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AND  
ENGINEERING NEWS

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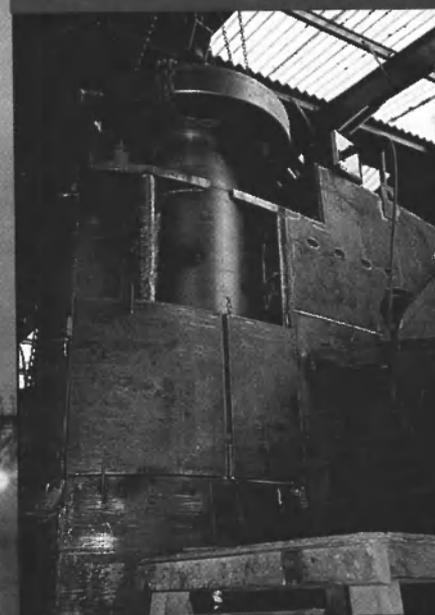
# Disney's New Ship Shape

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118 E. 25th St., NY, NY 10010

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e-mail: [mren@marinelink.com](mailto:mren@marinelink.com)

**PUBLISHERS**

Charles P. O'Malley

John E. O'Malley

John C. O'Malley

**Vice President/Editorial Director**

Gregory R. Trauthwein

**EDITORIAL**

Senior Editor

Nina D. Miller

Production Editor

Anthony Besada

Technical Editor

David Tinsley

International Editor

Alan Thorpe

Editorial Consultant

James R. McCaul, president,

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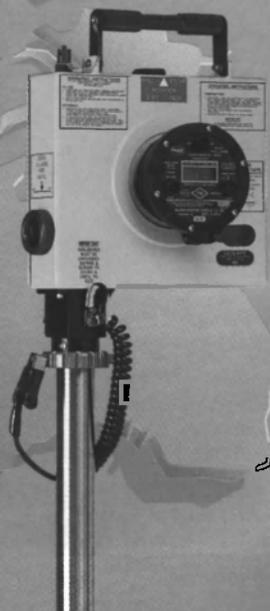
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## EDITOR'S NOTE

### Making it safe and simple

**A**n appropriate summation for the March edition comes from a quote by Albert Einstein: "Everything should be made as simple as possible...but not simpler!" The Finnish Maritime Administration offered me the opportunity to sail aboard the Finnish ice-breaker *Fennica* for a night. *Fennica*, which has been considered a technological wonder since it came into service in 1993, was chosen to play a major role in the ECHO Project, a program aiming to develop and set the world standard for ECDIS aboard merchant vessels. An international team has labored for the last 23 months, preparing the system for commercial viability, while readying it for final standards approval regarding data sharing and transmission within the system, and ultimately type approval of equipment, expected in the spring and autumn respectively.

The ECHO Project is pure in theory (at least as pure as *any* project can be that combines research and development with commercial prospects) in that its driving force has been, and remains, safety at sea. The point of the ECHO Project is not to simply prove that it can be developed, but that it can be developed and implemented aboard ships efficiently and cost effectively, with immediate benefits to owner/operators in terms of both safety and profits.

While the notion of safety at sea is simple, the actual implementation of a modern-day solution requires a system which combines ease-of-use backed by the latest in sophisticated, easily updatable technology. An update on the ECHO Project, as well as some thoughts following a night spent icebreaking near the Arctic Circle, begins on page 19.

The creation of Disney cruise ships *Magic* and *Wonder* — also profiled in this edition — provide a reiteration of this column's opening quote. Disney is well-known worldwide for its highly creative land-based entertainment properties. Interestingly, the company tends to avoid playing the role of guinea pig for new technology; preferring to incorporate proven methods to deliver its entertainment, and the Disney cruise ships from Italy's Fincantieri are no different in the matter of offering proven technology. Where these ships perhaps depart from their contemporaries is in the extraordinarily high involvement of individuals and organizations from outside of the maritime realm, providing a multitude of talent and creative spins to Disney's themes. While the general arrangements were created, tested and re-tested by some of the marine industry's top talent, Disney enlisted the services of maritime unknowns such as New York City-based Rockwell Group to fulfill the creative needs of parts of the ship. For more details, please refer to page 38.



*Greg R. Franthum*

## International Representatives

### INTERNATIONAL OPERATIONS

CHARLES E. KEIL, Vice President  
4400 N. Federal Highway, Ste. 210-06, Boca Raton, FL 33431  
Telephone: +561-368-1021; Fax: +561-368-1161  
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ANNE MURRAY/YVONNE SANDFORD  
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#### Germany/Switzerland

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# Uncovered: Lax Coating Application, Maintenance Come At A High Cost



by David Tinsley,  
technical editor

## One Step At A Time

With the increasing complexity of marine coatings, susceptibility to misuse has risen. Although modern systems demand greater vigilance in ensuring correct application and maintenance, problems subsequently encountered in service point to a lack of specific knowledge among shipyards, operators and crews.

Strict protocols now need to be observed in applying coatings, and every step of the process has to be recorded. "It's a precise and time-consuming task, but such are today's commercial pressures that yards and shipowners sometimes feel the need to cut corners," said paints and coatings expert **Ed Jansen**, of Antwerp-based Touw-Jansen.

Any shortcomings in the quality of the preparation and application work, or any cutback on the original specification in order to speed newbuilding delivery or trim costs, will produce extra cost in the longer term. The coating will deteriorate quickly and start to blister, flake, crack or crocodile, requiring an expensive repaint.

Tank coatings are particularly sensitive to irregularities, and call for the highest standard of application. However, according to Mr. **Jansen**, most problems with such coatings occur after a vessel has been delivered, due to carelessness or improper use. The slightest chip in a coating can lead to its eventual demise, and it is significant that deterioration frequently starts at a spot just below access points through which tools and equipment are fed down into the tank in the course of maintenance work.

Non-adherence to the prescribed cargo range within the scope of the protection system can, and does, lead to major problems, particularly where the coating resistance list has not been passed on to shipmanagers and charterers.

Owners should also impress upon crews the importance of ventilation, suggested Mr. **Jansen**. "In a case not long ago, a complete fleet of chemical carriers had to be re-coated when the crew failed to ventilate the cargo tanks properly after carrying methanol," he said. "Water-based cargoes were loaded

too soon afterward and the residual methanol in the tank coatings drew water into the coatings, causing swelling and cracking. The whole fleet was out of service for several weeks and the total bill for re-coatings and off-hires topped an estimated \$25 million."

As an authority on the subject, Mr. **Jansen** takes the view that owners should spend as much time deciding on a paint system as on major machinery or equipment selection. And once a ship has entered service, every effort should be made to ensure that those operating the vessel understand the delicate nature of the tank coatings in particular.

(For the latest marine paints and coatings system offerings from manufacturers, please refer to this month's "Marine Coatings & Corrosion Control" section, which starts on page 58).

## The New Thoroughbreds

Medium-speed propulsion machinery of a new, thoroughbred type is set to make its debut in a new generation of North Sea RoRo ships intended to ensure faster, more efficient freight exchange between Sweden, the U.K. and Belgium.

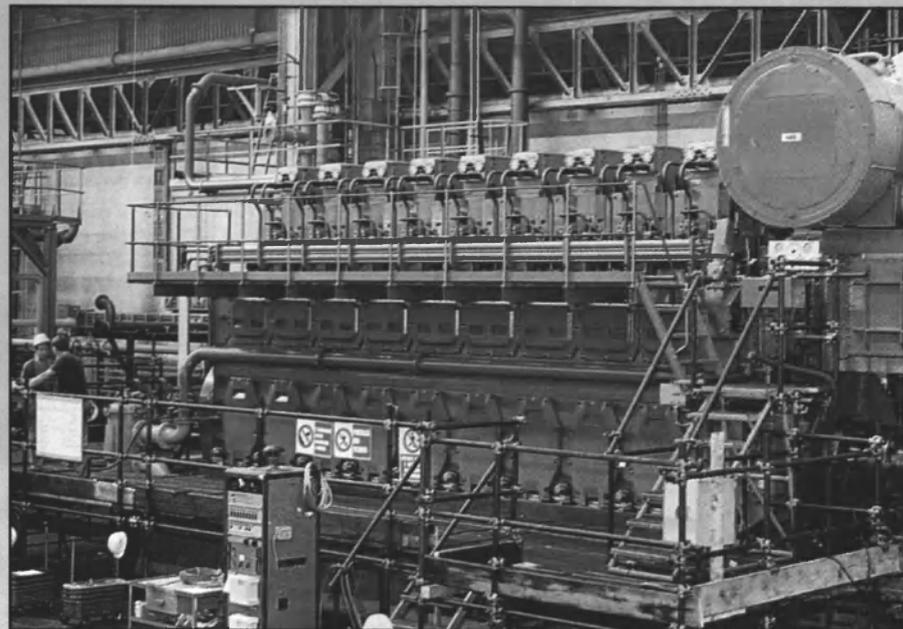
In addition to the commercial significance conferred by an opening reference for the 500-mm bore, four-stroke design conceived in Winterthur, the fountainhead of Swiss diesel engineering, the pro-

ject has a wider industrial aspect in the context of the rationalization taking place in the business in Europe.

The compact ZA50S perpetuates the Sulzer marque in the medium-speed domain against a backdrop of the commanding presence of the companion Wartsila range in the four-stroke field. The emergence of the new Sulzer machine is of added note for the unmatched level of medium-speed product development steered from Finland by parent organization Wartsila NSD Corporation, to strengthen the market standing of the Wartsila-branded portfolio.

Work on the ZA50S, though, was set in train well before the combination of Wartsila Diesel with Fincantieri-owned New Sulzer Diesel, as an evolutionary progression of the ZA series, which has achieved considerable success in the ZA40S. The fact that the first three recipients of the ZA50S design — the trio of twin-screw, 8,700-dwt Tor Line newbuildings — were ordered from Fincantieri, brought manufacture of the engines within the Italian group's remit.

In any event, the industrial philosophy espoused by Wärtsilä NSD's Finnish owners is reflected in the company's decision to concentrate all ZA production at the Grandi Motori Trieste (GMT) works, in which the Finnish group has a 40 percent stake. The



The ZA50S engine, one of two nine-cylinder units for the first Tor Line RoRo newbuilding at Fincantieri.



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## INVESTMENT IN DESIGN

ZA40S, for which 729 sales had been chalked-up in the marine and power plant sectors by December 1997, remains fully in the Wartsila NSD program, since there are many applications for which its power output and physical size are still very appropriate.

Wartsila NSD's 'focused factory'

concept, as applied to the Sulzer medium-speed engines and the huge GMT complex at Trieste, signals the end of ZA40S manufacture as the mainstream activity at the Mantes works of New Sulzer Diesel France, which will become primarily a maker of parts.

Trieste has also been nominated

as the production point for the Wartsila 64, the world's most powerful medium-speed engine, in addition to its substantial role as a manufacturer of Sulzer two-stroke engines.

The twin Sulzer 9ZA50S engines selected for each of the new Tor Line ships will have a combined

maximum continuous rating of 29,340-bhp (21,600-kW) at 450 rpm, driving controllable pitch propellers, for a service speed of 21.1 knots. With its higher cylinder output, the ZA50S meets market requirements for higher installed powers with fewer cylinders, in the larger and also faster types of ships where machinery space is restricted.

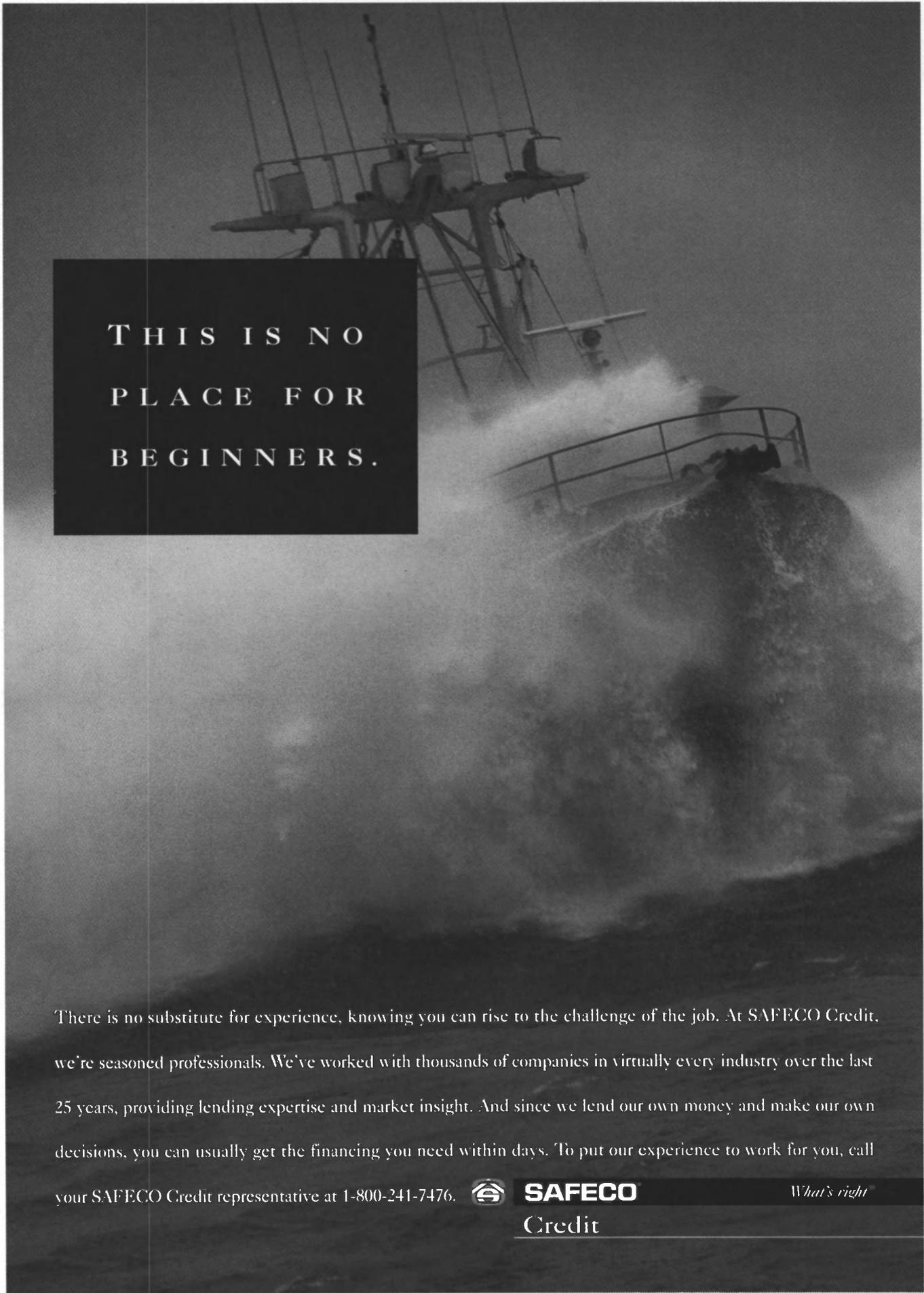
### Re-Focused Energies

Skills crafted and honed in shipyards on naval contracts can be effectively re-deployed to foster commercial diversification, given committed and focused management. Faced with generally reduced naval defense expenditure in the west — bred of a political complacency over national security following the end of the Cold War — naval yards, ancillary sectors and workforces have suffered contraction above and beyond that which technological progress itself would have brought.

In the European scenario, establishments in Italy and Scotland visited by *MR/EN* in recent weeks provide examples of the successful re-deployment of skills and resources into growth markets, albeit without the same degree of capital and work-hour intensity associated with work on fighting ships.

On the Ligurian coast, Fincantieri's naval shipbuilding division is readying the world's largest monohull fast ferry for year-round service in the Sardinian traffic, following its launching at Riva Trigoso in January. The stern-ramped Tirrenia ferry, designed to carry 1,800 passengers and 460 cars at around 40 knots, encapsulates the rapid progression of the division in developing a position in the commercial market, and in driving the technology ever-forward.

In more northerly climes, at one of Western Europe's largest naval support facilities, the precision engineering skills at Rosyth Royal Dockyard have been applied to effect in the offshore and rail sectors. The current output of subsea production manifolds, and the development of versatile new types of freight wagon for an increasingly integrated European rail network, give expression to the successful policy of Babcock International, as the new owner of the complex, to complement Rosyth's naval workload with other targeted business.



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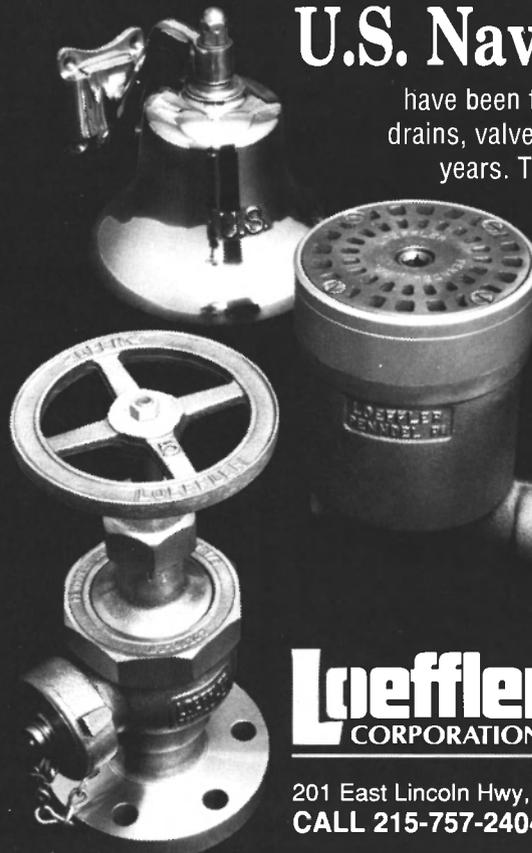
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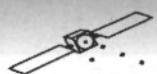


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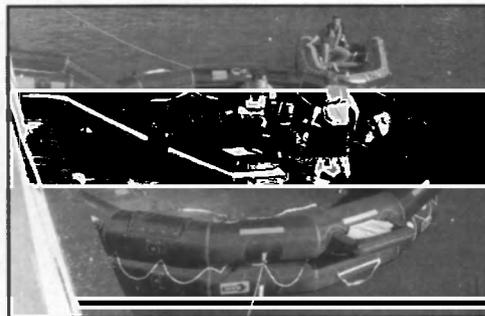
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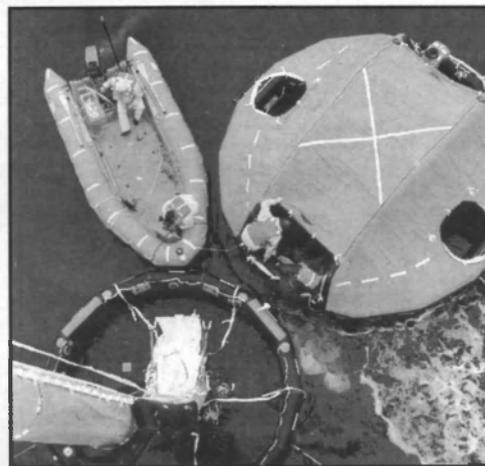
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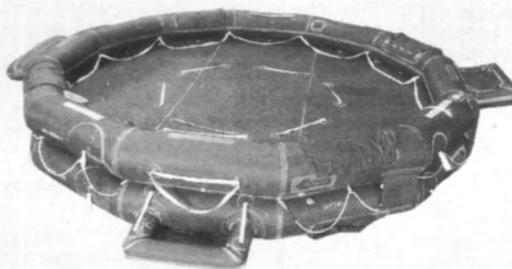
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**MARINE FINANCE**

**Transocean, Shell Reach Agreement**

Transocean Offshore Inc. has reached an agreement with Shell Deepwater Development over the dayrate for the third-year of a five-year contract on the company's fourth-generation semi-submersible rig *Transocean Richardson*. Transocean reported that revenues associated with the third year of the contract, which began on February 1, were around \$67.5 million.

**New NICO Ship To Work For Total**

UAE-based ship repair, fabrication and offshore services group NICO has purchased and overhauled a new ship for \$3.5 million which will be used by France's Total for operations off Thailand on a long-term oil field supply contract.

The NICO group is due to be acquired shortly by Topaz Energy & Marine SAOG (TEAM), a new public company under establishment in Oman.

**Burmah Sells LNG Stake To Mitsui**

British lubricants and chemicals group Burmah Castrol Plc has reportedly agreed to sell the remaining 50 percent stake in its liquefied natural gas (LNG) transportation joint venture to Mitsui O.S.K. Lines Ltd. and Nissho Iwai Corp. for approximately \$70 million. According to Burmah, the sale will result in a profit of around \$45 million.

**Keppel Marine Wins \$18M Contract**

Keppel Singmarine Dockyard won two contracts worth approximately \$18 million. One is for the conversion of two flat top barges to power generating barges for Wartsila NSD Finland Oy (Wartsila). The second contract was awarded by Sunlover Cruises Ltd., a subsidiary of Japan's NYK Lines, for the refurbishment of two high speed aluminum ferries.

**CP Ships To Extend TMM, Tecomar Shipping Pact**

Canadian Pacific Ltd.'s CP Ships subsidiary plans to extend and improve an operating agreement with Transportacion Maritima Mexicana SA (TMM) and Tecomar SV on the west Mediterranean to U.S. Gulf/Mexico container trade for an additional two years.

According to CP Ships, its Contship and Lykes Lines subsidiaries will increase the frequency of their service to weekly from the current once-every-11-day service which has been operating for the past three years.

Maritime Reporter/Engineering News

# Forest Products Nicho Looks Ripo For Expansion

*12% growth predicted over six years; Ports must step up improvement efforts*

In its latest report — *Forest Products Shipping: Looking to the Upturn?* — London's Drewry Shipping Consultants forecast that the forest products trade will rise, in terms of tonnage, nearly 12 percent by the year 2004 from current levels of around 170 to 175 million tons/year.

As significant to the shipping communities as are the hard numbers, so too are the changes in the type of products to be shipped and service expected.

Trade growth, according to Drewry, will not be distributed evenly: The focus will be on "downstream" products such as sawnwoods and boards/panels rather than logs and pulp and paper products rather than pulpwood. This will be crucial for both ship operators and ports as they will see more business falling into the dual arenas of minimum/nil damage "cargo care" and just-in-time (JIT) delivery.

## Holding A Steady Course

While not a major focus of the shipping market in general, the carriage of forest products has enjoyed steady growth over the last decade.

Tonnage transported in the mid-1980s equaled 125 to 130 million tons/year; this compares with 150 to 155 million tons/year at the start of the 1990s. In its latest report, Drewry estimated that by 2004 total seaborne trade could be touching approximately 190 million tons.

Even if trade volumes stall in the short term, key underlying fundamentals that underpin forest products demand — population growth, improving living standards (increasing demands generated by existing populations) and increasing levels of literacy — are wholly growth oriented.

The forest products trades make use of virtually every type of dry cargoship, with success determined by the blend of logistics, competitive advantage, quality of service and freight rates. This creates various shipping "battle-grounds" where competition comes to a head. Such an arena is the North American export sector.

Late 1997/early 1998 have seen a good deal of tension arise as various contract renewal sessions have

come around. Drewry noted that this tension is not wholly about freight rates (though this is impor-

tant) as the business has other logistical elements. Generally speaking, the breakbulk sector

regards the container market as a threat. With crisis in Asia impacting on the demand, not just for for-

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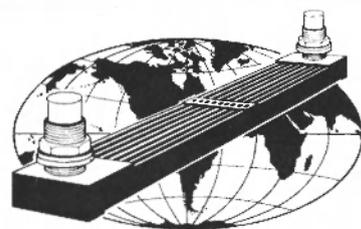


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## MARINE FINANCE

est products, it may be that the container sector will again be looking at the forest trades.

In the early 1990s, western Canadian shippers — at least in the sawnwood sector — had the fallback of a strong presence in the European market. This has largely disappeared — the EU's prolonged prevarication over kiln drying was a factor but high prices in Asia were even more so — and is unlikely to be won back given that aggressive new players from the Baltic States have emerged.

The changing market structure in northwestern Europe has impacted on ports, given that large volumes of wood-based products (primarily sawnwoods and panel products) now move as relatively small individual lots, and consequently, utilize relatively small ships, rather than the Handysize types that formerly served the trans-Atlantic sector. Pricewise, much of the traffic may be marginal business — that is, buyers will be willing to switch sources (and the port used) for very small price benefits.

### Focus On Ports

The changing requirements of the often complex forest products logistics chain, typified by the changing European pattern, have major implications for the requirements, developments and competitive position of forest products ports — this topic being a major feature of Drewry's latest report.

At the loading end, the port handling market is extremely fragmented and, indeed, specialized loading ports themselves exhibit marked differences in sophistication ranging from the leading edge of technology to the very basic. In contrast, the discharge side has tended to see more development over the longer period.

Crucially, Drewry noted, "there is an increasing trend, particularly in Northern Europe, for discharge ports to act as a storage and distribution hub, rather than a pure transit facility." Drewry added that this has fundamental implications for shipping as it enables a port to create critical mass making it a "must call" facility for shipping lines and drawing in landslide traffic to further boost the distribution hub role.

Such developments also emphasize the control over the trade held by the shippers and distributors, a factor which enables them, and not the shipping line, to dictate port call preferences. As a result, businesses might well switch shipping operators rather than switch ports.

Looking at the forest products industries themselves, Drewry noted a remarkable change over the past two decades.

The forest products companies of the 1970s generally had a complete mix of operations — from forestry to mill process and through to shipping and paper or timber merchants.

The forest products company of the late 1990s has been shaped and forced by shareholder pressures to sell-off non-core or under-performing units, to seek partners or accept bankruptcy, to bring manufacturing operations closer to the market and to make products that the consumers want.

Within the modern industry structure, there has been rapid growth by merger and acquisition. A number of these acquisitions have involved purchases of overseas companies encouraging the globalization of business.

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Maritime Reporter/Engineering News

## MARINE FINANCE

### KMY To Build Third Eagle Class Cruise Ship For RCCL

Royal Caribbean Cruises Ltd. (RCCL) recently confirmed its option agreement with Kvaerner Masa-Yards (KMY) to build a third Eagle-type giant cruise ship.

The new vessel will be built at KMY's Turku New Shipyard in Finland, and is scheduled for delivery in spring 2002.

### Carnival And Kvaerner Reach \$Multi-Million Agreement

Carnival Corp. has reached an agreement with Kvaerner Masa-Yards for the construction of one cruise ship for Carnival Cruise Lines, with options for two additional sisterships. Each vessel will cost approximately \$375 million. The 82,000 gt newbuildings will have a

passenger capacity of 2,100. Delivery of the first vessel is scheduled for late 2000, and if the options are exercised, the remaining two vessels will follow in 2001 and 2002.

### BMI Announces Contracts

Baltimore Marine Industries, Inc. (BMI) recently announced the following contracts, estimated at a total value of \$15 million: the refurbishment of LNGC *Matthew*, a liquefied gas carrier owned by Cabot LNG Shipping Corporation; the repair of USNS *Concord*, part of the U.S. Navy's Military Sealift Command fleet; the repair of *Frances Hammer*, an integrated tug-barge vessel owned by Ocean Chemical Carriers of Houston; and the repair, in conjunction with a cargo gear survey, of USNS *Wright*, a Maritime Administration aviation maintenance ship operated by American Overseas Marine Corp.

### Ugland Buys Into U.S.

Ugland International Holdings is considering additional specialist vehicle port acquisitions following its purchase of AutoPort Group in Wilmington, Del., for an initial \$20 million. AutoPort is being bought from the **Detwiler** family. **Brinton Detwiler** will remain president of AutoPort.



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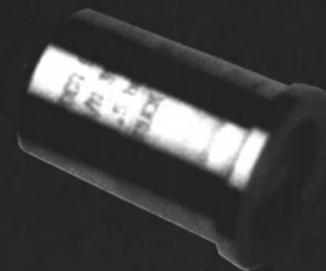
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## MARINE FINANCE

### Ellicott Wins Thai Contract

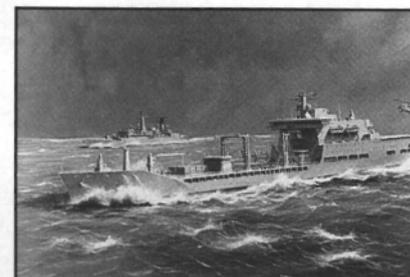
Ellicott International has received contracts from the Harbor Department of the Ministry of Transportation of Thailand covering 28 and 20 ft. (8.5 and 6.1 m) cutter suction dredges and associ-

ated equipment for operation in coastal rivers and harbor projects. The 28-ft. Super-Dragon dredges will feature a 3,100 hp hull pump, a 955 hp ladder pump and a cutter with 1,006 hp. These vessels are designed to produce 820-sq.-m. per hour of course sand through

6,561.6 ft. (2,000 m) pipeline. The 20-ft. Super-Dragons will have a hull pump of 1,710 hp and 250 hp on the cutter. In addition, Ellicott will deliver a tender boat as a support vessel for each new dredge: a twin screw 1,004 hp model for each 28-ft. vessel; and a single screw

540 hp model for each 20-ft. vessel. All vessels are scheduled for delivery in 1999.

### Cegelec To Provide Propulsion And Automation Systems To New Royal Fleet Oilers



Two new Royal Fleet Auxiliary Oilers will receive diesel electric propulsion systems and full automation systems from the Marine and Offshore division of Cegelec projects.

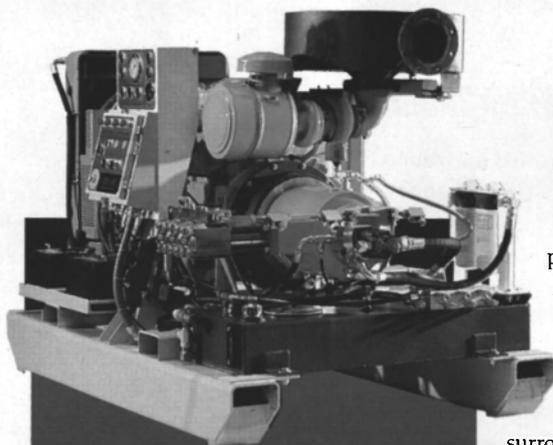
The first contract, awarded by GEC Marine's VSEL shipyard, is valued at approximately \$16 million and includes the design, supply and commissioning of propulsion equipment. The second contract, valued at more than \$2.4 million, is for automation systems, including Cegelec's integrated platform management system which will control power management, with many outstations being built into the power plant along with auxiliary systems such as tank gauges, valve stands and fire fighting equipment. The systems will power the two 30,000 ton vessels at speeds in excess of 20 knots, and delivery is scheduled for September 1998 and April 1999.

### MarinFloc Wins U.S. Approval

Sweden-based Marin Mijoteknik AB recently obtained a U.S. Coast Guard Type Approval Certificate for its MarinFloc bilge water treatment system. The lack of satisfactory techniques to handle emulsified bilge water from engine room areas has resulted in increased interest in such systems. Royal Caribbean has equipped eight of its ships with the MarinFloc system, and Star Cruises has ordered five units. More than 30 MarinFloc systems have reportedly been installed and approximately 20 units have been ordered within the last year.

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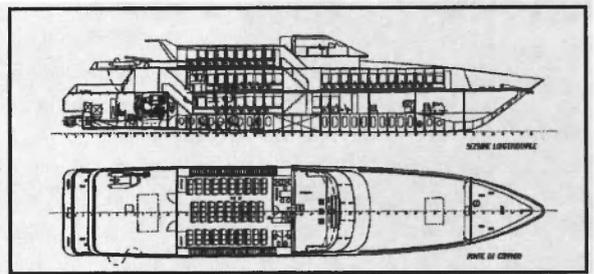
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# Atlas Awards Contract To Italian Builder

Rodriquez Cantieri Navali recently won a contract from Adriatic operator Atlas for the delivery of a Monostab 47 stabilized monohull vessel, to be delivered in May 1998. With a cruising speed of 34 knots, the vessel will have a passenger capacity of 400. The new vessel, under construction at the shipyard's Messina building slips, measures 154.2 x 24.9 x 4.2 ft. (47 x 7.6 x 1.3 m) and features two 1,826 kW power motors achieving a cruising speed of 34 knots with a full load and a 200 nautical mile fuel distance. The Monostab 47 is equipped with a Rodriquez

Engineering Seaworthiness Management System (SMS) — a computerized stabilization system which allows for the reduction of roll, pitch and vertical accelerations of the ship.



Monostab 47 general arrangements.

## Amer Reefer To Raise \$100M To Buy Ships

Refrigerated shipping company Amer Reefer Co. Ltd. plans to raise around \$100 million through a junk bond offering. T

he company intends to use the proceeds of the Rule 144A senior secured note offer to acquire three reefer ships, lifting its fleet to seven vessels.

## Daewoo Wins \$250M Order From Iran Tanker Co.

Daewoo Heavy Industries has won a \$250 million contract to build five 100,000-ton oil tankers for Iran's state-run shipping company National Iranian Tanker Co. The carriers will be delivered in stages from May 2000 to early 2001.

Daewoo Heavy, a unit of the Daewoo Group, has reportedly set a target of winning ship orders worth \$3.7 billion this year, compared with \$3.4 billion last year.

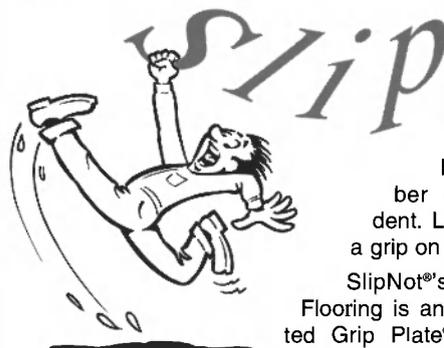
## BBE Awarded HAM Contract

Bill Brown Enterprises (BBE) has been awarded a contract by HAM Marine, Inc. to furnish and install the heating, ventilation and air conditioning (HVAC) system for the Marine Drilling Marine 700 semi-submersible Mobile Offshore Drilling Unit (MODU).

The unit is scheduled for completion in February 1999, and BBE will install the HVAC system at HAM Marine's Pascagoula, Miss., facility.

March, 1998

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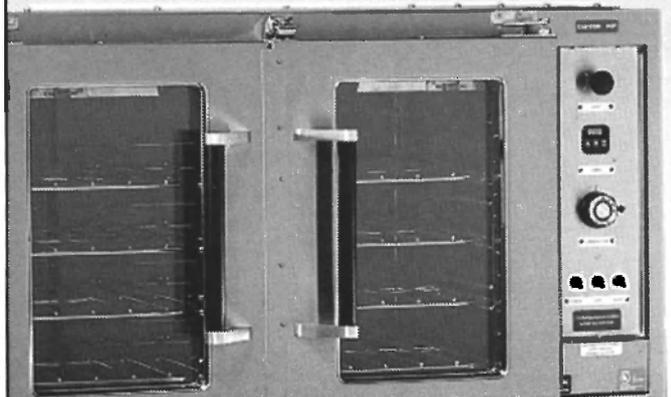
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**Austal Wins First Greek Contract**

Western Australian shipbuilder Austal Ships recently won its first contract from a Greek interest. The order from high-speed ferry operator Ceres Hyrdofoil Joint

Service, also known as Ceres Flying Dolphins, is for a third-generation 157.4 ft. (48 m) passenger catamaran.

With a fully loaded service speed in excess of 41 knots, the new vessel will join Ceres' fleet of 30 high-speed vessels in June 1998, operating in the Saronic Gulf lines, con-

necting the port of Piraeus with Poros, Hydra, Spetses and Porto-Heli.

Featuring a passenger capacity of 516, the vessel will have a beam of 43 ft. (13 m) and a draft of 4.6 ft. (1.4 m). The 12,500 bhp propulsion system consists of four MTU 16V 4000 M70 engines, four Kamewa

63 SII waterjets and four VLJ 930 Reingjes gearboxes. Classification is to GL 100 A5 HSC-B OC3 High Speed Passenger Craft/RoRo Type AUT.

**Krupp Wins \$120M Order From Belgian Interest**

A consortium made up of Krupp Fördertechnik GmbH and Thyssen Nordseewerke GmbH has received an order from Belgian group Jan de Nul for the construction of a hopper suction dredger with a hopper capacity of 33,000-cu.-m. The order, valued at \$120 million, is expected to be completed and the dredger delivered by January 2000. Jan de Nul will use the dredger in international land reclamation projects.

**JRM Sells Two Barges For \$50M**

The Malaysian joint venture of J. Ray McDermott (JRM), TL Marine Sdn. Bhd., has agreed to sell two combination pipelay/derrick barges to Global Industries, Ltd. for an estimated value of \$50 million.

"We continue to focus on the segments of the marine construction market where we believe we can be most successful," said JRM President and COO **Bobby Rawle**. "Long term, the Far East offers many opportunities for our company and we are committed to maintaining our presence there. Selling these barges does not affect our competitive or productive capacity, and we will continue to be well positioned as future opportunities arise in the (Far East)."

**Fincantieri And Avondale Sign Cooperative Agreement**

Fincantieri-Cantieri Navali Italiani SpA has signed a cooperative agreement with Avondale Industries, Inc. for two cruise ships intended for the U.S. domestic market.

This agreement becomes part of Fincantieri's internationalization strategy, which has also led to an agreement with Dalian New Shipyard, and to the establishment of a new company with ABB and Kvaerner Masa-Yards for the development of the new Azipod propulsion system.

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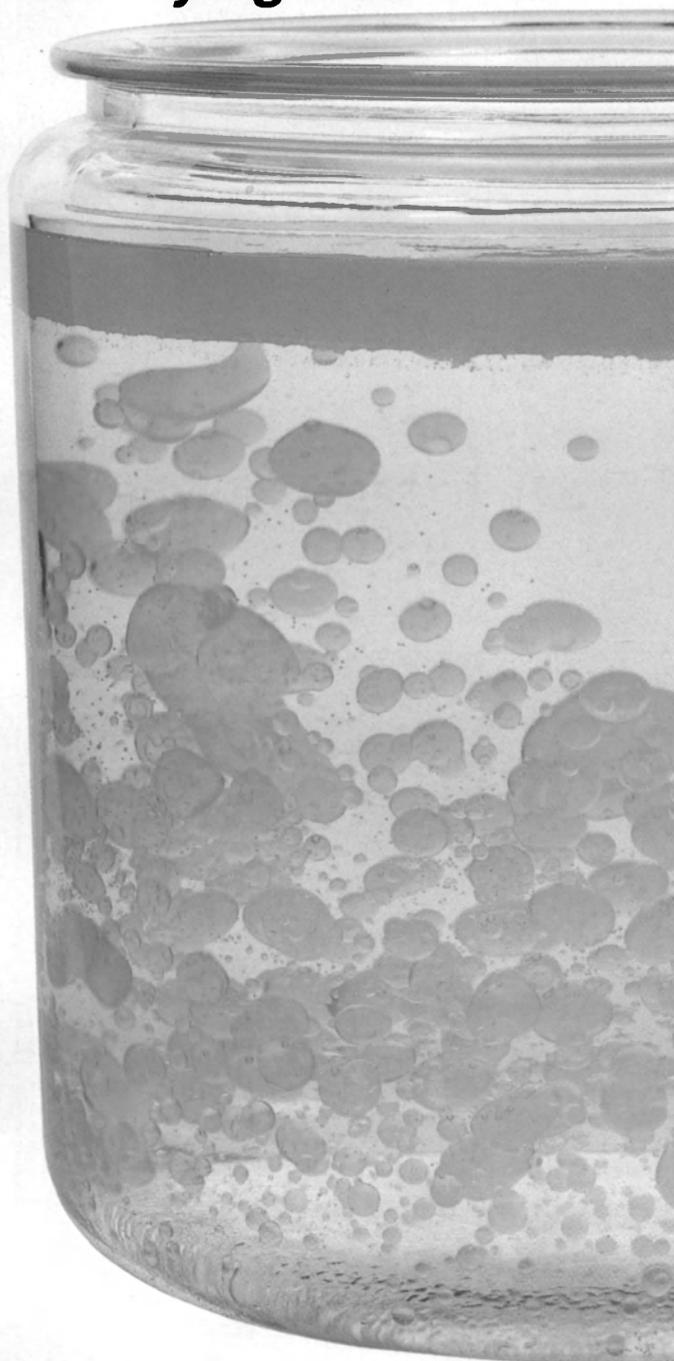


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Icebreaking in the Finnish section of the Northern Gulf of Bothnia — just 100 miles from the Arctic Circle — can never be considered routine. Strong winds and the earth's own rotation can cause ice to stack up in massive piles, towering nearly 33 ft. (10 m) above and anchored 66 to 99 ft. (20 to 30 m) below the water.

The activity of Finland's fleet of eight icebreakers, often working in close cooperation with their Swedish neighbors' icebreaking fleet, are integral in ensuring Finland's vital transport links remain open, even during the harshest winters. Of the nearly

23,000 shiploads of cargo in and out of Finland each year, nearly 40 percent (9,000 ships) carrying more than 27 million tons of cargo takes place during the winter months.

As the waters around Finland are traditionally frozen for more than four months per year, the government has taken several steps to ensure the safe passage of ships and crews during these harsh months. First, it shuts down 27 of its 50 ports, thus limiting traffic to the 23 indispensable areas of the most vital consequence. Second, it has built an impressive fleet of icebreaking ves-

sels, including two *Fennica* class ships, which are of the highest technical specification. In fact, *Fennica* was selected as the test vessel for a 23-month, 3.3 ECU project to develop an advanced ECDIS system, dubbed the ECHO project.

*Maritime Reporter & Engineering News* was invited to participate on a "routine" icebreaking cruise aboard *Fennica*, ostensibly to show-off its new ECDIS system, but with the parallel goal of showcasing Finnish icebreaking technology at its best.

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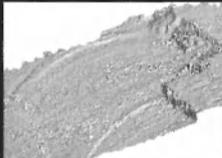
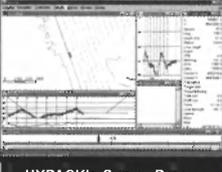
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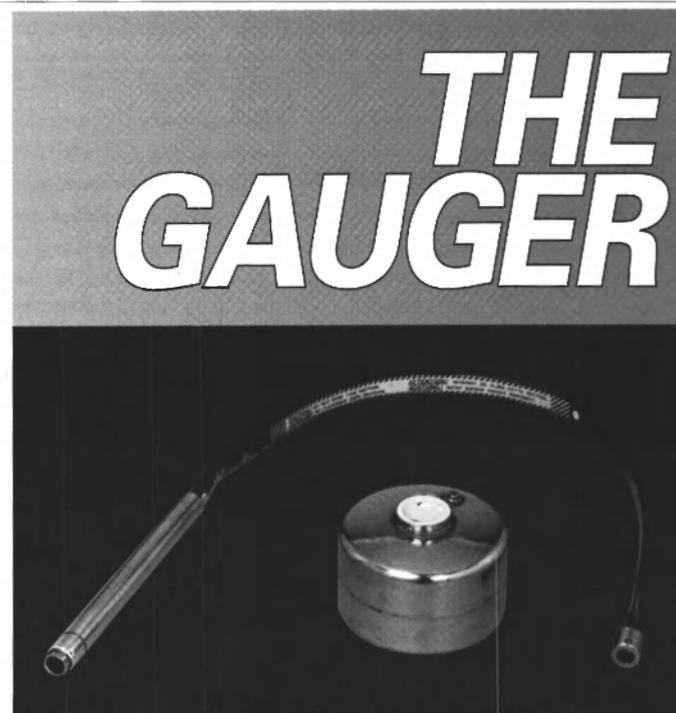



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## FROM THE BRIDGE

*Fennica* was delivered in 1993 by Finnyards, and the hulking vessel features a wealth of electronics and machinery innovation which helps to make its harsh-weather operations seem all too routine.

ECDIS aside, *Fennica* utilizes its full complement of advanced equipment and highly trained officers and crew to make light work of Finland's notorious iceflows. During a day-long cruise out of the northern port city of Oulu — which entailed escorting a small chemical tanker for more than 25 miles out — witness was given to the performance of the vessel's mostly Finnish-supplied outfitting of machinery.

The ship is powered by a diesel electric arrangement which consists of four Wartsila diesel engines, ABB generators and

<i>Fennica</i>	
Length	381 ft. (116 m)
Beam	85 ft. (26 m)
Draft	23 to 27.5 ft. (7 to 8.4 m)
DWT	1,650 to 4,800
Output	21,000 kW
Propulsion Units	(2) 7,500 kW
Bowthrusters	(3) 1,150 kW
Speed, open water	16 knots
Speed, 8-m ice	8 knots
Speed, 1.8-m ice	continuous
Bollard pull	234 tons
Accommodation	82
Deck crane	15 ton, 5 ton
A-Frame	120 ton
Towing winch	(2) 300 ton
Classification	
DnV +1A1, Tug, Supply Vessel, SF, Icebreaker	
POLAR-10, HELDK, EPR, EO, DNYPOS AUTR	

cyclo-converters, and a pair of 7.5 MW Aquamaster 360-degree rotatable thrusters.

When asked of the systems performance under severe conditions, the captain said that the maneuverability, stability and overall performance achieved by the arrangement was superior to any other vessel he had sailed on. Additional maneuverability is gotten through the use of three 1,150 kW Brunvoll bowthrusters.

In open water, the arrangement can power the 381 x 85 ft. (116 x 26 m) vessel to 16 knots, which *Fennica* can maintain a continuous eight knots while breaking through six ft. (1.8 m) of ice.

While impressive when smashing through ice (and rescuing the chemical tanker when it got stuck!), *Fennica's* true value comes from its multi-purpose design. It has a host of features and operational capabilities which make it a favorite workhorse in the harsh North Sea for eight months per year.

In particular, the vessel's 234-ton bollard pull is found to be very useful in the trenching and ploughing of cables and pipes, an operation it can easily handle without the assistance of other vessels. The large *Fennica* features accommodations for 82, ensuring plenty of room for the number of work hands needed for such

operations. Its normal crew for icebreaking operations is 21.

*Fennica's* 197-ft. (60-m) (1,045 sq. m.) deck space is particularly suited for handling large offshore equipment efficiently and safely.

The bridge is fitted with a "Who's Who" list of marine electronic equipment, including products from Selesmar, Magnavox,

Sailor and Leica.

The ship's dynamic positioning system allows its position to be determined within one meter of accuracy, and all of the icebreaker's functions can be controlled from the bridge. Another vessel of the *Fennica* class, albeit smaller because of its operational responsibilities further south, is due to

enter service for the Finnish Maritime Administration in mid-May of this year. Worthy to note is the use of the ABB azipod system on this vessel, which will have a shaft output of 10,000 kW. The vessel was originally scheduled for delivery in April, but problems with its propellers have caused a delay of a few weeks. Specifically,

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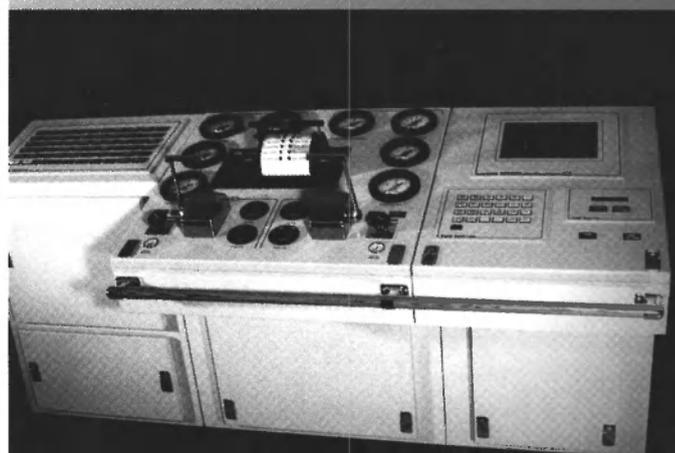
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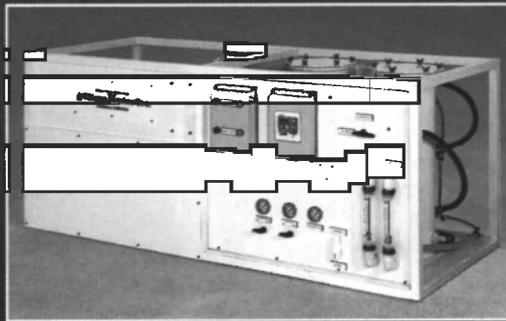
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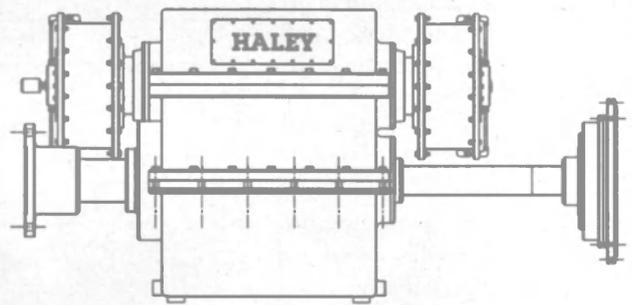
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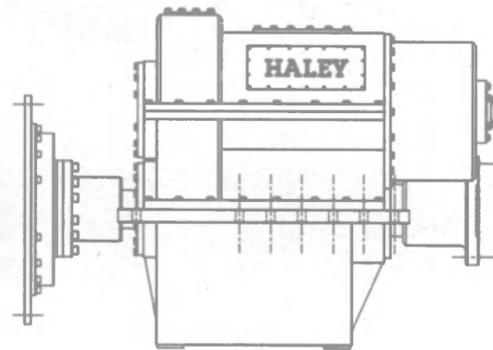
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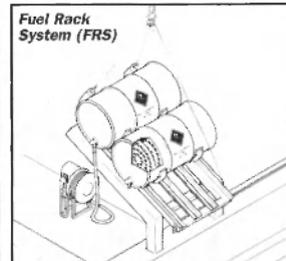
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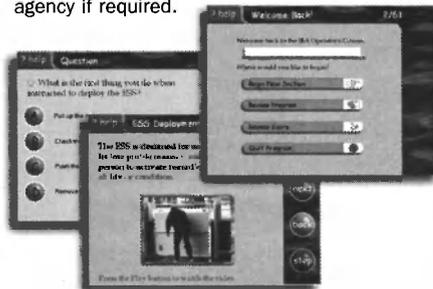
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## FROM THE BRIDGE

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tional bronze models. The propellers feature the additional strengthening to add to their service life (anticipated at 15

years), due to the large amount of time the props are cavitating due to the nature of icebreaking work.

## ECHO Project Update

Electronic Chart Display and Information Systems (ECDIS) are being counted on to improve safety at sea while making the working life of those onboard easier, particularly in regard to time saved updating and organizing paper charts. The ECHO (European Chart Hub Operations) project began in April 1996 with the aim of producing a prototype commercial service for the storage and distribution of ENCs. Led by Norway's Electronic Chart Center (ECC), the project is partially funded by the EU and includes many international organizations and manufacturers, including the Finnish Maritime Administration, Sysdeco Dikas AS, ASPO, Telenor, the U.K. Hydrographic Office, Inmarsat, IONA Technologies and Sintef.

Production of ENCs to the IHO's standard S57 edition 3 has begun in several centers, and the volume of available data continues to grow.

The ECHO project has linked the U.K. and Finnish Hydrographic Offices, who supplied their charts and updates via ISDN connections to the ECC. The ECC operated as a regional ENC Coordinating Center and provided end-user services from where the data were available on demand to the vessels 24 hours a day. Communications with the ECDIS equipment onboard utilized Inmarsat-B high speed and GSM connections, but any communications medium supporting the widely available TCP/IP protocol could be employed. These links allow instantaneous updating of charts while at sea, a key plank in the ECHO project. Close attention has been paid to the security of data and cost of transmission, to ensure the project represents a viable commercial service.

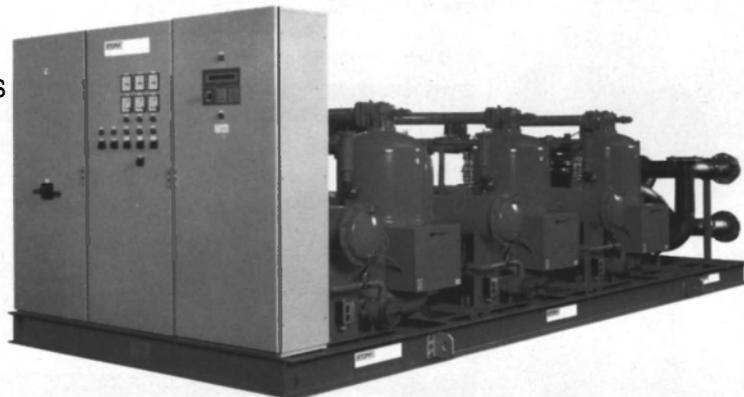
*(Please look in MR/EN's April 1998 Scandinavian Report for more extensive coverage of this burgeoning technological pro-*

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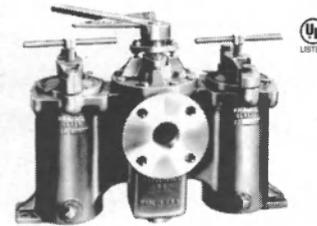
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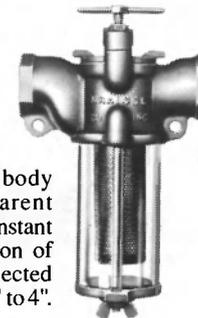
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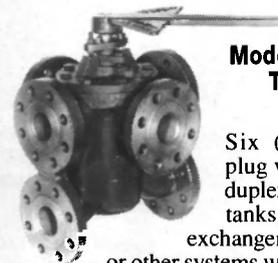
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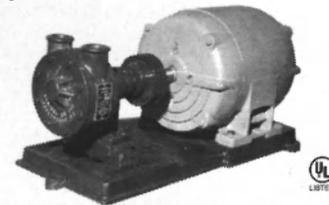


Cast bronze body with transparent sump permits instant visual inspection of flow and collected debris. Sizes 1" to 4".



### Model 72AA Transfer Valves

Six (6) port plug valve for duplexing two tanks, heat exchangers, filters, or other systems with minimum piping and space. Easy 1/4 turn, one stroke operation switches flow from one side to the other. Sizes 3/4" to 8" and larger. High pressure/temperature special designs available.



### Model 60 Pumps

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## Wade to Retire From Lloyd's Registry

**Chris Wade** is to retire from Lloyd's Registry in July after more than 30 years with the classification society. He will be succeeded as managing director of Lloyd's Marine Division by **Willem de Jong**. Mr. **Wade** was stationed around the globe for most of his career with Lloyd's, but returned to London in 1987 when he was named as head of the Classification Department.

## Caterpillar Gets Nod For New Catalina Ferry

Caterpillar's Engine Products Division announced that Catalina Cruises has chosen it to be the main power source for its latest catamaran fast ferry, to be delivered in June 1998. Four Cat 3512B marine engines, each rated at 1,950 bhp will be installed in order to achieve a top speed of 36 knots.

Each of these high-powered engines is 1,950 bhp at 1,835 rpm. These Cat engines will drive MJP waterjets through ZF marine gears. The 144-ft. (44-m) ferry was designed by International Catamarans, Ltd., Australia and is the largest catamaran ferry built to date by Nichols Brothers Boat Builders, Inc.

The schedule of the Long Beach to Catalina Island is to make the 23-mile round-trip four times daily. One of the deciding factors in going with Caterpillar engines was fuel consumption, reliability and weight.

## Atlantic Starts Major Conversion Project

Atlantic Drydock Corporation has recently started a \$76 million conversion, its biggest job ever, of the Bahamian-flag vessel *Tarago*, which arrived in drydock on February 22, for conversion into a Marine Corps pre-positioning vessel. Atlantic will perform the work on the 754-ft. (230-m) RoRo cargo ship under contract from *Tarago* Shipbuilding Corp. Plans include the addition of a new deck and cranes to meet U.S. flag requirements for military specifications. Once the work, which will take an estimated 12 to 18 months, is completed the vessel will join *Tarago's* fleet of 13 vessels that are used by the Marines. *Tarago* was seen as

ideal for U.S. Marine purposes due to its 190,000-sq. ft. deck area, 18 knot speed and 33,660 dwt, which makes it among the largest, fastest and strongest RoRo ships ever built. Ninety-one percent of the deck area is rated at 600 pounds per sq. ft. and its cargo pattern is laid out based on maximum flexibility and self-reliance. Each of the decks are to be connected by

fixed, wide ramps for easy access and traffic flow, which was formerly a problem aboard the ship when more than one deck was operating at a single time. Access to and from the vessel is via a 400 ton starboard quarter stern ramp which was designed to accommodate large cargo pieces and multi-lane traffic.

## Wolak Joins Lips, USA

**Brenda Wolak** has joined Lips USA, Inc. as sales manager of its Marine Propulsion Equipment. Lips USA is a subsidiary of Lips BV of Drunen, the Netherlands. Lips manufactures FP and CP propellers, side thrusters, steerable thrusters, waterjets and electronic control systems.

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## Midland Marine Named U.S. Agent For Astander

Astillero Astander, SA announced that it has chosen Midland Marine Corporation as its executive agent in USA. Astander expects to be able to give more value to their services to the shiprepair industry with the appointment.

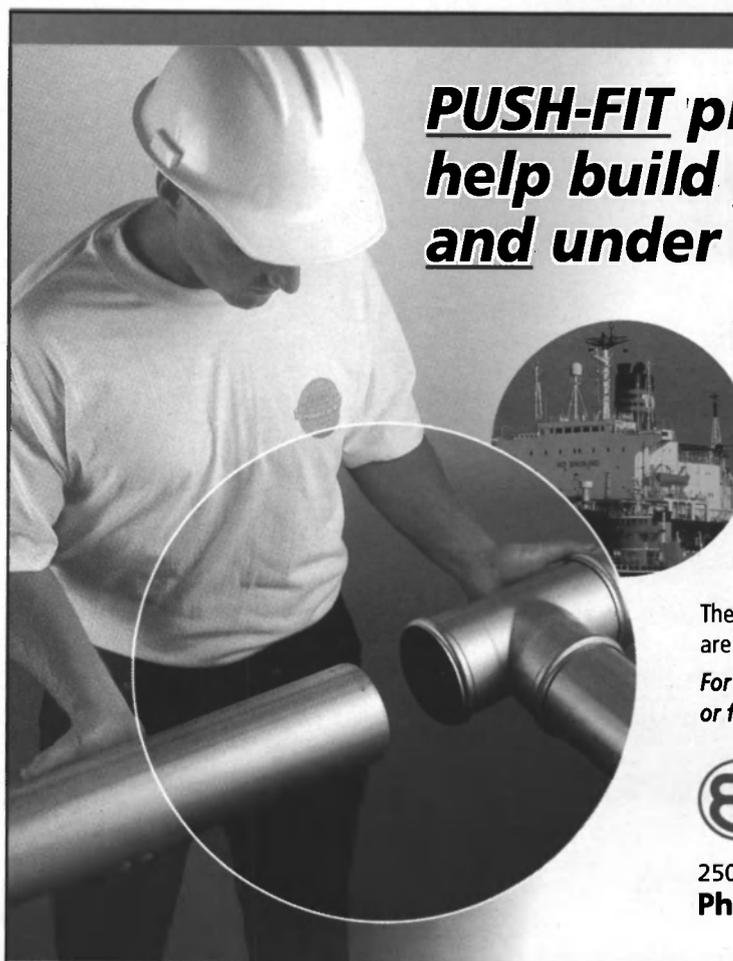
## Holland America Orders New Ship

Holland America Line (HAL), a unit of the Carnival Corporation, ordered a new 61,000-ton cruise ship from Fincantieri Shipyards, Italy. HAL is currently operating at near capacity with eight cruise liners, but is prepared to raise its fleet to 11. The latest order will

bring its fleet to 10 by the year 2000, and another new ship is expected to be ordered soon. The estimated value of this latest contract is \$300 million. HAL's parent company, Carnival Corporation, has already spent \$1.75 billion at Fincantieri Shipyards, which has been responsible for the construction of six Carnival vessels, plus the two more under contract (not including the latest contract).

## Astano Awarded Two Offshore Contracts

Astano Astilleros Espanoles has been awarded a contract to build two ultradeep water dual drilling floating monohull units from Transocean Offshore Inc. The units, *Discoverer Spirit* and *Discoverer Enterprise II*, will be operated in the Gulf of Mexico by Transocean for Unocal and Chevron, respectively. Delivery dates are expected to be between 18-24 months. The Astano designed vessels are entirely based on *Discoverer Enterprise* and are 837 ft. (255 m) long, 125 ft. (38 m) in breadth with a crude oil storage capacity of 40,000 tons, equivalent to 200,000 bpd. They will provide a total variable deck load of 20,000 tons for the drilling equipment and topside modules. In addition to this, they will each carry twin-drilling, twin derricks and two complete drillstrings which were designed for depths up to 10,000 ft. (3,000 m). Each unit will accommodate 200 people and will comply with U.S. Coast Guard Gulf of Mexico regulations. Transocean ordered the unit to use its patented drilling method called Expedrill, which allows for simultaneous, and differing, duties from each working drill without contamination, or interruption from stoppages.



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## Casino Vessel Delivered

The DeJong and Lebet, Inc.-designed 160 ft. x 65 ft. (50 x 20 m) SWATH (small waterplane area twin-hull) casino vessel *Suncruz VI* was completed at LeeVac Shipyards, La. DeJong and Lebet have designed 13 other such SWATH vessels to operate off of the coast of Florida. Currently under construction, at Keith Marine for Bayfront Ventures, are a 116 ft. (36 m) aluminum casino vessel and a 200 ft. x 40 ft. (61 x 14 m) yacht-type vessel.

## MC Shipping To Raise Money, Buy Ships

MC Shipping Inc. reportedly plans to raise \$100 million through a junk bond issue to fund further expansion into the gas carrier sector. The company said it intended to use the proceeds to acquire five liquid petroleum gas (LPG) carriers and purchase the remaining 50 percent interest in two 1995-built LPG carriers it already part owns.

Circle 325 on Reader Service Card

## Catch That Shooting Star

by Greg Trauthwein, editorial director

While predictions of the offshore boom's sooner-than-expected demise are still a bit premature, there have been several signs recently that indicate caution and diversification could be the keys to help builders and suppliers weather any potential shock.

At best, the market's signals have been mixed. While there is mounting evidence that the continuing Asian financial crisis and a warmer-than-normal winter have and will continue to cut oil demand, oil and offshore service companies alike have routinely touted record revenue and earnings numbers, and continue to project strong rig usage rates.

### A Numbers Game

In releasing its most recent report, the International Energy Agency (IEA) did little to instill confidence in a sustained market boom. Essentially, the IEA noted that oil stocks are going up, while supply is not surging as far ahead as planned. Specifically, stocks held in industrialized nations finished the end of last year at the highest level in two decades, barring 1994.

OECD industry stocks during the fourth quarter rose 160,000 bpd to 2,523 million barrels or 112 million barrels more than at end-1996. IEA also maintained that the world markets will be oversupplied in the near-term, even after the agency cut oil supply forecasts by nearly one-third. IEA's report said non-OPEC supply would probably exceed demand for at least the first half of 1998, putting additional pressure on crude prices, which have already lost about 30 percent since last November. Through all the smoke, world oil demand is still projected to rise 2.3 percent this year to 75.34 million bpd, a slower growth rate than 1997's 2.7 percent.

### There's Hope Yet

Despite the doom forecast by falling per barrel prices, offshore service companies have yet to pull the plug on a tremendous run, a boom market which has seen many companies double revenues from the previous year.

A good example is Transocean Offshore Inc., which reportedly expects to see continued upward pressure on drilling rig rates as a result of increased spending for off-

shore oil and gas exploration and production. According to Transocean officials, rates for the company's 19 semi-submersible rigs and drillships rose 31 percent to an average \$106,000/day, and contracts are getting longer, as oil companies seek to secure drilling rigs — rigs which have been notoriously scarce of late.

Another major player, Friede Goldman, expanded its horizons and business base with the purchase of France Marine S.A., as well as its subsidiaries Brissonneau & Lotz Marine, BLM Offshore, BOPP and Kerdranvat, which are designers and manufacturers of marine and offshore equipment. The acquisition will

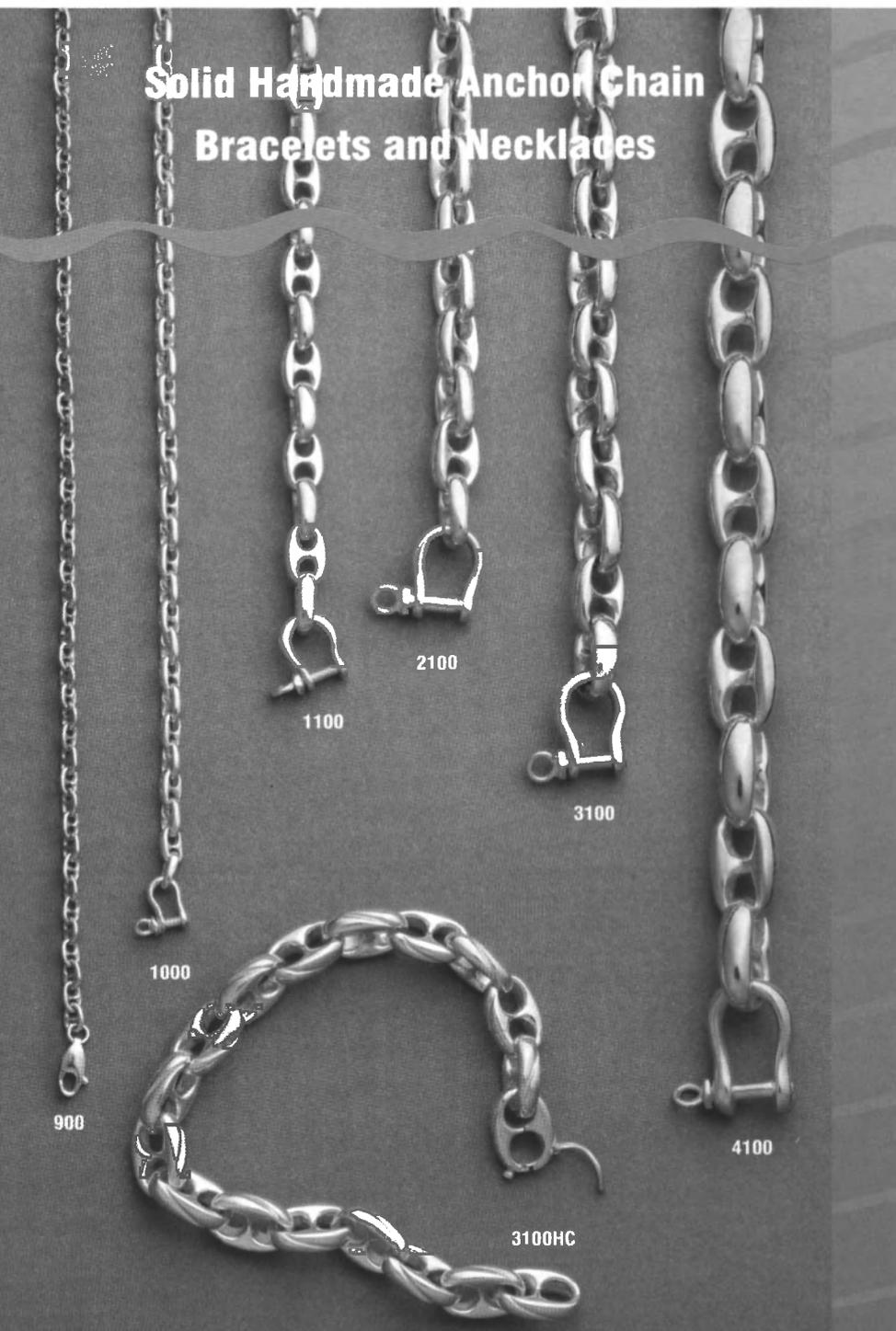
allow Friede Goldman companies to offer services in all phases of offshore rig construction — from design and engineering to manufacturing and equipment sales.

"This move carefully positions us for profitable growth in the worldwide offshore oil and gas markets," said **J.L. Holloway**, chairman and CEO of Friede Goldman.



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# Atlantic Marine Celebrates Dedication Of *Glomar Explorer*

Glomar Marine recently dedicated its ultra deepwater drillship *Glomar Explorer* at Atlantic Marine's Mobile, Ala., facility. The shipyard is currently nearing com-

pletion of the third and final phase of the re-activation and conversion of *Glomar Explorer* from a Navy vessel. The first two phases of the project were carried out at West

Coast facilities prior to the vessel's transit around Cape Horn to Mobile. The vessel was expected to leave Mobile last month for its first drilling assignment in the Gulf of

Mexico.

Designed and built by Global Marine for the U.S. Navy in 1972, *Glomar Explorer* was part of the Naval fleet for the last 26 years. Global Marine now has a 30-year lease with the Navy for use of the converted vessel.

Part III of the conversion at Atlantic Marine took five months and included:

- Installation of the vessel's sub-structure, drillfloor, active mud house, riser house and elevator and all drill systems piping above the main deck;

- Installation of a derrick capable of hoisting loads up to two million



### Glomar Explorer Main Particulars

Length, o.o.	618.8 ft. (188.6 m)
Beam	115.8 ft. (35.3 m)
Depth	51 ft. (15.5 m)
Draft	35 ft. (10.7 m)
Displacement	50,500 lt

### Design Operating Conditions

Maximum water depth	10,000 ft.
Maximum wind speed	100 knots
Maximum drilling depth	30,000 ft.
Estimated speed at full load	10 knots

### Capacities and Loading Data

Maximum variable load	23,500 lt
Drill water	50,600 bbls
Potable water	2,520 bbls
Fuel oil	49,500 bbls
Liquid mud	6,320 bbls
Bulk mud	36,000 cu. ft.
Bulk cement	11,160 cu. ft.
Living quarters	140 persons

### Station Keeping Equipment System

Main propulsion	(2) fixed pitch variable speed reverse/reduction propellers, each powered by (3) 2,200 hp DC motors
Total hp	13,200
(5) tunnel thrusters each driven by a 2,000 hp DC motor; (6) retractable azimuthing thrusters each driven by 3,000 hp variable speed motor	
Triple redundant DPS and acoustic back up positioning system	
Total station keeping hp	35,200

### Power Generation

EMD MP 16E98 diesel engines rated at 3,070 bhp, each driving a 2,200 kw, 4,160V AC generator	
Nordberg FS-1316-HSC 4,900 hp diesel engines each driving a 3,500 kw, 4,160V AC generator	
Total hp	36,780

### Drilling Equipment

Drawworks	National 2040, 4,000 hp
Mud Pumps	(3) National 14-P-220
Derrick	Enfob
Top drive	National PS-2
Rotary Table	National C 495
Drill Pipe Backer	Westeck horizontal
Cranes	(2) Seatrax 7228 and (2) 4220

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pounds, along with a new motion compensator to maintain constant weight despite vertical motion of the vessel;

- Installation of a top drive drilling system;

- Installation of a horizontal drill pipe racking system capable of handling 30,000 ft. of pipe;

- Installation of a marine riser handling system on the main deck; and

- Upgrade of the dynamic positioning system (DPS) with the addition of four new retractable thrusters to allow for long-term stability in extreme weather conditions. The DPS utilizes a global positioning system and power management system which maintain the vessel's location without the use of heavy anchoring equipment.

The *Glomar Explorer* project brings to four the number of major drillship conversion performed at Atlantic Marine in the last two years.

The three previous vessels were Transocean Offshore *Discoverer 534* and *Discoverer Seven Seas*, and Diamond Offshore *Ocean Clipper*.

Circle 84 on Reader Service Card

### Moeller To Buy Three Gas Vessels

A.P. Moeller reportedly entered an agreement with Norway's Westfal-Larsen to buy their Westgas gas carrier fleet of three 15,000-cu.-m. capacity vessels. The ships were all built in the early 1990s, and are expected to join Moeller's fleet in the next six months. Moeller reported the deal meant it would also take over Westfal-Larsen's newbuilding contracts for two 20,500-cu.-m. capacity gas carriers scheduled for delivery from Japan's Mitsui Engineering & Shipbuilding Co. Ltd. later this year.

Moeller already has four vessels of the same capacity.

### Ceanic Acquires Dynamically Positioned Vessel

American Oilfield Divers, Inc. d/b/a Ceanic has entered into a definitive purchase agreement with Edison Chouest Offshore, L.L.C. for the acquisition of

DSVSS *Laney Chouest*. This 240-ft. (73.1-m) vessel is a dynamically positioned special service vessel with accommodations for 54 persons and features an 85,000-lb. A-frame and two five-ton cranes.

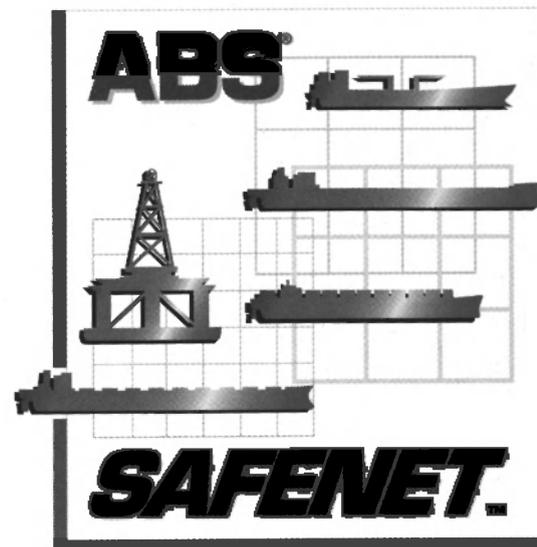
Ceanic expects to add this vessel to its Gulf of Mexico fleet for ROV support and other remote intervention services. The company

currently operates 21 vessels, 16 of which are in the Gulf of Mexico. *Laney Chouest* is scheduled for delivery to Ceanic in the fourth quarter of 1998, when its exiting time charter on the West Coast expires.

This transaction is subject to precedent conditions, including satisfactory inspection and deliv-

ery of the vessel in Louisiana.

"We are excited about adding this dynamically positioned vessel to our Gulf of Mexico fleet, as it reflects our commitment to expand our deepwater intervention services," stated **Rod Stanley**, president and CEO of Ceanic. The company intends to rename the vessel *Ceanic Legend*.



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## The Revitalized U.S. Title XI Financing Guarantee Program Available To The Energy Industry

by Art Dimopoulos, contributor

The offshore oil industry is no stranger to Title XI financing. During the height of the offshore and onshore construction boom in the late 1970s and early 1980s, over \$8.1 billion in approved Title

XI transactions were in force covering hundreds of ships, barges, lighters, tugs, supply boats and mobile offshore drilling units.

The building fervor came to a screeching halt in the mid-1980s

when the market collapsed. Private lending institutions and the Maritime Administration's (MarAd) Title XI program experienced extensive defaults. In the late 1980s and early 1990s there

was a lull in Title XI financing with very few transactions. As of 1992, no new Title XI applications were approved, and the total amount of Title XI guarantees outstanding had dropped to approximately \$2.3 billion.

With the changing of the world's geopolitical face, emerging markets fueled new opportunities. The world's fleet aged and the need to supply energy, raw materials and goods produced new demand. On November 30, 1993, the National Shipbuilding and Shipyard Conversion Act of 1993 was enacted. This expanded the Title XI program to include vessels built in the U.S. for foreign ownership and flag and authorized Title XI guarantees for shipyard modernization and improvement.

From 1994 to the present, Title XI projects have totaled in excess of \$2.7 billion. Projects have included a self-elevating mobile offshore drilling unit for the Rowan Companies costing \$174.9 million of which \$153.1 million or 87.5 percent was financed through Title XI; and a recent \$110.7 million semi-submersible mobile offshore drilling unit for Noble Drilling Corporation of which \$96.8 million was financed by Title XI.

Approved Title XI transactions have covered a wide array of vessels including: anchor handling/supply vessels, articulated tug and barge units, double skin tank barges, tractor tugs, lift boats, double hull product tankers and chemical carriers.

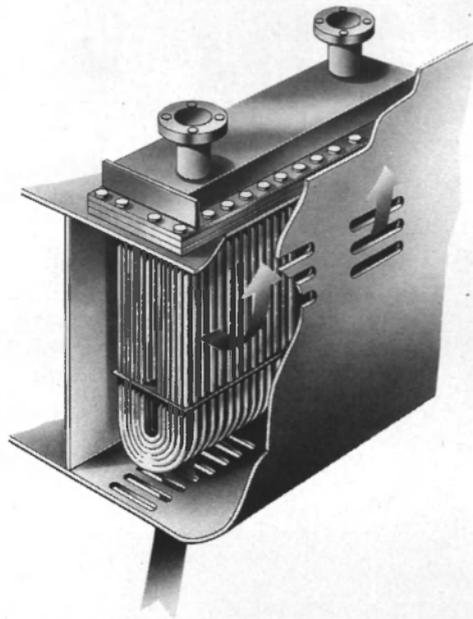
The resurgence of the offshore industry and an increased thirst for energy demand - especially in Asia - have resulted in a revitalized industry, which is reflected in the Title XI orderbook. As a result of increased offshore oil rig utilization and increased rates, new rig construction is once again under consideration. Despite the current lull brought on by the crisis in Asia, the long-term forecast is for continued growth and demand.

### Vessel Eligibility

The types of vessels eligible for Title XI guarantees include passenger, cargo and combination passenger-cargo carrying vessels, tankers, towboats, barges (including offshore drilling units) and dredges.

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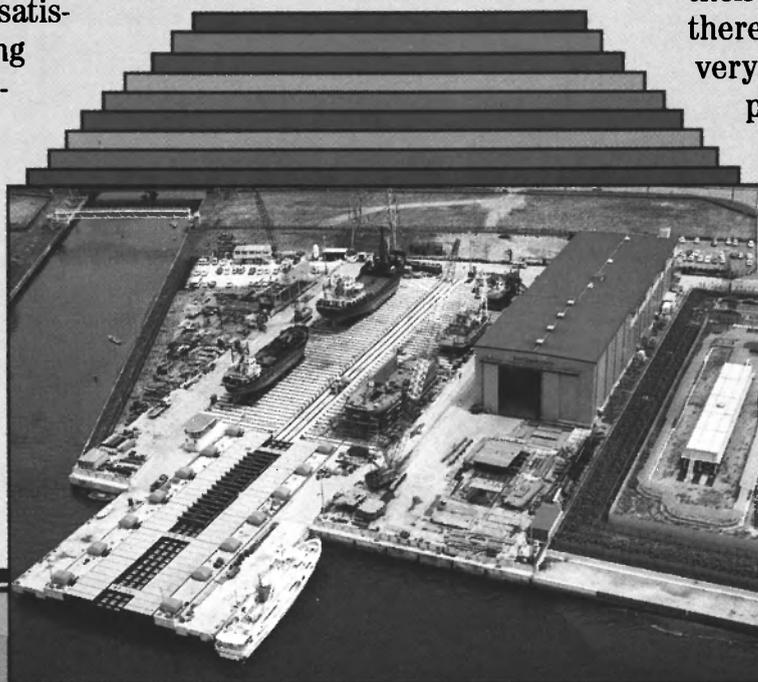
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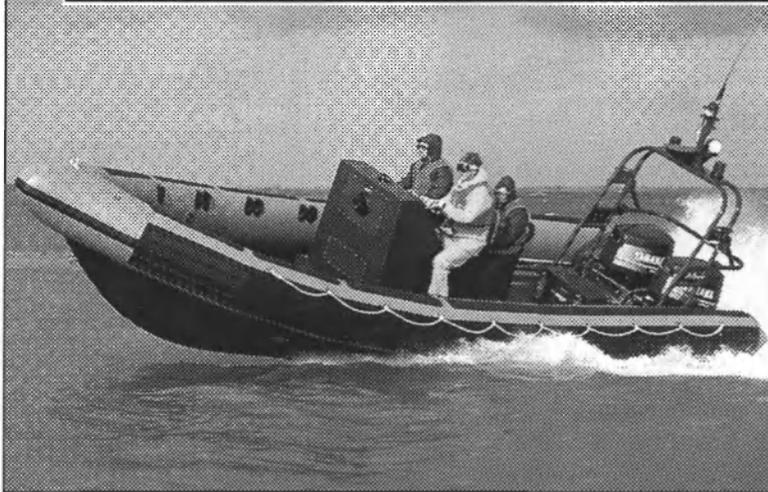
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To be eligible under the domestic Title XI program, a vessel must (1) be owned by a U.S. citizen; (2) be constructed, reconstructed or reconditioned in the U.S.; and (3) be documented under the laws of the U.S.

Eligible Export Vessels include any vessel that (1) is constructed, reconstructed or reconditioned in the U.S.; (2) is used in world-wide trade; and (3) upon delivery or redelivery, is placed under or continued to be documented under the laws of a country other than the U.S.

### Citizenship Of Applicant

The citizenship requirements under U.S. maritime law are primarily set forth in the vessel documentation laws, the Shipping Act, 1916, as amended, and the Jones Act. The documentation laws establish the general citizenship requirements imposed on owners of vessels documented under the U.S. flag

Section 2 of the Shipping Act, 1916, defines "citizen of the U.S." for purposes of several maritime statutes. It does include a stockholder requirement, i.e.; that the "controlling interest" in a corporation or partnership must be held by U.S. citizens and, in the case of a company operating a vessel coastwise, 75 percent of the interest must be held by U.S. citizens. This definition is incorporated into the Jones Act that requires vessels operated in the coastwise trade be owned by Section 2 citizens. It is also used in Section 9(c) of the Shipping Act, which prohibits transfers, including charters, of U.S. citizen-owned and U.S. documented vessels to non-Section 2 citizens.

With the 1993 amendments to the Merchant Marine Act of 1936, Title XI citizenship requirements are inapplicable for export vessel projects. Since 1994, MarAd has approved eight export Title XI applications.

### The Title XI Program

A successful Title XI applicant receives a guarantee from MarAd which is backed by the full faith and credit of the U.S. government for financing to construct, reconstruct or recondition vessels built in U.S. shipyards. In sum, the successful qualifying Title XI applicant can use the credit of the U.S. government to access U.S. capital markets. Accordingly, actual financing is provided through the issuance U.S.

Maritime Reporter/Engineering News

## LEGAL UPDATE

Government Guaranteed Ship Financing Bonds. These bonds are issued by the applicant and then placed with various private institutional investors. The bonds are exempt from registration under most U.S. securities laws.

Typically, interest rates are priced by benchmarking the rate of comparable U.S. Treasury obligations with an average life of 12.5 years, (for a 25-year loan guarantee) with a premium of 50 to 75 basis points added above the rate on the day that the bonds are sold. The bonds are normally amortized by semiannual payments of principle and interest. Interest rates are usually fixed throughout the life of the loan. The maximum available term is 25 years from the delivery of the vessel. The guarantees may cover construction period and mortgage financing.

All export vessels are eligible for an 87.5-percent guarantee of the actual vessel cost, including contract price, change orders, design and engineering expenses, inspection fees, owner-furnished equipment costs and interest. Domestic vessels are eligible for guarantees ranging from 75 to 87.5 percent, depending on vessel type.

Although the structure is somewhat different, the terms and provisions of the actual financing transaction are not unlike traditional mortgage financing. Investors in Title XI Bonds have been institutions such as insurance companies and pension funds. The purchasers look solely to the U.S. guarantee as security for payment of the bonds and do not examine the feasibility of the project or the financial condition of the issuer of the bonds. Should the vessel owner default, the government pays the bondholders. All security arrangements, including the mortgage on the vessel, are negotiated and entered into by the shipowner and MarAd. The bondholders have no interest in or right to the security.

Having the strength of the U.S. government behind the Title XI applicant provides flexibility and leverage to use the program in many innovative ways in conjunction with other financial structures, such as leveraged leases. Where the applicant or charterer of the vessel has adequate creditworthiness, creative utilization of the program's features is possible. For the right applicant and project, the Title XI program is well worth consideration.

*Art Dimopoulos, an attorney in the maritime practice group at Preston Gates Ellis & Rouvelas Meeds LLP, specializes in state and federal maritime issues and in international shipping mat-*

*ters. Preston Gates is a leading transportation law firm with experience in maritime policy and law. The firm has offices in 10 cities including Hong Kong, Los Angeles, San Francisco, Seattle*

*and Washington, DC. For more information on the preceding article, please contact Mr. Dimopoulos at (800) 992-1132, or (202) 628-1700, or by e-mail at (artd@prestongates.com).*

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## NEW & NOTABLE

### MES Delivers Cargo/Container Carrier



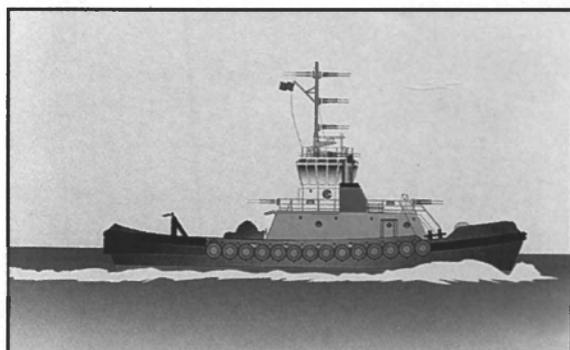
#### Star Harmonia Main Particulars

Length, o.a.	649.5 ft. (198 m)
Breadth, b.p.	101.7 ft. (31 m)
Depth, molded	62.3 ft. (19 m)
Draft, molded	39.3 ft. (12 m)
Gross tonnage	32,749
DWT	45,023
Cargo hold capacity	45,023 sq. m.
Main engine	Mitsui-MAN B&W 6S60MC
Maximum continuous output	143,000 kW at 96 rpm
Maximum complement	28
Flag	Norway

The 45,000-dwt general cargo/container carrier *Star Harmonia* was recently completed and delivered by Mitsui Engineering & Shipbuilding Co., Ltd. (MES) to owner Poseidon Ltd. Built at the MES Tamano Works, the new vessel is a sistership of *Star Herdla* (delivered in October 1994), *Star Hidra* (delivered in December 1994) and *Star Hansa* (delivered in December 1995). *Star Harmonia* is an open hatch-type bulk carrier, featuring hatches and holds built to the same size for efficient loading of unitized cargoes, containers and general bulk cargo items. The double hull vessel contains two sets of gantry cranes and a bow thruster and becker rudder for increased maneuverability.

Circle 67 on Reader Service Card

### New Crowley Tugs To Feature Caterpillar Engines



#### VMS Harbor Tractor Tug Main Particulars

Length	105 ft. (32 m)
Beam	36 ft. (11 m)
Depth	15 ft. (4.6 m)
Speed	13 knots
Bollard pull	50 tons static, 120 tons indirect
Propulsion engines	(2) Cat 3516B, each rated 2,400 bhp at 1,785 rpm

Nichols Brothers Boat Builders will construct six new Caterpillar-powered harbor tractor tugs for Crowley subsidiary Vessel Management Services, Inc. (VMS). All six ves-

sel will feature Voith Schneider cycloidal propulsion systems powered by two Cat 3516B engines rated at 2,400 bhp at 1,785 rpm. The first vessel is scheduled to be launched in May 1998. Vessel design was a joint effort between VMS, Guido Perla & Assoc. and Voith Hydro Marine Technology Group.

Circle 69 on Reader Service Card

### KMY Christens Fast Ferries For Greek Interest



#### Superfast III and Superfast IV Main Particulars

Length, o.o.	637.5 ft. (194.3 m)
Breadth	82 ft. (25 m)
Draft, design	21 ft. (6.4 m)
DWT	6,500
Gross tonnage	29,000
Complement	160 cars/122 trailers/750 passengers

Kvaerner Masa-Yards (KMY) recently christened two fast passenger/car ferries for Attica Enterprises SA, dubbed *Superfast III* and *Superfast IV*. Built at KMY's Turku New Shipyard, the two ferries, ordered in June 1996, were scheduled for delivery last month and this month, respectively. Both vessels will operate between Greece and Italy on the Patras-Ancona route, and are designed to maintain a regular 48-hour round trip with a service speed of 28.5 knots.

Each of the new vessels features two restaurants, a disco, a casino, three bars, a boutique and a swimming pool. The newbuilds are also equipped with fin stabilizers and two bow thrusters and one stern thruster. Total main engine power is 42,240 kW, achieved by four 10,560 kW Wartsila NSD 16ZAV40S diesel engines geared to twin shafts and CP propellers.

Circle 71 on Reader Service Card

### Halter Completes Three-Vessel Series For Panama Canal



Halter Marine Group, Inc. recently delivered *MV Cacique*, completing the delivery of a series

of three tractor tugs for the Panama Canal Commission. The series also includes *MV Gilberto Guardia F.* (delivered in September 1997) and *MV Cecil Haynes* (delivered in November 1997). All three vessels were built at Halter's Moss Point Marine facility in Escatawpa, Miss. The all-steel tugs measure 95 ft. (29 m) long with a beam of 34 ft. (10.4 m), and a normal operating draft of 12.8 ft. (3.9 m). Each vessel can accommodate a crew of four and carries 28,900 U.S. gallons of fuel and more than 3,000 gallons of potable water.

Each tug is powered by two General Motor EMD diesel engines, generating a total of 3,000 hp and turning two Voith Schneider cycloidal propulsion units. The system offers 360-degree maneuverability and increased capacity to steer and stop large displacement ships in the event of emergencies. The vessels each have a normal operating speed of 11 knots and an estimated bollard pull of 75,000 lbs. Electrical power for each vessel is provided by two Detroit Diesel 75 kW generators. The tugs, which are designed for both harbor assistance service and ocean operation, will be able to assist merchant and naval vessels, including nuclear submarines up to and including Panamax class dimensions, while transiting, maneuvering and docking or undocking in the waters of the canal. All three vessels will be homeported in Balboa and are classified ABS Maltese Cross A1 Towing Service Maltese Cross AMS.

Circle 72 on Reader Service Card

### New Sternwheeler Cruises Philadelphia Area



#### Liberty Belle Main Particulars

Length	140 ft. (42.7 m)
Breadth	40 ft. (12.2 m)
Builder	On Site Marine
Designer	DeJong & Lebet
Main engines	(2) Detroit Diesel 8V-71N
Gears	Twin Disc MG-509
Electrical Power	(2) Detroit Diesel MG 8V-71N, 200kW gensets
Bow thruster	Schottel

The 600 passenger dinner/cruise vessel *Liberty Belle* has commenced service in Philadelphia. The 140 x 40-ft. (42.7 x 12.2-m) sternwheeler was designed by DeJong & Lebet, Inc., built by On-Site Marine Construction and completed by owners **Mickey** and **Chuck Hindermeyer**. The vessel is certified by the U.S. Coast Guard under Subchapter K, and measures less than 100 gt. *Liberty Belle's* main deck dining room features extra-high ceilings and an aft mezzanine dining area. Innovative tonnage design enables the below decks to be used for galley, engine room, storeroom and heads, as well as for tankage.

## NEW & NOTABLE

*Liberty Belle* is powered by a pair of Detroit Diesel 8V-71Ns developing 305 hp at 2,100 rpm. Reduction gears are Twin Disc model MG-509, and electrical power is provided by two Detroit Diesel MG 8V-71N, 200 kW gensets. All engines were furnished by Johnson & Towers. A 150 hp Schottel bow thruster, powered by an electric motor drive and control, was furnished by Propulsion Systems, Inc.

### Hitachi Zosen Completes Bulk Carrier

*Cemtex Renaissance*, a 71,663 dwt bulk carrier ordered by U-Ming Marine Transport Corporation, was recently completed at the Maizuru Works of Hitachi Zosen. Under Taiwanese registry,

the new vessel is equipped with an energy-efficient Hitachi Zosen MAN B&W 6S60MC main engine and the Hitachi Zosen Super Stream Duct (SSD) system at its stern. In addition, *Cemtex Renaissance* marks the first Hitachi Zosen bulk carrier to feature the ABS Safe Hull.

Circle 68 on Reader Service Card



### New Model Engines For Dinner/Cruise Vessel

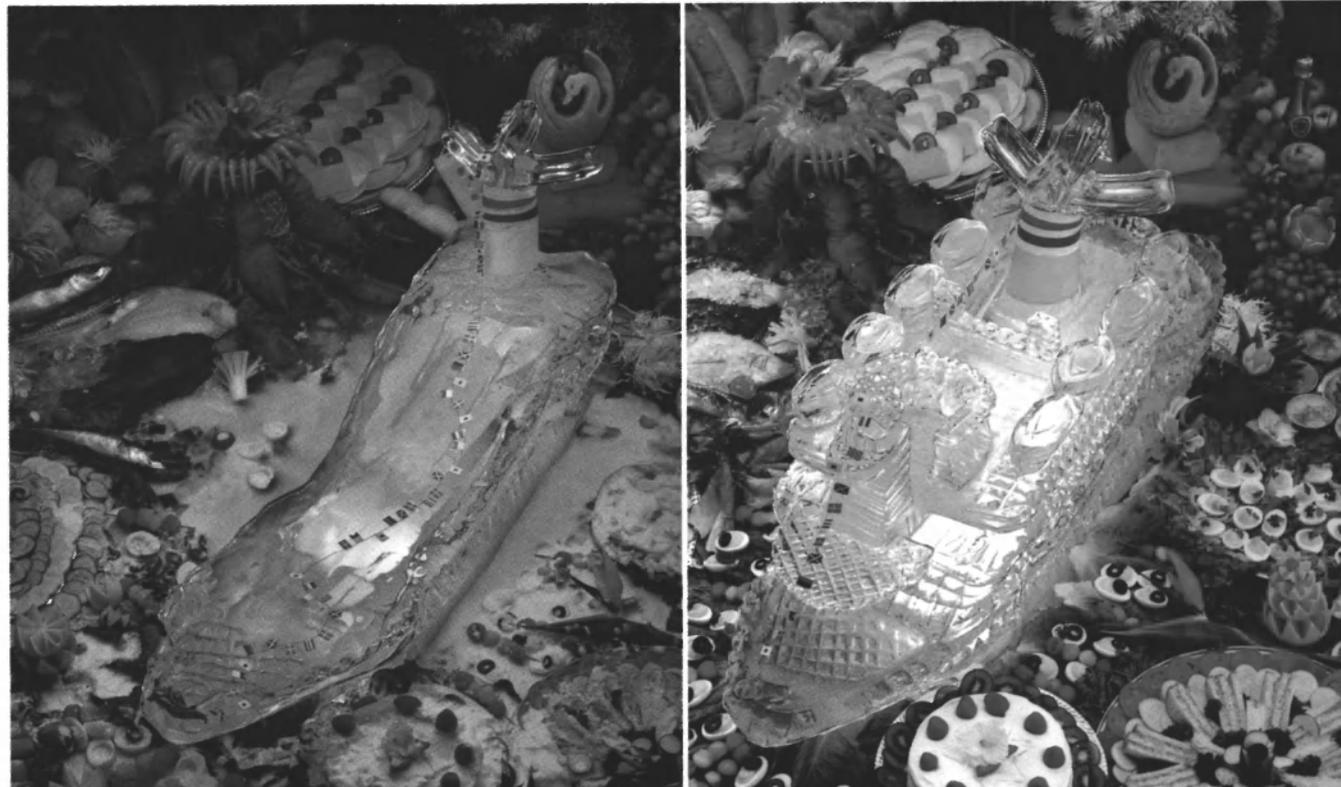
Freeport Shipbuilding in Freeport Florida is putting the finishing touches on another of its dinner/cruise vessels. This latest boat, to be named *Spirit of Carolina*, measures 100 x 32 ft. (30.5 x 9.7 m) and is powered by a pair of the new Cummins N14-M engines rated at 400 hp each at 1800 RPM. The engines will drive through Twin Disc MG5111 2.54:1 reduction gears. Owner Fort Sumpter Tours specified that the compact low-profile engines be keel cooled in this installation. A heat exchanger configuration is also available. The quiet running four cycle engine is well suited to passenger operations where low noise levels are particularly important.

For increased fuel efficiency and improved emissions, the engines are equipped with ceramic-clad dry exhaust manifolds for cost effective operation and greater passenger comfort. Design speed for the steel hull is 10 to 11 knots. Scheduled for a March 1998 delivery, the ship will be certified for 450 passengers and will comfortably seat 275 for dinner.

*Spirit of Carolina* is the third boat in the company's fleet and the first to be Cummins powered. This is the first passenger vessel to be equipped with the new Cummins new six-cylinder N14 engines which were derived from the Cummins 855 engine and were introduced at the 1998 Workboat Show in New Orleans last fall.

For additional information on the companies listed in this story, circle the appropriate number on the Reader Service Card in this edition.

Cummins .....76  
Freeport Shipbuilding .....77  
Twin Disc .....78



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## KMY Delivers First Azipod-Propelled Cruise Ship To Carnival



### Elation Main Particulars

Length, o.a.	855 ft. (260.6 m)
Breadth	118 ft. (36 m)
Draft	25.4 ft. (7.8 m)
Gross tonnage	70,400
Cruising speed	19.5 knots
Passenger capacity	2,634
Crew	Approx. 980
Machinery	Diesel-electric, power station, Azipod propulsion
Total output	47,520 kW
Main engines	(6) Wärtsila 12V 38
Propellers	(2) fixed pitch Azipod propellers
Bow thrusters	(3) 1,500 kW

Kvaerner Masa-Yards (KMY) was scheduled to deliver the seventh Fantasy class cruise liner to Carnival Corporation on February 24, to be followed by the eighth-of-class vessel, *Paradise*, later this year. *Elation*, built at KMY's

Helsinki New Shipyard for a reported \$300 million, is the first cruise ship to feature Azipod electric azimuthing propulsion (see *MR/EN* February 1998, page 23 for more details on the Azipod system).

Circle 94 on Reader Service Card

## All Is Grand At Princess

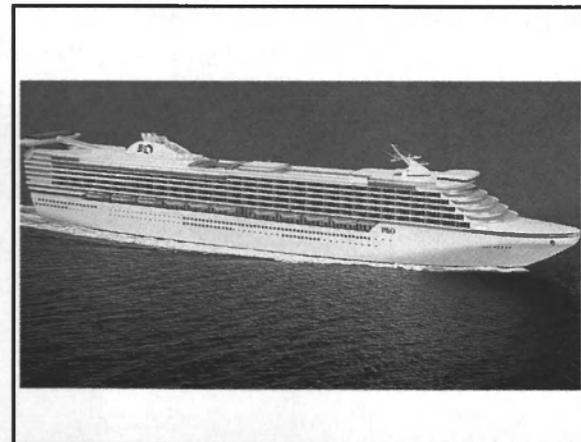
Princess Cruise's concerted effort to take cruising to the next level is about to set sail. When *Grand Princess* is launched in May 1998, it will be the largest and most expensive cruise ship ever built, representing \$450 million of the \$1.6 billion invested by Princess for its Grand class, five-ship expansion program — of which only the 77,000 twin ships *Sun Princess* and *Dawn Princess* have been delivered as yet.

At 109,000 tons, the 2,600-passenger *Grand Princess* is expected to help raise the number of Princess passengers from 460,000 to 750,000, annually.

*Grand Princess* will allow the cruise line to offer a choice of 65 itineraries and 230 ports worldwide, with cruises ranging from three to 64 days in length.

The new vessel will feature 72,000 sq. ft. of deck space, 13 bars, 28 wheelchair accessible rooms, four pools and basketball, volleyball and tennis courts onboard. Other amenities include three main dining rooms, caviar bars, pizzerias, barbeques, ice cream stations and a huge 620-

seat, 24-hour dining café, as well as 24-hour room service. In addition, *Grand Princess* will also feature the largest floating casino.



### Grand Princess Main Particulars

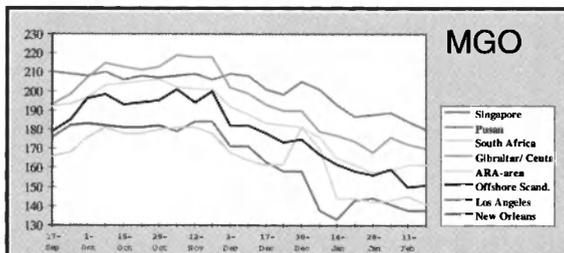
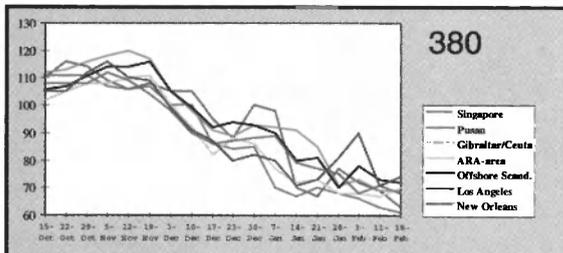
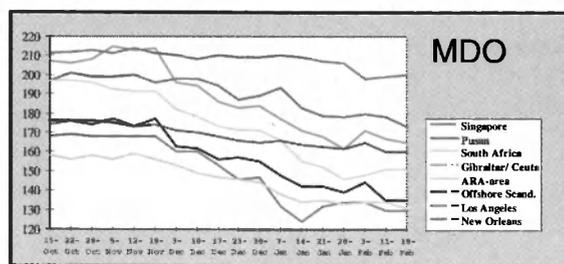
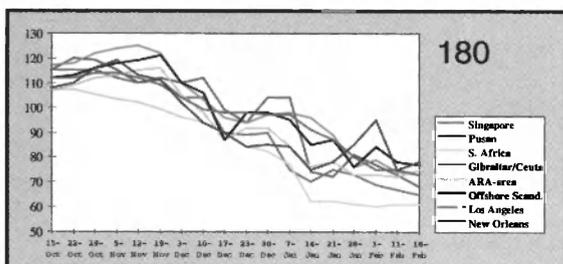
Length	951 ft. (290 m)
Height	201 ft. (62 m)
Beam	159 ft. (49 m), including bridge wing
Draft	26 ft. (8 m)
Flag	Liberia
Ship builder	Fincantieri, Italy
Designer	Giacomo Martola, Teresa Anderson
Classification	Lloyds and Rina
Tonnage	109,000
Decks	18
Crew	2,700
Engines	(2) fixed propellers
Propulsion	Siemens Electric propulsion motor, 21 MW
Generators	(6) Siemens, 11,520 kW, driven by GMT V-16 diesels
Service speed	22 knots



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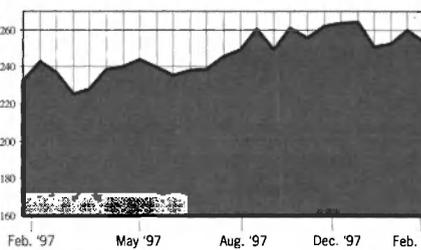
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## Recent Ship Sales

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)
1/9/98	Riomor	Bulker	11,702	82	\$4
1/9/98	Almendra	Bulker	19,373	76	\$2.2
1/16/98	Hollo Pioneer	Bulker	22,457	83	\$5.8
1/30/98	Nordic Moor	Bulker	29,466	81	\$4.7
1/30/98	Herzegovina	Bulker	30,880	77	\$2.9
1/30/98	Dryso	Bulker	31,945	78	\$4
1/9/98	Margo L	Bulker	42,562	78	\$3.1
1/23/98	Exemplar	Bulker	122,760	90	\$23
1/30/98	Excelsior	Bulker	122,829	90	\$23
1/9/98	Treasure Sunrise	Bulker	138,237	81	\$11.7
1/9/98	Sunny Ocean	Bulker	187,011	84	\$16.3
1/9/98	Monte Rotonda	Tanker	25,380	69	\$1.4
1/16/98	Freja Balhc	Tanker	28,750	91	\$17.2
1/30/98	Sea Angel	Tanker	32,229	76	\$2
1/9/98	Port Isabelle	Tanker	40,632	82	\$13.1
1/23/98	President	Tanker	60,960	86	\$20.5
1/23/98	Astro Pegasus	Tanker	81,275	75	\$5.7
1/30/98	Windsor	Tanker	81,299	80	\$14
1/9/98	Sulby	Tanker	84,464	81	\$10.8
1/16/98	Nicolas	Tanker	88,260	81	\$14
1/9/98	Knock Davie	Tanker	140,905	75	\$7.2

## Index Fleet Valuation



Current Market Value (\$M): \$252.9  
1 Month Ago: \$263.9  
6 Months Ago: \$237.9  
1 Year Ago: \$252.9

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.

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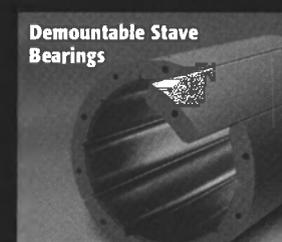
Fendering Systems



Shaft Seal



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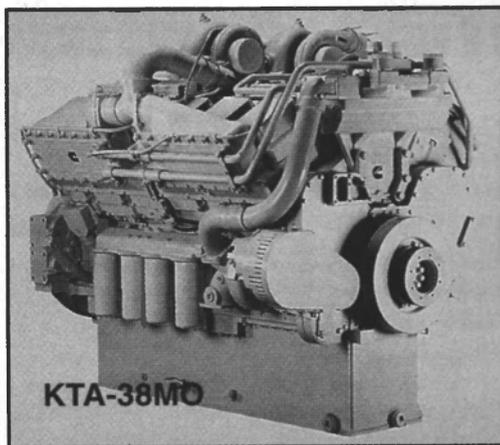
Propulsion Engines rated 750 BHP @ 1600 RPM

Bowthruster Engine rated 300 BHP @ 1800 RPM

**Owner:** Sea Horse Marine Inc., Lockport, LA

**Builder:** Bollinger Shipyards, Lockport, LA

**Engine Supplier:** Cummins Mid-South Inc., New Orleans, LA



As the oil rigs move further off shore in the Gulf of Mexico, a new generation of boats are evolving to service them. At one end of the spectrum are the high speed crew boats while at the other end are the big 220-foot and larger supply boats. In the middle are the displacement-hulled utility boats.

Sea Horse Marine, Inc. took delivery of a 150 x 36 x 12-foot utility boat from Bollinger Shipyards. With the first of Sea Horse's utility fleet to be powered by Cummins engines, the powerful and fuel efficient KTA38-MO propulsion engines enhance the speed in excess of 12 knots while under full load. Also the first of Sea Horse's utility vessels to be equipped with a bow thruster, the Cummins NT-855M furnish manoeuvrability and station keeping capabilities never before experienced.



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# CUMMINS MID-SOUTH, INC.

# CTR Looks To Build An Instant Fleet, Calling For 59 Ships In Four Years

CTR Group of Woodcliff Lake, N.J., has stirred considerable excitement in the maritime world with its recent tender for a fleet of 59 ships to help it lay and maintain 328,980 km of optic fiber cable. The company initially launched its project — dubbed Project OXYGEN — to build a Global Super-Internet last July. The Request For Proposal (RFP) was sent to 22 shipyards in Asia, Europe, and North America, calls for a fleet of 59 ships of various sizes to be delivered between 1999 and 2003. "This is one of the largest numbers of vessels ever contracted for at any one time in the commercial shipping industry," said **Larry Cahill**, vice president, Cableship Finance at CTR Group,

Ltd., the company building OXYGEN Network.

CTR has planned a bidders' conference for the potential suppliers on March 16 in Miami, where it will instruct them on bid submission procedures as well as the time line for completing negotiations, and give them a detailed briefing on the OXYGEN Network. The bids are due March 27. On April

25, CTR will announce a short list of bidders and begin commercial negotiations with them, with the goal of signing a shipbuilding contract on June 1. CTR expects the fleet to be based in 59 locations throughout the world under Project OZONE, the global maintenance system for the OXYGEN Network. It reasons that spreading the armada will make possible

an average response time of three days for a ship to reach a repair site. The RFP calls for the construction of several sizes of ships, which vary according to the water depth they are to operate in and the equipment they will carry. When the smoke clears, the CTR fleet could look like this: nine 4,000-dwt ships; 38 2,000-3,000-dwt ships; and 12 1,000-dwt ships.

## Avondale Restructures For New Century



From left to right: **R. Dean Church**; **Ronald McAlear**; and **Edmund Mortimer**.

Avondale Industries has reorganized into six strategic units in order to catch up on a \$3.7 billion backlog of work (including options). Avondale introduced six new vice presidents that will head each of the new units. **Thomas Doussan** was named corporate vice president and COO. He will be responsible for the engineering, production, material and estimating departments. **Thomas Kitchen** was named corporate vice president and CFO. His duties will include all corporate finance departments, business practices and integrated product and data environment (IPDE). **Edmund Mortimer** was named vice president of Government Programs. **Kenneth DuPont** was named corporate vice president of Commercial and Offshore Programs. He is responsible for the Industrial-Commercial group, commercial boat construction, the Steel Sales Division and the UNO-Avondale Maritime Center of Excellence. **R. Dean Church** was appointed corporate vice president and Chief Administrative officer. **Ronald J. McAlear** was named corporate vice president of Advanced Programs and Marketing. He will be responsible for advanced programs, marketing, proposal management and public relations.

March, 1998

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# Who's The Leader Of The Band?

by Greg Trauthwein, editorial director

When the Disney Cruise Line team was formed in the early 1990s, its mission from day one was clear: Create a "modern classic" cruise ship. While simple in statement, the challenge was compounded by a variety of factors. First, and perhaps most challenging, was the need to design, develop and deliver a product that would exceed the stratospheric expectations of Disney, a company famous for its demands of quality. Second, it was necessary to produce a ship worthy of holding its own among a slew of technologically advanced, increasingly sophisticated cruise ship newbuildings which have become the hallmark of the 1990s.

So began the journey to deliver what will prove to be the cruise industry's most significant ships of the year — *Disney Magic* and *Disney Wonder*.

The course plotted to develop these two ships — in terms of cruise industry norms — was familiar in many ways, pioneering in others. In terms of personnel, Disney ensured that the foremost talent — both traditional maritime and non-maritime expertise — was tapped to deliver a product which from design through construction was uniquely Disney. It is, perhaps, this integration of such a diversity of personnel and organizations — including Disney's own Imagineers — and the resultant shipboard features which will help

define the development of these ships as a watershed event for cruise ship outfitting. A perfect example of the integration of such talent is seen in the creation of the ship's unique exterior. Disney tapped Norwegian **Njal Eide**, one of the world's most recognized ship designers, to research and design the ship's outward appearance. Mr. Eide, in turn, consulted with an industrial engineer from frogdesign, a firm known predominantly for its package design for such clients as Acer and MacIntosh. "This is how we brought non-ship insights into the equation," said **Mike Reininger**, vice president, product development, Disney Cruise Line.

In terms of cruising itinerary, Disney chose to ignore the obvious choice of stopping at islands shared by other cruise companies, opting instead to purchase and develop its own Caribbean island — a parcel of land now dubbed Castaway Cay (see picture page 42). "Most of our competitors don't own their own islands; they have contracts ... which are used by several cruise lines," noted **Bob Shinn**, senior vice president and general manager, WDI-FL. "Ours is Disney-designed, owned and operated." The significance of this development is relevant to this article in that it had a hand in determining some of the eventual technical specifications and machinery requirements written



*While it may be a tad premature to crown Disney as a cruise industry leader, there is no denying that the addition of the famed company to the cruise ship owning fray has stirred much excitement and anticipation.*

into the vessels' final plans.

Purchasing islands and creative on-board environments notwithstanding, the focus of this article will center on the development, building, outfitting and operation of the 85,000-gt *Disney Magic*.

It is worthy to note that — despite the glitz and glamour surrounding the Disney name and properties — the end product is, after all, still a ship.

While Disney is always perched at the top of the cliff in terms of creativity, the company is noted for its sound technical approach to delivering its goods: i.e. while its shoreside and seagoing attractions are sure to inspire awe and wonder, it's a safe bet that the technology employed — which makes the creativity a reality — is tried and true. Hence, *Disney Magic* adheres to the same rules and regulations of other cruise ships, which consequently help define some of their inside and outside

design and specifications.

The roster of designers and suppliers employed to make the ships a reality include industry stalwarts such as **Njal Eide**, Deltamarin, Wartsila NSD, Carrier, Litton Sperry, Hopeman Brothers, General Electric, Thordon and Lloyd's Register, to name just a few. These, and many more individuals and organizations have collaborated to deliver a ship that is designed to be a safe, seaworthy vessel for several decades.

The shipbuilder, Italy's Fincantieri, has become synonymous with the construction of top quality cruise ships, and has enjoyed the lion's share of new cruise ship orders of late. However, the selection of the shipyard to build the Disney ships entailed a broad search for a company that could not only build the highest quality vessel — which there are many, particularly Kvaerner Masa-Yards, Meyer Werft and Chantiers de l'Atlantique — but locating the facility which offered the precise "window of opportunity" to accept the order and build the ships in Disney's timeline.

While the Disney "story" could fill bound volumes, following is a walk-through of the creation of a ship fit to carry the Disney name.

## From The Beginning

Disney began the active study of becoming a cruise ship owner/operator in the early 1990s, according to **Jon Rusten**, Disney Cruise Lines' (DCL) director of development and newbuilding. At that time, the company offered a cruise element to its land based operation via a teaming with Premier Cruises, which offered the "Big Red Boat" cruises. But Disney holds itself to the highest stan-

## From Black & White To Red (Orange, Yellow, Green, Blue, Indigo & Violet) All Over

When Disney set out to deliver its modern classic cruise ship, it decided not to strap itself with the baggage inherent in calling only on the experts in the marine field. Thus, the pair of Disney ships is the result of a collaboration of maritime and non-maritime personnel; Disney and non-Disney organizations.

This clever deployment of talents has yielded some unique results, one of which is embodied in one of the ship's signature restaurants. Disney commissioned Manhattan-based Rockwell Architecture, Planning and Design to "design something that represents the process of creativity of animators," said **Nancy Theil** of Rockwell. The fact that Rockwell Architecture, Planning and Design had never before worked on a cruise ship project did not pose a daunting hurdle, rather a creative challenge for a company (Disney) it already counted on its high-profile client list.

The result: A restaurant (dubbed the Animator's Palette) which, upon entry, is fully black and white, but which slowly evolves and changes to full color with moving animation by the meal's end — creating the feel of entering into a pen and ink sketch in an animator's studio. According to Ms. Theil, the process involves some clever lighting and standard theatrical effects. The fact that the project is on a ship is the only differentiating point for the New York City design-

er, as it falls well within the company's stated capability of creating "work centered on entertainment architecture and the notion of architecture as theater."

During the meal, animations gradually shift and evolve into full color drawing. Elements involved in the process include paintbrush columns with fiber optic tips and tables supported by huge pencils. Wall surfaces will be painted to simulate animator's story boards, and the corridor leading into the dining area will serve as an exhibition space, presenting the process of animation through sketches.

Left: The Animator Palette is shown in its black and white stage.  
Right: The restaurant is shown in full color.





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strategy. To start, the company held a design competition which tasked three renowned ship designers with providing a concept of the new ship, a concept to be presented to company CEO **Michael Eisner**. Following the selection of the "best relevant direction" for the design to proceed, the same three designers went back to work, from which the first tangible example of the Disney fleet emerged. (time frame: seven months, April to October 1994).

Simultaneously, a series of other critical interior and exterior design decisions were being made. Design resources from inside and outside



**CASTAWAY CAY:** Castaway Cay is a 1,000 acre private Island in the Abacos (formerly known as Gorda Cay) which Disney bought and developed as the day-long stop for its two ships, *Disney Magic* and *Disney Wonder*. Located 225 miles from the ships' homeport of Port Canaveral, the island will offer seclusion and natural beauty, as well as a plethora of watersports.

### GE Marine SUPPLIER

GE Marine Systems provided a wide range of propulsion and integration equipment onboard the two new Disney ships. Overall, GE Marine Systems products are focused on two main areas: Propulsion systems and Alarm, Monitoring & Control (AMSC).

General Electric Marine Systems (GEMS) in Harahan, La. furnished the Monitoring, Control and Remote Alarm System (MCRAS), the Electric Propulsion System, and the Propulsion Control System (PCS) installed on Disney Cruise Lines, Hulls 5989 and 5990. The MCRAS meets the requirements established by Lloyd's Register of Shipping for operating a ship with an unmanned engine room.

The MCRAS is a distributed input/output (I/O) system. The use of distributed I/O minimizes the necessity of shipboard cabling, and reduces the effects of a single component failure on system operation. The MCRAS utilizes Programmable Logic Controller (PLC) technology for equipment interface and data acquisition. Data is acquired by Remote Processing Units (RPUs) and Remote Input Output units (RIOs) located throughout the ship, in the vicinity of interfacing equipment.

MCRAS primary operator interface is through Video Display Units (located in the Wheelhouse, the Engine Control Room, and Safety Central) running GE's CIMPLICITY software. Each Video Display Unit includes a 21" color monitor and trackball interface, and is designed using a passive VME backplane.

Panels located in the Wheelhouse and the Engine Control Room provide dedicated controls and indicators for selected points. In addition, a traffic light system, also provided by GEMS, annunciates alarms throughout the machinery spaces and the Engine Control Room. Extension alarm panels are provided in the Engineers' Staterooms, the Chief Engineer's Day Room, and the Officers' Mess.

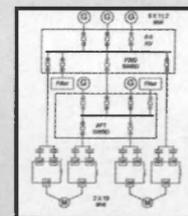
The MCRAS provides remote monitoring and control of a variety of individual vessel systems and propulsion auxiliaries, and includes the Power Management System. The Power Management System is responsible for sequencing, synchronizing (when in automatic operating mode), and load limiting of the five, 11.2 MW, diesel driven alternators which provide both ships service and propulsion power. Reactive load sharing between the alternators is a function of the electronic type governor system supplied by Basler Electric.

The electric propulsion motors are dual winding, synchronous motors manufactured by General Electric. The motors couple directly to the counter-rotating propulsion shafts, and each develop 19 MW at 150 fixed pitch propeller rpm.

The Propulsion Control System (PCS) is totally independent of the MCRAS, and consists of a Control Transfer System, an Engine Order Telegraph (EOT)/Throttle System, a Shaft Control System, a Safety and Shutdown System, and a Power Limit System. The backbone of the PCS is redundant GE Series 90-30 PLCs. The PCS uses distributed I/O,

and supports shaft speed and direction control from the Engine Room Console (ERC), the Wheelhouse Console (WHC), Port and Starboard Bridge Wing Consoles (PBWC and SBWC), or the Engine Room Local Console (ERLC). Communications between PLCs is over redundant Genius Buses. PCS interface with the MCRAS and with the LCIs is over redundant Ethernet Local Area Networks (LANs).

The PCS provides programmed propulsion ramps designed to maximize efficiency and passenger comfort in various, operator selectable operating conditions. Programmed ramps are provided for maneuvering and transit modes of operation. Maneuvering ramps allow for use of the ship's three 1,800 kW bow thrusters and two 1,800 kW stern thrusters. Transit ramps are provided for both normal and rough sea states (operator selectable). Transit ramps are designed to optimize the efficiency and performance of the propulsion drive train without adversely affecting the Power Generation System equipment. Propulsion ramps are effective through the entire throttle range (Full Astern to Full Ahead). Astern motor torque is limited to protect the rudders and shaft seals.



Pictured is a simplified diagram of the ship's Power Generation System and Propulsion System

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of the company were employed from around the world. Designers were given a space and the instructions to "create a fantasy space," said Mr. Rusten. Internally, Mr. Rusten and his team started to define the elements that were inherent in the classic cruise ships of previous

decades, elements that would be critical to set *Disney Magic* and *Disney Wonder* apart from the crowd. While creative freedom was granted to all, the final designs were taken to Deltamarin, Finland-based naval architect/marine engineering firm to ensure that the concepts were

achievable on a ship.

While this design work proceeded, towards the Autumn of 1994 Disney realized that a precious window of opportunity would be opening at several of the world's premiere cruise ship building shipyards in the Spring of 1995. This ignited a push to fast-track the

technical and conceptual design of the vessel by approximately three to four months to ensure that this opportunity was not lost. It is again relevant to note Disney's adherence to its own quality standards here. It would have been a quicker and cheaper for Disney to accept one of the shipyard's cruise

### Thordon SUPPLIER



Pictured is a close-up of the Thordon COMPAC Bearing System.

The need to run a clean ship, ensuring that all steps are taken to avoid costly and embarrassing pollution incidents, was central to the planning of the new Disney Cruise ships. Key pieces of equipment utilized to ensure that these goals are met — throughout the life of the ship — are the Thordon's COMPAC water-lubricated bearing systems and the Thordon SXL rudder bearings. Utilized widely in naval applications, the selection of the COMPAC system by Disney is key into the development of the system as a successful commercial product. "The Disney order, in addition to being a significant piece of business for us, is a very important commercial reference for our COMPAC system," said Don Cassidy, vice president, business development.

Thordon COMPAC is an open water lubricated propeller shaft bearing system utilizing Thordon, an elastomeric polymer alloy as the bearing wear surface. To reduce friction and improve low speed hydrodynamic performance, the lower half (loaded) portion of the COMPAC bearing design is smooth, and the upper half is designed with grooves for lubrication and cooling. The COMPAC systems offers numerous advantages to a cruise ship owner, perhaps none more important (aside from the environmental friendliness) than the lower acoustic signature, properties provided through COMPAC's low coefficient of friction, unique design and higher stiffness as compared to rubber. The Thordon SXL rudder bearings are proven worldwide in terms of value and performance, and for providing total freedom from water pollution concerns. Using an advanced polymer allows with a low coefficient of friction, Thordon SXL bearings offer freedom from the use of grease lubrication in all rudder bearing applications above and below the water line. Thordon walks the walk and talks the talk, backing it SXL system with a 10-year Wear Life Guarantee. Thordon Bearings Inc. is a member of the Thomson-Gordon Group of Ontario, Canada. The company designs and manufactures a complete range of high performance, environmentally friendly marine propeller shaft and rudder bearing systems



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ship designs — adding its own embellishments — to ensure that the ships go to market on time. “Our design work was done far in advance of the shipbuilding contract,” said **Arthur Rodney**, DCL president. All of the preparatory work on behalf of Disney was crucial to making the ships a reality,

as “we went out and pre-designed the ship with all of the architectural and technical elements defined...the shipyard was actually an extension of this process,” said **Mr. Rusten**.

The coordination of shipowner with shipyard, consultants, designers and naval architects from all

four corners of the world was another large logistical challenge in **Mr. Rusten's** estimation, a challenge which was only met with a detailed and successful communications process.

#### The Ship

Many of the exterior design ele-

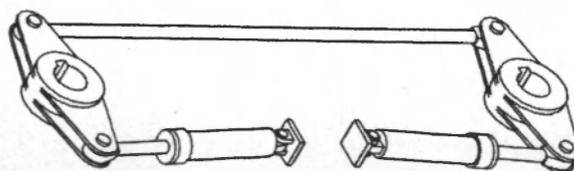
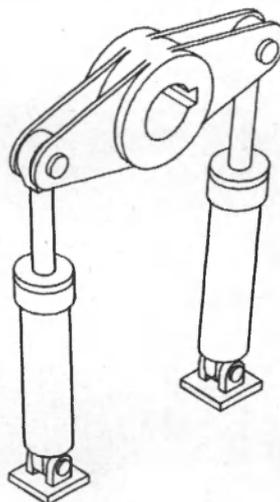
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M.V. Queen of Coquitlam, 139 M, 12,600 HP Ferry.  
(Photo courtesy of B.C. Ferries Corp.)

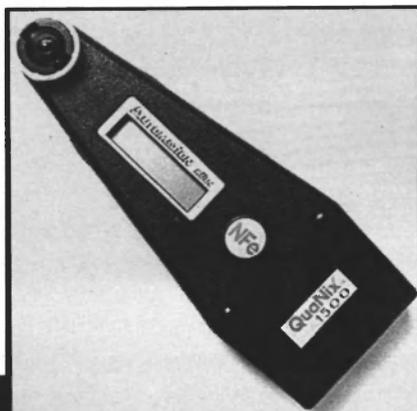
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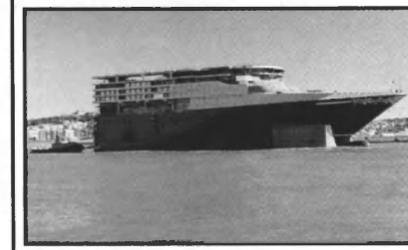


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INSTRUMENTS INC.

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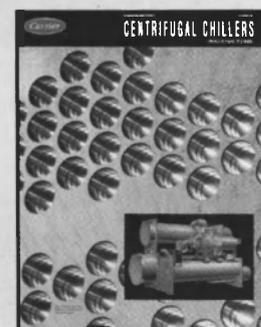


**FROM TWO TO ONE:** Disney's two cruise ships were each built in two sections at two different shipyards — Fincantieri's Ancona yard and Fincantieri's Marghera yard — in order to complete the vessels as quickly as possible.



### Carrier Transicold

SUPPLIER



Syracuse, N.Y.-based Carrier Transicold provided the two new Disney ships with new Carrier Centrifugal Chillers for the air conditioning systems on-board, and include the Carrier Comfort Network (CCN) automatic control systems. The chiller units are designed to provide advanced, super quiet semi-hermetic compressors, a system developed and delivered by Carrier in response to the cruise industry's repeated demands for superior units.

Carrier has a long history and proven track record in providing advanced cooling units, and some of the innovations incorporated into the new chillers are: reduced noise and vibration; reduced size and weight; modular construction; quick connectors; zero ozone depletion; safer, reliable controls; long-life sealed motor; high efficiency compression; and larger capacities.

The 19EX Hermetic Centrifugal Chiller is specifically designed for maximum environmental compliance, and was created to use HFC-134a, a non-ozone depleting refrigerant. But the refrigerant is only as good as the chiller which uses it, and to that end Carrier has taken several steps to ensure the reliability and cost-effectiveness of the 19EX unit. For example, the unit features steel-backed, babbitt-lined bearings; epoxy-coated compressor casing; tilting-pad thrust bearing; double helical gears; and a hermetic motor.

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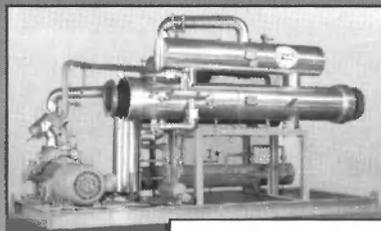
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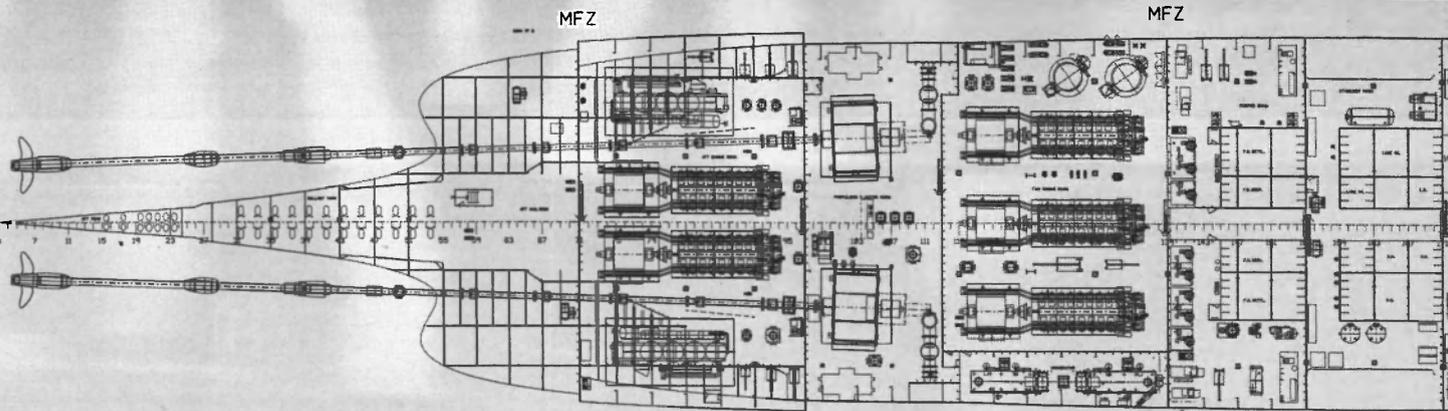
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**THE MODERN CLASSIC:** Disney's first two cruise ships were designed and built with an eye to the future and to the past.

Many features, including the long slender hull and exceptionally long propeller shafts, harken memories of great cruise liners from earlier this century ..... but the ship also sports some of the most modern outfitting in the cruise industry, featuring state-of-the-art marine equipment from industry stalwarts such as Wartsila NSD, Carrier, Hopeman Brothers, General Electric and Thordon.



ments of the *Disney Magic* exist for reasons of aesthetics rather than functionality; for example the flared bow design is designed to allow the ship to go through heavy waves without getting water on the deck or slamming. While the design will provide the additional benefit of passenger comfort, it was unnecessary for this particular operational environment, which is marked by relatively calm seas.

Because of the quality and quantity of the specialized design, architecture and technical solutions featured aboard the Disney ship, Mr. **Rusten** admits that the vessel put a tremendous amount of pressure on the shipyard. In turn, pressure was on Mr. **Rusten** and his team to maintain a good relationship with the yard to ensure that the standards were met. In this regard, he noted that "the Italians have done a great job" from both design and engineering angles.

From a first glance, the new Disney ships are distinctive in both form and color. To those who have studied or remember the grand cruise liners of the early 1900s, the *Disney Magic* will more than likely evoke fond memories. The tag Modern Classic is not simply a clever marketing moniker created by the minds of Disney, rather a true reflection of this amazing ship.

"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, respectful of an ancestral lineage but unmistakably contemporary," said Mr. **Reininger**.

"This ship is closer to a classic trans-Atlantic liner than anything that has been built since the 1960s," said Mr. **Rusten**.

Taken as a whole, many of the architectural elements of the vessel, including: its long (964 ft./294-

m) black hull with a curved line; its large circular portholes; the protruding bridge wing supports; the rounded stern; the two funnels (one working, with the fore funnel housing the ESPN Sky Bar); and the bow and stern embellishments — all collaborate to evoke a strong resemblance to and remembrance of the classic liners. In keeping with the classic liner approach, the relationship between the visual image of the ship and Disney is minimized, i.e. don't expect to see big mouse ears protruding from the bow!

At the same instance, the ship provides a whimsical vision that forever marks it a Disney ship. For example:

- The ornate embellishments on the bow and stern actu-

ally contain silhouettes of many popular Disney characters.

- The colors of the vessel itself — black, white red and yellow — are the colors of **Mickey Mouse** (note: it should be pointed out that the hull is actually painted a dark blue, which reflects a blue/black color [supplier: Jotun Brignola]).

Also, the company took the preventative measure of ensuring that the bright yellow (rather than traditional orange) lifeboats were in compliance with all international safety standards).

- Hanging off the stern is a 15-ft. statue of **Goofy** in a boatswain chair, adding his own artistic touches to the vessel. (Rumor has it that the Disney crew wanted to have one letter in the ship's name painted upside down, a la a **Goofy** goof, but the officials at classification society Lloyd's Register recommended against it.)

- Bay windows situated high-up on the vessel are symbolic of the old practice of placing life boats in this high spot (which is, of course, now against modern safety standards).

- Not seen but heard, will be seven additional ship whistles, whistles which have no relevance to the ship's navigation. Their purpose: to play the first seven notes of "When you wish upon a star."

While it is foolhardy to single out one person as responsible for the creation of the Disney ships, Mr. **Rusten's** singular focus for the past four years has been to ensure that *Disney Magic* and *Disney Wonder* were as structurally, functionally and technically correct as humanly possible.

A trip to Mr. **Rusten's** office quickly reveals his passion — the classic cruise liners of days past — and a conversation with him leaves the unmistakable feeling that he was a driving force in ensuring that the aforementioned classic ship elements made it to

## Disney Gets Indoctrinated To The Norwegian Way

The offices of Yran & Storbraaten, Architects AS in Oslo, by conventional standards, are cluttered.

However, it is from this clutter that some of the most brilliant cruise ship designs of modern times emerge, including much of the design of Disney Magic. **Bjørn Storbraaten** and **Petter Yran** came to form their now famous partnership through an initial meeting through Bjørn's sister. In 1985 the duo's first commitment consisted of the drawing up the plans for a radical rebuild of the Explorer Starship, which was transformed from a RoRo to a high-class cruise vessel.

### Getting The Call

It was about 1993/94 that the firm received the call, quite literally, from Disney regarding the new cruise ship. "They just called us and said 'hi, are you interested in helping us with our cruise vessel?'" said Mr. **Storbraaten**. At the first meeting, Disney executives asked Mr. **Storbraaten** to compare his firms to others. "It is not normal for a Norwegian to brag, but I did say that others consider us very good."

Once it was decided to bring Yran & Storbraaten aboard for the project, Mr. **Storbraaten** recommended the addition of **Robert Tillberg** and **Njal Eide** to join the team. The move was a critical one to the end product, as a design competition was initiated among the three to design "the" Disney ship.

In the end, it was a design from Mr. **Eide** that was selected (see related story page 77). Upon viewing Mr. **Eide's** final design, Mr. **Storbraaten** said "yes, that is it."

Once the ship shape was agreed upon, Mr. **Storbraaten** took up the arduous task of planning the internal spaces. "The ship is a big volume to design. We spent a long time developing the general arrangement plan, to a point where it is almost 100 percent effective, using every available square inch." For the development of *Magic* and *Wonder*, Disney took the stance of design first.

"Disney does not look at architecture as an extra invoice...they see it as extra quality," said Mr. **Storbraaten**. As an example, he noted that the bow was slimmed for pure aesthetics, necessitating the elimination of 17 cabins. Detail design to provide classic touches are also seen in the fact that the Disney ships will leave the anchor fully exposed, as was the case with ships years ago. "It's an important logo for a ship to have," Mr. **Storbraaten** said.

(While this article focuses on the role of Yran & Storbraaten, it is imperative to note that Mr. **Storbraaten** time and again stressed the importance of the team approach to design which led to the final product. He said, "you should have an ego, but not one so big that you cannot appreciate other ideas.")

<b>Mobil Girgi</b> SUPPLIER	<b>MOBIL GIRGI</b>
Italy's Mobil Girgi has produced furniture for more than 40 years.. Based between Milan and Como, Mobil Girgi provides specialized turnkey services across many industrial sectors. The company has provided the stairways for the Disney ships, and its portfolio includes work on the Rotterdam cruise ship for Holland American Line. The organization recently opened its first showroom in London.	

<b>Boldrocchi</b> SUPPLIER	<b>BOLDROCCHI</b>
Italy's Boldrocchi has a long list of marine cruise ship references, including the supply of air fans and ventilation equipment aboard the first two Disney ships. Specifically, the company provided 50 axial and radial fans for L.A.M. ventilation, as well as silencers and filters.	
As the company notes in its materials, ventilation and heat transfer aboard a large cruise ship is a particularly important part of ensuring passenger comfort.	
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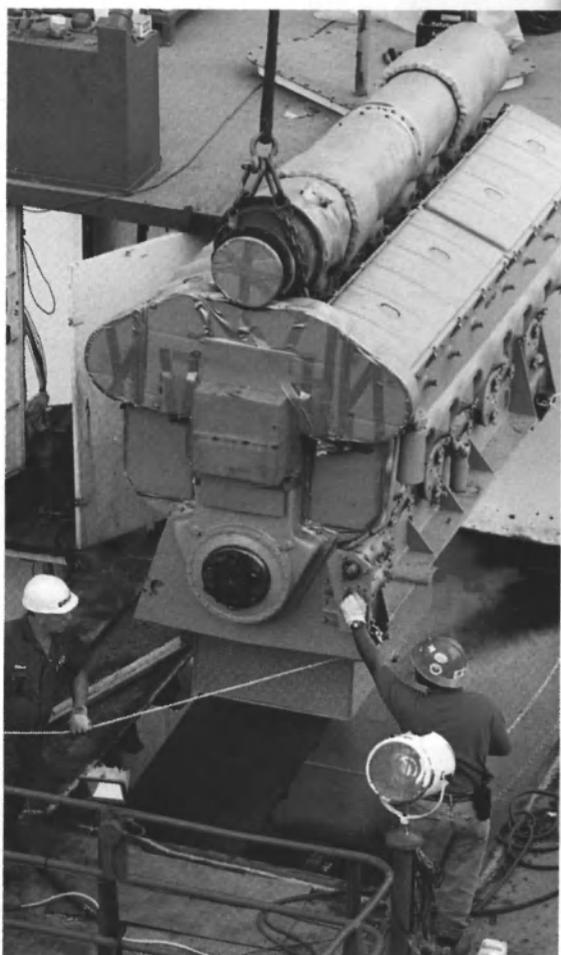
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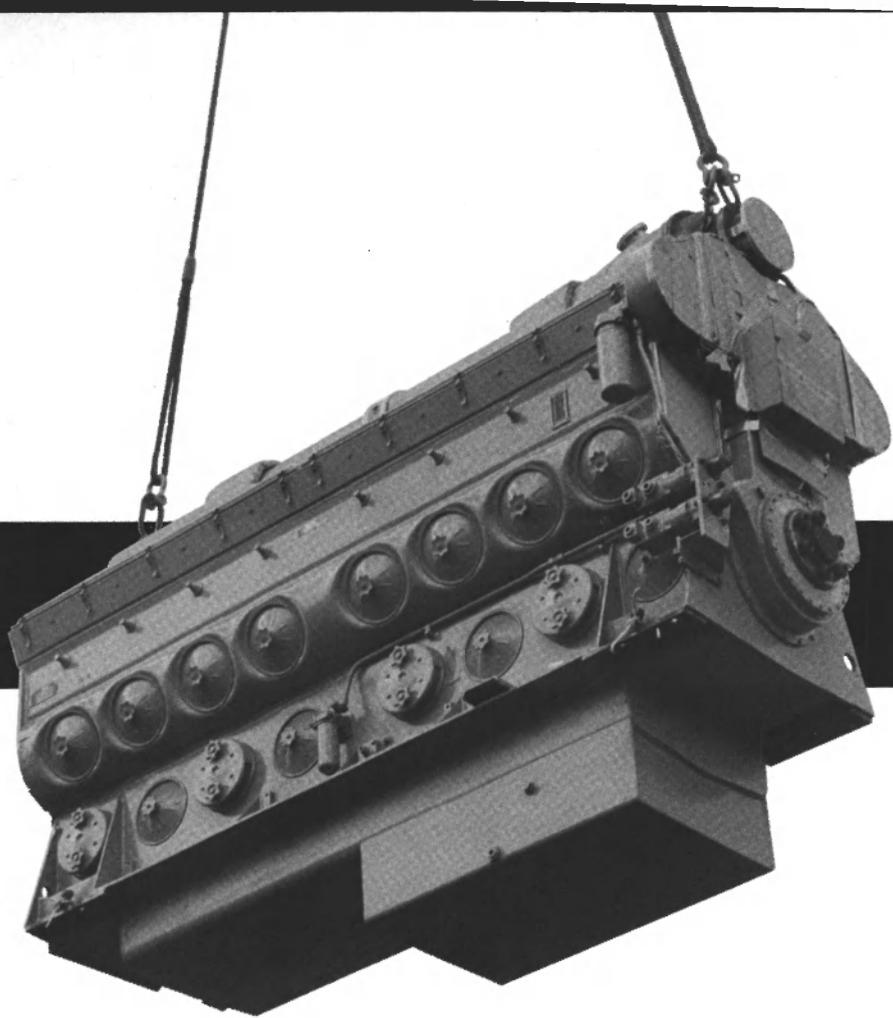
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## The Harvey Trojan

was built by Halter Marine in 1976 under another name, and was originally powered by two 2400 HP German engines, until business and equipment problems laid her up.

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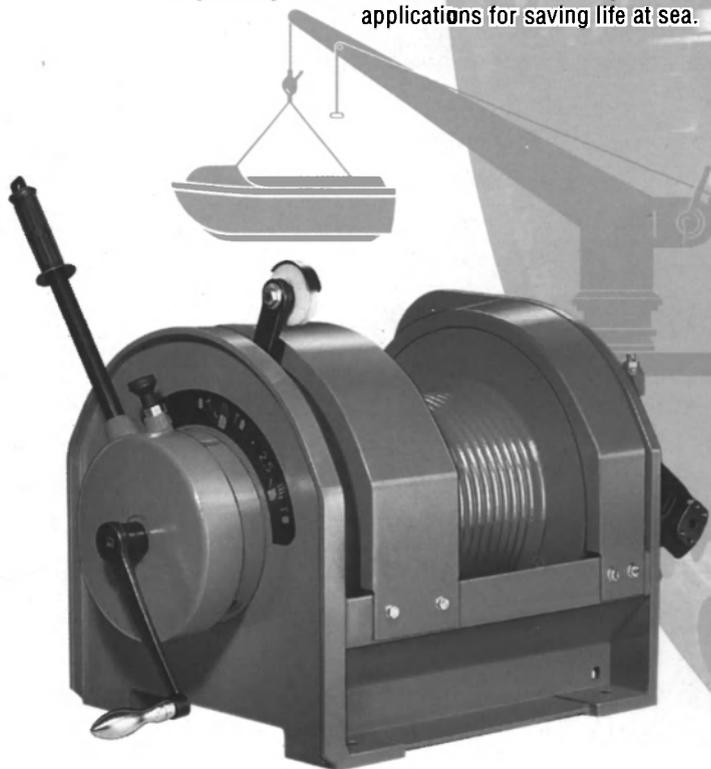
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## WORLD SHIP REPAIR TECHNOLOGY

# Business Is Brisk

Dubai Drydocks, the Middle East's largest ship repair yard, has announced 1997 figures which show a slight increase on those figures for the previous year (see Table One, below). The facilities were profitable for two straight years, and the 1997 results were achieved despite a lull in ULCC/VLCC repairs during the fall period when owners of such tonnage were keen to keep their ships at sea during a period of high freight rates.

Table One

Vessels Repaired (completed)	1996	1997
ULCCs	23	22
VLCCs	44	35
Tankers	42	57
Bulk Carriers	24	27
General Cargo	31	40
Miscellaneous	20	24
Total	184	205
DWT	24,430	23,233

Although the total number of ships completed by Dubai Drydocks increased by 21 compared with the previous year, 1997 saw a three month period when large tankers did not arrive on a regular basis, and thus the total deadweight figure declined from what was a record year during 1996.

According to the repair yard, the first seven months of 1997 recorded a total of 37 VLCC/ULCCs completed, an average of some 5.3 tankers per month. During the three month period from August to October, repairs to only seven supertankers were completed, an average of 2.3 per month. The last two months of the year saw a dramatic increase as freights fell and owners were forced to carry out postponed repair contracts. A total of 13 such large tankers were completed in the November-December period, an average of 6.5 per month.

Meanwhile, Bahrain Arab Shipbuilding and Repair Yard's (ASRY) success continued in 1997, despite increasingly fierce competition in the worldwide shipping market, especially from Dubai Drydocks and those yards operating in the Singapore area. The year 1998 started well and ASRY had received an encouraging level of enquiries, together with strong forward bookings.

Overall, ASRY's 1997 results were satisfactory and the yard obtained

a good share of both the international and local ship repair markets. A total of 116 vessels were repaired throughout 1997, with 101 ships of all types and sizes being accommodated in ASRY's three docks. These figures are slightly below the 1996 record level, as demand was relatively static in the fourth quarter due to owners deferring repairs until early 1998. In terms of vessel size and type, ASRY's market remained weighted toward crude oil tankers, products, chemical and LPG carriers, but with good demand for bulk carriers, general cargo and feeder container-ships.

Higher steel demand due to class requirements and life extension programs resulted in steel renewals of 4,164 tons, a 19 percent increase over 1996. Demand for high quality internal tank blasting and coating continued to be well maintained, with several vessels undergoing significant blasting/coating work. A substantial volume of pipework was also carried out, with more than 120,000 ft. (36,000 m) of various diameter pipe used.

A notable achievement in 1997 was the conversion of three Petrobas vessels for operation as shuttle tankers. The conversion work included the installation of bow loading arrangements, as well as other routine work. These vessels helped to increase the total amount of cable installed by ASRY throughout the year to cover 76,000 ft. (23,000 m).

The first drydocking of the new generation of HSS ferries outside the builders yard in Finland commenced with the HSS catamaran *Stena Explorer*, docking for annual survey and overhaul operations at Belfast's Harland and Wolff Ship Repair & Marine Services.

The vessel, which was due to re-enter service last month does not drydock on its twin hulls, but is supported on the underside of the wetdeck between the twin hulls, by 10 steel towers (each approximately 33 ft. high and seven ft. wide).

A hydraulically adjusted platform mounted on top of each tower carries custom-designed soft cappings and the complete mount ensures that the weight distribution at each individual tower can be precisely adjusted and controlled by hydraulics, during the process of pumping down the drydock level

Maritime Reporter/Engineering News

and transfer of the vessels weight to the towers. Preparation of the towers took approximately 14 days.

The Stena contract is part of a two-ship deal, with the second ship, *Stena Voyager*, due to arrive at the yard this spring. In addition to drydocking surveys, *Stena Voyager* will undergo change-out of gas turbine power plant and water jet propulsion units during its period in drydock.

Modification work at Poland's Gdansk Shiprepair Yard (GSY-Remontowa) continues with the two sisterships being docked from Copenhagen-based ferry operator DFDS AS. The first to arrive was the 21,545 grt passenger/car vessel *Prince of Scandinavia*, which is undergoing general modernization, including hull conversion and construction of additional side displacement tanks, increasing the vessel's stability. Passenger cabins are also being modernized and the ferry has now been equipped with modern life saving equipment. Also included in the work are overhaul and installation of new electrical air conditioning and ventilation systems.

General repair work includes blasting and painting, renovation of walls on car decks and main engine work.

Sistership, *Princess of Scandinavia*, which arrived earlier this year, is undergoing similar work, which is geared to getting the ship in spec with regulations set the Stockholm Convention and SOLAS.

While the privatization of Lithuania's Western Ship Repair Yard continues, the yard has been busy with some 70 percent of its cur-

rent turnover coming from the international market. A total of 130 ships were repaired at the yard during 1997, which is a gradual rise in the numbers over the past seven years. The competitiveness of the yard is seen with steel prices currently being offered around \$2.50 to \$3 per kg, and labor prices at \$14 per hour. Steel capability is about six to eight tons per day, but during the *Al Messilah* conversion contract (car carrier to livestock carrier), carried out during 1997, a figure of 11 tons per day was achieved.

The yard has already made inroads into the conversion market this year with the lengthening of a Danish general cargo vessel. The first contract for 1998 was for the conversion from a fishing trawler, *Atlantic Challenger*, to a seismic survey vessel for Norwegian owners. A similar contract is also being tendered for its sistership, *Atlantic Horizon*.

U.S. boxship operator Sea-Land Services has booked four of its ships at Germany's Werft, Bremerhaven, one of the busiest yards in Northern Europe. The ships involved are the 58,943 dwt *OOCL Innovation*, and the 58,869 dwt *Nedlloyd Holland*, *Sea-Land Performance* and *Galveston Bay*. Each repair operation will take two weeks to complete. Apart from these four ships, Sea-Land also has another five containerships due to be drydocked in Northern Europe later this year.

During 1997, China's Qingdao Beihai Shipyard (QBS) carried out repairs to

around 125 vessels, and out of this total, 85 percent were docked in the yard while it was seeking to build an 2,424.6 ft. (800 m). long berth in Yellow Island, Qingdao. The program is expected to be completed in 1999. The yard has started the year well with two conversions involving the 4,007 dwt Panamanian tanker *China Seaways* and a 4,089 dwt Panamanian general cargo vessel. Both ships are being converted to asphalt carriers and are owned by Kobe's Kyowa Sansho.

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*American Champion* at Tyne Tees Dockyard on November 23, 1997, preparations are underway for its lengthening.

After the conversion from a deepsea trawler/fish factory and processing vessel, it will reportedly be placed on long-term charter to Geco-Prakla as the world's largest seismic survey vessel.

The equipment associated with the vessel's original operations has

been removed, which included cranes, winches, processing freezing and storage machinery. In addition to the removal of machinery, large amounts of the ship's structure, both internally and externally, have been removed to make way for new equipment. Due to the engine room being located at the aft end of the vessel and the accommodation and wheelhouse located forward, large amounts of

electrical cabling and systems pipework were disconnected.

The yard has worked closely with ship designers and a heavy transport company in an effort to find a safe and efficient way of moving the stern part of the vessel 66 ft. (20 m) aft to allow the new sections to be inserted.

Large steel supports have been fabricated and welded to the underside of the ship to transfer

the weight onto the self-propelled computerized trailers. Consisting of a total of 48 axles, these trailers are capable of lifting more than 1,400 tons. They will be positioned under the ship in preparation for the move.

The ship will be 80 percent cut using gas cutting equipment. The hydraulic trailers will be able to

(Continued on page 66)

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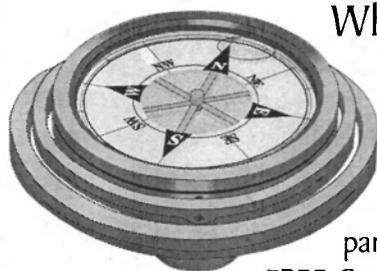
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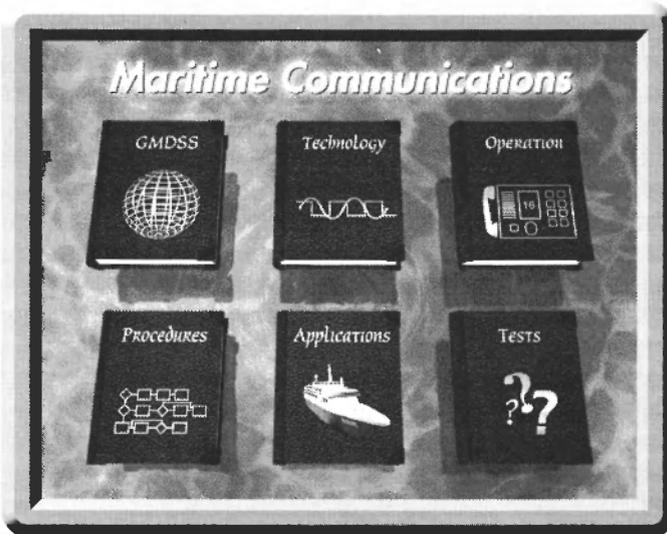
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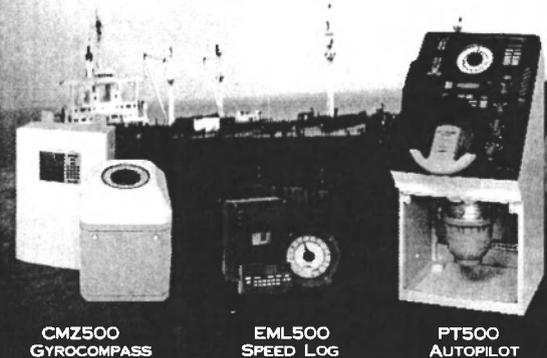
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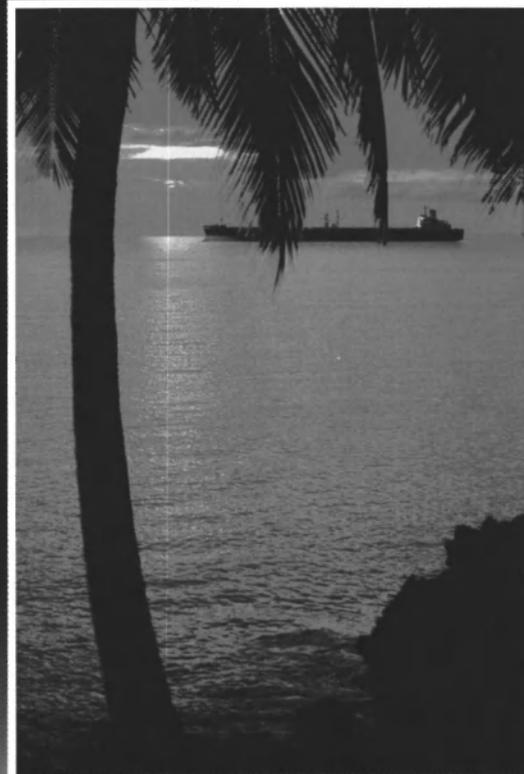
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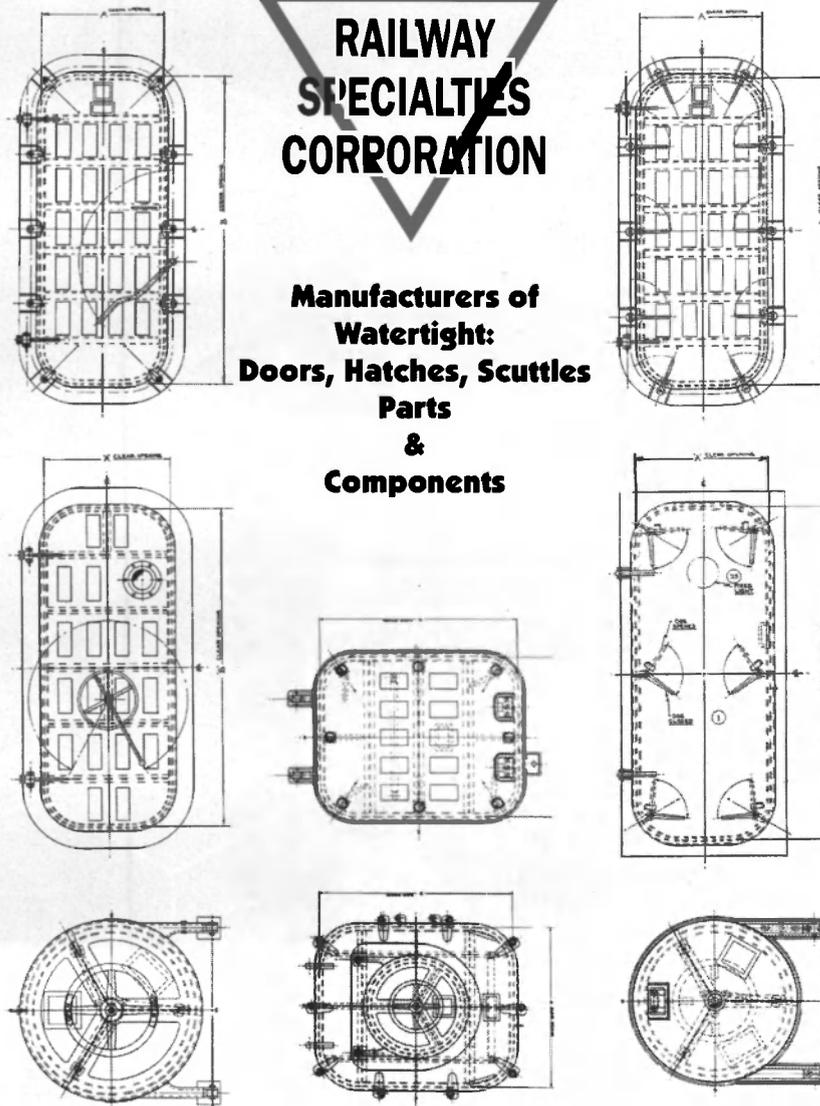
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original design.  
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## New Module Released by KCS

The new TRIBON compartment module from Kockums Computer

Systems (KCS) is designed to reduce work hours during the design of the internal arrangement and compartmentation of a ship and gives an advanced facility for the modelling and visualization of designs. The program reportedly allows for easy changes and additions to be made.

The Tribon module is broken down into three main sections: space Construction; Internal Surface Properties; and Compartmentation Properties.

The technology can also be applied to submarines and SWATHs

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## Need To Buy Or Sell Marine Parts, Equipment And Services?

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Why not join hundreds of ship owners, operators, managers and marine suppliers around the world who have discovered the power of the ILS Parts Information Network. Each month, our subscribers send and receive hundreds of messages like those below to fill their marine equipment needs quickly, economically and efficiently. Shouldn't you? For details, contact us today.

## New LR Software Saves Time And Money

Software solutions to help the maritime industry streamline the design and construction have been developed and marketed by virtually all ends of the industry over the past several years. The latest to enter the fray is U.K.-based classification society Lloyd's Register (LR), which recently unveiled its new computer software, designed to save time and costs in the design and maintenance of ships.

Dubbed ShipRight IS, the new software integrates design processes to reduce the time taken between initial planning for a ship and ordering the steel for its construction. The system is designed for use over a vessel's lifetime, to monitor wear and tear and give an electronic record of damage and repairs. ShipRight IS will reportedly be introduced to LR offices worldwide next month and made available to shipyards and designers at a later date.

According to LR officials, the system will be retroactively applicable to existing ships, providing the availability of sufficient details to create an electronic model of the

### Broadcast From: Skaarhamn, Sweden

"Urgent!! Urgent!! Please quote for 1 piece cylinder head complete, reconditioned, design IV 12 A34 or IV 12 A56 for Wartsila 624 TS. (Ship Manager)"

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### Broadcast From: Houston, TX

"We are looking for two (2) BBC turbochargers model VTR-354-11.  
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### Broadcast From: Spelle, Germany

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The Marine Parts Information Network

**NASSCO And KCS  
Announce Product Model  
Agreement**

National Steel and Shipbuilding Company (NASSCO) and Kockums Computer Systems Inc. (KCS) have announced a cooperative

agreement to implement and utilize the KCS TRIBON shipbuilding system at the San Diego shipyard. Previously, NASSCO has implemented the TRIBON Hull system on the Sealift New Construction (SLNC) Project.

Under the new agreement, NASSCO will also employ the TRI-

BON Outfitting system, TRIBON Initial Design and TRIBON Vitesse – the new rule-based design system introduced with TRIBON 4.

According to **Dirk Dyktra**, NASSCO director of Detail Design, the addition of TRIBON outfitting systems will enable the shipyard to

design and store all of the modeling and production information for an entire ship in a single, integrated product model. The combination of hull and outfit modeling in one system will reportedly reduce both modeling and planning time, as well as savings in areas such as interference checking.

The TRIBON Product Information Model is an intelligent product model that stores all the design and production information necessary to build a ship. Information can be displayed "as designed" by ship system or "as built" by production assembly or interim product. Production information includes drawings by block, assembly structures and interim products; automatic burning, beveling and welding information; and information for robotics – making TRIBON a CAD/CAM/CID system.

Circle 32 on Reader Service Card

**Nautical Software Releases  
GPS-C**

Nautical Software has released its GPS-Communicator (GPS-C) software program. The new program is a stand-alone GPS utility designed for Windows95, 3.1 and NT. GPS-C has three main functions: Data management – the GPS Manager manages waypoint, routes and tracks; Upload/Download – transfer Wizard takes users through upload/download processes; and Real-time data tracking and logging – Track Console gives real-time tracking and logging with a flexible instrument panel which reads data.

Circle 30 on Reader Service Card

**Dataworks To Replace  
Galbraiths Computers**

London-based shipbroker Galbraiths Ltd. is set to provide 70 network-based PCs. The order was for fully Windows-operational network-based computers to provide for full shipbroking, positioning, estimating and message handling support for the tankers, S&P and dry cargo departments of Galbraiths. Dataworks will supply the network, train and support the company and its employees as to how it will benefit from PC software. The system should be up and running as early as January or February 1998.

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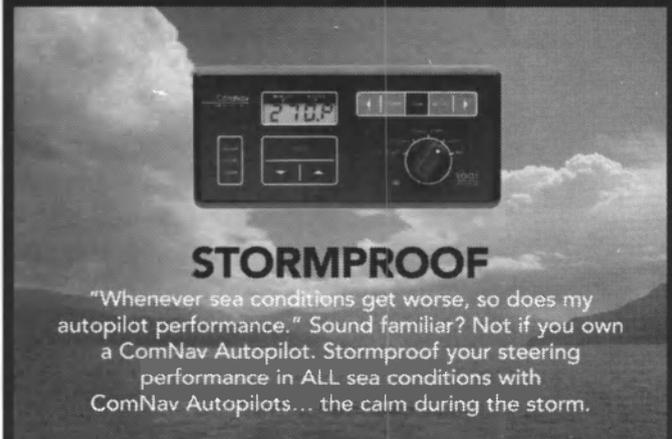
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## Suisse Atlantique Chooses SES's Shipping Software

Suisse Atlantique has chosen Shipmanagement Expert Systems S.A. (SES) shipping software to computerize both its office and vessels. Suisse Atlantique has ordered the Shipmanager Integrated Software and the Shipboard Management Systems from SES, in an effort to provide full computerization between its offices in Switzerland and its vessels with ship-shore-ship communications. SES's systems now operate in 23 countries worldwide.

Circle 40 on Reader Service Card

## Litton Develops IT Enterprise

Litton Marine Systems has developed a new marine information technology (IT) enterprise, encompassing all aspects of fleet administration, cargo and hull monitoring, vessel performance monitoring, voyage optimization, financial accounting, ISM codes, corporate integration/gateways, communication services and equipment. Litton has formed strategic alliances with partners such as the British Admiralty, Litton PRC, Marine Management Systems, Iridium North America, Ocean Systems and Ocean Weather. Litton PRC will provide a wide range of corporate IT programs, products and services for shore offices.

Circle 29 on Reader Service Card

## Kvaerner Races To Beat 2000 'Bug'

Jorgen Piene, Kvaerner's vice president Group IT, says the business awareness aspect is the most important issue for the group. There are far more implications than the software ones. He also pointed out the legal problems, procurement, engineering contracts, Stock Exchange requirements, banks records, client records, and insurance people that have to be taken care of. The implications could be huge if the computers shut down on January 1, 2000. Kvaerner assures the world that it will be ready by 2000 to operate correctly. What this whole experience is forcing Kvaerner to do is to upgrade all of its computers and outdated component equipment, which, Piene says, "will increase greater IT compatibility across the group."

Circle 45 on Reader Service Card

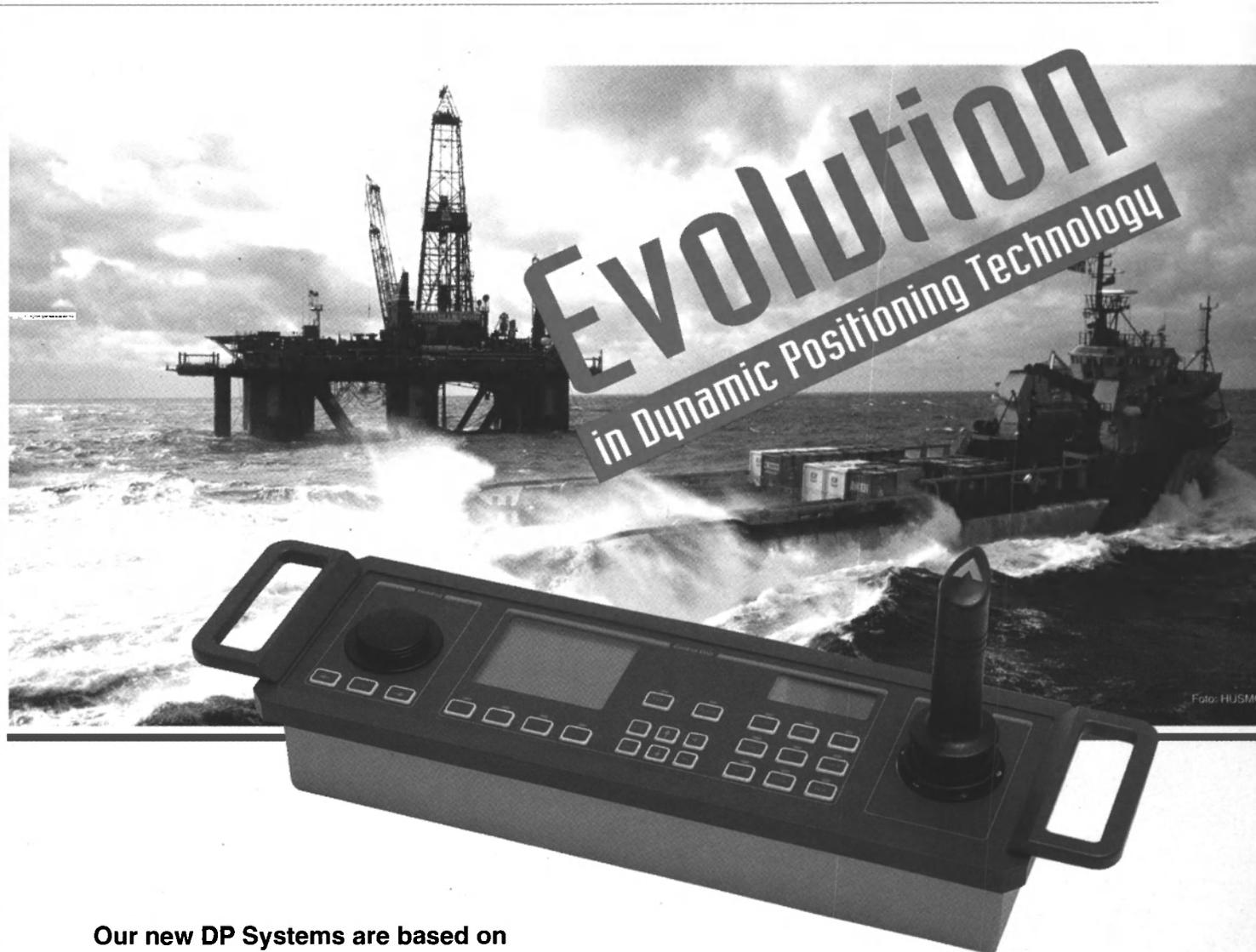
March, 1998

## Deneb Wins Award From NIST

Deneb Robotics Inc. was recently awarded a \$2.3 million, two-year, advanced technology program (ATP) from the U.S. Department of Commerce Technology Administration

National Institute of Standards (NIST). Deneb plans on improving existing factory scheduling systems through 3-D technology and simulation software by validating a new task scheduling and execution system in which software agents represent factory resources, systems and jobs. The system is expected to improve factory

throughput, lead time and agility while also reducing production costs. The prototype consists of a plan to integrate four technologies: a scheduling architecture; market-based mechanisms for coordination; algorithms for response to varying demands; and independent scheduling for different parts of the factory.



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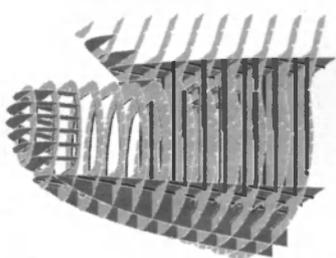
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## CAD-Link

3D Product Model & Nesting  
inside AutoCAD R14



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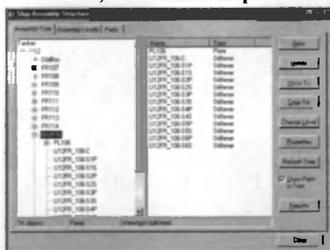
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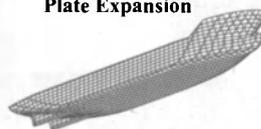


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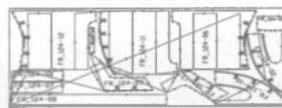
## ShipCAM

Fairing & Lofting  
Plate Expansion



### NC-Pyros

NC Code Generation



Free Demo CD



Circle 310 on Reader Service Card

## Kockumation And SpecTec Join Forces In Software Endeavor

Kockumation and SpecTec Systems have combined their efforts and have begun offering Kockumation's Loadmaster featuring SpecTec's AMOS-Load software in one product. The resulting hybrid works through the Windows95 platform. The new program has been further enhanced with a graphics-orientated interface to present ship status information via the Loadmaster. The program works through a series of simulations regarding the loading and unloading sequence. The software then obtains a list of immediate results to form the basis of a load/discharge plan. This feature of predictions is especially useful if there is a change in the load/discharge sequence.

In situations where there is a turn-around involved, the software can find the most efficient way to handle the unloading and subsequent reloading. Loadmaster also comes with a guide to conserve fuel by optimizing the vessel's trim line.

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

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And, it's all protected by a rugged, splash-proof housing. The Leica MX 400 delivers power, sophistication and precision in one easy-to-use

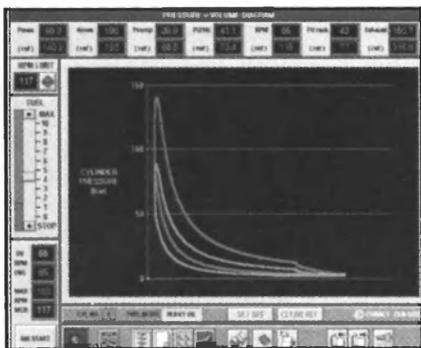
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## Paterson Introduces Latest Cobalt Marine Engineers Software



Pictured is a screen from Paterson Instruments' Diesel Watch software.

Paterson Instruments Ltd. has introduced its latest Cobalt marine engineers software, Diesel Watch. Based on two and four stroke marine diesels, this software reportedly complements engine performance monitors manufactured by companies such as Enox and Malin. Diesel Watch explains power diagrams using diesel engine computer simulations. The system allows users to make changes to a mechanical or fuel component and show cause and effect. Diesel Watch is designed for seagoing engineers, as well as technical departments, and can be applied to main propulsion units, auxiliaries and generator sets. Cobalt software runs in Windows environments.

Circle 31 on Reader Service Card

## Starpath Weather Trainer Software

This program was engineered to guide the user through some simple and complex ways to identify and analyze weather and wind patterns and their signs and sea and sky tendencies. The program is set up to ask real U.S. Coast Guard exam questions, teach how to read fax maps, interpret sea conditions, learn synoptic coding, and take certification exams. The Weather Trainer also offers on-line support for any user who needs it. The CD-ROM also contains a library of resources to aid the user in their search for understanding of weather patterns.

Circle 51 on Reader Service Card

## New Cinet Maritime PC

Disctec, a leading developer and marketer of portable, external parallel port peripheral products for personal computers is going to start distributing Cinet's Maritime

PC. This PC is a 200MHz Intel Pentium run desktop modified to withstand environmental conditions aboard vessels at sea. The computer is ISO 9001 certified and provides security of data, even in harsh conditions. There have also been 10 other type approval certificates obtained for the Cinet PC.

Circle 46 on Reader Service Card

## Overseas Shipholding Sells Three Bulk Vessels

Overseas Shipholding Group Inc. has raised \$30 million from the disposal of three out of 10 older dry bulk vessels it intends to sell.

The U.S. shipping group announced in November it hoped to generate proceeds of about \$140

million from the sale of its 10 older and less competitive dry bulk carriers, which will leave it with just two 1997-built 160,000 dwt Capesize vessels and its core fleet of oil tankers.

In the first nine months of 1997, OSG net operating loss attributable to all ten vessels, including interest exposure, was \$8.3 million.

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(Continued from page 54)

take the weight of the aft section of the ship and the final 20 percent of the ship's steel structure will be cut. The trailers will then lift the stern section off the keel blocks and transport it 66 ft. aft.

The first two units of the new mid-section, weighing 70 tons each, have been fabricated at the

yard and are ready to be lowered into the dock as soon as the vessel is split. Along with lengthening the vessel, the yard will also widen it by 14 ft. (4.3 m) and two complete new decks will be added. By the time the vessels leave the yard in June this year, approximately 1,000 tons of steel will have been added. The two new decks include more than 40 hydraulically operat-

ed winches and seismic equipment along with the existing main engine, which was flexibly mounted and arranged for Unmanned Systems operation (UMS). Two additional auxiliary engines are to be installed, along with extensive modifications to accommodations including the addition of 18 extra cabins, a hospital and a gymnasium. The existing 19 cabins will be

totally refurbished and upgraded.

#### FPSO Market Buoyant

The conversion market involving tankers to floating and storage offshore terminals is currently the most active among the ship repair yards throughout the world. There are more than 60 such FPSO projects (conversion and newbuilding) being currently discussed for introduction prior to the year 2002. The conversion projects currently underway are shown in table two below:

Table Two			
Owner	Shipyard	Capacity	Vessel Name
Modec	Jurong	357,600	Juno
Modec	Jurong	138,540	Anitra
Modec/BHP	Jurong	—	Modec Venture 1
Vietnam Pet	Hitachi	131,484	Proster
Bergesen	Aker McNulty	103,000	Berge Hugin
Bergesen	Jurong	103,000	Munin
Petrobas	Hyundai	270,358	Jose Bonifacio
Petrobas	Qinhuangdao	279,749	Henrique Diaz
Petrobas	Angra dos Reis	292,823	Vidal de Negrieros
Petrobas	AESA, Cadiz	283,000	Eastern Strength
Nortrans	Keppel	141,000	Knock Buie

The latest contracts include that of the *Eastern Strength* at Spain's Astilleros de Cadiz for Brazilian oil major Petrobas, and Singapore's Keppel Shipyard's contract to convert the 141,000 dwt conventional tanker *Knock Buie* to a FPSO for Norwegian owner Red Band. The vessel will be operated by Nortrans, and it will be located in the Ranger Field off the coast of Angola. Red Band is also currently considering the conversion of its vessel, *Knock Davie*, for a similar project.

Norwegian shipowner Bergesen is to convert two recently delivered 103,000-dwt multi-purpose tankers into FPSO units, while also converting the 103,000-dwt tanker newbuilding into a drill ship.

The work is being spread between yards in the U.K., Norway and Singapore. All three tankers have been built by Korea's Samsung Heavy Industries (SHI). The lead vessel, *Berge Hugin*, was delivered earlier this year and is expected to be converted at the Aker McNulty yard on Tyneside in the U.K. *Munin*, delivered from Korea last summer, has now arrived at Singapore's Jurong Shipyard Ltd. for conversion into a FPSO, while the third vessel, *Odin*, when delivered from SHI, will sail for Norway's Offshore and Marine Facility, outside Stavanger, upon conversion into a drillship.

It looks as if Singapore's Jurong Shipyard Ltd. (JSL) is about to win two more FSU/FPSO conver-

**ShipRight<sup>IS</sup>**  
New integrated software system

## Building on strength

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- facilities for data exchange with ship design systems using the latest STEP technology
- improved structural monitoring and maintenance planning.

ShipRight procedures enhance ship safety – giving a better understanding of ship structural performance through experience and knowledge gained from a distillation of theoretical analysis, experimental testing and in-service monitoring.

ShipRight<sup>IS</sup> provides a comprehensive set of software tools, helping you to:

- plan and achieve your design objectives
- generate concept designs
- define and update structural details
- check design scantlings for compliance with LR's Rules and ShipRight procedures.

Our new ShipRight and ShipRight<sup>IS</sup> brochures give you more details. For your free copies and further information, contact your local LR office or Jaek Polderman in Miami on +1 305 577 0876.

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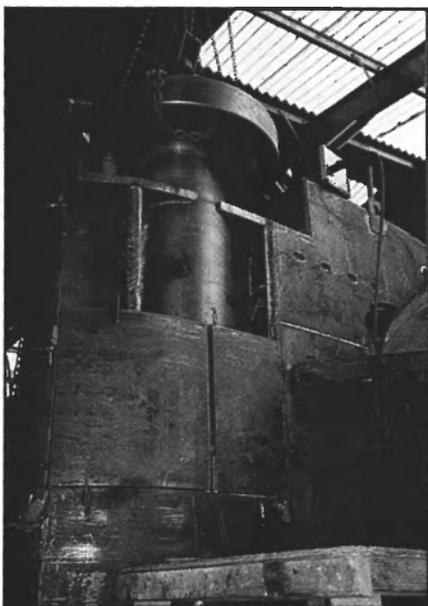
**Lloyd's Register**  
The BUSINESS of SAFETY

sion contracts, this time from Brazilian oil giant Petrobras. Of the two Petrobras-owned VLCCs involved, one will be used for storage duties and the other will be converted to a FPSO at Sembawang's Indonesian yards at Sembawang Karimun. In addition, Keppel is the favorite for the conversion of the VLCC *Bay Ridge* for Monte Carlo's SBM Engineering.

For additional information on the companies mentioned in this article, circle the appropriate number on the Reader Service Card in this edition:

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Gdansk Ship Repair Yard .....	89
Harland and Wolff .....	90
Jurong Shipyard .....	91

## Steel-Kit Offers Fast Rudder Replacement



Steel-Kit recently used its expertise to replace the rudder of a South American ship in 15 days.

Steel-Kit recently exhibited its fast rudder replacement prowess when a South American ship lost its rudder in a storm. After the owner had been quoted a wait of up to 90 days by other shipyards, an inquiry was made to Welsh-based Steel-Kit. It turned out to be a valuable call, as it took Steel-Kit — from inquiry to installation — just 15 days. The 12-ton rudder and stock were originally built using a main support element of cast steel. Steel-Kit used its experience in steel fabrication to build up the new rudder around a new turned stock using a specially designed steel fabrication.

The job came to Steel-Kit through Caldwell Marine, a shiprepair consultant near March, 1998

London. Using mostly resident naval architects, the new design was fully approved by DNV, and a steel billet was dsourced for the new stock. This was machined by Vosper Thornycroft while the computer developed fabrication steel was being cut by Steel-Kit parent company Loks Plasma. Welding was carried out at the Aberleri Shipyard, and upon completion, the rudder was mounted on a pal-

let for airfreight delivery to the ship in South America.

Circle 61 on Reader Service Card

## Refit & Repair '98 Set For Spain

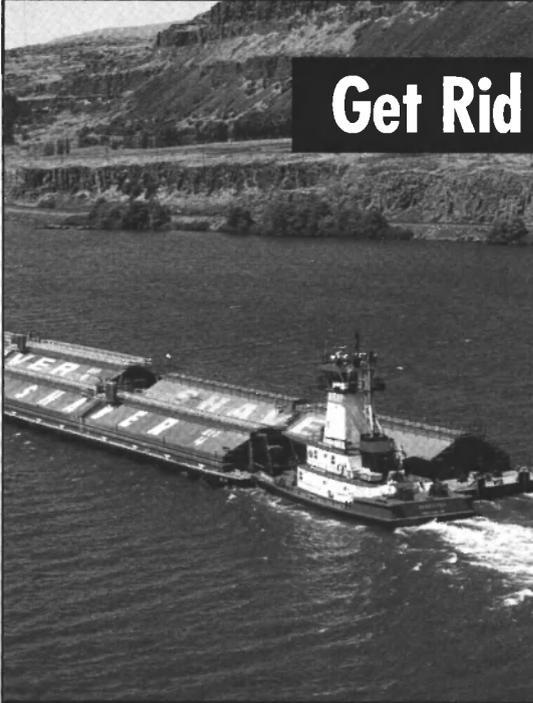
Refit & Repair '98, the luxury yacht and small ship refit and repair convention, is scheduled for October 1-4, 1998 in Balears,

Spain. The event is designed to address the specific and unique needs and requirements of planning a refit or repair to a luxury yacht or small ship.

For additional information on the event, contact **Gillan Beach**: 62 Packhorse Road, Gerrards Cross, Buckinghamshire, SL9 8EF, England, tel: +44 1753 890891; fax: +44 1753 893737; e-mail: gillanbeach@compuserve.com.

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*Shaver Transportation "Deschutes" pushing grain barges on the Columbia River using 1-1/4" diameter Mooring Master™ D-7. Photo by Hugh Ackroyd.*

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Circle 274 on Reader Service Card

## Astander: Boom Continues In '98

by David Tinsley

Astilleros de Santander (Astander) had to turn down work offers last year because of heavy patronage of its facilities. By landing a total of 60 repair contracts and one conversion project during 1997, the Spanish yard maintained the record-breaking

momentum of recent years, as manifested in both order intake and occupancy rates.

Occupancy of its 755 x 105.6 ft. (230 x 32.2-m) and 525 x 78 ft. (160 x 23.8-m) graving docks was logged at 100 percent for four months of the year, and is reported to have never dropped below 90 percent for

the rest of the time. Out of consideration of contractual commitments to the two drydocks and alongside berths, and cautious to avoid jeopardizing performance and service on the work already booked, Astander said it had to decline 13 firm job proposals over the course of 1997. The Santander yard's strong ties with the Norwegian shipowning community were reinforced, to the extent that

50 percent of its business last year emanated from that quarter. In addition, it consolidated its position in especially demanding areas such as the German and Dutch markets, and achieved breakthroughs in Denmark, the U.K. and elsewhere. Part of the Astilleros Espanoles (AESAs) group, Astander has developed a particular standing in the tanker category, spanning the gamut of oil, refined products, chemical and LPG carrier types. That area of specialization was accentuated last year through a contract flow which accounted for 70 percent of the yard's work overall. A highlight of the northern Spanish firm's activities was the transformation of the 2,737-gt, former Russian supply ship *Neftegaz 7* into a research vessel, renamed *Geoffjord*, for Norwegian owners. Elements of the work included 33.5 ft. (10.2 m) lengthening, installation of a dynamic positioning system including four new thrusters, construction of a new deckhouse, and provision of scientific research wherewithal. With the commissioning of a 200-ton crane at Drydock No. 2 and completion of the enlargement and modernization of alongside berth facilities in February 1998, the investment program started last year has largely run its course.

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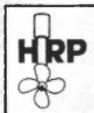
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## Keeping A Handle On The Repair Environment



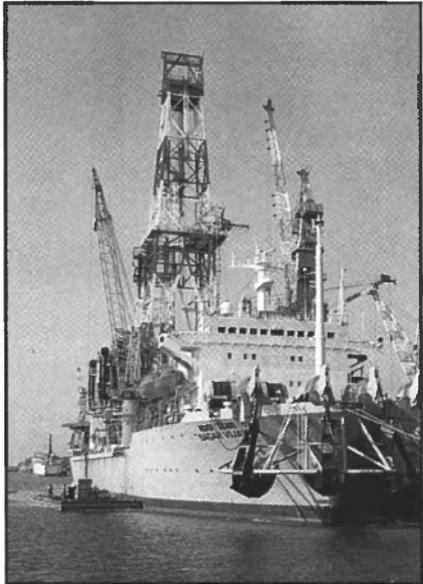
Dry Air Technology's desiccant dehumidifiers help control the ship repair and conversion environment, and prove especially useful in coating operations.

Dry Air Technology is a manufacturer of desiccant dehumidifiers for effective humidity and environmental control. Moisture-laden air enters through the process inlet and moves through the desiccant media. The desiccant media then absorbs the water vapor, and the dehumidified air is delivered through the process outlet directly into the controlled space or air stream.

Dry Air Technology's newest line of commercial dehumidifiers is the DDH Series, which has a range from 1,100 to 54,000 cu. m. per hour. The units are suited for the repairs and refits, as they help to control corrosion and condensation in sandblasting, surface preparation and coating operations.

Circle 66 on Reader Service Card

## Cochin Shipyard Completes MODU Repair



The repair and upgrade of *Sagar Vijay* MODU was the largest job ever completed by India's Cochin shipyard.

India's Cochin Shipyard recently completed major repairs and upgrading of Oil and Natural Gas Corp. of India's Mobile Offshore Drilling Unit (MODU) *Sagar Vijay*. The project was the largest ever single repair project undertaken by the yard.

The total work package consisted of cyclone damage repairs and an upgrading and enhancement of the capability of the vessel for deepwater drilling, in addition to major routine repairs.

*Sagar Vijay* was built in 1984 by Hitachi Zosen. The unit suffered serious damage during a cyclone in 1996 while carrying out exploratory drilling operations in Bombay High.

When the MODU arrived at Cochin, almost all major machinery had to be opened and inspected

for damage, and 17 foreign Original Equipment Manufacturers representatives inspected the vessel to assess the damage. The inspections found that major systems in need of repair included drilling equipment, riser handling, riser holding and support arrangement, compressed air, anchor handling and various subsea equipment systems.

It was while *Sagar Vijay* was laid-up that the owner made the decision to enhance the vessel for deepwater drilling.

The upgrading work involved extending the anchor cable length and increasing the length of the riser pipes and control cables; the provision of additional riser tensioners; the modification of the riser layout; the installation of

additional mud pump, compressors and ventilation system; and the renewal of the subsea equipment control system. The entire upgrade cost approximately \$13.2 million.

When completed, steel work totaled more than 250 tons, and the vessel had been drydocked for 41 days.

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#### APPLICATIONS:

- Spring Lines
- Breast Lines

#### BENEFITS:

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- Flexible, lightweight
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- Replaces wire size-for-size with greater strength



#### PRODUCT DESCRIPTION

**AmSteel® Blue:** The latest development of UHMWPE (ultra high molecular weight polyethylene) fiber in a twelve-strand braided rope utilizing tension-set Parallay™ design with our proprietary blue Samthane™ urethane coating. AmSteel®-Blue yields the maximum in strength-to-weight ratio and is stronger than wire rope constructions – yet it floats.

**Mooring Master™ D-7:** Designed to meet the rigors of the marine industry with maximum strength, service life durability, deck handling flexibility and firmness for winch drums. The seven braided core strength members are produced from UHMWPE (ultra high molecular weight polyethylene) fibers. The strength members are covered by a braided nylon chafe-protection cover. The cover allows the strength cores to do their work without exposure to external wear surfaces.



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## Drew Marine Provides For Repairs On The Go

The Amerarc L-300 inverter arc welding machine from Ashland Chemical Company's Drew Marine Division is designed to efficiently handle typical shipboard repair and maintenance tasks. The unit offers advanced features for TIG welding, and both the LS-300 and LT-300 models are suitable for stick welding, and for TIG welding in the lift-start mode. Inverter technology provides safeguards against improper operation or abuse through short circuit, and overload protection and other electronic controls help maximize the reliability of the machines.

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Circle 305 on Reader Service Card

*Following is a review of recent coatings, application and maintenance technologies from some of the industry's biggest players.*

**Sigmaguard Coatings  
Protect Water Ballast Tanks**

Sigma Coatings has developed a compound to extend the coating-life expectancy in water ballast tanks of U.S. Navy vessels.

The new Sigmaguard BT coating

is solvent-free in nature and it reportedly provides exceptionally high dry film thickness and optimal edge deposition on sharp edges, welds and corners where coatings tend to fail. These coatings also offer corrosion resistance, are light in color for easy inspection, and are suitable for block stage application.

Circle 5 on Reader Service Card

**Sherwin Williams Introduces  
COROTHANE Line of  
Coatings**

A new brochure is available from Sherwin Williams Industrial and Marine Coatings that provides information regarding its line of moisture-cure urethane coatings, specifically formulated for low temperature applications over marginally prepared surfaces. The COROTHANE I line can reportedly be applied in temperatures as low as 20 degrees F and in humidities up to 99 percent, with no dew point restrictions. The coatings contain Micaceous Iron Oxide, a metallic pigment that creates a barrier effect, reinforcing and strengthening the paint film.

Circle 2 on Reader Service Card

**Sattex Introduces  
New Buffing Compounds**

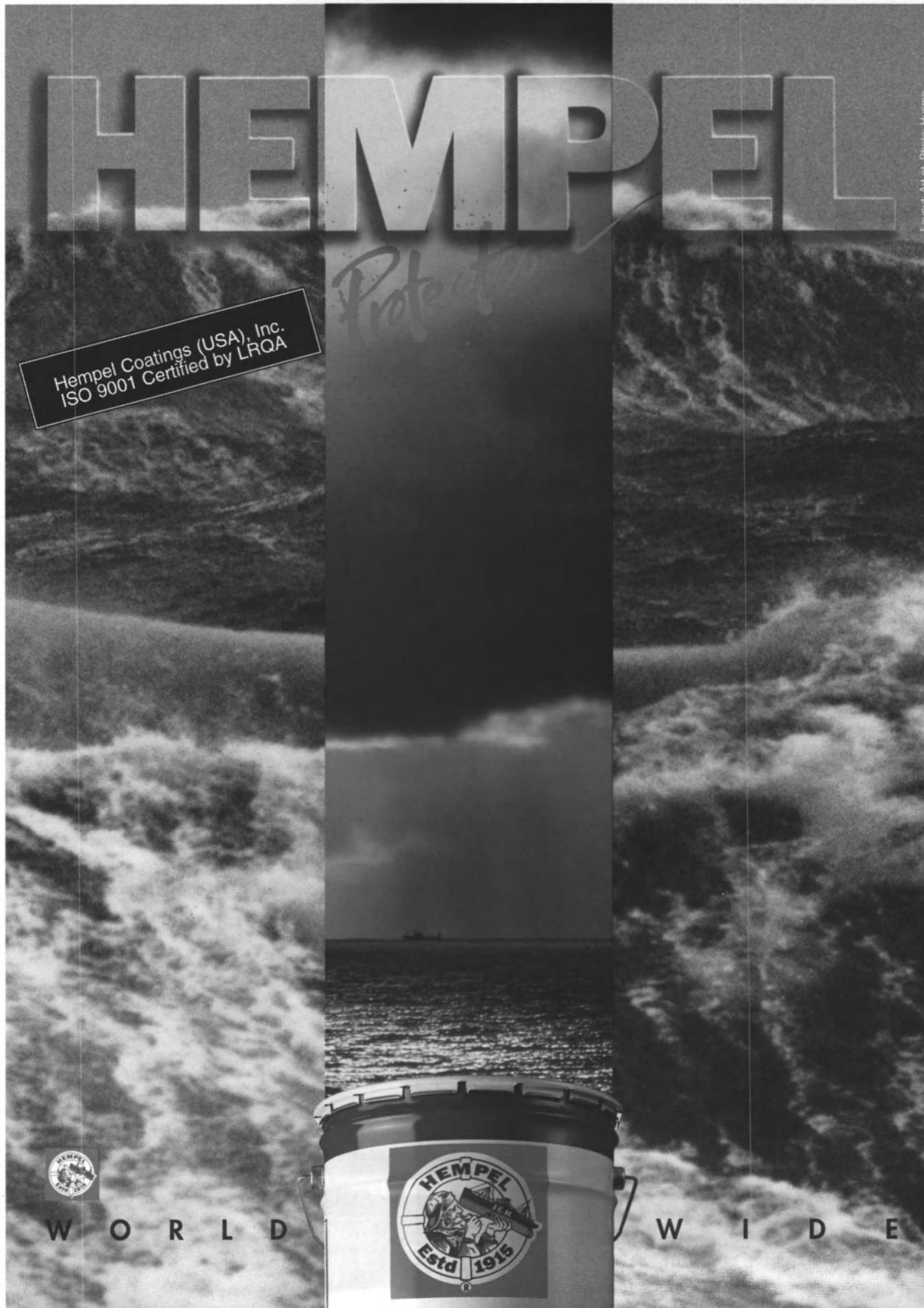
The Sattex Marine line of polishing compounds is available in brick shapes and stacks in six different abrasive grades. These buffing compound bricks and sticks vary in order to remove differing degrees of surface oxidation, minor scratches, orange peel and sanding marks while reportedly enhancing the luster of the hull's gelcoat. All Sattex compounds are non-toxic and saponifiable.

Circle 3 on Reader Service Card

**U.S. Paint Bolsters Product  
Line**

Awlgrip 2 is the latest coating from U.S. Paint Corporation with added benefits over its predecessor, Awlgrip 1. The widely acclaimed Awlgrip product line now offers standards that meet with California's tough EPA requirements, plus Awlgrip 2 reportedly offers a more environmentally safe, deep, rich, high luster shine.

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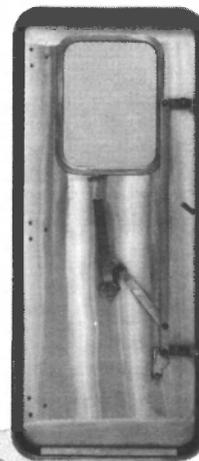
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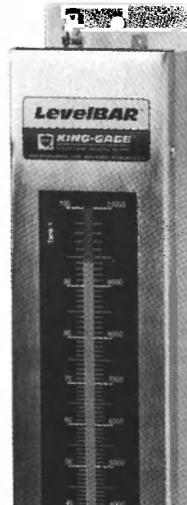
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Circle 263 on Reader Service Card

## MARINE PAINTS & COATINGS

### Drew Marine and Tectyl Team Up To Fight Corrosion

Drew Marine and Tectyl Industrial Products have joined forces to combat the corrosion of ballast tanks aboard larger vessels. Together they have designed Drewgard WB, a water-based coat-

ing that is light in color, easily applied and results in an air dry wax/polymer sulfonate emulsion finish that deters corrosion. The dried coating bonds directly with the metal surface forming a hard film-like barrier, yet it remains flexible and reportedly will not crack.

Circle 16 on Reader Service Card

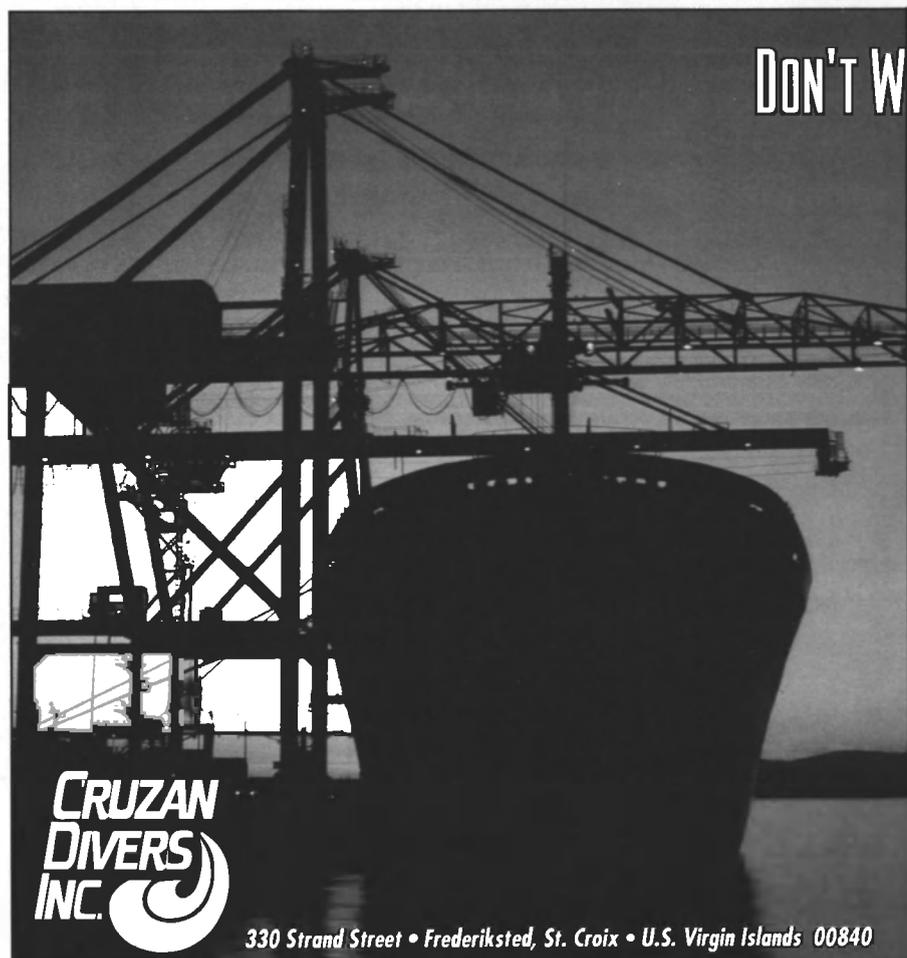
### Monopol Group Releases Antifouling Paint

The Monopol Group recently introduced Biomarine, an environmentally friendly, anti-fouling paint to protect the hulls of ships against parasitic organisms. Its formula is based on specific acrylic

resins which are transformed into a self-polishing polymer.

Biomarine reportedly repels organisms without killing them. It can be applied to various types of materials including steel, cast iron, aluminum, polyester, wood and zinc.

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### ABS Warns of Microbial Generated Corrosion and Pitting

A hyperactive bacteria found in most crude oils, sludges and seaweed is reportedly the most likely cause of microbial attachment to a ship's hull, and subsequent damage due to their corrosive natures. Untreated, these small pits grow into holes that can lead to oil leaking directly into waterways. If the vessel is double-hulled, the oil will then leak into the void between hulls and create a potentially explosive situation.

A 150,000-dwt tanker experienced 2 mm and 3 mm corrosion pits in certain areas in only two years on its cargo-tank bottom plating. Microbial-Influenced-Corrosion (MIC) can result from either settled water on the bottom of oil tanks or it can also exist in water droplets condensing from the crude oil itself in concentrations of up to 10 million cells per cubic mm in the settled water.

The bacteria will attach itself to rough surface areas such as weld or scratches. The strategy for new tankers can include better washing of the crude oil tanks and better bottom-draining designs.

Consideration should be given to coating the entire internal surface of the cargo oil tank, or possibly coating the cargo oil tank bottom plating and all of the associated structural members up to a range of 100-500 mm high with a lighter color, bacteria resistant epoxy coating.

In addition, the bottom plating thickness can be increased to accommodate higher corrosion rates.

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## MARINE PAINTS & COATINGS

### APS Offers Three New Marine Coatings

Advanced Polymer Sciences (APS) has developed three different lines of marine coatings for specific applications.

The Marineline coating was engineered for cargo tanks of chemical

and products tankers, and is based on the Siloxirane polymer anti-corrosion system.

The Steamline coating has been specifically developed to overcome pipe coating damage and problems caused by high thermal shock in extreme maritime conditions. It is a low temperature cure, multi-functional, crosslinked

organic/inorganic thermoset polymer coating that is adhered in two linings.

Ballastline is a premium grade coating for application to ballast tanks and void spaces. It can be brushed, rolled or sprayed on to the ballast in temperatures above 40 degrees F with a surface temperature to be below 178 degrees F. This product reportedly prevents further rusting of oxidized surfaces and also resists the development of corrosion.

Circle 10 on Reader Service Card

### PRS Releases HAP Free Coating

Products Research Services (PRS) has recently introduced a line of hazardous air pollutant (HAP)-free coatings in order to comply with Clean Air Act regulations governing emissions so that the user will not change their environmental reporting status. Use of these products can reportedly reduce the shipyard's chances becoming a major stationary source of toxic pollutant introduction.

Circle 9 on Reader Service Card

### NLB Expands Line of 36,000 PSI Water Jet Systems

Ultra-Clean 367 water jet system from National Liquid Blaster Corporation (NLB) provides water pressures up to 36,000 psi, taking on a variety of difficult cleaning, surface preparation and cutting jobs. The new system features a 250 hp diesel engine with a flowrate of up to 10 gallons per minute. The model can be mounted on a steel skid or a trailer for easy transport.

Circle 13 on Reader Service Card

### TFT Products Provide Solvent-Free Coatings

BIO-DUR 561 Kevlar coatings from TFT are comprised of micro-fiber reinforced solvent-free epoxy for ballast tank application and reportedly require no primers. This one-coat product is surface tolerant, moisture indifferent, odorless and temperature independent.

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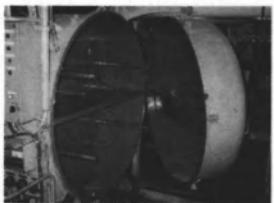
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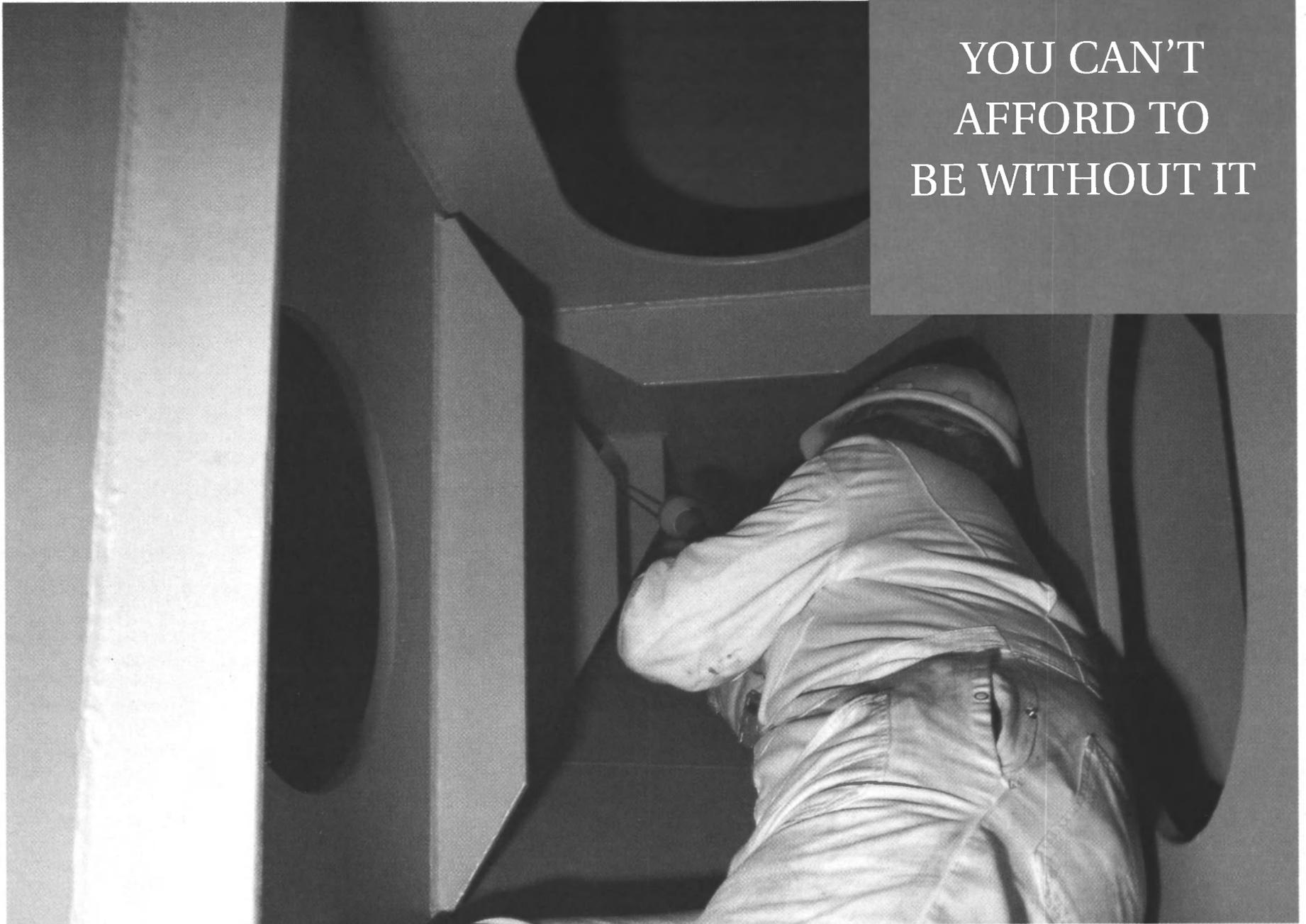
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#### Properties of Sigmaguard BT



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### C-Shield's ICCP Hull Protection Systems Fitted in 1000 Ships

CathelCo Ltd. has reportedly applied its C-Shield of protection to more than 1,000 hulls around the

world. This compact control panel (ICCP) system provides the advantage of a smaller control panel design and weight. CathelCo has also developed a range of surface-mounted linear loop, elliptical and circular recessed anodes which can reportedly be used in various combinations to provide optimum hull

protection for ships of any size.

### Circle 6 on Reader Service Card NACE Releases 1998 Product Guide

NACE International has released its 1998 product guide. The catalog features more than

1,000 books, technical standards, software and related degradation control products. The 1998 guide includes 23 new reference books, seven new technical standards and 14 new software programs.

Circle 15 on Reader Service Card

### En-vac Abrasive Blasting Robot Comes To Coating Market

The blasting robot from En-vac is a small, flat machine that can work on concrete, steel and non-ferrous materials performing blasting work while preventing fugitive dust emissions from entering the environment.

The robot can reportedly work up to 100 ft. vertically and 300 ft. horizontally from the support machinery and En-vac fits through tank manways and requires no tenting of the work area.

Circle 7 on Reader Service Card

### CheckLine Measures Coating Thickness on Metal Surfaces

The new CheckLine 977 series of gauges measures the thickness of paint, plating and other coatings on all metal surfaces with a measuring range of .01-77.0 mils. The 977 model includes a single purpose feature that allows for use on both ferrous and non-ferrous surfaces and dual purpose models for use on all metal surfaces. The hand-held gauge is capable of storing up to 26,000 data entry points.

Circle 14 on Reader Service Card

### Indmar Meets All HAP Regulations

With its latest line of marine coatings and paints, Indmar has become a member of the Transocean Marine Paint Association.

Indmar's product line consists of a complete package of sea-stock paints and coatings for shipyard usage which meet all new Hazardous Air Pollutant-free requirements. New products released by Indmar include 100 percent solids coal tar epoxy, 100 percent solids surface tolerant epoxy coatings, high solids acrylic and chlorinated rubber finishes and high solids chemical resistant tank linings.

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Circle 308 on Reader Service Card

Njal Eide  
DESIGNER

by David Tinsley, technical editor

Norwegian architect Njal Eide has always taken the view that a futuristic vision on the part of a designer is an essential complement to professional expertise and the ability to apply tried and tested principles.

The Eide name is synonymous with some of the most spectacular and grandiose areas incorporated in luxury passenger ships, and with a progressive approach, as mirrored in his early development of the cruise ship atrium concept, for instance.

The commission to develop the exterior architecture of Disney Magic presented a new challenge to the creative designer, given the company's requirement for a concept which would meld classical features with something new and different.

Having undertaken its own thorough studies, Disney sought a "modern classic" that would combine vision with nostalgia and the unique or unusual, in a common design theme.

The client ruled out both the futuristic concept Mr. Eide had first put forward, as well as designs proposed by the two other competing architects.

In drawing up their vision of a ship that would defer to an ancestral lineage while being unmistakably contemporary, Disney executives had been meticulous in their groundwork.

The veteran Norwegian designer admitted that he had to overcome initial reservations about taking on the project, out of concern that it might label him as a nostalgic, rather than as a modernist and progressive thinker.

He came to regard the remit, which meant finding a balance between old and new, as an appealing and highly demanding professional challenge.

"My intention was not merely to plagiarize but to contemporize the classic concept, to create a progressive and daring vessel, which at the same time evoked the feeling of a bygone era," said Mr. Eide.

He saw parallels in the development of classic cars such as Rolls Royce and Jaguar, which have retained their traditional trademarks while evolving in design in line with the demands of today's market.

Njal Eide also drew inspiration for the Disney Magic concept from his memories of the grand ocean liners that docked in Stavanger while he was growing up on the west coast of Norway back in the 1930s. He said the famous passenger ship *Stavangerford* gave him the idea for the impressive rounded stern of *Disney Magic*, one of the most distinctive features of the new ship which Mr. Eide believes won him the design award from Disney.

The ensuing development of the vessel was based on his well-honed philosophy that "cruise ship design requires the combination of tried and trusted tradition, existing expertise and futuristic vision on the part of the designer."

Subtle design means were employed to help reproduce the classical look, such as the apparent dramatic sheer of the 964-ft. (293.8-m) hull, created by the styling of the paint work and overall shape of the vessel. Distinguished by two funnels and a streamlined sculptural form, *Disney Magic* embodies tradition punctuated with a characteristic Disney atti-

tude. Thus, while the exterior color scheme is reminiscent of the classic ocean liners, it is also the instantly recognizable red, yellow, white and black of the company icon Mickey Mouse.

Similarly evocative of the ships of yesteryear is the tiered "wedding cake" design of the upper decks, as well as the two-funnel arrangement.

Despite the creative tensions of working with Disney, the company's corporate image gurus clearly

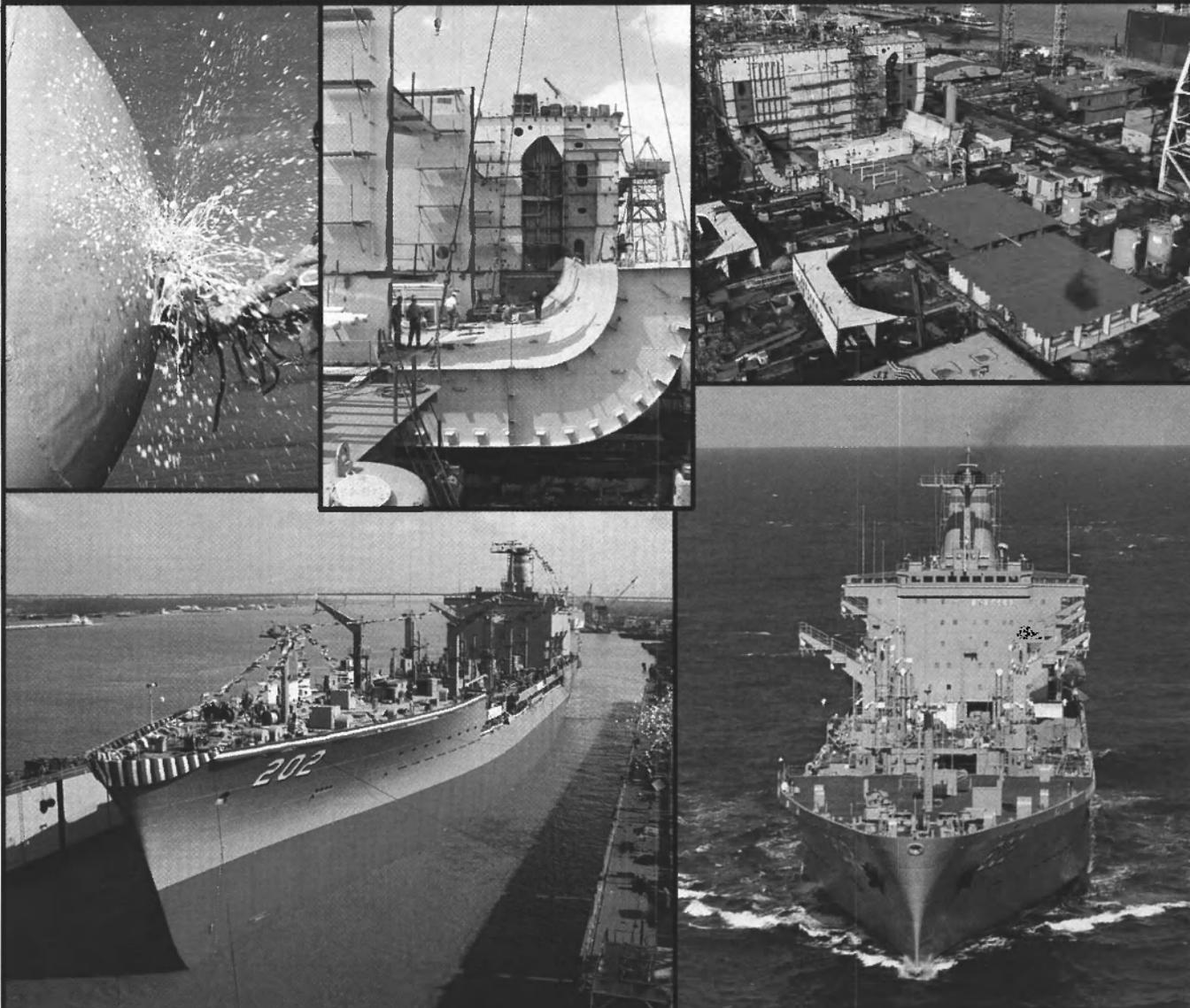
liked what they saw when Mr. Eide gave them his definitive concept. So much so, he said, that the finished vessel has incorporated most of the features of his original design.

"Disney felt that Njal was the architect who gave the best interpretation of our original design brief, and it was his concept that was brought to fruition," said Jon Rusten, Disney Cruise Line director of development and newbuildings.

Mr. Eide believes that working on the Disney Magic project has been a valuable object lesson that has influenced his design thinking.

"There is perhaps a danger of distancing oneself too much from the past, and losing sight of the traditional character of the cruise ship. I believe a Renaissance-style approach is needed, whereby one looks back to the past to gain fresh inspiration for the future," he observed.

## AVONDALE - LAUNCHES INTO THE DESIGN AND CONSTRUCTION OF DOUBLE - HULL TANKERS TO MEET OPA 90 REQUIREMENTS



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# Marine Literature Review



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## 22nd CIMAC

The International Congress on Combustion Engines has just published the itinerary for this year's congress. It will be meeting from May 18-21 in Copenhagen, Denmark. The brochure also contains important registration forms for hotels, social events and post congress tours of certain Danish plants and shipyards.

**CIRCLE NO. 101**



## 24-Hour Worldwide Service Center

For more than 14 years Motor-Services Hugo Stamp, Inc. has been serving ship owners, underwriters, ship and engine builders, offshore operators, power plants, and process and the mechanical industries with special parts for sale and many services for specialized engine parts needed to be fixed, upgraded or replaced.

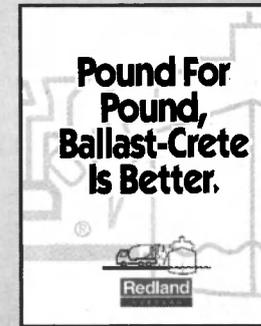
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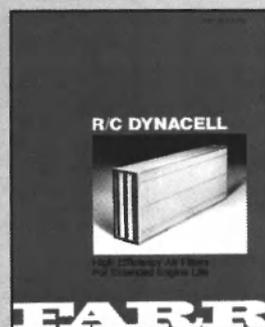
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## Ballast-Crete Advantage

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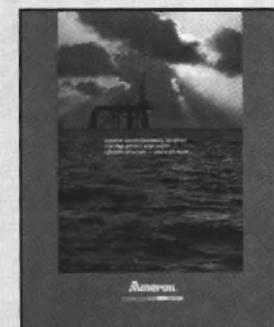
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## RF-180 Air Intake Filter

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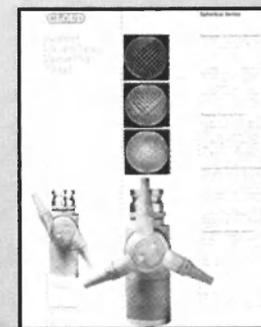
**CIRCLE NO. 105**



## Offshore Coatings From Ameron

The Ameron Protective Coatings Division offers many products for offshore industries where waterborne coatings are needed. The Amerguard line contains no toxins or solvents, thus are compliant with VOC regulations while eliminating waste disposal problems. Ameron can also coat your deck floors with a non-skid elastomeric polyurethane.

**CIRCLE NO. 106**



## Nozzles By Cloud

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**CIRCLE NO. 107**



## Bilge Alarm By FOCAS

The FOCAS 1500 Bilge Alarm accurately measures oil content in bilge water through the use of ultrasound enhanced turbidity measurements. The turbidity created by dirt, air and color wouldn't normally register as "oil content". Ultrasound constantly cleans the sample cell. For these reasons, the unit has worked successfully at 5 ppm alarm limits for bilge water discharges.

**CIRCLE NO. 108**



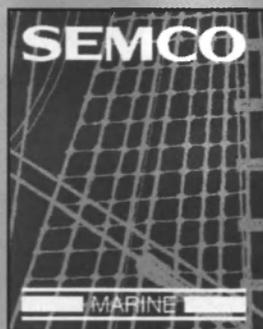
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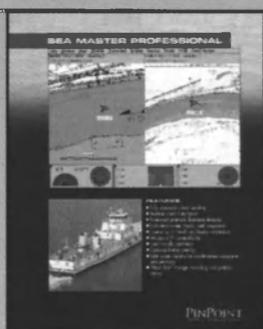
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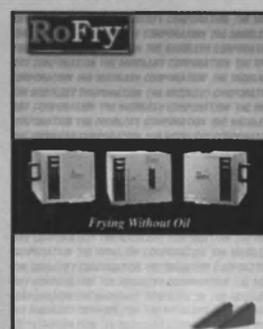
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**CIRCLE NO. 116**



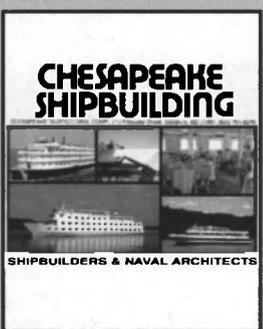
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**CIRCLE NO. 118**



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Chesapeake Shipbuilding's construction yard is situated on 13 acres of land with more than 2000 ft. of deepwater bulkhead on the Wicomico River in Salisbury, MD. Chesapeake offers vessel delivery of its standard designs usually within eight months after going to contract and does offer special options for their clients with custom preferences.

**CIRCLE NO. 119**



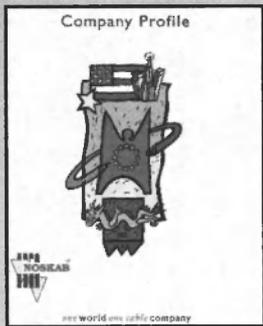
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**CIRCLE NO. 121**



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Noskab offers an array of cables ranging from power and control, instrumentation, flexible and portable, shipboard, armored power and control drilling rig cables, signal cables, Hawke cable glands and multicable transit systems plus many other cables for all of your maritime and electrical needs.

**CIRCLE NO. 122**



### CHAND Corporation

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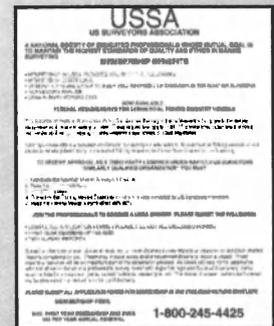
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### Temporary Fluid Storage

Canflex USA is a manufacturer of welded products made from coated strength polyester, nylon and kevlar fabrics. All of their products are easily collapsible for storage and transportation. Canflex manufactures floating fluid storage/transportation bladders, underwater lifting balloons, pillow tanks, spill containment beach booms and container bags for fluid storage.

**CIRCLE NO. 124**



### Marine Surveying

The Navtech Marine Surveyors Guide is an informative guide for yacht brokers, Captains, dock managers, marine operator and employees interested in doing pleasure-craft, cruising and commercial surveys. It has been one of the best tools for becoming a maritime surveyor because it also aids you through the process of getting your own surveying business started.

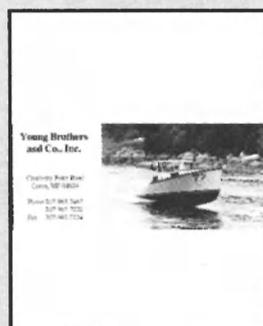
**CIRCLE NO. 125**



### Desktop Ship Designs

FastShip is the hullform design module of the FlagShip desktop ship design software suite, giving the naval architect the tools needed to address all aspects of ship design, including hullform design, stability and hydrostatics, resistance and powering analysis, structural design and optimization, maneuvering performance prediction and seakeeping predictions.

**CIRCLE NO. 126**



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**CIRCLE NO. 127**



### Shipboard Furniture

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**CIRCLE NO. 128**



### Small Dust Extractors

Dustcontrol designs and manufactures rolling, compact dust extractors and vacuums to help in your battle with dust particles from projects such as welding, cleaning, grinding and sanding. There are three models available, ranging with what form of dust it is you are trying to control. Each model also comes with attachments.

**CIRCLE NO. 129**



### Solon Belleville Springs

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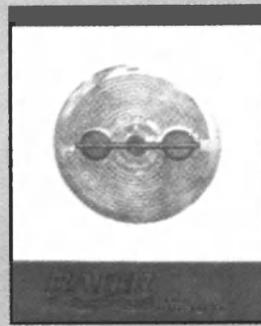
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### Yokogawa's Navigation Equipment

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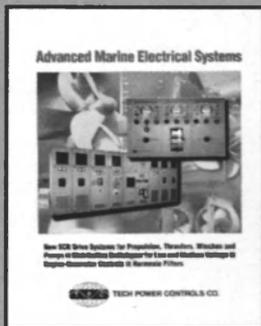
**CIRCLE NO. 132**



### Bollinger Shipyards, Inc.

Since 1946 the family owned Bollinger Shipyard has served the marine industry by building, repairing and servicing a wide variety of floating platforms and equipment. The shipyards are located in Louisiana and are capable of just about everything you need done. In addition, they offer an extensive network of design, engineering and customer assistance to all of its clients.

**CIRCLE NO. 133**



### Tech Power Controls

Tech Power Controls features ISO-Drive Systems. These are isolated SCR mounting, cooling, and are rugged for skid mounting. They come with state of the art circuitry, a single disconnect module and are compact in size for easy use, storage, maintenance and transport. Tech Power Controls also makes power generator controls and four-field excitation supplies.

**CIRCLE NO. 134**



### Thermax-Marine Fire Protection

Thermax is a non-combustible, non-toxic hard-core interior construction board manufactured in compliance with SOLAS 74, IMO regulation A 472 (XII) ISO 1182 and is ISO 9001 registered and certified. Its line of paneling is used as joiner panel systems and fixtures/case goods, all supplied with HPL or other decorative facings, and while still meeting all international body requirements..

**CIRCLE NO. 135**



### Mackay Communications, Inc.

Mackay Communications, Inc. designs, installs and repairs satellite communications systems for offshore, marine and land-mobile applications. Mackay specializes in 64 Kbps data transmission, real-time video and voice communications. Worldwide installation, licensing and repair services are offered through Mackay Marine, a wholly-owned subsidiary of Mackay Communications.

**CIRCLE NO. 137**



### Viking Softloop Fenders

Viking Fenders are the softest most forgiving ship assist fender on the market. They are designed for greater energy absorption and gripping ability and are ideal for tug bow, stern and side fenders. They are also a good fit for barges too.

**CIRCLE NO. 136**



### Personal Computer Command Center

The problem of power surges and noise interference can be virtually eliminated with the NAVY Controller V multi-stage power surge protection system. Use of this product results in clearer, more usable valid data, plus more reliable working equipment. Some of the options available are load drop-out relay, modem and rack mount.

**CIRCLE NO. 138**



### Financial Services

Debis Financial Services, Inc. has been the future of creative financing today. The offer construction-phase financing of up to 80% with interest only payments based on the variable interest rate and permanent financing options of up to ten years amortization with a fixed or variable interest rate.

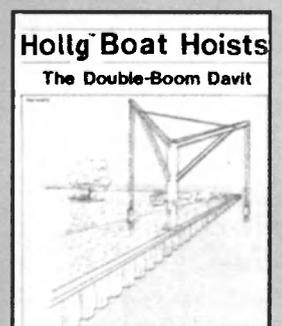
**CIRCLE NO. 140**



### J.R. Overseas' Portable Equipment

J.R. Overseas distributes tools for measuring moisture in various substrates and for gauging thicknesses of non-ferrous laminates up to 1.25 in. J.R. Overseas' moisture meters were designed for fiberglass and wood while their diagnostic instrumentation was designed mainly for marine repair and assessment.

**CIRCLE NO. 141**



### Holly Hoist Designs

Holly Boat Hoists feature a unique Double-Boom Davit design for lifting and lowering boats over land or water. The built-in swivel mechanism allows for 360 deg. rotation. Systems are available to meet U.S.C.G., SOLAS, API., Mil-Spec or OSHA requirements. Standard models with made-to-order dimensions with numerous options available.

**CIRCLE NO. 142**



### SPM Service And Support

SPM Instrument Inc. provides technical service, support and training in more than 50 countries. Their goal is to provide solutions to maintenance problems in all areas of maritime applications. One of their most sophisticated concepts is the Shock Pulse Method for bearings that is easy to use and quick to provide solutions to damage and lubrication problems.

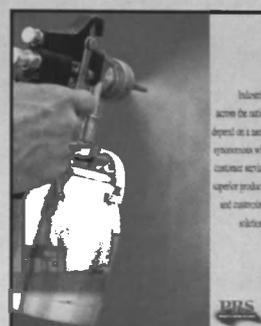
**CIRCLE NO. 143**



### Loeffler's Deck Drains Catalog

The Ship Deck Drains Catalog sponsored by Loeffler Corp. has been a leading source of ship deck drains since 1926. It supplies drains in sizes ranging from 1 1/2 in. to 3 in. for use with steel and aluminum decks and in either 1 1/2 or 2 in. for use with non-metallic decks. These drains are made to or modified from BUSHIPS standards.

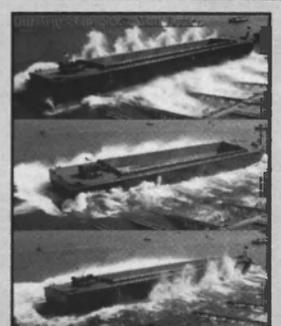
**CIRCLE NO. 144**



### PRS Paints and Coatings

PRS product line has been serving industries across the country for 50 years. PRS, which stands for Products, Research and Service, has developed HAP-free paint and coating systems for easy to use, highly effective and environmentally safe use in either interior or exterior spaces.

**CIRCLE NO. 145**



### Gundersen, Inc.

Located in Portland, Oregon, Gundersen is a price-competitive builder of barges of all types from 100 ft. to double-hull tank barges and other ocean going barges to 700 ft. Gundersen's 650 ft. side launch ways have 200-ton crane service. Its plant line is well equipped with new NC burning equipment.

**CIRCLE NO. 146**



### Big Blue

Big Blue, manufactured by Electronic Marine Systems Inc., is designed for use by shipboard personnel to view the complete loading operation in one glance. Built for the harshest environments of temperature, water, salt and vibration. Individual tank rates shown and time of fill or empty plus ABS and U.S.C.G. approved.

**CIRCLE NO. 147**



### A.C. Marine & Industrial Supply

A.C. Marine and Industrial supply says "Don't buy until you've checked our prices on anchor chains, stud links, rope, scuttles, deck and dock hardware, portholes, proof coil chain, fiber and synthetic ropes, related fittings, lashing chains and many more marine material. Allow us to quote your future material requirements!"

**CIRCLE NO. 148**



### Zero-Rust

Zero-Rust is a single component, high solids, multi-colored coating that acts as a sealant on steel. It prevents penetration of air and moisture to the steel's surface. Zero-Rust is a direct-to-metal coating. It is designed to be applied over rust or old paint with minimum surface preparation.

**CIRCLE NO. 149**



### Incolet Electric Toilet Systems

No pump out! No holding tanks! Incolet electric toilet incinerates waste to a small amount of dry, germ-free ash. Just throw it out with the trash once a week or so. Odorless, non-polluting, self-contained unit is easy to retro-fit. 120 or 240 volts. U.S.C.G. certified. Call 1-800-527-5551 for information.

**CIRCLE NO. 150**



### BMI, Inc.

Baltimore Marine Industries, Incorporated offers ship repair for commercial vessels of all types. Steel repairs and renewals are a specialty of the yard. All types of conversions, reflaggings, off-shore conversions, special purpose and product carriers can be done at the Baltimore yard, too. BMI also offers construction and steel industrial products

**CIRCLE NO. 151**



### TIVAR Dockguards

TIVAR Dockguard fender facings are formulated for seaport for seaport environments. TIVAR engineering plastic features a low-friction, wear-resistant surface that is chemical- and corrosion-resistant. It absorbs no water and leaches no chemicals. Available in a UV-resistant formulation and safety colors, TIVAR Dockguard has shown little wear after 10 years in place.

**CIRCLE NO. 152**



### Plastic Pilings, Inc.

The staff at PPI has the knowledge, experience and engineering skills to fulfill each client's construction needs. PPI's marine pilings, marine camels, marine lumber and fiberglass re-bars were designed for structural flexibility, environmental compatibility and user ease. All products are maintenance free, non-abrasive, fire-resistant and will not corrode or dry rot.

**CIRCLE NO. 153**



### Renold Hi Tec Couplings

Renold offers a range of couplings designed for heavy industrial applications providing protection against severe shock loads and vibration. Renold also manufactures medium and smaller range torque couplings for marine propulsion, power generation, diesel engines or even reciprocating machinery in a broad range of applications

**CIRCLE NO. 154**



### Company Wide Data Management

ARL designed marine software has put ship construction at your ease and fingertips. Along with Ship Constructor97, ARL offers ShipCam97, Cad-Link97 and NC-Pyros97 to bring design, construction and feasibility tests and budgets to a minimum. All programs are Windows compatible and offer many options to maximize your concepts.

**CIRCLE NO. 126**



### Norwegian Maritime Equipment AS

Norwegian Maritime Equipment sells, buys and negotiates secondhand, reconditioned and new equipment. This foldout brochure gives details of the wide range of products available and information about their sales offices in Norway and around the world.

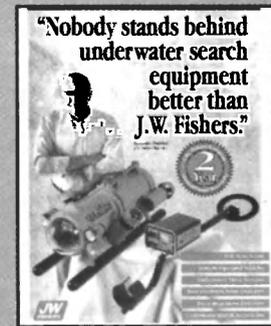
**CIRCLE NO. 156**



### Key Marine Industries

Key Marine distributes the services of BC Products including steel repairs and fabrication, Canadian certified welding, computerized test beds and a fully stocked machine shop. BC offers marine tape, petro tape and pip dressing-22, which is a surface drying type, anti-corrosive coating possessing outstanding resistance to high temperature.

**CIRCLE NO. 158**



### J.W. Fishers' Sea Otter and Metal Detector

J.W. Fisher offers a full line of underwater video systems, lights, altimeters and metal detectors that are operated either over the sides of a boat or by the hand of a diver. Each item is rated for depth, quick to deploy comes fully equipped with the necessary.

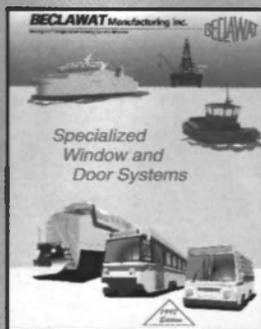
**CIRCLE NO. 159**



### Shipping '98

Stamford, Connecticut is hosting this year's Shipping '98 conference and exposition. It is a great place to launch your new products, make connections or just view the latest in all fields of marine technology. The conference will be held from March 23, 24 and 25th 1998. For more information call (203) 406-0110.

**CIRCLE NO. 160**



### Beclawat Specialized Windows and Doors

Beclawat makes specialized aluminum light duty, heavy duty and steel door and window systems. The catalog contains hundreds of models that are sure to be what you are looking for, plus they are accompanied by specifications and installation instructions.

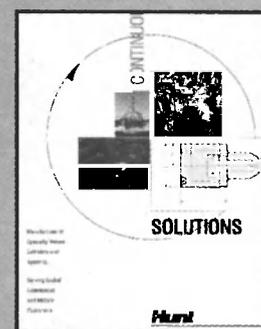
**CIRCLE NO. 161**



### Privateer Boats

The Privateer Boat Company has been family owned and operated for 13 years. Privateer boats are utilized by sea tow, wildlife agencies, research, police departments, charters, guide services, commercial and sports fisherman. Each boat is customized, hand laid and carries a five year hull warranty. Used Privateer boats have been sold for top dollar to construction standards.

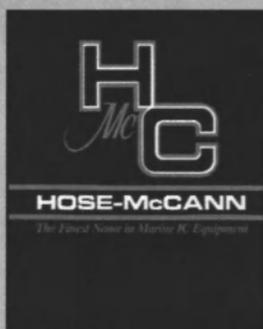
**CIRCLE NO. 162**



### Hunt Offers Continuous Solutions

Hunt Valve Company manufactures a huge assortment of cylinder valves, hexa-fluoride valves, cylinders and systems. It serves both commercial and military customers with a variety of brake mechanisms, nozzles, globe valves, blow down valves, outrigger cylinders and high pressure fresh and salt water valves.

**CIRCLE NO. 163**



### Your Maritime Communications Superstore

Hose-McCann Telephone Company, Inc. manufactures integrated public address and/or general alarm systems, intercom/talk-back systems, closed-circuit TV, video information and ship's recreational entertainment systems along with its core products, sound powered telephones and automatic dial systems and Military Spec equipment. Hose-McCann is proud to call themselves the ultimate purveyor of marine communication.

**CIRCLE NO. 164**



### Thordon Bearings, Inc.

Thor-Lube Pollution-free stern bearing systems are the proven choice for long life marine bearing systems. Thordon's grease-free rudder bearing systems are operating smoothly on thousands of vessels around the world and are backed by a ten year wear life guarantee.

**CIRCLE NO. 165**



### Water as a Tool for a Clean Environment

WOMA manufactures a full line of water blasting equipment ranging to 36,000 psi and 600 hp for the marine industry. The equipment is used as a cost effective and environmentally safe alternative to abrasive blasting for surface preparation of ship hulls and steel structures. WOMA offers hand-held and semi-automated systems.

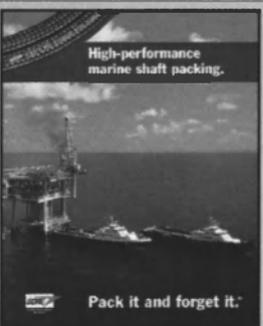
**CIRCLE NO. 166**



### Superweld Company Inc.

Superweld is a leader in the sale of new and remanufactured diesel engine parts. Our customers include those in marine rebuilding facilities and equipment dealers. They can repair and remanufacture any diesel engine part or rare casting at a tremendous savings of time and cost for the customer.

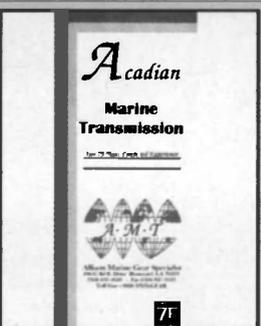
**CIRCLE NO. 167**



### Marine Shaft Packing

Gore's GFO fiber packing is a proven long-lasting, high-tech stern tube packing that's virtually maintenance-free and hardly ever drips. It's grease-free easy to install and runs cool without getting hard or abrasive so it won't damage shafts. ABS and OMSA approved and used by the U.S. Navy.

**CIRCLE NO. 168**



### Allison Marine Transmissions

At a time when Allison transmission parts are getting hard to find, Acadian Marine Transmission is taking steps to increase availability of these parts to aid the marine industry in quality parts and service. Acadian Transmission offers a complete line of parts and exchange assy. Along with new and rebuilt Hydreco pumps, we offer expert advice and troubleshooting to get your equipment back in running order.

**CIRCLE NO. 169**



### Insulation Monitoring

Insulation monitoring relay is an ideal relay for monitoring an unground system, on a split bus system or on two sides of a PT. SELCO USA, Inc. also offers a full range of generator monitoring, protection and control. This includes instrumentation, synchronizing and load sharing equipment and alarm annunciators.

**CIRCLE NO. 170**



### Eliminate False Alarms

The protect Equipment Protection System (EPS) by Trip-A-Larm has accumulated over 230 million hours without failure. A patented solid-state technology discerns between a false-alarm and true shutdown or other protection action. Its used on boilers, turbines, diesels, compressors, auxiliary machinery...virtually any type of equipment requiring protection.

**CIRCLE NO. 171**



### EFOUL Paints and Coatings

Antifouling for aluminum formulated especially for aluminum surfaces, NO Foul paints control biofouling without causing corrosion. No Foul paints are US EPA registered, easily applied and form smooth, hard high-performance antifouling coatings.

**CIRCLE NO. 172**



### Ductwork by MBRS

MBRS provides fabrication and installation of ductwork for the marine industry. They also manufacture a full line of metal products for the marine industry including louvers, dampers and water-tight covers. MBRS also provides a variety of hard to find custom fabricated metal products for all industries.

**CIRCLE NO. 173**



### TECO Coatings

TECO offers many ways of enhancing your vessel's performance and reduce dry-docking time. TECO can re-coat your vessel while at sea...thus reducing cleaning costs, down time, lost freight carrying opportunities and possible cargo contamination. TECO can also water, vacuum or sand-blast or hydro-jet a vessel's deck to prepare for the new coatings. All of these options can be realized without dry-docking.

**CIRCLE NO. 174**



### PlasTeak

PlasTeak offers recycled plastic dimensional lumber, 4X8 plastic sheets, customized swim platforms, boating accessories, teak and plywood replacement. PlasTeak's products will not rot, split, warp, crack or absorb water and are UV stabilized. "Do it once, do it right" 1-800-320-1841.

**CIRCLE NO. 175**



### Diesel America West...The Concept

Diesel America West, with over 25 years of experience packaging diesel equipment, offers their clients only the proven reliability of rugged and truly portable diesel equipment. While similar to gasoline equipment in size and weight, this machinery offers the advantages of safety, fuel economy, long-life, reduced downtime and year after year dependability.

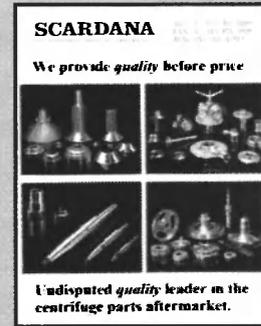
**CIRCLE NO. 176**



### Temp-Set Reusable Covers

Temp-Set covers from Superior Energies, Inc.(SEI) can be constructed for any temperature or atmospheric environment. They can usually be installed while process is on-line. Temp-Set covers are ideal for high-maintenance areas, and are fully weather resistant. They can be used on heat exchangers, valves, manways, flanges, pumps and turbines. All covers are guaranteed to fit to minimize heat loss.

**CIRCLE NO. 177**



### Scardana Spareparts Systems

Since 1974, Scardana has specialized in helping owners and managers source and supply high quality spare parts for existing tonnage, particularly for more mature ships. Scardana has succeeded continually to provide a constant, dependable alternative to high priced OEM parts, typically with more timely deliveries and close attention to individual ship's needs.

**CIRCLE NO. 178**



### Taylor Made Products

Taylor Made Group, Inc. produces new customized shipping covers offer boat manufacturers and dealers a number of advantages over shrink-wrap and other shipping covers currently on the market. Taylor Made also manufactures refrigeration units, stainless steel windshields, compressors and marine lights.

**CIRCLE NO. 179**



### Duramax Propeller Shaft Seals

The innovative Duramax Shaft Seal System eliminates concerns about the bilge pump failure and flooding, and also extends shaft life by eliminating shaft wear, drag and corrosion that are created by conventional stuffing boxes. For free information booklet on shaft seal technology call 440-632-1616, ext. 349.

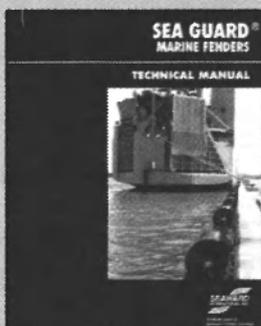
**CIRCLE NO. 180**



### Carborundam Abrasives

Carborundam offers a wide array of abrasive products for the marine industry. Bonded abrasives, superabrasives, coated abrasives, sanders, portable belt sanders and surface finishing products are among the many products aimed at keeping your vessel operating with supreme efficiency.

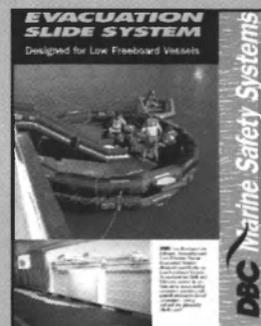
**CIRCLE NO. 181**



### Foam Filled Fenders

Seaward International's newly released Sea Guard foam-filled marine fenders technical manual is now available. Providing comprehensive technical data on standard and custom fenders in both English and metric specifications, and offering a step-by-step guide to designing fendering systems. Contact Seaward at 1-800-828-5360.

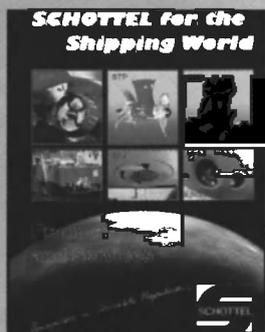
**CIRCLE NO. 182**



### DBC's Evacuation Slides

DBC has developed an efficient, accessible and cost effective marine evacuation system designed specifically for low freeboard vessels. A combination slide and platform stowed in an innovative space saving container, provides safe, speedy evacuation for all passengers—young, old and the physically challenged.

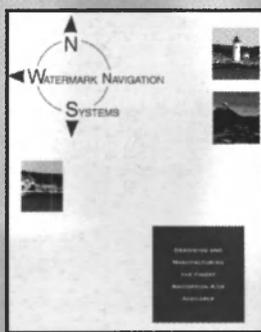
**CIRCLE NO. 183**



### Schottel Maritime Systems

Schottel manufactures standard FP or CP propellers rated at up to 3,400 kW with their transverse thrusters, pump jets rated at up to 3,500 kW, and manually operated mechanical steering systems on the propulsion unit itself to computer-aided remote-controlled joystick systems. All of their products are DNV and GL certified for quality.

**CIRCLE NO. 184**



### Watermark Navigation Systems

Watermark has designed a complete line of navigational products including buoys, flashing lights, regulatory signage and accessories. Regulatory surround sign is a nylon mesh, upright buoy and sign for high visibility. The battery-powered lighthoods act as light buoys, hazard lights, dock and breakwater indicators, barge and construction markers and temporary obstruction light.

**CIRCLE NO. 185**



### Big Top Manufacturing

Big Top manufacturing has been manufacturing a line of enclosures to enable the user to work outdoors in extreme climates, high winds and heavy snow loads. Custom and standard sizes, clear span-width up to 130 ft. Roll-up doors, zippered or velcro closure end panels, full or partial covers, insulation liners and wheel attachments are only some of the products Big Top manufactures.

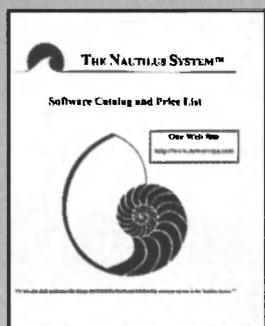
**CIRCLE NO. 186**



### TIMCO Industries...Service and Support

TIMCO Industries is proud of the fact that they do not compete with anyone—that they are only there to aid and assist any client with supplies, information and resources in the commercial marine transportation industry, worldwide. TIMCO offers a free 720 page equipment guide available in hard bound or CD ROM.

**CIRCLE NO. 187**



### The Nautilus System

The nautilus system can be designed into four design categories and they can be mixed or matched to fill all of your design needs. Hull design, fairing and lofting programs can be mixed with hull calculation, design analysis and general purpose programs for unrelated vessel design problems. All of these programs run in Windows.

**CIRCLE NO. 188**



### Rotocast Plastic Products

Rotocast manufactures a complete design of buoys and pontoons. All products are made from high-impact polyethylene and filled with Coast Guard approved 2 pound density urethane foam, which makes them virtually unsinkable. Included in the buoy line are can, nun and regulatory buoys, as well as float balls and mooring buoys. Modular pontoons can support up to 3,000 pounds.

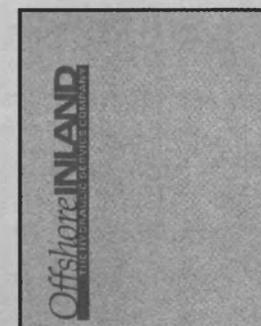
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### AIM-Flexible Exhaust Connectors

Applegate Industrial Materials (AIM) offers a complete line of joints, exhaust silencers, exhaust pipe, flanges and gasket and stud make up kits. Each piece is durable, reliable and comes from high quality materials. AIM is committed to bringing the finest equipment possible to you for the right application.

**CIRCLE NO. 190**



### Offshore Inland

Located in Mobile, Alabama, Offshore Inland is the premier hydraulic remanufacturing facility in the Southeast. Their focus is rehabilitation of existing hydraulic systems and individual components. If longer component life and economical operation hydraulic system is what you need the Offshore Inland has the expertise required.

**CIRCLE NO. 191**



### Better Aluminum Boats

Patriot premium quality aluminum workboats come in eight standard hull sizes, from 21 to 40 ft and are fully framed, water-tight bulkheads and self bailing decks. All hulls meet U.S.C.G. structural and welding standards. Small-shop, old-time craftsmanship and limited production allow for more personal attention with expert design and fabrication of custom and specialized equipment. Machine shop is on premises.

**CIRCLE NO. 192**

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# Synergizing Ship Repair

by David Tinsley, technical editor

Highly industrialized Singapore, embracing little more than 230 sq. mi. of territory off the southern tip of the Malay peninsula, is remarkable on many counts for its industrial endeavors and trading profile.

The economic contribution made by its ship repair activities cannot be understated. An estimated 15

floating docks and 15 graving docks, complemented by more than 10 yards involved in specialized ship and rig building, affords an indication of the scale and international influence of the sector.

It possesses the physical and technological capabilities to take on any type and scale of job in the ship repair and conversion domain. While its reputation for contractual performance and good produc-

tivity is undisputed, there are limits to its ability to ward off ever-keener competition in main sectors of the repair business, including standard drydocking work.

The characteristically forward-thinking approach which has seen Singaporean companies foster and develop shipyard ventures in lower wage cost areas of the Asia Pacific region, has also seen strategies employed on the home front of targeting higher value sectors of the business, investing in scale economies offered by new docks, and relaxing employment restrictions on foreign nationals in Singapore in an effort to ease labor supply problems.

While the ship repair business is essentially short-term in the lead times it involves, and while it is highly sensitive to cyclical shipping market conditions, corporate planners must take a long-term view of operations in Singapore, relative to emerging competition and sectoral industrial development on a global basis.

As a core element of the restructuring process now under way within Singapore's exceptionally heavy concentration of shiprepair facilities and building yards, the

merger of Sembawang Shipyard with Jurong Shipyard (JSL) brings a massive combined force into being. Although synergies will be exploited, the new entity can be expected to maintain the two sites for the foreseeable future.

Fluctuations in demand and ever-tougher competition for general ship repair and drydocking work have seen the industry in Singapore successfully develop more specialized lines of business. One such area has been the conversion of tankers for a floating production and storage role. The extent of new opportunities for tapping the resources of smaller or marginal oilfields is likely to ensure continuing demand for such units, although there is an increasing tendency toward newbuild construction.

JSL augmented its workload in the offshore sector by taking on the job of adapting the 103,000-dwt *Munin*, the second of two multi-purpose shuttle tanker (MST) new-buildings for a production role on the Lufeng field in the South China Sea. Ordered by Norwegian owners from Samsung Heavy Industries, and offering a storage capacity of 640,000-barrels, the vessel arrived directly from the Koje Island yard in South Korea for installation of processing equipment. Underscoring JSL's successful development of business in a niche market, the 1997 contract intake included the conversion of a VLCC into a 2.2 million-barrel FSU, the upgrading of a floating storage unit (FSU) into a floating production, storage and offloading vessel (FPSO), and the conversion of a Suezmax tanker for a stationary offshore role.

Among the lengthier jobs undertaken by Sembawang last year was the large-scale refurbishment of the 150,500-dwt Vietnamese FPSO *Chi Linh*. The vessel had been adapted for floating production duties in the late 1980s, and the recent refit prepared it for a further period of duty off the coast of Vietnam. Confirming the company's prowess in adapting tankers for offshore duties, Keppel Shipyard recently landed a contract from Singapore-based Nortrans Engineering Group for the conversion of the 141,000-dwt tanker *Knock Buie* into an FPSO.



Pictured is Keppel FELS shipyard.

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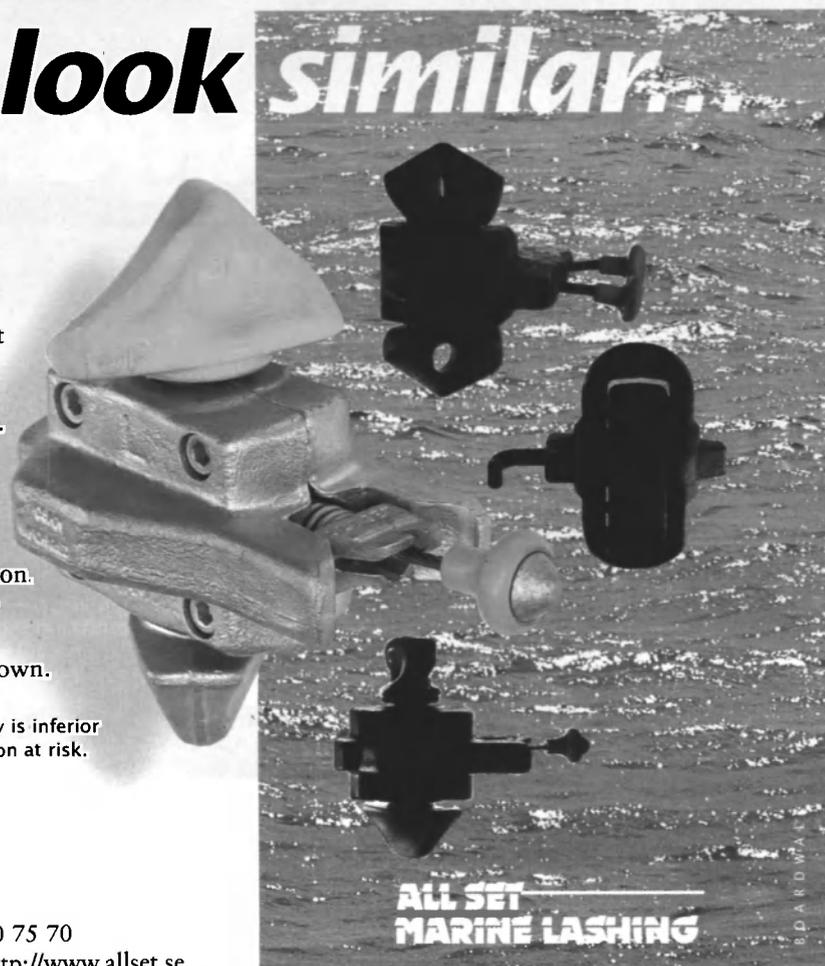
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Circle 317 on Reader Service Card



In its new guise, the 1975-built crude carrier will be deployed by Nortrans on the Ranger oilfield development off Angola, an area of fast growing activity.

Keppel's remit includes the fabrication and positioning of the requisite deck foundations for the process equipment, supplied by the contractual interests for installation by the yard. The transformation work also includes an eight-point mooring system, aft helideck, bow offloading line and platform, and deck crane and riser porch.

Immediately prior to the start of the conversion program, and under a separate contract from Norwegian shipowner Red Band, the yard effected about 100 tons of steel renewal, plus overhaul work and routing drydocking.

Contractual commitments in the offshore vessel category executed by prolific Keppel last year included the fit-for-purpose conversion of the 59,650-dwt tanker *Armada Perkasa* into an FPSO for duties off the Malaysian coast, and the adaptation of the 70,000-dwt tanker *Endeavor* as an FSO (floating storage and offloading) vessel. It also won the \$43 million project to convert the 12,000-dwt *Peregrine IV* into a dynamic-positioning (DP) drillship, due to be completed by mid 1998.

Buoyed by the resurgence of demand in the offshore market, Keppel FELS has extended its workload through 1999 and is pursuing a number of projects in its core business of rigbuilding and upgrading, involving new jack-ups and semi-submersible conversions.

With an oversupply situation having given way to a shortage of operational rigs, drilling contractors are now booking rigs as much as two years in advance, stimulating investment in new and rebuilt equipment. Toward the end of last year, Keppel FELS had already secured contracts worth \$471 million entailing completions in 1998, with more than \$300 million in new orders having been sealed for delivery in 1999. One of the highlights of the inflow of work last year was the award by Santa Fe for the construction of two Universe-class rigs, which will be similar to *Galaxy 1*, built at the yard for the same owner in 1994.

The Caspian Sea, one of the world's oldest oil-producing regions, is among the target markets identified by the company. While it has established a presence there by providing quality accommodation for oil companies, its

ultimate objective lies in supplying drilling contractors working in the growing offshore oil and gas sectors.

The Singaporean firm's U.S. subsidiary, Amfels, had around \$160 million worth of orders outstanding for completion in 1998-99, as of the end of December. Last year's contract intake featured two new-building jack-up rigs.

Keppel FELS' stake in the power business provides a valuable complement to its offshore work, and currently includes the construction of a 100-MW cogeneration plant at Zunhua City in China.

Part of the same owning group, Keppel Marine has four 18,000-bhp anchor-handling tug supply (AHTS) vessels on order for the A.P. Group's Maersk Supply

Service. The owner-supplied design features a 350-ton winch. Deliveries are scheduled at three-month intervals commencing in September 1998.

The first of a new breed of multi-role cargo and containership, offering scope for volume production, is set to be handed over this June by Hitachi Zosen Singapore (HZSL).

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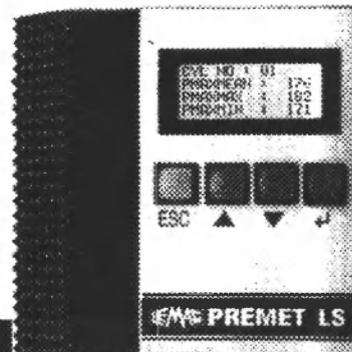
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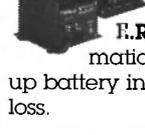
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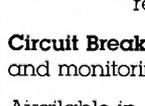
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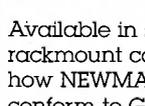
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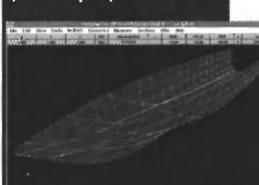
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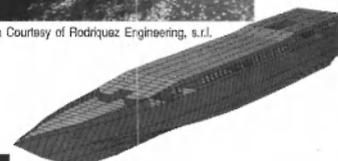
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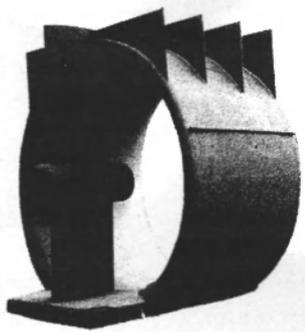
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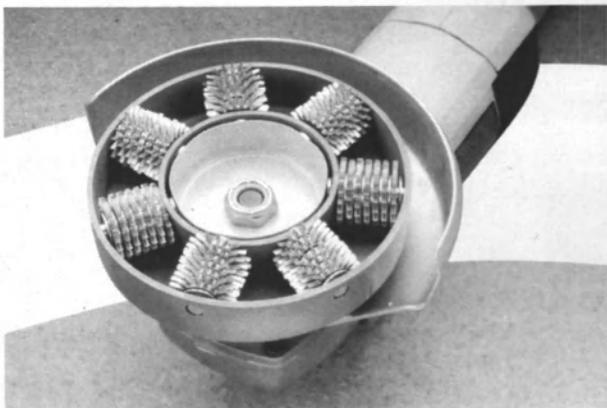
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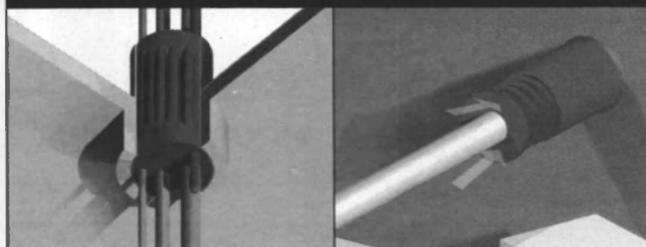
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has been developed by HZSL in conjunction with the GTR Campbell-associated constancy Algoship International, in anticipation of a replacement market for an earlier generation of standard design, general-purpose cargo carriers.

The series of 20,000-dwt geared vessels in hand for the Clipper Group of Denmark, Dockendale Shipping of the Bahamas, and Singapore's own Hai Sun Hup Company hold out the prospect of Singapore's shipbuilding industry fulfilling a role in providing economic substitutes for aging F-class vessels. Built primarily in Japan to Campbell-originated blueprints around 15 to 25 years ago, an estimated 200 such ships remain in service. One of the results of the recent upgrading of HZSL's facilities is that it can now accommodate an output of one Stamford newbuilding every three months. It has increased its capabilities with a 623 x 131.2-ft. (190 x 40-m) slipway for the construction of vessels up to 30,000 dwt, and has a new outfitting berth. Accreditation to ISO 9001 quality standards adds a further string to its bow in its commercial endeavors.

The competitively-priced Stamford-type vessel from the Japanese-owned yard has a four-hold configuration with total 23,880-cu.-m. and 23,795-cu.-m. grain and bale capacity measurements, respectively, plumbed by three 36-ton deck cranes.

The design has been conceived for bulk commodities, steel products, lumber and unitized forestry goods, or for a full container load of 869-TEU, employing both hold and weatherdeck stowage. Anticipated fuel consumption is 24.2 tons per day at 15 knots on the 30-ft. (9.2-m) design draft.

Singapore Technologies Shipbuilding & Engineering (STSE) is undertaking a further stage of modernization of its yard, which includes two floating docks, through the installation of a new shiplift facility. Its existing Syncrolift of 5,000-tons capacity is around 25 years old. As the marine arm of a diversified industrial group, STSE covers a whole range of sectors in the military and commercial vessel markets, including design, repair, reconstruction, newbuilding and fabrication.

Its recent work inflow has included comparatively long refit and repair contracts involving two tugs owned by Semco Salvage & Marine. The turnkey-type project on *Sea Lynx* and *Sea Panther* includes steel and pipe renewals, electrical and mechanical overhauls, upgrading of accommodation and air-conditioning, and hull re-coating.

## PEOPLE & COMPANY NEWS

### SpecTec Expands Into Poland

The SpecTec company, which offers computerized solutions to maritime problems, has expanded its operations into Poland. The new Polish office will be run by **Janusz Slowinski**, who will head up sales and support for Polish customers, while also aiding in SpecTec's implementation of its AMOS family of software.



Janusz Slowinski

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### Mitsui and Nissho Iwai Acquire BGT

Mitsui O.S.K. Lines, Ltd. (MOL) and Nissho Iwai Corporation (NIC) have acquired Burmah Castol, U.K.'s ownership of Burmah Gas Transport, Ltd. (BGT). Mitsui O.S.K. will now own 75 percent of BGT, while Nissho Iwai will own the remaining 25 percent. BGT will continue to act as an independently owned and operated subsidiary at its location in Greenwich, Conn. BGT carries liquefied natural gas from Indonesia to Japan under a long term contract.

### C&MT To Rent Survey Systems

GPS and integrated communications systems are now available for hire from Communications and Measurement Technologies, Ltd. U.K. (C&MT). The GIS and GPS survey equipment can be used either on or offshore, and is backed by training and support, planning, project management and qualified personnel.

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### ES Marine Announces New Credentials

The ES Marine Company has announced that **Richard Koch** and **William Driscoll**, both U.S. Coast Guard, retired, have completed courses certifying them in ISO/ISM Lead Auditing, and HAZMAT, respectively. These certifications allow ES Marine to have more people qualified to survey and assess vessels.

March, 1998

### ABB Turbo Receives Certification

ABB Turbo systems has received ISO 14001/9001 certification for its 500 kW diesel engines. ISO 14001 is the classification that sets and defines the standards for environ-

mental policy and performance in management systems.

Circle 23 on Reader Service Card

### Federal Signal Acquires Pauluhn Electric

Federal Signal Corporation has

acquired Pauluhn Electric Manufacturing. Pauluhn will now be managed by **Mike Oktela**, **Bill McNamara** and **Paul Wilkinson**, all formerly involved in sales for Federal. Pauluhn's product line will join Federal's Victor Marine Lighting line out of the U.K.

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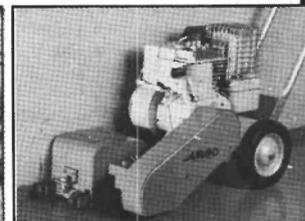
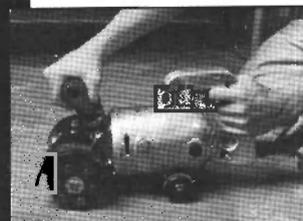
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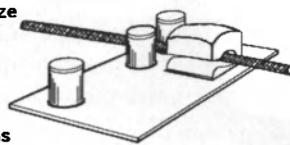


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## PEOPLE & COMPANY NEWS

### Holland & Knight Combines with Gabel & Hair

Holland & Knight LLP has combined forces with Gabel & Hair a 100-year old maritime law firm. The merger was designed to give Holland & Knight a larger presence in the maritime law field, while also strengthening the firm's ability to serve the interests of clients in the U. S. and in key international maritime markets.

### Uniglory and Evergreen to Launch New Global Connections From Indian Sub-Continent

Uniglory Marine Corporation and Evergreen will start operating in the Indian sub-continent using feeder services through Singapore, Colombo and the United Arab Emirates. There will also be a new shuttle launched between Singapore, Dubai and Abu Dhabi, which will use Singapore as a hub, providing connections not only to many of Uniglory's Asian regional services but also to Evergreen's various services to North America.

### NNS Posts Fourth Quarter And Year End Results

Newport News Shipbuilding (NNS) posted earnings in the fourth quarter of 1997 at \$0.44 per share and \$1.26 for the year. Revenues were down from \$1.87 billion in 1996 to \$1.79 billion. NNS fourth quarter net earnings were \$16 million after EBIT was calculated, which was up over last year's. These results reflect stronger contributions from the company's core U.S. Navy business.

### Tugz Names Starck VP

Joseph P. Starck has been named vice president Engineering in the Cleveland Shipyard and drydock of the Great Lakes Towing company and its affiliate, Tugz International L.L.C. His responsibilities will include commercial repair work and maintenance of the company's 50-tug fleet, as well as design, engineering, construction and supervision of six new reverse tractor tugs.

### Ingalls Adds Cavaiola As VP

Dr. Lawrence Cavaiola has been appointed vice president for Ingalls Shipbuilding Division of Litton Industries Government Relations and Strategic Development. Dr. Cavaiola will be employed full-time in Washington, D.C., representing Ingalls in its relationships with Congress and other government agencies as well as with Ingalls customers.

### Intercargo Insurance Joins IIC

Intercargo Insurance has become the newest member of the International Insurance Council (IIC) based in Washington, D.C. Intercargo markets to customs brokers, freight forwarders, logistics providers, intermodal carriers and importer/exporters.

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Adrick Marine, Adrick Marine, 81 Mahan St., West Babylon, N.Y. 11704  
Adrick Marine, 81 Manhattan Street, West Babylon, NY 11758  
Carrier Transicold, P.O. B. 4805, Syracuse, NY 13221  
Refrigeration Resources, 210 Westside Ave., Jersey City, NJ 07305  
Stork Canada, 47 boul. Marie Victoirin, Candiac, Quebec, Canada, JSR 1B6

## ALARMS, FACTORY MUTUAL-APPROVED SELCO 353 A Asbury Commons Dr., Atlanta, GA 30338

**ALLOY**  
Ampco Pumps, 4000 West Burnham St., Milwaukee, WI 53215

**ALUMINUM BOATS**  
American Eagle Mfg., 780 Pearle Jensen Way, La Conner WA 98257  
Munson Mfg., 780 Pearle Jensen Way, La Conner WA 98257

## ANCHORS AND CHAINS

All Alpha Int'l., Inc. P.O. Box 498985, Cincinnati, OH 45249  
Crandall Dry Dock Engineers Inc., P.O. B. 505804, MA 02150  
G.J. Wortelboer Jr. BV, P.O.B. 5003, 3008 AA Rotterdam, Nether  
Marit Chain, 230 Avenue Desandrouins, 59300 Valenciennes  
FRANCE  
Washington Chain & Supply Inc., Box 3645, Seattle, WA 98124  
Waterman Supply Co., P.O. Box 596, Wilmington, CA 90748  
Willem Pot, P.O.B. 29102, 3001 GC Rotterdam

## AUCTIONEERS

MACI Auctioneers, 2334 Willis Rd., Richmond, VA 23230

## AUTOPILOT SYSTEMS

ComNav Marine, 1915 Stainsburg Ave., Vancouver, B.C. CANADA

## BALLAST

Ballast Technologies, 4620 S. Coach Dr., 85714, Tucson, AZ  
Redland Genstar Inc., Executive Plaza IV, Hunt Valley, MD 109121031-

## BALLAST TANK CLEANER

TMT Services Corp./RUSTECO, P.O.B. 11398, Torrence, CA 90510-1398

## BASKET STRAINERS

Beard Industries Inc, 601 Banton Kelly Street, Shreveport, LA 71106-7198

## BATTERY CHARGERS

Newmar, 2911 West Garry Ave., Santa Ana, CA 92663

## BEARING—Rubber, Metallic, Non-Metallic

Blohm & Voss Industrie GmbH, P.O. B. 100720, D-2000 Hamburg 1, GERMANY,  
Simplex-Turmar Inc., P.O. B. 168, Little Neck, NY 11363-0168  
U.S.A. Reps:

Railko Ltd., Loudwater, High Wycombe, Bucks  
Hamshire ENGLAND HP109QV  
Kahlenberg Bros. Co., P.O. Box 358, Two Rivers, WI 54241  
Onion Corp., 1111 Cedar Creek Rd., Grafton, WI 53024  
Thordon Bearings Inc., 3225 Mainway, Burlington, Ont., CANADA L7M 1A6  
Vesco Plastics, P.O. B. 40647, Cleveland 2022 SOUTH AFRICA

## BILGE SYSTEMS

Nelson Div., Exhaust & Filtration Sys., Hwy. 51 West, P.O. Box 428, Stoughton, WI 53589

## BLOCKS & RIGGING

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

## BOAT BUILDER

Blount Marine, 461 Water Street, Warren, RI 02895

## BOAT RENTAL

Edison Chaiset, P.O. Box 309, Galliard, LA 70354

## BOAT SHAFTING

Western Branch Metals, Inc., 2401 Wesley St., Portsmouth, VA 23707

## BOX COOLERS

Ships Machinery Int'l, 8375 N.W. 56 St., Miami, FL 33166

## BRIDGE WIPERS

In-Mar Systems, Yellowstone Street, Kenner, LA 70064

## BROKERS

151 Maritime Services, 34062 El Encanto/B, Dana Pt. CA 92629

Captain Astad Company, Inc., P.O. Box 350486, Ft Lauderdale, FL 33335

Jack Faulkner, 2419 Caddy Lane, P.O. Box 371, Flossmoor IL 60422

Mowbray's Tug & Barge Sales Corp., 35 De Hart St., Morristown NJ 07960

## BULKHEAD SEALS/PANELS

CSD North America, 250 Commercial St., UNIT 2006A, Manchester, NH 03101

Blohm & Voss Industrie GmbH, P.O. B. 100720, D-2000 Hamburg 1, GERMANY

Panel Specialists, Inc./Thermax, 3115 Range Rd., Temple, TX 76501

Railko Ltd., U.S.A. Reps: Simplex-Turmar Inc., P.O.B. 675, Tonawanda, NY 14151-0675

Rox Corp., 12402 E. 60th St., Tulsa, OK 74146-6922

## CABLE TRANSIT SYSTEMS

CSD North America, 250 Commercial St., UNIT 2006A, Manchester, NH 03101

O-Z Gedney • Nelson Firestop, P.O. B. 726, Tulsa, OK 74101-0726

Rox Corp., 12402 E. 60th St., Tulsa, OK 74146-6922

## CAD/CAM SYSTEMS

Albacore Research, 3080 Uplands Rd., Victoria, B.C. CANADA V8R 6B4

All Alpha Int'l., Inc. P.O. B. 498985, Cincinnati, OH 45249

Autoship Systems Corp., #403, 611 Alexander St., Vancouver, BC, Canada V6A1E

Creative Systems, Inc., P.O. B. 1910, Port Townsend, WA 98368

IMSA, 13 Jenkins Court, Suite 200, Durham, NH 03824

Kockums Computer Systems AB, PO Box 50555, S-202 15

## Malmö SWEDEN

Scientific Marine Services, Inc., 101 State Pl., Suite F, Escondido, CA 92029  
TIMSCO, P.O. B. 91360, Mobile, AL 36691  
Ship Motion Associates, 10 Danforth St., Portland, ME 04101-4567

## CARGO MONITORING & CONTROL SYSTEM

Ian-Conrad Bergan, Inc., 3409 Gulf Breeze Parkway, Golf Breeze, FL 32561  
Radio-Holland USA, 8943 Gulf Freeway, Houston, TX 77017

## CHAINS

Washington Chain, P.O. Box 3645, Seattle, Wa. 98124

## CHARGE AIR COOLERS

Crane Heatex, 17 Grandview Ave., W. Orange, NJ 07052

## CHEMICALS

Uniservice Americas, 57174 Hardin Rd., Slidell, LA 70461  
Unitor Ship Service Inc., 2375 W. Esther St., Long Beach, CA 90813

## CLASSIFICATION SOCIETY

American Bureau of Shipping, 2 World Trade Center, 106th Fl, New York, NY 10048

Det Norske Veritas, 70 Grand Ave., Riveredge, N.J. 07661

## CLEATS

Washington Chain, P.O. Box 3645, Seattle, Wa. 98124

## CLUTCHES

Haley Clutch and Coupling Corp., 1820 Hwy. 1 North, Greenville, MS 38702

## COATINGS / COATINGS PROTECTION

Hempel, 6901 Cavallade St., Houston, TX 77028  
Products Research Service, 9229 Highway 23, Belle Chasse, LA 70037

TMT Services Corp./RUSTECO, P.O.B. 11398, Torrence, CA 90510-1398

## COMMERCIAL DIVING COMPANIES

Cruzan Diver's Inc., 300 Strand St., Frederiksted, Virgin Islands 00840

## COMMUNICATIONS SERVICE

Hose McCann, 1241 W. Newport Gender, Deerfield Beach, FL 33442

ICG Satellite Services, 8400 NW 52nd St., Suite 110, Miami, FL 33166

Maritime Telecommunications Networks, Inc., 8400 NW 52nd St, Suite 110, Miami, FL 33166

Ascom Tateco AB, Eppendorfer Weg 234, D-20251 Hamburg, GERMANY

AT & T Maritime Services, 412 Mt. Kemble Ave 5170, Morristown, NJ 07960

Newmar, 2911 West Garry Ave., Santa Ana, CA 92663

## COMMUNICATIONS SYSTEMS

Watercom, 458 E. Park Place, Jefferson, IN 47130

## COMPACTORS/FILTER CRUSHERS

Tech Oil Products Inc., 4308 W. Admiral Doyle Dr., New Iberia, LA 70560

## COMPOUNDS

ITW Philadelphia Resins, 130 Commerce Dr, Montgomeryville, PA 18936

## COMPUTER LOFTING

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Chand Corporation, 157 Hwy 654, Mathews, LA 70375

Coastal Oceanographics, Inc., 11-G Old Indian Trail, Middlefield, CT 06455

Creative Systems, Inc., O. Box 1910, Port Townsend, WA 98368

Sener, C/Severo Ochoa, 4 Parque Tecnologico de Madrid, 28760 Tres Cantos - Madrid SPAIN

Intecolor Corp., 2150 Boggs Rd., Deluth GA 30096

Proteus Engineering, 301 Pier One Rd., Stevensville, MD 21666

## CONDENSERS/SEPARATORS

Beard Industries Inc., P.O. Box 31115, Shreveport LA 71130

## CONSOLE-GMDSS

Furuno USA, Inc., 271 Harbor Way, S. San Francisco, CA 94080

Radio-Holland USA, 8943 Gulf Freeway, Houston, TX 77017

## CONSTRUCTION MATERIALS

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

## CONSULTANTS

Resolution Management, 11 Eves Drive Suite 140, Marlton, NJ 08053

Boland Industrial & Consulting Services, P.O.B. 91360, Mobile, AL 36691

## CONTROL SYSTEM—Monitoring

Engine Monitor, Inc., 179 Hickory Ave. Harahan, LA 70123

GEC ALSTHOM Diesels Inc., 10801 Kempwood Drive, Suite 1, Houston, TX 77043-1412

Ian-Conrad Bergan, 3409 Gulf Breeze Pkwy, Gulf Breeze, FL 32561

Gems Sensors Division, One Cowles Rd., Plainville CT 06062

MMC International, 60 Inip Dr, Inwood NY 11096

Prime Mover Controls, 3600 Gilmore Way, Burnaby V5G 4R8 CANADA

Robertson Marine Systems, 3000 Kingman St., Suite 207, Metairie, LA 70006

Scientific Marine Services, Inc., 101 State Pl., Suite F, Escondido, CA 92029

Stork-Kwant BV, P.O.B. 23, 8600 AA Sneek, Netherlands

Electronic Marine Systems, 800 Ferndale Pl., Rahway, N.J. 07065

## CONTROL SYSTEM—Steering

AutoNav Marine Systems Inc., 55A Clipper St., Coquitlam, B.C., Canada V3K 6X2

Engine Monitor, Inc., 179 Hickory Avenue Harahan, LA 70123

Kockum Sonics, Inc., 819 Veterans Blvd., Suite 201, Kenner, LA 70068

Stork-Kwant BV, P.O.B. 23, 8600 AA Sneek, Netherlands

Control Valves  
Leslie Controls, 12501 Telecom Dr., Tampa, FL 33637

## CONVERSIONS & REPAIRS

Vancouver Shipyards, 50 Pemberton Ave., N. Vancouver, B.C. CANADA V7P 2R2

## CORROSION CONTROL

Nace Int'l, 1440 South Creek Dr., Houston, TX 77064

TMT Services Corp./RUSTECO, P.O.B. 11398, Torrence, CA 90510-1398

## COUPLINGS

Mapeco Products, 90 Forest Ave., Locust Valley NY 11560

Centa Corp., 8185 Cass Ave., Darien, IL 60561

Haley Clutch and Coupling Corp., 1820 Hwy. 1 North, Greenville, MS 38702

Lo-Rez Vibration Control, Ltd., 186 West 8th Ave., Vancouver, B.C. V5Y 1N2

Mapeco Products, 90 Forest Avenue, P.O. Box 382, Locust Valley, NY 11560

Renold Hi-Tec, 512 W. Crescentville Rd, Cincinnati, OH 45246

Walz & Krenzer, 90 FForest Ave., Locust Valley, NY

## CRANE-HOIST-DERRICK-WHIRLIES

Bisso Marine Co. P.O. Box 4113, New Orleans, LA 70178

Holly Hoist Corp., P.O. Box 86, St. Clair Shores, MI 48080-0086

Marine Travelift, Inc., 49 E. Yew St., Sturgeon Bay, WI 54235

McElroy Machine & Mfg Co., Inc., P.O. Box 4454, Biloxi MS 39535-4454

New England Trawler Equipment Co., 291 Eastern Avenue, Chelsea, MA 02150

Xtek, Inc., 11451 Reading Road, Cincinnati, OH 45241

## CRANKSHAFT DEFLECTION ANALYZER

FCS, Inc., 22 Main St., Centerbrook, CT 06409

## CYLINDER LINERS

Silsan A.S., P.O. Box 127, TR-01210 Adana, Turkey

## DAVIS SYSTEMS

Wein Lambie N.A. Inc., 18 Ridgecrest Drive, Bridgewater Nova Scotia, Canada B4V 3 V8

## DECK MACHINERY — Cargo Handling Equipment

Markey Machinery Co., Inc., P.O. Box 24788, Seattle, WA 98124-0788

McElroy Machine & Mfg. Co., Inc., P.O. Box 4454, Biloxi, MS 39535-4454

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

Smith Berger Marine Inc., 516 South Chicago Street, Seattle, WA 98108

## DECK MACHINERY

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

Intercontinental Engineering, P.O. Box 9055, Kansas City, MO 64168

McElroy Machine & Mfg Co., Inc., P.O. Box 4454, Biloxi, MS 39535-4454

New England Trawler Equipment Co., 291 Eastern Avenue, Chelsea, MA 02150

Pusnes, PO Box 102, N-4818, Faervik, NORWAY

Smith Berger Marine Inc., 516 South Chicago St., Seattle, WA 98108

Timberland Equipment, P.O. Box 490, Woodstock, Ontario N4S 722 CANADA

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

## DEHUMIDIFIERS

Dry Air Technologies, 313 N. Oak St., Burlington, WA 98233

Desalination - REVERSE OSMOSIS

Lifestream Watersystems, Inc., P.O. Box 634, Huntington Beach, CA 92647

Matrix Desalination, 3295 S.W. 11th Ave., Fort Lauderdale, FL 33315

Reverso Osmosis of South Florida, 12301 SW. 133 Court, Miami, FL, 33186

## DIESEL ACCESSORIES

Hermont Marine, Inc., 3528 Griffith, St-Laurent, QUEBEC CANADA H4T 1A7

## DIESEL ENGINE ANALYZER

FCS, Inc., 22 Main Street, Centerbrook, CT 06409

Hermont Marine Inc., 3528 Griffith, St. Laurent, Quebec Canada

DIESEL ENGINE — Spare Parts & Repair

Scardana Americas Bkg., 502 Empire St., Greefield Park, J4V1V7 Canada

Alaska Diesel, 4420 14th Ave., NW, Seattle, WA 98107

Brigantine Services Ltd, 48 Wang Lok St., Yuen Long

Hermont Marine Inc., 3528 Griffith, St. Laurent, Quebec Canada

Industrial Estate, New Territories, HONG KONG

Caterpillar, Inc., Engine Div., P.O. Box 610, Mossville, IL 61552-0610

Castoldi S.p.A., Viale Mazzini, 161, 20081, Abbiatograsso, ITALY

Cummins Engine Co., 4500 Leeds Ave., Ste. 301, Charleston, SC 29405-8521

Cummins Mid-South, Inc., 110 E. Airline Highway, Kenner, LA 70062

John Deere, John Deere Rd., Moline, IL 61265

DMI Norshippoo Co., P.O. Box 2100, Norfolk, VA 23501-2100

GEC ALSTHOM Diesels Inc., 10801 Kempwood Drive, Suite 1, Houston TX 77043-1412

Klattenberg Marine, 17 Grandview Ave., W. Orange, NJ 07052

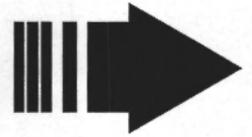
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**FIRE RESISTANT PANELS**

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Ginnell Fire Protection, 835 Sharon Drive, Westlake, OH 44145  
Panel Specialists, Inc./Thermax, 3115 Range Rd., Temple, TX 76501

**FIRE SUPPRESSION EQUIPMENT**

American Pacific Corp., 3770 Howard Hughes Pkwy, Las Vegas, NV 89100

**FLAME RETARDANT TEMPORARY COVERING**

Bainbridge, 252 Revere St., Canton, Mass. 02021

**FUEL CONSERVATION**

Instruments Computer & Controls, Inc., 70 South Bow Rd., Hookset, NH 03106

**FUEL DECONTAMINATION**

Environmental Solutions Int'l, 11002 Raccoon Ridge, Reston, VA 20191-4911

**GALLEY EQUIPMENT**

Cospolich Refrigerator Co., 949 Industry Rd., Kenner LA 70062  
Jamestown Metal Marine Sales, Inc., 4710 Northwest Second Ave, Boca Raton, FL 33431  
Lang Manufacturing, P.O. B. 905, Redmond, WA 98073  
Marine Accommodations, 3830 Williamsburg Rd. Jacksonville, FL 32256

**GANGWAYS, LADDERS**

SlipNot Safety Flooring, 2545 Beaufait St., Detroit, MI 48207  
Wooster Products Inc., 1000 Spruce St., P.O. Box 896, Wooster, OH 44691

**GEAR REPAIR**

Haley Marine Gears International, Inc., 2600 N. Concord Belle Chasse, LA 70037  
Cincinnati Gear Company, 5657 Wooster Pike, Cincinnati, OH 45227

**GENERATOR**

Alaska Diesel, 4420 14th Ave., NW, Seattle, WA 98107  
Baylor Co., 500 Industrial Blvd., Sugarland, TX 77478

**HEAT EXCHANGERS**

Alfa-Laval Separation Inc., 955 Meams Rd., Warminster, PA 18974

Beard Industries Inc., P.O. Box 31115, Shreveport, LA 71130  
Crane Heatec, 17 Grandview Ave., West Orange, NJ 07052

**HIGH PRESSURE WATER JETTING**

Aqua-Dyne, Inc., 3620 W. 11th Street, Houston, TX 77008-6004

**HOISTS**

Holly Hoist Corp., P.O. Box 86, St. Clair Shores, MI 48080-0086  
JD Neuhaus Corp., 2603 Rolling Rd., Gwynn Oak, MD 21207

**HORNS/WHISTLES**

Kahlenberg Bros Co., P.O. Box 358, Two Rivers, WI 54241  
Kockum Sonics, Inc., 819 Veterans Blvd., Suite 201, Kenner, LA 70068

**HYDRAULICS**

Cunningham Marine Hydraulics Co., 201 Harrison St., Hoboken, NJ 07030  
Engine Monitor, Inc., 179 Hickory Ave. Harahan, LA 70123  
Hamilton Jet, P.O. Box 709, Christchurch, NEW ZEALAND  
Offshore Inland, Inc. 3521 Brookdale Drive, Mobile, AL 36618  
Ultra Hydraulics Limited, Cheltenham Road East, Gloucester, GL2 9QN, ENGLAND

**INSULATION**

Blohm & Voss Light Insulation, Bartels & Laders GmbH, Nordereisstrasse 1S, 20457 Hamburg GERMANY  
Panel Specialists, Inc./Thermax, 3115 Range Rd., Temple, TX 76501  
Insulations, Inc., 1101 Edwards Ave., Harahan, LA 70123  
Superior Energies Inc., P.O. Drawer 386, Grovas, TX 77619

**INTEGRATED MONITORING SYSTEMS**

Data Star, Unit 100, 18 Gostick Place, N. Vancouver, BC Canada

**INTERIORS**

Custom Ship Interiors, Inc., P.O. Box 882, Solomons, MD 20688  
Hopeman Brothers, P.O. Box 820, 435 Essex Ave., Waynesboro, VA 22980  
Insulations, Inc., Rt. 5, 12360 Leisure Rd, Baton Rouge, LA 70807  
Jamestown Metal Marine Sales, Inc., 4710 NW Second Ave, Boca Raton, FL 33431  
Marine Accommodations, 3830 Williamsburg Rd., Jacksonville, FL 32256  
Maritime Services Corp., 3457 Guignard Drive, Hood River, OR 97031

**JOINER—Watertight Door—Paneling—Ceiling System—Decking**

All Alpha Int'l., Inc. P.O. Box 498985, Cincinnati, OH 45249  
Branton Ind., 1101 Edwards Ave., Jefferson, LA 70181  
CustomShip Interiors, Inc. P.O. Box 882, Solomons MD 20688  
Hopeman Brothers, Inc., P.O. Box 820, Waynesboro, VA 22980

Insulations, Inc., 1101 Edwards Ave., Harahan, LA 70123  
Marine Accommodations, 3830 Williamsburg Park, Suite7 Jacksonville, FL 32257  
Maritime Services Corp., 3457 Guignard Drive, Hood River, OR 97031  
Panel Specialists, Inc./Thermax, 3115 Range Rd., Temple, TX 76501  
Walz & Krenzer, Inc., 90 Forest Ave. Locust Valley N.Y. 11560

**KEEL COOLERS**

R.W. Fernstrum & Co., 1716 Eleventh Ave., Menominee, MI 49858

Kahlenberg Bros. Co., P.O. Box 358, Two Rivers, WI 54241  
The Walter Machine Co., Inc., 84-98 Cambridge Avenue, Jersey City, NJ 07307

**LASER ALIGNMENT**

Boland Industrial & Consulting Services, P.O.B. 91360, Mobile, AL 36691

**LIFEBOATS/RAFTS**

American Eagle Mfg., Inc., 780 Pearie Jensen Way, LaConner, WA 98257

DBC Marine Safety Systems, 12351 Bridgeport Rd., Richmond, B.C. CANADA V6V1J4

Norsale AS, P.O. Box 115, N-4818 Faervik, Norway

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

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

Zodiac of North America, P.O. Box 400, Stevensville, MD 21666

**LIFESAVING EQUIPMENT**

MGI International, 119-225 West 1st St., North Vancouver, B.C. CANADA

Stearns Manufacturing, P.O. Box 1498, St. Cloud, MN 56302

**LIGHTING SYSTEMS / EQUIPMENT—Lamps,Fixtures, Searchlights**

ACR Electronics, Inc., 5757 Ravenswood Rd., Ft. Lauderdale, FL 33310-5247  
Archway Marine, 4501 Swan Ave., St. Louis, MO 63110  
Golden Marine, 160 Van Brunt St., Brooklyn, NY 11231  
Kockum Sonics, Inc., 819 Veterans Blvd., Suite 201, Kenner, LA 70068  
Pauluhn Electric Mfg. Co., Inc. 1616 N. Main, P.O. Box 53, Pearland, TX 77581  
Francis Searchlights/Stam Supply Co., 4415 6th N.W., Seattle, WA 98107

**LINE & NET CUTTER SYSTEMS**

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

**LIQUID LEVEL GAUGES**

King Engineering Corp., P.O. Box 1228, Ann Arbor, MI 48106

**LIQUID OVERFILL PROTECTION SYSTEMS**

E.R.L. Marine Products, P.O.Box 1026, New Albany, IN 47151-1026

Metritape, Inc., 59 Porter Rd., Littleton, MA 01460

Gems Sensors, Inc., 1 Cowels Rd., Plainville, CT, 06062

**LOGISTICS**

VL Logistics Consultants, Inc., 3420 Bienville Blvd., Ocean Springs, MS 39564

**MACHINERY MAINTENANCE, REPAIR, OVERHAUL, AND TESTING**

Golden Marine Company Inc., 160 Van Brunt Street, Brooklyn, NY 11231

Maritime Power 200 Henderson St., Jersey City, NJ 07302

New England Trawler Equipment Co., 291 Eastern Avenue, Chelsea, MA 02150

**MARINE CONSULTANTS**

Band, Lavis, & Associates, 900 Ritchie Hwy, Suite 203, Severna Park, MD 21146

**MARINE DECKING**

W.S. Molnar Co., Slipnot Safety Division, 108 Via Hermosa St., Santa Cruz CA, 95060

**MARINE & INDUSTRIAL DOORS**

Railway Specialties Corp., 2979 State Rd., Bristol, PA 19007

**MARINE CEILINGS**

Hydro-Aluminium, Vik Verk, N-5880 VIK I SOGN, Norway

Insulations, Inc., Rt. 5, 12360 Leisure Road, Baton Rouge, LA 70807

Panel Specialists, Inc., 3115 Range Rd., Temple, TX 76501

**MARINE CONSULTANTS**

Kvaerner Masa Marine, 201 Defense Hwy., Annapolis, MD 21401

**MARINE DECKING**

E.H. O'Neill Co., 1405 Chippendale Rd., Lutherville, MD 21093

Hopeman Brothers, Inc., P.O. Box 820, Waynesboro, VA 22980

Insulations, Inc., Rt. 5, 12360 Leisure Road, Baton Rouge, LA 70807

Selby, P.O. Box 1600, Sapulpa, OK 74067

Slipnot Safety Flooring, 2545 Beaufait Street, Detroit, MI 48207

Marine Drilling & Blasting, Inc., P.O. Box 18098, Beverly Hills, CA 90209-4098

**MARINE ELECTRONICS**

Frank L. Beier Radio, 2001 Ridgeway Drive, Metairie, LA 70001

Kockum Sonics, Inc., 819 Veterans Blvd., Suite 201, Kenner, LA 70068

Saab Marine Electronics AB, Box 13045, 402 51 Goteborg, SWEDEN

Scientific Marine Services, Inc., 101 State Pl., Suite F, Escondido, CA 92029

**MARINE ELEVATORS**

McElroy Machine, 1101 Lorraine Rd., Biloxi, MI 39535-4454

**MARINE EQUIPMENT**

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

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

Maritime Power Corp., 200 Henderson Street, Jersey City, NJ 07302

Northeast Technical, P.O. Box 38189, Olmstead Falls, Ohio, 44138

Bohnet & Associates, 1150 Rule Rochelle, Sidell, VA 70458

McElroy Machine, P.O. Box 4454, Biloxi, MS 39535-4454

**MARINE FINANCING**

Salco Credit Co. Inc. 4909 156th Ave. NE, Redmond, WA 98052

**MARINE FIRE PROTECTION**

Insulations, Inc., Rt. 5, 12360 Leisure Road, Baton Rouge, LA 70807

Unitor Ship Service Inc., 2375 West Esther Street, Long Beach, CA 90813

**MARINE GEARS**

The Falk Corp., PO Box 492, Milwaukee, WI 53201-0492

Haley Marine Gears, Inc. P.O. Box 689, Greenville, MS 38702

Marine Gears, P.O. Box 689, Greenville, MI 38701

Cincinnati Gear Company, 5657 Wooster Pike, Cincinnati, OH 45227

**MARINE INSURANCE**

John G. Alden, 1300 SE 17th St., Fort Lauderdale, FL 33316

**MARINE PAINTINGS**

Sarba Art Studio, 6 Ridge Drive, Old Saybrook, Ct 06475

**MARINE PUMPS**

Gilkes Inc., P.O. Box 628, Seabrook, TX 77586

**MARINE SHAFTING**

Kahlenberg Bros, P.O. Box 358, Two Rivers, WI 54241

**MARINE SURPLUS SALES**

Defense Reutilization & Marketing Service, 2163 Airways Blvd., Memphis, TN 38114

**MARINE SYSTEMS SIMULATION**

Applied High Technology, 4 Place Dee Commerce Brossard, Suite 201 Quebec Canada J4W-3B3

**MECHANICAL PUMP SEALS**

John Crane Marine, USA, 1536 Barclay Blvd, Buffalo Grove, IL 60089

**METERS**

Selco USA, 2508 Lakebrook Ct., Atlanta, GA 30360

**MONITORS**

Intercolor Corp., 2150 Boggs Rd., Deluth GA 30096

**MOORING LINES**

Phillystran, Inc., 151 Commerce Drive, Montgomeryville, PA 18936-9628

**MOTOR PROTECTION EQUIPMENT**

Marine Safe Electronics, 37 Staffer Dr., Concord, Ontario L4K CANADA

**NAUTICAL JEWELRY**

Nautical Gold Creations, 23731 Madison St., Torrance, CA 90505

**NAVAL ARCHITECTS, MARINE ENGINEERS, SURVEYORS**

Band, Lavis, & Associates, 900 Ritchie Hwy, Suite 203, Severna Park, MD 21146

Northeast Technical, P.O. Box 38189, Olmstead Falls, Ohio, 44138

Advanced Marine Enterprises, Inc., 1725 Jefferson Davis Hwy., Arlington, VA 22202

Bay Engineering, 253 N. First Ave., Sturgeon Bay, WI 54235

Donald L. Blount, 2550 Elsmere Ave., Ste. K, Norfolk, VA 23513

C. Baxter & Associates, P.O. Box 9006, Mobile, AL 36609

CDI Marine Co., 4040 Woodcock Dr., Suite 200, Jacksonville, FL 32207

Childs Engineering Corp., Box 333, Medfield, MA 02052

Crandall Dry Dock Engrs., Inc., P.O. Box 505804, Chelsea, MA 02150

Crane Consultants, 15301 First Ave S., Seattle WA 98148

C.R. Cushing, 18 Vesey St., New York, NY 10007

CT Marine, 56 Crooked Trail, Rowayton, CT 06853

Cunningham & Walker, 1762 Providence Hollow Lane, Jacksonville, FL 32223

Arthur D. Darden, 3200 Ridgeway Dr., Suite 403, Metairie LA 70002

DeJong & Lebet, Inc., 1734 Emerson Street, Jacksonville, FL 32207

Design Associates Inc., 14360 Chef Menteur Highway, New Orleans, LA 70129

Designers & Planners, 2120 Washington Blvd. Ste.200, Arlington, VA 22204

Elliot Bay Design Group 5301 Shilshole Ave. N.W. Ste. 200, Seattle, WA 98107

Encon Mgmt & Engineering Consultant Services, P.O. Box 7760, Beaumont, TX 77706

GHM Inc. (Ind. Measurement Consultants), P.O. Box 1836, Newport News, VA 23601

Gibbs & Cox, Inc., 50 West 23rd St., New York, NY 10010

Heger Dry Dock Engineers, Inc., P.O.B. 6605, Holliston, MA 01746

J.J. McMullen, 2341 Jefferson Davis Hwy, Arlington, VA 22202

John W. Gilbert & Assoc., Inc., 199 State St., Boston, MA 02109

The Glosten Assoc. Inc., 600 Mutual Life Bldg., 605 First Ave., Seattle, WA 98104

Guido Paria & Assoc., 720 3rd Ave., Ste. 1200, Seattle, WA 98104

Morris Guralnick Associates, Inc., 130 Sutter St., Ste. 400, San Francisco, CA 94104

C. Raymond Hunt Associates, 69 Long Wharf, Boston MA 02110

JJH Inc., 3412 Progress Dr., Bensalem, PA 19020

R.D. Jacobs & Associates, 11405 Main St., Roscoe, IL 61073

Kvaerner Masa Marine Inc., 201 Defense Highway, Suite 202, Annapolis, MD 21401

James S. Kroger, 799 Brickelli Plaza Ste. 701, Miami, FL 33131

Rodney E. Lay & Associates, 13891 Atlantic Blvd., Jacksonville, FL 32225

MCA Engineers, Inc., 2960 Airway Ave., #A-103, Costa Mesa, CA 92626

Alan C. McClure Associates, Inc., 2600 South Gessner, Houston, TX 77063

McElroy Machine & Mfg Co., Inc., P.O. Box 4454, Biloxi, MS 39535-4454

John J. McMullen Associates, Inc., 1 World Trade Cir, Ste 3000, NY, NY 10048

Fendall Marbury, P.O. Box 2321, Annapolis, MD 21401

Marine Design & Operations, Inc., 225 E. 1st Ave., Roselle, NJ 07203

Marine Management Systems Inc., 470 West Ave., Stamford, CT 06902

Marine Power Associates, 1010 Turquois St., Ste 217, San Diego, CA 92109

Maritech, Seaciff, Bay Road, Newmarket, NH 03857

Maritime Design, Inc., 3020 Hartley Rd., Jacksonville, FL 32257

R.J. Mellusi & Co., 71 Hudson St, New York, NY 10013

Nautical Designs, Inc. 2101 S. Andrews Ave, Suite 202, Ft Lauderdale FL 33316

Olsen Marine Surveyors Co., P.O. Box 283, Port Jefferson, NY 11777

M. Rosenblatt & Son, Inc., 350 Broadway, New York, NY 10013 and 620 Fulson St., Ste. 301, San Francisco, CA 94107

Sargent & Herkes, 225 Baronne St., Suite 1405, New Orleans LA 70112

Scientific Marine Services, Inc., 101 State Pl., Suite F, Escondido, CA 92029

Sea School, 10812 Gandy Boulevard, St. Petersburg, FL 33702

Seaworthy Systems Inc., P.O. Box 965, Essex, CT 06426; 17 Battery Pl., New York, NY 10004; P.O. Box 975, Barnegat Light, NJ 08006; 2001 N. Bearegard Street, Alexandria, VA 22311; 50 Vashell Way, Orinda, CA 94563

George G. Sharp, Inc., 100 Church St., New York, NY 10007

R.A. Steam, Inc., 253 N. 1st Ave., Sturgeon Bay, WI 54235

A.K. Suda & Ass., 3004 19th St., Metairie, LA 70002-4989

TIMSCO, P.O. Box 91360, Mobile AL 36691

**NAVIGATION & COMMUNICATIONS EQUIPMENT**

Barco International, 2558 Mountain Industrial Blvd., Tucker, GA 30084

Northern Airborn Tech., 28 Lord Road, Suite

Rosandra 334, Trieste, ITALY  
GE Naval & Drive Turbine Systems, 166 Boulder Dr.,  
Fitchburg MA 01420  
GEC ALSTHOM Diesels Inc., 10801 Kempwood Dr. Ste 1,  
Houston, TX 77043-1412  
Gollens Worldwide, 160 VanBrunt St., Brooklyn, NY 11231  
Harbormaster Marine Inc., 31777 Industrial Rd., Livonia, MI  
48150  
Harrington Metal, 6720 124th Ave. Lennoxville, MI 49408  
Kahlenberg Bros. Co., P.O. Box 358, Two Rivers, WI 54241  
Knapp Mak, 7555 Danbro Crescent, Mississauga, Ontario,  
CANADA L5N 6P9  
LIPS B.V., P.O. Box 6, 5150 BB Drunen, The Netherlands  
Lohmann & Stolterfoht, P.O. Box 1860, D-58408 Witten,  
Germany  
Lo-Rez Vibration Control, 186 West 8th Ave., Vancouver, BC  
CANADA, V5Y 1N2  
Mapeco Products Inc., 90 Forest Ave., Locust Valley, N.Y.  
11560  
Markisches Werk, P.O. Box 1442, D-5884 Halver GERMANY  
MAN B&W Diesel, 17 State St., New York, NY 10004  
MAN B&W Diesel A/S, Ostervej 2, DK-4960 Holeyb,  
DENMARK  
MAN B&W Diesel A/S, Alpha Diesel, Niels Juels Vej 15. DK-9900  
Fredenshav, DENMARK  
MAN B&W Diesel GmbH, Stadtbachstrasse 1, D-86153  
Augsburg 1 GERMANY  
Ornithrustrer, Inc., 743 N. Main St., Orange, CA 92686  
Orion Corp., 1111 Cedar Creek Rd., Grifton, WI 53024  
Oy Wartsila Ab, Vasa and Abo Divisions, P.O. Box 244,  
SF65100 Vasa, FINLAND  
Rolia SP Propellers SA, Via Silva 5, P.O. Box 251, 6828  
Balerna SWITZERLAND  
S&S Propellers, 26-15 123rd St., Flushing, N.Y. 11354  
Schottel (Baylor), 500 Industrial Blvd., Sugarland, TX 77478  
Karl Senner Inc., 25 W Third, Kenner LA 70062  
Schottel-Werft, Manizer Strasse 99, D-56322 Spay/Rhein,  
GERMANY  
Schottel North America, Inc., 1505 Corbin Ave., Hammond,  
LA 70403  
Siemens Electric Ltd., 1180 Courteneypark Rd., Mississauga,  
ONTARIO  
Stewart & Stevenson, 1400 Destrehan, P.O. Box 8, Harvey  
LA 70059-0008  
Thrustmaster of Texas, P.O. Box 840189-12227 IFM 529,  
Houston, TX 77284-0189  
Ulstein Bergen Diesel A/S, P.O. Box 924, N-5002, Bergen,  
NORWAY  
Ultra Hydraulics Limited, Cheltenham Road East, Gloucester,  
GL2 9QN, ENGLAND  
Voith Hydro Marine Technology, P.O.B. 1125, D89509,  
Heidenheim, GERMANY  
U.S. Rep: Voith Schneider America Inc., 121 Susquehanna  
Ave., Great Neck, NY 11021

**PUMP—Repair—Drives**  
Scardana Americas Bkg., 502 Empire St., Greefield Park, J4V1V7  
Canada  
Gilles, Inc., PO Box 628, Seabrook, TX 77586  
Hamworthy Marine, Inc., 1129 Hospital Dr. Ste 3C,  
Stockbridge, GA 30281  
Kraissl Co., 299 Williams Avenue, Hackensack, NJ 07061  
Vita Motivator, 566 Parker St., Newark, NJ 07104  
Ampco Pumps, 4000 West Burnham St., Milwaukee, WI 53215

**RADARS—ARPS**  
Furuno USA, Inc., 271 Harbor Way, S. San Francisco, CA  
94080  
Radio-Holland USA, 8943 Gulf Freeway, Houston, TX 77017

**REFRIGERATION EQUIPMENT/SERVICES**  
Adrick Marine, 81 Mahan St., West Babylon, N.Y. 11704  
RTF Mfg., RD #1 Route 66, Hudson, NY 12534  
Unitor Ship Service Inc., 2375 West Esther Street, Long  
Beach, CA 90813

**REFRIGERATORS, FREEZERS, AIR COND.**  
Adrick Marione, 81 Manhattan Street, West Babylon, NY 11758  
RTF Manufacturing, RD #1, Rte. 66, Hudson, NY 12534

**REMOTE VALVE OPERATORS**  
American United Marine Corp., 5 Broadway, Rt 1, Saugus,  
MA 01906  
Elliott Manufacturing, P.O. Box 773, Binghamton, NY 13902  
Triumph Controls, 205 Church St., North Wales, PA 19454

**RH PROPULSION**  
Boil Filter, 15 International Dr., East Granby, Ct., 06206  
Gottens, 160 Van Brunt St., Brooklyn, NY 11231

**RIGID INFLATABLE BOATS**  
American Eagle, 780 E. Pearl Jensen Way, LaConner, WA  
98257  
Willard Marine, Inc. 1250 N. Grove St., Anaheim, CA 92806  
Zodiac of N. America Thompson Creek, P.O. Box 400,  
Stevensville, MD 21666

**ROPE—Manila—Nylon—Hawsers—Fibers**  
American Mfg. Co., 200 Southpark Rd., Lafayette, LA 70508-  
3609  
Bayer AG, D-41538, Dormagen, GERMANY  
Phillystran, Inc., 151 Commerce Drive, Montgomeryville, PA  
18936-9628  
Puget Sound Rope, 1012 Second St., Anacortes, WA 98221  
Rasmussen Equipment Co., 8727 5th Ave., P.O. Box 81206, Seattle, WA  
98108  
Wellington, P.O. B. 244, Madison, GA 30650

**RUDDER BEARINGS**  
Thordon Bearings, Inc., 3225 Mainway, Burlington, Ontario Canada L7M 1A6

**RUDDER BUSHES**  
Vesco Plastics, P.O. Box 40647, Cleveland 2022, South  
Africa

**SAFETY DECKING**  
SlipNot Safety Flooring, 2545 Beaufait St., Detroit, MI 48207

**SAFETY FLOORING**  
WS. Molnar Slipnet & Safety Flooring Division, 2545 Beaufait St.,  
Detroit, MI 48207

**SAFETY LIGHTING**  
Datrex, Inc., P.O. Box 1150, Kinder, LA 70648-1150

**SAFETY—MARINE**  
Wellin Lambie N.A., Inc., 18 Ridgeway Drive, Bridgewater Nova Scotia,  
Canada B4V 3V8

**SANITATION DEVICE—Pollution Control**  
Byrne, Rice & Turner, Inc., 1172 Camp Street, New Orleans,  
LA 70130  
Exceltech International Corp., 1110 Industrial  
Blvd., Sugarland, TX 77478  
Envirovac Inc., 1260 Turret Dr., Rockford, IL 61111  
Fast Systems, 3240 North Broadway, St. Louis, MO 63147  
Headhunter Inc., 214 SW 21st Terrace, Fort Lauderdale, FL 33312  
Micropher, 452 East Hill Road, Willis, CO, 95490

Owens Mfg., Hwy 92, Youngsville, LA 70592

**SATELLITE COMMUNICATIONS**  
American Mobile Satellite Corp., 10802 Parkridge Blvd.,  
Reston, VA 22091  
Boatrac, Inc., 6440 Lusk Blvd. #D-201, San Diego, CA  
92121-2758  
Furuno USA, Inc., 271 Harbor Way, S. San Francisco, CA  
94080  
KVH Industries, Inc., 110 Enterprise Center, Middleton, R.I.  
02842-5268  
ICG Satellite Communications, 8400 NW 52nd St., Suite 110,  
Miami, FL 33166  
Mackay Communications, 2721 Discovery Dr., Raleigh, N.C.  
27604-1851  
Norwegian Telecom, Postboks 6701 St. Olavs Plass, N-0130,  
Oslo, Norway  
PTT Telecom, Station 12, P.O. Box 30150-2500 JD The  
Hague, NETHERLANDS  
Radio-Holland USA, 8943 Gulf Freeway, Houston, TX 77017  
Singapore Telecom, 15 Hill Street, Telephone House, 2nd  
Storey, Singapore 0617  
Telstra Mobile Satellite & Radio Services, 79 St. Hillers Rd.,  
Auburn NSW 2144, AUSTRALIA  
Westinghouse Wireless Solutions Co., 930 International Dr.,  
Linthicum, MD 21090  
Land Sea Systems, 849 Seahawk Circle, Suite 103, Virginia  
Beach, VA 23452

**SCALE MODELS**  
Markitect, PO Box 225, Oconomowoc, WI 53066  
Scale Reproductions, 16346 County Road 13, Fairhope, AL  
36532  
Sturgeon Bay Model Shop, 187 N Ninth Ave., Sturgeon Bay  
WI 54225

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

**SEALS**  
John Crane Marine, USA, 1536 Barclay Blvd, Buffalo Grove,  
IL 60089  
Blohm & Voss Industrie GmbH, P.O. Box 10 07 20, D-20457  
Hamburg, GERMANY  
U.S.A. Reps: Simplex-Turmar Inc, P.O. Box 168, Little Neck,  
NY 11363-0168

**SEALANTS**  
Boatlife Industries, 2081 Bridgeview Dr., N. Charleston, SC,  
29405

**SENSORS**  
Gems Sensors, One Cowles Rd., Plainville CT 06062

**SHAFT HORSEPOWER MEASURING SYSTEM**  
Instruments Computers & Controls, 70 South Bow Rd.,  
Hookset, N.H. 03106

**SHIP CERTIFICATION**  
American Bureau of Shipping, 2 World Trade Center, 106th  
Fl., New York, NY 10048

**SHIP ELEVATION**  
Metric Systems Corp., 645 Anchors St., Ft. Walton Beach,  
FL 32548

**SHIPLIFTS**  
Synchrolift Inc., Two Datan Center, 9130 S. Dadeland Blvd.,  
Miami, FL 33156-7850

**SHIP REPAIR**  
Gollens Worldwide, 160 Van Brunt St., Brooklyn, NY 11231

**SHIP VALUATION**  
Capt. E.S. Geary, P.O. Box 1246, Fajardo, P.R. 00738

**SHIPBOARD FURNITURE/SWITCHING SYSTEMS**  
Engineered Data Products, P.O. Box 565, Woodbury, NJ 08096-7565  
Metric System Corp., 645 Anchors St., Ft. Walton Beach, FL  
32548

**SHIPBUILDING—Repairs, Maintenance, Drydocking**  
American Eagle Mfg., 780 Peare Jensen Way, LaConner  
WA 98257  
Amfels, Inc., P.O. Box 3107, Brownsville, TX 77823  
Astilleros Espanoles, S.A. Ochandiano, 14-16 28023 El Plantio SPAIN  
Atlantic Marine, Inc., P.O. Box 3202, Mobile, AL 36652  
Atlantic Marine, Inc., 8500 Heckscher Dr., Jacksonville, FL 32226  
Avondale Industries Inc., P.O. Box 50280, New Orleans LA 70150  
Bender Shipbuilding & Repair, P.O. Box 42, Mobile AL 36601  
Bisso Marine Co., P.O. Box 4113, New Orleans, LA 70178  
Blount Marine, 461 Water St., Warren, R.I. 02885  
Bollinger Lockport & Larose, P.O. Box 250, Lockport, LA 70374-0250  
Cardoc, P.O. Box 1147 Port Of Spain, Trinidad, W.I.  
Chris-Marine AB, P.O. Box 9025, S-2000 39, Malmo, SWEDEN  
Conrad Industries, 1501 Front Street, P.O. Box 790, Morgan City, LA 70381  
Eastern Shipbuilding Group, 2200 Nelson Street, Panama City, FL 32402  
Fincantieri SpA Cantieri Navali Italiani, Via Cipro 11, 16129 Genoa ITALY  
Gollens Worldwide, 160 Van Brunt St., Brooklyn, NY 11231  
Gulf Coast Fabrication, Inc., P.O. Box 539, Lakeshore, MS 39558  
HDW, Kiel, Germany, USA Rep.: Roland Marine Inc., 90 Broad St., NY, NY  
10004  
Halter Marine Group, Inc., 13085 Industrial Seaway Rd, Gulfport, MS 39503  
Hitachi Zosen, Hitachi Shipbuilding & Engineering Co., 1-1-1 Hitatsubashi  
Chiyoda-Ku Tokyo 100 Japan  
In-Place Machining Co., Inc. 929 North Buttm Street, Milwaukee, WI 53212-  
3793  
Jacksonville Shipyards, 750 E. Bay St., Jacksonville, FL 32202  
Jetboat, Inc., P.O. Box 610, Jeffersonville IN 47130  
Kvaerner Masa-Yards Oy, Box 132, SF-00151, Helsinki, FINLAND  
Kvichak, 615 N. 34 St., Seattle, WA 98103  
Leevac Shipyards, P.O. Box 1190, HWY 90 East, Jennings, LA 70546  
Lindenau GmbH, Skagerakulfer 10, Postfach 9093D-2300 Kiel, Friedrichsort  
GERMANY  
Motor-Service AB, Box 21 15, 144 04 Ronninge, SWEDEN  
Munson Hammerhead, 780 Peareie Jessen Way, LaConner WA 98257  
Newport News, 4101 Washington Ave., Newport News, VA 23607  
Peterson Builders, Inc., 101 Pennsylvania Ave., Sturgeon Bay, WI 54235-  
0650  
Thomas Marine, 37 Bransford Street, Patchogue, NY 11772  
Samsung Heavy Ind., 25, 1-ka, Bongrae-dong, Chung-ku, Seoul, Korea  
SeaArk, P.O. Box 210, Monticello AR 71655  
SeaFab, P.O. Box 1651, 4111 Cedar St. Pascagoula, MS 39567  
Service Marine Industries, P.O. Box 3606, Morgan City LA 70381  
Skippenner Shipyards, 621 Park Plaza Dr, Dept 21, LaCrosse WI 54601  
Stainer Shipyard, Inc., P.O. Box 742, Bayou la Batre, AL 36509  
Swath Ocean, 979 G Street, Chula Vista, CA 92011  
Talleres Navales del Golfo, Isote San Juan de Ulva S/N, 91800 Veracruz,  
Ver. Mexico  
Westport Shipyard, P.O. Box 308, Westport, WA 98595  
Willard Marine, Inc., 1250 N. Grove St., Anaheim, CA 92806  
Zodiac of North America Inc., Thompson Creek Rd., P.O. Box 400,  
Stevensville, MD 21666  
Friede Goldman, 525 E. Capitol Street, Suite 402, Jackson, MS 39201

**SHIPLYARD/CABLES**  
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21219-2599  
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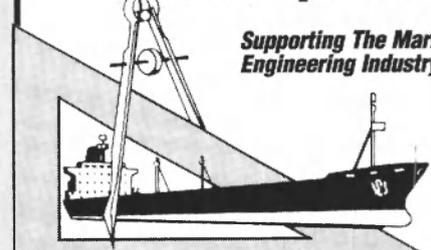
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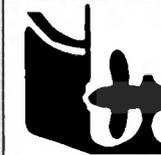
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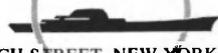
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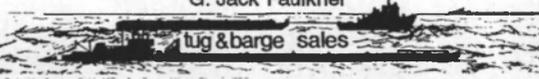
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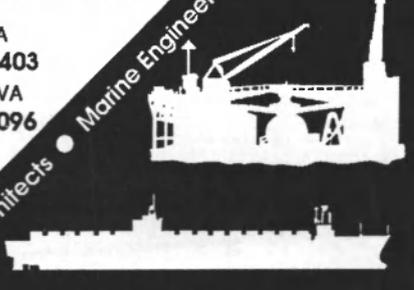
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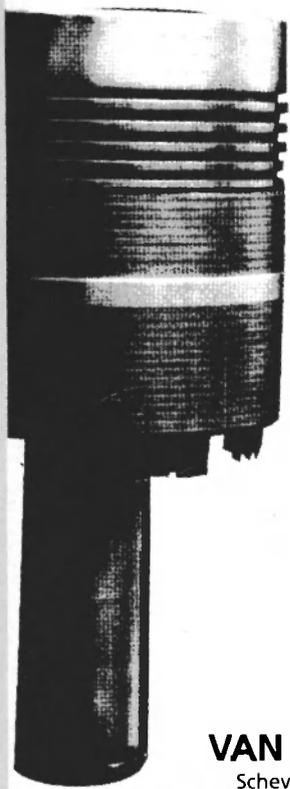
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