, Inc., 150 S.E. 29th St., Fort Lauderdale, FL 33316

WATERTIGHT CLOSURES
Walz & Krezner, 91 Willenbrock Rd., Oxford, CT 06478

WINCH MANUFACTURER
Burrard Iron Works Ltd., 220 Alexander Street, Vancouver, BC V6A 1C1, Canada, 604-684-2491, 604684-0458, sales@burrardironworks.com

WINCHES & FAIRLEADS
Allied Systems, 2300 Oregon St., Sherwood, OR
Coastal Marine Equipment, 20995 Coastal Parkway, Gulfport, MS 39503-9517, 228-832-7655, 228-832-7675, sales@coastalmarineequipment.com, Contact: Ralph Waguespack, www.coastalmarineequipment.com
Intercontinental Engineering , PO Box 9055 , Kansas City, MO 64168
Jeamar Winches, 1051 Clinton St., Buffalo, NY 14206
Markey Machinery, P.O. Box 24788, Seattle, WA 98124
MMC International, 60 Inip Dr, Inwood, NY 11096
Rapp Hydema, 4433 27th Ave. West, Seattle, WA 98199, (206) 286-8162, (206) 286-3084, scotta@rappus.com
Skookum , P.O. Box 280, Hubbard, OR 97032
Smith Berger Marine, 7915 10th Ave. S., Seattle, WA 98108
Superior Lidgerwood Mundy, 1101 John Ave., Superior , WI 54880
Timberland Equipment Ltd & Almon Johnson, 459 Industrial Ave., Woodstock, ON N4S 7Z2, Canada

WINDLASSES (ANCHORS)
Coastal Marine Equipment Inc., 20995 Coastal Parkway, Gulfport, MS 39503-9517, 228-832-7655, 228-832-7675, sales@coastalmarineequipment.com, Contact: Ralph Waguespack, www.coastalmarineequipment.com
Rapp Hydema, 4433 27th Ave. West, Seattle, WA 98199, (206) 286-8162, (206) 286-3084, scotta@rappus.com

WINDOWS
Deansteel Mfg., 111 Merchant St., San Antonio, TX 78204

WINDSCREEN & WINDOW WIPERS
Bae Systems, 550 South Fulton St., Mt. Vernon, NJ 10550
Hepworth Marine International , Hepworth House, Brook St., Redditch, Worcestershire B98 8NF, UK

WIRELSS MONITORING SYSTEMS
Michael J. Erland, 7001 Flewllyn Rd, Ottawa, Ontario K2S 1B6, Canada

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NVTi

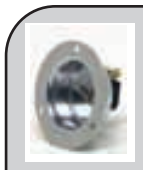
NVTi specializes in providing solutions for your night/day vision needs. NVTi-manufacturs remotely mounted, centrally monitored vision systems utilizing a combination of leading edge Thermal Imaging, Generation III Light Intensification, Ultra-low Light, and Color Camera Technologies.

Circle 101

Caterpillar

From propulsion engines to drive line and electronic control systems, from auxiliary power units to generator sets, Cat Marine offers a complete line of systems. ACERT Technology is the product of $500M investment structured on broadest product, application and manufacturing base in the industry.

Circle 102



Cole Hersee

Cole Hersee introduces its Recessed Toggle Switch for marine applications. It is comprised of a standard toggle switch centered at the bottom of a plated steel bowl measuring .892 in. deep. This new design prevents accidental actuation of the switch by passengers.

Circle 103

Deep Develoment

Recording high resolution video in environments is what Viperfish digital recorders have been designed for. Available for applications such as rugged top side, battery operated and underwater recording --Viperfish Digital Recorders are designed on a powerful digital platform that records non-multiplexed, high resolution video.

Circle 104

Northern Lights

New York Water Taxi implements Northern Light's M33C Commercial Diesel Generators. With each M33C, there is a naturally aspirated four-cylinder Lugger diesel engine that provides the torque and efficiency commercial operators require.

Circle 105

Mack Boring

Mack Boring & Parts Company has established a Commercial Marine Sales Division. The new division will distribute large-bore commercial marine engines from Mitsubishi, servicing Maine to North Carolina. Mack Boring will carry and service Mitsubishi engines ranging from 400 hp to 2,000 hp.

Circle 106

Midwest

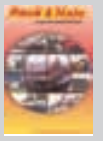
Mid-West Instrument introduces its new Model 123 Differential Pressure Gauge. This new gauge uses the same sensing and output method as the Model 120. Like the Model 120, the Model 123 is available in aluminum or 316/316L stainless steel bodies, 316 S.S. springs and internal parts, and a wide variety of elastomers.

Circle 107

Desmond Stephan

The performance of the Swirl-Off tool is dependent on the power it receives from your disc sander, grinder, polisher, or drill motor. The higher the RPM the faster the material will be removed. The tool will give its performance when a disc sander with speeds from 1500 to 4000 rpm are used.

Circle 108



Peck & Hale

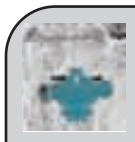
Peck & Hale is a designer and manufacturer of cargo securing systems for the Defense and Transportation industries. Peck & Hale offers a comprehensive service for the design, supply, refurbishment and replacement of equipment for all types of cargo securing systems.

Circle 109

Redwise

Redwise Maritime Services of Baarn, the Netherlands, provides a top quality take-over, sail-over, hand-over service for virtually every type of vessel, wherever you need it picked up or delivered. In addition to ship delivery, Redwise is also active as a specialist recruitment agency for mariners operating.

Circle 110



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Totem

Totem Plus is introducing its new DNV certified Personal Computer-

Totem PC TPC 1.2 Totem PC is a PC compatible computer system designed to be used in maritime environment. The computer is based on Intel computer technology and incorporate Intel 856G chipset.

Circle 114

HBM

The new one-piece steel P2V pressure transmitter from HBM is aimed at users needing reliability combined with accuracy. The design of the P2V is similar to HBM's Blueline series because the monolithic measuring body eliminates welded seams and clamped connections connecting to the measurement medium.

Circle 115

Enmet

Enmet's Spectrum SP with internal pump and a uniquely designed sample head was developed to meet these demanding requirements. Spectrum SP features a backlit digital display, dual-level alarms and a rechargeable battery.

Circle 16

DieselCraft

Dieselcraft Fluid Engineering of Auburn, Ca. has developed a new Two Stage Diesel Fuel Purification System. Stage one is a high-speed centrifuge separator that removes 99.9% of water and 95% of solid contaminants in diesel fuel. Stage two will address degradation, oxidation and repolymerization in fuel.

Circle 117

VingCard

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Circle 118

Netwave

NetWave Systems introduced its NW-4000 series of Compact Voyage Data Recorders. This VDR concept was developed in a co-maker ship between several manufacturers, making use of so Digital Signal Processors, within networked microprocessor architecture.

Circle 119

Mastervolt

Mastervolt has introduced the new Whisper 8 and 10 kVA generator sets which bridge the gab between the popular 6 kVA and the 12 kVA Ultra. The newly developed sound shields make the generators run quietly. The advanced DDC system, the Digital Diesel Control, are delivered as standard with the generator sets.

Circle 120

ASA/Jensen

ASA/Jensen Marine's Voyager Observation System can be utilized as a way to keep watch over the engine room or sleeping quarters. Using the system to for potential fire hazards is becoming is a way to stay informed of the boat's inner workings. As another option, the observation system can also be used as a security system.

Circle 121

MEDC

MEDC launched a new range of heavy duty control stations and terminal boxes for use in potentially explosive atmospheres. The new range comprises of various Control stations and Terminal boxes manufactured in both Stainless steel and GRP with a full range of pushbuttons, indicator lights, rotary switches among other options.

Circle 122

Graco

Graco has introduced a data recording kit designed to record critical application information on its Reactor proportioning system. The kit records the volume of material sprayed, target and actual A and B pressures, primary temperatures of the A and B components as well as hose temperature.

Circle 123

Ecom

The ecom i.roc x 10-Ex is a compact, industrial PDA based on a Pocket PC. It features three modes of communication-integrated WLAN 802.11b, Bluetooth and IrDA infrared port. Three different versions of the i.roc x 10-Ex meet the diverse needs and requirements of industry for ex-areas or unclassified areas.

Circle 124

AE Light

AE Light introduced the 14W HID Power Light. The model PL14, 14W Power Light is a personal searchlight. It produces 800+ lumens of true white light in a compact beam. Smaller and lighter than the 24W Power Light (PL24), this new model can be used for law enforcement, border patrol, search & rescue, andmaritime interdiction

Circle 125

Employment/Recruitment

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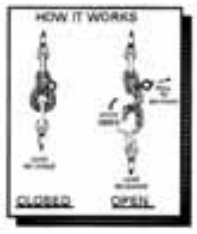

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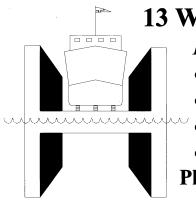

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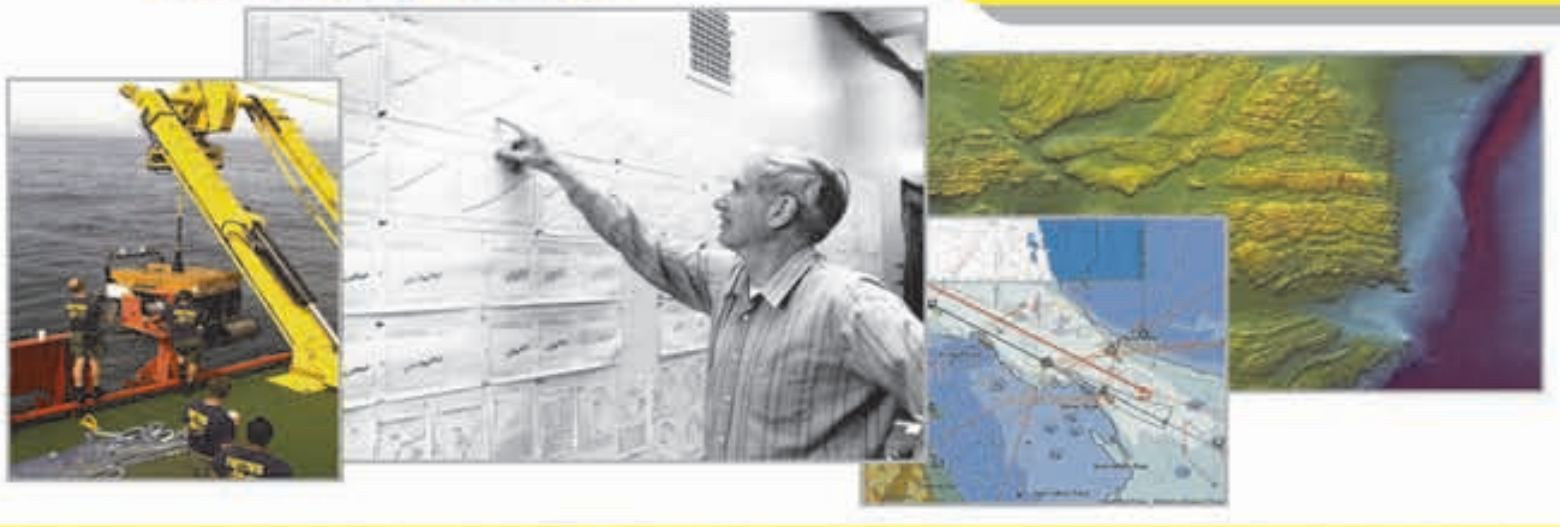

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