

March 2004

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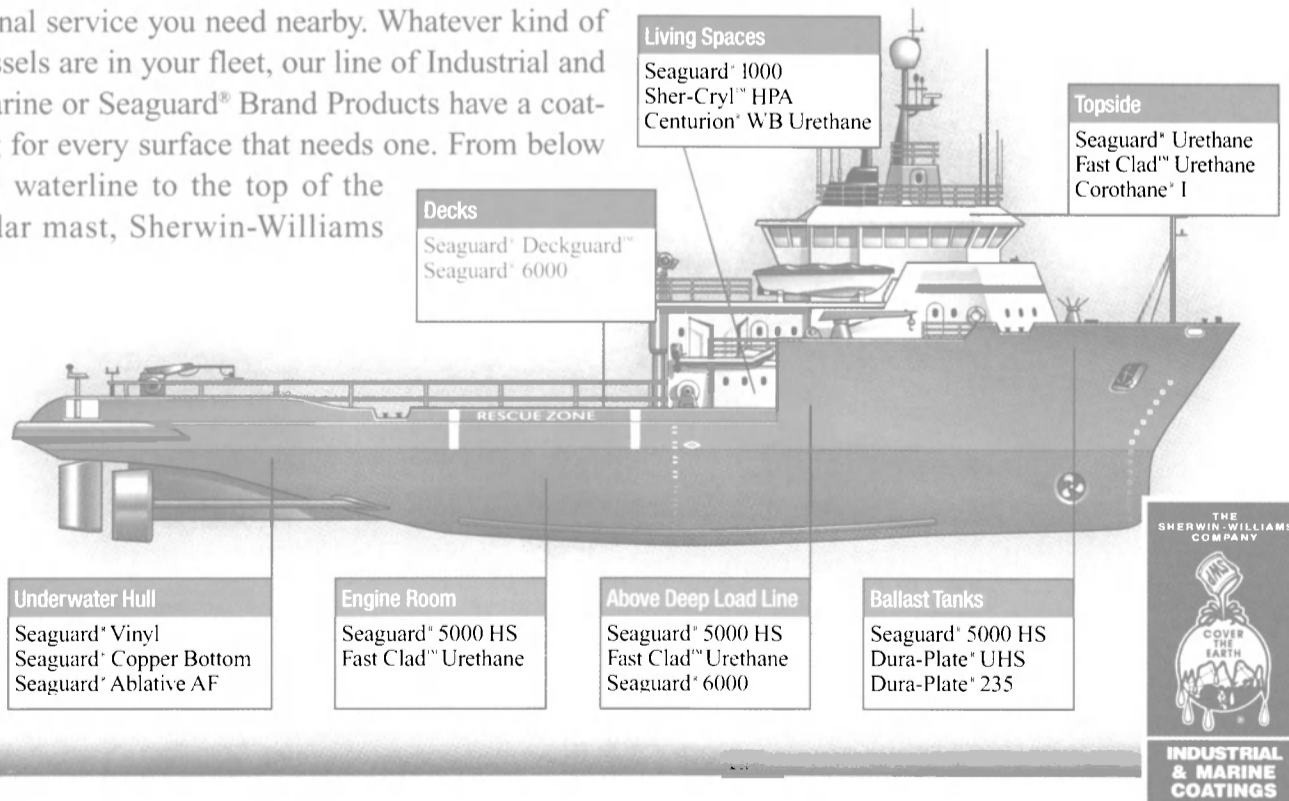


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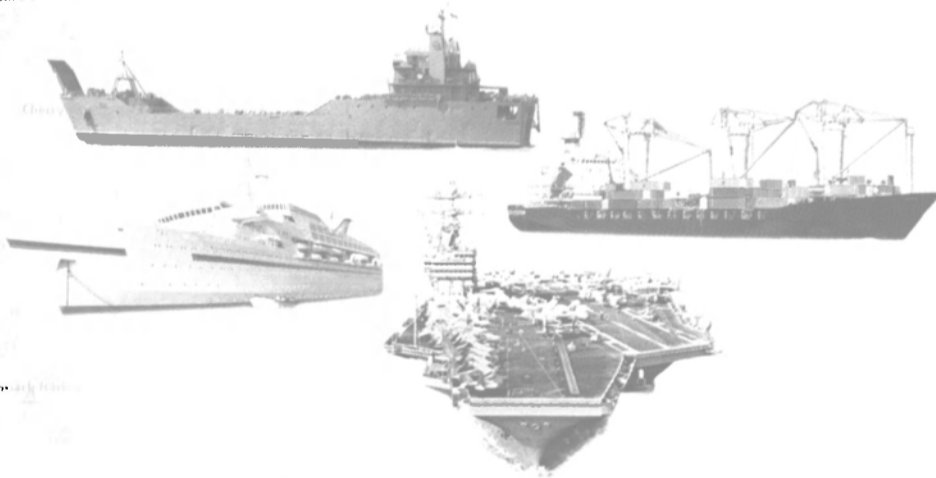
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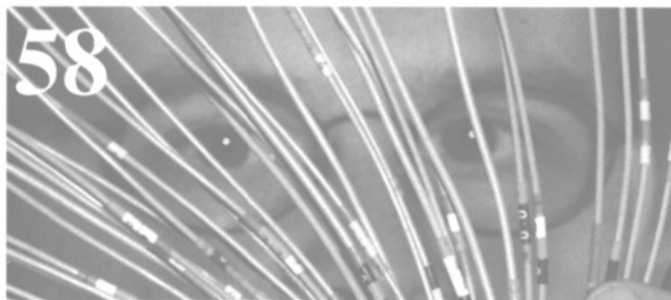
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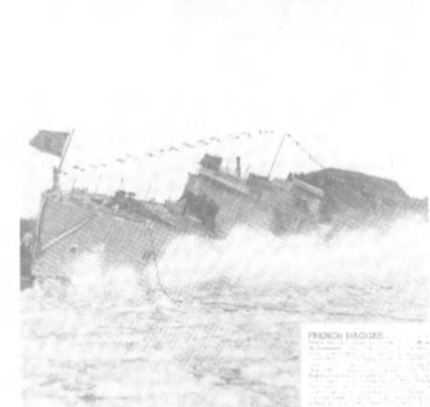


„Unser Papa baut hier megaschöne Yachten.“

ThyssenKrupp 

ABOVE: Blohm + Voss in Hamburg Germany will feature this banner on the side of its Dock 11 facing the Elbe River. Measuring 180 x 11 m, the poster features brothers **Cederic** (11 years old) and **Leon** (9 years old) - sons of the master welder **Boris Deutschmann**. The translation: **"Here our dad constructs mega-beautiful yachts"**

60 Years Ago



French Dagger

Christened Dague, meaning "dagger" in French, by Mrs Henri de Lageneste, wife of the Chicago representative of the French Liberation Committee, the submarine chaser W-13 is shown crashing into ice filled Sturgeon Bay from the ways of the Leatham D. Smith Shipbuilding company, on the cover of Maritime Activity Report's March 2, 1944 edition, 60 years ago. Dague was the second of three sub chasers the Smith Yard built for the Free French Government. The ships were identical to the American vessels, save one detail ... the French ships had accommodations for wine casks.

Don't Miss Maritime Reporter's 65th Anniversary Celebration edition, coming in AUGUST 2004.

Cartoon



"THIS IS THE SHIP'S NERVE CENTER. -BOPS, SORRY!- HIT THE WRONG NERVE!"

See David Tinsley's report of progress on the "electric" ship, starting on page 58.

March 2004

Maritime Meanings

Squeegee The familiar rubber-edged "broom" used for sweeping water from windows, vehicle windscreens, and the like, after they have been washed. Originally a nautical word, with the variation "squilgee;" it referred to the swab used for washing and cleaning the decks, and is a corruption of "squeege;" which itself is a colloquialism for "squeeze."

Source: *An Ocean of Words: A Dictionary of Nautical Words and Phrases*, by Peter D. Jeans; Birch Lane Press, 1998

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Editor's Note

Much of the copy on our pages is spent examining the technical and financial sides of our business — the vessels, systems and equipment, as well as the companies and individual that design, build and operate them.

The human side ... the people and personalities that make the maritime industry what it is and, personally, has kept me coming back for more for the last decade, often finishes a distant third. Some events of the last few months — the death of **Chris Cordeau** (29) from Portland Tugboat; the collision of the **Lee III** and **Zim Mexico III** at the mouth of the Mississippi, resulting in the sinking of the OSV **Lee III** and the apparent death of five crew members, including the confirmed deaths of **Baldemar Villarreal, Jr.** (54) **Joseph Harl Brown** (44), and **Lawrence Glass** (65); and the explosion and sinking of a chemical tanker off the coast of Virginia, apparently resulting in the death of 21 — helps to put into perspective our business at hand.

As proven by the above examples, the business of water transportation can be a dangerous profession, particularly when compared to that of, for example, a magazine editor. Aside from my regular travels to shipyards and courtesy rides aboard vessels, the most harrowing part of my daily life is the commute from Long Island to Manhattan — dodging taxis, buses and the rare crazed bike messengers — on my 20 minute walk to work. Life on the water is another story.

The business of building and operating vessels — while arguably safer than ever — requires a high degree of expertise, support, training and education. The investigation of maritime mishaps is a long, laborious and often inexact process, and a reasoning for the above-mentioned accidents is not even close at hand. During a recent meeting of the EU Temporary Committee on Safety at Sea, the delegation was told by **Eduardo Chagas** of the Maritime Transport Section of the European Transport Worker's Federation that the prime reason for casualties was human rather than structural failure. Combined with the current mandates regarding the security of vessels and port facilities, the need for outside assistance to ensure that your company's executives and personnel are properly trained and informed has never been higher. Critical decisions made today in this regard will have long term affect — either positive or negative — on a company's bottom line.

More importantly, it could be the difference between life and death.

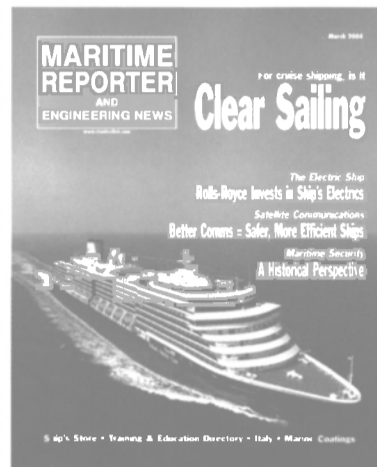


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On the Cover



Pictured on the cover is MS Oosterdam, an 82,000-gt, 1,848-passenger ship, built by Fincantieri driven to a speed of 24 knots a pair of 17.4 MW Azipods.

Cruise Shipping Coverage starts on page 26.

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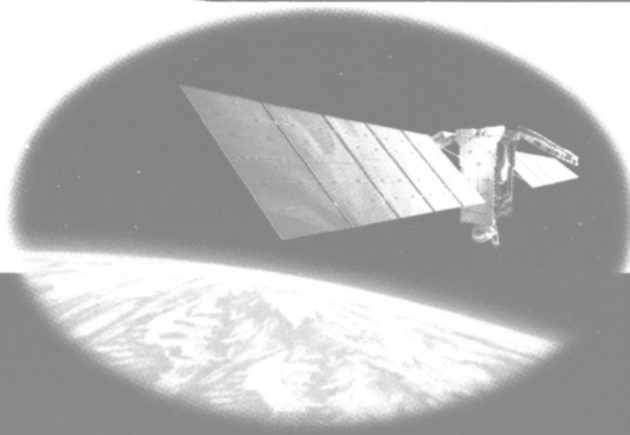
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Bollinger Delivers Tidewater Supply Boat Jonathan Rozier

Bollinger Shipyards delivered the Jonathan Rozier, the third of four 207-ft. (63 m), 4,750 bhp supply boats to Tidewater, Inc. This vessel follows the Lousteau Tide and Deville Tide,

Bollinger's new 220 class offshore support vessels (OSV), designed for Tidewater. The fourth vessel, Bourgeois Tide will be delivered in April of 2004. Jonathan Rozier measures 207 x 53-ft.

(63 x 16.2 m), and is 19-ft. (5.8 m) deep. Light draft is 6.5 ft. (1.98 m); loaded draft is 16.2 ft. (4.9 m). It has two Caterpillar 3516B diesel engines developing a total of 4,750 bhp at 1,600 rpm



Using diesel engines to generate power?

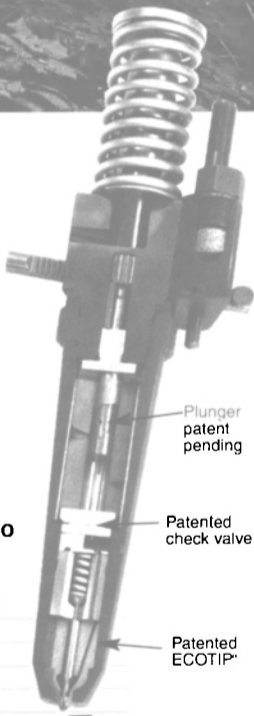
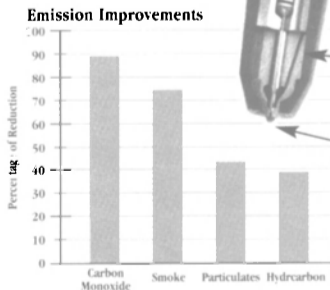
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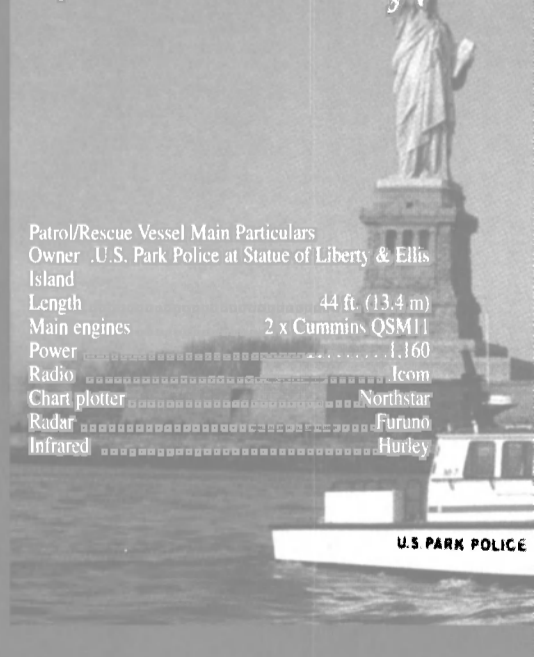
Jonathan Rozier Main Particulars

Length	207 ft. (63 m)
Breadth	53 ft. (16.2 m)
Depth	19 ft. (5.8 m)
Draft, light	6.5 ft. (1.98 m)
Draft, loaded	16.2 ft. (4.9 m)
Main engines	Caterpillar 3516B
Power	4,750 bhp
Z-Drives	Rolls-Royce
Bowthruster	Rolls-Royce

Cargo Deck	5,808 sq. ft.
Capacity	1,380 long tons
Liquid mud	6,223 barrels
Bulk capacity	6,000 cu. ft.
Accommodations	26 in 11 cabins
Classification	ABS

SeaArk Delivers Patrol

SeaArk Marine delivered a 44-ft. Dauntless Class patrol/rescue vessel to the U.S. Park Police at the Statue of Liberty and Ellis Island in New York Harbor. The boat is responsible for patrol, surveillance, search and rescue, port security, diving and anti-terrorism activities in New York Harbor and surrounding waters. The SeaArk 44-ft. Dauntless is constructed of all-welded marine grade aluminum and features a deep-vee variable deadrise hull that



Patrol/Rescue Vessel Main Particulars

Owner	U.S. Park Police at Statue of Liberty & Ellis Island
Length	44 ft. (13.4 m)
Main engines	2 x Cummins QSM11
Power	1,160
Radio	Icom
Chart plotter	Northstar
Radar	Furuno
Infrared	Hurley



Bollinger delivered Jonathan Rozier, a 207-ft. (63 m), 4,750 bhp supply boat, to Tidewater.

(Photo courtesy Bollinger Shipbuilding)

driving two Rolls Royce US 205 Z-Drives.

The bowthruster is a (Rolls-Royce) Ulstein-Aquamaster Combi Azimuth/Tunnel Thruster type TCNC 73/50-170, hinged retractable, powered by a Caterpillar 3508B diesel providing greater maneuverability and station keeping.

The cargo deck has a clear area of 5,808 sq. ft. capable of carrying 1,380 long tons.

Liquid mud capacity is 6,223 barrels and bulk capacity is 6,000 cu. ft. Air-conditioned and heated accommodations are provided for 26 people in 11 cabins.

A double bed hospital is also included and the boat's galley can serve 12 persons at a time.

Jonathan Rozier is U. S. flagged and classed by the ABS Maltese Cross A1, AMS, DPS1 and documented by the U. S. Coast Guard under sub-chapter L OSV & I Misc.

Vessel and carries full SOLAS certificate. Jonathan Rozier is named in memory of 1st Lt. Jonathan Rozier, who was

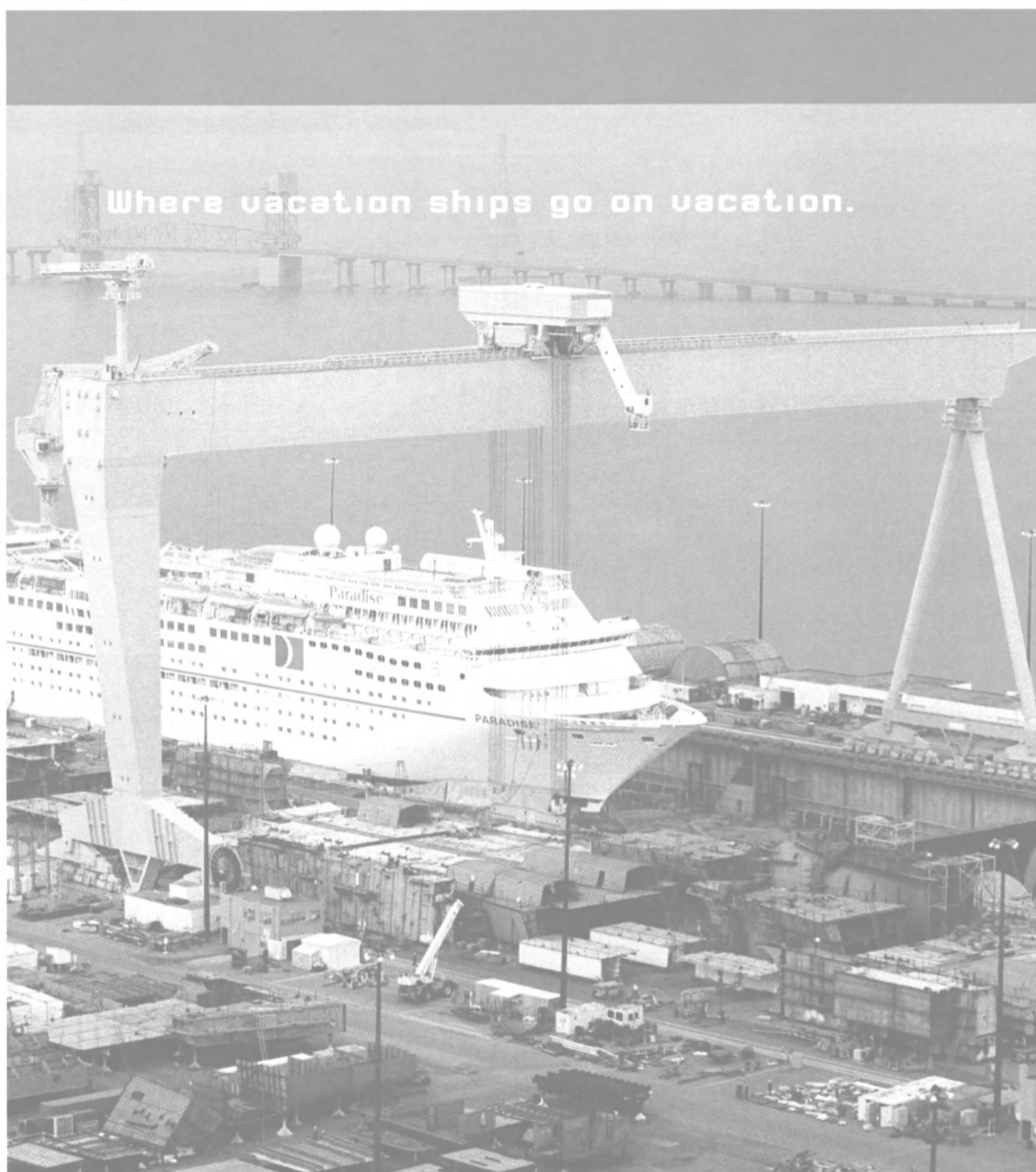
killed July 19, 2003 just outside of Baghdad, Iraq.

He was assigned to Bravo Company, 2-70th Armor, 3rd Brigade, 1st Armored Division. Rozier is the grandson of deceased Gwen Phillips, a Tidewater corporate headquarters employee of 24 years.

Boat to U.S. Park Police

produces a smooth, dry and stable ride. These characteristics are greatly appreciated by the crew for fast response and all-weather maneuvering capabilities. A recessed aft cockpit is installed to facilitate the vessel's mission, aiding in diving, recovery and towing operations and in boarding other vessels. The vessel is powered by twin Cummins QSM11 inboard diesel engines, each rated at 580 hp. Additional outfitting includes a 10.0 kW generator, an Icom VHF/FM radio, a Northstar chart plotter and a Furuno radar. In addition, a Hurley infrared system is installed for nighttime operations. For all-season crew comfort and operation, the boat includes central heating and air conditioning.

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World's Largest Dry Transport Vessel Delivered

Heavy transport shipping company Dockwise Shipping B.V. took delivery of the M/V Blue Marlin after her conversion into the world's largest semi-submersible heavy transport vessel able to carry heavy cargoes up to 73,000 tons. After a conversion of three months

at the Hyundai Mipo Dockyard Blue Marlin has re-joined the Dockwise fleet with an increased deadweight capacity of 76,061 tons. The beam has been increased by 21 m, which results in an increased unobstructed deck area of 11,227 sq. m (63 m wide x 178.2 m

long). The propulsion system of the vessel has been upgraded and extended with two Azimuth retractable propulsors, each 4.5 MW, to provide optimum manoeuvrability and seagoing characteristics while carrying ultra large cargoes. With this conversion Dockwise



responds to the continuing scale development in especially floating production units for the offshore oil and gas industry. The jumboized Blue Marlin will create the next phase in the transportation of fully integrated, heavier and ultra large floating production and drilling platforms up to 73,000 tons.

VT Halter Wins Contract

VT Halter Marine Inc. signed a \$5.2 m contract with Tide Leasing Company, L.L.C. to build a 200 x 75 x 14.5-ft. stevedoring crane barge. It will be classed by LR, and Hydralift AmClyde Inc., (AmClyde) will supply the crane for the project. The scope of work includes installation of the deck winches and crane pedestal and will take about 12 months to complete. In the four months that follow, VT Halter Marine will assist AmClyde with the installation and operational testing of the crane. Delivery of the 16-month project is scheduled to take place during the second quarter of 2005.

Circle 48 on Reader Service Card

Senesco Marine Wins Barge Contract

Senesco Marine signed a contract to build a 100,000-barrel double-hulled liquid fuel barge for Reinauer Transportation. Over the past year, Senesco Marine has delivered two 80,000-barrel double-hulled barges and is currently working on two more for delivery this year. Both 80,000-barrel barges reportedly are well ahead of schedule. CEO Gary Schuler is predicting that the new 100,000-barrel barge will also be completed ahead of the scheduled January 2005 delivery date. "We're very pleased to be working with Senesco Marine on the construction of our new barge," said Chris Reinauer, Reinauer Transportation. "The company's on time delivery process was a major factor in our decision to go with Senesco Marine."

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Circle 305 on Reader Service Card

Izar Sestao Delivers LNG Carrier Bilbao Knutsen

Izar Sestao delivered Bilbao Knutsen to Knutsen OAS, which will operate it for Repsol YPF. The ship has an LNG capacity of 138,000 cu. m. and it is the second ship with these characteristics built by the yard, following the FOC Inigo Tapias.

The burgeoning gas carrier segment is a key market for Izar, which has ample technical and industrial capacity in Sestao and Puerto Real. There are two more LNGs under construction at Izar's Puerto Real shipyard. Bilbao Knutsen was launched in September 2002. The ship underwent sea trials in November and the gas trials in December, which consisted on the cooling, loading and unloading of the tanks. For this purpose 5,000 cu. m. of LNG from Bahia de Bizcaia were used.

Circle 1 on Reader Service Card

Main Particulars

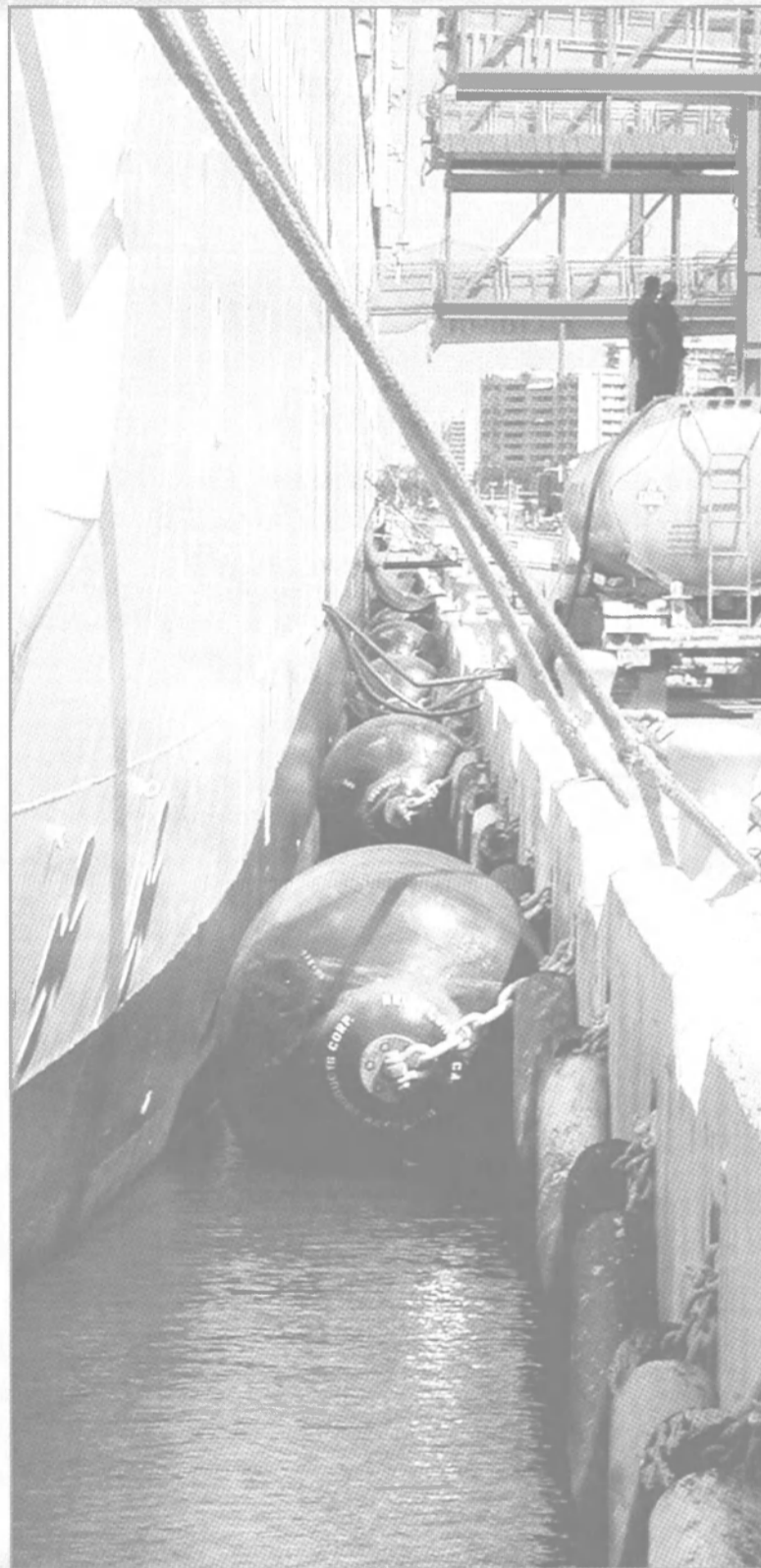
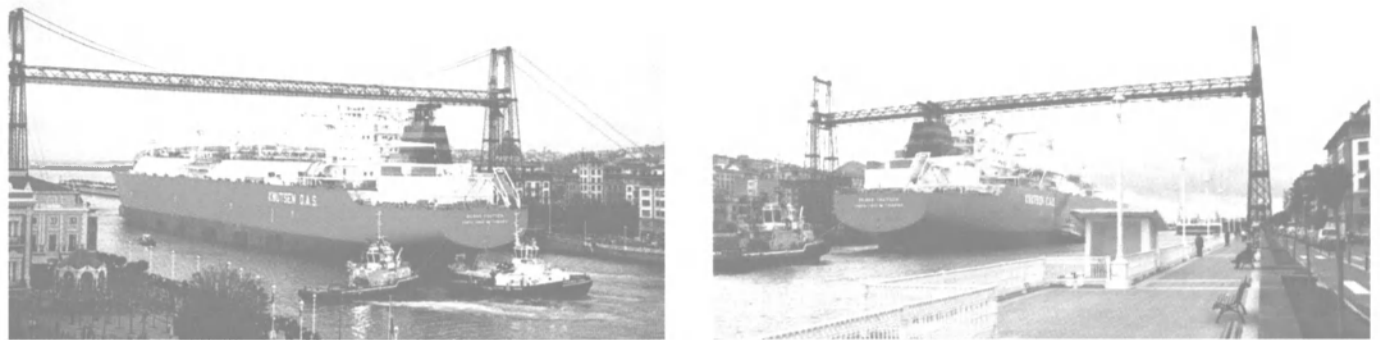
Length 933 ft. (284.4 m)
 Breadth 139 ft. (42.5 m)
 Draft 37.3 ft. (11.38 m)
 Depth 83.3 ft. (25.4 m)
 Speed 19.5 knots
 Crew 40
 Propulsion 28,000 kW at 83 rpm generated by one Kawasaki-IZAR steam turbine, provided by IZAR's Turbine Factory. This factory, located in Ferrol, has also provided the condenser of the propulsion plant.

Gladding-Hearn Gets Pilot Boat Orders

Gladding-Hearn Shipbuilding is building new pilot boats for the Portland, Maine and Delaware pilots. The shipyard's new Chesapeake class of pilot boats has also been built for the Virginia, Maryland, and Tampa Bay pilots. The Portland pilots will take delivery of their new launch in September, while the Delaware pilot boat is scheduled for delivery in November.

The all-aluminum boats, designed by C. Raymond Hunt Associates, measure 52.5 x 17-ft. with a 4.8 ft. draft, and are designed to reach 25 knots. The Portland pilots' launch will be powered by twin Caterpillar 3406E diesel engines, each delivering 600 bhp at 2,100 rpm, with Twin Disc M65114A gear-boxes. The Delaware pilots, on the other hand, chose Daewoo V18TIM 10-cylinder engines, coupled to ZF 350A gears. The engines turn five-blade Hall & Stavert bronze propellers. The Portland launch will have a Northern Lights generator, with 10 kW of output. Both vessels will be equipped with heated handrails and decks to prevent ice build-up in the winter. They are designed to have wide side-decks, and side and rear doors. At the transom will be throttle and steering controls and a winch-operated U-frame over a recessed platform for pilot rescue operations.

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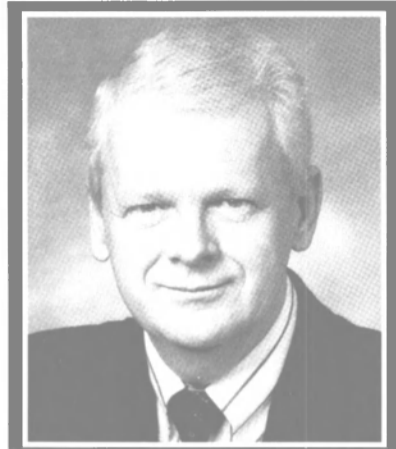
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Government Update

Port Security: A Historical Perspective



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

Pictured is the Coast Guard Cutter ADAK, from Sandy Hook, NJ, patrols past the Brooklyn Bridge. (USCG photo by PA2 Tom Sperduto)

The first foreign terrorist attack inside the United States was not the aviation-based assault of September 11, 2001. Eighty-five years earlier, foreign terrorists attacked a vital marine port facility in the Port of New York and New Jersey. Lest we forget.

Port security was first formally recognized as a national priority, and a Coast Guard mission, during the World War I era. Early on the morning of July 30, 1916, a tremendous series of explosions ripped through the waterfront at Black Tom Island in Jersey City, New Jersey.

Even though Europe had been at war for almost two years, peace still reigned in the United States. Although officially neutral, U.S. sentiment, both officially and popularly, had shifted heavily against the Axis Powers following the sinking of the RMS Lusitania by a

German submarine in May 7, 1915. In a precursor of the Lend-Lease Program of 1940, the Allied Powers were allowed to purchase arms and ammunition in the United States, so long as shipment was performed in vessels of their flags. The Jersey Central Railroad Terminal on



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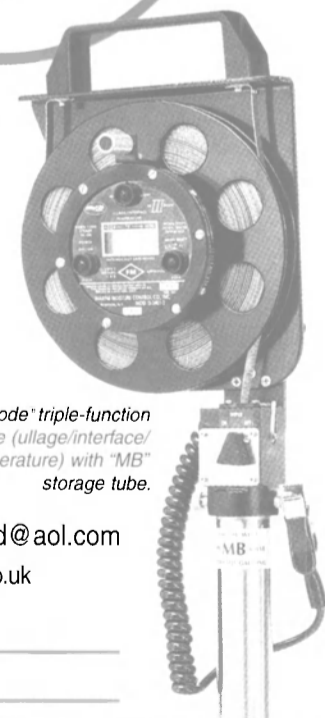
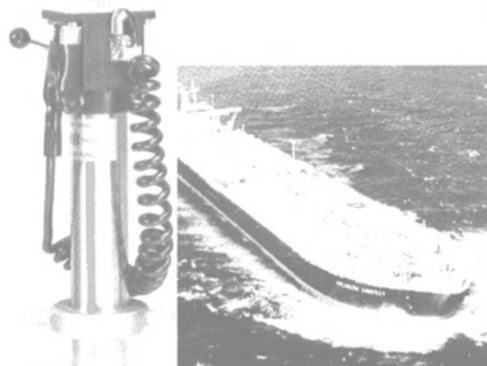
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Black Tom Island became a focal point for these shipments. Small arms ammunition, detonating fuses, and TNT were regularly shipped from this facility located across from New York City. Federal oversight was minimal and security was virtually nonexistent. Passes were not required to gain access to the facility. July 29-30, 1916, was a weekend. The longshoremen had departed, along with the railroad workers and crewmembers. Four security guards were present to patrol the entire terminal and piers, but they were more concerned about avoiding the clouds of mosquitoes. At about 2:45 on Sunday morning, flames were observed coming from one of the hundreds of boxcars loaded with explosives. The security guards immediately fled the facility, stopping only to set off the fire alarm. The explosions lit up the sky over Jersey City. Shrapnel and debris struck buildings miles away. People were thrown from their beds in northern New Jersey, Manhattan, Staten Island, and Brooklyn. In homes and buildings in area, including many Manhattan skyscrapers, windows facing the site were blown in and windows opposite the site were blown out. Thousands of terrified people fled to the streets, unaware of the source of the destruction. The shock wave was felt as far away as Philadelphia. Explosions continued until dawn. In the morning, Black Tom Island, the railroad terminal, the boxcars and locomotives, the piers, and the ships and barges moored there were gone. Miraculously, only four persons were known to have died in the catastrophe, including the master who lived aboard one of the barges. Total damage was estimated to be \$40 million. Liberty State Park, across from Ellis Island, now occupies the site of the Black Tom Island explosion.

While German saboteurs were immediately suspected as being the cause of the destruction, it wasn't until 1939 that the German government finally admitted culpability and paid a total of \$50 million in damages for both the Black Tom incident and the January 1917 explosion at a Kingsland, New Jersey munitions plant.

Congress, though, did not wait. On June 15, 1917 (less than one year after the Black Tom catastrophe), it enacted the Espionage Act, giving authority to the U.S. Coast Guard to regulate the anchorage and movement of ships in U.S. waters. By this time, the United States had entered World War I on the Allied side. The Coast Guard Commandant, Commodore Ellsworth

Bertholf, promptly designated the senior Coast Guard officers in New York, Philadelphia, Norfolk, and Sault Ste. Marie as Captains of the Port (COTP) to enforce the Espionage Act.

Captain Godfrey L. Carden, commander of the Coast Guard's New York Division, was COTP New York through-

out World War I. The majority of the nation's munitions shipments overseas left through New York. For a period of 1½ years, more than 1,600 vessels, carrying more than 345 million tons of explosives, sailed from this port. In 1918, Carden's unit was the largest single command in the Coast Guard. It was

made up of 1,400 officers and men, four Corps of Engineer's tugs and five harbor cutters. His pioneering work defined the Coast Guard's port security mission for the next 60 years.

Port security activities and enforcement of the Espionage Act largely terminated with the end of the war in



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Government Update

November, 1918. It resumed, and reached new heights, with the beginning of World War II in 1939. In July, 1941, Congress specifically recognized the position of Captain of the Port as the principal Coast Guard enforcement officer in ports as designated by the Commandant, as well as the adjacent

navigable waters of the United States.

On November 1, 1941, the Coast Guard was transferred to the Department of the Navy, with most operational units reporting to the Chief of Naval Operations for military duties. During World War II, law enforcement missions, though, such as COTP duties,

continued to be performed at the direction of the Commandant, who (for this purpose) reported directly to the Secretary of the Navy (in lieu of the Secretary of the Treasury, in peacetime). As in World War I, the Coast Guard supervised the loading and movement of merchant vessels bound for the wartime

theaters. It also oversaw many aspects of waterfront security, an activity for which the agency lacked authority during the First World War.

The year 1950 saw initiation of armed conflict in Korea and commencement of the 'Red Scare' in the United States, with Communists alleged to be lurking behind many, if not every, bush. In response to these events, Congress enacted the so-called Magnuson Act, which expanded the Espionage Act of 1917 by making it applicable any time the President finds the security of the United States to be threatened and by expanding its coverage to include not just vessels, but also harbors, ports, and waterfront facilities. President Truman quickly promulgated, by means of an Executive Order, regulations to implement the expanded port security mission of the Coast Guard. Those regulations have been little changed to the present day.

The port security mission could not, though, adequately address the growing needs of port safety. Congress eventually responded by enacting the Ports and Waterways Safety Act of 1972. This Act provided the Coast Guard with authorities similar to those found in the Espionage Act of 1917, as amended in 1950, but focused on peacetime safety, rather than wartime security. Authority under the 1972 Act was further expanded with passage of the Port and Tanker Safety Act of 1978. When terrorists struck on September 11, 2001, the Coast Guard had broad authority to take action to enhance the port security situation in U.S. waters. It promptly established security zones in almost all major ports and harbors. The agency also established special naval vessel protection zones around all warships in U.S. waters. Commensurate with the asymmetrical threat posed by terrorists, the Coast Guard utilized its authority under the Ports and Waterways Safety Act to require that advance notices of arrival be submitted earlier than previously and include additional information. Armed Coast Guard personnel, referred to as 'Sea Marshals', were placed on certain high risk vessels entering U.S. ports. All of these actions were taken under statutory authority whose genesis derived from the Black Tom Island incident. The Coast Guard's authority over, and responsibility for, port and maritime security were further expanded with passage of the Maritime Transportation Security Act of 2002 (MTSA). This statute, though, was not written on a blank slate. Rather, it was intentionally designed to build on the framework established by the Espionage Act of 1917 and the Magnuson Act of 1950.

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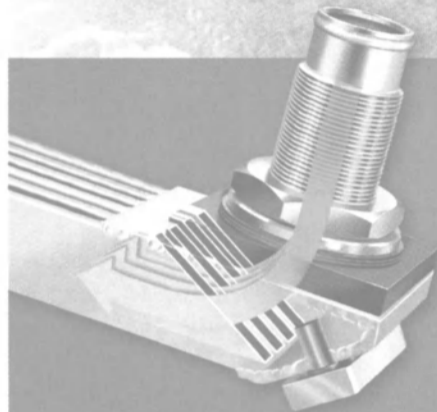
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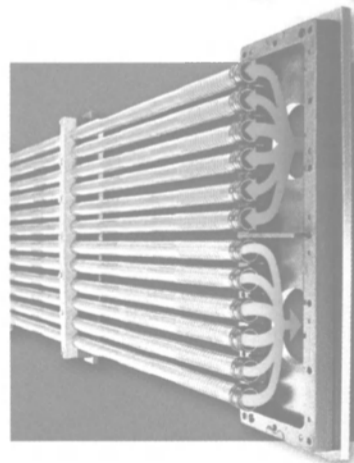
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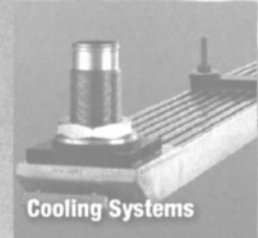
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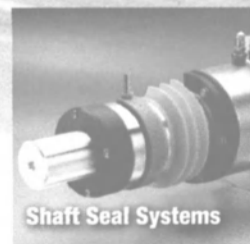
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Government Update

Seen in an historical perspective, the recent Coast Guard activities are another example of that service's prompt response to new challenges.

Security Challenges at Chem Facilities

At a hearing before the Subcommittee

on National Security, Emerging Threats, and International Relations of the House Committee on Government Reform, **John B. Stephenson**, Director of Natural Resources and Environment of the U.S. General Accounting Office (GAO) testified that chemical facilities may be an attractive target for terrorists.

Only those chemical facilities located adjacent to waterways are currently required to prepare and submit security plans.

In accordance with the Maritime Transportation Security Act (MTSA), such chemical plant and other waterfront facilities are required to submit

security plans to the U.S. Coast Guard. GAO-04-482T (Source: HK Law).

Delayed Enforcement of Change to "Shipper" Element

The U.S. Bureau of Customs and Border Protection (CBP) issued a Notice stating that is delaying indefinitely implementation of the change to the "shipper" element of the advance manifest filing requirement as provided for in its December 5, 2003 rulemaking under the Trade Act of 2002.

The change was scheduled to come into effect on March 4, 2004 and would have changed the "shipper" element of the advance manifest filing required of carriers from "the shipper's complete name and address, or identification number, from all bills of lading" (as provided for in the October 31, 2002 rulemaking establishing the 24-Hour Rule) to "the identity of the foreign vendor, supplier, manufacturer, or other similar party" (as provided for in the December 5, 2003 rulemaking).

The purpose of the indefinite delay is to allow CBP time to review a petition submitted by trade representatives challenging the definition of shipper. The trade representatives contended that carriers normally do not have access to the identity of the foreign vendor, supplier, manufacturer, or similar party. The extent of the carrier's information is generally limited to that found on the bill of lading. Until this issue is resolved, CBP will continue to enforce the requirements for the data element "shipper" as promulgated in the 24-Hour Rule. (Source: HK Law).

NVIC - Environmental Inspection of Foreign Vessels

The U.S. Coast Guard issued a Navigation and Vessel Inspection Circular (NVIC) providing an addendum to its Foreign Passenger Vessel Inspection Book consisting of an environmental inspection checklist. The checklist was developed with the participation of the Florida Caribbean Cruise Association (FCCA) and the Florida Department of Environmental Protection (FDEP) and takes into consideration new regulations on cruise vessel operations in certain Alaska waters.

The checklist does not change the regulations, but provides an extensive list of possible inspection items related to pollution prevention equipment, operation, plans, and records. (HK Law)



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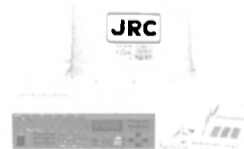
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MTSA: Another Key Layer of Port Security

By Chris Doane & Joe DiRenzo III

The Layered Defense.

This classic military strategy has been used as a primary approach for defending a valuable target, infrastructure or piece of property for centuries. Medieval rulers had wide moats and drawbridges surrounding their castles, followed by high walls and armies ready with flaming arrows or large caldrons of hot metal ready to dump on the attacking force to slow their advances. Modern day security barriers are now a fixture at every U.S. embassy around the world. The idea of a layered defense has been a primary tactic that have served military commanders well.

The layered defense strategy is also a cornerstone of security in the maritime arena, especially in the United States following the cowardly attack on the USS COLE. Critics and advocates alike agree that there have been tremendous advances in maritime security over the past two years throughout the United States, its' Commonwealths and Territories. Several steps have contributed to this advance, however, one specific action stands out, the implementation of the Maritime Transportation Security Act or 2002 (MTSA). Signed into law by President Bush on November 25, 2002, the MTSA represents one of the most comprehensive and important steps forward in meeting the President's and the Department of Homeland Security's layered security plan for our ports and waterways.

Since the tragic events of September 11, 2001 the Coast Guard has led a coalition of government agencies, maritime industries and the boating public in an ongoing effort to strengthen the security of the maritime transportation system. The eyes and ears of maritime law enforcement have been given a tremendous boost as legitimate maritime users from recreational sailors off of Martha's Vineyard, to fishermen near the Golden Gate Bridge to the crew of a dive boat off the Florida Keys report unusual activities. Maritime industries have voluntarily reinforced their security operations to prevent terrorist attacks. Federal, state and local law enforcement agencies have reenergized their focus on maritime security by increasing their presence on the water and along the waterfront. While all of these efforts have improved maritime security, they lacked a formal framework to ensure coordination and a proper distribution of

responsibility and accountability. The MTSA provides this formal framework.

In regards to port and waterway security, the MTSA contains four "major" components of interest. These are: the

requirement to complete port, vessel and facility vulnerability assessments, the submission and approval of security plans for facilities and vessels that may be involved in a transportation security

incident (an incident resulting in significant loss of life, economic loss or environmental damage), the establishment of Area Maritime Security Committees, and the development of Area Security

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Maritime Security

Plans. Collectively, these components of the MTSA establish a layered security strategy that significantly strengthens and standardizes the security measures for the domestic port security team of federal, state, local and private authorities. Just as important, successful

implementation of the MTSA requirements will bring the United States in compliance with the new International Ship and Port Facility Security (ISPS) Code. All nations participating in international maritime trade are required to be in compliance with the ISPS Code by

July 1, 2004.

Before any effective security measures can be implemented, there must be a vulnerability assessment. The MTSA requires certain waterfront facility and vessel owners/operators to conduct vulnerability assessments of their respec-

tive facilities and vessels and to submit a report to the Coast Guard. The MTSA also designates the Coast Guard Captain of the Port (COTP) as the Federal Maritime Security Coordinator (FMSC) and charges him or her with completing a vulnerability assessment of the maritime domain within his/her zone. These vulnerability assessments evaluate the potential consequences (loss of life, economic, environmental, etc.) associated with a terrorist attack, as well as the probability of success of such an attack based on the existing physical security measures.

The first layer of security in the port rests with the owners and operators of waterfront facilities and vessels; they have primary responsibility for the security of their property. Once the facility and vessel vulnerability assessments are complete, the MTSA requires that the owners/operators develop and implement security plans to address how they will reduce their vulnerabilities to an acceptable level. These facility and vessel assessments and security plans had to be submitted to the Coast Guard by December 31, 2003 for approval and implementation by July 1, 2004.

This is a huge undertaking affecting an estimated 3,200 waterfront facilities and about 8,500 vessels nationwide. This requirement includes passenger vessels, container ships and vessels or facilities that carrying or handle hazardous materials. Additional security requirements include everything from passenger, vehicle and baggage screening procedures to security patrols, personnel identification and even the installation of surveillance equipment.

For security reasons, the Coast Guard is not providing the names of facilities and vessels required to submit plans or who have failed to submit a vulnerability assessment or security plan. However, compliance has been excellent, as of February 2 over 90 percent of the required plans have been received.

The second security layer begins with the Area Maritime Security Committees created to assist the Coast Guard FMSC in developing the Area Maritime Security Plan. The MTSA requires the creation of an Area Maritime Security Committees within every COTP zone in the United States. Each committee is composed of representatives from federal, state and local agencies with a stake in port security as well as representatives from Native American tribes and the maritime industry. In addition to assisting the COTP/FMSC with developing the Area Maritime Security Plan, the committee also "builds an awareness of port activities, identifies risks,

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improves security measures, improves communication and coordinates rapid responses to changes in threats to our security."

The second layer is completed with the implementation of the Area Maritime Security Plan. This plan is a comprehensive security strategy for reducing the vulnerabilities identified in the port security assessment. It is a key document that spells out the port security roles and responsibilities of all of the port stakeholders, most particularly the federal, state and local agencies with jurisdiction and responsibility for maritime security. Not only does the plan address security actions to reduce vulnerabilities, it also describes how the security forces in the port will respond to increased threats and actual incidents. The Coast Guard Area Commands located in Portsmouth Virginia and Alameda, California must approve the plans by July 1, 2004 to meet ISPS Code requirements. The MTSA also requires that each plan be exercised annually.

One other part of the MTSA that has received some notice in newspapers throughout the country in the last week is the requirement for an Automatic Identification System (AIS) to be carried by all ships engaged in international voyage. This system, in theory, is designed along the lines of the Air Traffic Control System. AIS will send detailed ship information to other ships and shore-based agencies providing virtual tracking and overall monitoring. For example, once the AIS is fully operational, the Coast Guard will be able to identify all vessels approaching any given port well before they are in sight of the sea buoy. AIS will be part of a

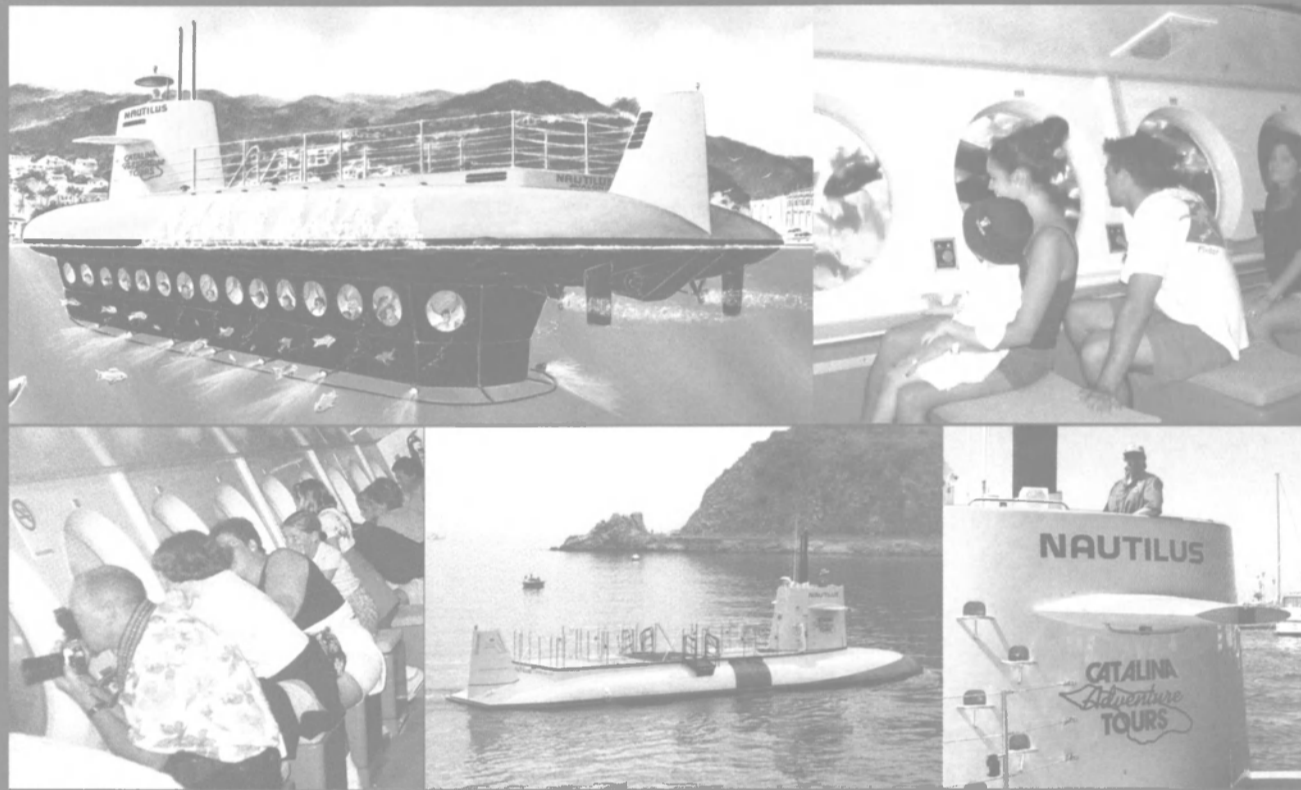
third security layer as we "push our borders out" to identify maritime threats as far from our shores as possible. Another component of this third layer will be increased security in foreign ports and on foreign vessels as they too come into compliance with the ISPS Code.

While we have already realized signif-

icant advances in maritime security over the last two years, successful implementation of the MTSA will significantly strengthen and standardize maritime security for all domestic ports and those within our territories and commonwealths. While teamwork amongst maritime stakeholders remains the key to

securing our ports, the Coast Guard intends to aggressively enforce the requirements of the MTSA as its overall enactment, slated for a statutory deadline of July 1, 2004, will be another step forward in a very difficult challenge... better Maritime Security and a safer America!

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About the Authors

Chris Doane is the Chief of Port Security and Response at Coast Guard Atlantic Area. Joe DiRenzo III is a Technical Director, specializing in Maritime Homeland Security issues for Anteon Corporation's Center For Security Strategies and Operations and a columnist for the News-Herald. Both writers are retired Coast Guard officers and have written extensively on port security and maritime terrorism issues.



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When Security is Made Simple

How are we to implement an effective Maritime Security Program?

When terrorists hijacked aircraft and used them as weapons, a significant par-

adigm shift occurred in how we view security in the U.S. The Department of Homeland Security (DHS) was created

and we were witnesses to the largest

shift in federal government roles and responsibilities since World War II.

Additionally, significant changes were made to the airline and maritime indus-

tries with the implementation of the Maritime Transportation Security Act of 2002 (MTSA) and its aviation counterpart. This article will discuss methodologies to assist maritime owners/operators in complying with the often confusing myriad of federal and international laws and regulations.

According to the U.S. Coast Guard, approximately six million loaded containers arrive into the United States from overseas, and nearly one billion tons of petroleum passes through U.S. ports. Nearly 6.5 million passengers annually travel on cruise ships and more than 13 million passengers and 32 million vehicles are carried on our ferry systems.

Among the major threats to be evaluated in risk management and analysis relating to the maritime industry include:

- The covert shipment of personnel, arms, or a variety of weapons;
- The possibility of a small explosive-laden waterborne vessel approaching a large vessel or port facility similar to the USS Cole incident that occurred in Yemen;
- The taking of a vessel by terrorist crewmembers who could use the vessel as a weapon;
- Major disruptions to port operations, military shipments and international trade through destruction of key assets such as container cranes and pier facilities or blockage of key facilities.

President Bush has stated in the National Strategy for Homeland Security that, "Securing the American Homeland is a challenge of monumental scale and complexity. But the U.S. has no more important mission."

Since 9/11, we have evolved from a somewhat passive, reactive security posture to a very aggressive, proactive approach. The airline industry has initiated a number of directives including the implementation of the Federal Air Marshal Program. Flight deck doors are now required to be hardened, and all luggage is passed through screening devices. The maritime security industry has also been witness to the development of new and/or modified international and federal mandates. New requirements were detailed in MTSA, amendments to the International Convention for the Safety of Life at Sea (SOLAS), and the adoption of the ISPS Code (International Ship and Port Facility Security Code). Specific mandates require maritime owners and operators to be in compliance with the following mandates or be fined \$25,000

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Maritime Security

per violation for failure to comply with MTSA mandates:

- Vessel and Port Security Assessment by July 1, 2004
- Vessel and Port Security Plan by July 1, 2004
- Designation of a Company Security Officer (CSO) by July 1, 2004
- Designation of a Vessel Security Officer (VSO) by July 1, 2004
- Designation of a Facility Security Officer (FSO) by July 1, 2004

A recent survey of a major U.S. port facility has shown that approximately 70 to 80 percent of maritime owners and operators are not yet in compliance with the mandates. The most likely reason for this seems to be due to the fact that these

new regulations are a source of confusion and frustration to many.

What can maritime owners and operators do to be in compliance with the seeming myriad of regulations? More importantly, what can they do to prevent their personnel and facilities from becoming a victim of criminal or terrorist activity?

1. Be proactive! Owners and operators need to develop a proactive security posture and develop this type of mindset in every member of the organization. Don't wait for something bad to happen before taking measures to correct the problem. Identify the gaps and take immediate measures to correct them.

2. Seek the services of an outside-sourced security consultant and request a security assessment. A consultant from outside of your organization can serve as an "agent for change". The security consultant hired to perform the assessment should have a solid working knowledge of the maritime industry as well as a strong foundation in all aspects of security. A consultant with military special operations, intelligence, or law enforcement experience in counter-terrorism will greatly assist in identifying security program challenges.


3. Maritime owners and operators should modify their current security plan or implement a new security plan based on the results of the security assessment. New systems should be rehearsed and tested periodically to ensure their effectiveness.

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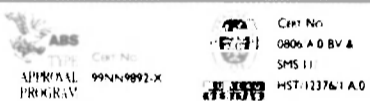
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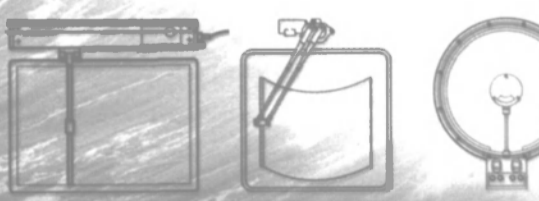
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About the Author

Duke Speed is the Director of Operations for Tactical Services Group International (TSGI). He is a 20-year veteran (retired) of the U.S. Marine Corps Force Reconnaissance community, and a federally certified counter-terrorism instructor for the Department of Homeland Security. Tactical Services Group International has partnered with Solutions Group International (SGI) to provide a variety of security-related services to the maritime industry. More information can be obtained by visiting www.TacticalServicesGroup.com.

Atlantic Marine Makes Management Changes



McAlear

Fleming

George Gibbs, chairman and CEO of Atlantic Marine Holding Co., the parent company of Atlantic Marine shipyards in Jacksonville, Fla., and Mobile, Ala., announced a management change. **Ron J. McAlear**, former president and CEO of Kvaerner Philadelphia Shipyard, was named president of both Alabama

Shipyard, the construction division, and Atlantic Marine-Mobile, the repair facility. An industry veteran, McAlear served in various management positions at Avondale Industries from 1988 to 2000. **Ed Fleming**, who has been president of Atlantic Dry Dock Corp., the Jacksonville repair division, since 1989, has also assumed new responsibilities as president of Atlantic Marine, Inc., the new construction arm of the Jacksonville facility. Fleming has been with the company for more than 25 years. Fleming replaces **Ed Doherty**, who retired.

Ice Breaker Started at Marinette Marine

The Manitowoc Company, Inc. held a keel laying ceremony at its Marinette Marine subsidiary for the Coast Guard's


newest icebreaker, Mackinaw. The ceremony featured Admiral Thomas Collins, commandant of the U.S. Coast Guard, as the keynote speaker, with **Jean Hastert**, wife of **J. Dennis Hastert**, Speaker of the House, serving as the ship's sponsor and authenticator.

"We are on schedule to deliver this innovative icebreaker in 2005," said **Dennis McCloskey**, president of Manitowoc Marine Group. "Not only is the MACKINAW the newest vessel we're building for the U.S. Coast Guard, it follows a series of 30 buoy tenders that we have built, many of which are now operating in the Atlantic and Pacific Oceans, in the Gulf of Mexico, and on the Great Lakes." The Mackinaw will be approximately 240 ft. long, 60 ft. wide, and displace 3,500 long tons.

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TEN Orders Two 1A Ice-Class Suezmaxes

Tsakos Energy Navigation Limited (TEN) ordered two suezmax, double hull, 1A ice-class 162,400-dwt tankers. The vessels are scheduled for delivery in the first half of 2007. Both vessels are to be constructed by Hyundai Heavy Industries (HHI), and represent the 26th and 27th vessels in TEN's newbuilding program since 1997. TEN's management believes that these vessels will be in heavy demand by Russian, Finnish and Canadian based oil majors and charterers in the near future, especially as many developing oilfields and ports currently under development in Russia, Eastern Siberia and Alaska will start producing oil and will require these specialized tankers for its transportation.




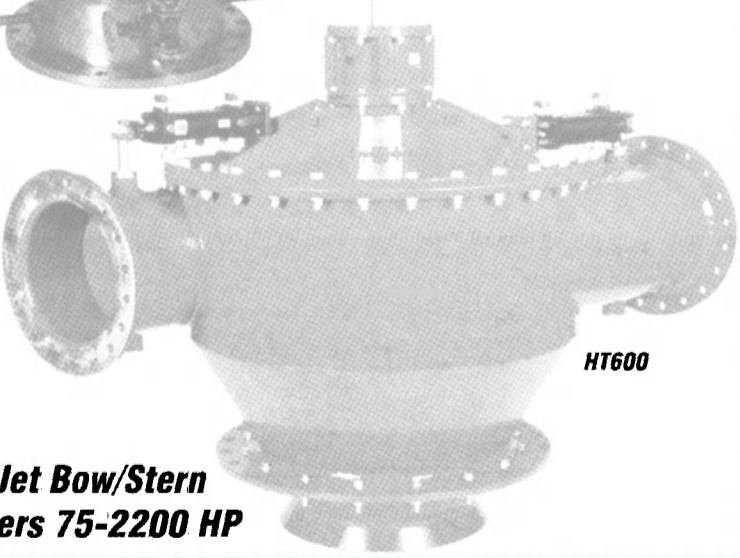
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Business Milestone for Vietnam

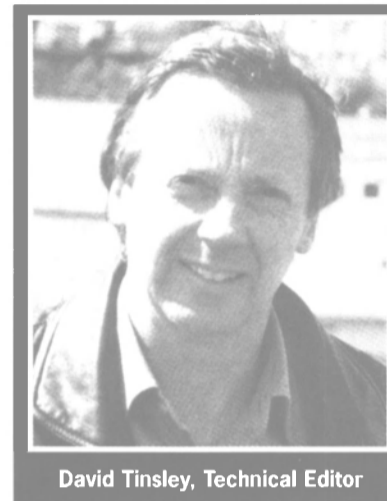
By David Tinsley

Vietnam's fledgling shipbuilding industry has raised its international profile by entering into a seminal agreement with the UK's Graig Group for the construction of a series of double-hulled bulk carriers. Cardiff-based Graig's bold move, potentially entailing 15 vessels of the Diamond 53 handy-max type, draws on its experience in assigning a similarly extensive program, for 14 examples of the 53,000-dwt design, to Chinese yards. For the industrially-ambitious Vietnamese, who have already made substantial investments in modern shipbuilding equipment and practises, the Graig deal has particular appeal not only for its promise of serial production of one of the most well-considered, future-oriented bulker designs, but also for the broader package which the firm brings to the project.

Having been conceived at a time of heated discussion within the marine industries as to the merits and demerits of double-skin bulkers, the Diamond 53

was the first issue of the joint venture firm set up in Shanghai by Graig and Carl Bro, a Danish specialist in naval architecture, marine engineering and project planning. Graig's operating know-how with dry cargo tonnage, arising from both shipmanagement and shipowning activities, helped shape the new breed, while Det Norske Veritas had a direct input on structural and regulatory issues. Most of the bulker newbuilds entrusted to China have been purchased by shipowning companies other than deal-maker Graig. As one of the first marine groups from outside China to realize the potential of the Chinese yards, it has to date been contracted to supervise nearly 50 newbuilds there, of various types, on behalf of owners worldwide as well as for its own shipbuilding interests. Unquestionably, the decision to take the original Diamond 53 program to China, coupled with a pragmatic design approach and Graig's development of a financial package, had brought double-hull construction within the bounds of commercial possibility.

An extra cost premium would have been entailed, at that time, in having such ships built in Japan. Keen price is, of course, fundamental to viability and to ordering decisions in the intensely competitive bulk shipping sector. Graig is looking to repeat the formula in Vietnam, leveraging the reputation gained in China. In addition to the attractive delivery positions conferred by the commitment with Vietnamese state shipbuilder Vietnam Ship Industry Corporation (Vinashin), the agreement offers broader longer-term benefits to all parties. "We can help the Vietnamese yards with the design, with procurement, with finance and with all-important quality control," said Graig chief executive officer Hugh Williams. "Our experience of working with yards in China to build series of ships means we can help the yards to develop, and give confidence to our partners that Vietnam can provide them with high quality tonnage," he added. Graig intends to open an office in Vietnam to serve the project. The geared, wide-hatched bulkers, it is



David Tinsley, Technical Editor

claimed, will be the largest and most sophisticated vessels yet built in Vietnam. The first of the firmly-booked quintet is due to be handed over in January 2006, and construction of the series has been assigned to the Halong yard in Quang Ninh province, and to Namtrieu Shipbuilding Industry Company in Haiphong. In the meantime, the first of the Diamond 53s from China is scheduled to be commissioned into service this year.

Industry's New Latin Quarter

As a major new investment in Latin America in the means of constructing lightweight fast ferries, Rodriquez Cantieri Navali do Brasil is set to reach an early milestone at the end of May 2004 with the launch of the first of an extensive series of commuter ferries for Rio de Janeiro services. Design, materials, and shipboard equipment as well as manufacturing know-how from the diversified, parent Rodriquez organization in Italy has provided the foundation for the Brazilian yard, inaugurated last year. Occupying a site of 13,000-square metres, of which 5,000-sq m is under cover, the yard is cutting its teeth on seven catamarans of 1,300 passenger-capacity and three smaller craft of 200 passenger-capacity. The program's leading edge will see the delivery of the first of the larger series, the CityCat DE52-type, quickly followed by the first of the CityCat 29 class. The aim is to complete the subsequent newbuilds at a rate of one per month. The double-ended, 52-m CityCats will each be equipped with two azimuthing propulsion systems, fore and aft, designed and made by group company Rodriquez Marine System, well known for its high-speed vessel stabilization and maneuvering products and design technology.

'Made in Germany' — a New High

Despite the problems posed for indigenous production by Europe's marine engineering industry due to the loss of critical mass in European shipbuilding, through the accelerated gravitation of shipbuilding activity to eastern Asia, MAN B&W Diesel's Augsburg works has hit a new high. From its landlocked location in southern Bavaria, the Augsburg marine engine division secured the largest order volume in the parent company's history in the anniversary year 2003. The most telling aspect of its achievement was the predominant export orientation of the new business, providing a further demonstration of the worth attached to the 'Made in Germany' label.

The company attracted contracts for a total 680,000-kW of medium-speed, large-bore diesel engines for manufacture at Augsburg, the fountainhead of the design technology embodied in that machinery. The power total is represented by 76 engines, destined for containership,

ferry, ro-ro vessel, chemical tanker, bulk carrier, FPSO (floating production, storage and offloading) unit and tug applications during 2004 and 2005.

Some 60-percent of the engines will be supplied to shipyards in China, South Korea, Japan and Vietnam, and a further 15-percent is for other export destinations. The home shipbuilding market accounts for 25-percent of the 2003 order tally.

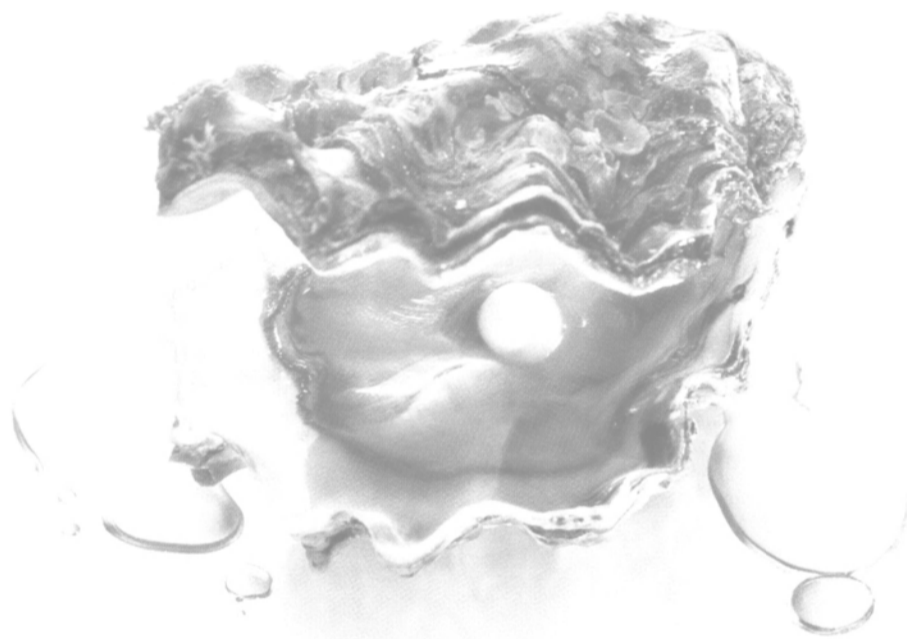
The company's Augsburg-developed family of large trunk engines, consisting of the 58/64, 48/60, 40/54 and 32/40 series, has been brought to the market over the period from 1985 to 1995, and the B version of the 48/60, with its 14-percent unit power uprating, was launched in 2002. The enduringly popular 58/64 and successful 48/60B are most strongly represented in the engines booked by shipyards and shipping companies from MAN B&W Augsburg last year for propulsion duties.

MAN B&W observed that the order boom in 2003 for merchant vessel newbuilds, primarily benefiting Asian workloads, reflected strongly increasing freight rates and low marine engine prices. The group's expansion of its network of international branches during the past few years better positioned it to act on the growth in market demand. MAN B&W has experienced strong business growth emanating from China's fast developing shipbuilding industry, in particular. The group reported that it now has a share of over 60-percent in the medium-speed, four-stroke propulsion engine market.

Last year's order inflow is the largest achieved by the parent company for Augsburg in 100 years. The first vessels were provided with diesel engine propulsion in 1903. Before 2003, the record year for marine engine orders at the works was 1938, when the tally amounted to 635,000-kW.

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That's why Det Norske Veritas (DNV) – soon to be followed by other classification societies – has introduced a Type Approval for separators as part of their new class notation Fuel. By verifying cleaning ability, it provides a performance standard like those used for engines or filters.

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Miracle on Ice

(Photo Credit: Kvaerner Masa-Yards)

Kvaerner Masa-Yards has delivered the \$375 million, 2,124-passenger Carnival Miracle, to Carnival Cruise Lines - its 20th Fun Ship - in the traditional handover ceremonies in Helsinki.

For anyone who has ever had the privilege to attend such a delivery, seeing a new cruise ship rolled out in the middle of the Finnish winter is truly an awe-inspiring, if not one of the most ironic, sights. However, it is a testament to accrued cruise industry expertise and a stable infrastructure of equipment and system suppliers that keeps the shipyard at the forefront.

Carnival Miracle is the sixth cruise ship in the Spirit class series of new

Panamax-size cruise ships for Carnival Cruise Lines (four ships) and Costa Crociere (two ships). The first ship in the series, Costa Atlantica, was deliv-

ered in year 2000. Carnival Spirit and Carnival Pride were delivered in 2001, Carnival Legend in 2002 and Costa Mediterranea followed in 2003. Carnival Miracle was officially named February 27, 2004, by former Army private Jessica Lynch, after which it was scheduled to depart on its inaugural three-day voyage from Jacksonville.

"Not only is the Carnival Miracle a spectacular 'Fun Ship' with all the features and facilities desired by today's discriminating vacationers, it also will operate a truly innovative inaugural schedule with departures from four convenient U.S. homeports, including our first-ever voyages from Jacksonville," said **Bob Dickinson**, Carnival president and CEO.

Following the trend towards more rooms with outside views, 80 percent of Miracle's 1,062 staterooms offer an ocean view, with 80 percent of those featuring private balconies. All the prefabricated staterooms have been manufactured by Piikkio Works Oy.

In designing a more narrow superstructure, one more deck with passenger staterooms could be added. In the superstructure most of the staterooms face the sea, and the technical spaces, including



(Photo Credit: Kvaerner Masa-Yards)

A Miracle Inside, Too! The central idea of "Famous Fictional Icons" has inspired Joe Farcus, Carnival's ship architect, in the design of Dr. Frankenstein's Lab onboard Carnival Miracle. See more Miracle interior photos in a related story on page 30).

Miracle Main Particulars

Gross tonnage	85,900
	(including balconies, approx. 88,500)
Passenger capacity, lower bed	2,124
Passenger capacity, max.	2,680
Passenger staterooms, total	1,062
Passenger staterooms, outside	849 (80%)
- with balconies	750 (70%)
Crew capacity	961
Length o.a.	959.6 ft. (292.5 m)
Breadth, max.	127.3 ft. (38.8 m)
Breadth, dwl	105.6 ft. (32.2 m)
Draft, dwl	25.5 ft. (7.8 m)
Speed, service	22 knots
Machinery output	62,370 kW
Propulsion	2 x 17.6 MW Azimuthing rudder propellers



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Cruise Shipping

the air conditioning machinery, are placed in the center of the ship, behind the passenger corridors.

The ship was floated out from the covered newbuilding dock in June 2003 and the successful sea trials took place in November. At the completion party held

onboard Carnival Miracle at the Helsinki yard already on January 17. **Micky Arison**, Chairman and CEO of Carnival Corporation noted that the ship was completed three weeks before the date agreed on. "You have done a fantastic job," he said.

Carnival Miracle carries a total of 2,680 passengers (lower beds: 2,124 passengers) in a total of 1,062 state-rooms. The maximum crew capacity is 961. Carnival Miracle measures 959.6 ft. (292.5 m) x (maximum breadth over the bridge wings) 127.3 ft. (38.8 m),

with a breadth at dwl of 105.6 ft. (32.2 m) and draught at dwl 25.5 ft. (7.8 m).

Miracle features 12 passenger decks plus four decks below for machinery and crew spaces.

The central idea of "Famous Fictional Icons" has inspired **Joe Farcus**, Carnival's ship architect, in the design of the public rooms aboard Carnival Miracle. The dramatic interiors exist in the architecture and decor throughout Carnival Miracle.

High technology design and construction

Carnival Miracle has a diesel-electric machinery, consisting of six Wartsila 9L46D diesel engines, with a total power of 62,370 kW, each connected to an alternator producing electricity to the ship's main electric network. The propulsion consists of two azimuthing electric Azipod propulsion units, with a power of 17.6 MW each. Carnival Miracle has three 1.91 MW tunnel thrusters in the bow. The service speed is 22 knots.

Circle 33 on Reader Service Card

New President & CEO at Kvaerner Masa-Yards

The Board of Kvaerner Masa-Yards has appointed **Yrjo Julin** (46) as new CEO of the Finnish shipbuilding company. He was scheduled to start in his new position on February 16, 2004. Julin has more than 20 years experience within the metals and shipbuilding industries. Since May 2002 he has headed Aker Finnyards, a highly specialized shipyard in the RoPax and Cruise Ferry market located on the western coast of Finland. Under his management, Aker Finnyards has had a very positive development and good profitability.

"KMY is a market leader in design and construction of innovative cruise ships and other sophisticated vessels. I look forward to working with the Masa-Yards team," Julin said.

"The shipyard must safeguard its leading technology position. We need to continue the ongoing cost improvement programs. In the short term, the top priority will be to secure new orders for KMY, especially for the Helsinki yard," he added.

With Julin at the helm of KMY, the close co-operation between KMY and Aker Finnyards will be further strengthened. Since early 2002, the two companies have been working closely together under the joint management of Aker Kvaerner Yards, harvesting considerable synergies.

NEW LEADERSHIP. NEW COMMITMENT.



ATLANTIC MARINE'S NEW TOP EXECUTIVES. Ron McAlear (left) is president of Atlantic Marine's new construction and ship repair facilities at Mobile, Ala., and Ed Fleming now heads up both new construction as well as ship repair at the Jacksonville, Fla. shipyard.



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Ron J. McAlear is now president of both our repair facility and new construction yard in Mobile. Ron is a former president and CEO of Kvaerner Philadelphia Shipyard. He served in various management positions for Avondale Industries from 1988 to 2000 and has been involved in shipyard operations for 30 years.

In Jacksonville, Ed Fleming has been promoted to president of our new construction yard. Ed has been president of our Jacksonville repair yard since 1989 and has been with Atlantic Marine for over 25 years.

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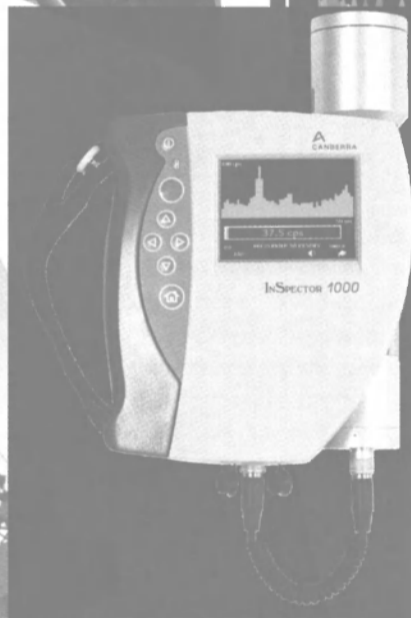
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He's No Regular Joe

Joe Farcus has been in the ship design discipline of architecture for more than 28 years, starting from the refitting of old tonnage and leading up to being involved in the design of six different prototype cruise ships. Here he shares with MR some of his thoughts on Cruise Ship Interior Design.

How do you start the design process?

In this sense I am a traditionalist. My belief is that people are booking cruises for the same basic reason they did 25 or more years ago. In one way or another those who are doing so are buying into the concept of the romance inherent with the sea. For those of us who are not sailors, being at sea is a most pleasant change of physical point of view. The view from a ship is all horizon, with occasional terra firma drifting by. The stars are brighter at night than in the city. The floor moves! The service provided by the crew is at a high level seldom found at hotels. What a fantastic set of ground rules to begin a design. So the idea in designing in such an environment is to not do anything that takes away from these great advantages over hotels. Keep the design ship-like in some way is my guiding principle.

At the beginning of a new project, I try and put myself in the position of the guest who will sail aboard her. I ask: "What do I want to see and experience on this ship?" My answer is "Something that does not take away from this romance which I want to be a part of."

The trick, of course, is to give form to that ideal which does not produce a negative effect on the desire.

What have been the biggest changes in the industry?

The level of sophistication: expected & delivered. Using movies as an analogy, the special effects that one experienced in seeing the original Star Wars movie pales in comparison to a action movie of today. Yet the acting from 20 or even more years ago is still just as valid (and some say better) than that of today. Such is the case with cruise ship design and Entertainment Architecture. I see the architectural solution to increased sophistication as mainly a technical one. It involves responding to the trends or better yet creating the trends by judicious analyzing of what has occurred and judging how that can be improved. Creating sophistication is very much a team creative process. It also crystallizes another personal view of mine. The cruise lines signs my contracts and pays the fees, but the passengers are the real clients. Satisfying their needs first is the best way to serve the

owners. As a result we are always formally and informally reviewing every aspect of the passenger's cruise experience in order to achieve the highest level of sophistication possible. We try and anticipate their needs before they do in order to deliver carefree enjoyment.

A cruise ship takes years to build and is designed to operate for decades ...

How do you keep design relevant?

Now sophistication also applies to pure decorative design as well. When I am designing interiors for these vessels I am never trying to follow what's in fashion in architectural or interior design today. Indeed in order to achieve a personal and artistic expression it is of utmost importance to create independent of fashion. Fashion is for today. Tomorrow is for another fashion. FASHION IS ABOUT 'NEW', WHILE DESIGN IS ABOUT 'BETTER.' Architecture has to be as timeless as possible to be attractive and practical. Practicality is an important aspect as it relates to economy & even though it hurts to think this way as a designer, it is a fact of life just as important as IMO.

Achieving design sophistication & artistic expression is largely a matter of experience & tenacity. It certainly requires personal faith for it often requires leaving what has been safe & accepted, & delving into the unknown & what if? The first step in creating the interior design for a ship is the conceiving of the story, which I call the Central Idea. For me this a point of logic to build the various diverse designs around. It's both loose & strong at the same time. The strength is that all of the designs will relate to each other in some way. The looseness allows me to design the diversity, which I feel is a very important part of cruise ship design.

Diversity as mentioned is the master criteria in fleshing out the Central Idea. I think this is also of utmost importance in designing a cruise ship. This is for several reasons not the least of which is the diversity of the passengers onboard. On the ships I design passengers come for all backgrounds, countries, & just about every other demographic that you can think of. Therefore it seems to me that this diversity should be realized in the designs.

The central idea of "Famous Fictional Icons" has inspired Joe Farcus, Carnival's ship architect, in the design of the public rooms aboard Carnival Miracle. The dramatic interiors exist in the architecture and decor throughout Carnival Miracle. From left: Horatio's Restaurant; Mad Hatter's Ball; and Phantom Show Lounge.



(All photo credits: Kvaerner Masa-Yards)

How do you balance your design with naval architecture and shipbuilding capabilities?

Advances in shipbuilding technology have mainly had a balancing effect on the rising cost of ship construction, which is due in this case to the market sophistication demands, safety issues and the cost which they create. At the end of the day, if the ship costs too much, then the passage price will raise to a point where the market will turn thin. Unfortunately, the design effect of this curtails creativity and design revolution. In every project that I have been involved with, the initial most daring naval architecture creativity is always compromised in the final form of the ship. But this is a fact of life which slows revolution into evolution.

What will the Cruise Ship of the Future Be?

Questions about the future are best answered by the past, as it is the only guide post to which one may rely upon to give any insight into predicting what may come. 'Should.' is the key word to this future. The cost of ships today does not allow for mistakes in basic planning, therefore the ships which will come to be will be evolutionary rather than revolutionary. I'm sure that owners would be happier believing that they are being shown a new design which should be built, rather than one which could be built.

What is the market that will steer the future?

Again, the past is the breeding ground in my opinion. If the past tells us anything, it tells us that the market wants more. If we look at the matriarchal ships which created cruising as we know it

today, it is clear that what they have offered the market then, is the whale oil lamp version of the halogen light today. Yet some of these veterans are still showing guests a good time, which demonstrates to me that the initial concepts which began the phenomenal

growth of cruising are still pertinent today. What has happened is that those concepts have become sophisticated, from safety items, to decoration materials, to new concepts of ship designs, to ways to cook a thousand chickens better: it is dramatic. In my mind, the personal

face of the market has always been a diverse group of people. This has played itself out in my work whereby I have very consciously and deliberately set out to create diverse and varied environments with and within all of the ships I have designed.

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Circle 246 on Reader Service Card

Cruise Passenger Travel Grows 8 Percent; New York and Galveston Post Big Gains

The top ten cruise lines carried 8.3 million passengers on 3,840 North American cruises in 2003, up eight per-

cent over 2002, the U.S. Maritime Administration (MarAd) reported recently. And a recent report in the *Wall Street Journal* (Tuesday, February 24), indicates that cruise pricing is on the rise, a positive sign for a sector badly

bruised by the fear and fallout following 9/11, as well as a number of high-profile "sick ship" cases.

The highest growth rates among the top 10 departure ports occurred in New York and Galveston, which recorded increases of 45 percent and 39 percent respectively in 2003. However, the traffic remains heavily concentrated at the major departure ports, which are located in Florida. Miami, Port Canaveral, and Fort Lauderdale accounted for 49 percent of the total cruise passenger traffic.

Overall, 72 percent of the total passengers recorded for 2003 chose Caribbean and Bahamas destinations. The figures are part of a statistical series issued quarterly by MarAd on U.S. cruise passenger traffic, with data for the 10 major cruise lines operating cruise ships with a capacity greater than 750 passengers. With the completion of 2003, MarAd now has available a three-year time series of data on North American cruise passenger traffic. Along with the cruise line and vessel name, the record for each cruise in the database contains the number of passengers carried, sailing date and departure port, destination, cruise length and ship capacity.



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Cruise Passenger Statistics¹ 4th Quarter 2003 (Passengers in Thousands)

No. of Cruises	% Change Prior Year	No. of Passengers	% Change Prior Year
983	3.5	2,112	6.1

¹North America Cruises by Ten Major Brands

Cruise Passenger Statistics¹ Cruise Line Market Share 4th Quarter 2003 (Passengers in Thousands)

Cruise Line	Passengers	Percent of Total Passengers
Carnival Cruise Line	708	33.5
Royal Caribbean International	621	29.4
Norwegian Cruise Line	195	9.2
Princess Cruises	172	8.1
Celebrity Cruises	146	6.9
Holland America Line	132	6.3
Disney Cruise Line	99	4.7
Costa Cruise Lines	21	1.0
Crystal Cruises	10	0.5
Cunard Cruise Line	8	0.4
Total	2,112	100.0

¹North America Cruises by Ten Major Brands

Cruise Passenger Statistics¹ Length of Cruise 4th Quarter 2003 (Passengers in Thousands)

Cruise Length	No. of Cruises	No. of Passengers
2 to 5 Days	283	637
6 to 8 Days	532	1,219
9 to 17 Days	162	248
Greater than 17 Days	6	8
Total	983	2,112

¹North America Cruises by Ten Major Brands

HAL's Vista Sails with ROCHEM Technology

The MS Oosterdam is Holland America Line's (HAL) second 1,848-passenger Vista-class ship. Delivered by Fincantieri Cantieri Navali Italiani, S.p.A., the ship includes some of the most sophisticated technical and environmental advances of any ship afloat. Many advances are below deck, well outside of the view of the passengers. For example, the engines are situated in two separate spaces that can be completely closed off from each other so that in the event of an emergency in one engine room, power systems in the other will still provide sufficient propulsion and electrical power to return the ship safely to port. The General Electric gas turbine also located in a separate room provides a third backup system and also allows the ship to operate without visible pollution in sensitive areas such as Alaska. Helping the Oosterdam to have a zero impact on the environment is the ship's Rochem system of sewage treatment, a purification system that treats all the water used on the ship. The gray water, which comes from showers and sinks and laundry water, is recycled and used for various technical things on the ship such as cooling water. Another part of the Rochem system treats the sewage, or black water and galley drain water. The water that comes from the Rochem system for discharge is purified to a near drinking water quality. This is another way that Holland America is working to preserve and protect the marine environment. The advanced wastewater purification systems supplied by ROCHEM have been installed on the Vista Class ships built at the Fincantieri yard in Marghera, Italy. ROCHEM was contracted to supply two purification units: 1) Grey Water Treatment System (GWTS) to purify the accommodation and laundry water generated onboard the Vista Class ship and 2) Black Water Treatment System (BWTS) to purify the sewage, galley water and concentrate from the GWTS generated onboard the Vista Class ship. With these two purification systems provide a treatment capacity of 850 m³/day (224,400 gallons/day) for the 85,000-ton vessel.

Both the GWTS and BWTS carry the latest IMO certifications and are designed to meet the most strict world wide discharge standards, e.g., Alaskan discharge standards defined by the Murkowski law. Utilizing ROCHEM's 30+ years of maritime experience, these advanced waste water purification systems are modular design for ease of

installation that provides flexibility in layout and reduces costs. Both systems are robustly designed utilizing barriers based on proven engineering and world

wide accepted treatment solutions. Included with supply is a high level of redundancy by designing for operating and maintenance flexibility.

(Continued on page 76)

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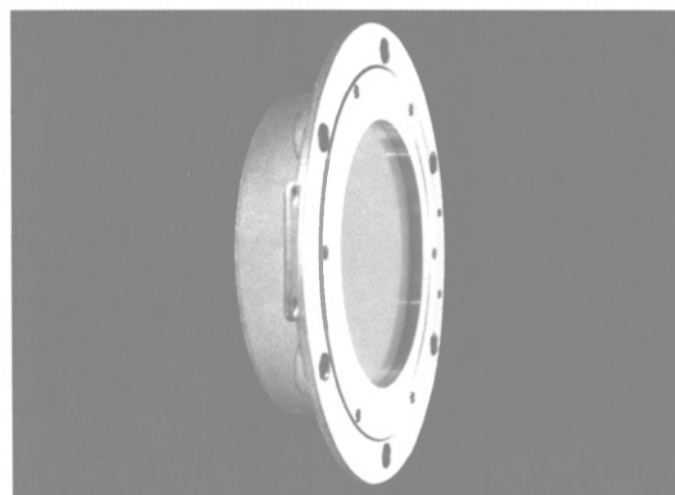


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Royal Caribbean Takes Mariner of the Seas

Kvaerner Masa-Yards' Turku shipyard delivered MS Mariner of the Seas, the fifth cruise ship in the Voyager-class series of cruise ships for Royal Caribbean Cruises Ltd. The first four ships in the series, Voyager of the Seas, Explorer of the Seas, Adventure of the Seas and Navigator of the Seas have been delivered annually since autumn 1999, one ship per year.

With a gross tonnage of approx. 140,000. Mariner has a passenger capacity of 3,800 and a crew capacity of 1,200. The ship measures 1,020.65 ft. (311.1 m) by 126 ft. (38.6 m) at water-line level (161 ft (49.1 m) breadth at the



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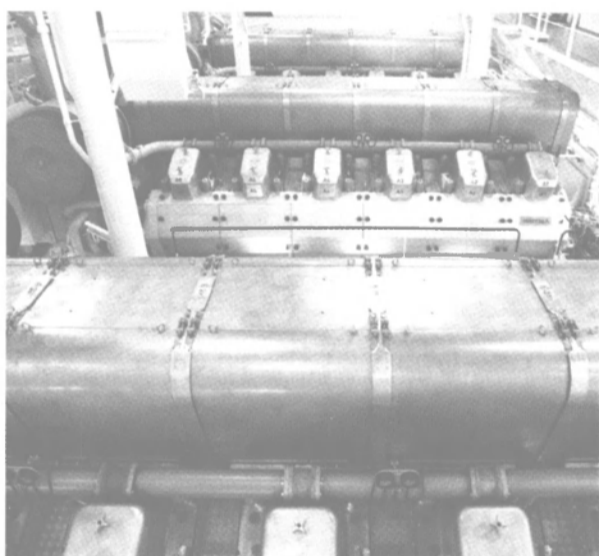
Main Particulars

Length, o.a.	1,020 ft. (311.1 m)
Breadth, max	161.1 ft (49.1 m)
Breadth, waterline	126.6 ft (38.6 m)
Draft, dwt	28.2 ft (8.6 m)
Height to top of funnel, approx.	207 ft (63 m)
Gross tonnage	138,300
Passenger capacity, lower bed	3,138
Passenger capacity, max.	3,807
Passenger cabins, total	1,557
Passenger cabins with view	1,077 (69%)
- of which with balconies	753 (48.4%)
- facing the Royal Promenade	138 (9%)
Crew capacity	1,213
Speed, service	22 knots
Main Engines	6 x Wartsila 12V46C
Total power	75,600 kW
Total propulsion power	42,000 kW
Propulsion machinery	3 x 14 MW Azipod propulsion, azimuthing, one fixed
Bow thrusters	4 x 3 MW, total 12 MW

bridge wings). "We are proud to have built yet another great cruise ship for Royal Caribbean, to specification, on time and to budget," said **Jorma Eloranta**, President and CEO of Kvaerner Masa-Yards.

This Post-Panamax size has allowed for unique design features and interior solutions. The cruise ship features a four deck high horizontal promenade, the Royal Promenade, a design featured for the first time on this Voyager-class cruise ship series. The length of the promenade is some 120 m, and it has in each end

The engine room.



Interesting Ship Facts

- 300,000 steel pieces were used for the steel hull of which 300,000 sq. m. are plates and 200 km steel profiles.
- There are 15,500 seats for passengers of which 5,300 seats are in cabins and 2,000 are seats on outer decks.
- There are 50,000 sq. m. of carpet.
- 1,850,000 cu. m. of air is transported and handled by air conditioning every hour.
- 61,000 electrical points are installed.
- About 3,000 km of electrical cables and about 16,000 automation points
- 5,000 sq. m. of windows
- About 140 km of pipes over one in. is installed
- 30 tons of ice cubes can be produced per day

an 11 deck high atrium, the Centrums. The Royal Promenade also features inside staterooms with a view. Almost 10 percent of Mariner's staterooms have bay windows overlooking the Royal Promenade. The big Savoy theatre seats 1,320 guests.

Mariner of the Seas was built in a relatively short time, as production started in summer 2001, and it was

docked out in February 2003.

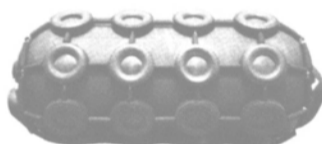
The relationship with Royal Caribbean dates back to the mid 1960's, when the cruise line's first ship, the 18,417 gt/725 passenger cruise ship Song of Norway was on the drawing boards. The yard in Helsinki built Royal Caribbean's first four ships, the Song of Norway (1970), Nordic Prince (1971) and Sun Viking (1972).



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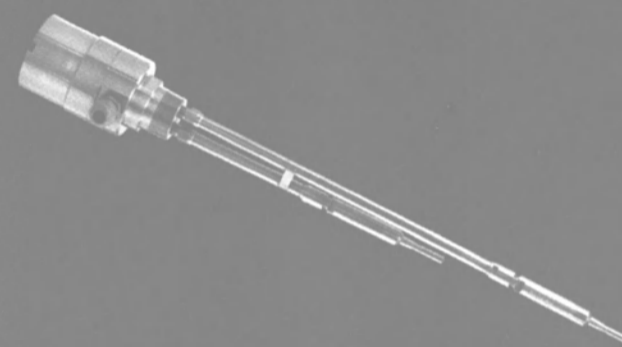
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Cruise Shipping

The 1,400 passenger Song of America was completed in 1982.

Also, the yard lengthened both Song of Norway and Nordic Prince in the first such operation ever performed on a passenger ship. The yard also developed the

concepts of the RCCL third generation (Sovereign-, Monarch-, Majesty of the Seas), fourth generation (Project Vision I & II and V & VI) vessels, of which Grandeur of the Seas and Enchantment of the Seas were delivered in 1996 and

1997 respectively, and developed the concepts of the recent Vantage and Millennium class ships.

Mariner of the Seas has a very advanced power arrangement and plant redundancy to ensure that it is operated



at optimum levels of safety and efficiency. Some features include:

- Divided machinery plant into two independent parts, the so called "half ship concept" including main machinery plant, fuel tanks, electric machinery, auxiliary systems, ventilation, piping, cabling and control and automation, basically from "fuel storage tanks to the

Fidelio Cruise Software Develop FCMMS

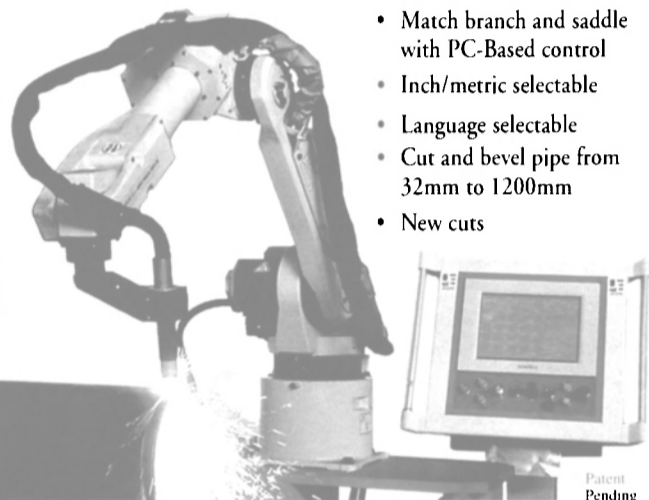
Fidelio Cruise Software GmbH announced the development of the Fidelio Cruise Materials Management System (FCMMS). FCMMS is a Windows based application designed to offer cruise ship operators a complete tool to manage the purchase and inventory control process (food-beverage-hotel equipment-shops-technical and more) following the logical purchasing process from time of purchase to the point of consumption. The result is optimized productivity while achieving financial targets.

Circle 21 on Reader Service Card

QM2 Uses MAPS Crew Manning System

Manpower Software (MSW) said that Cunard Line is using MSW's MAPS Crew Manning suite to schedule the crew for the Queen Mary 2. A project team from Manpower Software and Cunard worked against a tight deadline to implement MAPS at Cunard's offices in Southampton and Miami and onboard the Cunarders Queen Elizabeth 2 and Caronia and the three ships of the Yachts of Seabourn fleet. With this suc-

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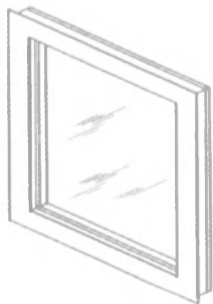
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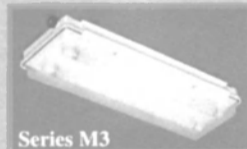
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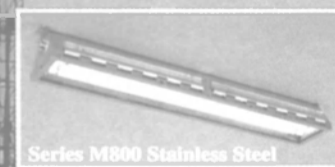


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propellers".

- Divided redundant main electric distribution and monitoring between the wheelhouse and control room (on Deck 1), and between the two separated high voltage switchboards (on Deck 0) and the three separate cyclo-converter rooms (on Deck 0 and Tween Deck).
- Divided redundant telephone, public

successfully completed, MAPS was used to recruit, train and assign the 1,250 crew on QM2. Cunard Line is now thus using MAPS to plan the allocation, travel and certification of crew across all its vessels.

Atlantic Marine Recognized for Safety

Atlantic Marine and Atlantic Dry Dock Corp. has been recognized by the National Safety Council (NSC) for its outstanding safety record in 2004. The Atlantic Marine Shipyards, by reducing its injury and illness rates by 82 percent for the year, won the NSC Green Cross for Safety Excellence Achievement, Perfect Record, Certificate of Merit and Significant Improvement Award.

NorseMerchant Ferries Plans Service Upgrade

NorseMerchant Ferries is to upgrade its Heysham — Belfast service to three sailings per day in each direction with effect from March 1, 2004. This increase in sailing frequency closely follows the restructuring of the company, which was completed in December, said NorseMerchant Ferries' Managing Director, **Phillip Shepherd**.

addressing, control and alarm systems.

- Five of the six generators can supply all normal service rating. Normally all engines will run, but this arrangement allows for one engine to be out of service for maintenance.
- The Mariner of the Seas has three azimuthing electric 14 MW Azipod

units. The two units on the sides are fully azimuthing whereas the one at the centerline is a fixed Azipod unit.

The Mariner of the Seas has been designed to manage 40 knots side winds - where ships normally can stay maneuverable in 25-30 knots winds. To handle this, there are four 3 MW tunnel

thrusters in the bow in addition to the Azipod units in the stern.

Sea trials showed that the ship can even move sideways with a speed of three knots.

The sea trials also showed that the manoeuvrability and course stability of the ship is very good.

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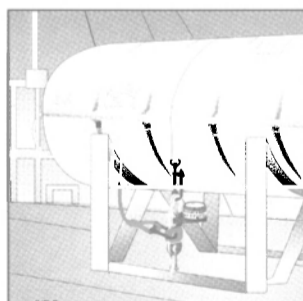
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The new Hammar H20 has a black thimble marked DECK which makes it easier to install.

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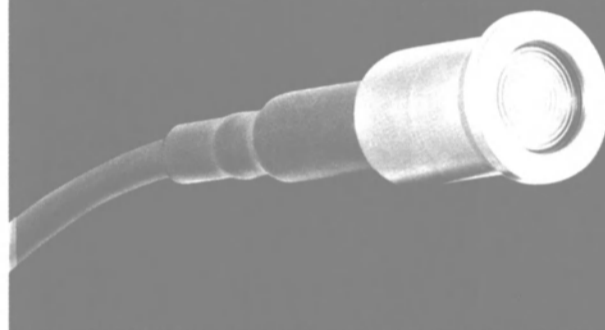
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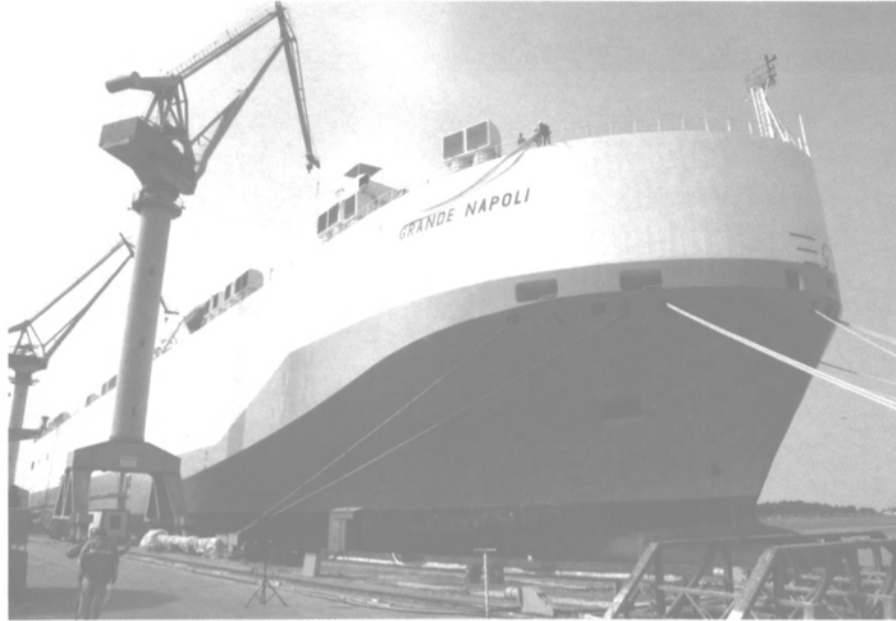
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Grimaldi Continues Fast Track Expansion

Manuel Grimaldi confided to some close friends last December that not only had he decided to set up a new line from Italy to Spain but also to purchase Superfast 1 now called Eurostar Roma for about \$49.3 million. The specification of the vessel will mean a greater presence in Mediterranean RoRo and in fact there are now three of this type of vessel under the name of Grimaldi Ferry Prestige. The new purchase Eurostar Roma (pictured opposite page) was presented by the Naples shipping group in Rome on January 23, 2004. The vessel is 24,000 tons, 570.8 ft. (174 m) long, with a beam of 78.7 ft. (24 m) and a cruising speed of 27 knots. Eurostar Roma can carry 1,400 passengers with 100 cars as well as 110 trailers. The ship will carry out a thrice weekly service between Civitavecchia and Barcelona. Sailing time for Barcelona is 18 hours and nine hours for Golfo Aranci. The name of the new Grimaldi-Naples vessel was chosen



because of Civitavecchia's identification as the port of Rome. Grimaldi-Naples Group, headed by **Guido Grimaldi**, is a leader in the transport of cars and wheeled vehicles and owns one of the

largest multi purpose and car carrier RoRo fleets in the world with 50 vessels, of which 31 are newbuilds, including five under construction. The Naples group operates shipping lines to over

100 ports in 40 countries in the Mediterranean, Northern Europe, Scandinavia, British Isles, West Africa and North and South America. Since 1997 the company has spent approximately \$1.3 billion modernizing the fleet, and its number of employees has risen from 1,000 to 3,100.

Three Newbuilds for Grimaldi

The car carrier Grande Lagos, the seventh of a 10-vessel order, was launched on February 22 at the Croatian yard Uljanik at Pola for Italy's Grimaldi-Naples. Grande Lagos, which will be delivered in May, is a 44,500 ton 650-ft. (198.4-m) long ship with capacity for 5,400 cars or 456 trucks and 200 cars on 45,671 sq. m., and has a cruising speed of 20 knots. The other three vessels will be delivered at Uljanik for Grimaldi-Naples during the period from 2004 and 2006. On February 16, Grimaldi-Naples took delivery of Grande Buenos Aires at

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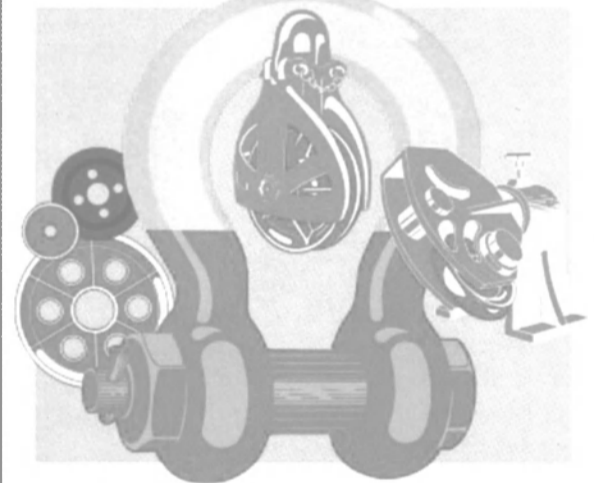
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Maritime Reporter & Engineering News

Fincantieri Ancona; the last of five sister ships ordered in December 2000.

The ship of 56,000 tons is 702 ft. (214 m) long with a beam of 105 ft. (32 m). It can carry 2,500 cars as well as 2,500 lane m and space for 850 teu. Grande Buenos Aires joins nine other Grande class vessels already in service on Grimaldi-Naples' established lines Northern/Europe/West Africa and Northern



Eurostar Roma

Europe/South America. Grimaldi Prestige Ferries the Group's new passenger and car trade name will inaugurate a new fast service from Civitavecchia to Barcelona three times a week and Civitavecchia to Golfo Aranci once a week with the ultra new RoPax Eurostar Roma a 24,000 ton ferry of 571 ft. (174 m) and a cruising speed of 27 knots able to carry 1,400 passengers, 100 cars and 110 trailers.

Fincantieri To Build Three for Finlines

Fincantieri and Finlines, the Finnish shipping company, last month signed a contract to build three RoPax ferries for a total contract value of about \$300 million. The order contains options for two additional ships at about \$100 million each.

The three ships will be employed by Finlines to connect Helsinki and Travemunde (Germany).

Finlines works mainly in North Europe and the Baltic Sea; as well as its traditional shipping activities (carried out by its fleet of 70 ships), the company also works in the field of port services (management of terminals, moving goods in ports etc.). The first vessel will be delivered at the end of 2005, the second and the third in mid 2006.

The 42,000 gt vessels will sport a loading capacity of 9,300 tons, a maximum length 708.6 ft. (216 m), breadth 100 ft. (30.5 m), height to the upper deck 52.5 ft. (16 m) and a draft of approximately 23 ft. (7 m), with 225 deluxe cabins. The ships are unique in that they are able to carry up to 500 passenger and 300 trucks in 4,200 lane meters, reported to be record figures for a ships of this type. The ships will be equipped with four Wartsila 9L46D engines, capable of providing a total power of 48,000 kW and a service speed of 25 knots.

Circle 23 on Reader Service Card

Italy: Working Hard to Eradicate Substandard Ships

Italy ranks number one in Europe for the number of ship inspections, with 2,431 last year, or 37 percent of ships berthed. It also leads in the number of ships stopped, with 392, which were held in port until faults were remedied. In part due to this effort the Italian flag has again been included in the White List that is the list of countries with the safest ships.

The checks carried out by the coast guard are conducted in accordance with EU directives that provide for 26 percent of all ships calling to be inspected. Called Port State Control, it is the means by which the EU imposes respect for safety at sea and carries out the fight against substandard vessels.

The year 2004 started with two out of six ships stopped. The M/N Spiros K with Honduras flag is still held in port since December 30, as the 1,851 ton, 90 m bulk carrier was found to have 33 deficiencies, some of which represented a serious risk for navigation and environmental protection

Pellegrino New MD at MSC

Domenico Pellegrino (35) is the new Managing Director of MSC Crociere Italiana. Pellegrino, with a degree in Political Sciences and a Master in Economics and Tourism as well as a great deal of professional experience in CIT and Valtur, has been working for MSC Crociere Italiana since 1995. He has recently been working as Sales Representative for the Italian market.

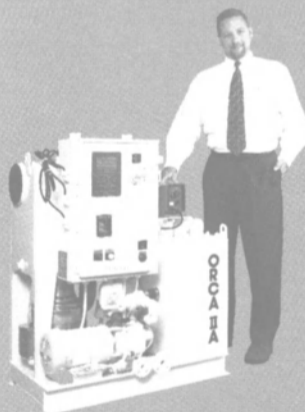


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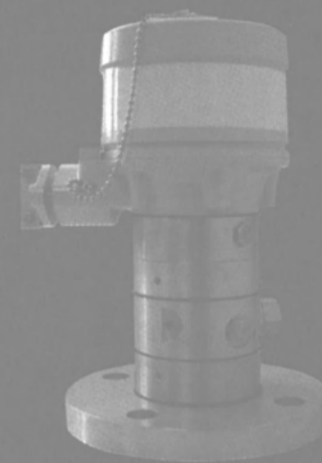


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The "Largest Cruise Ship in the History of Italian Shipping"

Costa Places \$450m Order With Fincantieri

The board of Costa Crociere on January 19 approved the issue of a letter of intent for the construction of a new ship at Fincantieri. Value of the order is about \$450 million. The 951-ft. (290-m), 112,000-ton vessel will be built in the Sestri Ponente yard in Genoa, scheduled to enter service in summer 2005. Designed to carry 3,600 passengers in 1,502 cabins, the ship will be bigger than the current fleet admiral Costa Fortuna which joined the fleet in November 2003 and its sister Costa Magica at the moment under construction at Sestri Ponente.

On completion the vessel will become the largest cruise ship in the history of Italian shipping.

The ship will be powered by two 21 MW diesel electric units and will operate all year round in the Mediterranean. In addition two swimming pools will be covered in order to be in use all year round in any climatic condition. As a

result of an agreement of September 2003 between Costa Crociere and TIM cell phones will be operable on board.

Pier Luigi Foschi president and managing director of Costa Crociere said "our decision to increase capacity resulted from the full acceptance of our product by the market and an expected continuing growth of demand for cruises in Europe. We also continue our commitment to develop passenger ship building in Italy where Italy is the world leader. Following on from Costa Fortuna launched in November 2003 and Costa Magica which enters service at the end of 2004 our relationship with Fincantieri which started in 1992 with the building of Costa Classica and Costa Romantica continuous very satisfactorily."

The order for the new vessel was also made possible by the recent harmonizing of law and taxation in Italy. Introduction of the tonnage tax has brought Italy into line with the rest of

Europe enabling Italian flag ships to operate internationally in a stable and competitive climate.

Giuseppe Bono managing director of Fincantieri said "this new order of which we are particularly proud is further recognition of the excellence of our products which combine rigorous cost control, innovative technology and respect for delivery times and enable our company to be at the very top. In fact this new order once again demonstrates the long sightedness and success of Costa Crociere and brings our order book up to nine ships enabling us to look with confidence at the near future in a moment when the market is not especially positive."

This new ship brings the Costa Crociere fleet investment from 2001 to 2006 to 2 billion euros. Two new ships entered service in 2003, Costa Mediterranea in June and Costa Fortuna in November. Costa Magica the sister

ship of Costa Fortuna is expected to join the fleet at the end of 2004.

Ship Specifications	
Gross tonnage	112,000 tons
Length, o.a.	951 ft. (290.2 m)
Beam	116.5 ft. (35.5 m)
Passenger capacity	3,800
Crew	1,090
Maximum speed	23.2 knots
Cruise speed	19.6 knots
Number of cabins	1,502
Of which External	61% (920)
Of which	10 panorama suites with balcony
	42 suites with balcony
	14 demi with balcony
	505 cabins with balcony
	349 cabins with window
Total cabins with balcony	571 (38 % of total cabins)
Internal	582
Builder	Fincantieri - Cantieri Navali Italiani S.P.A.
Entry in service	Summer 2006

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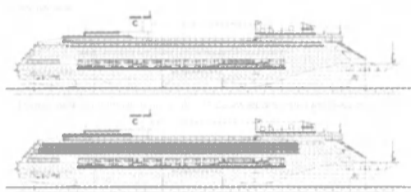
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"New" Costa Victoria Due in Savona

The ship, renovated thanks to the installation of panorama verandas in 242 cabins and four minisuites, was premiered in mid-February

Costa Victoria, one of the 10 ships in the Costa Crociere fleet after a facelift involving the addition of panorama verandas with private views to 242 cabins. The balconies were installed during a one-month stop when Costa Victoria was dry-docked at the German Lloyd Werft shipyard in Bremerhaven, where



she was built. The work involved the fitting of panorama balconies to 242 oceanview cabins on decks 9 and 10, as well as to four minisuites on deck 11—in all, 43 percent of the ship's oceanview cabins. This was the first time that refurbishing of this kind had been carried out on a cruise ship that was already in service.

The installation of the new verandas, which measure about 4.5 sq. m. in the oceanview cabins and roughly 9 sq. m. in the minisuites, also provided the chance to revamp other areas on board the ship. The buffet terrace, located on the stern lido on deck 11, has been extended by 60 sq. m., while two panorama promenades — each about 140 m in length — have also been added to deck 11, one on either side of the ship.

With the advent of the upgraded Costa Victoria, some 44 percent of the fleet's oceanview cabins are now fitted with verandas overlooking the sea. Considering only the new design cruise ships built after 1996 (Costa Victoria, Costa Atlantica, Costa Mediterranea and Costa Fortuna), this figure is even higher, at 72 percent.

Costa Victoria was built by the Lloyd Werft and entered service in 1996. The 827- x 105-ft. (252- x 32-m) ship is 75,000 gt, and can accommodate up to 2,394 guests in 964 cabins. The interiors of the Costa Victoria

were designed by the Italian architect Pierluigi Cerri, and feature mosaics by Emilio Tadini.

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Kvaerner Masa Marine, Vancouver B.C., Canada is engaged in marine consulting engineering and marketing primarily in North America.

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Circle 242 on Reader Service Card

Tribon M3 Debuts Equipment Selection

Tribon M3 Shipbuilding system offers an Equipment Selection feature, designed to offer considerable savings in the time designers spend on searching for material. The new tool Project Copy for reuse of design data is geared reduce design man-hours. Improvements on the System performance will have a dramatic impact on the speed of work.

Circle 18 on Reader Service Card

Fishman, Founder of Maritime Power, Dies

Irving Fishman recently passed away. Fishman held a degree in Chemical Engineering from Albany State College, and served on the Manhattan Project during WWII. Following the war, he began a life-long career in the marine industry, founding his own company,

Maritime Power, in 1956. Maritime Power's client list included the U.S. Navy, foreign navies, the oil majors, cruise lines, cargo carriers, towing companies and a number of industrial facilities. At the age of 85, Fishman still came to the office in Jersey City, NJ, every day. He will be remembered for his incredible knowledge, unshakable integrity, infectious personality, unique sense of humor and gentle humility.

New Company for Paper Transport

Gorthon Lines and B&N Nordsjofrakt, who for several years have cooperated on the transport of paper products in the North Atlantic, will coordinate their Atlantic activities in a newly-created company, which will be owned equally by Gorthon Lines and B&N. Gorthon's Atlantic transport activities will be

handed over in their entirety to the new company, as will B&N's 'RoLo' activities. The new company, Gorthon-B&N Transatlantic will have its head office in Helsingborg. Activities will start on April 1, 2004, and **Anette Henriksson**, the former finance manager at Gorthon Lines has been appointed as CEO. As part of the agreement between Gorthon and B&N to establish Transatlantic, Gorthon will acquire one of B&N's paper carriers, the 15,000 dwt Finnfighter.

Statoil to Expand U.S. LNG Capacity


A non-binding letter of intent has been signed by Statoil with U.S.-based Dominion energy company, giving Statoil the exclusive right to negotiate a deal which will secure access for the group to extra capacity at the Cove Point

liquefied natural gas (LNG) terminal in Maryland, USA.

Knightsbridge Secures Charters for Two Vessels

Knightsbridge Tankers Limited secured a medium-term time charter contracts for two of the company's five very large crude carriers (VLCCs). It has chartered the vessels to Tankers International LLC, each for a period of three years at a rate of \$30,000 per day with a 50/50 profit sharing arrangement for earnings in excess of \$30,000 per day calculated by reference to the BITR Index.

Tankers International LLC is a pool for the commercial operations of four large tanker owners and operators: A.P. Moller, Euronav Luxembourg SA., Overseas Shipholding Group, Inc and Reederei "Nord" Klaus E. Oldendorff.



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Satcom

Losing Contact ... *Not an Option*

Maritime communications is an estimated \$1 billion industry, encompassing ship operators, merchant fleets, governments and private yacht owners. There is arguably no more quickly evolving technical sector in the maritime market than the satellite communications niche. Safety, operational efficiency and quality of life onboard vessels of all type and size today more than ever depends on clear, reliable and cost effective satellite communication services and products. The following reports on recent advances from major service, product and system suppliers.

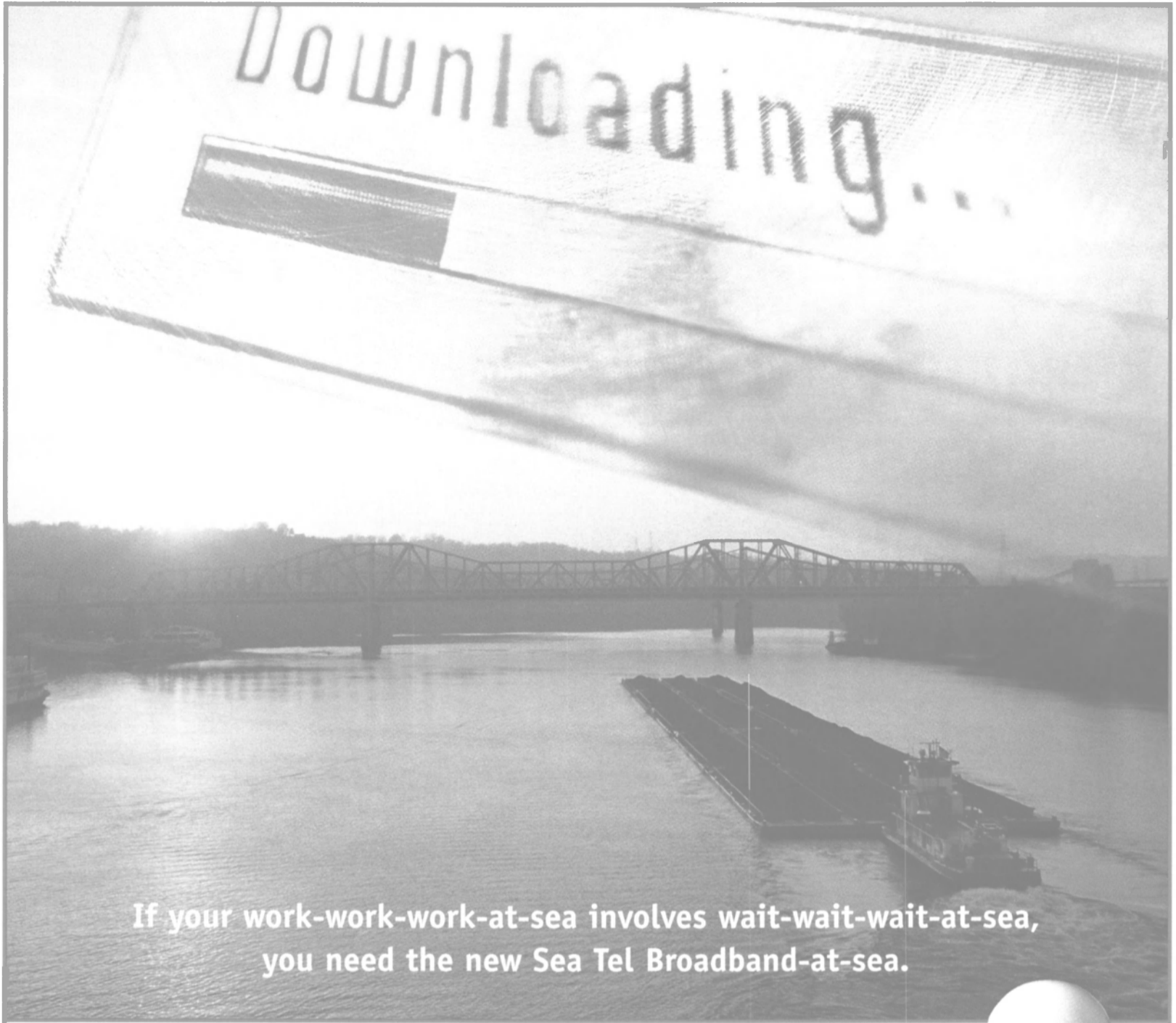
The year started with news that **Connexion by Boeing**, a business unit of The Boeing Company, would roll-out its high speed satellite broadband capability for the maritime industry. "We're actively engaged in discussions with several of the leading maritime operators, as well as potential distributors, and have received a tremendously positive response to our service and the speeds at which we can move data," said Connexion by Boeing President **Scott Carson**. Connexion by Boeing has tested real-time data communication and a live, high-quality video teleconferencing from a private vessel in Seattle's Lake Union to its Seattle campus. The Connexion by Boeing maritime solution is designed to be faster (approximately ten times faster, the company claims) and cheaper than existing maritime communications systems available, though final details on system and service pricing were not available at press time.

In late 2003 **Globalstar, L.P.** was acquired by Thermo Capital Partners, a plan which seems aimed to expand the provider's potential. The new company is planning to introduce an accelerated business expansion plan later in 2004. Globalstar's business assets were transferred to the new company, and will operate under the Globalstar brand name. "This is the beginning of a new, very encouraging chapter for Globalstar," said company president **Tony Navarra**. "Our working relationship with Thermo has already spanned many months, and as a result, we have been able to rapidly develop with them an outline for an aggressive business plan that

will give Globalstar the opportunity to broaden our business and to introduce new products and services in the future."

Cunard's new flagship, the 151,400 ton Queen Mary 2, has garnered its fair share of headlines and coverage in this, as well as many other business and consumer publications around the world. The world's largest cruise ship requires many innovative systems and products, and satcom is no exception. **Maritime Telecommunications Network (MTN)** satellite-based mobile communications platform is installed on Cunard's Queen Mary 2 to provide passengers and crew with a broad suite of Internet access and other communications services. MTN has outfitted QM2 with full redundancy services including dual antennas and its redundant FLYAWAY MPEG-2 Digital Video unit. Each antenna on the 151,400-ton vessel has 12 lines providing a total of 24 multiple voice, fax and data capabilities.

(Photo Courtesy of Eutelsat. See related story on page 55)



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Cost/GB	*1,000	*16,640 ISDN *36,000 MFPS	*18,720

4 15 03 ¹Source: KVH website ²Source: Delta Communications website

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Circle 267 on Reader Service Card

Satellite Communications

Xantic supplied its AMOS Maintenance and Purchasing application to the new flagship of the Cunard Line fleet, Queen Mary 2. The massive liner poses challenging requirements in terms of reliability, the maintenance of the

labyrinth of onboard equipment is of vital importance. Cunard implemented Xantic's AMOS Maintenance and Purchasing application as it provided the most comprehensive solution for Queen Mary 2's operational environment.

AMOS M&P provides administration, monitoring and control of maintenance management, spare part inventory, fiscal expenditures, purchasing and logistics. "The system was installed in the pre-construction stages of Queen Mary 2

and was key to our construction and procurement activities in preparation for delivery of the vessel. Xantic provided systems engineers to oversee and audit our database during construction, which proved to be invaluable in ensuring the system's availability," said **Steve Storey**, Director Technical Operations of Cunard Line Limited. "AMOS M&P has proven to be an integral part of our operation, allowing the realisation of efficient and economic maintenance, repair and procurement activities. The AVMS module, Xantic's Hotel defects reporting system, has allowed us to effectively deal with any unexpected problems onboard. This facilitates efficient management of our maintenance schedules and coordination of resources. The minimum disruption to our guests that results is paramount to our operation."


Stratos provides global BEST (Bandwidth Efficient Satellite Transport) service for the U.S. Navy, Military Sealift Command (MSC). With BEST, Stratos provides increased throughput over Inmarsat B HSD (High-speed Data) leases by combining multiple channels for additional bandwidth. BEST also offers a great deal of flexibility with respect to sharing and allocating the bandwidth available.

MSC uses Stratos' BEST technology for voice communications, email, Internet access, network access, and file transfers. Additionally, MSC is able to maintain 24x7 visibility and control over the Inmarsat lease connectivity for their fleets worldwide. From their central network operations center, MSC can allocate bandwidth to each ship, and adjust the bandwidth assignments on an as needed basis.

MSC has benefited from having this level of flexibility in managing their lease channel capacity. BEST allows MSC to respond instantly to mission critical requirements for increased voice and data connectivity.

Sea Tel was awarded "Best of Show" at the National Marine Electronics Association Convention for the WaveCall Model 3000 voice and data marine satellite antenna product. "We at Sea Tel are very proud to receive this award. It reaffirms our commitment to excellence in product development, performance and reliability," said **David Quadders**, Sales Manager — Americas.

The WaveCall Model 3000 is a compact voice and data system which uses an omnidirectional satellite antenna enclosed in a compact 10-in. dome. The size and construction of this unit allows great flexibility in configuring phone and computer systems for a vessel. It has been specifically designed by Sea Tel for the marine environment and has fea-



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tures not found on previous models including an optional remote display panel which shows signal strength, gateway, roaming and current phone registration data. The unit offers low-cost voice communications combined with up to 56 kbps data speeds for email and Internet use.

INAVSAT, a consortium formed jointly by **Inmarsat**, **EADS Space Services** and **Thales**, has been chosen as one of only three final bidders for the concession to develop and run Galileo satellite navigation system, the European equivalent to GPS. The second competitive phase will now go ahead with the three consortia of companies on the shortlist. Inmarsat, EADS Space and Thales are leaders in the field of mobile satellite communications, aerospace and navigation products and services

Kongsberg Seatex AS signed an agreement with the Galileo Joint Undertaking (GJU), which originates from the **European Space Agency (ESA)** and the European Union (EU). GJU is responsible for the development and implementation of Galileo — Europe's state-of-the-art global navigation system. Kongsberg will lead the Maritime Galileo (MARGAL) consortium, which will address future use and standardization of Galileo Maritime services based on early use of the European Geostationary Navigation Overlay Service (EGNOS). A major challenge faced by MARGAL is to provide identical basic solutions to both harbors/ports and inland waterways in order to provide a harmonized seamless service for both sectors. MARGAL is now moving into the design and demonstration phase with testing equipment placed along the Danube as well as in several U.K. ports.

The Maritime group is **EMS Satcom's** newest team. The group extends EMS satcom's industry leading satellite technology from air and land onto maritime platforms. The Fleet 55 Inmarsat satellite terminal is the group's flagship product, and provides 64kbps ISDN and MPDS connectivity to maritime vessels of all sizes, from small fishing vessels and yachts to large tankers and cargo vessels.

SeaDigital formed a business alliance with **Telenor Satellite Services** to market an integrated calling card solution. The SeaDigital ONE Card will provide seafarers with worldwide access to satellite and terrestrial telecommunications at very low cost. It is aimed specifically at the maritime market and allows seafarers to make calls while at sea or from port. The ONE Card is designed to provide an easy and affordable means to stay in touch with home and family,

regardless of time or distance. The SeaDigital ONE Card also provides increased flexibility for use on land and at sea in various combinations. The ONE Card works with terrestrial phone services, as well as all of Telenor's services via Inmarsat including A, B, M, Mini-M, GAN, and Fleet. Shore to ship calls can be made to all the mobile satellite providers such as Inmarsat, Iridium and Thuraya.

Telenor delivers high-speed data, voice and video communications and offers a portfolio of value-added services including prepaid calling solutions, easy internet access with e-mail and direct calling to Inmarsat terminals. Telenor also offers The Source, a web-based account management system available exclusively to Telenor Service Providers. Telenor Satellite Services owns and operates a global network of

land earth stations located at Eik (Norway) and Southbury (Connecticut) and Santa Paula (California) in the United States, and uses the satellite systems of Inmarsat, Intelsat, and Iridium for its services.

KVH Industries signed an extension of its 2002 agreement with Thrane & Thrane, making KVH the sole marine channel partner of Thrane & Thrane's Inmarsat Fleet marine satellite commu-

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Data speed	9.6k	64k ISDN	64k ISDN
MPDS	Yes	Yes	Yes
GMDSS	No	No	Yes

*) includes coverage on fax, data, ISDN and MPDS services

Smart Communication Solutions



Satellite Communications

communications products to the U.S. marine market. KVH will continue to distribute Thrane & Thrane's full line of existing Inmarsat maritime products through KVH's nationwide dealer network. In addition, KVH and the Denmark-based **Thrane & Thrane** will work together to

introduce products geared toward supporting high-speed, two-way data communications in the U.S. maritime market. The newest of these products is the Tracphone F33 global satellite communications system, which offers voice, fax, data, and high-speed Internet access

around the world. Vessel owners and fleet managers rely on **SeaWave STAR**, a Web-based asset tracking tool. Vessels equipped with a SeaWave communications system can be tracked for free by authorized remote users using SeaWave STAR. Fleet owners and managers

locate, monitor and communicate with all their vessels with a single heads-up display featuring common interface elements. To generate tracking information the ship owner or administrator simply sets the desired time interval for reports. Back on shore, authorized personnel with a user name and password can log into the mySeaWave Web portal and see the ship or multiple ships in a single display. Tracking assets from the most remote areas in the world is a benefit to fleet management and safety. Benefits include: Track multiple vessels in the fleet; detailed voyage information; view log entries, comments, fuel and cargo reports; easily export data into Microsoft Excel for trending and analysis; intuitive interface requires little or no training.

Nera F77 continues the company's long experience with 64 kbps high-speed data and high quality products dedicated to the maritime market. Nera F77 will give ships online access to a whole range of applications like the internet and e-mail with the world's first global maritime Mobile Packet Data System (MPDS). The Nera F77 package includes high-speed ISDN at a 64 kbps, which permits fast data transfer. This gives a ship online access to a whole range of applications like the internet and e-mail.

The **Eurocomm** system delivers a 2 wire telephony interface in a ruggedized marine package. One is HWU-EFMU-II-WS Iridium System features a ruggedized design designed for maritime use and environment. It is vibration resistant and features low power consumption (25 W in TX mode / 8 W in stand-by mode).

Marlink now offers a full range of Inmarsat services for customers requiring flexible and efficient land mobile communications over satellite. Marlink's new Regional Broadband Global Area Network (Regional BGAN) offers reliable, 24-hour a day Internet Protocol (IP) connectivity at data speeds of up to 144kbps via a secure channel. The service is available in Europe, Asia, and northern and central Africa. Additionally, Marlink offers its Regional BGAN users' access to a dedicated leased line from Telenor Satellite Services. This exclusive communications feature affords Marlink customers access to a secure transmission path for their high-speed data communications. Another major benefit of Regional BGAN is its cost effectiveness. Connection to the Internet or a private network can be kept "always on" as customers pay only for the amount of data sent or received. Regional BGAN offers the additional benefit of using notebook-sized, portable satellite IP modems.

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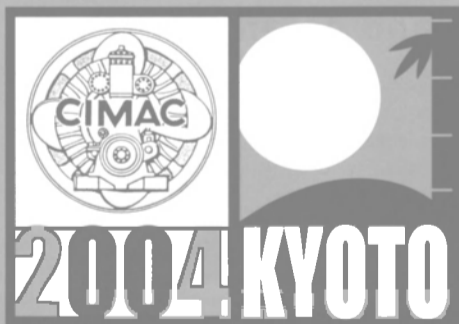
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The new Ship Security and Alert Systems (SSAS) regulations were adopted by International Maritime Organization (IMO) to enhance maritime security in response to the increasing threat from terrorism and piracy. After July 1, 2004, most deep-sea passenger and cargo ships must be fitted with a device that can send an alert message containing the ship's ID and position whenever the ship is under threat or has been compromised. The distress message must be activated covertly from a switch on the navigation bridge or other shipboard location, and transmitted only to the designated authority without being received on other ships or raising an alarm on the ship under attack.

Thrane & Thrane offer the TT-3000SSAS Capsat Ship Security Alert System, based on the well-known and reliable Inmarsat-C service, known for its unique role in maritime safety and for more than a decade an integral part

of the IMO's GMDSS (Global Maritime Distress and Safety System). It has been developed by Thrane & Thrane to supply customers with a system that fulfills the new SOLAS requirements from IMO.

The new SOLAS resolution 6 states that the Ship Security Alert System shall provide ships with two alarm buttons, which can be activated in case of a piracy or terrorist attack. The alarm is a covert signal, which will have no sound and no flashing lights so that it is in no way obvious to any intruders on board the ship.

Among a long list of other features, Capsat Ship Security Alert System offers the opportunity to use additional fleet tracking software, which will enhance Vessel Monitoring Systems (VMS) and fleet tracking possibilities.

Iridium Satellite introduced a new range of maritime satellite communication services providing cost-effective solutions for shipowners to meet the

new IMO requirements for SSAS. "The IMO performance standards for SSAS are very broad, so as to allow for different technical solutions," said **Christina Clifton**, executive vice president, sales and marketing, for Iridium. "Iridium's SSAS solutions provide the shipowner with a flexible array of choices to meet the IMO carriage requirements and flag administration specifications. Importantly, with Iridium, the SSAS alert messages are routed directly to the designated authority specified by the flag state." Iridium provides several options for sending SSAS messages through its global satellite network, using short burst data (SBD), short messaging service (SMS) or circuit switched data protocols, with calls routed through public switched telephone networks, virtual private networks or the Internet. The SSAS terminal can be programmed at installation, based on the shipowner's service plan and flag requirements. Iridium SSAS units are

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available from a variety of service equipment manufacturers.

The eTrac SSAS is from **KVH Industries, Inc.** The small, integrated eTrac SSAS uses the Inmarsat mini-C communication system and real-time GPS position reporting to provide alert messaging capabilities aboard vessels worldwide. Initially developed to help commercial vessel owners and crews maximize their safety and meet strict new IMO and U.S. Coast Guard (USCG) regulations, the eTrac SSAS also serves as an excellent resource for passengers and crews of private yachts, enabling them to send instant alerts in response to danger, such as terrorism, piracy, or vessel distress. The KVH eTrac SSAS stands less than 6-in. high and weighs only 2.4 lbs. The eTrac SSAS antenna is a fully integrated system, containing a transceiver, antenna, and a 12-channel GPS receiver. The two panic buttons can be placed as far as 165 ft. away from an interconnection box to make sure an alert can easily be sounded should the need arise. With no monthly subscriptions or transmission costs for emergency messages, eTrac SSAS offers an extremely low lifetime cost.

Sailor's SSAS meets the SOLAS requirements by IMO. Based on the Inmarsat C system, the new Sailor H3000M SSA Mini-C solution offers a

wide range of communications services providing a SSAS solution.

The Sailor H3000M SSA Mini-C also provides traditional Inmarsat-C services, such as position reporting and

polling, e-mail, fax, telex, X.25 data files and mobile-to-mobile communication. The Sailor H3000M SSA Mini-C is a unique Inmarsat Mini-C system, comprising a transceiver, antenna and

12-channel GPS receiver in one single unit. When one of the Alert Buttons is activated, the Sailor H3000M SSA Mini-C transmits an alert to an Inmarsat Land Earth Station (LES). The alert

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For additional information on the companies mentioned in the Satellite Communications report, circle the appropriate number on the Reader Service Card in this edition.

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Satellite Communications

message is then forwarded to a pre-defined recipient, typically the Search and Rescue Center in the vessel's country of registration. The message includes ship identification as well as its position.

Satamatics launched Ocean Alert, an ultra-compact Ship Security Alert System (SSAS) that enables full compliance with all SOLAS XI-2/6 mandatory SSAS regulations and performance standards. Centered around Satamatics' innovative SAT 101 miniature satellite terminal, Ocean Alert is designed to provide the maritime industry with an important, cost-effective tool to meet the new regulations for Ship Security Alert Systems. Ocean Alert provides global coverage and fully automatic roaming across all the world's ocean regions. Ocean Alert also provides fleet operators with a vital long-range tracking capability, suitable for future vessel monitoring requirements. Ocean Alert combines location tracking with security monitoring. Sealed and certified to IP66, for operation above decks in heavy seas, Ocean Alert's compact and easily concealable antenna maintains reliable communications with satellites at elevations as low as just five degrees above the horizon. Satamatics' Ocean Alert allows a totally covert installation, while ensuring unrivalled levels of operational performance.

Skanti introduced a ship security alert system based on the Inmarsat Satellite Network. In addition to the Ship Security Alert System, the Skanti Scansat Mini-CTM SSA features well-known Inmarsat C services, such as position reporting and polling, e-mail, fax,

telex, X.25 data files and mobile-to-mobile communication. The Skanti Scansat Mini-CTM SSA transmits an alert to an Inmarsat Land Earth Station when the alert button is pressed. The alert message is then forwarded to a pre-defined recipient, usually the Search and Rescue Center in the vessel's country of registration. The alert message specifies the vessel's identification and position. The recipients are updated on this information frequently, because the Skanti Scansat Mini-CTM SSA transmits the message continually at programmed intervals until de-activated. Skanti also unveiled the SSA for the Iridium system.

The Tracs-Ships' Security Alert System (SSAS) was launched by **Thales Navigation Ltd.** The unit is based on the Thales Inmarsat-C tracking unit that has been refined to exceed the IMO specifications for SSAS units. Tracs-SSAS introduces a unique feature that can provide land-based security organizations with ship movement information that has been unobtainable until now. The Thales Tracs-SSAS tracks and stores the vessel's location continuously regardless of whether an alarm button has been pressed. As with conventional SSAS units, the vessel location information will only be transmitted to the designated authority when it has been activated. However, the stored information can be called-up and made available to the shipping company for its own management purposes and, more significantly, it can also be called-up by a Coast Guard or security organization wanting to verify the ship's port of origin.

GALILEO Lifts Off

The European Commission adopted a communication on progress on the GALILEO program. Less than two years after the launch of the project in March 2002 and less than six months after the actual setting up of the GALILEO joint undertaking, the Commission informed Parliament and the Council of progress achieved in the development phase of the project. Among other things, the communication covers the ordering of the first two experimental satellites, the cooperation agreement with China and the procedure for designating the future concession holder for the system. "Everything is now in place to be able to move on to the deployment and operation phases in accordance with the planned deadlines, i.e. before the end of the decade," said **Loyola de Palacio**, Vice-President of the Commission.

Last year was crucial for the program. The adopted communication states first of all that the development phase, which extends from 2002 to 2005, is progressing as planned. The first two experimental satellites were ordered in July 2003. They will be emitting signals from space by the summer of 2006 and will thus guarantee the use of frequencies that the World Radiocommunications Conference held in 2003 allocated, moreover, to the GALILEO system. Finally, the communication devotes a great deal of attention to the preparation of the future phases of deployment, from 2006 to 2008, and operation, from 2008. The procedure for designating the future concession holder for this system is making very satisfactory progress, since three consortia have been admitted to the second phase, the competitive negotiation (see IP/04/172). Moreover, discussions on the future management structures for the system, particularly for the Supervisory Authority, are making good progress within the Council.



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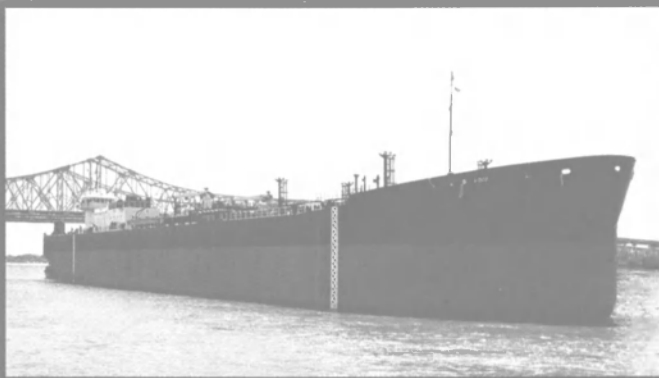

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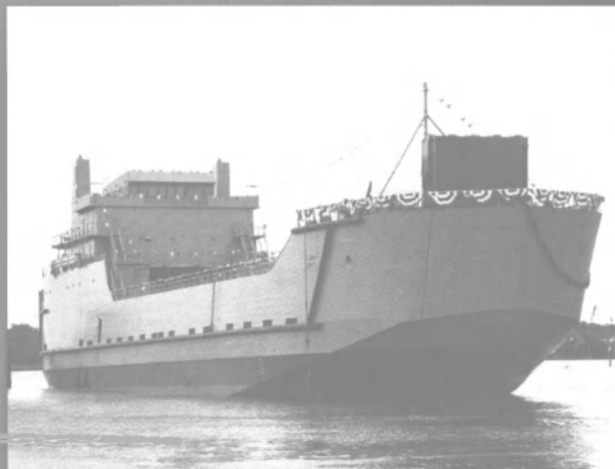
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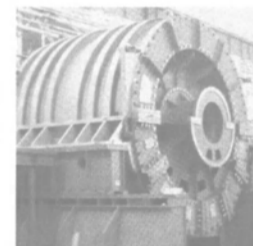
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Icebreaker Uses Satellite to Break Through Communications Barriers

In Finland and Sweden, a large percentage of commercial trade is transported by sea. During the winter months, this presents something of a challenge, as most of the trade routes are almost completely frozen over. Through a joint cooperation, the Swedish and Finnish Maritime Administrations enlist a fleet of icebreakers — nine vessels that travel the frozen waters to clear the ice and allow commercial ships to pass through. Thanks to these icebreakers, ports in both countries can remain open year-round. Communications is key to ensure that the icebreakers do their job, as they must be able to communicate to access up-to-the-minute information on weather forecasts and ice conditions, transmit estimated times of arrival and departure, send calls for assistance, and plan their daily operations. Previously, the icebreakers and ground facilities were equipped with the NMT mobile radio communications system, which operated over national public networks. But in 2002, this service was terminated. Seeking an alternative, the countries turned to Eutelsat. "We needed a permanent system that could function in mesh mode 24 hours a day, and enable direct, simultaneous communication between some or all of the boats as well as the various sites on the ground. Internet access was also critical - and it had to be available on the boats out at sea," said **Magnus Engstrom** of Satpool, the company responsible for integrating the network. "With such a complex set of specifications, satellite offered the best option." Eutelsat provided the icebreakers with a mesh network built on its Eutelsat@Sea solution for corporate and commercial maritime users. Because no land lines are required, the network can be easily shared between Sweden and Finland, offering direct communications via satellite for both vessel-to-vessel and vessel-to-ground interactions. During the "ice-over period," which runs from October to May, the icebreakers share a permanent, guaranteed capacity of 1 Mbps with their facilities on the ground. In addition to complete voice and data coverage, the network is extended via gateway from the headquarter offices to deliver Internet and email access for crew members on board the vessels. Network supervision, control and monitoring are operated by Eutelsat.

Through its satellite network, the icebreakers' at-sea communications capabilities are faster, stronger, and more

reliable, with improved access to critical information as well as personal and business communications. The Eutelsat solution offers the capability to dynamically assign bandwidth between termi-

nals, enabling on-demand access while fully maximizing available resources. If any of the nine vessels are not at sea on a given day, the remaining bandwidth is shared by those on the water, and allo-

cated according to demand. This streamlines costs and ensures high availability at all times.

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Cellular Fixed Wireless Helps Deliver Mercy

Mercy Ships is a nonprofit organization operating medical relief ships that travel to the poorest countries of the world to perform medical services and community development programs. In order to serve such communities, the ships have three basic requirements: a place to dock, fresh water and telephone access. In these poor countries, it is very common to have a wired public phone system that is very old, overloaded, and not readily available at the docks. However, GSM cellular service is generally available in the port area, so finding a way to use that cellular service has been a must for Mercy Ships.

In their quest to access the GSM cellular service, Mercy Ships discovered **Telular Corporation**, a cellular fixed wireless company whose patented RJ-11 (standard phone jack) to cellular interface technology enables users to connect to cellular service using standard phones, faxes and modems. For Mercy Ships, this was a crucial and cost-effective advantage to Telular's products. Mercy Ships installed two of Telular's Phonecell SX5e GSM Fixed Wireless Private Branch Exchange (PBX) Terminals on its Caribbean Mercy ship, providing dial-tone connectivity to the ship's PBX via Belize Telecom's DigiCell GSM network.

To make the connection, Mercy Ships simply had to connect Telular's terminals to the ship's PBX via a standard RJ11 plug on the back of the terminal and connect the terminals to a power source (electrical jack or battery power). The terminals then access the nearest cellular signal (pictured left). Now, when a crewmember picks up the phone, a dial tone is present and the phone operates just as if it were connected to a landline network. As long as a cellular network is available, Mercy Ships will be able to connect to that network with

Telular's terminals. To receive a strong signal from the cellular system, Telular's terminals are mounted in the captain's anteroom on the boat deck, the highest deck on the ship. The antennae for each of the units are mounted remotely on the roof (deckhead) of the boat deck to give best signal performance. A variety of

pole or mast mount omni-directional antennas are available for the special operating conditions of a water surface environment. Mercy Ships estimates that 50 calls are placed per day while in port, enabling them to coordinate patient appointments, order supplies and have them delivered, and coordinate between

ship-based medical units and clinics in the village. "Our phones are almost in the same class as the generators that produce electricity for the ship," said **Don Golden**, IT Manager for M/V Caribbean Mercy. "We tend to take our phone connection for granted, but we could not do the surgeries and provide services without it." — *By Dan Wonak, Sr. VP of Marketing, Telular*

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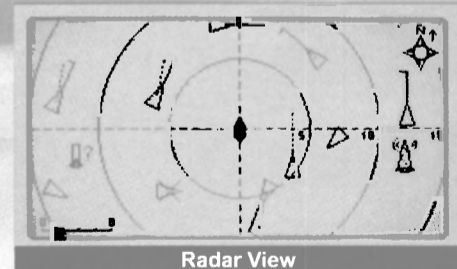
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Mercy Ships, PetroCom in SatCom Project

PetroCom, LLC and Mercy Ships last year teamed with a consortium of telecom providers to bring a satellite-based communications network for the Caribbean Mercy. **Tom Dane**, Satellite Sales Engineer for PetroCom, says, "We have designed and delivered a highly reliable system which meets the unique requirements of Mercy Ships." Under the three-year agreement, PetroCom LLC, Satellites Mexicanos S.A. de C.V. and DDB Unlimited Inc. will provide the necessary electronics, satellite bandwidth, and system monitoring and project management to provide full time voice, data and Internet access for the Mercy Ship. The system was installed and commissioned in Port Canaveral, Fla., on August 8, just prior to Caribbean Mercy's voyage to Darigra, Belize. According to Mercy Ships CIO **Kreig Ecklund**, "As we continue to expand our reach around the world, reliable communications are playing an increasingly important role. The expertise and contribution of PetroCom and its partners are vital to our plans for meeting the health and wellness needs of the world's poorest populations."

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Marine Technology

Rolls-Royce

Homing in on Ships' Electrics

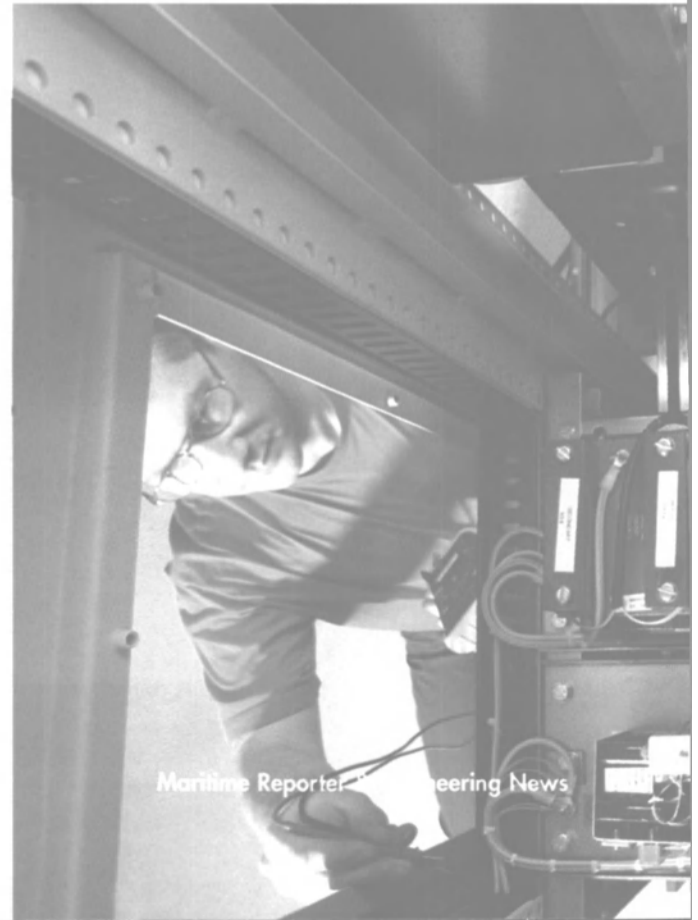
By David Tinsley, technical editor

Power systems specialist Rolls-Royce now derives nearly \$1.5 billion of total annual sales of \$8.7 billion from the marine market, and an important element of its growth strategy in the marine domain is the development of its electrical capabilities, products and technology. The increasing use of electrical drives and other sub-systems, and a move towards highly automated, integrated shipboard networks, is evident in both the commercial and naval sectors, in the technology-intensive, specialized vessel categories which form the group's heartland business areas. The success of electrical power and propulsion systems in application to high capacity cruise vessels has proved to be one of the most significant technological developments in commercial shipping over the past decade and a half, and electric drives are finding an ever-broadening market in the offshore and tanker sectors and other fields. In the naval business, most new vessels larger than frigates are being designed with electrical propulsion systems.

As in cruise vessels, integrated shipboard systems are increasingly favored, whereby the network supplies electrical energy for the hotel load and all other consumers as well as for propulsion. Navies are moving towards the integrated full electric propulsion concept, requiring new power electronic technologies to link power generation, propulsion and distribution systems.

Recognizing the need to respond to market dynamics, by providing more sophisticated electrical solutions, Rolls-Royce created a dedicated, Marine Electrical Systems business unit last year, under the direction of **Rick Kane**. The business embraces the group's elec-

Above: Rolls-Royce has formed the Marine Electrical Systems business to harness propulsion products into integrated packages..
Below: 440V switchboard sections being manufactured at Marine Electrical Systems. (All Photos: Rolls-Royce)



trical propulsion and power, marine automation and control, and motion control systems, and links other Rolls-Royce products such as prime movers, propellers and thrusters. It is tasked with developing and delivering fully integrated solutions for applications up to 100-MW.

Laying down building blocks for the future, Rolls-Royce plans to expand internal design engineering and integration resources and create new technology demonstrators and test facilities, while also entering into partnering arrangements with electrical motor, drive and generator manufacturers. Determination to build capability and extend market reach found early expression in August's takeover of UK-based VT Controls, with its strong naval market presence in power and automation systems. The company's Cosham site at Portsmouth is now the headquarters for the Marine Electrical Systems business.

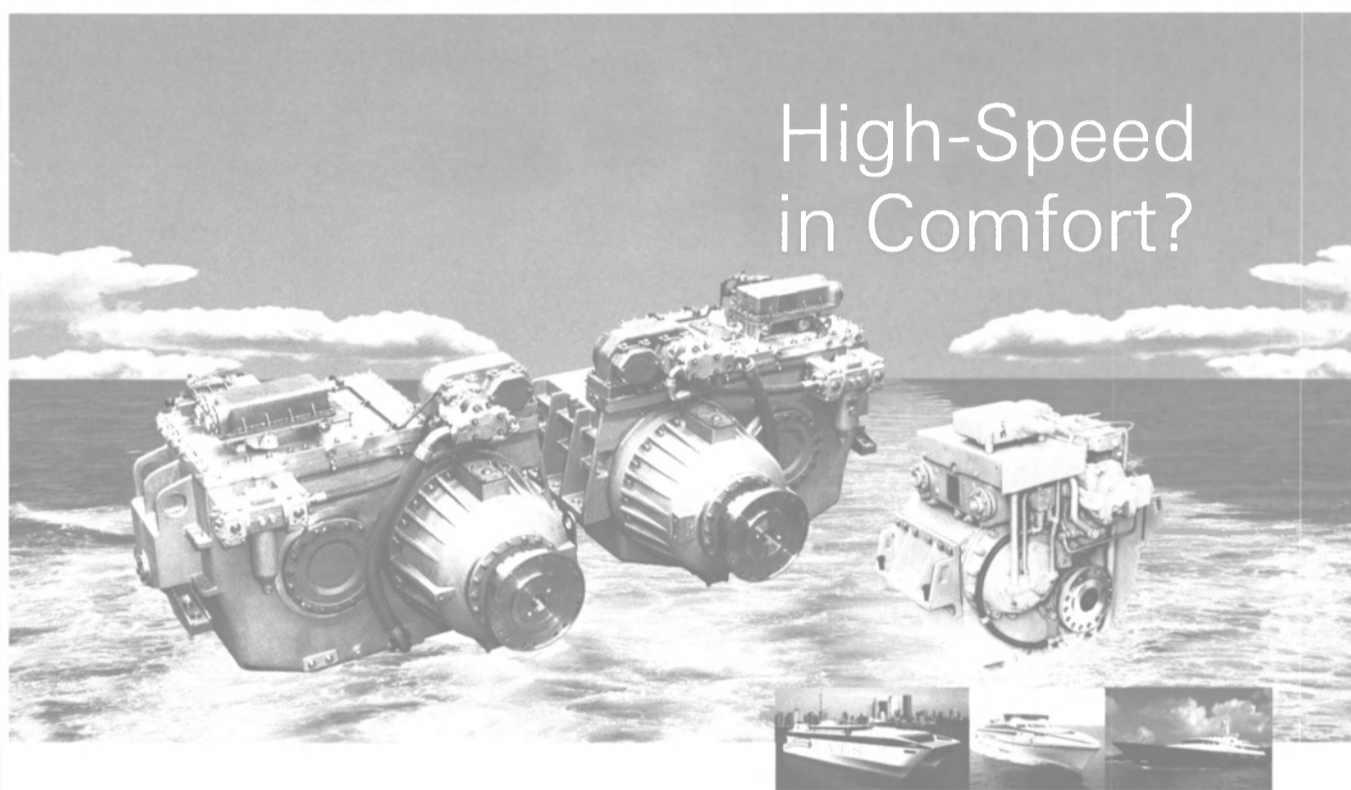
Kane explained that Rolls-Royce is targeting expansion for Marine Electrical Systems through organic growth and strategic acquisitions. It is creating a team capable of designing and developing electrical machines and components, and regards partnering with selected manufacturers, in the field of power conversion and rotating electrical machinery, as an important plank of strategy. New technologies are being developed to provide competitive electrical products and systems, such as for dedicated packaging of marine drives and specialized motor designs. One current project involves the development of a transverse flux motor, aimed at achieving a high torque density factor for new designs of alternator or podded electric drives, for example.

Marine Electrical Systems is now in the process of establishing a new test facility at Blyth, in north-east England. The waterfront site, which includes a former commercial drydock, will allow the company to test marine electrical and mechanical load systems, closely replicating the topology and inter-connectivity of shipboard networks. The business will also use the new complex

to create innovative control and protection methods for integrated marine electric systems, and to prepare technology demonstrators. The investment at Blyth underscores a growing demand from the market, not least in the naval sector, for significant 'de-risking' of new products and systems. The electrical systems business draws together the group's marine automation and control activities

based at Longva, near Aalesund, in western Norway, the motion control know-how deriving from the Brown Brothers fin stabilization and Interling tank stabilization units in the UK and Germany, respectively, and the power electrical systems engineering based in the UK.

Among the key goals is the leverage of existing electrical systems, automation,



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Marine Technology

integrated controls, motion control and modelling and simulation capabilities to expand market share, and the continued development of a common control architecture as a platform for all products. Elements of the common platform are already being used in control sys-

tems for Bergen diesel engines and the new MT30 marine gas turbine, in new joystick controls, UMAS automation systems, and elsewhere. Rolls-Royce is adding a new string to its bow through the development of its own dynamic positioning (DP) technology. The pro-

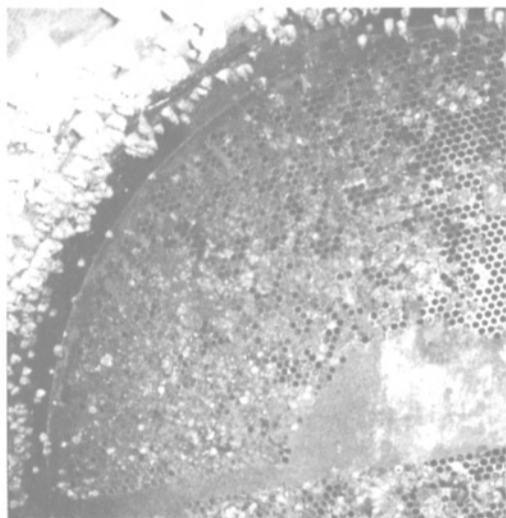
jected range will extend from a station-keeping system, known as the Compact DP, through to DP-3 triple redundant systems for demanding offshore industry requirements. The DP systems will build upon the common controls platform architecture. The group's DP core

technology will comprise an operator workstation, operator panel and graphical display linked to the main control cabinet and controller by the control network, interfaced to integrated bridge systems, sensors and position reference systems. The unit will send instructions to, and receive feedback from, the power plant, propulsors and maneuvering equipment. A further set of interfaces can exchange data with support, monitoring and advisory systems, which may include consequence monitoring, data logging and report tools, vessel simulators and health monitoring arrangements. Rolls-Royce automation and control equipment featuring the next generation UMAS system is to be employed in the initiative with Furuno relating to integrated bridge systems (IBS). Sealed last June, the pact between the two groups is centered on the use of Furuno Integrated Navigation System (INS) products in Rolls-Royce ship systems, as well as on the use of Rolls-Royce automation and control products in Furuno sales to the commercial marine market. As a prime example of Rolls-Royce's predilection for selective industrial collaboration, the U.K.-owned group and Furuno are jointly developing elements of the IBS to optimize flexible use of equipment and displays, improve information flow and system functionality, and enhance man-machine interface (MMI) design. A pilot installation is expected to be ready for installation by mid 2004, and a UT-series offshore support vessel is a candidate for the initial application.

Rolls-Royce is also planning to consolidate and develop its modelling and simulation capabilities, to provide a systems engineering, integration and analysis tool to evaluate design alternatives and optimise performance under various conditions. It is felt that this will additionally be beneficial to through-life service needs, as regards both ships and systems.

It is envisioned that the Marine Electrical Systems business will bring commercial marine expertise to its already well established naval market position. Recent experience in providing full electrical propulsion, automation and other systems to sophisticated offshore vessels, such as the wind turbine installation ship Mayflower Resolution and the UT-Design support vessel Bourbon Tampen, as well as that accrued in current naval projects, strengthens its hand in developing future naval market opportunities. The group is looking to play an active role in naval vessel programs including the Royal Navy's future aircraft carriers, a new generation of frigates for the Italian

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and French navies, and the US DD(X) destroyers.

The site at Cosham has a power systems role in the RN's Type 45 destroyer program, supplying packages including 440V ship services switchboards, electrical distribution centres and panels, electric motor starters, transformers, and shore connection boxes. Rolls-Royce is providing the WR-21 gas turbines, propeller shaftlines, steering gear and stabilisers for the ships. MES is also designing and manufacturing switchboards and 440V load centres for the Astute-class nuclear submarine, and automation equipment for two Portuguese offshore patrol vessels.

Circle 35 on Reader Service Card

ShipConstructor Chosen as Standard

Albacore Research's (ARL) ShipConstructor software was named design software-of-choice under the Second-Tier Shipyard Design Enhancement Program, which was granted funding under the National Shipbuilding Research Program (NSRP) Advanced Shipbuilding Enterprise initiative. The NSRP Advanced Shipbuilding Enterprise is a collaborative program aimed at boosting productivity among U.S. first- and second-tier shipbuilding and repair yards. At a quarterly meeting held in Victoria, BC in January 2004, the project was deemed "on schedule."

Recent project awards included \$1.25 million for the development of standard shared CAD software for commonality of designs of critical components such as HVAC and piping systems and creation of common parts catalogue. The NSRP project funding will provide for an intensive six-month development program for ARL to upgrade, modify

Protect Ships from Short Circuits

The Siemens Industrial Solutions and Services Group (I&S) has developed a current limiter based on high-temperature superconductor (HTS) technology to protect ship power supply systems against short-circuits. Short-circuit currents are automatically limited to a non-critical value as soon as the current rises, owing to the sudden increase in the inherent resistance of the superconductor.

Circle 19 on Reader Service Card

HZ Completes Massive EC Engine

Hitachi Zosen Corp. recently completed Japan's first electrically controlled marine diesel engine of the MAN B&W type, what it is calling the world's most advanced technology for powering large ships. The engine (Hitachi MAN B&W 6S50 ME-C, 9,480 kW) will be delivered to Naikai Zosen Corp. in Hiroshima Prefecture.

Circle 20 on Reader Service Card

and enhance selected portions of the ShipConstructor software package to fully meet the design requirements of the U.S. second-tier shipyard industry. Pat Cahill, Bender Shipbuilding & Repair Co. Inc., said, "ShipConstructor was independently selected for this program, based on its core functionality as an affordable 3-D product modeling


software, which integrates seamlessly with AutoCAD, the de facto international CAD software standard.

The second-tier shipyard design improvement program, headed by Bender Shipbuilding & Repair Co., Inc., includes seven shipyards and four naval architect firms. "This initiative will enable smaller shipyards, which often

are faced with short-lead-time one-off design situations and a high level reliance on design subcontractors for overflow work, to become world-class competitors through the use of an affordable AutoCAD compatible standard design package," said **Rolf Oetter**, president of ARL.


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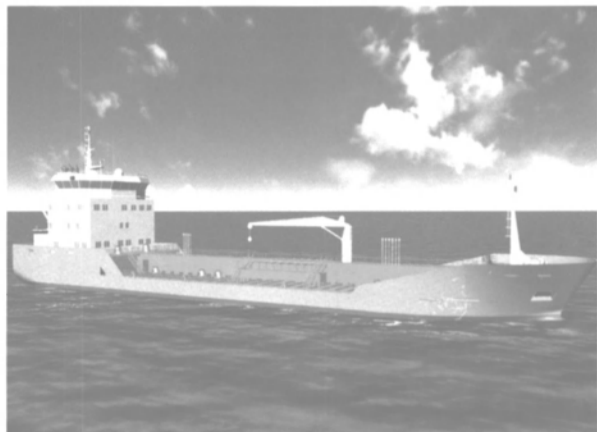
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Contract for New Product Tanker Design



A contract covering the design of a 4,200dwt oil product tanker has been won by NVC -Design. It represents the first ship to be built to a concept developed by Rolls-Royce, a design which combines a tailor-made hull design with a diesel mechanical propulsion system based on twin Ulstein Aquamaster Azipull azimuth thrusters with pulling propellers.

This design has been given the type number NVC 604 PT.

The vessel has been contracted by Norway's Bergen Tankers AS, and it will be built by RMK Marine Shipyard in Turkey, scheduled for delivery in September 2005. Rolls-Royce is to deliver the design and the Azipull thrusters.

The concept is intended to provide a number of advantages, perhaps most importantly an increase in cargo space compared to a conventional single screw product tanker, as the azimuth thruster system allows the engine room bulkhead to be moved further aft. Depending on the size of vessel, the increase in cargo volume is 5-7%.

By using two independent propulsion lines comprising thruster, shaft generator and main engine, a high level of redundancy is achieved. It also means that maintenance work can be carried out on one engine when the vessel is working cargo in port, since the other unit, assisted by the tunnel bow thruster, is immediately available to take the vessel to safety should an

emergency arise at the terminal. Propulsion system redundancy also increases the level of safety in coastal navigation.

In developing the hull form, Rolls-Royce had to ensure that the ship would have good course keeping ability. Hulls with length to beam ratios desirable for low first cost and high earning capacity in the past tended to have poor course stability when propelled by azimuth thrusters, needing large steering corrections resulting in heavier fuel consumption.

Choosing the Azipull solution for propulsion is designed to help greatly, as they, with their hydrodynamically optimized underwater units, provide substantial rudder area. Even so, a major program of computational design and model testing was undertaken to ensure that the result would be a tanker with course stability well in excess of the IMO zig-zag test requirements.

The double hull vessel incorporates a bulbous bow, plus a short skeg for docking purposes. Azipull propellers are positioned below headboxes and allow the aft end of the hull to be optimized for minimum resistance and simplified hull construction.

An attraction is that in port one engine can be shut down. The other is declutched from its thruster and drives its generator supplying power for the hydraulic deepwell cargo pump powerpacks and the vessel's hotel load.

The 4,200-dwt Rolls-Royce oil product tanker design on order for Bergen Tankers has a cargo hold volume of 5,200 cu. m. split between 10 tanks. These lie within the double hull which has an overall length of fractionally under 90 m and a moulded breadth of 16.5 m; the summer draft is 6 m. Cargo heating is by stainless steel coils through which thermal oil is circulated. Each tank has its own cargo pump and the total discharge rate is 1,200 cu. m./hr.

Each main engine develops about 1,400 kW at 900 rpm, coupled to a 1,000 kW generator and an AZP85 Azipull thruster. Allowing for 15 percent sea margin and hotel load on the shaft generator the service speed at 90% MCR will be 13.3 knots, with a corresponding fuel consumption of about 8 tons/24 hrs. A 500kW tunnel bow thruster is electrically driven and the shaft generators are backed up by two 350kW gensets and a small harbor/emergency set.

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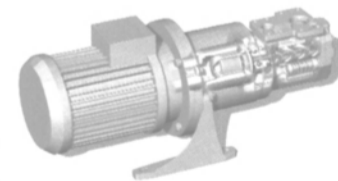
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IMO Launches New Pump Series

IMO AB, a member of the Colfax Pump Group, launches a new pump series called Opti Line. In addition to traditional IMO features such as long life and durability, low noise, low pressure ripple and compact design, the new Opti Line adds a new feature which is leak-free, made possible with the use of magnetic couplings. Further to the new Opti Line pump series, IMO AB also launches the new 2.0 version of Winpump, a popular Windows based computer program to calculate pump needs.



Circle 8 on Reader Service Card

Ultrajet Expands into Larger Jet Market



Ultrajet 575

Design work at Ultra Dynamics on waterjets to satisfy input powers in excess of 2,000 hp has been accelerated during the last two years due to specific customer requests for larger Ultrajet models. One such request came from a Malaysian shipyard who is currently undertaking sea trials on two new craft, which have already been fitted with the first of these planned new Ultrajet models. Ultrajet also did not chose a simple control system for the introduction of the Ultrajet 575; these first boats were fitted with sophisticated twin station joystick control systems with a more conventional steering system being employed as a backup system. The UltraJet 575 has evolved from the company's growing range of jet units and incorporates a number of design refinements to improve installation and operation of the jet. The UJ575 is supplied as a compact, complete propulsion package capable of absorbing input powers up to 1,700 bhp and has a dry weight including the hydraulic control system of 1,450 kgs. The installation is simplified for the boat builder with most of the control system components being mounted on the Ultrajet and all inter-connecting cables being fitted with plugs for "plug and play" installation requiring minimum skill levels.

Circle 11 on Reader Service Card

Cylinder Lube Breakthrough

Hans Jensen Lubricators A/S have reported a break-through for its recently introduced Swirl Injection Principle for cylinder lubrication of two-stroke marine diesel engines. The Swirl Injection Principle (SIP) is designed to enable a reduction of cylinder oil consumption while maintaining a highly satisfactory cylinder condition compared to conventional methods of lubrication. The manufacturer claims that it is the only cylinder lubrication principle allowing an even circumferential distribution of the cylinder oil on the upper part of the liner wall for every engine revolution. This is crucial according to engine designers, since acid neutralization is paramount for avoiding excessive liner wear due to corrosion. The system design allows retrofit application with advantages similar to those obtained on newbuildings. In a retrofit situation, a reduction in cylinder oil consumption by 60% has been experienced, with hardly any liner wear (below 0.02 mm/1000h), and extended lifetime of piston rings.

Circle 10 on Reader Service Card

Simrad Chosen for 100 Yemen Patrol Boats

Simrad was selected to supply radar and VHF communications equipment to 100 patrol boats currently in production for the Yemen Coast Guard. Delivery and installation of the CR44 radar and RD68 dVHF radios for the first 25 boats is underway. Installation will continue throughout the year with the final patrol boat completed by the end of 2004.

The CR44 multi-function radar from Simrad's xx44/54 series of professional GPS ChartRadars, Chartplotters, ChartSounders and ChartRadar Sounders has been chosen as the main navigation tool onboard. The CR44 features high-speed processors for very fast



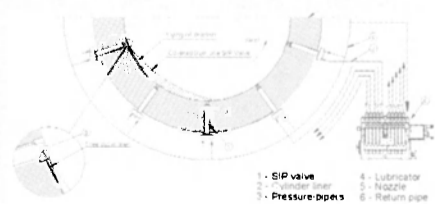
Simrad RD68 and CR44 on a new patrol boat

updates and redraw times in order to meet the ever-increasing demands of the modern navigator. Simrad's RD68 dVHF radio with built in Class D DSC controller will provide the core means of communication for the coast guard patrol boats. Simrad's distributor in Dubai, Emphor (previously Maritronics), won the contract.

Circle 12 on Reader Service Card



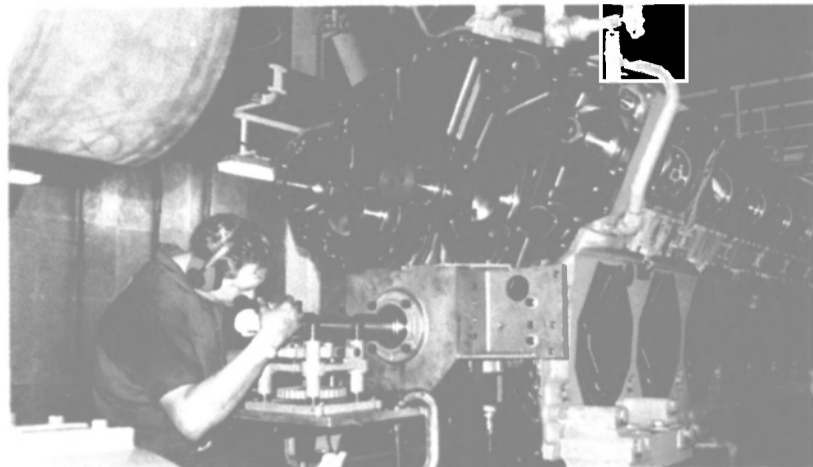
The spring in the SIP valve works at a pressure of approx. 40 bars. Besides ensuring an adequate pressure for cylinder oil to become a suitable spray when leaving the nozzle, is designed to ensure that the oil in the tube between cylinder lubricator and SIP valve stays under pressure. Thus, injection timing can be controlled as required for the purpose. The swirl injection principle is patented.



The principle of operation can be seen in this figure.

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GE Awarded Marine Contracts

General Electric Co./GE Aircraft Engines won a \$16,500,000 (3-year base, estimated) fixed-price with economic price adjustment contract for marine gas turbine engines for the Army, Navy, Air Force, Marine Corps and federal civilian agencies. This contract is for a three-year base contract with two three-year option periods. Contract funds will not expire this fiscal year. There was one proposal solicitation, and one responded. The Defense Supply Center Columbus, Columbus, Ohio, is the contracting activity.

National Defense Tank Vessel Construction Assistance Program

The Maritime Administration (MarAd) is soliciting competitive proposals for construction in the United States of new product tank vessels necessary to meet commercial and national defense needs of the United States and to be built with assistance under Subtitle D of the Maritime Security Act of 2003. Any U.S. citizen or U.S. shipyard may submit a proposal. Under the National Defense Tank Vessel Construction Program, the new product tank vessels must be not less than 35,000 and not greater than 60,000 deadweight tons. The tank vessels must meet the requirements of foreign commerce: be capable of carrying militarily useful petroleum products; be suitable for national defense or military purposes in time of war, national emergency, or other military contingency; and meet the construc-

tion standards for documentation under laws of the United States. 69 Fed. Reg. 7992 (February 20, 2004).

Issue RFP	Friday, February 20, 2004
Phase I Proposals Due	Tuesday, May 4, 2004
Phase I Evaluation Complete	Monday, July 19, 2004
Phase II Offerors Notified	Friday, July 23, 2004
Phase II Proposals Due	Wednesday, October 6, 2004
Phase II Evaluation Complete	Monday, December 20, 2004

United Defense Wins Multi-Ship Contract

United Defense Industries, Inc. has announced that the U.S. Navy's award to its Southwest Marine (SWM) subsidiary, for pre-production planning for the repair, alteration and dry docking of the USS SHRIKE (MHC 62). The contract follows SWM's current 5-year contract for repairs to the Mine Countermeasure (MCM) class of vessels. Work on the ship is scheduled to start on May 26, 2004, and complete on August 20, 2004.

ASA: Navy Budget is "Deeply Troubling"

Cynthia Brown, President of the American Shipbuilding Association (ASA), which represents the U.S. shipbuilding industry, calls the President's fiscal year 2005 budget "deeply troubling." "It cuts funding for naval ships by \$100 million while increasing the Department of Defense (DOD) budget by \$26.4 billion, or 7%. Cutting funding for naval ships is reckless

when we do not have enough to fight the war on terrorism." "The gutting of America's naval power is frightening," she said. "The fleet has shrunk from 594 ships in 1987 to 294 today. Budgets of the last 12 years have bought only six new ships a year, on average. At this production rate, the fleet will drop to fewer than 200 ships," she said.

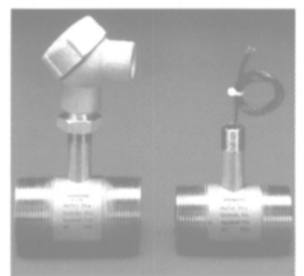
TEN Orders Two Ice-Class Suezmaxes

Tsakos Energy Navigation Limited (TEN) ordered two Suezmax, double hull, IA ice-class tankers, with carrying capacity of 162,400 dwt each. The vessels are scheduled for delivery in the first half of 2007.

Both vessels are to be constructed by Hyundai Heavy Industries (HHI). TEN's management believes that these vessels will be in heavy demand by Russian, Finnish and Canadian based oil majors and charterers in the near future, especially as many developing oil-fields and ports currently under development in Russia, Eastern Siberia and Alaska will start producing oil and will require these specialized tankers for its transportation. Including the contract announced today, TEN expects its fleet to grow to 39 vessels by the end of 2007.

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TORM Orders Tanker from China

A/S Steamship Co TORM signed a contract with Dalian New Shipbuilding Ltd. in the People's Republic of China for construction of one high-specification 110,000 dwt Aframax (LR2) product tanker. This order is based on an option granted when TORM placed an order for two vessels in October 2003.

Rapp Hydema Seattle Expands Yard

Rapp Hydema U.S. is expanding its industrial yard in Seattle, increasing its yard size by some 2,700 sq. ft. Owing to a substantial equipment inventory, Rapp has leased space in recent years at a nearby Commodore Way yard from the Port of Seattle; the new yard expansion will, however, allow the inventory to be more conveniently placed on Rapp's own property.

Circle 17 on Reader Service Card

Trico Completes Credit Facility

Trico Marine Services, Inc. closed the refinancing of its existing U.S. revolving credit facility. The company refinanced the U.S. Dollar Facility to relieve itself of the maintenance debt covenants under that existing facility and to add operating flexibility. The company's new \$55 million senior secured credit facility is secured by 43 supply vessels.

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Company Profile

BollFilter: 50 Years of Success and Counting

For more than 50 years BollFilter has sought to design, manufacture and deliver advanced filtration technology, specializing in filtration technology for shipbuilding and engine-building. Founded in 1950 by Messrs. Boll and Kirch in Cologne in the wake of World War II, the company has grown from its original crew of 25 to worldwide operations more than 300 strong, plus a strong network of agencies on all continents. The company, which has occupied nearly 22,000-sq.-m. of space in the Kerpen industrial district

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near Cologne since 1979, has been built on innovation and a commitment to delivering quality products, and a number of Bollfilters are the result of the company's own research and development, and are protected by patents or utility models. BollFilter's range extends to filtration systems for a number of liquids, including: Chemicals, Cleaning Agents, Cooling lubricants, Oils, Fuel and Water. But the company's expertise extends beyond pure product supply, as many customers have found an advantage in involving Boll & Kirch technicians and engineers in the early phases of their projects. To further aid in the selection process the company maintains on its website (www.bollfilterusa.com), a comprehensive filter problem questionnaire, which allows the company more precisely identify and solve a particular customer's problem.

Single filters One-chamber filters are the basic models used in liquid-filtering technology. They fulfill the technical filtering tasks just as reliably as switch-over double filters or automatic filters. This is because all designs of filter can be installed with the various means of filtration. The BASIC-type BollFilter is used wherever the plant or filter can be switched off without fuss. They are also used by means of cutoff valves to clean or change the filter inserts.

Duplex filters consist of two filter housings. One filter housing is in operation while the other, cleaned, half of the filter is held in reserve. If the degree of contamination exceeds the tolerance threshold, the operation will



then switch to the cleaned half of the filter with no pulse pressure. The contaminated filter insert is then cleaned whilst the plant continues operating. The switch-over takes place by means of a change-over cock or by means of two-stage three-way ball valves. The construction makes it impossible to switch off both filter chambers simultaneously.

Automatic filters In BollfilterUSA automatic filters, the filter candles, wedge wire candles, or wire mesh candles are automatically cleaned by back-flushing without interrupting operation. This may depend on differential pressure, time, and be carried out using the plant's own medium. This could be a compressed-air-supported medium or external medium. Filters of this type are used when contamination is occurring constantly, manual cleaning is uneconomic, or the plant filters are extensively automated.

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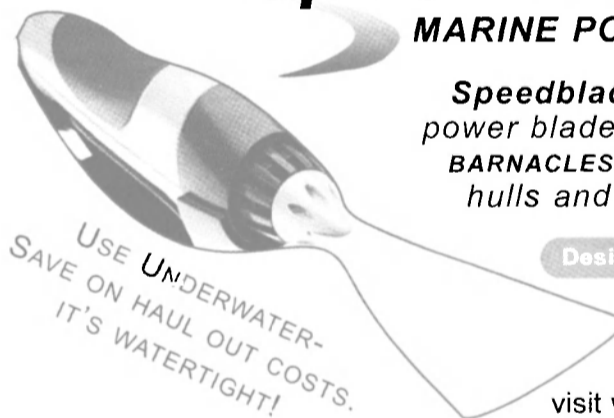


Rolls-Royce Unveils Family of Fast Naval Ship Designs

Rolls-Royce debuted designs for a family of four fast navy ships, all based on a fast monohull commercial design. The 580.7 ft. (177m) Fast Naval Sea-Lift Vessel is designed to carry 2,500 tons of cargo for 3,000nm at 40 knots, powered by three gas turbines driving waterjets. The design includes a smaller Intra-Theatre Logistics Vessel (ITLV), a Fast Surface Combatant, and a smaller Fast Attack Craft. The CODAG-powered ITLV is 393 ft. (120 m) long and is designed to transport troops and equipment. A 5,000-ton Fast Surface Combatant, based on the same fast hullform, is capable of 40 to 60-knots, Power would come from a hybrid gas turbine and electric system linked to four waterjets, providing the ability to operate efficiently throughout the speed range. Finally, a Fast Attack Craft provides speeds up to 60 knots, high agility, and a simple steel construction. Four gas turbines drive twin waterjets in a CODOG configuration. The propulsion system and internal general arrangement are configured to allow maximum availability of prime upper deck space for installation of a customer-defined combat system. All the ships are based on the P2500 Fast RoPax designed by Rolls-Royce's commercial marine operations and received BV classification.

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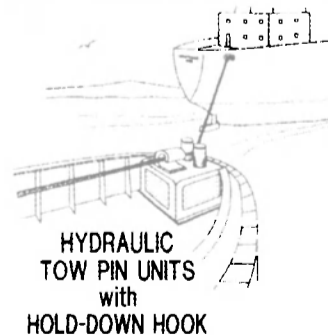
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New York City
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REQUEST FOR BIDS

150,000cuft SLUDGE VESSEL CONSTRUCTION CONTRACT

The New York City Department of Environmental Protection (NYCDEP) is soliciting bids for Contract No. SM-70-L for the construction of a 150,000cuft Sludge Vessel. This vessel will be used to transport sludge between the various Sewage Treatment Plants throughout the City of New York. The term of the contract is two(2) years. A pre-bid conference will be held at the Wards Island Water Pollution Control Plant (WPCP), Training Room, Wards Island New York, 10035 on March 30, 2004 at 10 a.m. The pre-bid conference is not mandatory, but prospective bidders are encouraged to attend. A complete bid package for the contract will be available beginning March 16, 2004. To receive the bid package, call (718) 595-3236/3265, or the bid package can be picked up at the following address: NYCDEP, 59-17 Junction Boulevard, 17th Floor, Flushing, New York 11373. Bids for the contract are due at the address no later than April 16, 2004, 11:30 a.m. All inquiries regarding this bid must be in writing to the following Contract Person:

Mr. John Chen, Chief, Marine Section
Department of Environmental Protection,
Bureau of Wastewater Treatment, Wards Island, New York 10035
Tel: (212) 860-8250, Fax (212) 860-9578

Circle 292 on Reader Service Card

The Corrosion Control Challenge

Last year Germanischer Lloyd and Muhlhan sponsored a Surface Protection Symposium in October in Lübeck, dealing with the topic of value retention in the shipping industry. The outcome was a lively exchange of ideas among shipowners, coating material manufacturers and surface protection experts. Up-to-date findings from research were discussed with the same vitality as problems from workaday practice. This report provides an overview of the events involved.

After Dr. Richter from Germanischer Lloyd had welcomed those attending, Mr. Harms — also from Germanischer Lloyd — described both the development and current status of international stipulations for the assessment of corrosion in water ballast tanks, including the "Unified Requirement Z7" (1990) from the International Association of Classification Societies. He emphasized the negative consequences which arise when a tank coating is classified as "poor". In that case the water ballast tanks must be inspected each year by a classification society, resulting in a substantial operational disadvantage to the owner. In the process Mr. Harms also disclosed the criteria for assessing coatings and illustrated the visual benchmark used in assessing to what percentage the surface area displays coating material failure or intensive corrosion. That procedure had already been vigorously discussed by symposium participants the evening before as its practical enactment is a source of difficulties time and again.

Mr. Harms dealt in addition with Germanischer Lloyd's "Condition Assessment Program" (CAP), a program in which corrosion protection plays a special role. He demonstrated how the lifespan of a ship can be extended from 10 to over 30 years using this program, and how value retention can be assured and the return on investment (ROI) increased as well.

Dr. Dittmers from Corroconsult GmbH, Hamburg, reported on the basis of his experience as a coating damage assessor. Coating defects can thus be divided into four groups:

1. Peeling and poor adhesion due to solvent retention, humidity, exudations, oils and greases;
2. Blistering due to impurities on top of the primer, to salts or due to defective



cathode protection using an external power source;

3. Cracks due to an inappropriate coating system or excessively thick layers of coating;
4. Corrosion at weak points such as welding and stoving points, undercoating thicknesses and porous coatings.

One focus of the report was dedicated to solvent retention, the way it works and the causes behind it, whereby the speaker demonstrated that damage can be avoided when awareness of the caus-

es is greater. Typical errors favoring the occurrence of solvent retention are: low temperatures during application, thick layers of coating, high percentages of solvents, rapid chemical curing and subjecting coatings to stress through water too soon.

Dr. Dittmers dealt furthermore with osmotic blister formation and the causes behind it. Here he particularly noted salt content on steel surfaces.

The speaker proceeded to present the findings of a test trial in which the

behavior of various coating systems during the Salt Spray Test (in compliance with ISO 7253 using 720 h of the appropriate C5 substances according to ISO 12 944-6) were studied following different forms of steel preparation. The steel preparation methods used were abrasive dry blasting "Sa 2 ½" (AB), ultra-high-pressure water blasting (UHP) and ultra-high-pressure abrasive blasting (UHPAB). The tests showed that the most intensive coating infiltration (14.4 mm infiltration) occurred in the case of abrasive blasting (AB). While distinctly better results were achieved (9.9 mm infiltration) using ultra-high-pressure water blasting (UHP) than was the case with abrasive blasting (AB), those surface areas prepared using UHPAB exhibited the best results (7.7 mm infiltration). Dr. Dittmers ascertained that the common notion of an area blasted using Sa 2 ½ being the best basis for good surface protection must be questioned with a critical eye.

Dr. Greverath from Muhlhan Surface Protection International GmbH, Hamburg, described the development of surface protection and used it to deduce the following essential criteria for modern surface protection: steel preparation, surface cleaning, climatization, coating material, application of the coating material, quality control and maintenance. Meanwhile a technically high status prevails in nearly all of these fields. With respect to surface preparation, though technical development has been accomplished in recent years, Dr. Greverath nonetheless saw a considerable potential for optimization. Environmental aspects were a particularly driving force for UHP technology, whereby the costs per square meter did rise as a result. A different case in point, however, was UHPAB. Here not only environmental aspects are being taken into consideration: the lowest total costs in comparison to other processes are being achieved as well. In addition, using UHPAB an unparalleled high quality of produced surface area can be effected, and thus excellent conditions for adhesion of the coating that follows, because here one is dealing with a dust-free process, it removes chlorides from the surface and enables the shaping of prescribed surface roughness. What also impressed the participants during an afternoon demonstration of the process



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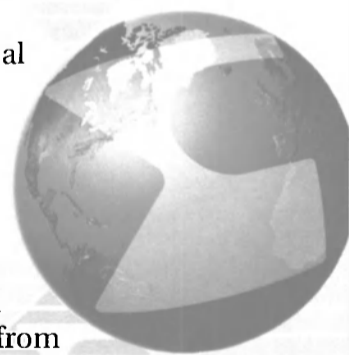
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Coatings & Corrosion Control

in Lübeck's inner city was the obviously high level of blasting performance. The physical principles behind the UHPAB process were presented by Dr. Popplau, a fluid mechanics expert from Caitec GmbH, Norderstedt. It was explained that the basic idea of two-stage acceleration, which in the case of UHPAB means that blasting material is accelerated via compressed air and ultra-high water pressure, is a) responsible for the high blasting performance, and b) that the process households with energy very efficiently. As

with UHP, a process with such a high level of performance is naturally potentially dangerous. Dr. Popplau has therefore developed a new type of "dead man's switch" based on an electronic bus system. Different from conventional dead man's switches, in this case blasting is not generated a simple connection via a switches, but instead by means of a secured digital network connection between the dead man's switch and the control unit of the pressure source. This method prevents the system from being switched on uninten-

tionally, as can occur with UHP dead man's switches when damaged cables in water have been short-circuited. Yet another advantage of this network link exists in the possibility to transfer data between the blaster and headquarters. This enables the blaster to switch back and forth between the UHPAB, UHP, AB and air programs in order to apply the respectively optimal processing option to the surface being worked on. This worldwide innovation termed μ -select was presented for the first time in Lübeck. That the UHPAB process deals not only with a safe blasting method, but an environmentally friendly one as well, was underscored by the presentation given by Dr. Michelsen from Muhlhan Surface Protection International GmbH, Hamburg.

Dr. Momper, a lecturer at the Polytechnical University of Rhineland-Westphalia in Aachen, used his presentation to compare existing standards toward assessing blasted surfaces. He came to the conclusion that these standards do not take all of those characteristics relevant for assessing the quality of cleaned surface areas into consideration. Those characteristics can be subdivided into:

1. visible impurities such as rust, flash rust, dust, old coatings, mill scale and foreign objects;
2. invisible impurities such as organic substances (very thin films of oil or grease) and soluble substances (chlorides, ferritic salts), as well as
3. the roughness of the surface.

In a critical comparison of visual standards, the speaker ascertained among other factors that, within these standards, highly differing depictions exist in the visual description of what, viewed formally, are surfaces in an identical state. It furthermore became clear that both the help of visual comparative samples and the verbal description contribute toward making the assessment of flash rust extremely subjective. Measurement of the degree of flash rust with the help of the Hempel Adhesive Strip Test proved to be quite useful, but computer analysis of the color spectrum of a surface photo could be a viable approach, too. On the basis of a literature study Dr. Momper came to the added conclusion that the impairment of coating systems' adhesion due to flash rust must be regarded very discriminatingly. An intelligent coordination of the degree of flash rust and the coating system selected can eliminate this alleged problem. In contrast, according to the statements made by Dr. Momper the situation is different in the case of salts on the surface or with rust impurified by salts. Salts lead to the formation of blisters underneath the coating and destroys it. Even fluctuations in chloride content as low as $1 \mu\text{g}/\text{m}^2$ can influence the lifespan of coatings decisively because the correlation between blistering and salt content displays a steep gradient in the relevant sector. That correlation is all the more noteworthy as salt content is not being taken into consideration in hardly any standard. In the interests of shipowners, whose main focus of attention lies on as long a lifespan as possible, this should change in the future. Also of interest to owners would be to reduce the interpretive leeway for the remaining influential factors. Keeping in line with this idea, Dr. Momper presented a new surface standard built to a certain extent upon known elements, yet one which also takes "old" processes such as dry blasting (AB) into consideration to the same degree as the "new" UHPAB method.

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Visions East Sells First System

Visions East sold its computerized yacht fairing and painting technology. A new shipyard in Sweden purchased a 54 m yacht system. It is being integrated in Helsinki, Finland and will be installed and operational by this summer. The new robotic system was conceived and patented by **Steve Morton**, the founder and President of Visions East. "Our technology will lead the marine industry into the new era," said Morton. The labor intensive fairing and painting methods of the past are giving way to the efficiency of computer-controlled automation. The patented technology is designed to increase productivity, control costs and improve the entire marine coatings process. Visions East is also developing a wheeled version of their technology to perform computer-controlled surface preparation and coatings application for large commercial and military vessels.

Circle 40 on Reader Service Card

Nippon Paint Restructures

Nippon Paint is restructuring its marine coatings subsidiary to increase its presence in the global marine paint market for newbuildings, shiprepair and maintenance. As part of a strategy to build up its marine coatings business worldwide, Nippon Paint Co Ltd is restructuring its specialized subsidiary company, Nippon Paint Marine Coatings Co Ltd. Nippon Paint Marine Coatings (NPMC) is being relaunched on November 1, 2004. In the meantime, the company is developing its capability to manufacture and supply high-quality marine coatings and paints worldwide under the Nippon Paint brand for newbuildings as well as shiprepair and maintenance. NPMC will also pro-

vide technical services to customers for newbuildings and shiprepair in and outside Japan. "We shall be able to provide our customers throughout the world with Nippon Paint brand products, services and know-how," said Isao Takemoto, president of NPMC.

Nippon Paint and London-based International Coatings Ltd are terminating their association in marine coatings as of October 31, 2004. Until then, NPMC will continue to service marine customers under its ongoing product and delivery system in association with International Coatings. After October 31, 2004, NPMC will also continue to supply International-brand products such as Intersleek and Intershield 300: the company will manufacture these products and sell them under NPMC brands.

Nippon Paint is expanding its overseas business network by using manufacturing, sales, service and logistic networks established by the NIPSEA group [a part of Nippon Paint - see note 1], while also establishing new bases at key locations in Europe, America and the Middle East.

While its parent company, Nippon Paint, will continue to handle basic research and development, NPMC will be responsible for applications, development and improvements. This arrangement is intended to contribute to more efficient utilisation of the technological resources available within the group.

NPMC's restructuring will be completed by April 1, 2004. This includes capital investment by Wuthelam Holdings, based in Singapore. Nippon Paint will contribute 60 per cent of the capital investment, and Wuthelam 40 percent.

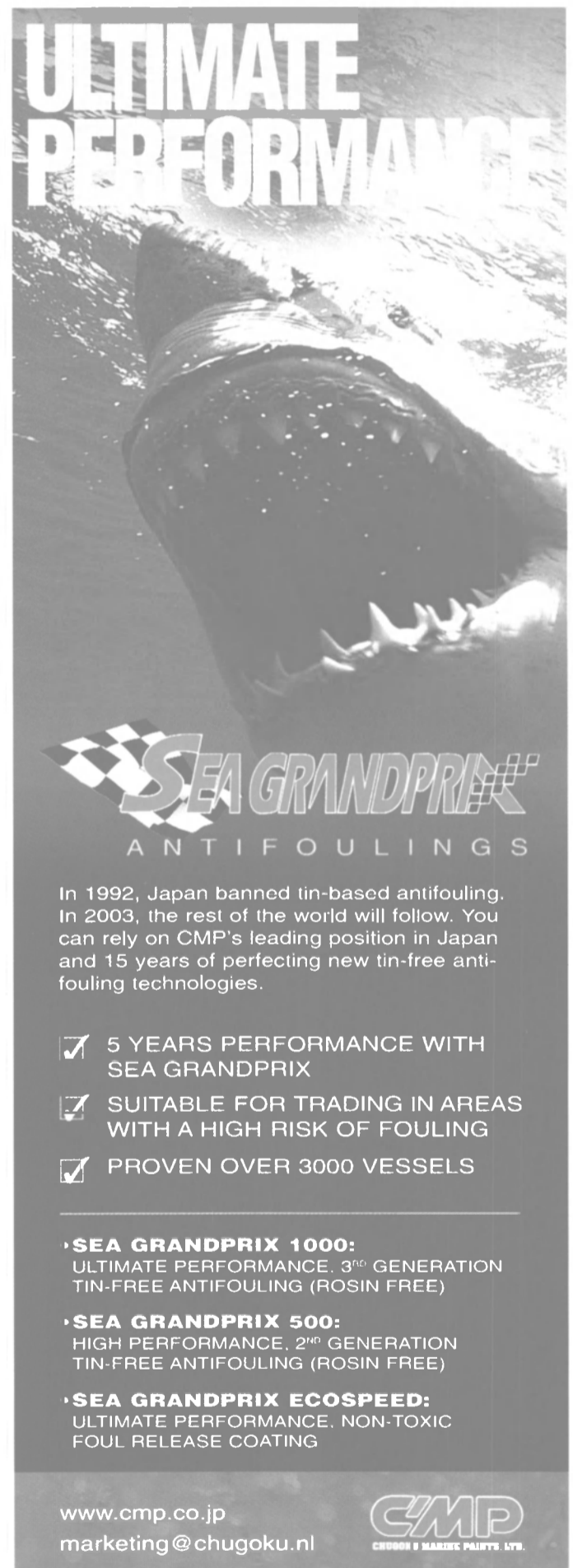
In 1990, Nippon Paint became the first company to develop and introduce a tin-free hydrolytic anti-fouling coating, Ecoloflex. The company is currently working on a range of advanced products and services under its own brand, as well as technical know-how throughout the world.

Circle 45 on Reader Service Card

Metal Fusion Helps Stop Corrosion

New advances in metal fusion technology produce a metalized coating with no porosity, which can be applied at rates similar to those achieved by airless painting practices. The substrate temperature does not affect the process, and there is no curing time. The competitive process results in extremely long term near permanent corrosion protection, which is designed to be competitive in price with conventional corrosion systems. High speed metalizing of a variety of substrates can be accomplished rapidly under harsh field conditions. As there is no cure time required for the process, which can be used to apply up to 35 mils with only one coat, the application time is often much reduced from a conventional corrosion prevention system. Pitted steel and corroded rivets can be filled with metal easily, thereby eliminating welding and steel replacement. Rivet seams on oceangoing vessels were sealed and operated for years through difficult weather conditions without leaking after quickly metalizing corroded areas. Pure copper, as opposed to leaching cuprous oxide, can be permanently bonded to steel, wood and fiberglass providing permanent protection against marine fouling. The process throws plasma or molten metal against the substrate at high velocities, which melt the peaks of steel substrates forming an alloy bond at the surface. This produces very high adhesion and tensile strength when compared with conventional systems. The metal alloy which forms on the surface is impervious to air and water inclusions, and when zinc or aluminum are applied, provide cathodic protection as well as a total oxygen and moisture barrier. The new advanced technique produces a film of metal on the substrate that will not undercut, has no porosity, and less than one percent air inclusions in the coating. Most metals that can be put into wire form can be applied. The process has design approval from ABS, and has been approved for use in chemical tank linings by the USCG. The Federal Highway Administration endorses metalizing for bridges with no topcoat, or with a single cosmetic coat only. Some marine applications include using pure aluminum for a near permanent non-skid, which has very high abrasion, and wear characteristics when compared with conventional materials. Aluminum non-skid can even be steam cleaned when contamination from hydraulic fluids, grease and fuel are encountered. Applying stainless to bowthruster tunnels helps to eliminate cavitation problems, which can erode carbon steel quickly. Application of zinc to ballast areas turns the entire tank into a zinc anode, and zinc can be applied to tightly adhering rust providing a hard coating without surface prep. As there are no chemicals, curing time, or solvents involved in metalizing, a variety of cosmetic topcoats can be applied directly to the metalized surface as soon as it is applied. For more information

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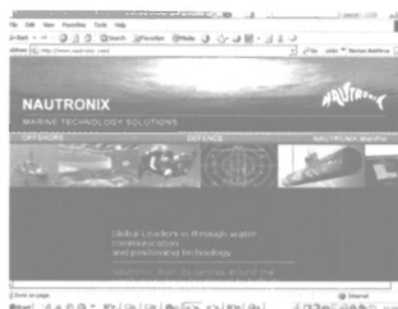
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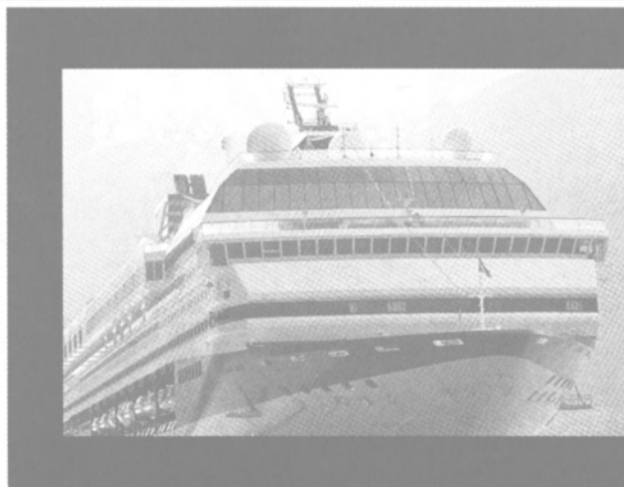
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Training & Education Directory

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an aura of realism w/o associated risks.
Products: Courses include: Bridge Resource Management (BRM), Electronic Chart Display Information Systems (ECDIS), ARPA, Radar (Orig & Refresher), Shiphandling, Tractor Tug Usage, etc.

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Cherry Hill, NJ 08034 USA
Captain James A. Sanial (USCG Ret)
tel: (856) 428-2848
fax: (856) 428-5105
email: jasanial@erols.com
Descr: Maritime Safety and Security Services
Products: General Maritime Consulting Services

Maritime ISAC
3471 N. Federal Hwy., Suite 508
Ft. Lauderdale, Florida 33306 USA
www.m-isac.org
BGEN Ken Bergquist, USAR (Ret)
tel: 954-567-2536
fax: 954-567-2511
email: staff@m-isac.org
Descr: Maritime Information Sharing & Analysis Center

Maritime Security Council
3471 N. Federal Hwy., Suite 508
Ft. Lauderdale, Florida 33306 USA
www.maritimesecurity.org
Kim Petersen
tel: 954-567-2536
fax: 954-567-2511
email: staff@maritimesecurity.org
Descr: The Maritime Security Council represents the interests of the international shipping and ports communities.

Maritime Services Institute
MSI Building
1000 Islands, NY 13607
aamaritime.com
Marlene Barrett
tel: 315 482-2671
fax: 315 482-4174
email: maritimeschool@aol.com
Descr: Maritime Services Training
Products: Yacht Brokerage Operation,

Graduate Sales, and Marine Survey Training

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Rotterdam, ZH 3072AP
The Netherlands
www.msrr.nl
Marja Behrend
tel: + 31 10 486 66 54
fax: + 31 10 484 60 71
email: mbehrend@msrr.nl
Descr: Consultancy. Research and Training institute
Products: See our website for more information

Maritime Training Services
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Seattle, WA 98102 USA
www.maritimetraining.com
Rick Titcomb
tel: 206 467 8458
fax: 206 467 0128
email: info@maritimetraining.com
Descr: produces and distributes training videos and DVDs.
Products: Video training on subjects such as Security, Stowaways, Explosives, Familiarization, PIP, Drills, Bunkering, and more.

MITAGS
692 Maritime Blvd
Linthicum Heights, MD 21090 USA
www.mitags.org
Glen Paine
tel: 866-656-5568
fax: 410-859-5700
email: admissions@mitags.org
Descr: Maritime Training Institute & Conference Center
Products: Maritime Training & Conference Center

Moxie Media, Inc.
5700 Citrus Blvd. Ste. A-1
New Orleans, LA 70123 USA
www.moxietraining.com
Sharon Webb
tel: 504-733-6907
fax: 504-733-9493

email: info@moxietraining.com
Descr: Maritime Training and Safety
Publisher - videos, CD ROMS, DVDs, manuals, online programs
Products: ISPS Code & MTSA Maritime Security Video Training Series, STCW and

National Cargo Bureau, Inc.
17 Battery Place, Suite 1232
New York, NY 10004 USA
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Phil Anderson
tel: (212) 785-8300
fax: (212) 785-8333
email: ncbnyc@natcargo.org
Descr: Marine Surveying, Certification and Training
Products: Hazardous Materials Regulations (CFR & IMDG Code); Vessel Stowage and Segregation; Cargo Stowage and Containerization; Securing of Non-Standardized Cargo; Placard Recognition.

National Maritime Education & Training Association
1600 Duke Street, Suite 400
Alexandria, VA 22314 USA
www.nmeta.org
Laura Shelton
tel: 703-519-0158
fax: 703-519-1716
email: lshelton@wpa.org
Descr: NMETA was formed with the goal of providing representation in Washington, DC, for the maritime training and education industry. NMETA tackles critical industry issues and provides education to the industry.
Products: Promotes the maintenance and expansion of the maritime education and training industry.

Ocean Rescue Systems
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Portland, ME 04104 USA
www.oceanrescue.com
Joe Mokry
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Descr: Training agency for rescue craft operations, patrol craft operations and Rescue Swimmer training

Products: Water rescue products

Ocean Research & Exploration International
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www.ocean-research.org
Capt. R. Hellenenthal
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email: training@pacific-safety.com
Descr: Hazmat Emergency Response & Marine Safety Training
Products: Hazmat and Maritime Safety Training
Port Security Group

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under construction
Captain Robert S. Stack
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Products: Homeland Defense Security

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Descr: Poseidon - Your maritime training partner
Products: GMDSS, Radar/ARPA-, ECDIS-, Navigation-, Bridge- and Engine room Simulators, Teaching Aids

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tel: 954-463-9195
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email: wgatchell@resolvemarine.com
Descr: Shipboard Firefighting & Basic Safety Training

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email: training@rmaworld.com
Descr: Plans, Training, Exercises, Response
Products: Training: Security, Qualified Individual, Spill Management, Incident Command System, HAZWOPER, Regulatory.

Maritime Security Professional Training

By James Shelley, Department Head for Marine Safety & Security, MITAGS

Port facilities and Shipping companies are rushing to comply with new international and national maritime security requirements.

The ISPS (International Ship and Port Security) and the U.S. maritime security requirements mandate security assessments, plans and training of security personnel. The Maritime Institute of Technology (MITAGS) and its satellite school, the Pacific Maritime Institute (PMI) offer training for port facility, shipping company and ship security officers. MITAGS/PMI is now offering training for Maritime Security Professionals. The ISPS Code, the Maritime Transportation Security Act

(MTSA) of 2002 and in the Code of Federal Regulations (CFR) mandate training for port facility personnel with specific security duties. MTSA actually requires the government to establish training and certification standards. In a report to Congress in May, 2003, the U.S. Maritime Administration recommended specific training standards. As of the writing of the article, the Federal agency has certified any maritime security professional training program.

To fill this vacuum, MITAGS has developed a one-week training program designed for port facility security guards to comply with the standards of 33 CFR 205.210 and the intent of MTSA Section 109 and ISPS Code Part B, Section 18.2. This course is presented by maritime

security and law enforcement professionals.

Training begins with an overview of the new maritime security regulations and the role of the security guard in that process.

Hands-on training focuses on the skills required to be effective at protecting the port from security breaches and incidents.

Security and defense tactics skills are taught by trained law enforcement defense tactics instructors. Attendees learn methods to screen and search people, vehicles and spaces, using standard security equipment and techniques. For additional information about any of the maritime security courses,

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Dania Beach, FL 33004 USA
www.star-center.com
Graeme Holman
tel: 954 921 7254
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email: gholman@star-center.com
Descr: Maritime simulation, training, assessment & research center
Products: Simulation Training, STCW 95 training, Vessel/Company Security Officer, Research

School of Marine Science & Technology, University of Newcastle upon Tyne

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Newcastle upon Tyne, NE1 7RU UK
www.ncl.ac.uk/marine
Professor Atilla Incecik
tel: +44 191 222 6718
fax: +44 191 222 5491
email: atilla.incecik@ncl.ac.uk
Descr: A world leading School for multi-disciplinary study of marine vehicles. Sponsored Research to support 'sustainable use of the seas'. Towing tank, cavitation tunnel and a Research vessel Bursaries available, Quality study in a great city.
Products: B Eng. & taught MSc. Naval Architecture, Marine Engineering, Transport, Offshore, Marine Biology, Coastal Management, Small Craft. PHD Study. Full time & Distance Learning

Seafarers Training Center

PO Box 75274
Kapolei, HI 96707 USA
www.seafarers.org
Joe Curtis
tel: 808.682.0888
fax: 808.682.5088
email: seafarerc@aol.com
Descr: Maritime training & education
Products: STCW BST, BFF, Adv.FF, Crowd & Crisis, Damage Control, CBR Hazards

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Descr: A global leader in maritime security services, products and training
Products: ISPS Code & MTSA compliant ship & port assessments, plans, and consulting; PFSO, CSO, SSO training & instructional videotapes; ISPS Code/MTSA software

Seattle Maritime Academy

4455 Shilshole Ave NW
Seattle, WA 98107 US
www.seattlecentral.edu/maritime
Jim Hasselbalch
tel: 206 782 2647
fax: 206 782 2821
email: jhasselbalch@sccd.ctc.edu
Descr: Community College
Products: Marine Deck Technology and Marine Engineering Technology certificate programs

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Stennis Space Center, MS 39529 USA
www.marine.usm.edu/hydro/index.html
David Dodd
tel: 228-688-7127
fax: 228-688-1121
email: david.dodd@usm.edu
Descr: University
Products: Master's Degree and Category A Accreditation in Hydrographic Science

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Descr: Maritime Training Center
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Leitao
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fax: +86-027-86811760
email: leitao52@yahoo.com.cn
Descr: marine education

WUT-STC

1040 Heping Da Dao, Wuchang, Yu Jia Tou Campus(South), Ground floor of East End, New Marine Building, Wuhan University of Technology, Wuhan, P.R.China
Wuhan, 430063 P.R.China
www.wut-stc.com
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fax: 86 27 8658 1166 (from 18th Mar.)
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EU: Human Factor is Key to Safety

The EU's Temporary Committee on Safety at Sea was told that the EU's response to recent maritime disasters had missed the key point — the human factor. **Eduardo Chagas**, of the Maritime Transport Section of the European Transport Workers' Federation (ETF), said that the prime causes of tanker casualties were not structural but human. Grounding and collisions accounted for almost 50 percent of incidents, whereas only around 11 percent were related to hull failure. Flags of convenience and false certificates for merchant navy officers were the issues that most needed to be tackled. The ETF representative told astonished MEPs that one of his colleagues had managed to "buy" an official captain's certificate in Panama by just sending a fax with some personal data and payment.

SWIFT Crews Take MSI Courses

Members of the Navy's newest warship, SWIFT (HSV-X2), recently completed a 10-day combined Bridge Resource Management (BRM), Automatic Radar Plotting Aids (ARPA), and Electronic Chart Display Information Systems (ECDIS) course at MSI Norfolk. This is the third such course attended by the Navy's high speed catamaran crew.

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AMSEA Releases New Safety Film

Rescues at Sea: A Guide to Helicopter Rescues and Dewatering Pumps, was recently released by the Alaska Marine Safety Education Association (AMSEA). The 24-minute-long film explains and demonstrates the procedures involved when the USCG responds with a helicopter to a vessel in distress. *Rescues at Sea* is offered for \$20.



Circle 14 on Reader Service Card

MCA Approves Nav Training Center

Northrop Grumman Corporation's Sperry Marine business unit said that the Maritime and Coastguard Agency has certified its navigation training center, in New Malden, U.K. The center is out-fitted with the latest electronic teaching aids and a complete functional virtual integrated bridge system with visual simulator. The facility also features a separate classroom with multiple individual workstations for practical chart work and live ECDIS applications, as well as a "Smartboard" for interactive simulated scenarios.

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San Francisco, California - Nov. 22nd

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Response & Results:

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Training the Trainer to Keep Knowledge Afloat

Northrop Grumman Newport News Shipbuilding invests to maintain its skilled workforce.

By Jim Miller

Shipbuilding, like other industries that rely on a skilled workforce, faces a serious problem: an alarming "knowledge loss" in the area of specialized machining. Not only are many workers with machining expertise reaching retirement age, but fewer people are entering the machine trade. There's also the cyclical nature of shipbuilding which adds to the problem: use of a specific piece of equipment or a particular skill might occur only once every three or four years in the process of constructing a submarine or carrier. In the interim, these skill workers retire, are promoted or otherwise change jobs. Gradually, the ability to use a piece of equipment can be lost.

Northrop Grumman Newport News, a shipbuilding customer of Climax Portable Machine Tools, recognized a dwindling level of expertise among its workers in the use of our portable boring bar equipment in the construction of submarines and carriers. Northrop Grumman Newport News is the nation's sole designer, builder and refueler of nuclear-powered aircraft carriers and one of only two companies capable of designing and building nuclear-powered submarines. Like many companies, Newport News realized that unless its skilled machinists improved and shared their knowledge, skills could very well be permanently lost.

The Time has Come to Train the Trainer

Ed Elliott, General Foreman in the Trades Management Division at Newport News, recognized the need to address his company's knowledge loss in the area of portable machine tools, and together with



Robert Downing, initiated a training program for Newport News in 2002. Downing, who at the time functioned as Senior Operations Coordinator, discovered a lack of internal expertise in boring techniques, especially using portable tools that many workers hadn't been exposed to. He turned to Climax to help coordinate a training program.

"By bringing in experts," said Downing, "we were able to cost-effectively begin a program aimed at educating a select group of people not just on the latest boring techniques, but on how to effectively train others."

The five-day program — one day in the classroom and four days in the shop — focused primarily on the use of two Climax machines, the 2-in. BB5000 boring bar, and the 3-in. BB6000. In the classroom, PowerPoint presentations covered equipment safety, as well as machine tool applications, operational techniques and maintenance. "At Newport News, we take safety as our number one priority and what impressed me is Climax does too," said Elliott. "We covered the proper way to handle the equipment and the potential dangers - how things like loose clothing, poor lighting, improper ventilation and inadequate eye and ear protection represent potential dangers." Enhanced productivity was stressed, too, and demonstrated with hands-on training during the four-day in-shop portion of the program. New, time-saving boring techniques were covered, as well as innovative machine tool applications and maintenance recommendations to extend tool lifetime. "It's the kind of information that a lot of organizations don't share," said Elliott. "Most just sell you a piece of equipment, and

you have to figure it out for yourself."

After learning how to set up, operate, and become familiar with all functions of the machines, trainees were required to undergo skills assessment and tested on the information they'd learned.

The original five people who attended the initial training course have been joined by two other instructors, and have to date succeeded in training 16 others. Ultimately, as many as 40 workers will be trained, reinforcing Newport News' work force and enabling the company to stay on the cutting edge of portable machine equipment, processes and tooling. Since training took place on-site, travel expenses were minimized and the number of participants maximized. Ed Elliott also anticipates an additional payoff in terms of machine tool usage. "As we've train our young mechanics, we discover that they're extremely creative. They'll look at a job and find a totally new application for the boring bar and more and more uses for it on the ship, which is what we were hoping for. I doubt that our BB5000s and BB6000s are going to sit on the shelves the way some specialized tools usually do."

Elliott sums up the training experience this way. "Climax did a good job training our people, and I think our people are doing an outstanding job passing what they've learned along. The whole concept really worked out well — we're all becoming much more knowledgeable."

Circle 6 on Reader Service Card

Jim Miller is a senior applications engineer for the shipbuilding systems group of Climax Portable Machine Tools. He has more than 18 years experience with Climax and is a specialist in the area of solving on-site machining needs of the shipbuilding industry. He served four years with the U.S. Navy as Submarine Tender Machinist servicing the U.S. Naval Fleet in both the Pacific and Atlantic arenas.

NAVIGATION / GMDSS

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HAL's Vista Sails with ROCHEM Technology

(Continued from page 33)

The ROCHEM GWTS system is a low-pressure reverse osmosis (LPRO) membrane design that operates at less than 20 bars. Greywater is fed to a pre-filtration unit to remove fibers and large particles (>100 µm) and then fed to the LPRO system that recovers roughly 85% of the feed as high quality water. This purified water can be discharged

overboard or utilized onboard for reuse. The small amount of concentrate is further treated in the Bio-Filt system (BWTS). The GWTS was supplied with two identical units that can work in parallel or separately. The first stage system is supplied with ROCHEM-FM modules that provide the main treatment of the greywater. The greywater is supplied to the first stage after going

Parameter	Units	MARPOL 73/78 IMO Resolution MEPC.2(VI)	USCG 33 CFR 159 Type II MSD	Alaskan Discharge Standards 33CFR159.309
Fecal coliform	cfu/100 ml	250	200	20 ²
Total suspended solids (TSS)	mg/l	100 ¹	150	30 ³
Biochemical oxygen demand (BOD)	mg/l	50	n.r.	30 ³
Total residual chlorine	mg/l	n.r.	n.r.	10
pH	S.U.	n.r.	n.r.	6-9

1 Limit based on shipboard test.
n.r. = Not regulated
2 Geometric mean of the samples from the discharge during any 30-day period and not more than 10% of the samples exceed 40 cfu/100 ml.
3 30 day average. The 7-day average not to exceed 45 mg/l.



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through prefiltration to remove fibers, hairs and large sediment from the feed that might block the flow. From the pre-filtered greywater, the first stage will produce an amount of permeate which will go to a buffer tank for polishing, and the retentate is directed to the buffer tanks for the BWTS.

The second stage is supplied with ROCHEM-FM modules followed by a UV sterilizer to polish the permeate from the first stage. The concentration of BOD5, total suspended solids, fecal coliform, phosphorus, nitrate, nitrites and heavy metals are reduced further by the second stage below detectable limits. The concentrate of this second stage is recycled to the inlet of the first stage.

The ROCHEM Bio-Filt system consists of a biological process of highly concentrated biomass combined with FM module technology utilizing UF membranes. This membrane bioreactor has a modular design and is manufactured as a multi-tank construction that is easy to adapt to different applications.

As wastewater is continuously fed to the system, the treated influent from the bioreactor is circulated through the FM module to separate the solids and organic matter that is returned to the bioreactor and the pure effluent is discharged overboard. The oxygen demand for the biological process is provided through air-injection using micro bubble technology. Sensors measure the dissolved oxygen and biomass concentration to control the system to maintain a highly efficient biological degradation.

As part of the delivery process, Holland America Line, Fincantieri and ROCHEM organized the installation of laboratory equipment to monitor the influent and effluent quality of the GWTS and BWTS. An actual operating laboratory with trained chemists were boarded and traveled with the Oosterdam during its initial commercial itinerary in Europe. The performance test, designed in this manner, was able to evaluate the advanced waste water purification system under actual conditions with all of the variations in flow and contaminant concentration that the itinerary could offer. The key results of this effort confirmed a similar successful effort made on the first ship of the Vista class, the MS Zuiderdam.

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Circle 301 on Reader Service Card

BUYER'S DIRECTORY

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Rampmaster, Inc., 6600 NW 32nd Avenue, Miami, FL 33147, 800-327-8917, 305-694-8270, sales@rampsonline.com. Contact: Al Davis, www.rampsonline.com

AIR CONDITIONING & REFRIGERATION
Adrick Marine Corp., P.O. Box 1549, N.Massapequa, NY 11758, 631-491-9475, 631-491-9478, adrick1976@aol.com,
 Bailey Refrigeration, 4986-1 Euclid Road, Virginia Beach, VA 23462
 Cospolich Refrigeration, 14695 Highway 61, Norco, LA 70079
Flagship Marine, Inc. 2427 SE Dixie Hwy., Stuart, FL 34996, 800-316-6426, 772-283-4611, sales@flagshipmarine.com. Contact: Tom Martland. www.flagshipmarine.com
 Port-A-Cool, P.O. Box 2108, Center, TX 75935
 Stork Bronswerk Inc., 3755 C Boul., Matte, Brossard, Quebec J4Y 2P4, Canada
 Taylor Made Environmental, P.O. Box 15299, Richmond, VA 23227

AIRHORNS/SIGNALING EQUIPMENT
 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
ALARMS, FACTORY-MUTUAL APPROVED
 NREC Power Systems, 5222 Hwy 311, Houma, LA 70360
 Selco USA Inc., 2508 Lakebrook Ct, Atlanta, GA 30360-1715

ALUMINUM BOATS
 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
ALUMINUM SUPPLIER
Aluminum & Stainless Inc. 101 Thru-Way Park, Brossard, LA 70518, 800-252-9074, 337-837-5439, sales@aluminumandstainless.com

ANCHORS & CHAINS
CS Controls Inc. 101 Dickon Road, Houma, LA 70363, 985-876-6040, 985-876-0751, info@cscontrols.com.
 Contact: Paul Srigley, www.cscontrols.com,
 G.J. Wortelboer Jr. B.V., P.O. Box 5003, 3008 AA Rotterdam, Netherlands
 Washington Chain & Supply, P.O. Box 3645, Seattle, WA 98124
ANTI-FOULING
Flexdel Corp. /Aquaquad, 1969 Rutgers University Blvd., Lakewood, NJ 08701, 888-353-9335, 732-901-6504, flexabar@sprintmail.com. Contact: Joe. Andy, or Rick, www.aquaquad-boatpaint.com
 Jotun Paints USA, 9203 Highway 23, Belle Chasse, LA 70037

AUTOPILOT SYSTEMS
 AG Marine Inc., 5009 Pacific Highway East 11, Tacoma, WA 98424
 Beier Radio, 1990 Industrial Ave., Harvey, LA 70058
 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., Tucson, AZ 85714
 Redland Genstar Inc., Executive Plaza IV, Hunt Valley, MD 10912-1031
BATTERY CHARGERS
La Marche, 106 Bradrock Drive, Des Plaines, IL 60018, 847-299-1188, 847-299-3061, sales@lamarchemfg.com. Contact: John Pawula, www.lamarchemfg.com

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
 Orkot Composites, 2535 Prairie Rd, Unit D., Eugene, OR 97402, 541-688-5529, 541-688-2079, mscott@polymersealing.com. Contact: Mike Scott, www.orkotmarine.us
 Thordon Bearings Inc., 3225 Mainway, Burlington, Ontario L7M 1A6, Canada
BILGE SYSTEMS
 Fast-Systems, 14040 Santa Fe Drive, Lenexa, KS 66215-1284
Westfalia Separator, Inc., 100 Fairway Court, Northvale, NJ 07647, (201) 767-3900, (201) 784-4399, brown.courtney@wsus.com. Contact: Courtney Brown

BLOCKS & RIGGING
 Skookum, P.O. Box 280, Hubbard, OR 97032
BOATBUILDER
 Sea Ark Marine, P.O. Box 210, Monticello, AR 71655-0210
 Washburn Doughtly, P.O. Box 296, E. Boothbay, ME 04544
BOLLARDS
 Maritime International, 100 E. Vermilion St. #212, Lafayette, LA 70501
BRIDGE SUNSCREENS
 Martek Marine Blinds, Unit 46, Century Business Centre, Maverts Way, Rotherham, South Yorkshire S63 5DA, UK
BROKERS
 Marcon International, P.O. Box 1170, Coupeville, WA 98239
BULKHEAD SEALS/PANELS
 CSD North America, 880 Candia Rd., Unit 10, Manchester, NH 03109
 Thermoax, 3115 Range Rd, Temple, TX 76501
BUOYS
 Datex, P.O. Box 1150, Kinder, LA 70648
CAD/CAM SYSTEMS
 Albacore Research, 4196 Kasilan Place, Victoria, BC V8X 4L7, Canada
Albacore Research LTD., 304-3960 Quadra St., Victoria, B.C. V8X 4A3, Canada, 250 479-3638, 250 479-0868, Marketing@ShipConstructor.com. Contact: Silke Sommerfeld. www.ShipConstructor.com
 Autoship Systems Corp., Suite 312-611 Alexander Street, Vancouver, BC V6A 1E1, Canada

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 Inc., BLDG. 9114 MISAAP Industrial Complex, Stennis Space CTR., MS 39529, 228-813-1700, 228-813-1709, sales@coastalmarineequipment.com. Contact: Ralph Waguespack, www.coastalmarineequipment.com
CS Controls Inc. 101 Dickon Road, Houma, LA 70363, 985-876-6040, 985-876-0751, info@cscontrols.com.
 Contact: Paul Srigley, www.cscontrols.com
 Superior Lidgerwood Mundy, 1101 John Ave., Superior, WI 54880

CARGO MONITORING & CONTROL SYSTEM
 Hermatic Inc., 4522 Center St., Deerpark, TX 77536
CAST IRON REPAIR
 In-Place Machining, 1929 N. Buffum St. Milwaukee, WI 53212

CHAINS
 Crandall Drydock Engineers, PO Box 505804, Chelsea, MA 02150
 G.J. Wortelboer, Postbus 5003, 3008 AA Rotterdam, Netherlands
 Washington Chain & Supply, P.O. Box 3645, Seattle, WA 98124
CHEMICALS/ CHEMICAL CLEANERS
 Uniservice Americas, 57174 Hardin Rd., Sidell, LA 70461
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
 DeFelsko Corp, 802 Proctor Ave., P.O. Box 676, Ogdensburg, NY 13669
 Ferro Corp., 1301 North Flora St., Plymouth, IN 46563
 Flow International Corp., 23500 64th Ave., South Kent, WA 98059
 Hempel Coatings, 10-3511Viking Way, Richmond, BC V6V 1W1, Canada
 Jotun Paints USA, 9203 Highway 23, Belle Chasse, LA 70037
 MK Production Resources Inc., 1610 Reynolds Street, Brunswick, GA 31520
 Mr. Longarm, Inc., P.O. BOX 377, Greenwood, MO 64034-0377
 Nace International, 140 South Creek Dr., Houston, TX 77084
NAPASCO Inc., 213 Main Project Road, Shriver, LA 70395, 985-449-0730, 985-449-0740, napasco@napasco.com. Contact: Pam Bartell, www.napasco.com
 Resto Motive Laboratories, P.O. Box 1335, Morristown, NJ 07962-1235
 Sherwin Williams, 101 Prospect Ave., Cleveland, OH 44115
 Sigma USA, P.O. Box 816, Harvey, LA 70059

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
 Seawave, 76 Hammarlund Way, Middletown, RI 02842
 World-Link Communications, 74 Main St., Framingham, MA 01701
COMMUNICATIONS SERVICE
 Maritel Marine Communications, 16 E. 41st Street, NY, NY 10017
COMPOSITE SHAFTS
 Centa Corp., 815 Black Hawk Drive, Westmont, IL 60559
COMPOUNDS
 Philadelphia Resins, P.O. Box 309, Montgomeryville, PA 18936
COMPUTER SOFTWARE MONITORING SYSTEMS
 Azonix Corp., 900 Middlesex Turnpike, Bldg 6, Billerica, MA 01821, (978) 670-6700, (978) 670-8855, ProPanel-Mariner@azonix.com
COMPUTER/ COMPUTER SOFTWARE
 Autoship Systems Corp., Suite 312-611 Alexander Street, Vancouver, BC V6A 1E1, Canada
 Creative Systems Inc., P.O. Box 1910, Port Townsend, WA 98368
 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
 Beier Radio, 1990 Industrial Ave., Harvey, LA 70058
 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
Industrial Power Systems, 3010 Powers Avenue Unit 16, Jacksonville, FL 32207, 904 731-8844, 904 731-0188, marine@ipsjax.com. Contact: Glenn Beaupre, www.ipswitchgear.com
 Kobelt Manufacturing Co. Ltd., 8238-129 Street, Surrey, BC V3W0A6, Canada
 L-3 Communications Westwood Corp; Tano Div., 5700 Citrus Blvd, Ste E, New Orleans, LA 70123, 504-733-4777/ 1-800-229-TANO, 504-734-2127, guy.hardwick@l3com.com
 MMC International, 60 Inip Dr. Inwood, NY 11096
 Prime Mover Controls, 3600 Gilmore Way, Burnaby, BC V5G 4R8, Canada
 Tano Corp., 57017 Citrus Blvd., Ste. E. New Orleans, LA 70123

CORROSION CONTROL
 Furuno USA Inc., 4400 NW Pacific Rim Blvd, Carnas, WA 98607
 Gardner Denver Water Jetting Systems, 8807 Emmett Rd., Ste 100, Houston, TX 77040
 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
 Geislinger Corporation, 200 Geislinger Drive, Battle Creek, MI 49015

Interexpo Ltd Couplings In Stock, Plateia Theatrou 4. Athens 105 52, Greece. +30 210 3245666. +30 210 3248666. +30 210 3249666. interexpo@interexpo-ltd.gr. Contact: Marie Helene Charon. www.coupling.gr
 Mapeco Products, 91 Willenbrock Rd., Unit B, Oxford, CT 06478
 MMC International, 60 Inip Dr. Inwood, NY 11096
CRANE - HOIST - DERRICK - WHIRLEYS
 Bisso Marine Co., P.O. Box 4113, New Orleans, LA 70178
CS Controls Inc. 101 Dickon Road, Houma, LA 70363, 985-876-6040, 985-876-0751, info@cscontrols.com.
 Contact: Paul Srigley, www.cscontrols.com
 E. Crane, 241 Executive Dr., #3, Marion, OH 43302
 Holly Hoist Corp, P.O. Box 86, St. Clair Shores, MI 48080
 Liebherr Werk Nenzing GMBH, P.O. Box 10, A-6710, Nenzing, Austria

CRANKSHAFT REPAIR
 In-Place Machining, 1929 N. Buffum St. Milwaukee, WI 53212
 Waltz & 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
 Coastal Marine Equipment, Bldg 9114 MISAAP Ind. Complex, Stennis Space Center, MS 39529
Coastal Marine Equipment Inc., BLDG. 9114 MISAAP Industrial Complex, Stennis Space CTR., MS 39529, 228-813-1700, 228-813-1709, sales@coastalmarineequipment.com. Contact: Ralph Waguespack, www.coastalmarineequipment.com
CS Controls Inc. 101 Dickon Road, Houma, LA 70363, 985-876-6040, 985-876-0751, info@cscontrols.com.
 Contact: Paul Srigley, www.cscontrols.com
 rtercontinental Engineering, PO Box 9055, Kansas City, MO 64168
 Markey Machinery, P.O. Box 24788, Seattle, WA 98124
 McElroy/Catchot Winch Company, Inc., P.O. Box 4632, Biloxi, MS 39535-4632
 Rapp Hydema, 4433 27th Ave. West, Seattle, WA 98199
 Smith Berger Marine, 7915 10th Ave. S., Seattle, WA 98108
 Superior Lidgerwood Mundy, 1101 John Ave., Superior, WI 54880
 W.W. Patterson, 3 Riversea Road, Pittsburgh, PA 15223

DEHUMIDIFIERS
EBAC Industrial Products, 704 Middle Ground Blvd, Newport News, VA 23606, 800-433-9011, 757-873-3632, sales@ebacusa.com. Contact: Gray Coughlan, www.ebacusa.com
DESALINATION - REVERSE OSMOSIS
 Exstar International, 6709-B Netherlands Drive, Wilmington, NC 28405
 G E T. Inc., 3135 Golden Ave., Long Beach, CA 90806
 Reverse Osmosis of South Florida, Inc., 150 S.E. 29th St., Fort Lauderdale, FL 33316
DIESEL CYLINDER INDICATORS
 Kiene Diesel, 325 S. Fairbanks St., Addison, IL 60101
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
 Aquamarine Engineering, P.O. BOX 83495, San Diego, CA 92138
 Caterpillar, Inc., P.O. Box 610, Mossville, IL 61552-0610
 Chris Marine AB, Box 9025, 200 39 Malmo, Sweden
 Cummins Marine, 4500 Leeds Ave., Ste 301, Charleston, SC 29405
 GE Marine Engines, 1 Neuman Way, Cincinnati, OH 45215
 Giro Engineering Limited, Talisman, Duncan Road, Park Gate, Southampton, Hants SO31 7GA, UK
 Man B&W Diesel, 17 State St., NY, NY 10004
 Man B&W Diesel A/S, Telgholmsgade 41, Copenhagen SV DK-2450, Denmark
 Man B&W Diesel AG, Stadtachstrasse 1, Augsburg 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
 Maniso USA, Inc., 100 Davidson Ave., Somerset, NJ 08873
 Motor-Services AB, Box 2115, Ronninge S-144 04, Sweden
 Motor-Services Hugo Stamp, 3101 S.W. 3rd Ave., Ft. Lauderdale, FL 33315
 NREC Power Systems, 5222 Hwy 311, Houma, LA 70360, 985-872-5480, 985-872-0611
 Reagan Equipment, 2550 BelleChase Hwy, Gretna, LA 70054
 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
DIGITAL TORQUE METER SYSTEMS
 Instruments, Computers & Controls, 78 Londonderry Tpke, Hookset, NH 03106
DISPLAY TECHNOLOGY
 Kent Modular Electronics Ltd., 611 Maidstone Road, Rochester, Kent, UK
DIVING & SALVAGE
 Bisso Marine Co., P.O. Box 4113, New Orleans, LA 70178
DOCK FENDERING SYSTEMS
 Plastic Pplings Inc., 1485 South Willow Ave., Rialto, CA 92376
DOCUMENTATION/DATABASES
Zaetric Business Solutions, LLC, 24800 I-45 North, Suite 324, Houston, TX 77386, 713-824-1654, 713-621-4885, inquiries@zaetric.com. Contact: David Woodly, www.zaetric.com
DOOR LOCKS
 The Brass Works Inc., P.O. BOX 566, DeLand, FL 32721, 386-943-8857, 386-943-8810, info@marinedoorandcabinhardware.com
DOORS- MARINE & INDUSTRIAL
 Deansteeel Mfg., 111 Merchant St., San Antonio, TX 78204

Joiner Systems, 1925 52nd Avenue, Lacine, Quebec H8T 3C3, Canada
Juniper Industries Inc. 72-15 Metropolitan Avenue, Middle Village, NY 11379, 718-326-2546, 718-326-3786, marinesales@juniperindustries.com. Contact: Sales, www.juniperindustries.com

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@usalslidingdoors.com. Contact: Mr. Robert Weiland, www.usalslidingdoors.com
 Waltz & Krezner, 91 Willenbrock Rd., Oxford, CT 06478
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
DRY DOCKS- DESIGN
 Crandall Drydock Engineers, PO Box 505804, Chelsea, MA 02150
 Heger Dry Dock, Inc., 13 Water St., Holliston, MA 01746
ELASTOMER PIPING PRODUCTS
 Elasto Valve Rubber, 1691 Pioneer Road, Sudbury, ON PG3 1R2, Canada
ELECTRIC & CONTROL SYSTEMS
Geniro Systems Inc., 1885 Boul Dagenais West, Laval, QC H7L 5A3, Canada, 450-622-7575, 450-622-8484, stefan@genirosys.com
ELECTRICAL EQUIPMENT
 MMC International, 60 Inip Dr. Inwood, NY 11096
 Olusun Electric Corporation, 10901 Commercial Street, Richmond, IL 60071-0001
ELECTRONIC CHARTS
 C-Map Commercial, 133 Falmouth Rd, Mashpee, MA 02649
Navionics, 6 Thatcher Lane, Wareham, MA 02571, 800-848-5896/508-291-6000, 508-291-6006, sales@navionics.com
EMERGENCY DISTRESS SIGNAL
Greatland Laser, LLC., 4001 West International Airport Rd, Anchorage, AK 99502, 907-245-4475, 907-245-4599, laser@alaska.net. Contact: Jim O' Meara, www.greatlandlaser.com

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
ENGINES
BTMC, 5810 Columbus Pike, Lewis Center, OH 43035, 740-548-4282, 740-548-5756, davemiller@btmccorp.com. Contact: Dave Miller, www.btmccorp.com
 Fairbanks Morse, 701 White Avenue, Beloit, WI 53111
 GE Marine Engines, 1 Neuman Way, Cincinnati, OH 45215
 Pri Products-Power Research Inc.s., 6970 Portwest Drive, #180 Houston, TX 77063
EVAPORATORS
 Alfa -Laval Separation, Inc., 955 Meams Rd., Warminster, PA 18974
 Beard Industries, 601 Benton Kelly St., Shreveport, LA 71106
 Sasakura Engineering, 7-32 Takeshima, 4-Chome, Nishiyodogawo KY Osaka555, Japan
EXHAUST
 Marine Exhaust Systems of Alabama, P.O. Box 698, 757 Nichols Ave., Fairhope, AL 36533
EXPANSION JOINTS
 Elasto Valve Rubber, 1691 Pioneer Road, Sudbury, ON PG3 1R2, Canada
 Silax 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
Fender Care Americas Inc C/OBC Shipping Inc... 7611 Lake Road South Mobile, Mobile, Middle Bay Port Building 305., AL 36605, +44 78029 65765, wendy.stephan@fendercare.com. Contact: Wendy Stephan, www.fendercare.com
 Maritime International, 100 E. Vermilion St. #212, Lafayette, LA 70501
 Plastic Pplings Inc., 1485 South Willow Ave., Rialto, CA 92376
 Poly-Hi-Solidur, 2710 American Way, Ft. Wayne, IN 46899
 Schuyler Rubber Co., 16901 Woodred Rd., Woodville, WA 98072
 Seaward International, 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

FILTER INSERTS
CC Jensen Inc, 1557 NW Ballard Way, Seattle, WA 98107, 206-789-1710, 206-789-1747, ccjensen@ccjensen.com. Contact: Sales, www.ccjensen.com
FILTERS/FILTER SYSTEMS
AAF International, 10300 Ormsby Park Pl, STE 600, Louisville, KY 40223, 888-388-0529, 888-398-0529, mbragg@aafintl.com. Contact: Myles Bragg, www.aafintl.com
 Algae X International, P.O. Box 4011, Fort Myers Beach, FL 33932
 Boil Filter, 9822 General Drive, Ste. 180, Plymouth, MI 48170
 G.E.T. Inc., 3135 Golden Ave., Long Beach, CA 90806
 Hellan Strainer, 3249 East 80th St., Cleveland, OH 44104
 US Filter, 2 Milltown Ct., Union, NJ 07083
FIRE & SAFETY PRODUCTS
 Brockdale International, 1--8755 Ash St., Vancouver, BC V6P 6T3, Canada

DBC Marine Safety Systems, 101-3760 Jacobs 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
Pt. Canaveral Manne Fire Fighter Academy, P.O. Box 267, Cape Canaveral, FL 32920

FLANGES

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

FLOW CONTROLS

Hofte Flow Controls, 107 Kitty Hawk Lane, Elizabeth City, NJ 27906

FLUID SEALING & PACKING

The Delmar Company, Highway 60 Rte 4, Dillwyn, VA 23426

FUEL ADDITIVES

Pri Products-Power Research Inc.s., 6970 Portwest Drive, #180, Houston, TX 77063

FUEL INJECTORS

Interstate Diesel, 4901 Lakeside Avenue, Cleveland, OH 44114-3996

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

GALLEYS

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

GANGING & SAMPLING

Hermatic Inc., 4522 Center St., Deerpark, TX 77536

GAS GENERATION SYSTEMS

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

GAS TURBINES

GE Marine Engines, 1 Neuman Way, Cincinnati, OH 45215

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

GMDSS- GEAR BOXES & BEARINGS

Beier Radio, 1990 Industrial Ave, Harvey, LA 70058

GOVERNORS

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

GPS

Leica Navigation, 23868 Hawthorne Blvd, Torrance, CA 90505-5908

Standard Horizon, 10900 Walker St., Cypress, CA 90630

GROUNDINGS

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 Meams Rd., Warminster, PA 18974

Aquamarine Engineering, P.O. BOX 83495, San Diego, CA 92138

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

Tranter, Inc., P.O. Box 2289, Wichita Falls, TX 76307

940-723-7125, 940-723-1131, www.tranterphe.com

HEAVY FUEL TREATMENT

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

HIGH SPEED FERRY BUILDERS

ncat 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, Bldg 9114 MISAAP Ind. Complex, Stennis Space Center, MS 39529

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

Kockum Sonics LLC, 933 Industry Road, Suite 105, Kenner, LA 70062

HOSES/HOSE FITTINGS

JGB Enterprises, Inc., 115 Metropolitan Dr., Liverpool, NY 13088

HYDRAULIC SYSTEMS

Allied Systems, 2300 Oregon St., Sherwood, OR

Anchor Laminar, 38565 Country Club Drive, Farmington Hills, MI 48331

INCINERATORS

Therm-Tec Inc., P.O. Box 1105, Tualatin, OR 97062

INFRARED IMAGING EQUIPMENT

Firr Systems, 16505 SW 72ND AVE, Portland, OR 97224

INSPECTION EQUIPMENT

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

INSTRUMENTATION

Hoffer Flow Controls, 107 Kitty Hawk Lane, Elizabeth City, NJ 27906

Thermo Electron, 6801 Cochran Rd., Solon, OH 44139

INSULATION

M & A Supply LLC, 150 North Plains Industrial Rd., Wallingford, CT 06492

203-294-9431, 203-294-1697, sales@ma-supply.com, Contact: Jeff Blake, www.ma-supply.com

Mascoat Products, 10890 Alcott, Unit 12, Houston, TX 77043

Pacor, Inc., P.O. Box 107, Westville, NJ 08093

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

INSURANCE SERVICES

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

INTERIOR DESIGN

Global Interior Group, 2426 Dennis Street, Jacksonville, FL 32204

INTERIORS

Custom Ship Interiors, Inc., P.O. Box 882, Solomons, MD 20688

Directions In Design, Inc., 1849 Craig Road, St. Louis, MO 63146

314 205-2010, 314 205-0889, May-Zinsers@didinc.com, Contact: Sharon May-Zinser, www.didinc.com

Global Interior Group, 2426 Dennis Street, Jacksonville, FL 32204

Hopeman Brothers, P.O. Box 820, 435 Essex Ave., Waynesboro, VA 22980

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

Lit Industries, 516 Costner School Rd., Bessemer City, NC 28016-9801

Panel Specialists Inc./Thermax N.A., 3115 Range Road, Temple, TX 76504-1240, 254-774-9800, 254-774-7222, thermax@eroils.com, Contact: John Hutchison, www.panelspec.com

JOINER- WATERTIGHT DOOR-PANELING- CEILING SYSTEM

Custom Ship Interiors, Inc., P.O. Box 882, Solomons, MD 20688

Hopeman Brothers, P.O. Box 820, 435 Essex Ave., Waynesboro, VA 22980

Joiner Systems, 1925 52nd Avenue, Lacine, Quebec H8T 3C3, Canada

Waltz & 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

LASER ALIGNMENT

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

LAUNDRY EQUIPMENT

Richard Galley Supply, PO Box 4035, Houma, LA 70361

LEAK REPAIR

ndumar Products Inc., 2500 Tanglewilde, Suite 260, Houston, TX 77063

LIFEBOAT TESTING

Water Weights, Inc., 5139 Brook St., Suite E, Mont Clare, CA 91763

LIFEBOATS/RAFTS

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

Survival Systems International, P.O. Box 1567, 931 Industry Rd., Kenner, LA 70062, 504-469-4545, 504-466-1884, service@ssinola.com

Viking Life Saving Equipment, 1625 N. Miami Ave., Miami, FL 33136

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

Wolong International, 151 Chin Swee Road #03-14, Manhattan House, 169876, Singapore

LIFESAIVING EQUIPMENT

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

Viking Life Saving Equipment, 1625 N. Miami Ave., Miami, FL 33136

LIFT EQUIPMENT

Mi-Jack Products, 3111 West 167th St., Hazel Crest, IL 60429

LIFT EQUIPMENT TESTING

Water Weights, Inc., 5139 Brook St., Suite E, Mont Clare, CA 91763

LIGHTING SYSTEMS/ EQUIPMENT

ACR Electronics Inc., 5757 Ravenswood Rd., Ft. Lauderdale, FL 33310-5247

Archway Marine Lighting, 4501 Swan Ave., St. Louis, MO 63110

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, Contact: unknown, www.marinesigns.com

LINE & NET CUTTERS

Spurs Marine, 201 S.W. 33rd St., Ft. Lauderdale, FL 33315

LUBRICANTS

Exxon Mobil Marine Lubricants, 3225 Gallows Road, Fairfax, VA 22037, 1-609-409-2741, 1-609-409-5699,

unknown, Contact: unknown, www.exxonmobil.com

Pri Products-Power Research Inc.s., 6970 Portwest Drive, #180, Houston, TX 77063

LUBRICANTS/LUBRICATION SYSTEMS

Benjamin R. Vickers & Sons Ltd., Airedale Mills, 6 Clarence Road, Leeds, W. Yorkshire LS10 1ND, UK

Companion Products, Inc., 2040 Johnson Ct., Unit A, Kingston, IL 60145-0009

MACHINERY MAINTENANCE, REPAIR & TESTING

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

MANEUVERING EQUIPMENT

Van der Velden Marine Systems, Birkenweg 11, D-21465, Reinbek, Germany

MARINE & OFFSHORE SIGNAGE

Maritime Associates, P.O. BOX 1788, Crystal Bay, NV 89402, 775-832-2422, 775-832-2424,

maritimeas@charter.net, Contact: unknown, www.marinesigns.com

MARINE CONSTRUCTION/REPAIR

Sundial Marine, 5605 N.E. Sundial Road, Troutdale, OR 97060

MARINE CONSULTANTS

Hail Associates of Washington, P.O. Box 1554, Mukiteo, WA 98275

MARINE DECKING & FLOORING

Hopeman Brothers, P.O. Box 820, 435 Essex Ave., Waynesboro, VA 22980

Lonseal Flooring, 928 East 238th Street, Carson, CA 90745

SipNOT Metal Safety Floorings ID.V. of W.S. Molnar Company, 2545 Beaufait St., Detroit, MI 48207

MARINE DIESEL ENGINES

MAN Engines & Componets Inc., 591 SW 13th Terrace, Pompano Beach, FL 33069, 800-MAN-2842, 954-946-9098, www.man-mec.com

MARINE ELECTRONICS

ACR Electronics Inc., 5757 Ravenswood Rd., Ft. Lauderdale, FL 33310-5247

Beier Radio, 1990 Industrial Ave, Harvey, LA 70058

Comark Marine, 93 West Street, Medfield, MA 02052

GMT Electronics, 171 Main St., South River, NJ 08882

Hattealand Display, Bogstadveien, 19., N-0355 Oslo, Norway

Jotron Electronics, Box 85., NO-3280T Jodalynng Norge, Norway

Leica Navigation, 23868 Hawthorne Blvd, Torrance, CA 90505-5908

Marine Electronic Solutions, 1522 Crabapple Cove, Jacksonville, FL 32225

Saab Marine Electronics, Box 13045, 402 5Goleborg, Sweden

Standard Horizon, 10900 Walker St., Cypress, CA 90630

MARINE ENGINEERING

Elliott Bay Design Group, 5301 Shishole Ave., NW, Ste. 200, Seattle, WA 98107

Heger Dry Dock, Inc., 13 Water St., Holliston, MA 01746

MARINE EQUIPMENT

Plastic Pijings Inc., 1485 South Willow Ave., Rialto, CA 92376

Scardana Americas Bkg., 502 Empire St., Greenfield Park J4V 1V7, Canada

Waterman Supply, P.O. Box 596, Wilmington, CA 90748

MARINE FURNITURE

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

MARINE GLASS

ProCurve, 3535 Davisville Rd., Hatboro, PA 19040

MARINE HARDWARE

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

MARINE HAZARD RESPONSE

Marine Respose Alliance LLC, 1102 SW Massachusetts St, Seattle, WA 98134-1030

MARINE LIGHTING & ELECTRICAL SUPPLIES

Manning Electric Inc., 154 27th Street, Brooklyn, NY 11232, 718-832-2488, 718-832-2493, info@manning-electric.com, Contact: Anthony Menditto, www.manning-electric.com

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

MARINE RADIOS

Standard Horizon, 10900 Walker St., Cypress, CA 90630

MARINE SENSORS

Airmar Technology Corp., 35 Meadowbrook Drive, Milford, NH 03055, 603-673-9570, 603-673-4624,

sales@airmar.com, Contact: Peter Braffitt, www.airmar.com

MARINE SERVICES

Conam Inspection, 192 International Blvd., Glendale Heights, IL 60139

MARINE THERMAL IMAGING

Anon International, 720 Glen Eagle Drive #100, Winter Springs, FL 32708

MARITIME TRAINING & SCHOOLS

Marine Safety International, Marine Terminal, Laguardia Airport, NY 11371

METALIZING

International Metalizing & Coatings, PO Box 201, Cherry Hill, NJ 08003

METERS

Selco USA, Inc., 2508 Lakebrook Court, Atlanta, GA 30360-1715, 1-877-selcous (1-877-735-2687) 770-455-9110, 770-455-3754, info@selcous.com

MONITORING ALARM/CONTROL

Marine Electric Systems, Inc., 33 Route 17 South, East Rutherford, NJ 07073, 201 531-8600 Ext 231, 201 531-8606, info@marineelectricsystems.com, Contact: Gary Mandell, www.marineelectricsystems.com

MONITORING SYSTEMS

G.R. Bowler, Inc. Marine Controls, 2261 Lake Rd., Ontario, NY 14519, 800-524-9570, 315-524-8753, gary@grbowler.com, Contact: Gary R Bowler, www.grbowler.com

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

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

MOORAGE FACILITY

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

MOTOR PROTECTION

Marine Safe Electronics, 261 Millway Ave. #12, Concord, Ontario L4K 4K9, Canada

NAV/COMM EQUIPMENT

Beier Radio, 1990 Industrial Ave, Harvey, LA 70058

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

Chartco, New North Road, Hainault, Ilford Essex 166 2UR, UK

Electronic Marine Systems, 800 Ferrdale P., Rahway, NJ 07065

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

Hose-McCann Telephone Company, 1241 W. Newport Center Drive, Deerfield Beach, FL 33442, 954-429-1110, 954-429-1130, mchip@hosemccann.com

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

Transas Marine USA, 19105 36th Ave. W., Ste

Man B&W Diesel AG, Stadtbachstrasse 1, Augsburg D-86153, Germany
Mapeco Products, 91 Willenbrock Rd., Unit B, Oxford, CT 06478
Napier Turbochargers, P.O. Box 1, Waterside, South Lincoln LN5 7FD, UK
Nya Berg Propulsion AB, Box 1005, 430 90 Ockero, Sweden
Propulsion Systems Inc, 601 NE 26th Court, Pompano Beach, FL 33064
Rolls-Royce Commercial Marine, 10255 Richmond Ave., Ste 101, Houston, TX 77042
Schottel Gmbh & Co., KG-Mainzer Strasse, 99-D-56322-Spary, Germany
Schottel Inc., 675 Industrial Blvd., Sugar Land, TX 77478
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, 3131 S.W. 42nd St., Ft. Lauderdale, FL 33312, 954-581-4040, 954-581-4078, www.zf.com, Contact: A.J. Halavacs, www.zf-marine.com
ZF Marine Group, Elherst, 50, 88046 Friedrichshafen, Germany

PROPULSION MONITORING

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

PUBLICATIONS

Maritime Reporter, 118 East 25th street, New York, NY 10010, 212 477 6700, 212 254 6271, jomalley@marinelink.com, Contact: John O'Malley, www.marinelink.com

PUMP-REPAIR-DRIVES

Fybroc-Div. of Met-Pro, P.O. Box 144, Harleysville, PA 19438
Reagan Equipment, 2550 BelleChase Hwy, Gretna, LA 70054
Scardana Americas Bkg., 502 Empire St., Greenfield Park J4V 1V7, Canada

RADARS-ARPAS

Ampco Pumps Co., 4424 West Mitchell St, Milwaukee, WI 53214
Beier Radio, 1990 Industrial Ave, Harvey, LA 70058
Furuno USA Inc., 4400 NW Pacific Rim Blvd, Camas, WA 98607

RADIATION DETECTION

Thermo Electron, 6801 Cochran Rd., Solon, OH 44139

REMOTELY OPERATED VEHICLES

VideoRay LLC, 415 Engleview Blvd., Exton, PA 19341

REVERSE OSMOSIS

G.E.T. Inc., 3135 Golden Ave., Long Beach, CA 90806

RIGID INFLATABLE BOATS

Willard Marine Inc., 1250 N. Grove St., Anaheim, CA 92806
Wing Inflatables, P.O. Box 279, 1132 Samoa Blvd., Arcata, CA 95521

ROPE-MANILA-NYLON-HAWSERS-FIBERS

Marlow Ropes, South Road, Halisham, East Sussex BN27 3JS, UK
Puget Sound Rope, 1012 Second Ave., Anacortes, WA 98221

ROTATING EQUIPMENT

FCS, Inc., 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

SAFETY MANAGEMENT CONSULTANTS

Modern Maritime, 67 Bow St., Ste. 3, Portsmouth, NH 03801

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

FabEn Co., Inc., 2012 Karbach, Houston, TX 77092
Lalizas SA, 21 Haidariou St., 545 Piraeus, Greece
SlipNOT Metal Safety Floorings (Div. of W.S. Molnar Company), 2545 Beaufait St., Detroit, MI 48207

Steams Mfg. Co., PO Box 1498, St. Cloud, GA 56302-1498
Thordon Bearings Inc., 3225 Mainway, Burlington, Ontario L7M 1A6, Canada

Viking Life Saving Equipment, 1625 N. Miami Ave., Miami, FL 33136

Walport USA, 39-5A Dover Rd South, Toms River, NJ 08757

SALVAGE

Titan Maritime Industries Inc., P.O. Box 350485, Ft. Lauderdale, FL 33004

SANITATION DEVICE- POLLUTION CONTROL

Envirovac Inc, 1260 Turret Dr., Rockford, IL 61111
EVAC Environmental Solutions, 1260 Turret Dr., Rockford, IL 61111

FAST@Systems, 8229 Brentwood Industrial Drive, Brentwood, MO 63144, 314-645-6540, 314-645-6131, solutions@marinefast.com, Contact: Alan Fleischer, www.marinefast.com

Headhunter Inc., 3380 SW 11th Ave., Ft. Lauderdale, FL 33315
Hydrox Systems, 9800 McDonald Park Rd, Sidney, BC V8L 3S8, Canada

Microphor, 452 E. Hill Rd., Willis, CA 95490
Research Products-INCINOLET, 2639 Andjon Drive, Dallas, TX 75220, 800-527-5551, 214-350-7919, sales@incinolet.com

Sanitary For All, Inc., 3909 Wilmer Rd., PMB 472, Niagra Falls, NY 14305

SATELLITE COMMUNICATIONS

Beier Radio, 1990 Industrial Ave, Harvey, LA 70058
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

Land Sea Systems, 509 Viking Drive, Suites K,L,M, Virginia Beach, VA 23452
Nera Satcom AS, Box 91, NO-1375 Billingstads, Norway
Stratos, 1501 Metcalfe St. Ste 1900, Ottawa, Ontario K2P 1P1, Canada

Thrane & Thrane A/S, Lundtoftegadesvej 93D, DK-2800 Lyngby, Denmark

SCARIFIERS

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

SEALS

Duramax Marine LLC, 17990 Great Lakes Parkway, Hiram, OH 44234
Kobelco Marine, Inc., 366 Fifth Avenue, Suite 312, NY, NY 10001, 212-967-5575, 212-967-6966, hawkins@kobelcomarine.com

March 2004

Orkot Composites, 2535 Prairie Rd, Unit D., Eugene, OR 97402

SEATING

H.O. Bostrom, 818 Progress Ave., Waukesha, WI 53186

SECURITY

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

SECURITY BARRIERS

Seaward International, P.O. Box 98, Clearbrook, VA 22624

SECURITY CONSULTANTS

Solutions Group, 9663 Santa Monica Blvd. Ste 175, Beverly Hills, CA 90210, 877-844-8744, 908-858-9391, sginternational@earthlink.net, Contact: Michael Duffy, www.solutionsgroupinternational.com

SENSORS

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

SHAFT SEALS

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

SHAFT/BORE ALIGNMENT TOOLS

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

SHAFTS

Geislinger Corporation, 200 Geislinger Drive, Battle Creek, MI 49015

SHEAVES

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

SHIP DISPLAYS

Data Modul, 1767-46 Vets Memorial Highway, Islandia, NY 11749

SHIP LIFTS

Synchrilift Inc., Two Datron Center, 9130 S. Dadeland Blvd., Miami, FL 33156-7850

SHIP MANAGEMENT

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

SHIP REPAIR

Dubai Drydocks, P.O. Box 8988, Dubai, United Arab Emirates
GMD Shipyard, 360 Front St., Staten Island, NY 10304
GS-Hydro U.S., 1395 Bluehills Ave., Bloomfield, CT 06002
United Marine Enterprises Inc., P.O. Box 22077, Beaumont, TX 77720

SHIP SIMULATORS

Kongsberg Maritime Ship Systems AS, PO Box 1009, 3194 Horten, Norway

SHIPBUILDING-REPAIRS, MAINTENANCE, DRYDOCKING

Allen Marine, P.O. Box 1049, Sitka, AK 99835
Atlantic Marine, Inc., P.O. Box 3202, mobile, AL 36652
Atlas Metal Sales, 1401 Umatilla St., Denver, CO 80204
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, Willemstad, Curacao, Netherlands Antilles

Damen Shipyards, P.O. Box 1 Gorinchem, 4200AA Holland, Netherlands
Delyens Shipyards Inc., 1670 Drydock Ave., Bldg 236, North Charleston, SC 29450

Eastern Shipbuilding Group, 2200 Nelson St., Panama City, FL 32402

Fincantieri Canterieri Navali Italiani Spa, Merchant Shipbuilding Div., 34123 Trieste, Italy
Giadding Hearn, 1 Riverside Ave., Somerset, MA 02725

GTR Campbell Marine, 24 Lambton Street, Ormstown, Quebec J0S 1A0, Canada

Horizon Shipbuilding Inc., 13980 Shell Belt Rd., Bayou La Batre, AL 36509

In-Place Machining, 1929 N. Buffum St, Milwaukee, WI 53212
Leevac Industries, LLC, P.O. Box 1190, Jennings, LA 70546
Mariso USA, Inc., 100 Davidson Ave., Somerset, NJ 08873

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

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

SHIPYARDS

Alabama Shipyard, P.O. Box 3202, Mobile, AL 36652
Allen Marine, P.O. Box 1049, Sitka, AK 99835
Atlantic Marine, Inc., P.O. Box 3202, mobile, AL 36652

Bollinger Shipyards, 8365 Hwy 308 South, Lockport, LA 70374, 985 532-2554, 985 532-7225, RobertS@bollingershipyards.com, Contact: Robert A. Socha, www.bollingershipyards.com

Derecktor Shipyard, 311 E. Boston Post Rd., Mamaroneck, NY 10543
Delyens Shipyards Inc., 1670 Drydock Ave., Bldg 236, North Charleston, SC 29450

GMD Shipyard, 360 Front St., Staten Island, NY 10304
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

SILENCERS

EM Products, 5380 Cottonwood Lane, Prior Lake, MN 55372, (952) 440-9200, (952) 440-3400, sales@zerostart.com

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

SIMULATION TRAINING

Marine Safety International, Marine Terminal, Laguardia Airport, NY 11371

Maritime Institute of Technology, 5700 Hammonds Ferry Rd., Linthicum Heights, MD 21090

Posedion Simulation AS, Box 89, NO-8370 Leknes, Norway
Transas Marine Overseas Ltd., 12 Obukhovskoy, Oboroni, St. Petersburg 193019, Russian Federation

SKILLED LABORERS

Ameri-Force Inc., 3266 Talleyrand Ave., Jacksonville, FL 32206
MK Production Resources Inc., 1610 Reynolds Street, Brunswick, GA 31520

SLIDING DOORS

Waltz & Krezner, 91 Willenbrock Rd., Oxford, CT 06478

SOFTWARE

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

Creative Systems Inc., P.O. Box 1910, Port Townsend, WA 98368
Loadmaster International, St. Varvsgarten 11B SE, 211 19 Malme, Sweden

Resurgence Software Inc., 2021 Lakeshore Dr., Ste 21D, New Orleans, LA 70122

STEERING GEARS/ STEERING SYSTEMS

A. Van der Velden B.V., Dorpsstraat 67a, PO Box 2061, 2930 AB Krimpen a/d Lek, Netherlands

CS Controls Inc, 101 Dickon Road, Houma, LA 70363, 985-876-6040, 985-876-0751, info@cscontrols.com, Contact: Paul Srigley, www.cscontrols.com

Kobelet 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

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

SUN PROTECTION SYSTEMS

Solar Solve Marine, 7 St. Hilda Industrial Estate, South Shields NE33 1RA, UK, +44 191 454 8595, +44 191 454 8692, info@solosolv.com, Contact: Paul Hopkins, www.solosolv.com

SURFACE PREP TOOLS
Aurant Mfg., 1210 Ellis St., Cincinnati, OH 45223

Flow International Corp., 23500 64th Ave., South Kent, WA 98059, 800-446-3569, 253-813-9377, mbest@flowcorp.com

Flow International Corp., 23500 64th Ave., South Kent, WA 98059
NLB Corp., 29830 Beck Road, Wixom, MI 48383, 248-624-5555, 248-624-0908, nlbmktg@nlbusa.com, Contact: Jenna Eads, www.nlbcorp.com

Schmidt, PO Box 37, Fresno, TX 77545

Ultrastrip Systems Inc., 3515 SE Lionel Terrace, Stuart, FL 34997, 772-287-4846, 772-781-4778, sales@ultrastrip.com, Contact: John Odwazny, www.ultrastrip.com

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

SWITCHBOARDS

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

Kock Engineering Co, PO Box 1228, Ann Arbor, MI 48106
Kingsong Sonics LLC, 933 Industry Road, Suite 105, Kenner, LA 70062

Saab Marine Electronics, Box 13045, 402 5Goleborg, Sweden
Technical Marine Services, 6040 North Cutler Circle, Portland, OR 97217

TEAK DECK SEALANT
Boatlife Industries, 2081 Bridgeview Drive, N. Charleston, SC 29415, 800-382-9706, 843-566-1275, Contact: Louise Schmidt

TESTING SERVICES
Wyle Laboratories, 7800 Govern's Dr. S.W., Huntsville, AL 35807

THRUSTER SYSTEMS
Omnithruster, 30555 Solon Industrial Parkway, Cleveland, OH 44139, 440 542-9260, 440 542-9265, widmer@omnithruster.com, Contact: Kurt Widmer, www.omnithruster.com

Thrustmaster of Texas, Inc., 12227 FM-529, Houston, TX 77041, 713 937-6295, 713 937-7962, info@thrustmastertexas.com, Contact: Bert Ault, www.thrustmastertexas.com

TRAINING
International Maritime Training, 910 SE 17th St., Ste 200, Fort Lauderdale, FL 33316

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
Travel Services Unlimited, 200 Golden Oak Court, Suite 120, Virginia Beach, VA 23452

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

ULTRA HIGH MOLECULAR WEIGHT MARINE FENDERING
Ultra Poly, Inc., 2926 So.Steele Street, Tacoma, WA 98409

ULTRASONIC TESTING
M.A.C.E, 5910 NE 15th Ave., Fort Lauderdale, FL 33331

ULTRATHIN (UJHM) NON-SKID DECKING
Ultra Poly, Inc., 2926 So.Steele Street, Tacoma, WA 98409

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

VACUUM EQUIPMENT
Industrial Vacuum Equipment Corporation, N8091 Maple Street, Ixonia, WI 53036, 800-331-4832, 920-261-7117, randy@industrialvacuum.com

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

VALVES
Norriseal, P.O. Box 40525, Houston, TX 77240, 713-466-3552, 713-896-7386, sales@norriseal.com, Contact: Gordon Dorr, www.norriseal.com

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

VENTILATION SYSTEMS / PRODUCTS
Delta T Systems, PO Box 9159, Jupiter, FL 33468
Dry Air Technology, 313 North Oak St., Burlington, VA 88233
Jon M. Liss Associates, PO Box 5005-73, Rancho Santa Fe, CA 92067

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

VIBRATION CONTROL PRODUCTS
Lo-Rez Vibration, 186 W. 8th Ave., Vancouver, BC V5Y 1N2, Canada, 604-879-2974, 604-879-6588, lo-rez@lo-rez.com, Contact: Ted Spaetgens, www.lo-rez.com

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

VOYAGE DATA RECORDERS
Rutter Technologies, P.O. Box 23150, Churchill Park Postal Outlet, St. John's, NL A1B 4J9, Canada

WASTE WATER TREATMENT
Aircav, 4217 N. Old U.S. 31, Rochester, IN 46875
EVAC Environmental Solutions, 1260 Turret Dr., Rockford, IL 61111, 815-654-8300, 815-654-8306, sfredrick@evac.com

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Products



Acomarin

The vision of Acomarin Engineering is to continue developing the Pushpin couplers, not only for tug and barge operations, but also for offshore applications. A development of a new innovative application double-pushpin has already been started. The major idea of Double-pushpin is to be able to load/offload and to keep connected at the same time.

Circle 101



Federal Signal Corp

Federal Signal of audible notification appliances for public address applications now offers the Wide-Area Dispersion Speaker (WDS). It is engineered for more efficient large area sound coverage and higher-quality reproduction of voice, tone and live public address, the WDS offers enhanced sound-level consistency plus improved intelligibility.

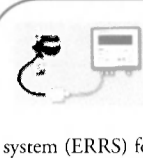
Circle 102



Floscan

Columbus McKinnon has introduced its new hand chain hoist, the Hurricane, which combines high quality and ruggedness in an economically priced hand chain hoist. It is developed by a cross-functional global team from CM's engineering, marketing and manufacturing groups, the Hurricane line carries a five year warranty.

Circle 103



Hammar

Hammar has launched a new electronic remote release system (ERRS) for life rafts, evacuation systems or other lifesaving appliances. It is now being marketed with the MRRS. The ERRS is specially designed for quick evacuation and is operated via an electronic control panel that activates one or several electric Hammar H20 Remote Release Units.

Circle 104



IMC

IMC offers permanent corrosion protection in the form of an economic rapid spray metal bonding. Metal bonding provides cathodic protection which can outlast conventional painted coatings 4 to 8 times. The metal coating can form an ion exchange, creating a molecular bond of alloy metal at the surface, rather than simply a mechanical bond, as in the case of paint.

Circle No. 105



SAM Electronics

The new Multipilot 1000 represents a unique navigation system combining ARPA Radar, ECDIS, conning and automatic steering control as the most compact solution available in the marine market. Combining the full radar capabilities with electronic chart and automatic steering control in one unit offers significant benefits for a safe navigation.

Circle 106



Roxtec

The Roxtec system is a modular sealing system; it uses a frame, compression unit and sealing modules to seal a transit. It is a mechanical seal that provides certified protection. The built in flexibility provides features such as fast and simple installation and easy future reconfiguration.

Circle 107



SPS

SPS replaces conventional stiffened metal plates in maritime, offshore and civil engineering structures. It is used for construction and also, as SPS Overlay, for repair and conversion purposes. It bonds a new top plate to the existing structure in a process that is simple and fast. Hotwork is minimal avoiding the need to remove any piped and electrical services that maybe attached underneath the structure.

Circle 108



Unicorn

The Unicorn Coating System is a thermal marine coating used in conjunction with a bio-inhibitor epoxy. The main body of matrix, gum resin, is transformed into an amber-like substance on treated surfaces. The system inhibits the growth of barnacles, zebra mussels, algae, tube worms, and other fouling organisms for up to 30 years.

Circle 109



Chugoku

Chugoku can offer coatings for every area of a vessel, whether it be for new buildings or for ships in service. Chugoku also supplies to the offshore sector and other marine installations - in fact every where paint is needed. With advanced, environmentally friendly products, Chugoku is regarded as a leading expert in the supply of coatings for Marine use.

Circle 110



Vision East

Robotic marine solutions company, Visions East, announces the first sale of its computerized yacht fairing and painting technology. A new shipyard located in Sweden has agreed to purchase a 54 meter yacht system. This first system was sold in December 2003 and will be installed and operational by summer 2004. The system is being integrated in Helsinki, Finland.

Circle 111



Sherwin Williams

Sherwin Williams Industrial and Marine Coatings group serves North America with a broad line of high-performance coatings, comprehensive technical service, and the industry's largest distribution network

Circle 112



International

Intersmooth Ecoloflex SPC has been developed in conjunction with International Marine Coatings's technology partner in Japan, Nippon Paint Marine Coatings. Its unique, patented self polishing copolymer mechanism ensures continual biocide release and inherent self smoothing for extended in-service periods.

Circle 113



NCP

NCP Coatings, Inc., has introduced its new Optically Active Coating System, known as OACS. The OACS system is designed for a wide array of manufacturing and inspection applications such as, coating, substrate, or product integrity cannot be compromised by uneven or flawed coatings.

Circle 114



Enco

Enco announces the release of the Enco 2004 Master Catalog. With lower everyday prices, new brands and over forty thousand items, the Enco 2004 Master Catalog and offers customers the largest selection of metalworking machinery, tools and shop supplies in company history.

Circle 115



Moxie

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Circle 116



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Delta T

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Circle 118



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Circle 119



CASS

CASS Polymers has released the new Marine Systems Guide for their ADTECH Marine Systems product line. In addition to their high performance offering of epoxies, adhesives and fairing compounds, the new guide also features descriptions of the hottest new products: ProSeal EZ, Marine Bond & Fill and ProBuild Marine Epoxy Systems

Circle 120



Seastate

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Circle 121



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Circle 122



Southco

Southco provides marine products, including design and color customizations to match the look and feel of your boats. Among their extensive line of products for the marine industry, Southco carries anchor and storage lockers, engine covers, glove boxes, cabinetry and instrument covers.

Circle 123



MSA

The Ultima XE Gas Monitor from MSA Instrument Division now features an integral XP push button switch that enables easy resetting of latching alarms. The switch has earned cUL approval for Class 1, Div 1, Groups B, C and D. The monitors provide continuous monitoring of combustible and toxic gases and oxygen deficiency, using catalytic and electrochemical technologies.

Circle 124



Kiene

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Circle 125



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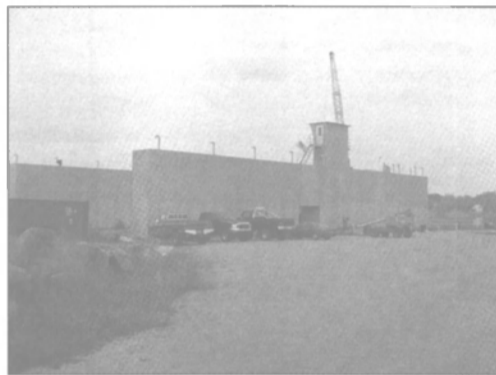
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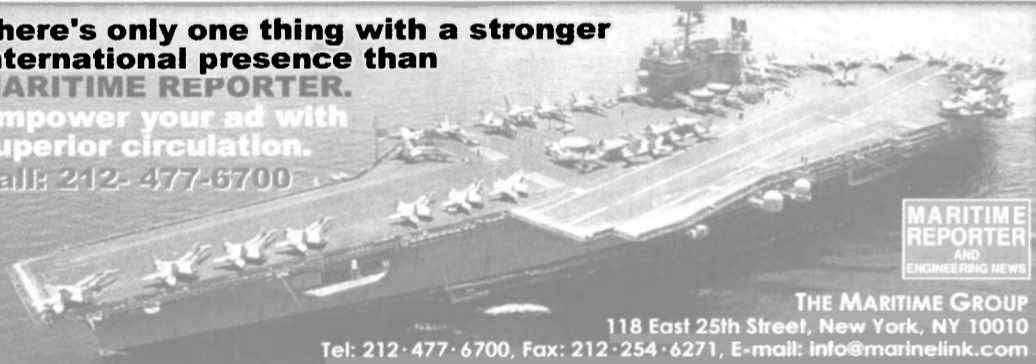
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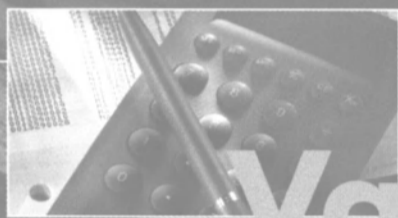
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