

FEBRUARY 1998

# MARITIME REPORTER AND ENGINEERING NEWS

The cruise ship buying binge continues, creating more

# Rooms With A View

## MARITIME ASIA

Japan is exhibiting resilience in the face of adversity

## NAVAL TECHNOLOGY

CVN 777 aircraft carrier concept . . . rethinking the ship  
from the hull up

Marine Finance • Legal Update • Disney's Debut • Bunker Fuel Monitor • Recent Ship Sales  
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## In This Edition

**Pictured on the cover:** *Crystal Harmony* was built by Finland's Kvaerner Masa-Yards' Turku New Shipyard for Nippon Yusen Kaisha (NYK Line), and is operated by Crystal Cruises. The 50,200-gt vessel is propelled by a diesel electric package which includes Wartsila Diesel engines and ABB motors.

### ...Where no one has gone before

The cruise industry continues its era of unbridled expansion, with regular news of new half-billion dollar ships becoming the norm. Contributing writer Bridget Murphy speaks to executives at the leading cruise ship companies to determine if the best is yet to come. The section begins on page 37.

**PLUS:** *Disney Magic* is set to hit the high seas (page 56).



### 8 Engine Rooms, Where It's Make Or Break

Engine rooms constitute a large percentage of a ship's initial and lifecycle costs. David Tinsley explores developments to get the most for the money.

### 32 Maritime Asia

Japanese shipyards are exhibiting trademark resiliency in the face of the unbelievable Asian financial fallout. — by David Tinsley

### 65 Navy: The Next Generation Is Now

Sneak a peak at the next-generation aircraft carrier — CVN 777 — which is under development now.

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## EDITOR'S NOTE

### Taking a step back ... to leap forward

It is easy to be swept-up in the trappings and hype of today's "deal-a-minute" business environment, which can cause executives and managers to lose sight of sound business practices and decisions. A hallmark of the maritime industry is its reverence for its history, and it should not be forgotten that the study and understanding of maritime's past is essential for its future.



History tells us — on the business side — that the maritime market, across the board, is notoriously cyclical. For example, in the early 1980s, builders and suppliers of naval vessels were enjoying a historic boom market, building what seemed to be a never-ending fleet of new ships. Similarly, in the early 1990s, the line leading to the soap box where the value of offshore oil development was being extolled was very short. But political and economical forces have an uncanny knack for altering the best laid plans.

Lesson learned: Instead of only trying to ride the winning horse, spread your company's exposure and also mount the two that will place and show. Get as much — for example — offshore business as possible now, but keep the company's theoretical ear to the ground (and eyes on *MR/EN*'s pages) to discover where the next business opportunity may lie.

There's an interesting new report from Stuart Slade of Forecast International which projects that more than \$160 billion will be spent over the next decade on warships and equipment worldwide (see story, part of this month's Naval Technology report, on page 72). As cruel as the international markets have been on corporate wealth, it is more pressing than ever that builders and suppliers position themselves for business around the globe.

History tells us — on the technical side — that "the best is yet to come"... and it always will be! Last month marked the 100-year anniversary of B&W acquiring the rights to produce the engine patented by Rudolf Diesel. The first engine produced was a land-based model, the DM140, which was a one-piston engine with a 320 mm bore and 490 mm stroke, producing 40 hp at 180 rpm. It is certain that in the early 1900s, pioneer diesel engineers could not predict the emissions regulations and electronic control systems which help define diesel engine development today. Similarly, it is tough to imagine what the driving issues will be in another 100 years. The only certainty is that companies which continue to explore, produce and profitably market cutting edge, technologically advanced marine equipment will ensure their place as industry leaders.

*Greg R. Franthum*

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# Engine Rooms: The Dollars And Sense



by David Tinsley,  
technical editor

Reinvestment in Denmark's capacity to produce two-stroke propulsion machinery is already paying-off for MAN B&W, increasing its sourcing options for engines up to 17,200-bhp.

In a prestigious new deal, the company's recently expanded Alpha Diesel plant in northern Jutland has been entrusted with the manufacture of the twin-engine installation for a new type of Alaskan trader, designed to strict environmental criteria.

ARCO Marine's Millennium Class tankers will establish a new technological benchmark in the U.S. coastwise trade, shuttling crude oil in one-million-barrel shipments from Valdez to Cherry Point, on Puget Sound.

Endorsed by the Washington State legislators, the design's multifarious attributes include fully redundant propulsion and steering systems.

At least one of the two 125,000-dwt newbuilds assigned to Avondale Shipyards, as yet known as Hull No. 2497, will be fitted with compact, low-speed prime movers produced and tested at the extended Frederikshavn factory, on the engine licensor's home ground.

The engines specified are seven-cylinder models of the S50MC-C type offering a unit output of 15,015-bhp (11,060-kW) at 127-rpm, each of which will be direct-coupled to a Kamewa controllable, reversible pitch (CRP) propeller.

Each side of the drive line in the 30,030-bhp installation will lend itself to independent control, and each engine will be housed in its own, separate machinery room to reduce the risk of the ship being disabled through fire, flooding, breakdown or fuel contamination involving a single engine.

The fact that the CRP propellers will be able to switch from full-ahead to full-astern thrust in a matter of seconds will obviate the need for the longer process of engine reversing in an emergency maneuver or stopping situation.

The plant for the double-hulled ARCO Marine tanker, due in service in the year 2000, is at the upper end of Alpha Diesel's enlarged product range.

Expenditure on new 1,500-sq.-m.

assembly and test modules, including an 18-m production headroom and 300-ton lifting capacity, has raised its build scope to the largest S50MC-C model in the portfolio, the eight-cylinder version delivering 17,160-bhp.

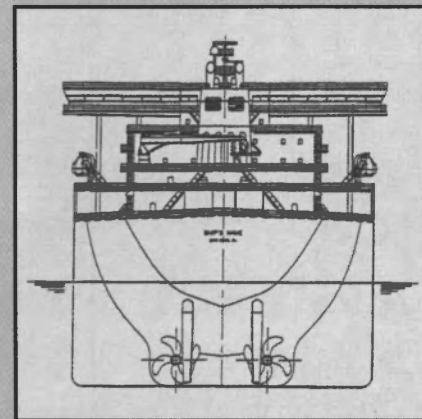
## Preventative Maintenance

Most engine room fires result from a failure to carry out straightforward maintenance tasks costing just a few dollars. Yet the toll exacted from such neglect is remarkably high, in some cases leading to loss of life, and invariably resulting in heavy cost.

Protection and indemnity (P&I) insurance specialist The Swedish Club calculates that claims of this type average \$2 million per case.

A common shortcoming is poorly maintained lagging, which carries the risk of an exposed hot surface igniting an oil spray if a line fails. It reports that a recent fire in a ship's machinery space broke out during work on a duplex filter. For reasons still unclear, the crew member involved removed the active, rather than the passive filter, and the ensuing oil spray struck an exposed exhaust gas manifold.

Problems with the functioning of the firefighting equipment available to engine room personnel caused a delay in tackling the situation, and the incident ended with the vessel declared a constructive total loss (CTL).



Above: ARCO Tanker, stern view.

Against this backcloth, the Gothenburg-headquartered Club distributed a checklist to ships as one of a series of initiatives aimed at reducing life-threatening and costly fires in machinery spaces. More than 300 Chief Engineers have now confirmed that their vessels comply with the safety measures advocated.

In essence, the campaign seeks to tighten-up the situation by requesting serving Chiefs to make a thorough inspection of their domain to ensure that, for instance, all pipes, fittings and electrical connectors are in sound condition, insulation or lagging covers all hot surfaces, there is no hazardous leakage of oil, and that high-pressure fuel oil pipes are properly shielded. It also exhorts the Chief to check that quick-closing valves, fire-dampers and fire alarms are functioning, that the



Pictured above is the aftermath of an engine room fire.

## INVESTMENT IN DESIGN

general standard of cleanliness is high, and that the crew is well versed in firefighting and emergency procedures.

### Advanced Function In Form

Innovative Ramform technology, which made its startling and highly effective debut in research and seismic survey applications, is set to become a tool of North Sea oil production and processing.

The concept of a hull form which reaches its extreme width at the transom, corresponding to about half the waterline length, has been found to offer an extremely stable aftship working platform, particularly for multi-streamer seismic operations across a wide weather window. The unique, delta shape was used in the Barents Sea-deployed, Norwegian defense surveillance vessel *Marjata*, and subsequently in the acclaimed new generation of seismic ships operated by Petroleum Geo-Services (PGS).

Now, the configuration has been adopted by PGS in a floating production, storage and offloading (FPSO) vessel for the development of the Banff field in the U.K. sector of the North Sea.

Following delivery of the new-building by Hyundai Mipo Dockyard in South Korea, topsides installation will be undertaken at the Aker McNulty yard on the Tyne, in line with Conoco's schedule for bringing up first oil in mid 1998.

The PGS FPSO mirrors the design of the company's Ramform seismic vessels, but is proportionately larger at 393.6 ft. (120-m) length overall and stern beam of 177 ft. (54-m), with a deckload capacity of approximately 16,000-tons for a full complement of production equipment.

Engineered to meet the 100-year storm standard, the design promises outstanding stability in rough seas. While the unit will be geared-up initially to handle 60,000-bpd, *Ramform Banff* has been designed for ready upgrade to a 120,000-bpd production, processing and storage capacity.

In the meantime, Langsten Slip & Baatbyggeri at Tomrejord, in western Norway, has just delivered 10,150-gt *Ramform Valiant*, the third in the series of PGS seismic ships encapsulating the hull concept.

Soon to be joined by sistership *Ramform Viking*, which is in the

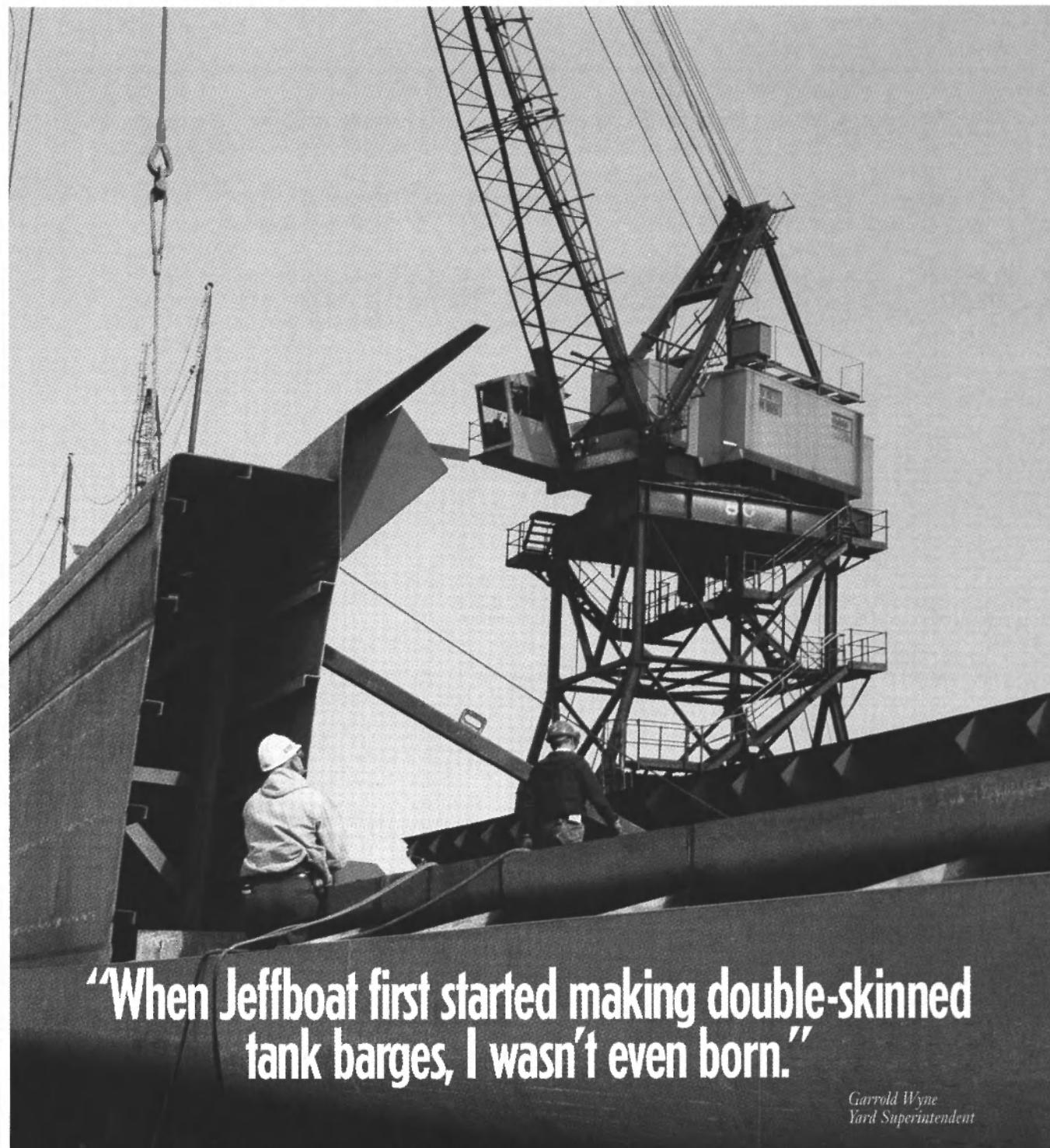
final stages of fitting out at Langsten's yard, the latest tonnage pushes back the bounds of seismic survey capability still further.

First-of-class *Ramform Explorer*, which quickly set new performance records at the highest technology end of the seismic market, provided the industry with a 12-streamer

capacity in 1995, and the subsequent delivery from the Langsten Group, 9,200-gt *Ramform Challenger*, introduced a 16-streamer tow capability in 1996. The more powerful, longer-range *Ramform Valiant* demonstrates the ongoing evolution of the design, with the capacity to simul-

taneously deploy and tow a 20-streamer array

The PGS Group says Ramform will not be limited to seismic acquisition and floating production. It is also researching the development of drillship, well intervention vessel and cable-laying vessel designs embodying the configuration.



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**P&O To Sell Stake In Argentinean Operator**

Peninsular & Oriental Steam Navigation Co.'s (P&O) Australian subsidiary will sell its 37.5 percent stake in a Argentinean terminal operator for \$38.8 million. The

sale of Terminales Rio de la Plata SA (TRP) to AIG-GE Capital Latin American Infrastructure Fund LP (LATIF) will reduce P&O's stake in the operator to 50 percent. TRP operates terminals 1 and 2 at Puerto Nuevo in a Buenos Aires under a 25-year concession awarded in September 1994.

**Aker RGI Wins Farstad Deal**

Langsten Slip & Baatbyggeri, a yard of the Langstengruppen group, has won a contract from Farstad Shipping ASA to build a multi-purpose anchor-handling/supply vessel. Following the deal, Langstengruppen has an

order reserve of approximately \$470.5 million.

**PGS Wins China Seismic Deal**

Seismic specialists Petroleum Geo-Services ASA (PGS) has been contracted to perform a 3-D seismic survey offshore China. The contract was awarded by state-owned China National Offshore Oil Corp. The 2,150-sq.-km survey will take place in the Qiong Dong Nan Basin, offshore Hainan Island.

**PGS Awards Order To Aker, Wins Contract From Norwegian Interests**

A unit of Aker RGI's partly-owned Langstengruppen subsidiary has won a contract to build a new Ramform vessel for offshore service company Petroleum Geo-Services ASA. The contract is valued at \$80 million.

PGS said it had decided to exercise its option to build a sixth Ramform vessel following a strong performance from the existing ships and firm demand for the high technology equipment within the oil industry. The vessel is expected to be delivered in the first half of 1999, will have the same dimensions as the company's Ramform #5 and will be equipped to handle up to 20 streamers. Aker RGI holds 67.5 percent of Lanstengruppen.

In addition, PGS has been awarded two seismic contracts tendered by Norwegian operators. The contracts were with Norsk Hydro ASA and Statoil. The two 3-D seismic contracts would cover between 11,000 and 12,000 sq. km aggregate, subject to results from final survey configurations. PGS said the contracts would occupy two Ramform vessels from April/May through September/October 1998.

**First Calgary In \$15M Oil Deal**

First Calgary Petroleum recently signed a \$15 million deal for oil exploration in the southern province of Hadramout. First Calgary signed a memorandum of understanding (MOU) with Yemen in November 1997 for sector 43, which covers 2,717-sq.-km.

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**Kvaerner Masa-Yards**

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**YVC Ysselwerf Receives PSV Contract**

Simon Møkster Rederi A/S has placed a contract with YVC Ysselwerf for two multi-purpose field supply & pipe carriers (PSV). The two PSVs will be built according to the Marin Teknisk MT 6000 design.

The first vessel will be delivered in February 1999 and will enter immediately in a contract with Statoil. The second vessel will be delivered in July 1999.

The first vessel will be built in close cooperation with Wilton Fijenoord, Schiedam, and Verolme Heusden while Ysselwerf's slipway is occupied by a super freeze stern trawler. The second vessel will be built completely at YVC Ysselwerf.

**Aker Maritime Wins \$90.2M Deal**

Aker Finnyards won a \$90.2 million order for two RoRo vessels from Finnish Rettig's shipping arm Bore. The 54.9-ft. (16.7-m) ships will have two 18,900-kW/hr diesel engines.

**Transocean Wins Unocal Contract**

Transocean Offshore Inc. has been contracted by Union Oil Co. of California (Unocal) to build an ultra-deepwater drillship for a period of five years plus an option for an additional five years. The new Discoverer Enterprise-class drillship may be equipped to drill in water depths up to 10,000 ft. and would work initially in the Gulf of Mexico. The drillship will be constructed at an estimated cost of \$318 million, including capitalized interest and other non-hard-ware costs.

**GEC-Marconi Signs Brunei Ship Contract**

Britain's General Electric Co. Plc recently signed a contract with Brunei for the supply of three off-shore naval patrol vessels. GEC's defense arm GEC-Marconi was selected in October 1996 to supply the three ships as well as propulsion, weapon systems, spares and training, which was expected to provide a wide range of British

firms with work as subcontractors. Britain's Defense Secretary **George Robertson** said in a statement the confirmation of the order was "extremely good news" for the British defense industry in general and GEC's Yarrow shipyard in Glasgow, in particular.

**Croatian Shipyard Wins \$9M Norwegian Deal**

Croatian shipyard Viktor Lenac won a \$9 million order from Norway's Farstad Shipping ASA to refit its supply vessel *Lochnagar*

as a pipe-laying ship.

The ship is scheduled to be refitted by May 31, 1998, and the Rijeka-based shipyard is currently in talks with the Norwegian company for equipping it with pipe-laying equipment worth an additional \$4 million.

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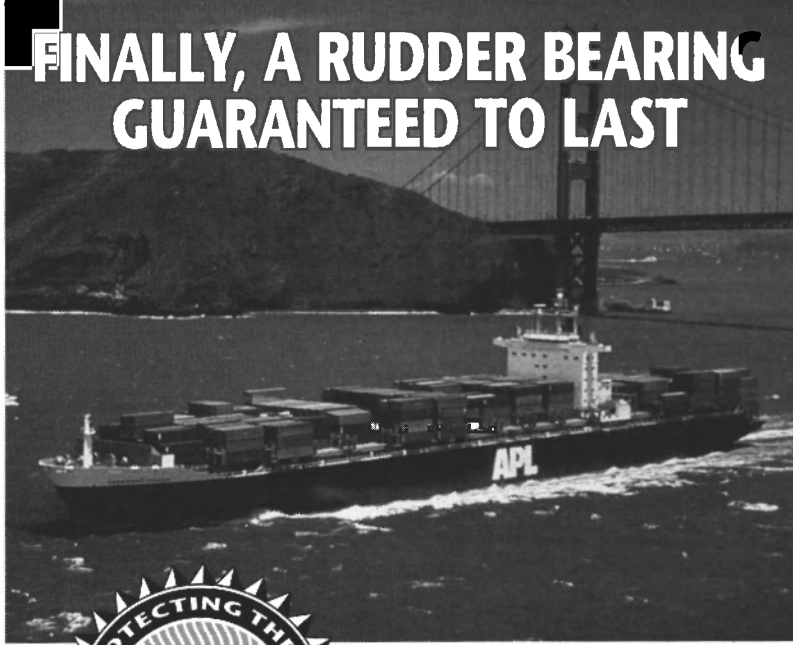
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## MARINE FINANCE

### GulfMark To Offer \$26.7M For Brovig

GulfMark Offshore Inc. reportedly plans on making a cash offer of approximately \$26.7 million to purchase the outstanding shares of Norwegian offshore support vessel

company Brovig Supply ASA. Under the deal, GulfMark would pay \$3.07 per share for the 8.7 million outstanding shares of Brovig Supply that the company does not already own.

GulfMark currently owns 2.9 million shares, or 25 percent of Brovig Supply's 11.6 million out-

standing voting shares.

### Algoma Buys Tankers From Imperial

Algoma Central Corp.'s Algoma Tankers Ltd. unit acquired four tankers from Imperial Oil Ltd. for

\$8.9 million. The company also won a long-term contract to transport Imperial Oil liquid products. Under the agreement, Algoma Tankers will transport Imperial products on the Great Lakes, the St. Lawrence Seaway and the coastal waters of eastern Canada and the eastern U.S.

### Frontline Orders Tankers From Hyundai

Frontline has signed building contracts with the Hyundai Shipyard in South Korea for two Suezmax tankers. The ships, to be delivered in January and April 2000, are sisterships to three vessels Frontline already has on order at the same yard. Frontline will finance the vessels through ordinary bank financing and the company's ordinary cash flow and would not require additional supply of equity.

### Meridian In \$160M Norwegian Ship Deal

Ukraine's Meridian shipyard in the southern city of Mykolayiv is to build 16 container ships for Norway's Eksportfinansin. The contract is reportedly worth \$160 million.

### First Olsen Sells Last 1970s Tanker

First Olsen Tankers Ltd. has agreed to sell its vessel *Knock Davie* to Liberian-registered Nortrans Offshore Vietnam Ltd. The sale price was \$7.2 million on an "as-is" basis. The book value of *Knock Davie* was \$4.3 million as of September 30, 1997. The vessel is scheduled to be delivered to the buyer by February 15, 1998. The sale is in accordance with the company's policy of phasing out its tankers built in the mid-1970s.

### Oryx Signs \$28.8M Oil Deal With Algeria

Oryx Energy Co. of the U.S. has signed a \$28.8 million oil exploration accord with the Algerian state-owned oil and gas company Sonatrach. In a five year deal, Oryx will carry out seismic work and drillings in the Timissit area, stretching more than 4,731 sq. mi. in southeastern Algeria.



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Kahlenberg Signals were developed to withstand the punishing use of commercial and military service. Their durability has been demonstrated over decades of service on ocean-going vessels ranging from naval warships to commercial vessels. Military specifications have required extensive testing for many of these whistles and the accessories supplied with them, which have proven the exceptional qualities of Kahlenberg design and manufacturing.

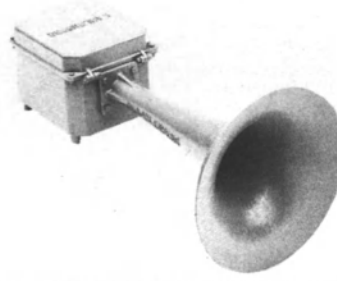
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**German State Sells Yard To Aker**

A preliminary decision has reportedly been made in favor of Norwegian interest Aker RGI on the second privatization of the MTW shipyard. Aker RGI has upped the offer on the shipyard to \$46.7 million from an original \$44 million and is also prepared to pay an additional \$2.7 million for the acquisition of the Elbe shipyard in Boizenburg.

In addition, the consortium wants to guarantee 1,600 jobs rather than the 1,550 agreed previously.

German bidding group and Norwegian firm Ullveit Moe has also shown interest in MTW. MTW was firstly privatized by Bremer-Vulkan-Verbund, which collapsed in 1996, and was later taken over by the state again. The new privatization still needs the approval of parliament and the BvS as joint owners.

**Northrop Grumman Wins \$77.8M Navy Contract**

Northrop Grumman Corp. has received a \$77.8 million U.S. Navy contract for launcher systems production to upgrade U.S. Trident I nuclear submarines with new

launch tubes and subsystems to accommodate the larger D-5 Trident II ballistic missiles.

The contract also covers deployed systems support which includes sustaining engineering and field and logistics support services for the Navy's fleet ballistic missile program. Plans currently call for

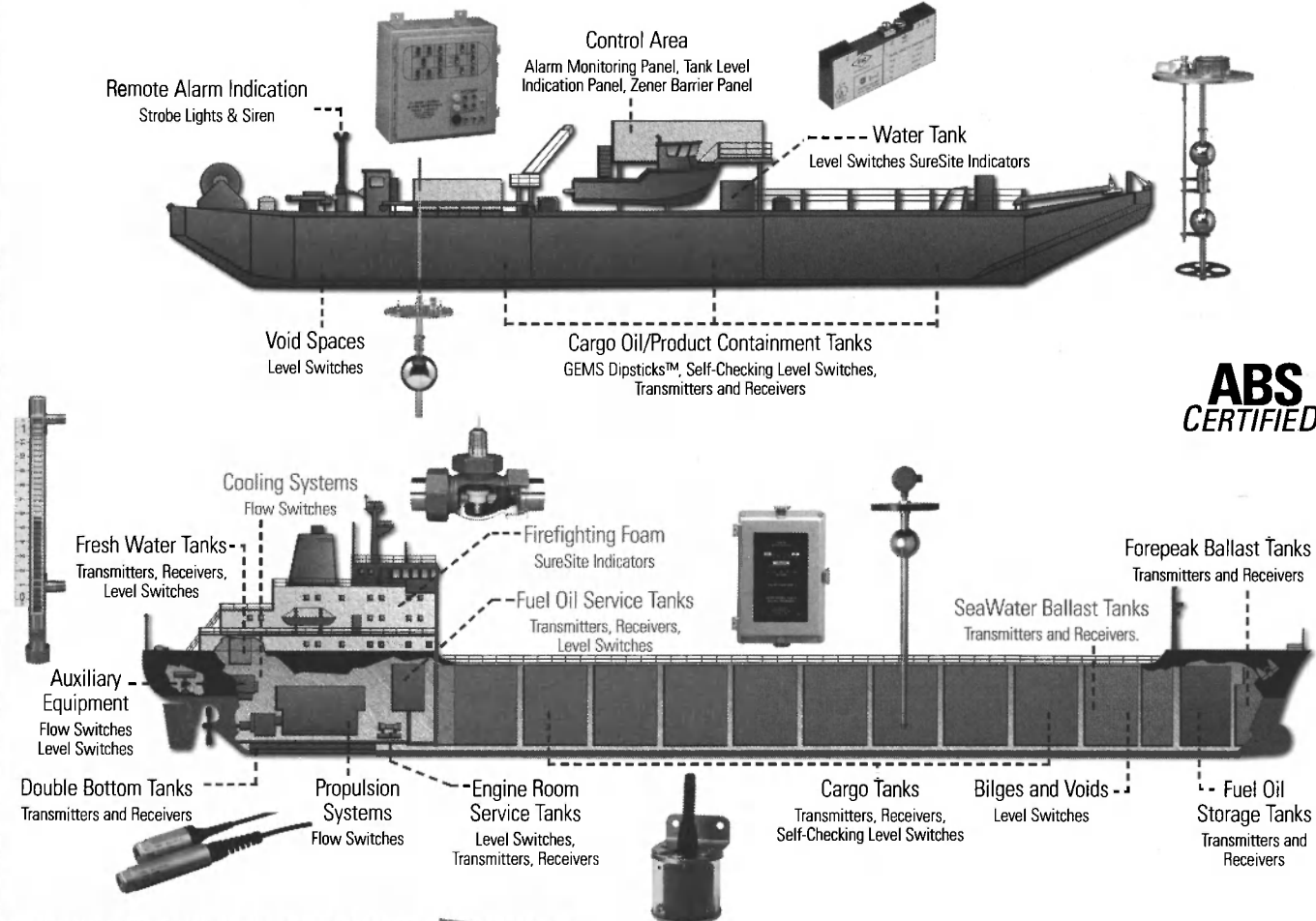
four Trident I submarines to be upgraded to fire the D-5 missile. Initially, Northrop Grumman Marine Systems will build 24 launch systems for the USS *Alaska*, to commence this year, to be followed by the USS *Nevada*, the USS *Henry M. Jackson* and the USS *Alabama*.

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**Evergreen Unit To Order 10 Containerships**

Evergreen Marine Corp. (Taiwan) Ltd.'s inter-Asian shipping unit is placing an order for 10 containerships with a group shipyard.

Uniglory Marine Corporation has placed a provisional order with Evergreen Heavy Industrial Corporation's Nagasaki shipyard for ten 1,420 TEU P-class container vessels.

Delivery of the first ship will be in July 1999, following the scheduled completion in April of the last in a series of six 1,164 TEU vessels the yard is building for Uniglory.

According to Evergreen, the contract, which was scheduled to be signed last month, calls for the ships to be delivered at three month intervals, with the last vessel delivered in October 2001.

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**Atlantic Marine In Final Stages Of Conversion Project**

The third and final phase of the reactivation and conversion of

Houston-based Global Marine, Inc.'s *Glomar Explorer* is nearing completion at Atlantic Marine's Mobile, Ala., facility.

The 116 x 619-ft. (35.3 x 188.6-m) Navy vessel was converted to an ultra-deepwater

drillship with the addition of a rig floor substructure, derrick riser tensioning/handling system motion compensator, drillpipe racker, two pedestal cranes, additional blowout prevention (BOP) system, drilling mud system and a

vessel management system incorporating the latest technology in dynamic positioning.

**Fisher Says Ship Upgrades Will Lift Capacity**

James Fisher & Sons Plc plans to spend \$10.34 million on upgrades to two coastal oil product tankers that will halve their time in port and increase their annual carrying capacity. The U.K. shipping company signed a contract with Birkenhead ship repairer Cammell Laird Plc for the installation of segregated ballast tanks and the upgrade of piping on the vessels, *Cableman* and *Tankerman*.

Finance for the conversions will reportedly be met from the company's own cash resources and bank facilities.

**Lockheed Martin Signs \$50M Contract With Egyptian Government**

Lockheed Martin Corp has signed a \$50 million contract with the Egyptian government to supply equipment to monitor ship traffic in the Gulf of Suez.

The contract for the Vessel Traffic Information Management System (VTIMS) will form the basis of Egypt's port management system. It is a continuation of an existing system Lockheed Martin developed for the Gulf of Aqaba.

**Keppel Wins \$130M Enesco Order**

Enesco International Inc has signed a contract with Keppel Fels Shipyard in Singapore for a harsh environment jack-up drilling rig at a cost of approximately \$130 million.

The rig, an enhanced KFELS MOD V, is expected to be delivered in January 2000, and will be named *Enesco 101*.

The cost of the rig (which excludes capitalized interest) will reportedly be financed out of corporate funds, including proceeds from a recent \$300 million debt offering.

Enesco also has an option with Keppel Fels to build an identical rig for the same price.

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## MARINE FINANCE

### STN Atlas Elektronik Disincorporates Marine Electronics Division

STN Atlas Elektronik disincorporated its marine electronics division as of January 1, 1998, and transformed the division into an independent company operating under the name of STN Atlas Marine Electronics GmbH with its headquarters in Hamburg. The company attributed the move as making the unit attractive for future strategic alliances in the marine electronics sector, and is hailed by the parent as a move to strengthen the division.

### TDI-Halter Tapped To Build Three Sedco Forex Barges

TDI-Halter, Inc. signed a contract worth approximately \$30 million with Sedco Forex of Paris for three cantilever drilling and integrated servicing barges for operations in Lake Maracaibo, Venezuela. Delivery is scheduled for June, August and September of 1998.

The barges are specially designed for drilling and well re-entry in 8,000-ft. depth wells. They will feature a cantilever drill floor extended to 50 ft. over the barge's stern and 40 ft. off the water.

Their overall length, inclusive of the drill floor is 230 ft. (70 m), with a 75 ft. (23 m) beam and 15 ft. (4.5 m) depth. The barge rigs will be outfitted with a centralized control cabin, first class accommodations for 44 persons, a 35 metric ton capacity AmClyde model 10000 pedestal mounted deck crane and helideck for a Bell 212. Upon delivery, Sedco Forex will dry tow the barge rigs across the Gulf of Mexico to Venezuela.

Circle 37 on Reader Service Card

### Afai Shipyard Starts Expansion Plan

Afai Southern Shipyard (Panyu) Ltd. has started a yard expansion project which entails building a series of buildings, as well as conversion of existing buildings. The shipyard, which is increasingly getting larger vessels, deems the moves prudent in accommodating additional staff.

Afai Ships Limited reported that the first K50 vessel is close to completion. The K50 is a DNV-classed

262-ft. (80-m) vessel which has the capacity for 450 passengers and 89 cars, and is reportedly the first high-speed passenger/car ferry to be built in China. At press time, the yard reported that the superstructure was completed, the bow was being attached, and the interior outfit was underway with elec-

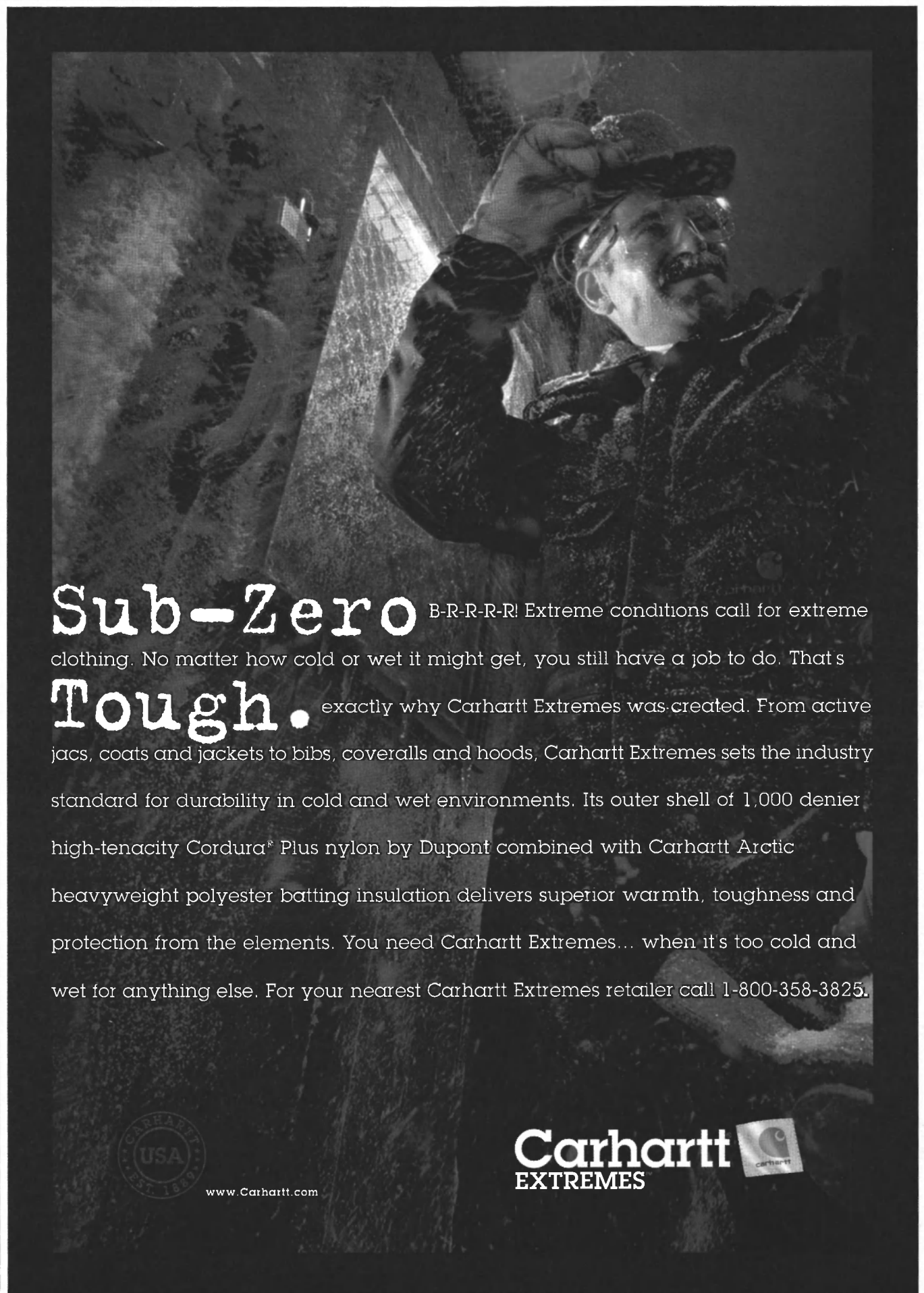
trical and mechanical installations.

The vessel is built of 5383 H116 plate and 6082-T6 sections aluminum alloy.

The hulls are divided into eight, vented, watertight compartments comprised of fore peak, two voids, pump compartment, long range

fuel tanks, fuel tank compartment, engine room and water jet compartment.

The speed of 47.5 knots is obtained with four Ruston 16RK 270 diesels, rated at 5,500 kW each at 1,000 rpm. Each hull will be fitted with two Kamewa 80 SII water jet propulsion units.



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M/V *North Islands* dragged its anchor and ran aground off the coast of Chile during a storm in early September. In seven to eight meter seas, the vessel quickly broke in two at the forward end of the No. 4 hold. At the time of the

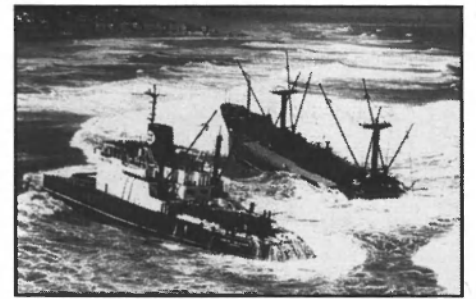
accident it had about 400 tons of heavy fuel aboard, 220 tons of which was located in hold No. 3 port and starboard double bottoms.

While this oil was immediately lost to the sea, the challenge to keep the remaining fuel from soiling the water further was tossed to Titan Maritime Industries of Ft.

Lauderdale, Fla.

Titan was chosen by the vessel's underwriters to remove the pollutants, and the method chosen was to pump the oil to a small self-propelled tank barge anchored 492-ft. seaward of the wreck, beyond the surf zone.

Because of the difficulty in han-



dling heavy equipment, and due to the high viscous nature of oil involved, a Desmi DOP 160 pump (see related story on next page for details) was selected.

Divers had to hot tap the double bottom tanks in the engine room and remove the oil from the top of the tanks as they were breached and the oil could not be pumped through the pipe work.

Circle 15 on Reader Service Card

# When Push Comes To Shove... The Move Is To Marine Travelift

Marine Travelift mobile boat hoists are clearly marina operator preferred. Designed with them in mind, the units include the features and performance that easily make them the number one choice throughout the world. Units are



A covered operator's compartment provides protection from the elements.

available with lifting capacities ranging from 15 to 500 tons. Today, marinas around the world rely on their Marine Travelift mobile hoists. Our hoists provide marina operators with the opportunity to not only better serve their customers, it affords the important opportunity to handle a wider variety of boats. Conforming to the hull configurations of pleasure crafts, work boats, commercial fishing boats and barges is no problem for the versatile boat hoist. Because our units feature 90° pivot steering and a proven pivot trunnion system which maintains structural integrity under load on level or varied terrain, you can take

full advantage of all your yard space for storage and service. That means you get to maximize your customer service opportunities and increase your potential for customer satisfaction. But there's much more to a Marine Travelift mobile boat hoist. You get the standard features you need and a complete array of affordable options to customize your choice. You owe it to yourself to learn all the details. The time was never better to maximize your marina or boat yard's potential. Each unit is loaded with the



Sling block design rotates to accommodate sling angles and varied hull shapes.

**Marine Travelift Boat Hoists...  
Operator Preferred!**

features that have made them the popular choice of professional boat handlers. Models like our 50BFM feature a forward beam design that allows for unsurpassed rigging and boat structure clearance in addition to convenient power adjustable slings for easier boat

handling.

The powered sling adjustment and all other controls are within easy reach in the operator's enclosed compartment. A readable load weight indicator system means you get more confident lifts. Our four hoist winch design means you get fast hoisting speeds teamed with precision, independent control at all four corners of the boat hoist for confident, even lifts.

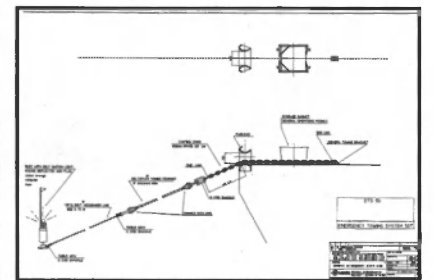
Details and specifications on our complete line of mobile boat hoists with capacities from 15 to 500 tons and our line of Mariner® forklifts are available from your local representative or Marine Travelift, Inc., 49 E. Yew St., P.O. Box 66 Sturgeon Bay, WI • 54235-0066 • USA Phone: 920-743-6202 • Fax: 920-743-1522 E-mail: [info@marine-travelift.com](mailto:info@marine-travelift.com) Web-site: [www.marine-travelift.com](http://www.marine-travelift.com).



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Enhances Safety**



Pictured above is a diagram of the new 50-ton emergency towing system.

A new addition to the range of D-box towing systems is a 50-ton system created by Leenstra and used to target the company's fleet of small petro-chemical tankers, vessels which do not fall under the IMO 3563 ruling (below 20,000 tons), but wish to comply with regional rulings, such as the Washington State spill prevention program.

An immediate advantage to fitting the system, according to Leenstra, is a five to 10 percent reduction of insurance premiums.

The D-box towing system is flexibly designed to allow its fitting to suit any ship, and also to be maintenance free and competitively priced.

The D-Box system, which is also available in ETS 100 ton and ETS 200 ton models, is an easily adaptable deployment box design which houses the aluminum buoy, tipto eight messenger, the Deltaflex towing pennant and chafing chain. The complete layout and structural appraisal can be handled by Leenstra, if needed.



A Marine Travelift model 50BFM mobile boat hoist during a haul-out at Canal Boat Yard, Seattle.

## New Lightweight Tenders Offered In U.S.



The U.K.'s Craft Espace Ltd. introduced two new hard-bottomed stowaway tenders that can shrink down to manageable sizes for optimum stowage and handling. The smallest tender is the Espace 4.6, which fully assembled measures just 15 ft. (4.6 m). Designed for yachts over 45 ft. (13.7 m), the tender is constructed primarily of Kevlar, which makes the tender long-lasting, strong and light. Craft Espace is also offering the Espace 5.4 rigid inflatable, which weighs 572 pounds with steering console and seating, but no engine. The Espace 5.4 is also constructed of Kevlar.

Circle 16 on Reader Service Card

## HydroComp Offers New And Improved Propulsion Software

HydroComp, Inc. has released the latest version of its ship propulsion software NavCad. Version 3.6 offers new and enhanced features, including the capability to analyze waterjet-powered vessels. NavCad serves as a tool for predicting and analyzing vessel speed and power performance, and also provides for the selection of suitable propulsion system components such as engines, gears and propellers. Features of the NavCad 3.6 include an improved main screen allowing for faster preparation of reports and graphs and new propeller options including surface-piercing and cycloidal propellers, custom Kt/Kq data files and cupped propellers. NavCad is currently used by Volvo Penta, Kamewa, Kieran International Ltd., the Colombian Navy and Exxon Research.

Circle 5 on Reader Service Card

## Ro-Clean Offers New Submersible Screw Pump

Ro-Clean's Desmi DOP-160 is a development of the DOP-250, which has been utilized in many oil spills in skimming and offloading operations.

The new model will provide the heavy oil pumping capability of its predecessor in a more compact and lightweight form. This will allow operators to utilize the DOP-160 with reduced hydraulic power requirements and smaller hose sizes.

The DOP-160 is capable of handling debris, due to a cutting knife

fitted to the leading edge of the screw. The knife will cut plastics, rope and other materials that are often trapped in the oil.

The DOP-160 offers a capacity in excess of 110 gpm (25 sq. m./hr.), and can develop discharge pressures up to 10 bar (150 psi) over a full range of light or heavy liquids.

Circle 4 on Reader Service Card



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Circle 286 on Reader Service Card

# Breaking New Ground

In December, Freide Goldman Offshore held a groundbreaking ceremony to signal the early stages of construction for the company's rig manufacturing yard in Pascagoula, Miss. The yard is one of the first created specifically for building offshore drilling rigs and production vessels, and is designed to allow four new jack-ups to be built simultaneously, in record time.

With rig utilization rates nearing

100 percent worldwide (up from about 55 percent just 10 years ago) the shortage of jack-up and semi-submersible rigs is projected to be acute in the coming years. Specifically, there is information indicating that there will be a shortage of eight jack-ups and 17 semisubmersible rigs in 1998 alone. As analysts continue to project demand to outpace supply — even in the face of the recent oil supply and demand quandary —

Freide Goldman Yard.



Friede has designed the move to equip it to fill worldwide rig needs. "Indicators suggest that the rig shortage should extend well beyond 1998, leading to a robust market for upgrade and newbuild over the next several years," said **Joe Agular**, oilfield services analyst, Johnson Rice & Co. Investment Securities. "Rig owners are committing large amounts of capital to upgrading and expanding their fleets."

The yard design was a collaborative effort. "We started with a blank piece of paper and kept asking everyone: 'If you could design the ideal fabrication yard, what would it include?' from that feedback, we started to put together a plan," said William Skinner, president, Friede Goldman Offshore. "The yard will employ modern construction techniques, incorporating the best from the fields of manufacturing and fabrication."

The 90-acre yard will include more than 100,000-sq.-ft. of component staging areas and will be outfitted, to a degree, like a large assembly line, with raw materials entering the facility, proceeding

through the fabrication and assembly area, and finally, moving out to the launching sites.

The new facility is designed to process 48,000-tons of steel per year, and the facility offers a tremendous 2,000-ft. deepwater outfitting bulkhead and unrestricted access to the Gulf of Mexico, a feature which will allow the industry's largest equipment to enter directly, while saving cost on towing services. U.S. Senate Majority Leader Trent Lott (R-Miss.) and Mississippi Governor Kirk Fordice were both on hand for the ceremony, which included a ribbon-cutting for Friede Goldman International's (parent of Friede Goldman Offshore) subsidiary HAM Marine's new training center. Along with the tremendous need of equipment, the Gulf area yards are currently in need of skilled craftsmen to build the labor-intensive rigs. HAM has taken a proactive stance in addressing its worker needs, targeting public assistance recipients, high school students and others with no previous industry experience.

Circle 27 on Reader Service Card

## LEICA MX 400 DGPS PROFESSIONAL NAVIGATOR

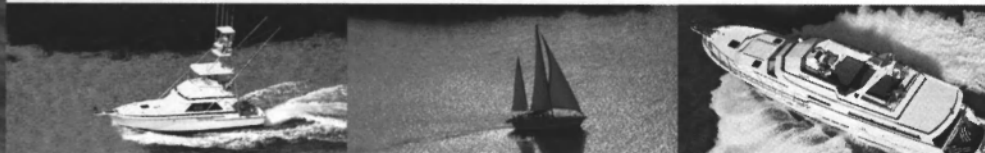


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world, and operate in nine languages. Best of all, this advanced technology is exceptionally user friendly. In

addition to easy-to-read screens and numerous single button features, the MX 400 provides four NMEA input/output ports for interfacing with other on-board electronics.

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Circle 246 on Reader Service Card

### Edison Chouest Icebreaker Drydocks At Ingalls



Edison Chouest Offshore recently drydocked its icebreaker *Laurence M. Gould* at Ingalls Shipbuilding Division of Litton Industries. The 230-ft. (70-m), 3,400-ton vessels was placed in drydock for hull modifications on sea chest strainers, sonar access covers and a water-tight door.

Since mid-1997, Edison Chouest has contracted with Ingalls for 13 next-generation 240-ft. (73.1-m) OSVs, with options for four more; and has contracted for seven 190-ft. (58-m) OSVs with options for seven more. Nine of the 31 vessels are in various stages of construction, with the first scheduled for launch this month. The total value of the package is expected to reach \$125 million over the next few years.

Circle 28 on Reader Service Card

### Elf To Award Aker \$50-\$100M Deal

France's Elf Aquitaine is to award Aker Maritime a contract to build the jacket of an offshore drilling platform. The work would be for the Virgo discovery in the Gulf of Mexico offshore Louisiana. Aker spokesman Thorbjørn Andersen said that the contract, to Aker Gulf Maritime, was expected to have a value of between \$50 and \$100 million.

### Halter To Acquire Calcasieu Shipyard

Halter Marine Group, Inc. has signed a letter of intent to acquire the stock of three companies comprising the operations of Calcasieu Shipyard, Inc. This Sulphur, La., full-service shipyard provides repair and conversion services, vessel gas freeing and cleaning services, and specialized new construction. The 35-yr.-old yard which employs approximately 170, is located 17 miles north of Cameron, La. on the Calcasieu River at the Intracoastal Waterway.

Terms of the pending transaction were not disclosed and closing is expected during the first quarter of 1998. Upon completion of the acquisition, the yard will be known as Halter-Calcasieu. Revenue generated by Calcasieu Shipyard during the last twelve months approximated \$14 million.

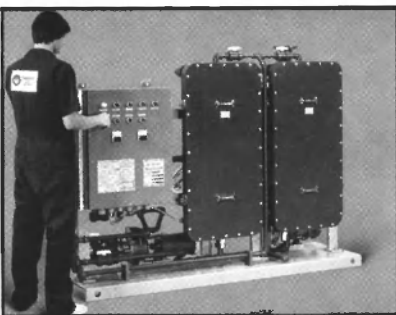
"Calcasieu's location close to the

Louisiana/Texas border is convenient to tugs, supply boats, barges and specialized vessels working in this very busy sector of the Gulf of Mexico. It is in an ideal location between our other Louisiana and Texas ship repair facilities and represents another important milestone in accomplishing our strategy to expand the repair part of our business. The shipyard has an experienced, well respected management team, and its acquisition will strengthen Halter's position

in the region while providing our customers with greater services." said **John Dane III**, chairman, president and CEO of Halter Marine Group, Inc. The facility has three 2,000 ton floating dry docks, a 400 ton railway, and a complete machine shop. Its fully permitted gas freeing facilities include large volume fuel storage, oil and chemical barge cleaning, pressure barge flaring and nitrogen inerting.

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### Marine Sewage Treatment From The Market Leader



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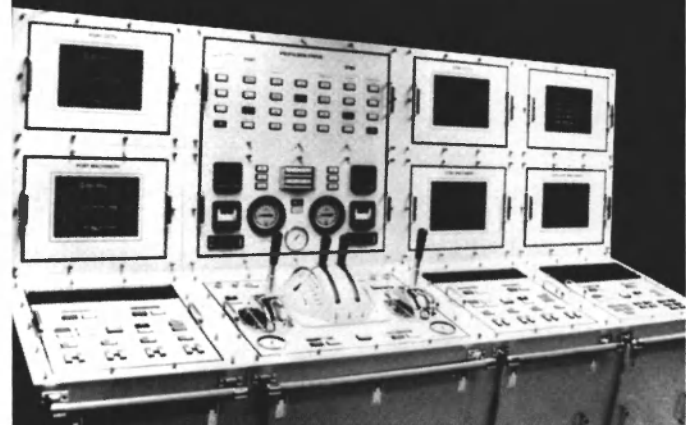


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Circle 220 on Reader Service Card

## Marine Drilling Signs Three-Year Contract

Marine Drilling has signed a three-year contract with Esso Exploration Inc., an affiliate of Exxon Corp., which will generate day rate revenues of about \$207 million during its primary term for

the Marine 700 drilling rig. Marine Drilling is scheduled to begin operations in the first quarter of 1999. Final construction of the Marine 700, a deepwater semi-submersible drilling rig, will be at HAM Shipyard in Pascagoula, Miss. The unit will be initially equipped to work in water depths up to 5,000 ft., readily upgradeable


to 7,500 ft. Marine 700 will be available to Exxon affiliates for work worldwide, outside the North Sea.

## Rowan Signs Charter Agreement With Sea Mar

Rowan Companies Inc. signed

term charter agreements with Sea Mar Management Inc. and Edison Chouest Offshore for the exclusive use of five offshore supply vessels.


The charters range from one to five years starting in the first quarter of this year, and new vessel deliveries scheduled between the second quarter of 1998 and the first quarter of 1999.



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## Venezuelan Frigates Come To Ingalls For \$315M Modernization Project



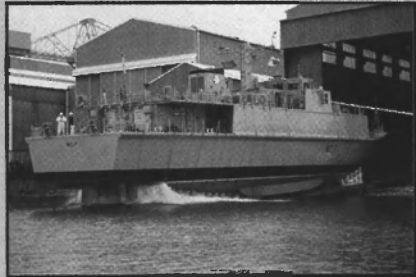
Two Italian built 2,500-ton LUPO class frigates of the Venezuelan Armada have been sent to Ingalls Shipbuilding, a division of Litton Industries, for a \$315 million modernization project. *Mariscal Sucre* (F-21) and *Almirante Brion* (F-22) — both designed for anti-air, anti-surface and anti-submarine warfare missions in 1980 and 1982 — left Caracas in convoy with the T-62 transport ship *Arv Esequibo*. The T-62 accompanied the frigates in order to return their crews of nearly 300 back to Caracas after turning the vessels over to Ingalls Shipbuilding in Pascagoula, Miss.

The scheduled work will include repairs to the ship's hulls, replacement of their diesel engines, upgrading gas turbine engines, replacement of the ship's electrical generating propulsion plants and machinery control systems, as well as upgrades of shipboard command and control systems in the ships' Combat Information Centers (CIC). In addition, all weapons' systems will be overhauled.

Circle 30 on Reader Service Card

Circle 306 on Reader Service Card

## VT Delivers LCVPs, Minehunter



Pictured is HMS Pembroke.

The U.K. Minister of Defense recently received four new landing craft vehicle personnel ships (LCVPs) from Vosper Thornycroft Ltd. (VT), vessels destined for the Royal Marines. The new LCVPs will be carried aboard the landing platform helicopter (LPH) vessel HMS Ocean.

The Mark 5 series of LCPV is all aluminum and nearly 50 ft. (15 m) long with the capacity for 35 personnel and nearly two tons of equipment.

These vessels are all powered by Volvo Penta diesels driving Vospower 170 water jets to produce speeds in excess of 15 knots fully loaded.

VT has also delivered the Royal Navy's latest minehunter, HMS Pembroke, from its Southampton shipyard. Pembroke is the seventh minehunter in a batch of 12 Sandown class vessels being built by VT.

The major innovation in the technology involving the building of this vessel is its Seaman Composite Resin Infusion Molding Process (SCRIMP). SCRIMP allows for the composite to be vacuum-sealed by a machine, whereas the older models and composites had to be applied by hand.

VT is using the SCRIMP method for all of the superstructures and some of the internal structures of the new minehunters. The resin allows the vessel to remain non-magnetic and to also resist high shock loads.

The Sandown class minehunters are 175 ft. (52.5 m) long and displace about 470 tons with an accommodation of 40 crewmen.

Circle 32 on Reader Service Card

## BBN Sonar Completes Sea Trials

BBN Technologies has announced the successful sea trials of four of its Distant Thunder sonar systems for U.S. Navy patrol ships. This advanced anti-submarine warfare system (ASW) was

developed in partnership with the Defense Advanced Research Projects Agency (DARPA) over the last 6 years. Distant Thunder is a low frequency, multi-static active sonar system designed to provide an organic rapid area search and localization capability for U.S. Navy ships against quiet diesel/electric submarines operat-

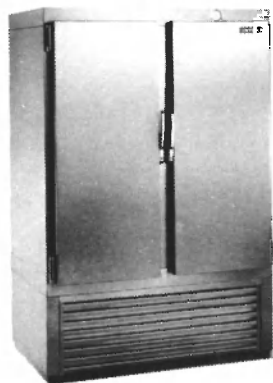
ing in acoustically adverse waters, such as those found along coastal regions. This system will be blended by means of commercially-off-the-shelf hardware with helicopter, surface and command and control systems support to more accurately locate anomaly-like sounding submarines.

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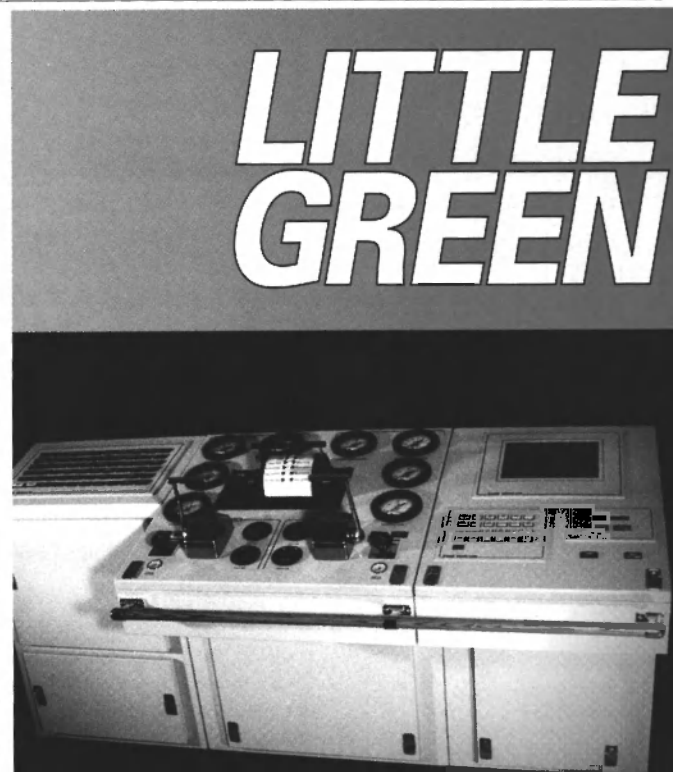
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Circle 221 on Reader Service Card

## Lockheed's *SLICE* Hits the Waters

A revolutionary new ship designed by Lockheed Martin Corp. for the U.S. Navy has successfully completed sea trials. **Paul Rospin**, program manager for the Navy ship *SLICE*, said the

unique design and high technology offers 30-knot speeds and high stability for a relatively small ship. (*SLICE* achieved 31.6 knots in trial runs off Oahu.)

*SLICE* measures 105 ft. (33 m) long and is a higher-speed derivative of SWATH technology featuring twin MTU 16V396 TB94 engines providing 3,500 bhp each.

The prototype was designed, built, tested and delivered in less than four years for a price of \$14.5 million.

The applications for *SLICE* are flexible allowing for both military and commercial use. Intended uses of the one-of-a-kind vessel include craft command and control, littoral warfare, missile

launch pad, patrol boat, test range support craft, special warfare, helicopter supporter, and search and rescue missions. Hawaii's Senator **Daniel Inouye** hopes this new technological advance can someday be applied to an inter-Hawaiian Island ferry service, as well as for offshore research, oil supply/crew boat, and possibly an excursion/cruise ship.

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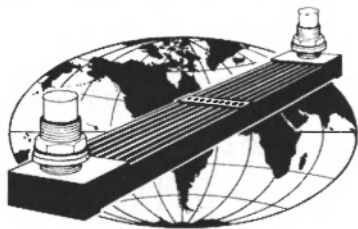


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Circle 265 on Reader Service Card

## CACI Wins \$20.8M Navy Contract

Information technology company CACI International Inc. has received a five-year, \$20.8 million contract from the U.S. Navy.

Starting April 1, 1998, CACI will provide technical and engineering services to the Navy's submarine-launched ballistic missile program.

The U.S. Naval Surface Warfare Center in Dahlgren, Va. awarded the contract, which includes a \$2 million base period and five option periods totaling \$18.8 million.

## Ingalls Celebrates Keel Laying of LHD-7

Ingalls Shipbuilding division of Litton Industries celebrated the keel laying of the landing craft LHD-7, *IWO JIMA*. The new vessel will carry more than 2,000 marines, a navy crew of 1,200 and both Navy and Marine Corps assault helicopters.

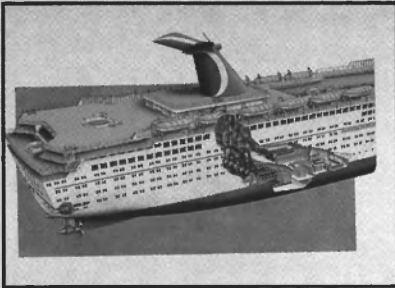
## Comptek Nabs Four-Year \$25.8M Navy Contract

Comptek Research Inc., which sells electronics and data communications systems, received a four-year \$25.8 million contract to perform engineering services for the U.S. Navy, with options for an additional \$9.1 million of work.

The contract increases Comptek's backlog to \$115 million, the highest level since September 1996. The U.S. Navy Space and Naval Warfare Systems Center in San Diego awarded the contract, which calls for Comptek to provide engineering and computer programming services for the maintenance and modification of the Navy's Command and Control Processor computer program.



## First Azipod-Propelled Liner Completes Sea Trials



Above, an illustration of the Azipod system installed on *Elation*.

Below, *Elation* is shown during sea trials.



The sea trials of Azipod-propelled cruise ship *Elation* were recently successfully completed after its construction at Kvaerner Masa-Yards' (KMY) Helsinki yard for Carnival Cruise Lines. The \$300 million, 2,040-passenger ship was tested in the Gulf of Finland.

*Elation* is fitted with two 14 MW Azipod units azimuthing through 360 degrees, and incorporates an electric AC motor which is located inside the propeller pod.

The Azipod units replace the internal electric propulsion motors, shaft lines, rudders and rudder machinery along with three 1,500 kW tunnel stern thrusters, found on the six existing 70,400 GT/2,600 passenger fantasy-class cruise liners built by KMY.

The tests revealed an increase of eight percent efficiency, a half-knot of speed and savings of 40 tons of fuel per week in normal operation. The turning diameter of the ship was decreased by 30 percent. After sea trials, *Elation* returned to the yard for a final fitting, and was scheduled for delivery this month.

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## Euronaval 1998 Set For Paris

From October 26- 30 representatives from 120 countries will gather in Paris for Euronaval 1998. Some of the products that will be exhibited at Euronaval 1998 will be parts and accessories for surface ships, submarines, surveil-

lance ships, harbor craft and landing craft.

Electronics products to be shown include the latest in sonars, underwater acoustics, radars, navigation equipment, data processing, display monitors and telecommunications technologies. There will also be weapons experts on hand to discuss sea-to-sea and sea-to-air missiles. For those interested in

the aeronautics aspects of the industry, there will be displays, exhibits and discussions on aerial systems, fixed-wing aircraft and helicopters, engines, weapons and airborne detection.

For more information visit the Euronaval website at <http://www.euronaval.tm.fr>, or call, tel: +33 1 47 36 80 80; or fax: +33 1 40 93 57 72.



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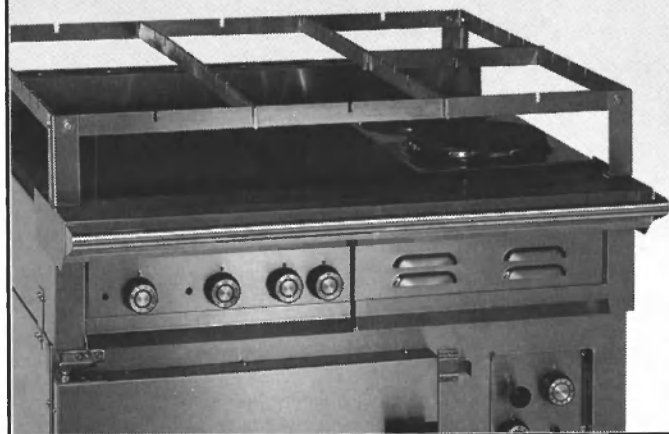
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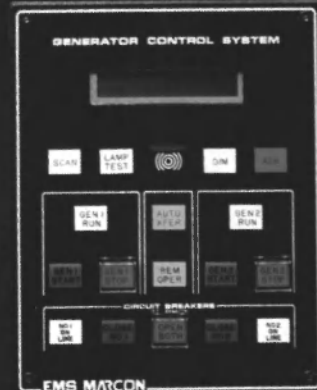
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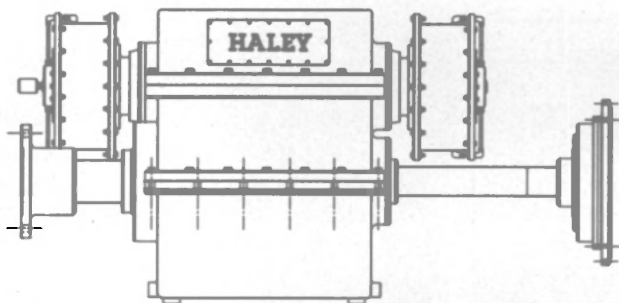
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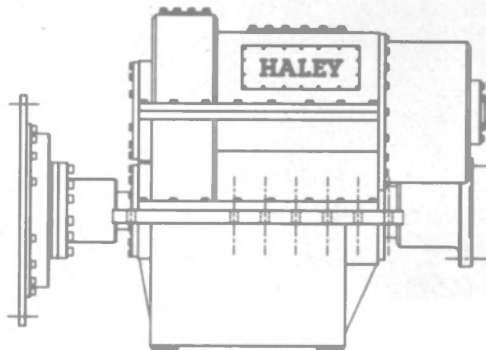
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## PEOPLE & COMPANY NEWS

### GE M&I Engines Appoints U.S. Navy And Marketing Manager



Robert Saul

**Robert Saul** has been appointed by GE Marine and Industrial (M&I) Engines to oversee the U.S. Navy and North American marine efforts involving gas turbine and gear programs. Mr. Saul previously worked for Lockheed Martin Information Systems in Orlando. He is also a cited and acclaimed member of the U.S. Navy League.

### BP's David Witmer Passes Away

**David J. Witmer**, a naval architect and marine engineer at British Petroleum (BP) for more than 13 years, recently died of cancer at the age of 50.

Mr. **Witmer** was a U.S. Navy veteran, a grad-

uate of the University of Michigan's naval architecture and marine engineering program. He was a member of many organizations dedicated to the safety and pioneering of maritime architecture and vessels.

### Crowley Names Oil Barge Sales Manager

**Chris Dugan** has been named new Sales manager for Petroleum Transportation for Crowley Marine Services (CMS) in Seattle, Wash. Mr. **Dugan** formerly served CMS as manager of Customer Service for Southern California. He will oversee petroleum transportation to areas such as Alaska, Hawaii and Mexico. CMS's fleet consists of 14 oceangoing barges.

### Mackay Acquires ESSE

Mackay Communications has gained

immediate entry into the coveted market of the Hampton Roads area with the acquisition of Electronic Sales and Service Inc. (ESSE). ESSE has expertise in most communications, navigation and safety equipment, including radars, Satcoms, and GMDSS Consoles, and will be renamed Mackay-Hampton Roads. With this acquisition, Mackay now offers service facilities in all major U.S. Ports.

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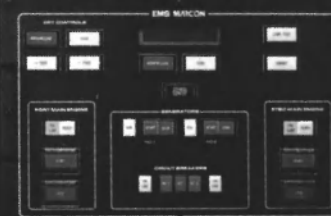
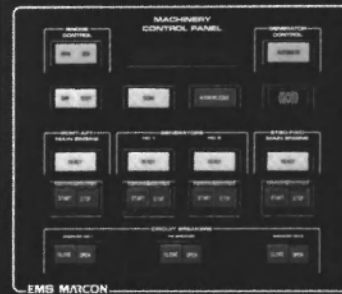
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**CSI Announces Three Promotions**

Composite Structures International, Inc. (CSI) has promoted **Ken Berg** from manager to director of Corporate Engineering.

Mr. **Berg** will head all ventures in research and development of new products and applications, design and engineer fiberglass structural

systems and conduct seminars.

**Marty Mauer** was named vice president, Sales and Marketing for international regions and North America. Mr. **Mauer** has greatly increased international sales volume with his ideas, strategies and new products.

**Wendell Hollingsworth** was promoted to director of operations for CSI. Mr. **Hollingsworth** will be responsible for all plant operations at five of CSI's facilities.

**Bollinger Names New VP**

**T. Walter Berry** has been named executive vice president and COO of Bollinger Shipyard Inc.

Mr. **Berry** will oversee the operation of all of BSI's subsidiaries.

**FCS Establishes Service Center In U.S.**

FCS, Inc. has established a Malin Precision Diesel Engine Analyzer Service Center in Centerport, Conn. Dive Time Systems, Inc. in the U.K. will assist with the training and set up of the facility which will handle upgrades, repairs and recalibrations.

**Ulstein and Hyundai Join Forces**

Ulstein Berger (UB) AS and Hyundai Heavy Industries (HHI) have entered into two agreements. The first covers the manufacture of current designs of UB engines under license by HHI in South Korea for marine and land-based energy production. The second agreement allows for joint design and development for a new medium-speed engine.

**Offshore Equipment Market Looking Up**

More good news regarding the longevity of the offshore oil boom was heard recently when Italian drilling equipment company Saipem SpA reported that it expected the offshore plant equipment market to grow by 10 to 15 percent in 1998.

According to the company's chairman, **Fabrizio d'Adda**, the deep sea market has remained firm, and is the cause of Saipem's optimism. Mr. **d'Adda** also noted that depressed oil prices will not affect the market so much in 1998. However, if oil prices remain at current levels, plans beyond year-end could be altered.

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**PEOPLE & COMPANY NEWS**

**Mathers Controls Names Tilschner Head of European Sales**



Mark Tilschner will be responsible for developing new customers in the European marketplace.

Mr. Tilschner will also maintain Mathers' customer database and head the training and service departments. Mathers produces single-lever electronic control systems for boat engines.

**Oceaneering Buys San Jacinto**

Oceaneering International Inc. (OII) has purchased production barge *San Jacinto* for \$7 million from Conoco Indonesia Inc. The purchase was designed to give OII its first production presence in Southeast Asia.

**DNV Earns USCG Authorizations**

Det Norske Veritas (DNV) received permission from the U.S. Coast Guard to conduct plan approvals, surveys, and issue load-line and international oil pollution prevention statutory certificates for both new and existing U.S. flag ships. These authorizations were implemented in order to improve safety at sea and also to reciprocate Norway's willingness to let USCG ships survey and approve its ships.

**ASTM Committee Elects New Slate Of Officers**

The American Society of Tests and Measurements (ASTM) Committee F-25 on Ships and Marine Technology has announced the following new officers to serve through December 31, 1999: **Harold H. Greiner**, chairman; **Charles H. Persall**, administrative vice-chairman; **A. Eugene Henn**, technical vice-chairman; **Thomas F. Conroy, Jr.**, promotional vice chairman; **Glenn M. Ashe**, secretary; **Edward C. Barrett**, membership secretary; and **Robert P. Draim, Robert R. Hardison, George Ponton** and **Philip R.J. Lloyd**, members-at-large.

February, 1998

**DNV Gives Drewgard 'OK'**

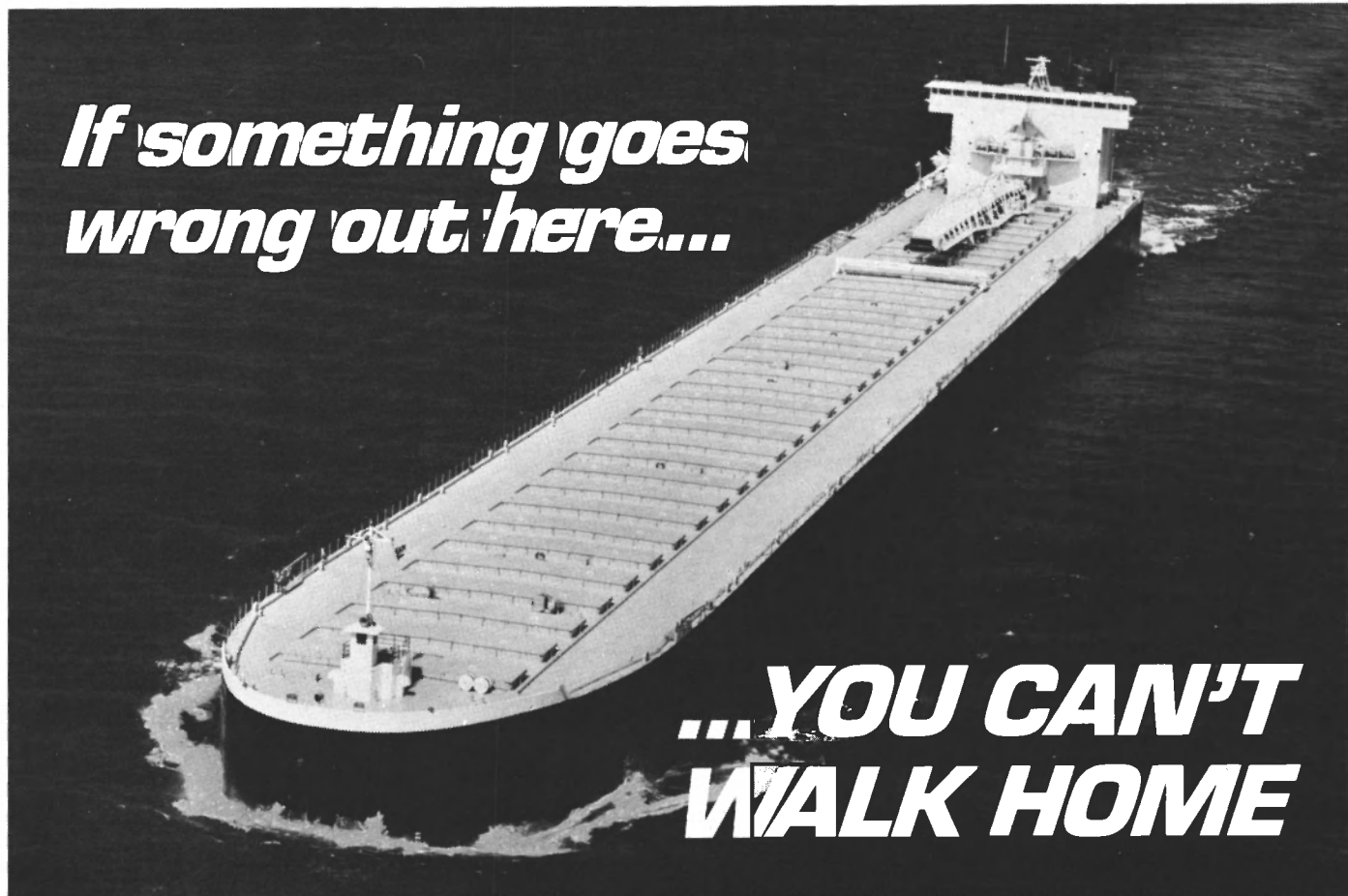
Ashland Chemical Company's (ACC) Drew Marine Division has received a Type Approval Certificate from DNV for use of 'Drewgard WB' corrosion preventative as a semi-hard ballast coating. This designation means that annu-

al ballast surveys may possibly be avoided.

This new coating and process reportedly lowers the total costs of application, and eliminates dry-docking, while giving hard-coating performance with a normal service life of five years. It is a wax and synthetic polymer formulated with

water as its carrier.

The resulting film reportedly will not crack or peel, and is thinner, brighter in color for easier inspection, and has a shelf life of approximately two years. It reportedly dries in 45 minutes while needing only one thin 4-5 mils thick coat.



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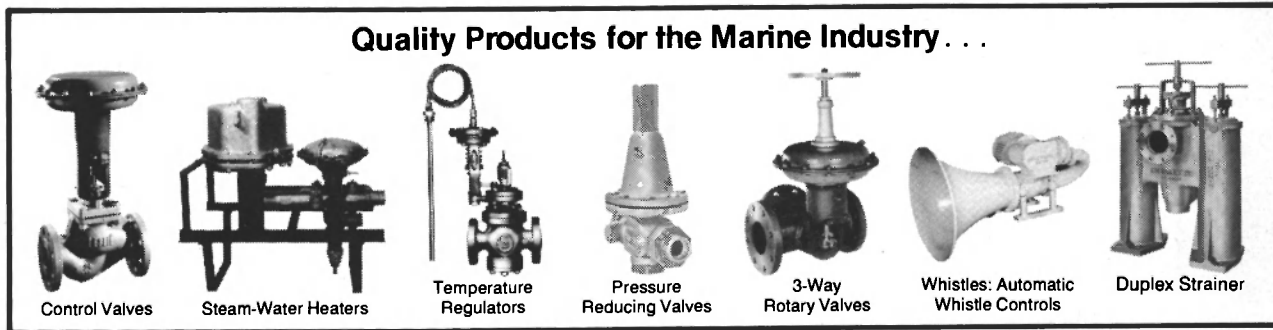
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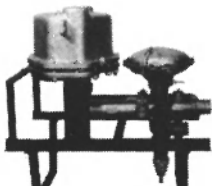
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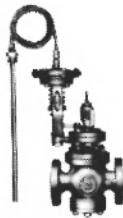
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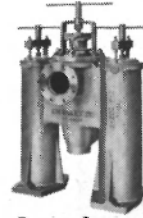
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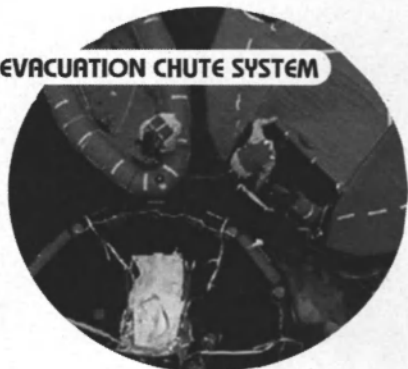


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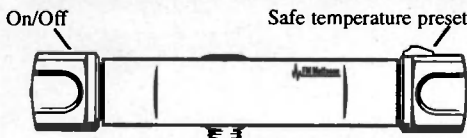
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## Butterworth Names Turkish Agent

Yedi Deniz A.S. has been named, by Butterworth Systems, Inc., sales and service representative for the Turkish marine industry effective November 1, 1997, representing a select group of worldwide marine equipment manufacturers.

## Stanford Named VP Of TAST

Chris Stanford has been named vice president of TAST Corporation. Mr. Stanford will be responsible for TAST operations in Houston. TAST is a 20-year-old corporation devoted to exclusive shipyard representation of many U.S. and Canadian shipyards.

## Ulven Buys Gardiner Assets

The Gardiner manufacturing company of Oakland has been purchased and moved to Hubbard, Ore. by Ulven Companies and hybridized to produce a broader selection of forged and steel cast products.

## NNS Appoints New Director

Scott Stabler has been named to the newly created position and department of director of business development for Newport News Shipbuilding (NNS).

Mr. Stabler will focus on creating new methods to take full advantage of the company's current strengths and analyze new business ventures.

## Kings Point Selects Alumni President

Virgil R. Allen was selected president of the U.S. Merchant Marine Academy alumni organization which represents more than 20,000 alumni, parents and friends of the federal institution from Kings Point, Long Island, NY.



Virgil R. Allen

Mr. Allen was a member of the Academy's 1973 graduating class and has also served more than 20 years in the U.S. Coast Guard.

**ABS Sponsors Scholarship**

The American Bureau of Shipping's (ABS) Program Manager, **Frank Iarossi**, announced that ABS will be sponsoring a new scholarship program for students attending courses in maritime engineering, accredited by the Institute for Stage I Chartered Engineer registration.

The program, largely based in London, will result in up to 10 annual single-payment scholarships of roughly \$1600 per year. This is the second time within the last year that ABS has sponsored a maritime scholarship.

In other ABS news, **Dimitri Houliarakis** has been appointed vice-president of the eastern region for ABS Europe Ltd. Mr. **Houliarakis** formerly served as ABS Country manager of Greece. He still holds many other senior level positions. **Konstadinos Klapanis** has been promoted to the spot Mr. **Houliarakis** just vacated.

**FST Names Bertolino Senior VP**

**Robert Bertolino** has been appointed senior vice president of Fay, Spafford and Thorndike (FST). His responsibilities include managing the consulting engineering and planning firm, as well as FST's structural division. Mr. **Bertolino** also serves as FST's chief security officer.

**Pedersen Joins FVO Staff**

Seattle's historic Fishing Vessel Owners Marine Ways (FVO) added **Leif Pedersen** in the role of marketing and customer service representative.

**Delmar Systems Signs Five-Year Deal With Shell**

Shell Oil Co. and Delmar Systems have agreed upon a plan in which Delmar will provide a suction anchoring system for rig mooring in water depths up to 8,000 ft. (2,440 m.) for Shell's Deepwater Development division.

The system allows for pre-deployment of the anchor so that crews can begin operations immediately upon arrival.

Delivery of the anchoring sys-

tem will take place in July 1998.

**Kerr Norton Selects VPs**

**Anthony Samona** was named vice president of Kerr Norton Marine's (KNM) U.S. Gulf region. Mr. **Samona** is a 20-year veteran

of the Norton Lilly organization.


**Douglas Gutwig** has been promoted to vice president of the company's U.S. West Coast and Hawaii regions.

Mr. **Gutwig** has been successful at KNM in its Asian vessel owner/operator relationships.

**OMI Elects New President**



**Tommy L. Lee** has been elected president of Offshore Marine Services, Inc., which provides support for OMI Petrolink Corp., a provider of lightering and related service in the U.S. Gulf.

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## PEOPLE & COMPANY NEWS

### Lehman Appointed Maintenance and Repair President

Kimble Lehman has been named president of National Maintenance & Repair Inc.'s Hartford, Ill. shipyard. He was

formerly vice president overseeing the hull and gas-free cleaning facility.

### Senior Transportation Engineer Joins CH2M Hill

Stan Moon has joined the staff

of CH2M Hill as a senior Transportation Engineer. Mr. Moon has more than 30 years of transportation experience managing systems, programs and projects for the Washington State Department of Transportation.

He will be serving West Coast transportation clients from the

firm's Seattle office.

### New Management Consulting Group Formed

The Annapolis Management Group and Polaris Associates have consolidated to form a new management consulting group, Sanborn Yearwood & Associates (SYA) in order to serve clients in maritime markets and international trade communities.

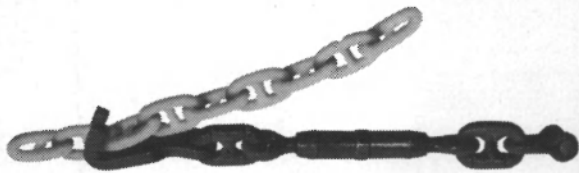
### Germanischer Lloyd Opens Office in New Orleans

Germanischer Lloyd (GL) has opened a station in the port of New Orleans to interact with shipyards, broaden its service network, provide a more direct contact with ship owners and suppliers, along with securing a better relationship between port and state authorities and GL customers.

### East Coast Overseas Appoints Campos President

Carlos Campos has been appointed president of East Coast Overseas. Mr. Campos was formerly an associate of East Coast's parent company in Lisbon.

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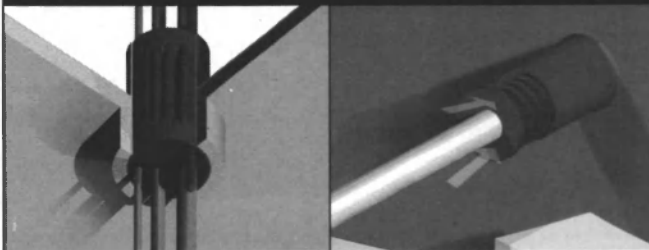
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## P&O Launches Containership

P&O Nedlloyd recently launched *Arica*. The 2,160-TEU containership is the first of several new vessels to be launched by the company this year. *Arica* was christened and launched at Flender Shipyard and will be assigned to the company's Lamcon services after its completion in March.

Sailing between the Far East and South America, the new vessel will replace existing charter ships on the same route and is the sixth ship from the Flender yard to be chartered by P&O Nedlloyd from Reederei Claus Peter Offen, Hamburg. *Arica* is classed to GL 100 A5 E standards and meets SOLAS 11-2 regulation 54. Measuring 600 ft. (183 m) long with a 95 ft. (29 m) beam, *Arica* is powered by MAN/B&W 6 S 60 engines with a service speed of 20 knots.



## Rolla: Advancing Propeller Design

Founded in 1963 by Philip Rolla, Rolla Propeller offers a wide variety of services, consultations and designs, including: performance and power prediction for displacement and planing craft; propeller design; estimation of complete hydrodynamic characteristics of the propeller geometry, and propeller cavitation characteristics through exclusive lifting surface and panel method programs; manufacturing of propeller models; model basin tests in the Berlin University cavitation tunnel and at the IMHEF cavitation tunnel at Lausanne; full scale tests; propeller re-calculation and redesign for existing vessels; designing and manufacturing of propeller prototypes and pre-series; designing of conventional and unconventional propulsion systems; and consultation on propulsion problems. All Rolla propellers are designed to be dedicated to a particular craft's projected operational profile by using the Rolla proprietary lifting service and panel method programs, and are manufactured using the Catia CAD/CAM program. A Rolla-associated manufacturing facility is able to mill propellers up to (9.8 ft.) (3 m) in diameter with a five axes MECOF M 1000 milling machine.

Rolla also offers a complete design service for companies interested in the application of surface propellers, specifically for those operators not wanting to use a commercially available drive, but desiring to realize their own proprietary system. Rolla will collaborate with builders in the design of their own system, and will make available more than 30 years of experience in surface propellers and installation.

### Foundation Built On R&D

As part of its ongoing dedication to research, in 1993 Rolla became a member of the MIT/Navy/Industry Consortium on Cavitation Performance of High Speed Propulsors. One of the principal objectives of the consortium was to develop efficient computational optimization techniques for the automated design, in the presence of cavitation, of innovative high-speed propulsive configurations.

In general, propellers are produced in high-tensile stainless steel (using investment casting and forging) for very high-speed craft and traditional casting in

steel or NiBrAl for commercial, military, workboats, luxury boats and pleasure boats up to 80 knots.

The Rolla families of stainless steel and NiBrAl surface piercing propellers include lines specifically designed for Arneson Drives, Levi

Drive Units, Mondrive System and Trimax. In addition, Rolla recently designed and produced forged steel blades for controllable pitch surface propellers. The results Rolla obtained at the Technische Universitat Berlin constitute the first systematic series of surface propellers available in the world and permit the company to supply

the torque and thrust coefficients and efficiency, horizontal and vertical force figures for different shafty inclinations and propeller immersions. The Rolla stainless steel propellers for stern drives include lines specifically designed for ZF-MPM, Volvo Penta, MerCruiser, Kiekhaefer, Yamaha and OMC.

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Pictured is the Tsuneishi shipyard of Tsuneishi Shipbuilding, which has complemented its considerable bulker program with orders from Ugland for 6,000-unit car carriers.

## Resilience In The Face Of Adversity

by David Tinsley, technical editor

Having demonstrated considerable fortitude in withstanding an intensified competitive onslaught over recent years, Japan's shipbuilding industry is hoping that South Korea will not put even greater emphasis on exports as part of its drive to overcome financial crisis.

Japanese yards wholeheartedly embraced technological initiatives in a determined bid to raise productivity at a time when they were most seriously disadvantaged by the strength of the Yen.

Rising newbuilding demand over a period of improvement in the currency relationship enabled the industry in Japan to realize the steady gains in efficiency resulting from earlier commitments to new systems and improved organization.

A distinct leaning toward standardized output in a general merchant shipbuilding context has meant that the effect of, and the yield from, capital expenditure and modernization has been optimized by batch or series production. The downside of a shipyard-led emphasis on a standard specification is the premium that has to be paid by an owner for any measure of tailoring. The upside is efficient contractual performance and build quality at a competitive price.

But there are fears that the impact of South Korea's national economic crisis on currency values and restructuring planning will be a redoubling of efforts on overseas markets. Refund guarantees are currently perceived by some owners as a potential problem at certain yards on the peninsula, but the conclusion in recent months of a number of newbuilding deals with high-profile foreign operators demonstrates that such a view is not held in every quarter.

Coinciding with the deepening of South Korea's financial turmoil, world shipbuilding statistics issued by one authoritative source, Lloyd's Register, pointed to the backlog of newbuilding work in South Korea having overhauled that of Japan's shipbuilders.

A very high level of new contract intake, amassing to twice the amount of tonnage completed over a three-month period, saw South Korea edge above Japan in the world shipbuilding stakes in regard to total orderbook, as of September 30, 1997. Since output is a better indicator of production and overall

Pictured is 72,000-dwt bulker *Rubin Power*, which is controlled by Navix Line, which has ordered SpecTec shipboard systems for its entire fleet.



Maritime Reporter/Engineering News



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activity, though, it was significant that Japanese completions of 2.131 million-gt and 1.444 million-compensated gross tons (cgt), during the third-quarter of the calendar year, remained in excess of South Korea's deliveries.

Japan's work tally, accounting for 31 percent and 27 percent of the

world total by gt and cgt respectively, is at its highest level in years, 50 percent more than it was in 1985 and three times that of the slump years of 1987-88. Nonetheless, South Korean yards have trebled their workload over the same period, and their current two-year contract backlog repre-

sents a substantial platform from which to launch a restructure of the industry. Figures issued by the Japan Ship Exporters' Association (JSEA) showed that the export-designated contract intake in the 1997 calendar year, including tonnage built for foreign affiliates of Japanese companies, had reached

273 vessels of 11 million-gt by the end of November, compared with 234 of 7.7 million-gt for the whole of the year before.

In line with the positive trends in demand, and out of consideration of recent years' generation of new capacity in South Korea, government controls on Japanese capacity have been relaxed to some degree. A number of yards have been permitted to increase the extent of simultaneous construction of ships up to a certain size, thereby providing builders with

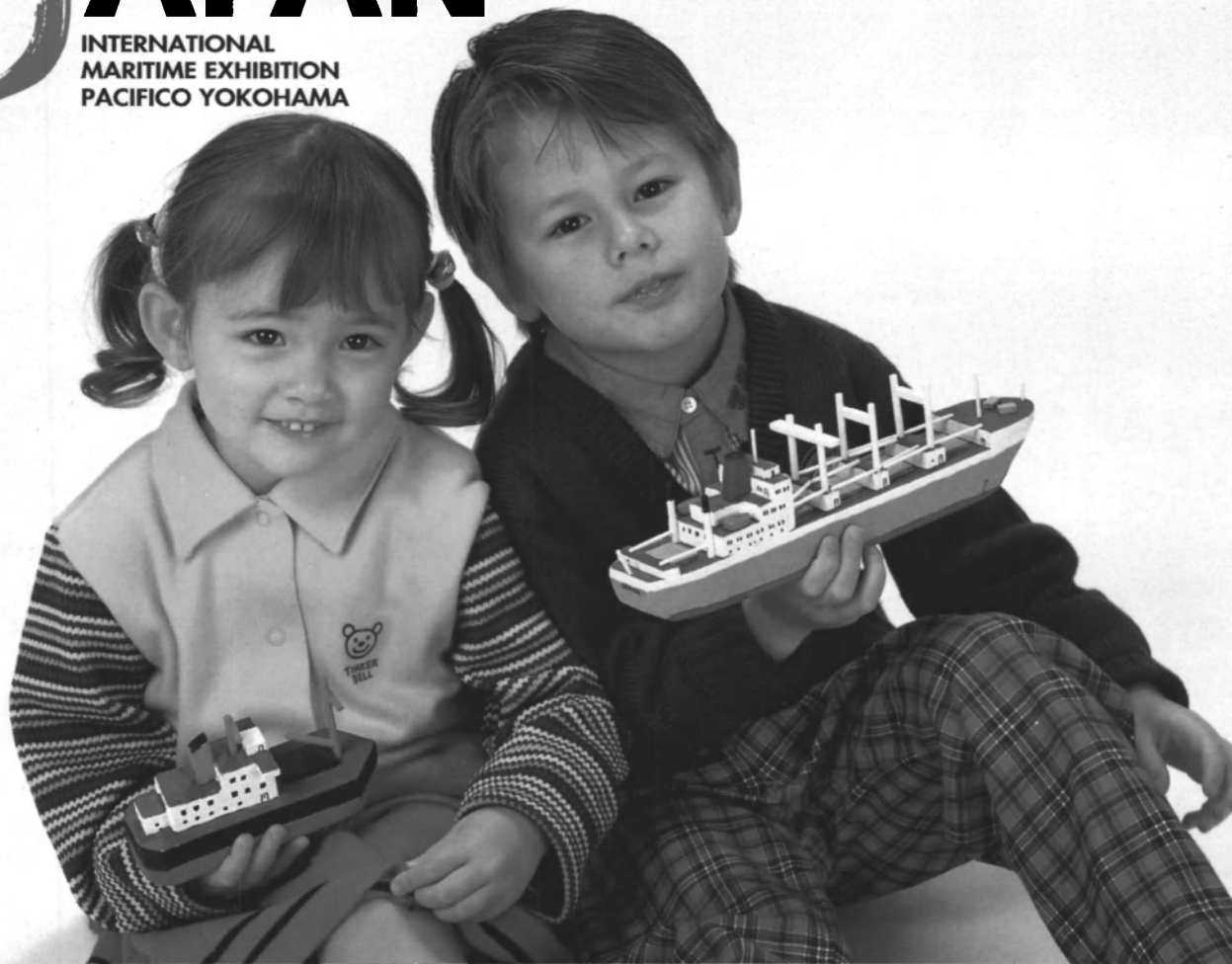
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Date: 11 (Wed.) - 13 (Fri.) March 1998  
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- International Exhibition 10:00-17:00
- International Conference 11:00-17:00  
11 March, Pacifico Yokohama Conference Center
- New Technology Seminar (11-13 March)
- IT Seminar by Marintek (Norway) (12 March)



### New Japanese Engine Designs

Following on from the development in 1996-97 of the UEC43LSII engine, Mitsubishi Heavy Industries is to add a smaller long-stroke design to its portfolio, in the shape of the UEC37LSII.

As Japan's only designer of large two-stroke diesels, and the single competitor in the field to the European-based market leaders MAN B&W and Wartsila NSD Corporation, Mitsubishi's diesel engine division has sought to increase the number of options available in its range of machinery up to 63,600-bhp, while pursuing an active product modernization program. The 430-mm-bore UEC43LSII, covering a power band from 5,720 to 11,440-bhp, is positioned as a replacement for the UEC45LA type, while the nascent, 370-mm-bore UEC37LSII engine provides for powering configurations in the 5,250 to 8,400-bhp sector at a running speed of 186-rpm, compared with the 160-rpm of the 43-type.

The prospective addition to the series has the same stroke-to-bore ratio of 3.49 as the UEC43LSII, a similar brake mean effective pressure (bmeP), and a specific fuel consumption rating of 129-g/bhp-h, marginally above that of the 43 engine's 127-g/bhp-h.

A simplified and compact form of construction has been adopted, as reflected in the cast monoblock composition of the camshaft box and engine frame, on the one hand, and the cylinder jackets and scavenging trunk, on the other. The Japanese company has also unveiled a 520-mm bore diesel aimed principally at the market for Panamax bulkers and smaller vessels.

The UEC52LSE has been designed to produce 2,320-bhp per cylinder at a crankshaft speed of 127-rpm, and is claimed to be one of the most fuel-conservative in its class, requiring just 123-g/bhp-h. With its comparatively high power rating, the new type offers the same output as competing designs but with the advantage of one cylinder less.

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Pictured is *Halo Olympus*, a 1997-built Optima-type from Hitachi Zosen, one of the world's most prolific builders of Panamax bulkers.

greater flexibility in responding to the market's needs and realizing efficiencies in unit construction costs. There are also plans to reactivate docks for newbuilding purposes. Sensitivity to South Korean expansion, albeit now halted by the national economic crisis, is heightened by the fact that Japanese shipbuilding has cut its physical capacity twice in the past two decades — in fiscal 1979 and 1987. Thus from its peak of 18 million-gt in 1975, the industry is currently sized at some 10.5 to 11 million-gt.

The indications are that this may be brought up to around 11.5 to 12 million-gt by the end of 2000.

**Big Investment In Technology**

Japanese shipbuilders' unflinching trust in technology as a tool for maintaining competitiveness in the face of demanding market conditions and adverse labor supply trends is manifested across a broader-than-ever range of applications.

Three companies, Mitsubishi Heavy Industries (MHI), Mitsui Engineering & Shipbuilding (MES) and Sumitomo Heavy Industries (SHI), are investing more than Yen1 billion into a new system which addresses the gradual reduction in the number of long-serving skilled personnel on the production floor.

Ishikawajima-Harima Heavy Industries (IHI), Kawasaki Heavy Industries (KHI), Hitachi and Nippon Kaiji Kyokai (NKK) will also be involved in the three-year program, which will be partially funded by the Ship & Ocean Foundation and the Nippon Foundation.

Constituting a major collaborative initiative in the CIM (computer integrated manufacturing) field, the project seeks to make yards less dependant on the skills and long experience of senior foremen and other key people by obviating

the need for individuals to input data into microprocessor-controlled systems. As testimony to the spread of Japanese shipbuilding influence, 1997 saw the delivery of the first vessels from a joint venture yard in the Philippines and the start of the ship construction program at a new joint under-

taking in China.

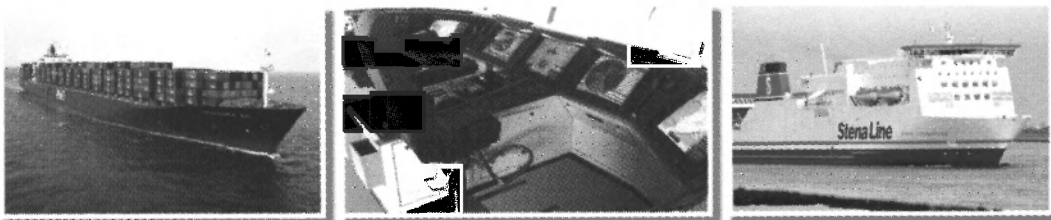
*Sea Amelita* led a class of 23,400-dwt geared bulkers entrusted to Tsuneishi Heavy Industries Cebu, established on a greenfield site near Balamban by Tsuneishi in conjunction with the diversified Aboitiz Group of the Philippines.

The vessel was completed within

two years of the ground being broken at the site on the west coast of Cebu Island, to which Tsunieshi had committed 100 Japanese supervisors. The yard is anticipated to attain a level of welding skills comparable to that of its parent in

*(Continued on page 58)*

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# Cruise Ship Market



## *A Time To Reflect . . .*

*. . . but not to stand still. The cruise shipping market has been in a near perpetual motion of big, bigger and biggest new ship contracts since the early 1990s, and there is no indication that this will change anytime soon. Already well-established in the American psyche, cruise shipping is actually expanding further in the U.S., while enjoying new interest and business worldwide. Contributing writer Bridget Murphy spoke to cruise industry leaders to discuss the future course of cruise shipping business.*

## Defying Boom and Bust Predictions

### Cruise Shippers Gear Up For the New Millennium

by Bridget Murphy, contributing writer

*Buoyed By '97 Earnings and Lessons Learned, Owners Anticipate Another Decade of Market Growth*

Simply put, the cruise lines outdid themselves last year. Consolidation and globalization were the pet phrases used by industry insiders to describe the market atmosphere in 1997, but

North American consumers were too distracted to pay attention to the predictions of analysts, investors and owners. Fresh options and new vessels were luring them to the sea. They were

buzzing about trips on the world's largest passenger vessel, lining up to book passages on Mickey Mouse's new ship, and financing vacations afloat with loans from the cruise lines. Some people rode the rails to ports of origination, others cruised from Houston, or opted to bring their families on voyages aboard child-friendly newbuilds, with their underage broods toting special edition cruise ship Barbies along for the ride.

The flurry of ship ordering activity that ushered in the early 1990s continued, and cruise line executives used the trade show last March as a platform to shelve the notion that the market was becoming oversaturated with a glut of new berths. They hinted at further brand consolidation, and chanted a "Look to Asia" market expansion mantra. Arriving in Miami with an infusion of capital

**"I think you may see us in a position where we would be ordering a ship,"**

**— Cunard's Mr. Bates**

and ship orders under its belt, even the troubled Norwegian Cruise Lines was back in the loop.

As *Disney Magic* materialized on Fincantieri's docks and promised to lure first-time passengers to cruising, Carnival Cruises readied to launch a partnership with Hyundai Merchant Marine in Asia, which the bullish interpreted as another indicator of the sector's depth. Rumors of a Cunard sale swirled mid-summer as Royal Caribbean and Carnival fought to acquire the struggling Overseas Shipholding Group's infant Celebrity Cruises fleet. With eight



**Enchantment of the Seas**

Shipyard .....KMY  
Name . . .Enchantment of the Seas  
Ship owner/operator .....RCL

Kvaerner Masa-Yards (KMY) Helsinki delivered the sistership of *Grandeur of the Seas* to Royal Caribbean in July of 1997. *Enchantment of the Seas* is a 916 ft. (280 m) long, 2,400-passenger luxury liner that boasts a total of 975 spacious cabins. KMY's price tag for completing both vessels was \$193 million when they were ordered in 1994.

KMY equipped *Enchantment of the Seas* with four MAN B&W electric propulsion engines capable of outputting 12,600 kW each. *Enchantment of the Sea* has a 74,000 gross tonnage and a maximum cruising speed of 23.5 knots. Although *Enchantment of the Seas'* length has been increased by 63 ft. (20 m), KMY was able to reduce the number of engines from five to four, and still maintain a high knot output. The four MAN B&W engines are single acting, non-reversible, fuel injected, turbo-charged trunk piston diesels, each driving an AC 15,300 kVa alternator feeding the

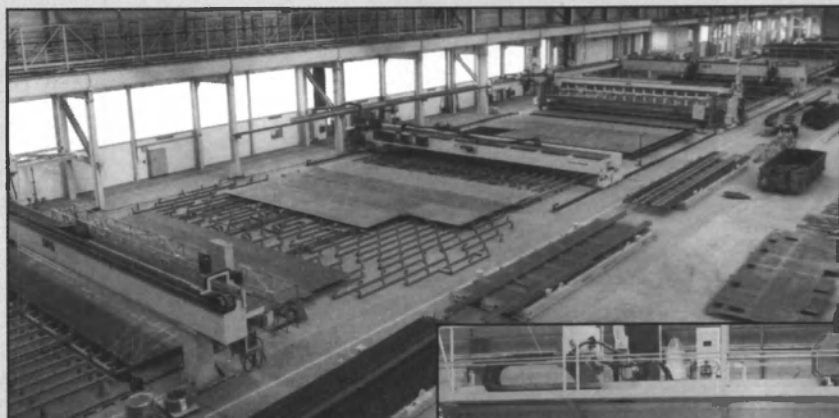
(Continued on page 48-A)

#### Enchantment of the Seas Main Particulars

Designer	Kvaerner Masa-Yards
Flag	Liberia
Classification	. . . . . DHV
Contract date	August 1994
Float out date	November 1996
Delivery date	July 4, 1997
Length, o.o.	916.6 ft. (279.1 m)
Length at design waterline	777.2 ft. (236.9 m)
Breadth at design waterline	105.6 ft. (32.2 m)
Breadth maximum	121.3 ft. (37 m)
Draft, design	24.9 ft. (7.6 m)
Air draft at design draft c	161.4 ft. (49.2 m)
Tonnage	74,140
Speed	22 knots
Maximum speed	23.5 knots
Main electric drives	(4) 15,300 kVA, 6,600 V, 60Hz Cegelec
Diesel alternators	(2) 1,050kVA, 60 Hz
Emergency diesel-generators	(2) 1,050kVA, 60 Hz
Propellers	(2) Fixed pitch, KaMeWa
Propeller diameter	17.7 ft. (5.4 m)
Rudders	Willi Boker
Stabilizers	Brown and Brothers
Boilers	Aalborg Sunrod
Cooling system	Sabroe Marine
Steering gears	Rotary-vane type
Four main engines	Man B&W 12V48/60
Propulsion motors	2 Cegelec 17,700kW
Passenger capacity	2,440
Cabins	975
Crew	760

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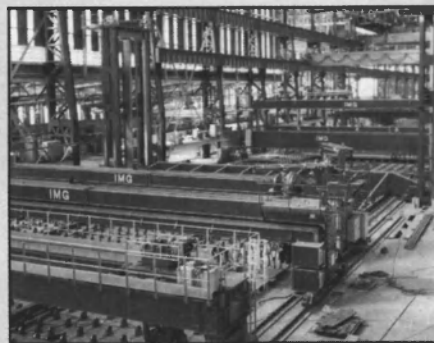
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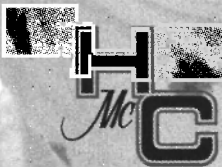
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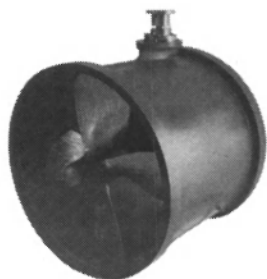
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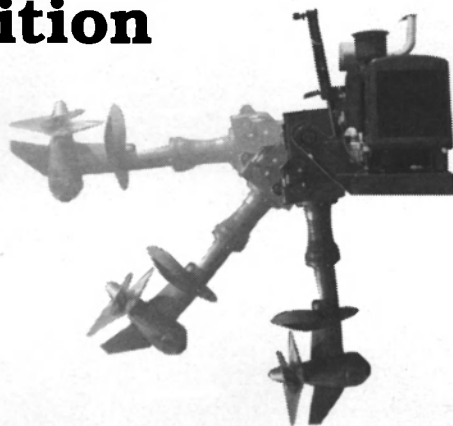
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newbuilds scheduled to debut in the upcoming year and five new vessels with more than 1,300 berths to be water-ready by December, sector-wide business was proceeding at a fair clip in the latter half of 1997. But while other positive developments, like the cutting of the first piece of steel for Royal Caribbean's Eagle class of ships at Kvaerner Masa-Yards in Finland, took place in the fall, before the year was over a smoke signal would go up, cautioning players to tread lightly in a market subject to adjustments and mishaps. Carnival pulled out of its venture in Asia, and in October the Asian financial market bottomed out. Disney announced a delay in the delivery of its first ship forcing thousands to change their plans for its maiden voyage, and Holland America also canceled three sailings on *Rotterdam VI*, all due to slowdowns at Fincantieri's Marghera yard. NCL's *Norwegian Star*, the first ship to call Houston its home, underwent a series of disastrous cruises which resulted in a class action lawsuit, and NCL's ship *Leeward* was alleged to have caused 500 years worth of damage to the Great Maya Reef off Mexico in a grounding incident.

One week into 1998, however, Princess Cruises announced a contract with Fincantieri for two 109,000-ton, 2,600-passenger sisterships for *Grand Princess*, which will surpass *Carnival Destiny* as the largest cruise ship afloat when it debuts this spring. On the shore side, Princess also opened a new facility in Valencia, Calif., to house its operations personnel, who will interface with executive staffers occupying Century City offices 30 miles further south.

Kvaerner's Cunard Cruise Line also completed a move of executive offices from New York to Miami, spurred by hiring and tax incentives offered by Florida's Dade County. Just weeks before this year's State of the Industry debate, several cruise executives have shared their spins on the 1997 market with *MR/EN*, some indicating that moves by their companies this year will set up the industry for growth in the new millennium.

### New Berths, New Addresses

While "mega-ships" are expected to play a role in driving the indus-

*(Continued on page 46)*

# Cruise Ship Market

## Sony Introduces VideoStore For Galaxy and Mercury



Pictured is the Sony Theater, recently installed on Celebrity cruise ships *Galaxy* and *Mercury*.

The Sony Corporation has developed and installed an interactive VideoStore aboard Celebrity Cruises' *Galaxy* and *Mercury*. The system is designed to allow users sophisticated levels of customized, easy and quick location of both audio and visuals in its database.

The system works with coded video compression and once a video is selected, the mainframe will translate the compressed signal and broadcast it in under three seconds to anywhere throughout the ship. The system is tailor made for companies who need programming repeated at various times of the day, such as cruise ships, theme parks, and hotels.

The staterooms and public areas of the ships are also equipped with monitors and display units that allow the user to access art, the ship's gift shop, videos, games, program guides, safety instructions and shore excursion information. The onboard movie theater can also access the VideoStore and play any of its movies.

VideoStore reportedly allows hundreds of channels to work either independently of each other, or be linked together. The system can also stagger viewings of the same program into different rooms or display monitors at different times, all from the same source. The VideoStore offers an HTML interface as well as an intuitive GUI.

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## ABB Delivers Motors To Germany's Largest-Built Liners

ABB has delivered 1,400 motors to Celebrity Cruises in Miami for installation aboard its three

largest cruise ships: *Mercury*; *Galaxy*; and *Century*.

All three of these cruise ships were built in Germany for Celebrity by the Meyer Shipyard in Papenburg. The motors were designed from .25 to 160 kW of a rugged cast iron in order to meet

Celebrity's long expected service life for the three ships of around 30 years each.

The motors are expected to drive pumps, fans, water coolers, steering gear and stabilizers.

All of the motors were certified by Lloyd's Register of Shipping.

ABB has also fitted newer vessels with their cast iron motors. M/V *Oriana*, M/V *Superstar Leo*, M/V *Superstar Virgo* and three ships from the Fincantieri Shipyard in Venice have all used the new ABB motors.

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# Cruise Ship Market

## Holland America Buys Three Furuno Sonar Units

Three new Furuno DS30 Dual Axis Doppler Sonar units are now in place aboard Holland America's *Westerdam*, *Noordam* and *Nieuw*

*Amsterdam*. Each of these sonar devices is equipped with a high frequency transducer that generates three narrow beams. The unique system was designed to reduce the effects of both cavitation and the ship's pitch and roll. Even in shallow waters, the highest level of

system accuracy is reportedly maintained by the unit's computer circuitry. The DS30s have 10.4-in. diagonal monitors which display vital information such as speed, depth, and rate of turn. It is also a laser gyro which requires little or no maintenance. The Doppler

Sonar can also determine the overall prediction of motion of a vessel in any given period of time. The DS30s can display the information in three different modes: speed, berthing and NAV data. The information can be translated into a relationship of time, distance and speed as to when the ship will berth, and at what distance and what exactly will happen. The units function by interfacing with other marine electronics on board. The system comes with a display unit, transducer with tank, separate control head, processor unit and transceiver unit.

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## Climate Control for tough marine environments



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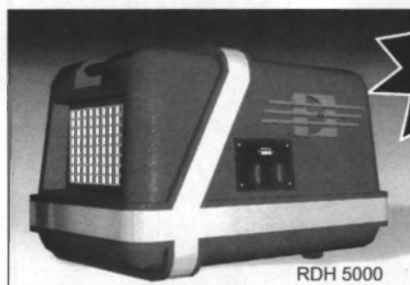
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## Trimline Earns Refurbishment Contracts

U.K. marine outfitter Trimline has landed two major refitting contracts for work on P&O Cruises' *Victoria* and Airtours' *Carousel*. The two ships will drydock in October and November 1998. Most of the refurbishments aboard *Victoria* revolve around re-upholstering of furniture, installing new curtains and re-carpetting public areas along with more than 250 cabins. Trimline also plans to take about five weeks aboard the *Carousel*, before it heads for Barbados for the winter. A total of 11,000 sq. m. of carpet are expected to be re-laid.

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## Thordon Offers Three Bearing Systems

Thordon Bearings Inc. offers open water lubricated propeller shaft bearing systems which have been installed on the new *Disney Magic* (see page 56). Thordon provides three systems: the COMPAC propeller shaft bearing system which offers low friction and long life in blue water operation; Thordon Composite, a propeller shaft bearing designed for abrasive conditions, specifically dredges, tugs and towboats operating in silt-laden rivers; and Thordon XL, a general purpose bearing. In addition, Thordon also offers Thor-Lube, an environmentally friendly, sealed stern tube bearing system which reportedly eliminates pollution concerns relating to stern tube oil.

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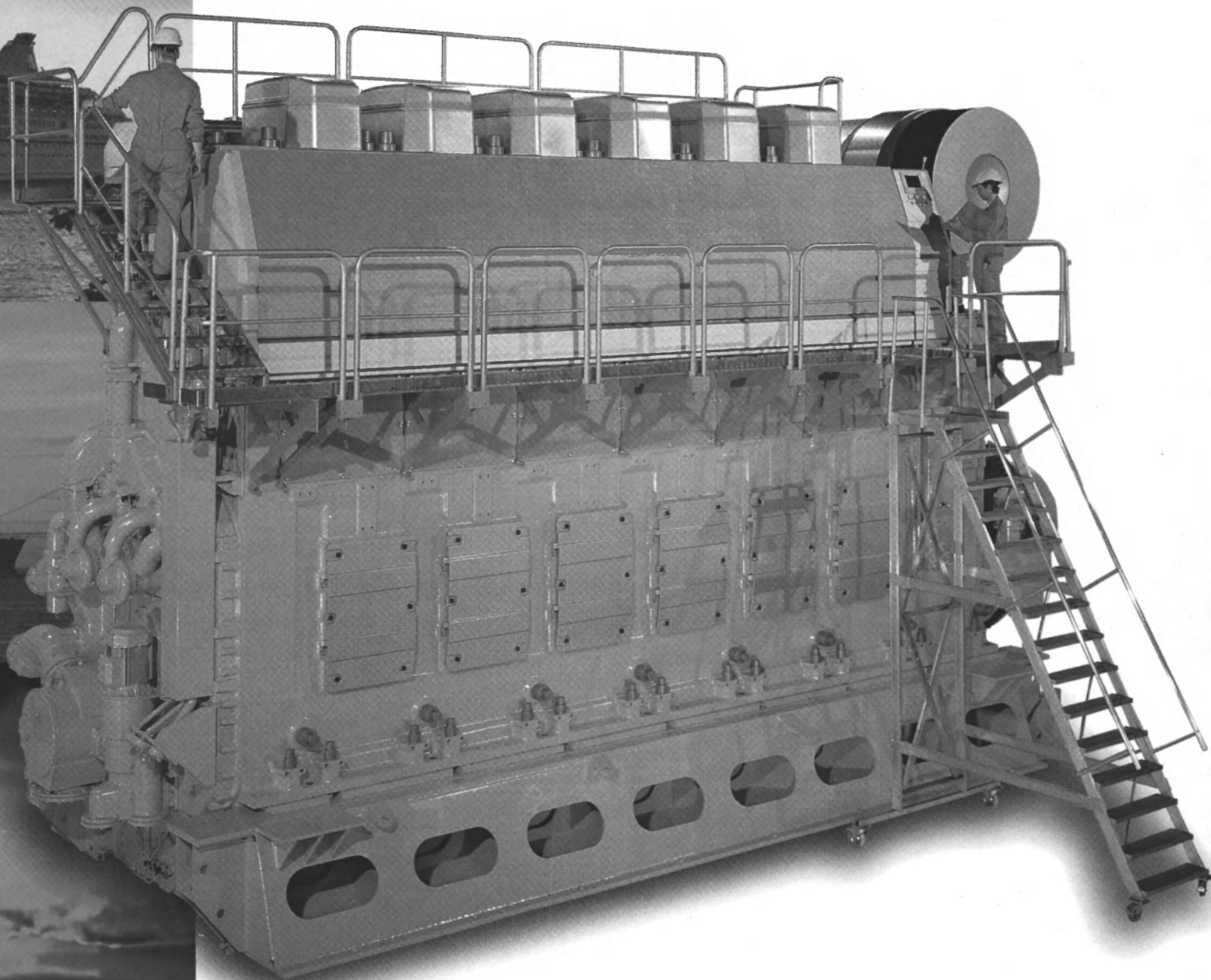
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# Cruise Ship Market



## Rotterdam

**Shipyard:** .....Fincantieri  
**Ship name:** .....MS Rotterdam  
**Ship owner/operator:** .....HAL

On December 9, 1997, during a ceremony in Fort Lauderdale, Fla., Princess Margriet Francisca of the Netherlands dedicated Holland America Line's (HAL) new flagship, — MS *Rotterdam*. At a cost of more than \$280 million, the 781-ft. (237-m) long *Rotterdam* became

HAL's ninth ship in its 125-yr. history.

December 15th marks *Rotterdam's* maiden 10-day Caribbean voyage. After which, it was scheduled to sail around the world on a 97-day voyage, calling Port Everglades home.

*Rotterdam* will be taking over as the sixth flagship of the HAL fleet due to the retiring of the fifth *Rotterdam* in September 1997.

Fincantieri Shipyard specially designed *Rotterdam* in order to increase its power and speed, resulting in the liner's cruising speed of 25 knots.

To achieve this swift speed, *Rotterdam's* hull was lengthened by 62 ft. (18.9 m) and widened to 106 ft. (32.3 m) — the maximum allowed to travel through the Panama Canal. *Rotterdam's* hull is cambered inward, giving it the appearance of a somewhat older and classic vessel, and the new vessel features a three deck atrium.

Additional features reminiscent of the earlier *Rotterdam* vessels include the side-by-side, twin smokestacks, which are a departure of the fleet's now familiar single-stack adornment.

*Rotterdam's* engines have also been changed to achieve the heightened cruising speed. Its engine room contains five, 16-cylinder diesel engines.

Some of *Rotterdam's* amenities include a casino, spa, art gallery where works were commissioned exclusively for the cruise line and themed for Dutch exploration, an 800-seat dining room, many lounges and duty-free shops, as well as a 557-seat Queen's Lounge where shipboard entertainment is performed all day and night.

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### Rotterdam Main Particulars

Ship's registry	.....The Netherlands
Classification	.....Lloyd's Register
Launch date	.....December 15, 1997
Length, o.a.	.....781 ft. (237 m)
Breadth, molded	.....105.6 ft. (32.2 m)
Breadth, maximum	.....111.6 ft. (34 m)
Draft, design	.....25.6 ft. (7.8 m)
Maximum air draft	.....165.1 ft. (50.3 m)
Beam	.....105.8 ft. (34 m)
Top cruising speed	.....25 knots
Service speed	.....22.5 knots
Number of propellers	.....(2)
Rudders	.....(2) Flap type
Gross tonnage	.....62,000
Total passenger cabins	.....659
Passenger maximum	.....1,316
Crew cabins	.....358
Total crew	.....630

# Cruise Ship Market



**Mercury**

Shipyard . . . . .Meyer Werft  
Ship name . . . . .Mercury  
Ship owner/operator . .Celebrity

Touted as the largest German passenger ship ever built, Mercury was delivered to Celebrity Cruises by Meyer Werft Shipyard on Oct. 15, 1997. The Mercury, valued at \$320 million, is the last of the five new ships commissioned by Celebrity during the 1990s. Mercury will sail out of Fort Lauderdale, Fla. to the Western Caribbean, Trans-canal and Pacific Coast until the busy summer cruising season when it will sail exclusively to and from Alaska out of Vancouver.

Mercury is an 865 ft. (263 m) long ship with a 77,713 gross tonnage. Its engines are capable of producing 53,556 hp., propelling the vessel along at an average cruising speed of 21.5 knots. Mercury's passenger capacity is 1,888 along with a crew of about 900. The vessel's navigational system includes Multi Pilot which also functions as a radar unit with complete ARPA functions, and an electronic chart display which graphs all nearby ships onto a transparent sea chart in the precautionary case of an emergency turn (with reference points on the shore also displayed on the chart). Maneuverability aboard Mercury is controlled by two pitch propellers, three bow thrusters, two stern thrusters and two active rudd-

ers, all of which are operated and controlled by a single joy stick.

The ship's propulsion system consists of four MAN B&W L48/60 diesel non-reversible engines — two of these engines producing 18,900 kW and two producing 12,600 kw. Electric power is sup-

plied by MAN B&W 6140/54 generators as well as two shaft generators driven by a gearbox PTO.

Onboard features include a large casino, a 1,000-seat theater, a 10,000-sq.-ft. spa, five-star penthouse suites, and an art collection of more than 400 original works of

art.

Additional amenities include five swimming pools and an assortment of games and activities. Together with Century, Galaxy, Horizon, and Zenith, Mercury adds to Celebrity's high-rated premium cruise line status.

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#### Mercury Main Particulars

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Launch date	November 1997
Classification	Lloyd's Registry 100A 1
Main engines	4 Man B&W L48/60
Couplings	Vulkan-Roto
Gearboxes	Renk
Electric power supply	Man B&W L40/54
Oil purification	Alfa Laval
Length, o.n.	865.8 ft. (263.9 m)
Breadth, molded	105.6 ft. (32.2 m)
Depth to deck 14	143.6 ft. (43.76 m)
Decks	15
Draft	25.3 ft. (7.7 m)
DWT	6,500
Tonnage	77,713 GT
Propulsive power	21.5 knots
Passenger capacity	1,888
Passenger cabins	944
Maximum crew	909

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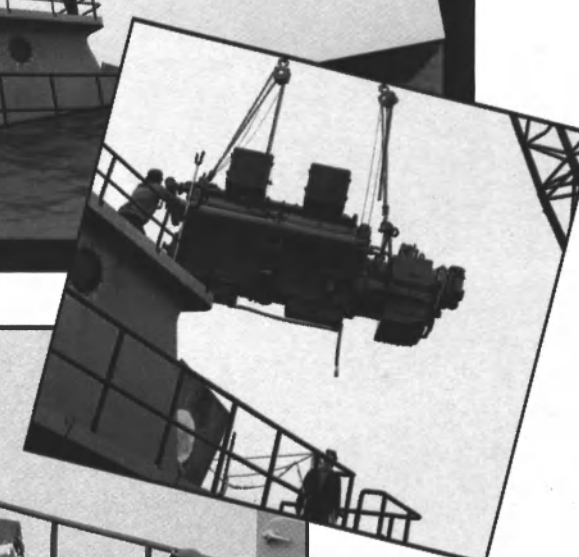
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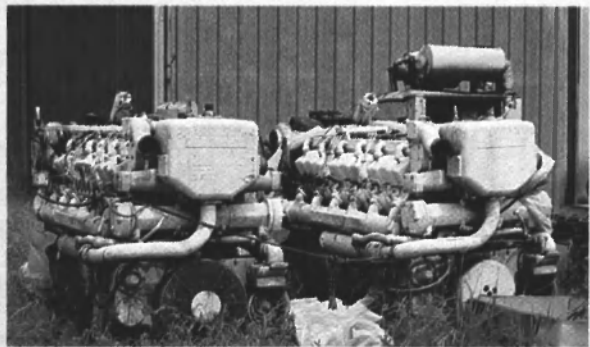
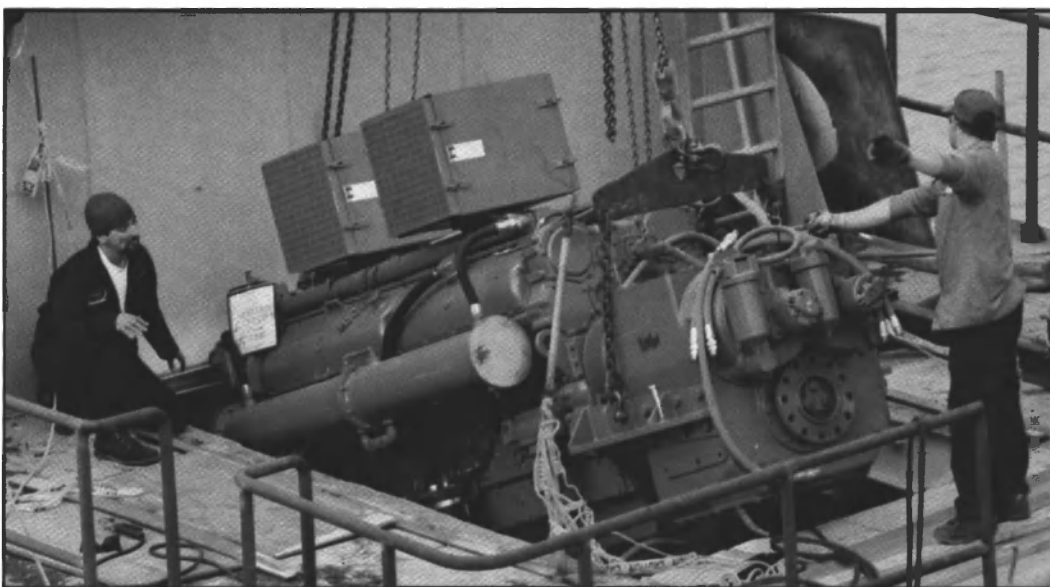
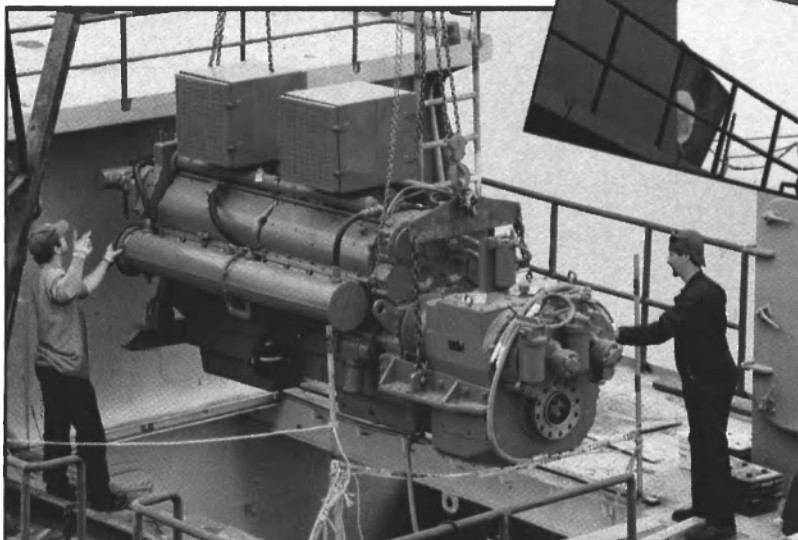
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- Subsequently operated in Pacific, vicinity of Guam
- Boat originally built for Gulf Mississippi Marine Corp.
- Current Owner: Dawn Services, Inc., Gretna, LA



*Above: Old engines from "Gulf Dawn"*

try's future growth, **Rick James**, senior vice president of Sales and Corporate Relations for Princess Cruises, thinks the term is becoming a misnomer. He said Princess' Grand class was designed with a

focus on intimate onboard atmospheres, making ship size irrelevant. "When you see the *Grand Princess* and you take a look at *Carnival Destiny*, you see that there are really two different

design philosophies involved," said Mr. **James**, whose company, after the recent Fincantieri order, will have a fleet of 13 ships by 2001.

Mr. **James** was unconcerned about any slowdowns at

Fincantieri, pointing out that Princess' ships will be built at Trieste, not the Marghera yard building *Disney Magic*. "I'm sure whatever delay occurs with *Disney Magic* or any of the other ships, it's a one-off situation," added Mr. **James**.

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### They Said It ...

The past several years have been a boom in terms of cruise ship building and supply, a trend which appears poised to continue well past the turn of the century. Here's some insight from two of the industry's leading companies regarding fleet expansion.



"We are talking to several yards in terms of a new-building program for Carnival Corp.," **Vicki Freed**, Carnival.

"We won't change much for '98, but you'll hear a lot of announcements for what we're going to do in the next three years," **Richard Sasso**, Celebrity Cruises.



The executive said that Princess will continue aiming its product at the baby boomer demographic, but declined to discuss if ticket sales were his company's top revenue source. Princess will stand apart from other brands because it is positioning itself as the industry's employer of choice, according to Mr. **James**, who said his company's employees are "much more a part of the process of how things are designed and delivered to the customer."

The executive declined to say if Princess had bid for Celebrity Cruises, but when asked if P&O would consider making an offer for Cunard, Mr. **James** said: "There are a lot of companies for sale. I think we're continuing to look to grow the Princess brand."

# Cruise Ship Market

**Peter Bates**, executive vice president of Sales and Marketing for Cunard, advised *MR/EN* to check with parent company Kvaerner to see if any sales offers were moving forward. Mr. **Bates** has great expectations for the cruise line, which is newly positioned in South Florida with 80 percent of its 250-person staff hired locally. "The plan was that we would break even in '97. We actually returned to profit in '97," said Mr. **Bates**, adding that he expected double-digit growth in 1998 to provide momentum going into 2000.

"I think you may see us in a position where we would be ordering a ship," said Mr. **Bates**, when asked if his company would consider placing a newbuild order before Kvaerner found a buyer. Mr. **Bates** also said that Cunard will increasingly look to globalization, which "is going to be very important in terms of where passengers want to go and where the business comes from," but acknowledged that Europe would be the likely target. "I think we will find Asia tough in the next year because of problems they're having over there," said Mr. **Bates**.

## New Caution

Investment in Asia was appealing last March, but Carnival Cruise Lines balked and decided not to reposition *Tropicale*. **Vicki Freed**, senior vice president of Sales and Marketing, explained the rationale behind the cancellation of the Carnival Cruises Asia venture with Hyundai Merchant Marine. "We had two different philosophies and we just felt that we couldn't go forward with two different views of the market. We may look at that project at a later date. Right now, it's on the back burner," said Ms. **Freed**.

In terms of activity in already established markets, Ms. **Freed** reiterated Carnival's welcome greeting to Disney, although she said that Cunard's move to South Florida would be a non-issue for her company. "It's nice to have another cruise line down here but it doesn't matter if it's New York or Florida. They're not introducing anything new to the market."

Ms. **Freed** expects the industry market will undergo further consolidation in 1998, but explained

that one of Carnival's market strategies will be a renewed focus on travel agencies, since 98 percent of her company's business comes through this channel. Carnival has also made public its

intentions to grow by contracting for another group of ships, but Ms. **Freed** would not speculate on whether one yard was leading the bidding while negotiations are underway.

"We are talking to several yards in terms of a newbuilding program for Carnival Corp.," said Ms. **Freed**, who preferred to discuss the upcoming debuts of Carnival's *Elation* and *Paradise* newbuilds.



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Another cruise executive who would probably rather focus on his company's newbuild contract is Norwegian Cruise Lines (NCL) President **Hans Golteus**. After a spate of mechanical problems with

*Norwegian Star*, Mr. **Golteus** told *MR/EN* that NCL is determined to continue operations from the Port of Houston.

When asked about the lawsuit filed by *Star* passengers who slept

on deck after the ship lost its air conditioning systems, Mr. **Golteus** said: "I cannot comment on any aspect of that lawsuit for reasons that you probably understand."

*Star* will go into drydock later

this year at an undetermined yard, but Mr. **Golteus** would not say if the ship would be replaced or joined by additional ships in Houston afterwards. "What we have said from the beginning is that we believe Houston is a heavy possibility to be more than an 800-passenger turnaround. If we are correct, then Houston will be ready for bigger ships or more ships."

Mr. **Golteus** said NCL will benefit this year from the steps taken in 1997, which besides placing *Star* in Houston, included new ship contracts, an internal reorganization and investment of new capital in the company.

"When you're taking new steps like this and establishing new markets, it takes some time to get the full effect," said Mr. **Golteus**. He said that NCL also has an ongoing newbuilding program study, although he was unsure if it would come to fruition in 1998.

In 1998, NCL may be forced to answer charges that its ship *Leeward* was involved in a grounding in Mexico that severely damaged the world's second largest reef. "As we see it, it must be some kind of wrong identity. We have not been near reefs in Mexico with *Leeward*," said Mr. **Golteus**, who said that NCL divers and the ship's classification society investigated *Leeward's* structure and found no indication of reef contact.

On a positive note, Mr. **Golteus** indicated that NCL's booking pattern is much stronger than in previous years. The industry will stay tuned as the company negotiates a new contract with the Port of Houston to extend beyond its May 1999 agreement, as the market tries to absorb the additional berths provided by NCL's three-ship addition this year.

### New Family, New Growth

When it comes to market place breadth, Royal Caribbean has an upper hand this year following the acquisition of Celebrity Cruises in 1997. "Now that two great brands have been put together, it would probably be easier to tell you where we don't go rather than where we do go," said **Brian Rice**, vice president of Revenue Control for Royal Caribbean.

"We're feeling reasonably good about 1998 ... We have not reached a point where we're not comfortable with what we've bit off," said



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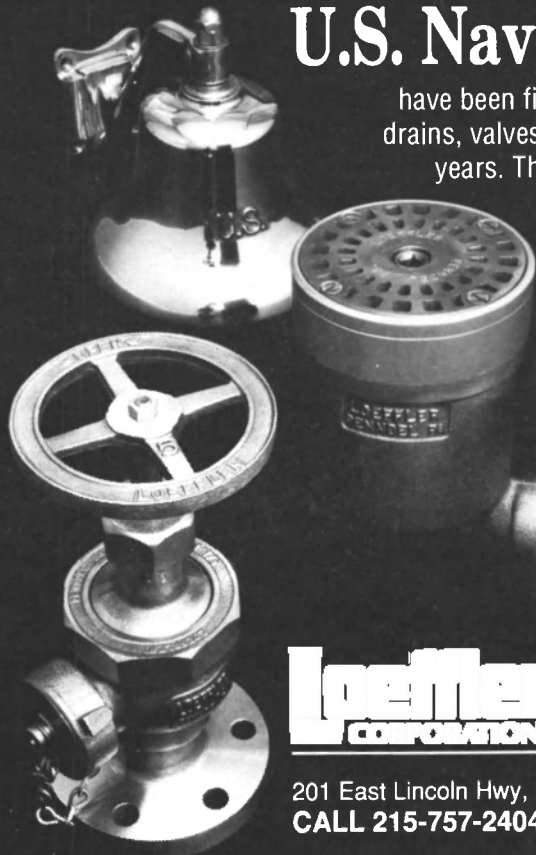


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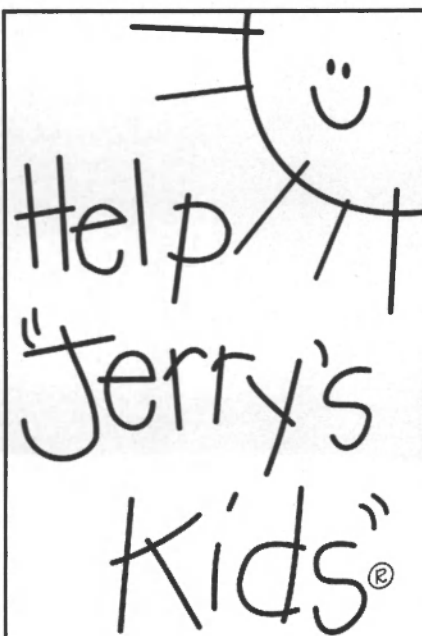


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# Cruise Ship Market

Mr. Rice.

Mr. Rice said the sale of *Sun Viking* did not indicate his company's desire to move away from the Asian cruising market. "There's a lot more at stake than the tactical economic environment of 1998," commented Mr. Rice, adding that Royal Caribbean would continue to look to Asia with an eye on long-term, strategic initiatives.

While the construction of the Eagle class continues this year, Royal Caribbean's profits will be boosted with the debut of *Vision of the Seas* in the spring, which will join Celebrity's late-1997 release *Mercury*. "Mercury has started its life off with a bang," said Celebrity President Richard Sasso.

Life with Royal Caribbean seems to agree with him. "It's a challenge when you're merging a lot of back-

door operations. Every time you do something comprehensive, it requires more work," said Mr. Sasso. Mr. Sasso faces one of the more daunting industry challenges in 1998, as Celebrity works to

keeps its brand name out front. However, the Celebrity president said that his company is ahead of its goals, and to expect "exciting news in the first quarter." "We won't change much for '98, but

you'll hear a lot of announcements for what we're going to do in the next three years," said Mr. Sasso, who agreed that certain companies are poised to become more global in 1998.

## Enchantment of the Seas

(Continued from page 38)

6.6 kV main bus bars.

Passenger features of this new vessel include an 870-seat movie theater, six bars and lounges, a casino and a 1,171-seat dining room. KMY has equipped *Enchantment of the Seas* with the latest in interactive televisions that allow passengers to view photos, read books from the ship's library, rent a movie, play video poker and purchase goods from the ship's gift shop.

After trial runs off the coast of Great Britain, *Enchantment of the Seas* will first officially embark across the Atlantic to New England to familiarize its crew with its new and complex navigational technologies before setting sail on the warmer waters of the Caribbean, out of its home port of Miami.

The vessel comes equipped with three satellite communications and navigation systems, three radars, three compasses, three raster scan ARPA radars, three navigators, and a Doppler log with longitudinal and transversal speed indications. There is also a 5,000 point monitoring system installed in the bridge center to watch over, maintain and alert the crew if problems should occur in any unmanned spaces of the ship, such as the engine room.

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**Cruise Ship Market**

**Gulf Coast Service Provider To Overhaul Cruise Ships**

Hydraulic service provider OffshoreINLAND was recently selected to overhaul the steering gear system on Carnival Celebration and SeaEscape Ukraina. Both cruise ships were undergoing repairs at a Gulf Coast shipyard.

Circle 25 on Reader Service Card

**BIMCO Launches Cruise Voyage Charter Party**

BIMCO has completed its Voyage Charter Party (CRUISEVOY) for the cruise industry. The new standard document is scheduled to be available for use by cruise ship operators and charterers in the next few months.

CRUISEVOY is a purpose-made contract for the industry, the result of interest on behalf of cruise

ship owners dating back to 1995.

The innovative charter party marks a first for the cruise industry, as up until now, there had been no single standard form available — which was specifically designed — for the special considerations involved in the chartering of cruise ships.

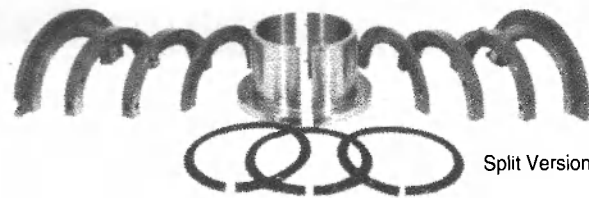
CRUISEVOY permits a cruise vessel, with an agreed itinerary and schedule, to be booked by a number of different charterers or tour operators, each booking a proportion of the ship's accommodation on behalf of their customers. CRUISEVOY acknowledges the need for considerable forward planning by tour operators involved in arranging short cruises, often up to a year in advance of the voyage.

The charter party incorporates equitable cancellation and termination provisions to deal with circumstances preventing, delaying or interrupting the cruise.

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# MAN B&W Celebrates 100th Anniversary Of Diesel Engine License Agreement

Late last month — January 28, 1998 to be exact — marked the 100th anniversary of B&W acquiring the rights to use the patent granted to German engineer **Rudolf Diesel** for his invention.

In 1892, Mr. Diesel patented the engine which would later be named after him — the diesel engine.

The diesel engine was run for the first time on February 17, 1894

at Maschinenfabrik Augsburg. That same year, Mr. Diesel tried to interest B&W in his engine, sending a letter to **David Halley**, B&W managing director. Enclosed with the letter was his book, *Theorie und Konstruktion eines rationellen Warmemotors*, which described a 30 to 40 percent fuel utilization as opposed to the 15 percent obtained with contemporary steam engines.

Mr. Halley's response: Using

oil as fuel was unusual and it was very difficult getting the oil to its destination at a reasonable cost. In brief, B&W was not immediately interested.

Enter Danish engineer **C. Winsløw**, who visited Maschinenfabrik Augsburg in October 1897, where he met **Rudolf Diesel**. There, Mr. **Winsløw** — who worked for the Danish company A/S Titan — attended a trial run of the test

engine. Titan was interested in producing small diesel engines and had sent Winsløw to Augsburg to study the engine. As Titan was only interested in small-engine production, Mr. Diesel gave them until November 30, 1897 to find a manufacturer who would be interested in large engines, and he set up a draft agreement.



Rudolf Diesel

Before the November deadline, Titan got together with B&W, and the contract was split in two, giving B&W and Titan joint rights to produce engines of up to 20 hp for DEM 40,000 and DEM 20,000. However, B&W and Titan were unable to come to an agreement, and in December 1897, **Martin Dessau**, B&W's managing director, went to Berlin where the contract was set up and signed by Diesel and later by B&W on January 28, 1898. The first engine was delivered in 1904 to N. Larsens Vognfabrik in Copenhagen to produce electricity for lighting. The engine type was DM140, i.e. one cylinder with an output of 40 hp at 180 rpm. The cylinder diameter was 320 mm and the stroke 490 mm.

The demand for marine diesel engines grew rapidly, and around 1909, B&W engineers developed a reversing mechanism enabling the engines to run in both directions. In 1910, diesel engines were being built for the world's first ocean-going motorship, M/S *Selandia*. With *Selandia's* maiden voyage to Bangkok in 1912, the B&W engine became recognized as an innovative addition to the shipping industry. In the following years, the diesel engine was further

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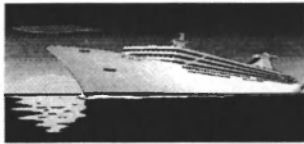


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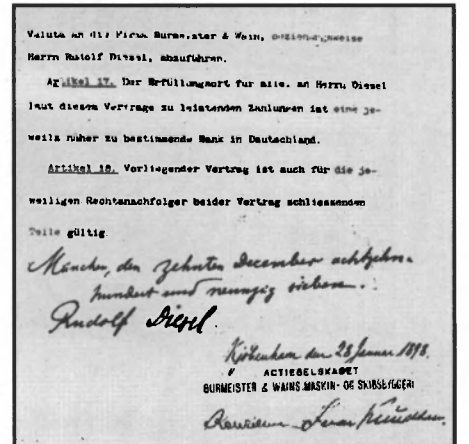
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Above is a photo of the original B&W/Diesel contract.



improved and its field of deployment enlarged to include everything from ships to power plants, road and rail.

The first ship with a two-stroke diesel engine was the M/S *Amerika*, which was delivered to the East Asiatic Company in 1930. B&W soon became a licensor of diesel engines built according to company specifications, with the first license contract signed in 1910.

Before 1960, the majority of licensees were European. This changed in the 1970s and 1980s when large parts of the shipbuilding and engine production industry moved to Japan, and later to Korea and China. Currently, more than 80 percent of engines built according to MAN B&W Diesel specifications are built in East Asia.

### MAI Completes Cruise Ship Projects

Marine Accommodations, Inc. (MAI), exclusive distributor of BUIL Industries BIP accommodation systems, was recently involved in the modular panel construction and turnkey installation on cruise ships *Queen of the West* and *Pacific Warrior*. The BIP system is comprised of joiner bulkhead liner partitions, ceilings, A, B and C-class doors and hardware, floating floors, pre-fabricated bathroom units, furniture, galley and laundry equipment, accessories and CAD engineering. In addition, MAI's interiors division, Marine Accommodations Interiors (MA Interiors), has completed the renovation of the main dining room, gift shop, galley decking and cabin doors onboard Royal Caribbean's *Song of America*, and has been awarded a contract from Clipper Cruise Line to perform cabin upgrades onboard *Nantucket Clipper* and *York Town Clipper*. MAI will also supply and install complete joiner packages comprised of joiner bulkheads, ceilings, doors and pre-fabricated bathroom modules in Royal Caribbean's *Sovereign of the Seas* and *Grandeur of the Seas*. MA Interiors is currently scheduled to complete work on 11 cruise ships in 1998.

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### Carnival Affiliate Signs Contract With Kvaerner

Carnival Corp. affiliate Costa Crociere SpA has signed an agree-

ment with Kvaerner Masa-Yards for the construction of an 82,000-gt cruise ship. The estimated cost of the 2,100-passenger vessel is \$390 million. The new vessel will be the eighth in the Costa fleet, which is jointly owned by Carnival and Airtours plc. In addition to its equity interests in Costa Cruises, Seabourn Cruise Line and Airtours plc, Carnival Corp. is comprised of

Carnival Cruise Lines, Holland America Line and Windstar Cruises. Combined, Carnival Cruise Lines and Holland America have six new ships slated for delivery over the next three years – 101,000-ton *Carnival Triumph* and sistership *Carnival Victory* are scheduled to enter service in 1999 and 2000, respectively; Carnival 70,000-ton SuperLiners *Elation*

and *Paradise* are currently under construction and scheduled to debut in March and November 1998, respectively; and Holland America Line has two 65,000-ton cruise ships on order, both scheduled for delivery in 1999.

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Turn To Page 56 For More News On The

Cruise Ship Market

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# The Vexing Issues Surrounding Bulk Carrier Safety

Since the early 1990s, bulk carrier safety has been a priority matter of world's maritime authorities, as representatives of the policy makers, classification societies, shipbuilders and ship owners have grappled with the means and

methods necessary to ensure the safe and long-time performance of this vessel type.

While it is a definitive that there are no definitives in regards to vessel design, there have been some sweeping mandates imple-

mented which are geared toward ensuring the long life and safe operation of bulk carriers.

## The IMO Rules

Last year the International Maritime Organization (IMO)

adopted new measures — specifically survivability and structural requirements — to improve the safety of bulk carriers, particularly to prevent them from sinking if water enters the ship. The new requirements apply to existing bulk carriers as well as new ones, which was necessary to help stem the rise in bulk carrier accidents which was seen in the early 1990s.

From 1990 to May 1997, 99 bulk carriers sank, killing 654.

The new regulations form a new Chapter XII to the IMO's main maritime safety convention, the International Convention for the Safety of Life at Sea (SOLAS), 1974.

Existing ships which do not comply with the appropriate requirements will have to be reinforced — or they may have to limit either the loading pattern of the cargoes they carry or move to carrying lighter cargoes such as grain or timber.

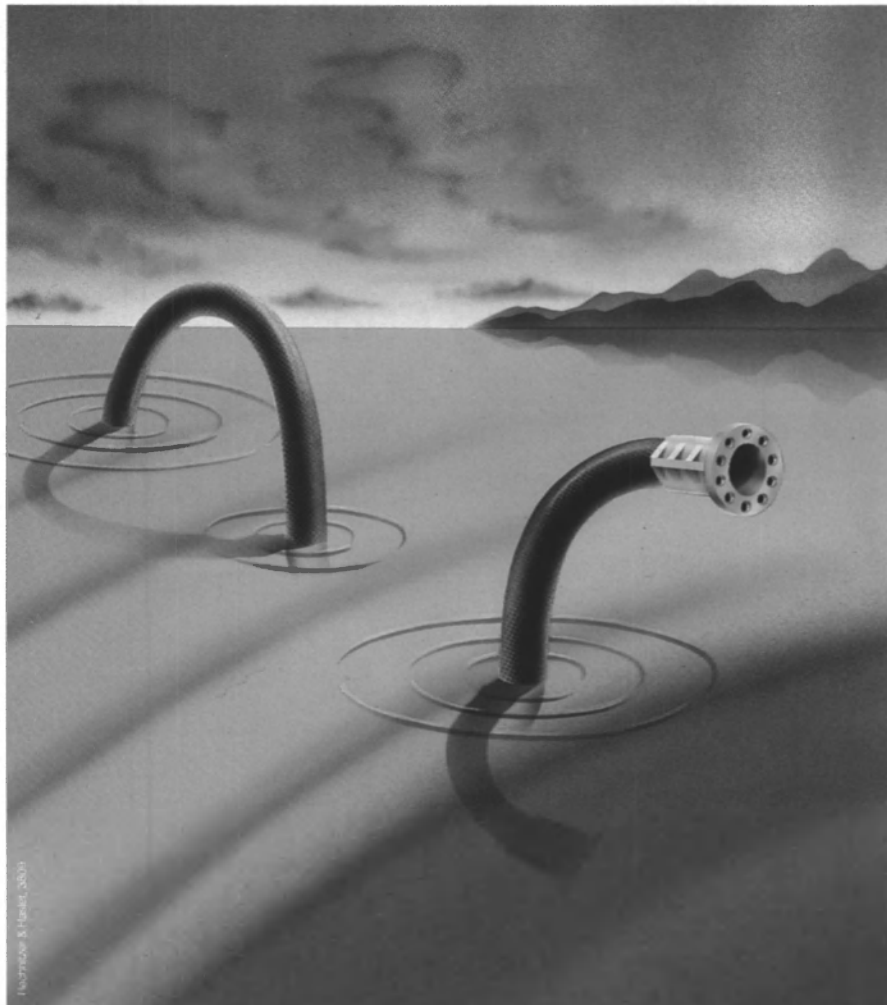
The new regulations are expected to enter into force on July 1, 1999 under SOLAS's "tacit acceptance" procedure. They state that all new bulk carriers 492 ft. (150 m) or more in length (built after that date) carrying cargoes with a density of 1,000 kg/cu.-m. and above should have sufficient strength to withstand flooding of any one cargo hold, taking into account dynamic effects resulting from presence of water in the hold and taking into account the recommendations adopted by IMO.

For existing ships (built before July 1, 1999) carrying bulk cargoes with a density of 1,780 kg/cu.-m. and above, the transverse watertight bulkhead between the two foremost cargo holds and the double bottom of the foremost cargo hold should have sufficient strength to withstand flooding and the related dynamic effects in the foremost cargo hold.

Cargoes with a density of 1,780 kg/cu.-m. and above (heavy cargoes) include iron ore, pig iron, steel, bauxite and cement. Lighter cargoes, but with a density of more than 1,000 kg/cu.-m., include grains such as wheat and rice, and timber.

## Working With Industry

At the request of IMO, the International Association of Classification Societies (IACS) carried out a study into bulk carrier survivability and found that if a



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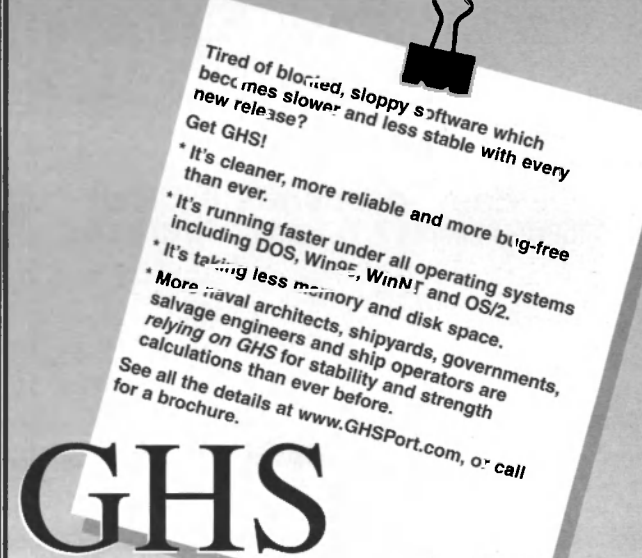
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ship is flooded in the forward hold, the bulkhead between the two foremost holds may not be able to withstand the pressure, especially if the ship is loaded in alternate holds with high density cargoes. If the bulkhead collapses, the ship could sink in a matter of minutes. The most vulnerable area on the ship, IACS concluded, are the bulkhead between numbers one and two holds at the forward end of the vessel and the double bottom of the ship at this location. It proposed that during special surveys of ships, particular attention should be paid to these areas and, where necessary, reinforcements should be carried out.

The Conference also adopted amendments to IMO's "Guidelines on the enhanced program of inspections during surveys of bulk carriers and oil tankers" which were first adopted at IMO's 18th Assembly in 1993.

#### Newbuild v. Secondhand

Of course, any matter regarding the world's bulk carrier fleet would be foolhardy without discussing the financial side of the business. While freight rates are notoriously fickle, there is a plethora of new tonnage ready to come on stream in 1998, a situation which should harm freight rates, in the near term, significantly.

Combined with the financial fall-out in Asia, and the resultant slow down of goods shipped across the seas, the freight rates could stay depressed for some time.

In the long-term, however, investment in new, high-quality tonnage should be deemed a prudent business move, as it will become increasingly important — and mandated — that bulk carriers achieve the highest level of quality.

Scrapping activity will naturally be of high interest during the year, and according to Drewry's, 61 Capesize vessels will be 20 years of age or older soon, and should be regarded as prime scapping candidates. If history — near-term history in this case — is taken into account though, it should be noted that in 1996, only 19 vessels of 70 "candidates" were actually scrapped.

#### Protecting The "Workhorse"

Modern bulk carriers, often described as the workhorses of maritime, can be traced back to the 1950s when shipyards began building ships designed specifically for

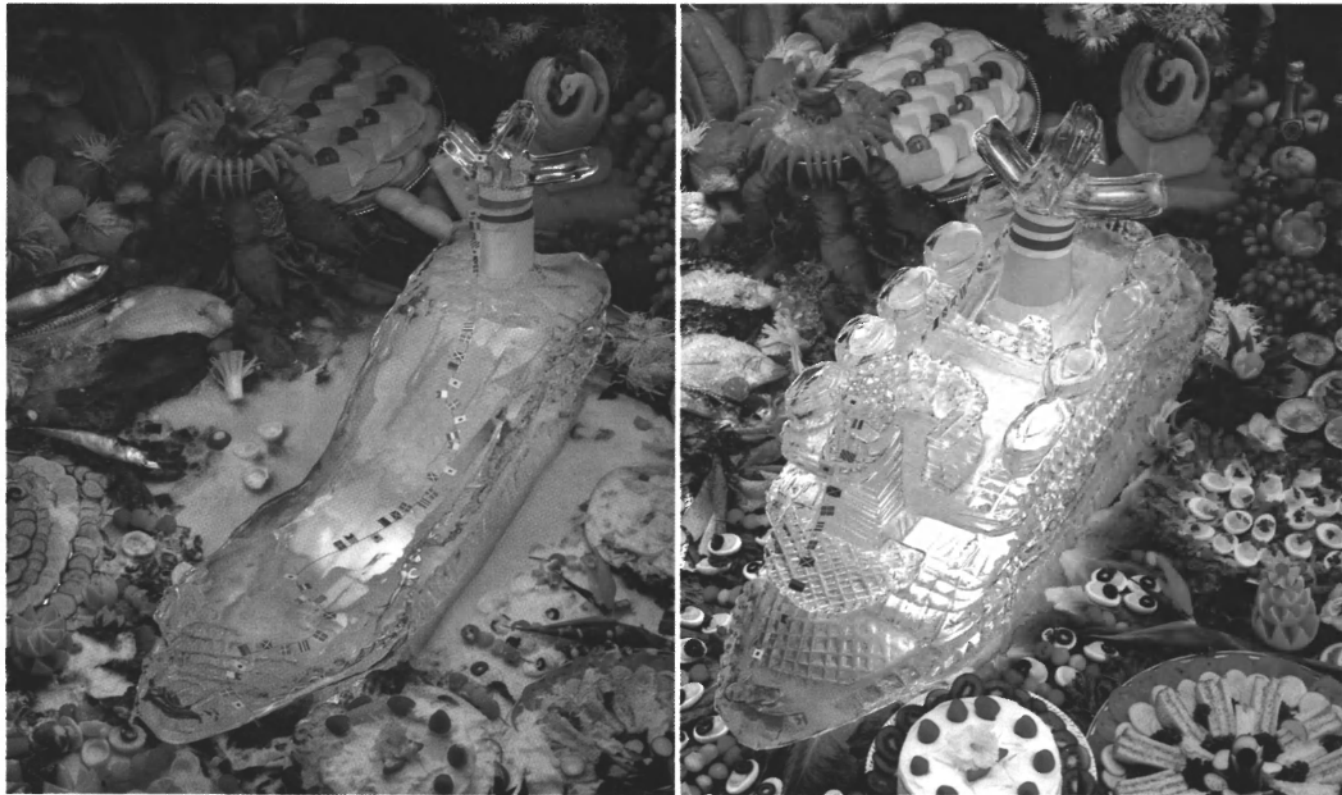
carrying non-packed commodities such as grains or ores.

Concerns regarding bulk carrier safety date back to 1959, and the original SOLAS included a chapter devoted to the carriage of grain, while a Code of Safe Practice for Solid Bulk Cargoes (BC) was adopted in 1965. But a dramatic

increase in bulk carrier losses in the early 1990s raised alarm bells at IMO. Severe structural damage to the ships, including some cases of the vessels literally breaking in two, resulted in heavy loss of life. In 1990 alone, 20 bulk carriers were lost with 94 fatalities, and in 1991 24 bulk carriers were lost

with 154 lives.

As a result, the Assembly of IMO in 1991 adopted an interim resolution to improve bulk carrier safety, concentrating on the structural integrity and seaworthiness of ships, and ensuring loading and carrying of cargo would not cause undue stresses.



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## Protecting The Investment

New IACS and IMO rules are designed to ensure the long life and safety of ship and crew, which should be of high interest given the tremendous amount of investment in new tonnage. The following data from Drewry's "Dry Bulk Carrier Prospects, 1997-2000: Meeting The Challenge of Oversupply," highlights some of these costs.

Panamax Bulk Carrier Investment Appraisal				
Year	Newbuild Price \$(M)	Rate for 10% IRR (\$/day)*	Secondhand Price \$(M)	Rate for 10% IRR (\$/day)*
1997	26.5	13,200	20	11,550
1998	27	13,400	20.5	11,850
1999	27.5	13,800	21.5	12,400
2000	28.5	14,300	20.5	12,300
2001	29	14,500	20	12,150
2002	29.5	14,700	19.5	12,050
Forecast 5-year avg. time charter rate		13,500	12,650	

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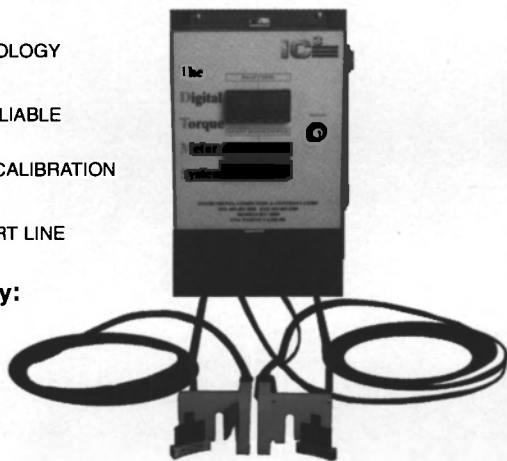
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## DNV: A Study In Disaster

Norway's Det Norske Veritas regularly publishes information on accidents at sea in order to foster an exchange of information which may aid other owner/operators. While the accident described here is a tanker and not a bulk carrier, it is worthy to note that DNV has been a strong leader in the formation and implementation of bulk carrier rules and regulations.

The accident involved a 17,955-grt tanker built in 1973. The vessel was on ballast voyage when the master noticed a loss of steering. The vessel was near a safe port (luckily), and when it arrived it was found that although the balanced rudder was still in place, seven of the eight fitting bolts between the rudder stock and rudder flange were missing.

The nut on the remaining bolt was found to be secured to the rudder stock flange with a flat bar, and not the bolt (see Fig. 1). Apparently, the bolts loosened, turned off and were lost since they were fitted upside down. The securing should have been between the bolt and the nut, as indicated on Fig. 2.

From the experience, DNV concluded the following:

- When refitting rudders, make sure that fitted bolts are used and

Figure 1: Securing arrangement at time of casualty

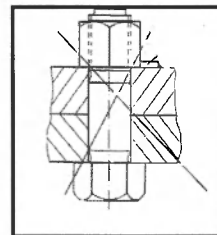
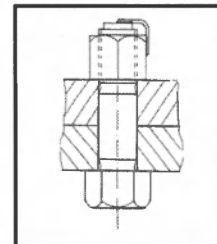


Figure 2: Original securing arrangement.



that proper securing arrangements are employed;

- Always secure the nut to the bolt;
- Make sure that the weld has been carried out properly, particularly checking to ensure that both the bolt and nut are weldable; and

- If screws are used in the securing arrangements, the material used is to be carefully selected in order to avoid galvanic corrosion of nuts and bolts.

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## BIMCO:

### Setting A Course Toward Bulk Carrier Safety

BIMCO announced its first residential course on Bulk Carrier Safety: The Practical Implementation and Implications of New Bulk Carrier Regulations. The course is scheduled for March 16-18 in Copenhagen.

BIMCO aims to bring technical managers, naval architects, new-building departments and the

industry's top experts on bulk carrier safety together to discuss the issue and shed some light on the technicalities of the new regulations implemented by IACS and IMO. The course will concentrate on structural requirements, operational measures and the new SOLAS regulations.

*Operational Measures — the*

*Code of Practice for the Safe Loading and Unloading of Bulk Carriers* will center on lectures by **Hans-Jorgen Reinkjop** of LKAB on the Code's impact on terminal efficiency, Capt. **Jack Isbester** of Eagle Lyon Pope Assoc. and author of *Bulk Carrier Practice on the Benefits of the Code from a Master's Point of View*, and **Ian**

**Williams** of the Australian Maritime Safety Authority.

The SOLAS sector of the program will feature **Henrik Monberg Carlsen** of Marine Alignment, **Arve Myklebust** of Det Norske Veritas and **Ole Borring Sorensen** of Hempel Marine Paints.

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### Meyer Werft Delivers Sinabung

Meyer Werft of Papenburg, Germany recently delivered passenger ship *Sinabung* to the Directorate General of Sea Communication, Jakarta/Indonesia. The vessel is the first in a new improved series of two passenger ships for Indonesia featuring improved container transport facilities and a considerably increased speed — two knots faster than its predecessors. *Sinabung* measures 480.6 ft. (146.5 m) long and 76.7 ft. (23.4 m) wide and has a passenger capacity of 1,906. The second vessel in the new series will be delivered in fall 1998.

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#### *Sinabung* Main Particulars

Length, o.a. .... 480.6 ft. (146.5 m)  
 Length, b.p. .... 426.5 ft. (130 m)  
 Breadth, molded ..... 23.4 ft. (7.6 m)  
 Draft ..... 19.3 ft. (5.9 m)  
 Gross tonnage ..... 14,800  
 DWT ..... 3,175

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## Disney Brings Magic To The Seas

Disney's entrance as a cruise ship owner should have long-term positive benefits in raising even further the awareness of the cruise industry in North America. The company will come to market with two unique ships — *Disney Magic* (which was scheduled for delivery in the middle of this month) and *Disney Wonder* (scheduled for delivery in December) — which are designed to offer all of the creature comforts and amenities of a modern cruise liner, packed in a ship styled after the greatest cruise liners of the 20th century.

It should come as no surprise that a Disney-

built ship offers a truly unique look and experience. The company's trademark is attention to detail and quality, and the resultant 85,000-gt *Disney Magic* is no exception. Created from a diverse team of maritime and non-maritime talent, the ship went from drawing board to reality at Italy's Fincantieri shipyard.

Tagged as a "modern classic" by the operator, the ship is distinctive with its twin funnels and stream-lined sculptural form which harkens memories of the great ships of the 1930s and 40s.

"After closely studying the archetypes of classic vessels, as well as exploring wildly innovative original designs, we arrived at an identity that communicates a 'modern classic' ideal,

Right: An artist's rendition of *Disney Magic*.



Below: *Disney Magic* is shown under construction at Italy's Fincantieri shipyard.



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# Cruise Ship Market

respectful of an ancestral lineage but unmistakably contemporary," said **Mike Reininger**, vice president product development, Disney Cruise Line (DCL).

While the outside is an instant classic on sight, and "all-Disney" —

by virtue of its dark hull, bold red funnels, yellow striping and lifeboats — the inside of the ship is state-of-the-art maritime, incorporating the latest products and systems from some of the world's premier ship equipment suppliers

(please see Particulars list below).

Disney's approach to building its new fleet was to plan the ships, in detail, and then approach a shipyard to build the design. "Our design work was done far in advance of the shipbuilding con-

tract," said **Arthur Rodney**, DCL president.

The ship's exterior was researched and designed by Norway's **Jjal R. Eide**, one of the world's most recognized ship designers. He consulted with an industrial engineer from Frogdesign, a firm know for its package design for such clients as Acer and MacIntosh, which shows how non-ship insights entered and affected the overall equation.

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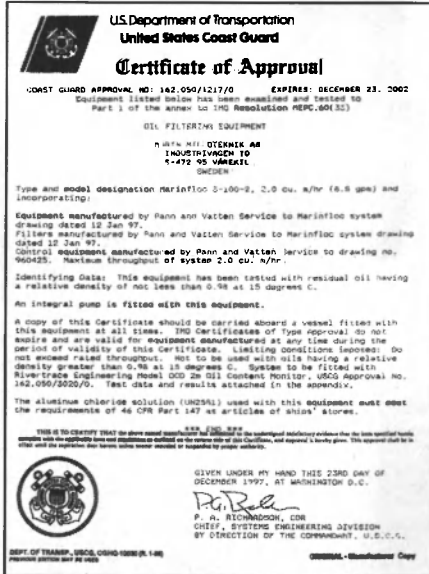
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### Disney Magic Main Particulars

Shipyard	Fincantieri, Trieste
GRT	85,000
Contract date	April 1995
Scheduled delivery	April 1998
Passengers	1,750
Crew	915
No. of Staterooms	875
Outside Staterooms	73%
Registry	Bahamian
Length	964 ft. (294 m)
Width	106 ft. (32.3 m)
Draft	25.3 ft. (7.7 m)
Speed, max.	24 knots
Speed, cruising	21.5 knots
Designer	Fincantieri
Propellers	Lips Italiana
Generator engines	Grandi Motori Trieste
Thruster engines	Fincantieri
Steering controls	Ulstein Frydenbo
Propeller shafts	SDF
Engine licensee	Wärtsilä NSD
Intermediate shafts	Lucchini Siderugica
Flap Rudders	Bot Groningen
Main switchboard panels	N Magrini Galileo
Oil fired burners	Aalborg Boiler
Exhaust gas boilers	Rizzi
Centrifugal and screw pumps	Garbarino Pompe
Axial flow pumps	Frank Mohn
Air conditioning	ATISA
Air compressors	Sperre; Ingersoll Rand
Air fans and ventilation	Boldracchi
HVAC compressors	Carrier Transicold
Freshwater generators	Alfa Laval Desalt
Fuel oil modules and oil separators	Alfa Laval
Pipe antifouling	Cathleco
Paints	Jotun Brignola
Lifeboats	Harding Safety
Liferafts	Viking
Lifesaving equipment	Stearns Manufacturing
Fire Detection	Autronica
Carbon dioxide and sprinkler systems	Silvani
Water spray	Helen Larssen
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Communications equipment	Telmar
Passenger information	Scandinavian Micro
Stairways	Mobilgiri
Elevators	MacGregor
Galley Equipment	Electrolux
Waste treatment	Scanship
Atrium	Hopeman Brothers
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Teak deck covering	Thaiphong Sawmill

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(Continued from page 35)

Japan. Construction of a handysize bulker was also set in train at Nantong Ocean Ship Engineering Co., an enterprise founded by KHI and China Ocean Shipping Co. (COSCO). Located 100-km upstream of Shanghai on the Yangtze, the Nantong yard will be the beneficiary of a newbuilding dock initially foreseen for vessels up to 160,000-dwt, and scheduled for completion by September 1998.

The Japanese group is also lending its know-how to a further joint venture with COSCO to manufacture azimuthing and tunnel thrusters, as well as other equipment in China. KHI's earnings from marine equipment produced in Japan are expected to amount to some Yen5 billion this year.

The plant at Wuhan is expected to become the principal source of supply for bow and stern thrusters, for

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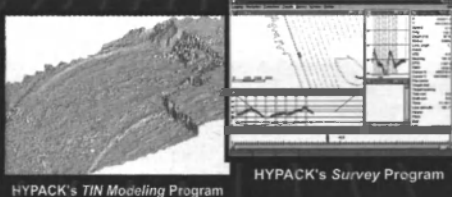
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## Reduce Coating Work 40 Percent

In a bid to help yards achieve higher productivity and quality levels, a comprehensive, yet rationalized paints package for the entire ship construction process has been introduced through the Chugoku Innovative Ship Coating System (CIS). Chugoku Marine Paints' initiative is claimed to offer reductions of up to 40 percent in the amount of coating work that has to be undertaken in protecting the fabric of the hull and its internals during the production of a newbuilding. Cutting the number of treatments and individual coatings contributes directly to man-hour intensity and building schedules. CIS has been structured to ensure that immediate benefits to yards are paralleled by long-term advantages for contractual owners in paint quality and maintenance-free characteristics.

The system has been formulated in mind not only for the production implications of the shift to double-hulled tankers, but also of the industrial environment in Japan where the managing of large newbuild projects faces extra pressures due to the shortage of skilled coatings applicators among already much slimmed-down workforces.

Chugoku has sought to rationalize the range of coatings required through the whole construction program by improving the quality of individual paint systems, so reducing total cost of paint per sq. m. in materials and application, while benefiting long-run maintenance. Many of the products have quick-drying properties and others offer environmental advantages salient not only to existing or proposed future legislation governing antifouling, but also health and safety considerations in shipyards.

The concept of build efficiency and improved protection through rationalization in the number of products used and "passes" employed is common to CIS in all its configurations, which obviously depend on the type of vessel involved. In the construction of a bulkier, for instance, a universal primer called Bannoh 500AC can be used as the single anti-corrosive, tar-free treatment over the whole of the outside shell to simplify the coating arrangements, with a related epoxy binder employed for the underwater areas.

The antifouling medium would be a tin-free, self-polishing coating named Sea Grandprix 100. Chugoku claims that the latter, which uses copper as the main antifoulant and polishes due to hydrolysis, offers a performance similar to that of tin-based products and therefore much improved on existing, non-tin antifouling. The range available under CIS includes a single type of primer, Bannoh 200, for the exposed deck and superstructure and a heat-resistant, inorganic primer Cerabest for the engine room. Modified tar-free epoxies Nova 1000 or 2000 for the ballast spaces come in light colors to facilitate tank inspections and meet new regulations, while another version of the Nova series has been developed for the protection of cargo hold areas.

which KHI is experiencing a surge in orders arising mainly from container newbuilding projects. The Chinese factory will also serve as a procurement base for the Japanese partner.

## Strengthened In The European Market

Mitsui Engineering &

Shipbuilding (MES) has strengthened its standing with the European ship owning community in recent months by landing bulk carrier contracts in the Polish and Italian markets.

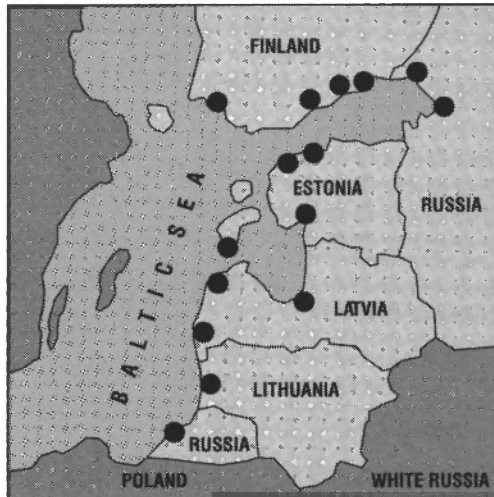
The Japanese company's propensity for developing niche business in the bulk shipping field has been particularly well illustrated by its long running production of ships of

the open-hatch type, incorporating maximum width hatchways for efficient working of unitized cargoes of forestry products and other goods. In the case of the new contract from Polish Steamship Company (PZM), the subject design will enable navigation into the Great Lakes while offering a relatively high capacity of 34,600 dwt.

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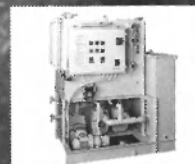


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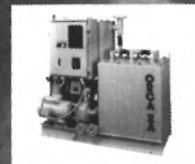
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The deal is understood to be one of the single largest transactions ever between the two countries. It reflects growing interest by Japanese industry in the eastern European market, and also demonstrates the broad sourcing policy pursued by PZM, the largest operator in the region. Deliveries of the Handysize Polish series are scheduled to start in early 1999.

MES has also augmented its bulk carrier workload with a 75,000-dwt Panamax unit to be built at Chiba for Naples-based Augustea Imprese. The newbuilding project — an illustration of the Italian company's tendency in recent years to opt for Japanese construction — calls for delivery of an 89,000-cu.-m. capacity bulker by the end of 1999. The latest gener-

ation of the open-hatch bulk carrier class is represented by 56,700-dwt *Hoegh Morus*. Constructed at the Tamano works for Leif Hoegh, the ship employs the successful concept first introduced in the early 1970s, and progressively refined and upscaled to reach the size and high level of transportation and handling efficiency embodied now in *Hoegh Morus*.

Central to the design idea, the hatchway openings in the double hulled, Panamax-beam vessel have the same dimensions as the holds facilitating the working of forestry goods such as lumber, paper rolls pulp and woodchips.

Another trademark of the type is the installation of two traveling gantry cranes on the upper deck, conferring cargo handling self-sufficiency across the range of freight transported.

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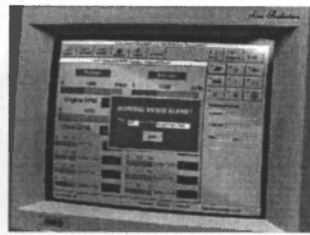
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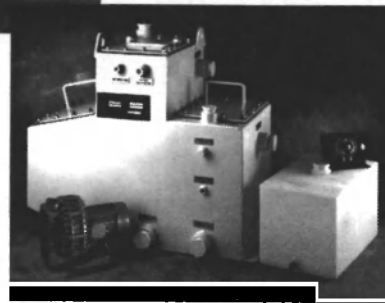
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### Evergreen ... The Shipbuilder

With the sale of Hayashikane Shipbuilding by the Taiyo Fishing Co. to the Evergreen Group several years ago, the Taiwan-based organization obtained a stake in the vibrant industry on Kyushu Island. Evergreen immediately increased the capital of the yard, which had originally traded as Taiyo Zosen, invested in new workshops and other facilities and raised the productivity of the premises.

The development policy has been vindicated by the increasing efficacy of the yard in Nagasaki, which has emerged as a primary source of feeder and intra-regional containership capacity for the parent group in Taipei. As Evergreen Heavy Industrial Corp. (EHIC), it has been charged with construction of 10 vessels of the 1,164-TEU A-class, and is set to take on an additional 10-ship program involving a new larger type, designated the P-class. The first three representatives of the A-class were commissioned by Evergreen, and all subsequent vessels in the series are to the account of the affiliated company Uniglory Marine Corporation. Following the scheduled delivery in April 1999 of *Uni-Assure*, EHIC plans to focus on the new 1,420-TEU P-class, with the first of the envisaged 10 for Uniglory expected in July 1999 and the last due in October 2001. The P-type will replace vessels of 860 to 960 TEU built in the 1970s and deployed on Uniglory's Asia service network. Earlier, it had been thought that EHIC would go forward into the next decade with a 2,000-TEU type, which had figured among fleet projects considered by the group.

### Containership Technology Taken To New Heights

While certain yards in Denmark and Germany continue to have a major impact on containership technology at the upper end of the

Maritime Reporter/Engineering News

capacity range, Japanese and South Korean shipbuilders dominate actual global production of vessels in the 3,000-TEU stakes and above.

Prowess in the containership sector is widely spread in Japan, although IHI and MHI have again stamped their authority on the field with a tranche of contracts involving blue-chip names in the worldwide liner industry.

Responding to the opportunities presented by a powerful, indigenous shipowning base, the industry has taken a further step along the road of ever-increasing cargo capacity concentration with the construction of a 5,700-TEU post-Panamax class for NYK Line.

The series-opener, 75,000-gt *NYK Antares*, was commissioned from IHI's Kure yard in the latter part of last year to take the mantle as Japan's largest line-haul vessel. The vessel has recently been followed out of Kure by a sistership,

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while two more boxships of the type are scheduled from MHI, along with one from MES during the first-half of 1998. Built to a 131-ft. (40-m) molded breadth and to Nippon Kaiji Kyokai (ClassNK) rules, the new design has been capacity-optimized within dimensions governed by draft restrictions and the outreach of post-

Panamax dockside gantries already in place at ports on NYK's Asia/Europe express route.

As an element of the exercise in optimizing revenue-generating volume, *NYK Antares* has been constructed to a girderless design. This has allowed an additional row of containers to be carried below decks, compared with the usual

box girder arrangement, which provides longitudinal rigidity and support for the container load.

The requisite reinforcement has instead been achieved through closer attention to the design of the hatchcovers, upper deck, cross deck members and longitudinal and transverse bulkheads, and scrutiny of the hatchway corners to

obviate undue stress concentration.

Fine mesh finite element analysis (FEA) was employed in the design of the long and large hull form, and ClassNK undertook its own independent analyses to confirm this as part of the plan approval process. The ensuing design provides for a 14-row underdeck cellular stowage, with 16 rows accommodated on the weatherdeck and hatchcovers in tiers of up to six.

*NYK Antares* had the added distinction of being fitted with the world's most powerful, single-engine diesel installation, in the shape of a Japanese-made 11-cylinder model of the Swiss-developed, Sulzer RTA96C type. Driving a single, FP propeller, the plant has a nominal rating of 82,170-bhp (60,390-kW) to ensure a laden service speed of 23 knots.

ClassNK technical staff oversaw testing of the two-stroke engine at manufacturer Diesel United's works in Aioi, and measured nitrogen oxide (NOx) emissions during shop trials. They were found to be within the limits prescribed under new IMO Marpol requirements due to be implemented from January 2000.

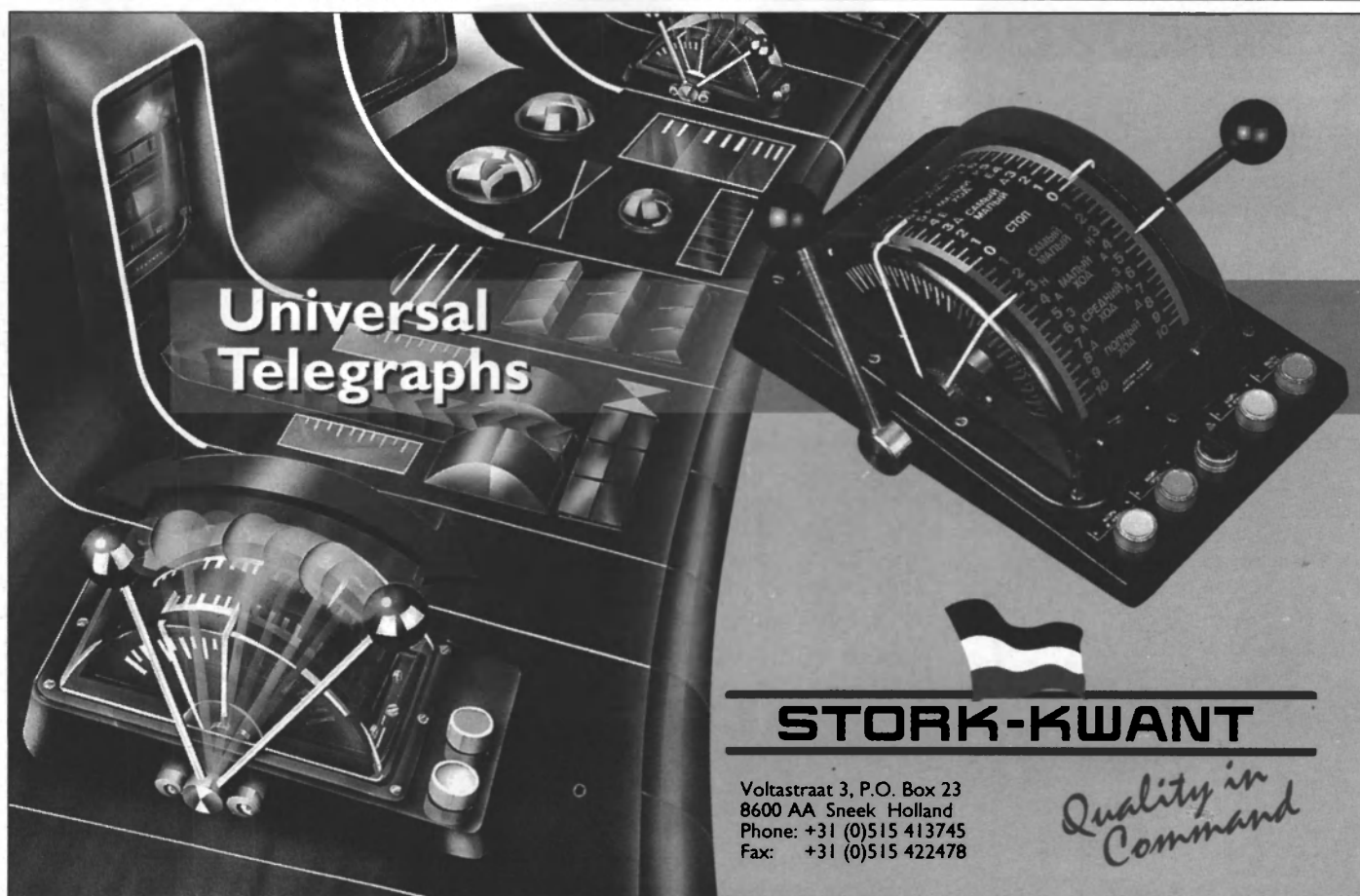
However, the propulsive energy incorporated in NYK's liner fleet flagship is set to be surpassed by the machinery subsequently completed and tested at Aioi for supply to the first of the 6,674-TEU new-buildings ordered by P&O Nedlloyd.

Weighing 2,030-tons, the massive, 12-cylinder Sulzer RTA96C engine will give a record-breaking 89,640-bhp (65,880-kW), to power the ship at speeds up to 25-knots. The recipient vessel, the first of four from IHI's Kure yard in western Honshu, is due to be phased into the trade between eastern Asia and Europe during the spring of 1998.

The program of RTA96C production at Diesel United, jointly owned by IHI and Sumitomo Heavy Industries, is indicative of the long and close ties between the Japanese licensee and the Swiss engine designer, now part of the Wartsila NSD Corporation.

A distinguished record of cultivating business with leading foreign names has also been demonstrated by IHI with the delivery of the 4,062-TEU, Champion-class containership *Sea-Land Lightning*.

The new vessel marked the completion of the latest four-ship con-




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## NK: Step To The Head Of The Class

Classification society Nippon Kaiji Kyokai (ClassNK) has enjoyed a steady growth in business through the 1990s, such that its market share stood at approximately 20 percent as of the end of November 1997. The extent of its influence can be measured by the 6,541 vessels of a total 101.4 million-gt under class at that time, together with an overall new-building workload standing at 649 ships of 12.6 million-gt under construction or on order as of October 31, 1997. Over the period from 1992-96, the fleet entered with the society had increased at an average annual rate of 1.36 percent by number of ships, and at 4.34 percent annually in gross tonnage. The cumulative figure for tonnage volume is especially impressive, showing a near-22 percent growth to just over 98 million-gt at the end of 1996, compared with 80.6 million-gt in 1992.

In the course of the same timescale, new-buildings constructed to NK rules rose from 332 ships of 5.43 million-gt to 467 vessels of 6.72 million-gt for 1996, having reached 6.9 million-gt in 1995. The latest figures available for 1997 show a similarly buoyant level of activity, attaining 443 ships of 6.32 million-gt by the end of November. The society has a low casualty rate with respect to bulk carrier safety, despite the large number of such vessels on its register. Nonetheless, nearly 1,000 existing ships under ClassNK are affected by new international safety requirements laid down for bulkers, said to be the greatest number of any classification body. This situation has necessitated that ships be examined at a rapid pace to determine whether they meet the new criteria. To help address this need, the Japanese society is offering shipowners a calculation service for ships under class, to compute the strength of the after bulkhead of the furthest forward cargo hold, as well as the double bottom. Owners are then notified of the requisite thickness for the bulkhead plates, if the ship concerned is to satisfy the new requirements. The findings are then compared with the actual plate thickness, as measured by the owner, so as to determine what measures, if any, need to be taken to ensure compliance. ClassNK can also assist shipowners to determine the best possible course of action, which could entail calculating the extent of structural reinforcement needed, establishing maximum cargo densities that can be safely transported, or levels of homogeneous loading.

Through a new service launched last year, dubbed NK-SHIPS, shipowners can obtain instant access via computer or fax to the society's in-house classification database. In addition to receiving details regarding their tonnage, users will be able to obtain particulars of any of the approximately 6,400 vessels entered with NK.

The society's President and Chairman **Tadashi Mono** said, "This development reflects the rapid use which we are making of information technology in order to respond to the needs of our clients. Improving the speed of secure access to such information will be of benefit to everyone; it means that surveys can be planned more effectively, saving money and time and ultimately improving safety."

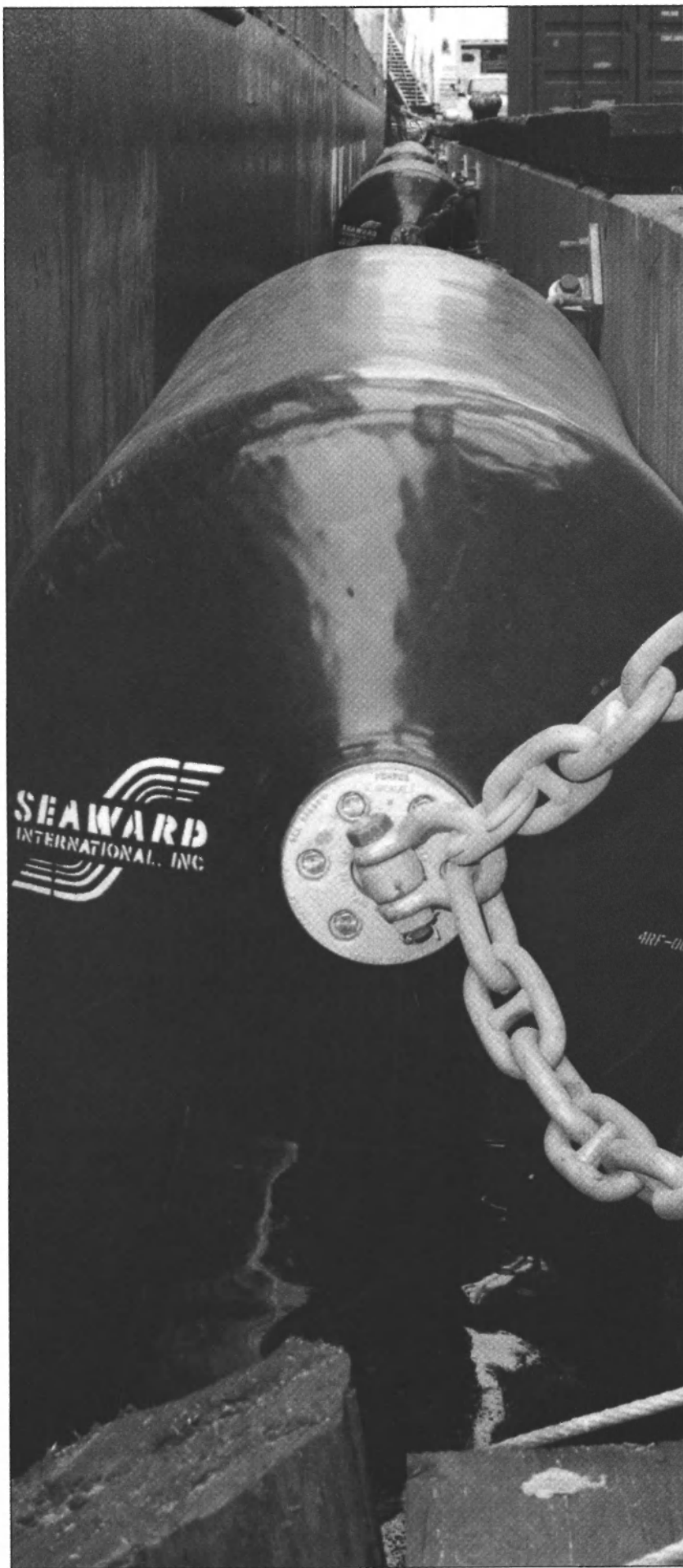
tract from an affiliate of Sea-Land Service, and ranked as the ninth-of-class for the U.S. through-transport carrier. The first in the Panamax-beam series had been commissioned in mid 1995.

Erudite World-Wide Shipping returned to Japan for VLCC tonnage last year after a gap of more than a decade.

The latest deal for a 300,000-dwt crude carrier capped a remarkable year for IHI in booking VLCC projects, mainly emanating from the domestic market.

Last year's completion of the world's first purpose-built floating LPG storage vessel for Chevron's Escravos Gas project off West Africa, and the impending delivery

of the 26,000-gt luxury cruise ship *Pacific Venus* testify to the company's efforts to build business in higher value-added sectors. It is also examining the feasibility of LNG floating production, storage and offloading (FPSO) vessels, in the light of interest in small and medium-scale offshore natural gas field projects.



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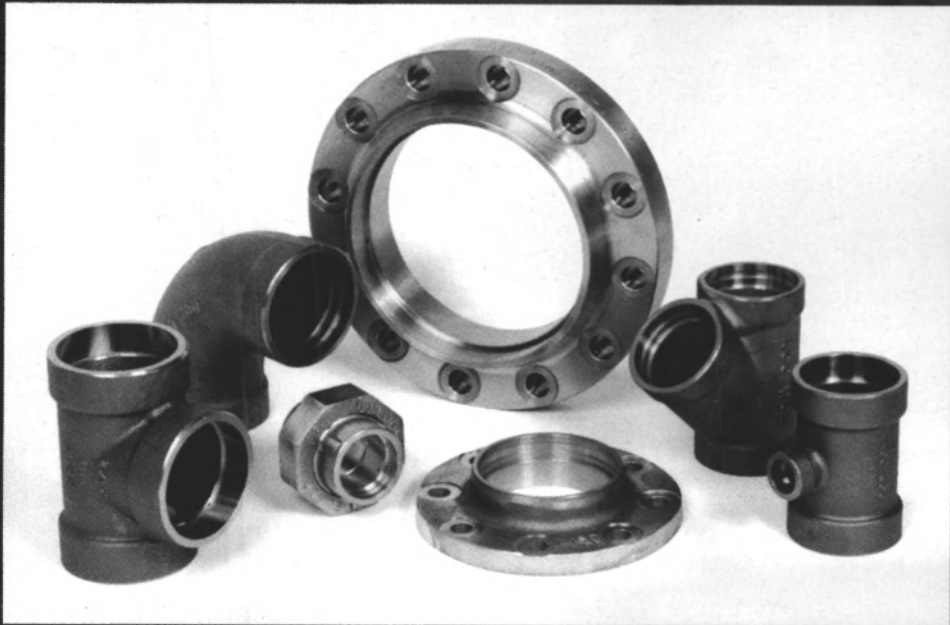
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# NNS: Working To Increase Performance And Decrease Cost Of 21st Century Carriers

Newport News Shipbuilding (NNS) is helping the Navy fulfill its mission in an era of shrinking defense budgets with its Carrier Innovation Center (CIC) which is designing future aircraft carriers with lower life cycle costs. NNS engineers are sailing aboard carriers to see how the Navy uses its product, studying how the crew, systems and hardware work in the real world. Armed with that knowledge, NNS can then design future carriers that are cheaper and more efficient to operate by integrating new technologies, requiring less manpower.

NNS has developed a model for studying the full cost of operating a carrier over its lifetime, a model which looks at all the cost drivers, including small items, large systems and people. For example, carriers have always included space for a heavy, expensive machine to bread chicken patties. But a few days at sea showed NNS the machine was a waste of space, weight and money, since the Navy now buys chicken patties already breaded. A small item, to be sure, but a big one when the cost is multiplied over 50 years.

A much larger and more significant issue is the deck-to-deck movement of supplies and ammunition. One NNS analysis showed it takes 13 men on each deck using an archaic conveyer system to move boxes from a storage room to their final destination several decks above. Today's Navy can no longer afford to be that labor-intensive.

Based on its experience, NNS is studying a number of solutions that will result in lower life cycle costs. As a first step, antiquated machinery is being eliminated or replaced with equip-

ment that is smaller, lighter, less expensive and more functional.

To address the bigger issue of supply movement, NNS is looking at ways to redesign the ship putting supplies closer to their final destination. For example, NNS analysts are studying the placement of food storage areas closer to galleys, and consolidating galleys, so fewer workers are needed to transport materials from place to place.

### Saving 75%

In battle, a carrier's existence depends on its ability to re-fuel and re-arm aircraft more efficiently and economically. The CIC is also working with companies such as Boeing to cut the time and manpower it takes to get a plane back on its bombing mission, looking to reduce an aircraft's "pit" time by 75 percent in the next generation of aircraft carriers.

Today, it is impossible to load fuel, missiles and bombs on the plane at the same time. First, the aircraft is parked on the deck for re-fueling, a 13-min. process involving a long, difficult hose run. Then new bombs are put on board, a delicate seven-minute operation requiring six to eight workers to lift and position as many as 18 bombs, each weighing at least 500 lbs. This 20-min. process is too slow for modern combat situations, and too labor-intensive for a Navy looking to reduce manpower costs.

NNS is looking for ways to pit faster, cheaper and better. The shipyard is

working with aircraft manufacturers and robotics engineers to cut the time a plane sits on the deck between bombing runs. They are exploring the possible use of a new aircraft valve that could cut re-fueling time from 13 min. down to five. They are also working to develop a

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Pictured below are two artist renditions of possible CVN 777 concepts — a future aircraft carrier from NNS

The top photo represents a revolutionary design approach that would split aircraft and ship operations functions between two islands, incorporate a "pit stop" for aircraft operations and rearrange elevator placement.

The bottom photo represents a more evolutionary design which incorporates cost savings, automation and stealth in a more traditional single island design.



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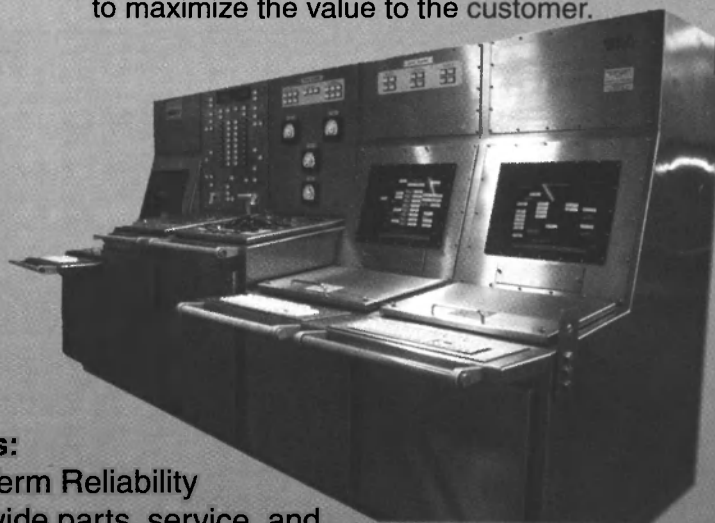
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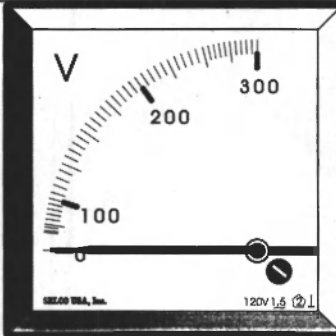
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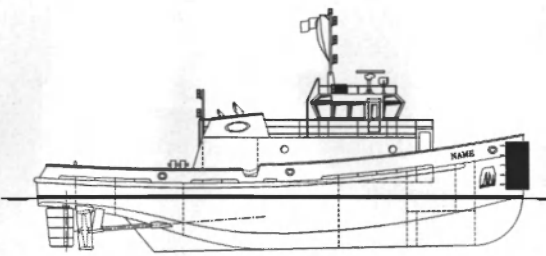
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## NAVAL TECHNOLOGY

mechanical system able to load bombs in the tight quarters and hostile environment of a carrier deck. These two steps will reportedly cut manpower on the pit crew by 50 percent, and let this smaller crew load bombs and fuel at the same time. The result: A five-minute pit stop that puts planes back in the air as quickly as possible.

### Looking To Commercial Ships For Big Savings

Fighting corrosion in a carrier's jet fuel and ballast tanks is a high maintenance job. The tanks' coating and square, hard edges are prime breeding grounds for corrosion. High installation and maintenance costs are also a fact of life in the way miles of shipboard pipe are welded together. These costs were never considered a major issue for the Navy, which was more performance-driven than the cost-driven commercial world. That is now longer the case. Today the Navy is driven by performance and cost.

The commercial world invests in a number of small steps that have the potential to significantly lower the costs associated with tank corrosion and welded pipes. NNS is studying these measures, analyzing their initial costs and projecting how much money they will save over the half-century life of future aircraft carriers. The commercial fleet attacks the corrosion problem in two ways. Its tanks have rounded, bulb-shaped edges instead of hard ones. Different coatings and ways of applying them are also used. These measures reportedly reduce corrosion, significantly lowering the maintenance cost of shipboard tanks. Rather than welding, pipes on commercial ships are now joined using a technique called a lap joint flange, which NNS is currently exploring.

### Out Of This World Solutions

NNS is also working to design low maintenance blast shields. Each time a jet leaves a carrier deck, it puts out a blast of heat that can send temperatures soaring as high as 2,300 degrees F. Panels called jet blast deflectors pop out of the flight deck to protect workers and other aircraft from the extreme heat. The CIC is looking for ways to lower the currently high cost of maintaining these panels, while preserving their toughness and ability to cool in a matter of seconds. Engineers are considering the use of a material that protects the space shuttle from the intense heat of re-entry. Jet blast deflectors are currently cooled by pumping sea water through a complex network of pipes. This is done as the shield is lowered into the deck and the next plane rolls across — all in less than 15 seconds. Unless the shield is cooled quickly and effectively, planes suffer tire damage as they roll into launch position. While the current cooling sys-

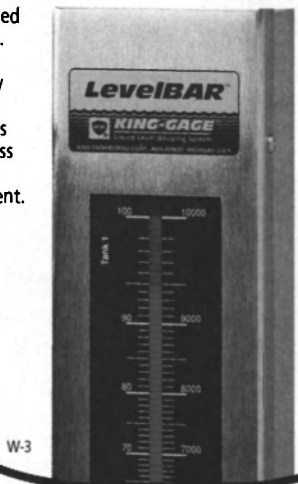
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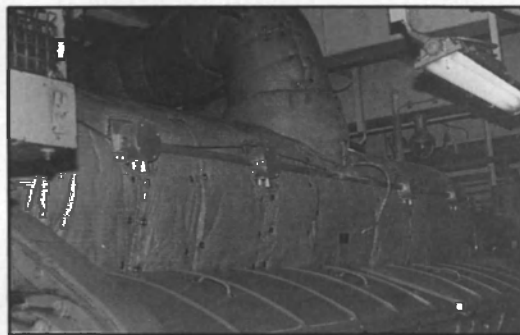
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# Consolidating Government Cargoes

by Art Dimopoulos, contributing writer

The Maritime Administration (MarAd), Military Sealift Command (MSC), General Services Administration, U.S. Department of Agriculture (USDA) and the Agency for International Development (AID) are considering consolidating government-impelled cargoes on privately owned U.S.-flagged vessels that are on long-term time charter to the MSC.

The plan, still in its conceptual stages, does not envision MSC vessels competing with commercial U.S. flag ships, but with foreign flag ships currently receiving cargoes for foreign destinations.

In 1997, MarAd granted 374 waivers for cargo movements involving Ex-Im Bank transactions totaling 152,547 metric tons. USDA and AID cargoes shipped on foreign flag vessels accounted for about 310,281 metric tons of packaged commodities.

The government's objectives in consolidating cargoes include the following: enhancing support of the U.S. flag merchant marine; bolstering and attracting available skilled merchant mariners; enhancing services for U.S. interest in remote areas of the world; prudent utilization of government resources; and trimming government transportation costs from the present \$11.6 billion level.

As noble as these ends are, the means are not without criticism from several U.S. industry sources.

Given that privately owned vessels on charter to the MSC could potentially be competing and given preference over domestic line haul carriers involved with foreign-flag service carriers, concern is warranted.

Indeed, through pooling arrangements, slot charters and other type of intermodal arrangements, the envisioned plan is not without consequence.

Critics of the plan have warned that the possibility of unfair cargo manipulation to the detriment of certain carriers could substantially impact cargo operations.

The government has requested feedback from the industry in voicing its concerns and helping forge equitable solutions toward achieving the above-mentioned goals.

Interested parties desiring to be on a working group, mailing list or to merely voice their opinions should contact the Maritime

Administration, Office of Cargo Preference, 400 Seventh Street, S.W., Washington, D.C. 20590. Correspondence may be addressed

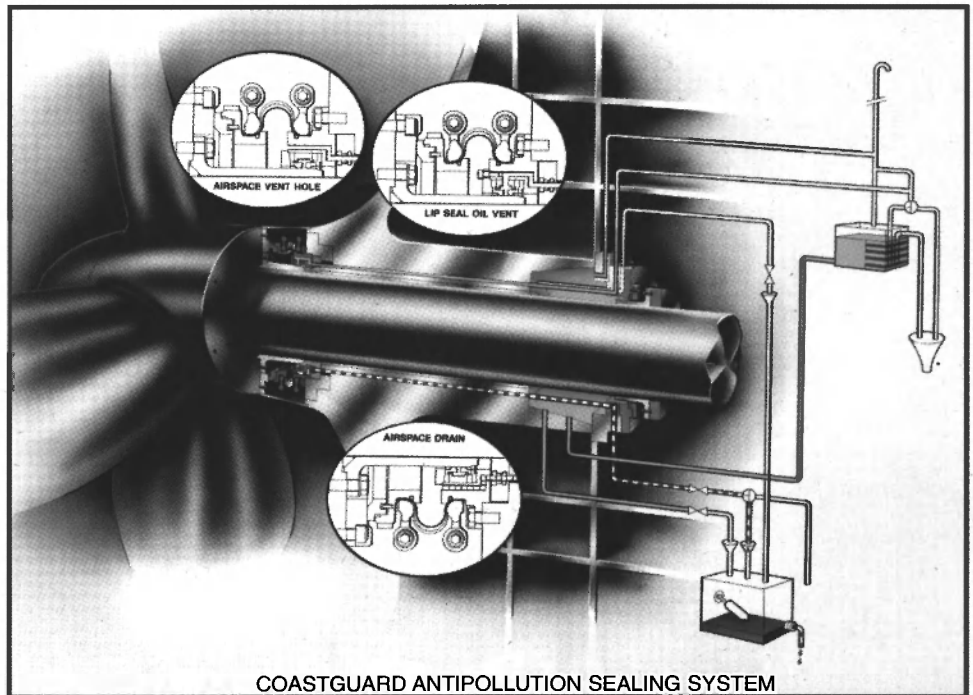
to **Thomas W. Harrelson**, Director, Office of Cargo Preference, e-mail: tom.harrelson@marad.dot.gov.

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# GLO Solicits Comments On Oil Spill Legislation

A proposed regulation requiring more vessels operating in Texas coastal waters to maintain oil spill prevention and response plans was recently published in the *Texas Register* by the General Land

Office (GLO). Publication of the proposed rule marks the beginning of a public comment period, which ends March 2, 1998. The rule, which supports the Texas Oil Spill Prevention and Response Act of

1991 (OSPRA), covers vessels capable of carrying 10,000 gallons or more of oil as fuel or cargo and which are not required to have federal or international response plans. Vessels which will be affect-

ed by the rule include larger shrimp and commercial fishing vessels, offshore workboats, supply boats, crew boats, tugs and push boats, dredges, public vessels, research and recreational vessels.

"It is vital that we receive input from the individuals who will be affected by this rule," said **Garry Mauro**, Texas land commissioner. "A large percentage of vessel-related oil spills are preventable and that is one focus of this rule: Taking more preventive measures to reduce the risks of spills. The end result can be cost effective for all entities involved, state and private, when measured against the cost and repercussions for cleaning a spill. This rule will also help to further strengthen our posture of deterrence and readiness in dealing with oil spills and protecting the natural resources of the Texas coast."

Some key aspects of the proposed rule are:

- Vessels which already have prevention and response plans that meet the intent of the rule may be deemed in compliance. Vessel owners who are unsure whether their plan satisfies the new rule may request a plan review by the GLO;

- Vessels will be required to carry onboard spill response information to prompt spill response actions;

- The GLO will provide forms for vessels that do not currently have a plan in place and do not wish to develop their own format for a new plan;

- Vessels will not be required to submit any information to the GLO. The agency will check compliance with the regulation in the field during spill response and routine harbor patrols; and


- Vessels that choose to implement voluntary spill prevention measures may benefit from reduced penalty actions for unauthorized discharges of oil.

*Written comments on the proposed rule and its economic impact may be submitted to **Carol Milner**, General Land Office, Legal Services Division, 1700 North Congress Ave., Austin, Texas 78701-1495.*

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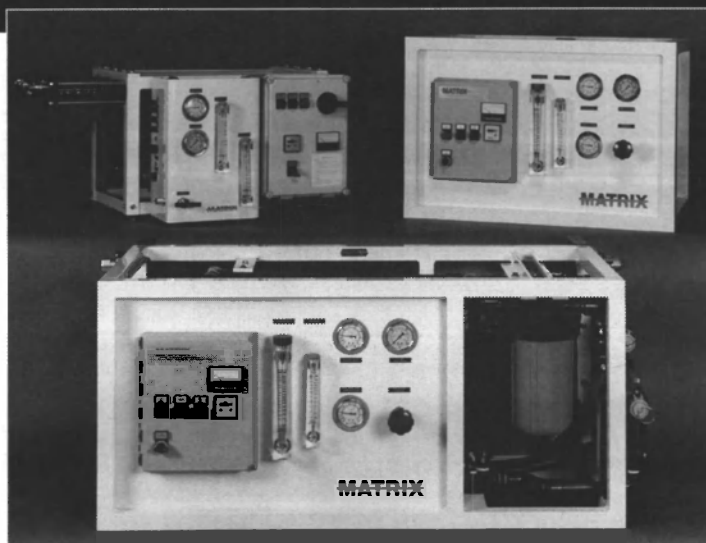
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## Fincantieri Launches P&O Sea Princess Cruises Liner

Fincantieri launched cruise ship *Sea Princess* at its Monfalcone yard on January 23. The vessel is the third of four 77,000-gt liners for P&O-Princess Cruises and is a sister ship of *Sun Princess* and *Dawn Princess*, delivered in November 1995 and April 1997, respectively. Delivery of *Sea Princess* is scheduled for early 1999.

*Sun Princess* inaugurated P&O-Princess Cruises' Grand class series in 1995. A fourth sister ship, *Ocean Princess*, will be built soon.

Fincantieri is currently completing 109,000-gt *Grand Princess*, touted to be the biggest cruise ship in the world and destined to become the flagship of the P&O-Princess Cruises fleet.

## MC Shipping To Add To Fleet

MC Shipping reportedly is positioned to add to its fleet of 13 vessels. The company, which added five ships last year, reportedly believes that market conditions are right — i.e. ship prices are declining — for such a move.

## Global Buys Rig For \$150M

In a positive sign for the offshore exploration industry in general, and Global Marine in particular, the company announced that it has bought a third-generation semi-submersible drilling rig from a unit of Coflexip Stena Offshore for \$150 million.

Dubbed *Stena Forth*, the rig is reportedly capable of working in water depths of 1,800 ft. and can be modified up to 3,000 ft. It is projected that the unit will generate revenues of \$68 million in a contract in the U.K. North Sea which extends to November 1998.

## Ceres Orders High-Speed Ferry

Greece's Ceres Hellenic Shipping Enterprises reportedly ordered a 157.5-ft.(48-m), 516-passenger, 43-knot catamaran ferry from Austal Ships. The vessel — scheduled for delivery by the start of this summer — is scheduled to serve the Piraeus-Poros-Hydratses-Porto Heli route.

## Sea Containers Ferry To Enter Service; Company Seeks \$100M

Sea Containers *SuperSeaCat* fast ferry will enter service in early March, for service between Liverpool and Dublin. The compa-

ny said that the vessel will cut about two and a half hours off conventional ferry crossing times. The 328-ft. (100-m) craft has a capacity for 774 passengers and 175 cars.

In addition, Sea Containers intends to raise about \$100 million via a private placement of unsecured senior notes, subject to mar-

ket and other conditions. The company intends to use the net proceeds for general corporate purposes, which may include funding for the previously announced proposed joint venture with General Electric Co. affiliate GE Capital, repayment of debt, redemption of preferred stock, capital spending and working capital.

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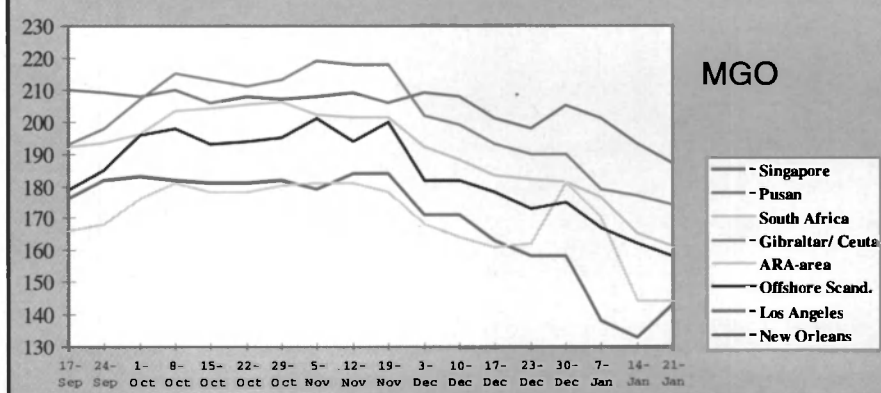
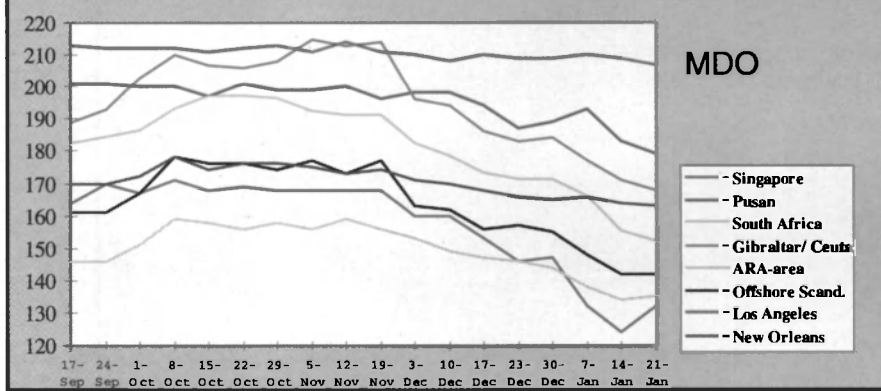
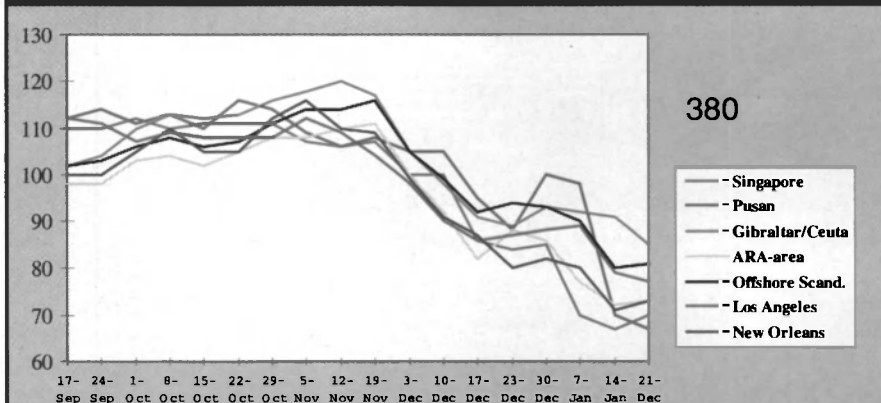
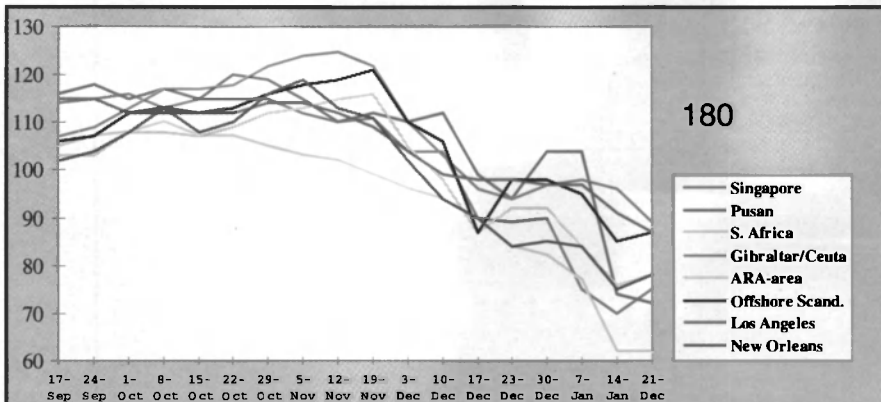
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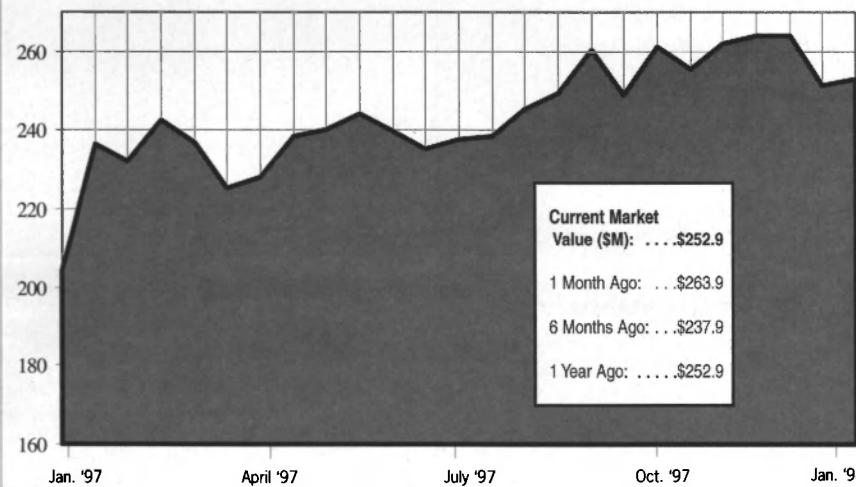
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# Recent Ship Sales

This report, compiled by Shipping Intelligence, Inc., a New York maritime consulting firm, tracks sale prices of secondhand bulk carriers and tankers. For more information, call tel: (212) 997-0966.

Date Reported	Vessel Name	Vessel Type	DWT	Year Built	Sale Price (M)
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12/5/97	Asian Confidence	Bulker	19,395	79	\$3.5
12/5/97	Aikaterini L	Bulker	20,297	77	\$2
12/5/97	Sea Lion 1	Bulker	21,143	80	\$1.6
12/12/97	Halla Pioneer	Bulker	22,457	83	\$6
12/12/97	Angeliki D	Bulker	32,312	71	\$1.7
12/5/97	Nickolas	Bulker	34,458	73	\$2.1
12/5/97	Csk Fortune	Bulker	65,622	87	\$13.7
12/12/97	M.N. Istanbul	Bulker	124,817	78	\$6.5
12/19/97	Ocean Conqueror	Bulker	143,731	83	\$14.6
12/12/97	Loire Ore	Bulker	151,143	96	\$40
12/5/97	Iron Pacific	Bulker	231,851	86	\$33
12/5/97	Barrington	Tanker	32,000	89	\$19.5
12/5/97	Sun Rose	Tanker	32,512	72	\$2.9
12/5/97	Palmerston	Tanker	36,701	90	\$18
12/12/97	Team Llada	Tanker	45,831	87	\$18.6
12/19/97	Terra Nova	Tanker	60,998	83	\$16
12/5/97	Prosperity	Tanker	98,671	78	\$3
12/12/97	New Louisiana	Tanker	115,831	75	\$7
12/19/97	Golden Prospect	Tanker	318,822	75	\$8.5

# Index Fleet Valuation



The Index Fleet Valuation is representative of the resale market for Bulk Carriers and Tankers as a whole. The Index Fleet consists of 15 vessels, nine Bulk Carriers and six Tankers, of various sizes and ages. Fluctuations in the value of the world fleet are mirrored in the Index Fleet. This report, compiled by Shipping Intelligence, Inc., a New York maritime consulting firm, tracks sale prices of secondhand bulk carriers and tankers. For more information, call tel: (212) 997-0966.

## NAVAL TECHNOLOGY

(Continued from page 66)

tem does work, the network is an expensive maintenance proposition of piping, elbows and joints that leak and corrode. NNS is looking for ways to meet the Navy's demand for a jet blast deflector that will keep the flight deck moving while costing less to maintain. NNS Engineers are studying whether a high density version of the composite used on the space shuttle can meet the extreme demands of an aircraft carrier, where it must stand up to the increasing heat of newer jets, cool rapidly and still be tough enough for a plane to roll over or land on top of it. Most important, engineers are analyzing whether the initial cost of building the new shields will be rewarded by lower maintenance costs over the life of the carrier.

Circle 7 on Reader Service Card

## Kvaerner Wins U.S. Feasibility Study

A division of the U.S. Department of Defense (DoD) has awarded to Kvaerner ASA a contract for a feasibility study for a mobile offshore base. Awarded by the Office of Naval Research, the offshore base, dubbed *SeaBase*, has been conceived as the world's largest marine structure. Kvaerner's plans envisage a structure measuring 5,249 ft. (1,600 m) long and 459.3 ft. (140 m) wide, comprising three large-scale, semi-submersible platforms. The three platforms will be linked by two semi-buoyant flexible bridges. Facilities onboard the structure will include a runway capable of landing aircraft ranging in sizes up to the C-17 transport craft and accommodations for up to 10,000 military personnel. *SeaBase* will reportedly be capable of absorbing the motions of the high seas, and remain operational as a movable military base.

"By reconfirming the feasibility of our design for this unusual project, Kvaerner will be in a unique position for participation in further stages of the Mobile Offshore Base development, from detailed design to the anticipated construction of this unique structure," said **Per Herbert Kristensen**, president of Kvaerner Maritime. As an approved U.S. government contractor, Kvaerner will also now be able to participate in future projects for the U.S. DoD.

Circle 10 on Reader Service Card

## Fairbanks Morse Wins \$20M Navy Order

The Fairbanks Morse Engine Division of Coltec Industries has received an order valued in excess of \$20 million to produce four engines and related equipment that will propel a new ship for the U.S. Navy Sealift program.

The four engines are for the program's sixth ship, designated T-AKR 305. The engines are scheduled to be delivered to Avondale Industries, Inc. in 1999. Previously, Fairbanks Morse had been chosen to provide engines for the first five ships in the Sealift program.

The engines, 10-cylinder Colt-Pielstick PC4.2 models, are each rated at 16,290 hp. These ships will augment the nation's capacity to transport tanks, trucks and other equipment around the world rapidly. Each ship is 950 ft. (289.6 m) long and is designed to cruise at 24 knots.

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February, 1998

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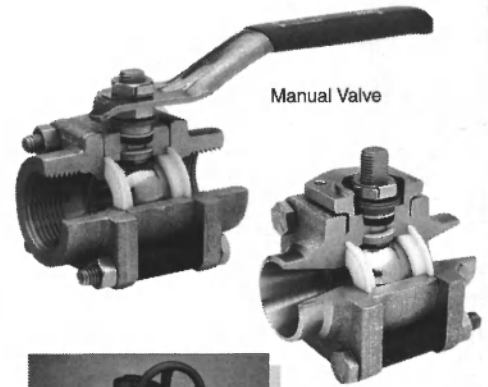
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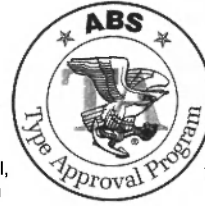
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71

## New Study Projects \$160 Billion Naval Market

In a new study entitled *Littoral Warfare: An Emerging Market for Ships & Systems*, Stuart Slade of market research and publishing firm Forecast International projects that over the next decade,

more than \$160 billion will be spent worldwide on warships and their equipment as a result of the shifting worldwide emphasis from deep ocean to coastal and shallow water operations. This look at the

likely structure of naval expenditures over the next decade brings together the operational, technical and financial implications of littoral warfare.

The study states that littoral regions have become extremely complex, multi-dimensional, threatening environments that

present entirely new tactical challenges to naval forces. Littoral mission profiles now extend far beyond combat operations to include maritime policing and even humanitarian tasks. The result is a key paradigm shift in naval doctrine that has implications for maritime forces in every size category. This extends beyond navies to include coast guard services, land-based maritime aircraft units and coastal defense forces. Surprisingly, the latter is projected as becoming increasingly important, and much attention is devoted to the often neglected market offered by coastal defense weapons and systems.

Key to the study is a mathematical model that allows procurement programs to be broken down into expenditures on key areas such as hulls and machinery, weapons, radars, sonars, electronic warfare equipment and C4I systems. The analysis shows that littoral warfare is essentially a C4I problem, and that more than a quarter of the total expenditures will be devoted to improvements in this sector. The study also found that dramatic advances in civilian sector computer technology have strongly impacted the design of naval C4I systems, bringing the procurement of very capable systems within reach of even the smallest naval powers. The limitations of technological developments, such as air-independent propulsion for submarines and reduced signature "stealth" techniques for ships and aircraft, are explored, as well as the benefits they may confer. Some prevalent myths, such as the suggestion that smaller warships are somehow "the way of the future," are contradicted by detailed assessments of building programs and ship construction economics.

*Stuart L. Slade is the author of numerous articles on naval and defense subjects, with works widely published in industry journals such as Naval Forces, Navint, International Defense Review and Armed Forces. He has also been a contributor to a number of books on naval subjects, including Navies of the Nuclear Age and the forthcoming Navies of The 21st Century and Future Naval Aviation. Mr. Slade is presently senior defense analyst with Forecast International/DMS, in Newtown, Conn.*

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## NAVAL TECHNOLOGY

### Halter Lays Keel Of First Bahamas Class Patrol Boat



Halter Marine Group, Inc. has laid the keel for the first of two 198.8-ft. (60.6-m) Bahamas class long range offshore patrol boats for the government of the Bahamas. The design is an adaptation of the Europatrol 250, a modern Vosper International patrol craft design incorporating the latest in available technology to provide a comfortable, capable craft to fulfill the

mission requirements of the Royal Bahamas Defence Force (RBDF). The vessels will include components produced by two Halter shipyards. Halter-Gulfport, Miss., will fabricate the boats' aluminum superstructures which will be mated to the vessels' steel hulls at Moss Point Marine, Inc., where the vessels will be completed.

The new patrol boats are designed for multi-purpose patrol of Bahamian territorial waters to counter illegal narcotics traffic; provide search, rescue and refugee assistance; control economic fisheries protection zones; and provide disaster relief.

Mission-related areas include high-speed response to emergencies, mothership applications in support of security operations, surveillance monitoring and control of sea lanes and support of coast

guard, police and customs operations.

The first vessel is scheduled for delivery in January 1999, and the second will follow in March 1999. The Bahamas class vessels measure 198.8 ft. (60.6 m) long with a 29.2 ft. (8.9 m) beam and a full load draft of 8.5 ft. (2.6 m). Each will have a range of 3,000 nautical

miles at a speed of approximately 10 knots. Accommodations for up to 62 personnel with an endurance of 21 days are provided.

The total cost for the two vessels is approximately \$26 million, and the four optional Nassau class patrol boats would raise the contract value to \$62 million.

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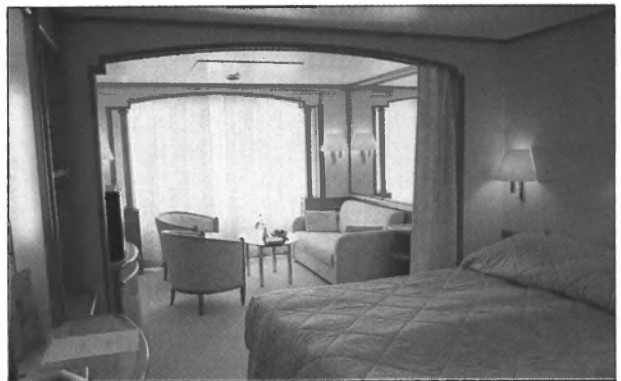
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**IBS:**

# Ensuring Ship Safety

*While the advent of advanced-technology products and systems which constitute the automated bridge — and technological advances in general — have had a tremendous effect on the outfitting of bridges on all vessels, these factors have had a similar, sweeping effect on the marine electronics supply market itself.*

*Small, independent players have regularly been scooped up and integrated by larger companies which see such strategic acquisitions as an opportunity to cost-effectively and time-efficiently acquire a compatible technology or product which will help them become a "one-stop shop."*

*While maritime has, is and will always be a crew-intensive industry, new products and systems — such as the integrated bridge systems — are continually introduced to help few do the job of many, safely and efficiently. Skeptics who continue to label the maritime industry as conservative and slow to act on emerging trends and technologies may not be far from the mark in classifying a certain segment of owner/operators. But owners of quality ships continue to demonstrate that an investment in advanced marine electronics is "in vogue."*

*The ensuing pages highlight the efforts of a few suppliers in outfitting modern ships.*

## U.K.'s MSA Evaluates Raster Chart Display System

U.K. shipping companies are helping the MSA to evaluate Raster Chart Display Systems (RCDS) in use on their ships. The results will be submitted to the IMO in time for next July's meeting of the Sub-Committee on Safety of Navigation - NAV 44.

The IMO has already adopted performance standards for Electronic Chart Display Information Systems (ECDIS). However, there is currently only a limited amount of vector data available to support full ECDIS. The MSA believes that raster charts, which already have a wide-coverage and are exact copies of official paper charts, provide a reliable electronic charting service for areas where official vector data is not yet available.

In the light of debates at NAV

43, the IMO has called for more feedback from users to help it assess the safety of RCDS.

The MSA has given permission for a number of U.K. ships to use RCDS as their main charting tool so that a fair and independent evaluation can take place. Together, with similar feedback from a number of other countries, the results will enable the safety factors for raster charts to be properly assessed at IMO.

All vessels involved in the MSA's evaluation use the U.K. Hydrographic Office's ARCS charts and the UKHO will be assisting the MSA in evaluating the feedback.

The MSA welcomes the active participation of the following companies in this important work:

British Antarctic Survey; BP Shipping Ltd.; F T Everard & Sons Ltd.; P&O European Ferries; Shell UK Ltd.; United Marine Dredging Ltd.; Royal Fleet Auxiliary; and RNLI.

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Maritime Reporter/Engineering News

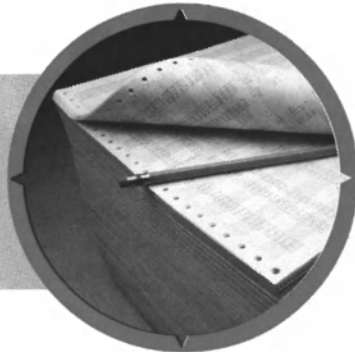




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## Litton Wins Prestigious IBS Contracts

Litton Marine Systems received an order for four integrated bridge systems from Samsung Heavy Industries late in 1997, to be installed on four new ABS-classed VLCCs for Chevron Shipping Co.

Each ship is scheduled to be fitted with a Sperry Vision 2100 integrated bridge system, which will include a Sperry VMS VT voyage management system (electronic chart display and voyage data recorder); Decca BridgeMaster VT radars; and Sperry gyros, autopilots, steering controls and speed logs. The communications equipment will include a Sperry GMDSS station. The ink wasn't even dry on this prestigious order when Sperry was selected to provide the integrated bridge system for the new Eagle-class cruise ships for Royal Caribbean. The three 130,000-ton ships, under construction at Kvaerner's Turku yard, will each receive a totally redundant package consisting of two independent Vision 2100 integrated bridge systems. Keeping with its hallmark of investment in technical innovation, Litton debuted the Innovation Bridge Series for the first time last year. The new ergonomic multi-function bridge workstation concept takes advantage of the latest advances in flat-panel display technology, using high-resolution flat-panel color display screens which are only eight cm deep.

"With the combination of advanced flat-panel technology and multi-function displays, we are able to reduce the number of separate consoles and workstations required for the current generation of integrated bridge systems," said **Nolasco DaCunha**, vice president, Sales and Customer Support.

Circle 17 on Reader Service Card

## Kelvin Hughes Brings Advanced ECDIS To Market

Kelvin Hughes is offering an enhanced ECDIS to provide mariners with optimum safety and function in one central control unit. These functions include navigation, route editing and selection and docking modes, as well as interface selection with other systems. In chart mode, this new system allows for full access to electronic charting facilities. The latest ECDIS display is a multi-fueled system designed to accept both official electronic navigation chart and raster chart information, which comply with IMO standards and are produced by the international hydrographic offices. The new ECDIS will be available in both Nucleus 5000 and Nucleus 6000 formats, and is designed for inclusion in the Kelvin Hughes range of integrated bridge systems.

Circle 19 on Reader Service Card

Maritime Reporter/Engineering News

**Furuno Releases New ARPA Radars**

Furuno recently unveiled its latest line of commercial grade ARPA radars — the FAR2805 series. These units meet IMO requirements for installation aboard all classes of conventional vessels.

There are seven models available, ranging from 10 to 60 kW, including both X-band and S-band configurations.

The units incorporate a logarithmic amp, multi-level quantization, echo stretch, echo averaging and built-in radar interference rejector to provide quality target location.

Each unit provides a 360 mm diameter picture with extra space for alphanumeric data.

A total of 40 targets can be entered into the Furuno ARPA radars. Each radar can be equipped with either a 36 or 44 rpm motor for high-speed vessels.

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**Maintaining Electronics Assistance From Land**

Radio Holland is a supplier of innovative solutions in the field of satellite and radio communications, automation, observation and navigation systems, servicing a wide range of vessel sizes, types and niches.

In 1997, SAIT-Radio Holland introduced its new Shore Based Maintenance Coordination Contract (SBMCC), proving that shoreside support is just as crucial to maintaining advanced electronic systems as onboard personnel. With the SBMCC, a shipowner can reportedly utilize Radio Holland's worldwide organization to take care of all marine electronic problems.

The SBMCC complies with all international regulations encompassing GMDSS, IMO and SOLAS. It is coordinated from four area coordination centers, covering all seven seas.

Circle 20 on Reader Service Card

**MAN Debuts GPS/GLONASS Navigation System**

With the addition of GLONASS to GPS, a new dimension in marine

navigation has been reached with the introduction of MAN Technologies NR-N124 satellite navigation system.

GLONASS represents the latest technology in satellite navigation. The new system — the Russian equivalent of GPS — adds another 24 satellites for precision positioning using the MAN Technologies NR-N124 GPS/GLONASS Navigation System.

To take advantage of the

increased satellite availability, as well as the improved integrity of two independently operated satellite positioning systems, the NR-N124 features 12 channels for LI GPS and 12 channels for L1 GLONASS, providing all-in-view tracking for both constellations.

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90 cm and .10 of a knot.

Standard features of the NR-N124 include: automatic beacon scan and selective algorithms, which lock on the strongest transmitting beacon station in seconds; and digital matched filters, which allow for adjacent channel rejection. A multi-track Beacon receiver, the latest in radio transmission technology, is available with the system as an option.

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## CALENDAR

### FEBRUARY

**Seatrade Tanker Industry Convention:** February 11-12, London, UK.  
Contact: Seatrade, Maureen Standing, tel: +44 1206 545121; fax: +44 1206 545190.

**The Sea Empress Oil Spill:** February 11-13, Cardiff, UK.  
Contact: The Cartered Institution of Water and Environmental Management, CIWEM Services Ltd., tel: +44 171 831 3110; fax: +44 171 405 4967.

**Oil and Gas Thailand '98:** February 11-14, Bangkok, Thailand.  
Contact: Overseas Exhibition Services Ltd., tel: +44 171 486 1951; fax: +44 171 486 8773.

**IP (Institute of Petroleum) Week:** February 16-19, 1998, London, UK.  
Contact: IP, Jane Hill, 61 New Cavendish Street, London, W1M 8AR, tel: +44 171 255 1472; fax: +44 171 255 1472.

**Oil and gas West Asia '98:** February 16-19, Sultanate of Oman.  
Contact: LMC, Mrs. Sord, tel: +44 171 453 2712; fax: +44 1992 570853.

**SPE India Oil and Gas Conference**

**and Exhibition:** February 17-19, New Delhi, India.

Contact: SPE, Dan Lipsher, tel: (972) 952-9306; fax: (972) 952-9435; e-mail: dlipsher@spelink.spe.org

**Worldwide Deepwater Technologies Forum:** February 23-24, London, UK.  
Contact: IBC, Emma Tamlyn, tel: +44 171 453 2712

**Liner Shipping, 2001 And Beyond:** February 24-25, London, UK.  
Contact: Containerisation International, Cathy Francis, tel: +44 171 505 3500; fax: +44 171 505 3535.

**UDT Pacific '98, Undersea Defense Technology:** February 24-26, Sydney, Australia.  
Contact: Nexus Information Technology, Beverley Lucas, tel: +44 1322 660010; fax: +44 1322 661257; e-mail: udt.pacific@nexus-media.co.uk.

**UDT Pacific '98:** February 24-26, Sydney, Australia.  
Contact: Beverley Lucas, tel: +44 1322 660070; fax: +44 1322 661257; e-mail: HYPERLINK mail to:UDT.Pacific@nexusmedia.co.uk.

**Fast Ferry International:** February 24-26, Bella Center, Copenhagen.  
Contact: Fast Ferry International, Denise Clifford, Millroy House, Sayers Lane, Tenterden, Kent TN30 6BW, United Kingdom, tel: +44 1580 766960; fax: +44 1580 766961; e-mail: info@fastferry.co.uk.

### MARCH

**ASNE Day 1998 (10th Anniversary of the American Society of Naval Engineers):** March 3-4, Washington, DC.  
Contact: ASNE, Sally Cook, tel: (703) 836 6727; fax: (703) 836 7491.

**IADC/SPE Drilling Conference:** March 3-6, Hotel Inter-Continental Dallas, Dallas, Texas, USA.  
Contact: SPE, Dan Lipsher, tel: (972) 952-9306; fax: (972) 952-9435; e-mail: dlipsher@spelink.spe.org

**Seatrade Cruise Shipping Convention:** March 3-7, 1998, Miami Beach, FL.  
Contact: Seatrads, Maureen Standing, tel: +44 1206 545 121; fax: +44 1206 545 190.

**Fish Canada '98:** March 6-8, Moncton Coliseum/Agrena, Moncton, N.B., Canada.  
Contact: Catherine MacNutt, Denex

Group, Inc., tel: (902) 468 4999; fax: (902) 468 2795; e-mail: HYPERLINK mail to: denman@ns.sympatica.ca.

**International Oil Spill Conference & Exposition:** March 8-11, Washington State Convention and Trade Center, Seattle, WA.  
Contact: Trade Associates, Inc., tel: (301) 468 3210; fax: (301) 468 3662

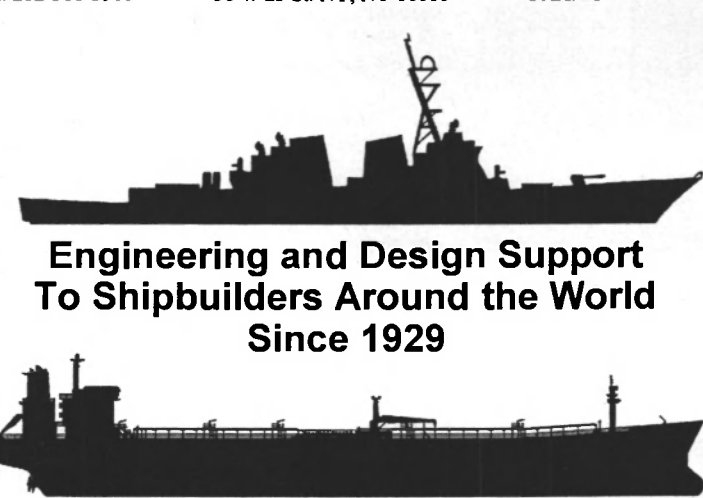
**Ports '98, "Ports — Transportation Link To Global Trade":** March 8-11, 1998, Long Beach, CA.  
Contact: The Office of the U.S. Section, PIANC, tel: (703) 428 6286, fax: (703) 428 8171

**CHC '98, Canadian Hydrographic Conference:** March 9-12, 1998, Victoria, BC, Canada  
Contact: Canadian Hydrographic Conference, tel: (250) 363 6346; fax: (250) 363 6323; e-mail: HYPERLINK mail to: chc98@ios.bc.ca chc98@ios.bc.ca

**Oil Spill Response — The National Contingency Plan:** March 10-11, Copthorne Effingham Park Hotel, Gatwick, UK.  
Contact: IP, Jane Hill, 61 New Cavendish Street, London, W1M 8AR, tel: +44 171 255 1472.

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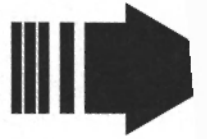


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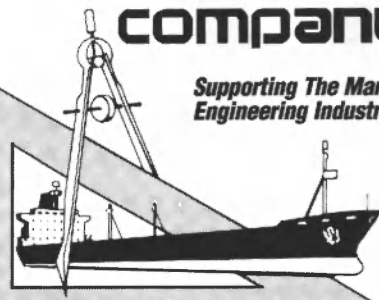
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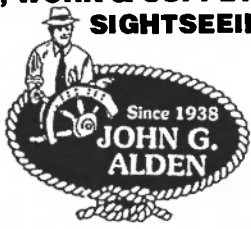
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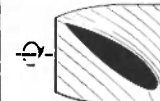
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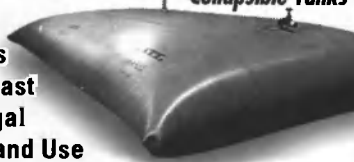
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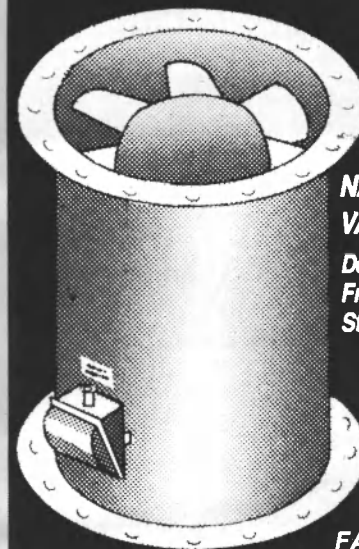


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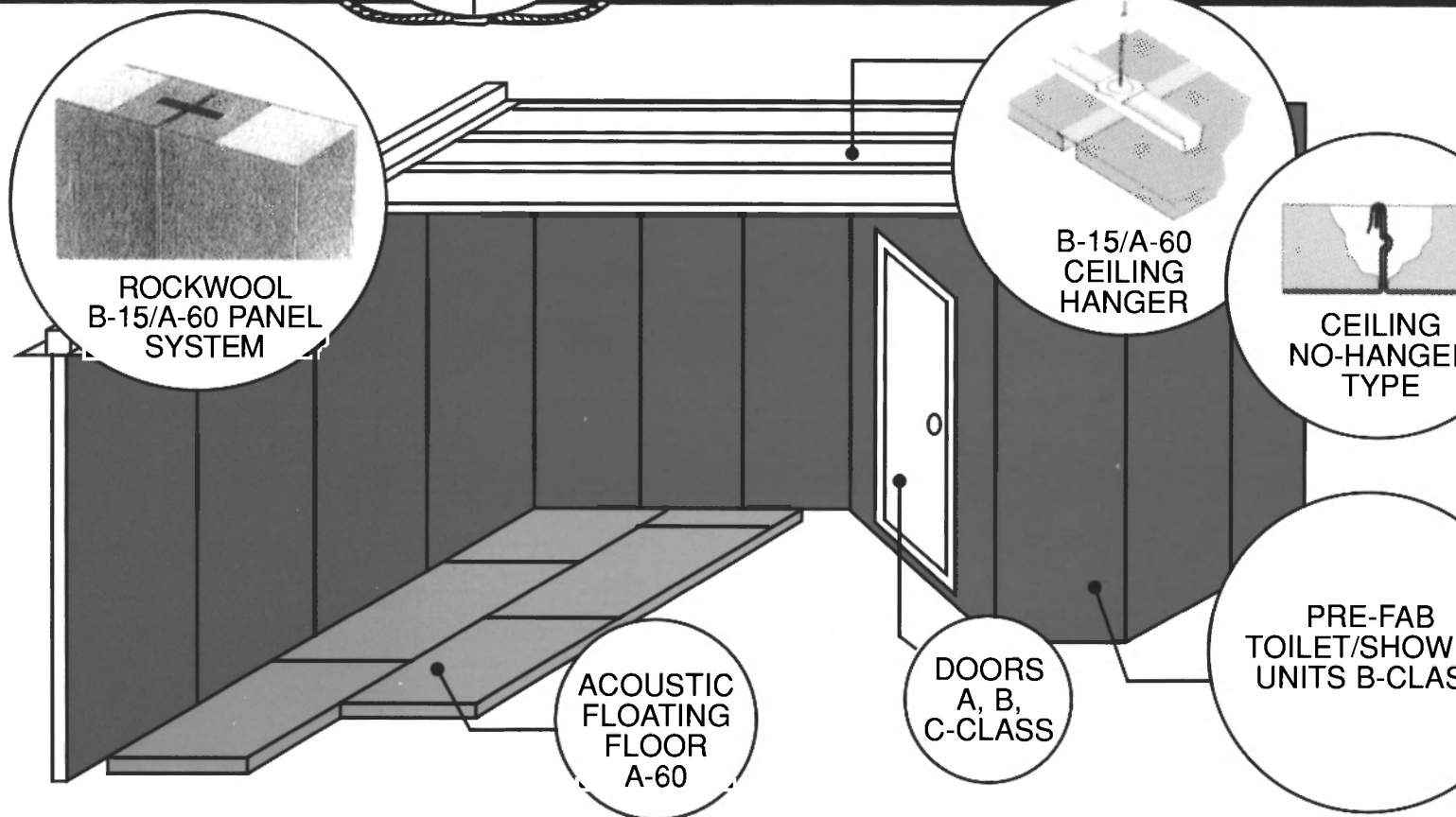
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