

**MARITIME  
REPORTER**  
AND  
ENGINEERING NEWS

SPECIAL FOCUS:

**Clean Seas  
& Safety**

**Ship Repair:**

New Regulations Contribute To Market Upswing

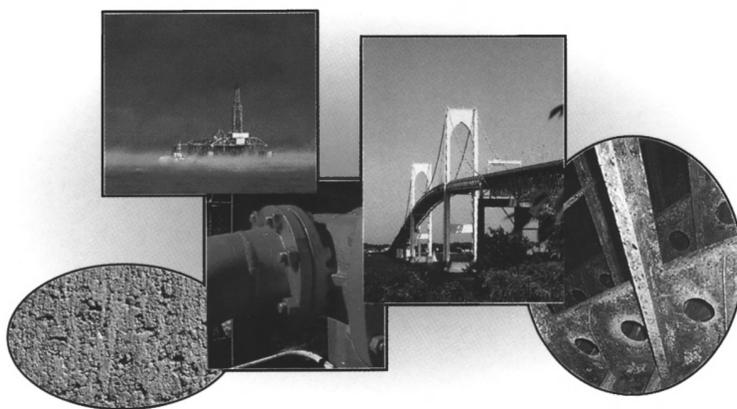


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**OCTOBER 1995**

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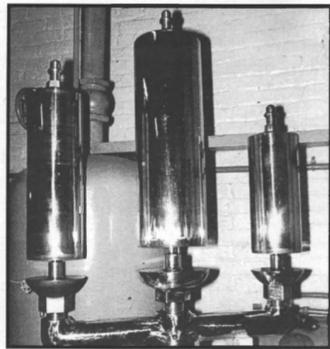
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## ON THE COVER

Pictured on this month's cover are a pair of port pilot boats — the *Phineas Banning* and the *Stephen M. White* — both assembled at Willard Marine boat yard in Anaheim, Calif. The boats were designed specifically to serve the needs of Los Angeles port pilots who, under U.S. Coast Guard regulation changes, will have their boarding area extended to three miles out to sea. The 52-ft. (15.8-m) vessels can cruise at 27 knots. See full details on page 18.

### 30 SETTING A COURSE FOR CLEANER SEAS

Legislation and regulations have resulted in research programs and technological developments aimed at designing MARPOL-compliant vessels. Also, see how some suppliers are making regulatory compliance easier for owners and operators.

### 48 SHIP REPAIR

The ship repair sector has benefited from increased regulation, but which yards are benefiting the most, and where? What market segments are expected to be the hottest in the repair industry? International Editor Alan Thorpe addresses these questions and more.



### 62 SAFETY AT SEA

Ship casualties are down, but shipbuilders, owners and operators are under constant pressure to produce and maintain safer ships.

#### ALSO IN THIS ISSUE:

- 40 European Update:** FBM decision to specialize in fast ferries pans out; Dutch yard wins RoRo orders; Scottish shipbuilders make a comeback.
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**MARITIME  
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## EDITOR'S NOTE

Whereas death and taxes are the reputed certainties in life, new rules and regulations in regard to safety at sea and clean seas are just as sure bets in the marine industry. The phrases "Clean Seas" and "Safety at Sea" are heard so often that it might seem they have entered the fraternity of industry buzzwords. But the fact is, tremendous efforts by international authorities to enact rules and regulations to protect the environment, the ship and the crew have brought the issues to the top of most every vessel owner/operator's agenda.

With new rules and regulations constantly coming on-line or being discussed, the challenge for the shipbuilder and the shipowner is to integrate the mandated changes — often entailing considerable capital expenditure — in a cost-effective and efficient manner.

Focusing on both safety and clean seas in this issue happens to be particularly relevant, considering the vast number of issues currently under scrutiny by national and international regulatory bodies. When the Conference of Contracting Governments to the International Convention for the Safety of Life at Sea meets next month at IMO headquarters, major changes to the safety standards of RoRo passenger



ships are expected. While new standards regulating the building and outfitting of RoRos affect only a niche of the marine industry, it can be safely said that the fervor to make *all* vessels safer and cleaner is rapidly rising. According to the recent ILU casualty report (page 62), the industry is heading in the right direction. Merchant ship casualty, in terms of both number of ships and total gross tonnage, has shown marked improvement during the first six months of 1995, as compared to the same period in 1994.

Tying in with our environmental theme (albeit not intentionally), International Editor Alan Thorpe reports that the ship repair market outlook is good, due to heightened environmental pressures, as well as rising freight rates. The article starts on page 48.

*One final note:* Questions have been forwarded to me regarding *MR/EN's* reporting on statistics quoted at a MarAd-sponsored conference, and referenced in the featured article of the August 1995 edition, "U.S. Yards: Seeking the Competitive Edge." Two of the letters received are reprinted on page 8.

Greg Trauthwein, editor

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### Daewoo Receives \$185 Million Order From Chevron

Daewoo Heavy Industries Ltd. won a \$185 million order from Chevron Overseas Petroleum to design and build three offshore oil production platforms for operation off the coast of Angola. Daewoo Heavy won the contract following six months of

heated competition.

The platforms are designed to weigh 22,000 tons and are expected to be completed in 21 months. Daewoo will provide all test operations. Following completion, Chevron reportedly has plans to put the

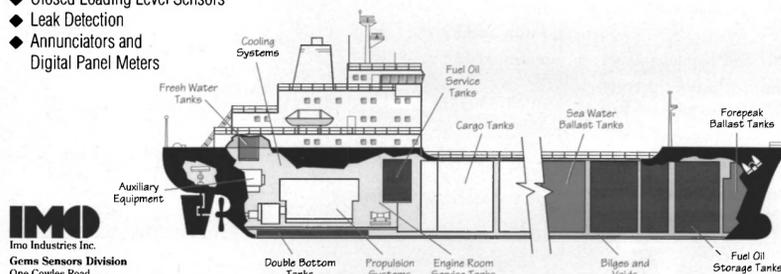
platforms into operation in the Cabinda oil fields off the coast of Angola for the daily production of 100,000 barrels of crude per day. Chevron was reportedly impressed with the company's quality production on previous jobs.

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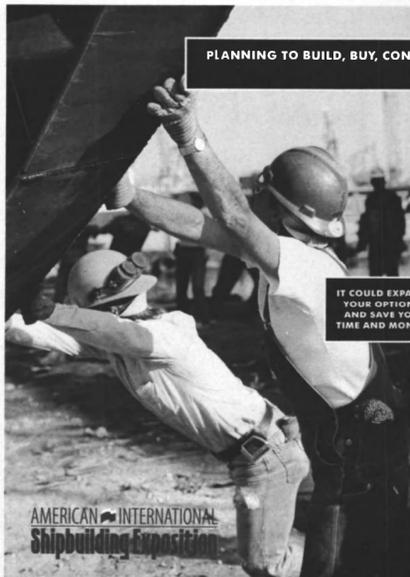
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## LETTERS TO THE EDITOR

### Dear Editor:

In the Editor's Note section of the August 1995 issue, you requested comments or suggestions be sent to your attention via e-mail or telefax.

Before I address my concern, I would like to go on the record that as a longtime sub-

scriber to MR/EN, I have noticed a significant improvement in the quality and content of your editorial articles; however, I am concerned with comments made by Mr. Stott at the recent conference on shipyard competitiveness, and reflected in the article "U.S. Yards: Seeking the Competitive Edge."

Your article referenced Hitachi Zosen's ambitious goal of achieving productivity levels of six to eight employee hours per completed compensated gross ton (CGT). Since I have the reputation of being a "barn yard" economist, this information piqued my interest, and I was able to receive additional

information in the form of Table 1 of Mr. Stott's MarAd presentation. Table 1 states: "U.S. shipyard employees produce at a rate of 150-200 employee hours per CGT, while Japanese workers' current rate is 17-22 employee hours per CGT." How can that be? Are you telling me that the U.S. worker is only 11 percent as efficient as the Japanese worker? Even if the U.S. rate is based on production of military warships, the spread does not make any sense at all. If these numbers are even close to being accurate, why should we even bother with Title XI financing as well as government programs designed to encourage capital investment in domestic ship construction?

I fear that information of this nature could damage the editorial credibility of MR/EN. I would appreciate comments from your side on this issue.

Sincerely,

James Baur  
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*The MarAd-sponsored conference at which the statistics on production were quoted prompted this letter from international maritime consultant James R. McCaul, IMA Associates, to Adm. Herberger. The letter is reprinted here with Mr. McCaul's permission. — ed.*

### Dear Adm. Herberger:

The conference on shipyard competitiveness, sponsored by the Maritime Administration Office of Shipyard Revitalization, provided comparative data for employee hours per CGT in U.S. and Japanese shipyards. This information was provided in the introduction to the conference, setting the scene for the recommendations that followed.

Can you really believe that U.S. shipyards are one-tenth as productive as Japanese shipyards? I certainly don't believe this. Nor do any of the Japanese shipbuilders with whom I've spoken believe they are 10 times as productive as U.S. shipyards. Maybe 30 to 50 percent more productive due to learning and volume, but not 10 times!

It's my understanding that the U.S. government is attempting to help U.S. shipyards move into commercial work... Inaccurate information depicting U.S. shipyards as unproductive dupes is counterproductive... It scares prospective customers. To use a government-sponsored forum to convey this image make no sense.

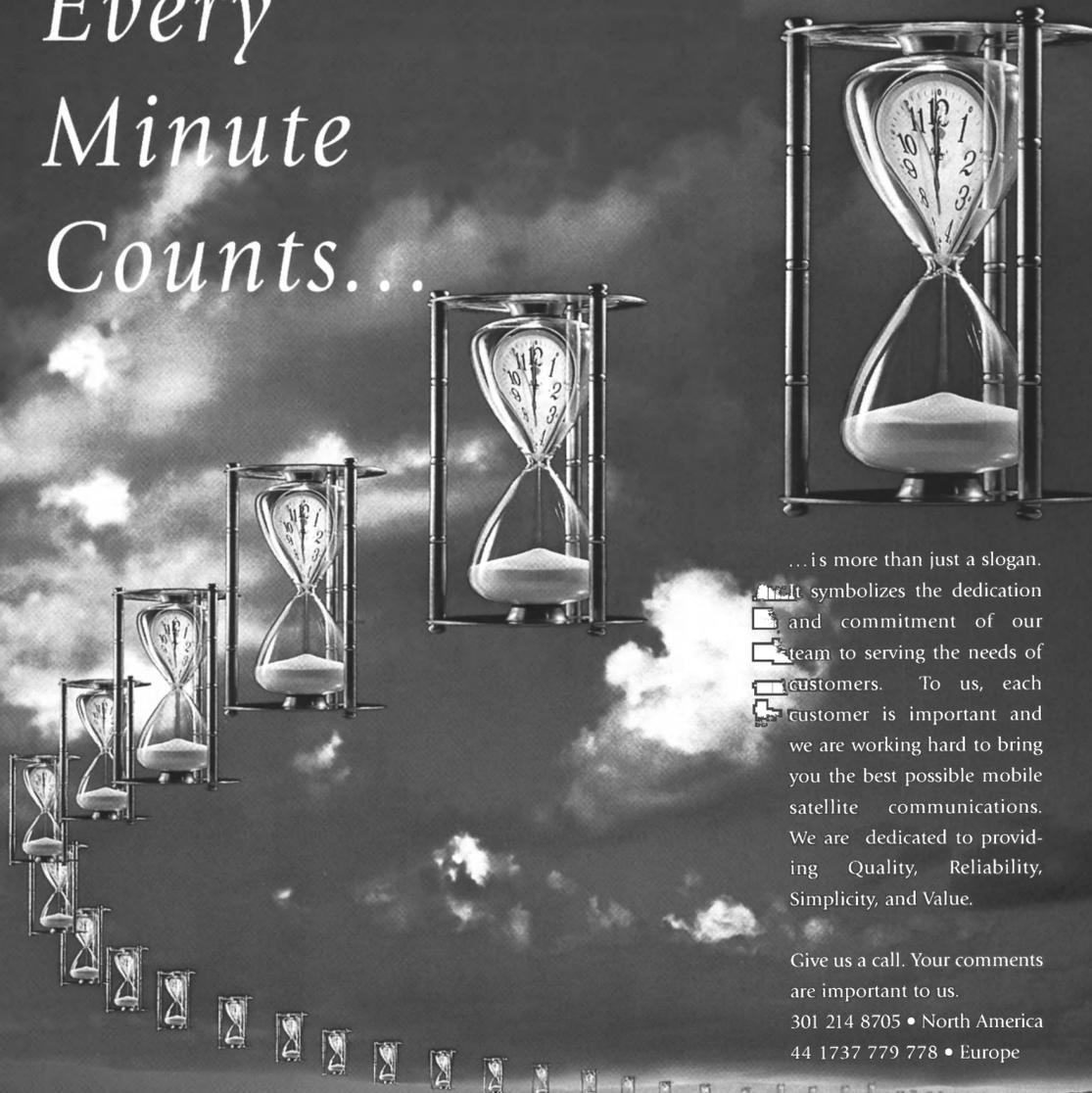
Wouldn't it be far better to focus on the successes of Newport News, Trinity, Avondale, Alabama in attracting foreign customers? In fact, how do you explain these successes in light of the ridiculous productivity comparisons provided in this conference?

Sincerely,

James R. McCaul  
President  
IMA Associates  
Washington, D.C.

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### OSI Wins U.S. Contract

Offshore Systems International (OSI) sold 10 ECPINS (Electronic Chart based Precise Integrated Navigation System) to the American Steamship Co., based in Buffalo, N.Y., a subsidiary of GATX Corp. The systems will be installed on self-unloader bulk carriers which travel on the Great Lakes. Installation is scheduled for this month.

The sale is the largest U.S.-based commercial sale in the company's history. American Steamships' fleet-wide purchase of ECPINS reportedly makes the company the largest U.S.-based user of Electronic Chart Display and Information Systems (ECDIS). The bulk carriers vary in size from 639 ft. to 1,000 ft. (194.75 m to 304 m).

The company also reported a financial plan which will help it improve sales and marketing ca-

capacity. OSI has reached an agreement with Spratt Securities Ltd. to act as agent to arrange a major private placement in the amount of \$2.55 million to \$3.4 million. The placement is on a best efforts basis and is in the form of Special Warrants. A minimum of 1.5 million Special Warrants to a maximum of two million Special Warrants priced at \$1.70 per warrant are being sold.

For more information on OSI  
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### Evergreen And Uniglory To Upgrade Container Fleets

Taiwan's Evergreen Group is to build 11,850 new freight containers in order to upgrade the fleets now operated by sister companies Evergreen Marine Corp. (EMC) and Uniglory Marine Corp.

The total value of the contracts is approximately \$50 million. EMC placed an order with Evergreen Heavy Industrial Corp. (EHIC) in Chung Li, Taiwan, for 2,050 new general purpose containers plus 200 refrigerated containers. The general purpose containers comprise 400 20-ft., 1,400 40-ft. and 250 40-ft. hi-cube units, for a total of 3,700 TEUs. The 200 reefer units are also 40-ft. high-cube containers.

EMC also placed orders with EHIC's Malaysian subsidiary, Evergreen Heavy Industrial Corp.

### Evergreen Signs Panama Container Terminal Contract

Dr. Chang Yung-fa, chairman of the Evergreen Group, and Ernesto T. Balladeras, president of Panama, signed a contract whereby Evergreen will invest \$85 million in the first phase of a new container terminal at Colon at the eastern end of the Panama Canal. The new facility, the Colon Container Terminal, is located at Coco Solo, adjacent to the city of Colon, to the north of Panama City. Construction of the first phase will start in March 1996 and is scheduled to be completed in December 1997. The facility will be managed by Evergreen on a common-user basis. Once the first phase of the terminal is fully operational, the company predicts an annual throughput of 300,000 to 400,000 containers. Initially, the two berths will be served by three Panamax gantry cranes. The new terminal will become the hub point for Evergreen's regional Caribbean feeder service. It currently uses two 510-TEU vessels.

### Karl Senner Enters Agreement With Centrico

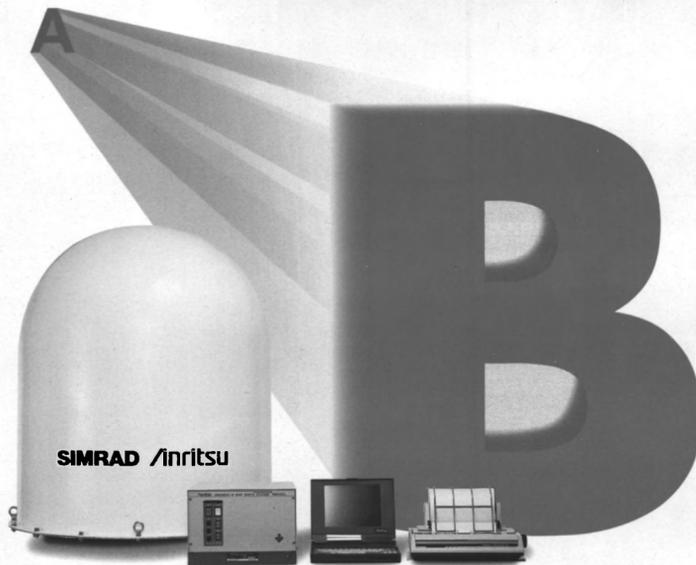
Karl Senner of New Orleans entered an agreement with Centrico to sell and service Westfalia separators for marine service in the U.S. Gulf Coast area.

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## Austal Delivers 25th Vessel To China

Western Australia shipbuilder Austal Ships recently celebrated the delivery of its 24th and 25th high-speed ferries to China. Since the first Chinese delivery in 1990, the company's 131.5-ft. (40-m) catamaran has evolved into a sleek, streamlined look, with an emphasis on client specifications and propulsion alternatives, as well as the design-specific rounded bilge and bulbous bow. The most recent vessels, *Shun*

*De* and *Hai Yang*, were respectively fitted with gas turbines and diesel engines. Yuet Hing Marine Supplies of Hong Kong ordered the ships, on behalf of the Shun Gang Passenger Transportation Corp. (*Shun De*), and the Ahuhai Jiuzhou Port Shipping Co. (*Hai Yang*). They will join a fleet of 21 Austal-built ferries already servicing the Hong Kong and Guangdong region.

*Shun De* has a service speed of 40 knots, and a passenger capacity of 332. *Shun De* represents the owner's fourth Austal-built vessel, and second gas turbine ferry, and will replace an original vessel of the same name which has been sold to another area operator. *Hai Yang* has a service speed of 33.5 knots, and a passenger capacity of 338. Both vessels share the dimensions of 131.5 ft. (40.1 m) by 37.7 ft. (11.5 m) by 4.59 ft. (1.4 m).

For more information on Austal Ships  
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### Shun De Specifications & Equipment

Vessel type ..... Passenger catamaran  
Port of registry ..... Rong Qi,  
..... People's Republic of China  
Classification .. China Classification Society  
Length overall ..... 131.5 ft. (40.1 m)  
Width ..... 37.7 ft. (11.5 m)  
Depth ..... 4.59 ft. (1.4 m)  
Service speed ..... 40.2 knots  
Main engines ..... (2) AlliedSignal TF 40  
..... gas turbines  
Gearboxes ... (2) Cincinnati Gear MA 107  
Propulsion system ..... (2) KaMeWa  
..... 71S waterjets  
Auxiliaries ..... (2) MTU 6V183AA51

### Hai Yang

Vessel type ..... Passenger catamaran  
Port of registry ..... Zhu Hai,  
..... People's Republic of China  
Classification .. China Classification Society  
Length overall ..... 131.5 ft. (40.1 m)  
Width ..... 37.7 ft. (11.5 m)  
Depth ..... 4.59 ft. (1.4 m)  
Service speed ..... 33.5 knots  
Main engines ..... (2) MTU  
..... 16V396TE74L diesels  
Gearboxes ..... (2) ZF 8U755  
Propulsion system ..... (2) KaMeWa  
..... 71S waterjets  
Auxiliaries ..... (2) MTU 6V183AA51s

### Edgetech Announces New European Service Center

Edgetech, a Milford, Mass., marine instruments manufacturer, has announced the appointment of Oretch Sales B.V. in the Netherlands as its authorized European service center, effective November 1, 1995. Oretch will service all Edgetech products for European customers, and the Oretch technicians will be factory trained by experienced Edgetech personnel so that upgrades and repairs will be able to be carried out in the field. Consumables, spare parts, and rental/lease equipment will also be available through the service center.

For more information on Edgetech  
Circle 65 on Reader Service Card

Maritime Reporter/Engineering News

## Hitachi Zosen Receives Orders For Two LPG Carriers

Hitachi Zosen Corp. won an order for a pair of LPG carriers, each with a capacity of 18,000-cu.-m., from Norsk Hydro A.S.

Established in 1905, Norsk Hydro is Norway's largest publicly-owned industrial concern. It is now operating 13 gas tankers, and the newly ordered LPG carriers will enhance the company's petrochemi-

cal and fertilizer product transportation capacity.

The carriers are designed to transport not only LPG, but also a variety of other products, including ammo-

nia and vinyl chloride monomers. Powered by Hitachi Zosen B&W6S50MC diesel engines, the multipurpose LPG carriers are designed for excellent safety and eco-

nomical performance.

The ships will be built at the company's Ariake Works.

For more information on Hitachi Zosen Circle 192 on Reader Service Card

### 18,000-cu.-m. LPG Carrier Main Characteristics

Length o.o. ....	505 ft. (154 m)
Breadth, molded .....	80.7 ft. (24.6 m)
Depth, molded .....	43 ft. (13.1 m)
Scantling draft, molded .....	30.6 ft. (9.35 m)
GT .....	13,800 (approx.)
DWT .....	18,500 (metric)
LPG tank capacity .....	18,500-cu.-m.
Main engine .....	Hitachi Zosen B&W
Delivery .....	1997

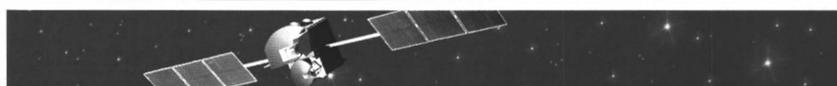
## ACL To Acquire All Marine Assets Of ContiCarriers & Terminals

Continental Grain Co. of New York and American Commercial Lines (ACL) of Jeffersonville, Ind., announced they have signed a letter of intent under which ACL will acquire all of the marine assets of ContiCarriers & Terminals, Inc. (CCT), a wholly-owned barge transportation subsidiary of Continental Grain, and CCT's wholly-owned subsidiary, Dakota Barge Service, Inc. of St. Paul, Minn.

The transaction, which is subject to the negotiation of definitive agreements and applicable regulatory approval procedures, is expected to be completed by the end of the year. It involves 400 barges, nine towboats and three drydocks.

In addition, Continental Grain intends to enter into a long-term contract with ACL to supply barge freight to Continental's inland river elevators. **John Zick**, senior vice president and general manager of Continental's North American Grain Division, said the company's decision to withdraw from the barge business and to outsource its barge transportation needs from ACL will better position it to manage its core businesses — the origination and international marketing of grains and oilseeds.

**Michael C. Hagan**, president and CEO of ACL, said the outsourcing by Continental of its barging operations to ACL builds on the long-standing partnership between the companies.



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## Singmarine Wins \$34 Million Contract

Singmarine Industries won a \$34 million contract from F.T. Everard & Sons Ltd. of the U.K. to build a pair of coastal tankers for ocean petroleum products. The contract to build the two 3,700-dwt vessels was reportedly won against stiff in-

ternational competition.

The first of the vessels is expected to be delivered by the fourth quarter of 1996, with the second delivered in the first quarter of 1997.

"We appreciate the confidence of F.T. Everard & Sons in Singmarine's

capability and experience demonstrated by their awarding the building of the two coastal tankers to us," said **Toh Ko Lin**, executive director, Singmarine.

The vessels will measure 288.7 ft. (88 m) long and 54 ft. (16.5 m)

wide, capable of a service speed of 12.5 knots. They will be of double-hulled construction and reportedly state-of-the-art in regards to cargo handling and monitoring systems. Each vessel will have complete segregation of up to five grades of cargo, with a total capacity of 4,250 cu. m.

For more information on Singmarine  
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## Army Corps Of Engineers Seeks Vessel To Purchase

The director of the U.S. Army Corps of Engineers' Marine Design Center (MDC) announced the initiation of a negotiated procurement to acquire one existing floating crane of suitable quality and characteristics to support the Lock and Dam Maintenance Mission of the Rock Island District, USACE.

The vessel to be acquired shall be a non-powered, steel constructed barge, supporting a permanently mounted, revolving heavy lift crane capable of satisfying various lifting requirements.

The barge, including the crane foundation, shall be classed by the American Bureau of Shipping as an "A 1 BARGE," and shall hold a current classification certificate, both at the time of proposal and at the time of delivery. Physical condition inspections of each qualified vessel will be required prior to contract award, and shall be performed at the offerers' location.

Interested parties should contact: Commander and District Engineer, U.S. Army Corps of Engineers, Philadelphia District, Wanamaker Building, 100 Penn Square East, Philadelphia, Pa. 19107; tel: (215) 656-6770; attn: CENAP-CT (Ms. Linda Toth); Reference: DACW61-96-R-0001.

## Orbital, Teleglobe Sign Final Agreements For 36-Satellite Orbcomm Network

Orbital Sciences Corp. and Teleglobe Inc. signed a final financing and construction agreement for an expanded 36-satellite Orbcomm global communications system. Under the terms of the agreements, Teleglobe will invest a total of \$85 million; Orbital a total of \$75 million. The total capital committed to the project will be \$160 million and the two companies will each own 50 percent of Orbcomm Global, the owner and operator of the system.

In a related event, Orbital announced that it has received a \$160 million contract from Orbcomm Global for the construction and launch of the remaining 34 Orbcomm satellites.

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## MARITIME ADMINISTRATION NEWS

### Applications Approved

#### MarAd OKs Sales Request

MarAd has approved a request by J. Ray McDermott Holdings, Inc., New Orleans, La. to sell and transfer to Panamanian registry the cargo barges *Intermac 600* and *Intermac 627* to Panama Offshore Chartering Co. 19, Inc., a Panamanian corporation.

#### Hurricanes Cause NPR Delays

MarAd has granted a request from NPR, Inc. to operate the SS *Carolina* and the SS *Nueva San Juan* in the domestic trade for one voyage each to accommodate NPR's new deployment. NPR said unforeseen events, including, among other things, an extraordinary hurricane season, caused significant vessel deviations and delays. None of NPR's competitors raised any objections to the emergency request. Section 506 of the Merchant Marine Act of 1936, as amended, permits the temporary transfer of vessels built with the aid of construction-differential subsidy (CDS) into domestic trade up to six months if it is deemed necessary. Vessel owners must receive written permission from MarAd and must repay CDS on a pro-rata basis for periods of domestic trading. The two vessels were built with the assistance of CDS.

#### Drilling Rig Transfer OKd

MarAd has approved a request by Whittington Drilling Ltd., a Bermudian corporation, to transfer the drilling rig *Arethusa Staworker* (ex-*Treasure Staworker*; ex-*Penrod*), to Panamanian registry, without change in ownership.

#### MarAd Extends Subsidizable Lives Of Two Vessels

MarAd and Maritime Subsidy Board have approved an application from Mormac Marine Transport, Inc. to extend the subsidizable life on the *Mormacstar* and *Mormacsun* and to enter into a subsidy sharing arrangement among those vessels and the *Mormacsky*.

The subsidy board noted that under the action the amount of operating-differential subsidy payable under the new arrangement will not increase beyond what already had been authorized. The board also determined the action was in the public interest "in view of the maintenance of useful ships manned with trained and efficient personnel to meet active sealift requirements of the Department of Defense and to maintain U.S.-flag commercial service on its essential liquid and dry bulk cargo carrying services ..."

Under the board's action, the *Mormacstar* and *Mormacsun* will

remain eligible until for financial aid until the subsidy contract expires Jan. 31, 1997, when both will be more than 20 years of age.

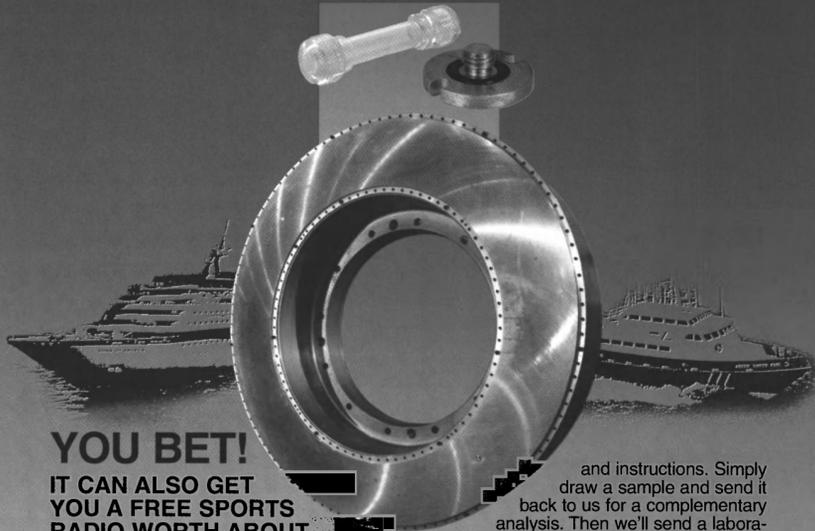
A notice of Mormac's request was published in the *Federal Register* on Aug. 10, but no responses were received.

#### Crowley To Sell Tank Barge

MarAd has given Crowley Marine Services, Inc., Oakland, Calif., permission to sell a tank barge (*Barge No. 25*) to Atlantic Service Supply, S.A., a Panamanian corporation. The barge will be transferred to Panamanian registry. MarAd also has ap-

proved an application by Key International Drilling Co. Ltd., a Bermudian corporation, to transfer the ownership of a Panamanian drilling rig (*Santa Fe Rig 127*) to Santa Fe Drilling Operations, Inc., a Cayman Islands corporation. The vessel will remain under Panamanian registry.

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## MARITIME ADMINISTRATION NEWS

### Applications Received

#### Permission Sought To Sell Drill Rig

MarAd has received an application by Key International Drilling

Company Ltd., Dallas, Texas, asking permission to sell the 6,104-gt oil drilling rig *Santa Fe Rig 127* to Santa Fe Drilling Operations, Inc., a Cayman Island Corp., also of Dallas. The rig would be used in worldwide drilling operations. It was built in Kaohsiung, Taiwan in 1981.

#### Neptune Asks Permission To Sell Tanker

MarAd has received a request from Neptune Int'l., Inc., Elk Grove Village, Ill., to sell the 27,269-gt tanker *Baltimore Trader*. The proposed purchaser is Neter Navigation, S.A., of Singapore. The vessel would be

resold to Baldev Ship Breakers of India and scrapped in that country. The vessel was built in 1955 in Sparrows Pt., Md.

#### Coastal Tug & Barge Files Application

Coastal Tug & Barge, Miami, Fla., has applied for permission to sell the oil barge *Coastal 29* to Serenity Navigation Co. of Panama for operation under Panamanian registry. The barge would be used for bunker supply within the Panama Canal waters to supply vessels in both sides of the canal.

#### MarAd Published Final Rule Regarding Academy Regs

MarAd is publishing a final rule in the *Federal Register* amending regulations for admission and training of midshipmen at the U.S. Merchant Marine Academy. This rule modifies 46 CFR Part 310 which concerns nomination and admission to the Academy of persons from American Samoa and Panama and the Secretary of Transportation's authority to recover costs of education from graduates if they fail to fulfill certain conditions of their service obligations. The rule, assigned Docket No. R-161, is effective upon publication. For additional information, contact Crawford Ellerbe, Academy program analyst, Office of Maritime Labor and Training, 400 Seventh Street, SW, Room 7302, Washington, D.C. 20590. He may be reached at tel: 202-366-2643.

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Circle 26 on Reader Service Card

### DNV Introduces Nauticus Hull-Design Software

Det Norske Veritas (DNV) has introduced a hull design software program, Nauticus. The program is designed to assist in the design of hull forms. As the user enters the design data in form, the rules of the software automatically check the design against the DNV standards. The program allows the design of a complete hull form in minutes, ensuring compliance with DNV as well as statutory requirements.

The Total Safety Class is based on the belief that all maritime accidents result from a chain of events related to the hardware (the ship itself), the software (the organization), and the qualifications of the humans operating both.

According to DNV, the Total Safety Class concept requires a strong emphasis on information management, requiring a view toward the next generation of Information Technology (IT)—enabling the processing of large amounts of data in a more consistent and efficient way. Nauticus was created to be a tool for achieving that flow of information, as it provides hull designers a means of creating a hull form that automatically conforms to DNV standards.

For more information on DNV Circle 61 on Reader Service Card



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## Pilot Vessels Designed For Anticipated USCG Regulation Changes

On August 31, a dual christening was held at Worldport LA for the Port's new pilot boats, *Phineas Banning* and *Stephen M. White*, as each was welcomed into service, after a design process that commenced more than a few years ago, according to **Jack Hochadel**, vice president of Willard Marine — the yard charged with the vessel construction and outfitting.

The vessels were designed specifically to serve the needs of Los Angeles Port pilots, whose boarding area will be extended from three-quarters of a mile to three miles out at sea, under anticipated U.S. Coast Guard (USCG) regulation changes. At Los Angeles Harbor, a pilot boards a ship out at sea, and helps steer it past the Los Angeles Lighthouse to its assigned berth in the 7,500-acre Port. Departing ships also carry pilots, who board while still at berth, and disembark after the vessel is at sea.

C. Raymond Hunt Associates, Inc., of Boston, Mass., designed the vessels, based on the requirement for fast, pilot-boarding launches capable of year-round, all-weather operation, with the capacity to maintain speed and provide stable boarding in rough seas. In a recent talk with *MR/EN*, Captain **Patrick Donahue** of Worldport LA reported on the vessels' operation since both were put in service, one in mid-June, and the other during the first week of August.

"They handle better with a little

more speed. With the old boats, we had to go slow. Now boarding is possible at eight to ten knots," said Captain **Donahue**.

When asked how the pilot boats will contribute to the overall operation of the Port, he responded, "We can service ships out further and faster. With the old boats, people would stack up. We can now service three or four at a time, and keep them coming."

### Phineas Banning and Stephen M. White Specifications

Length	52 ft. (15.8 m)
Width	15 ft. (4.5 m)
Depth	4.5 ft. (1.3 m)
Hull	20 degree deadrise deep-V
Maximum speed	27 knots
Service speed	22 knots
DWT	23

### Equipment List

Main engines	(2) Detroit Diesels, each rated 530 bhp
Propeller	Michigan 32 x 33 Dynaquad
Couplings	Detroit Diesel taper fit
Reduction gears	Twin Disc MG 511A 1.92:1
Engine controls	Detroit Diesel DDEC single lever
Shafting	2.5-in. Aquamet 22 H.S. stainless
Bearings	B.F. Goodrich Cutless Commander
Radar	Furuno KCR-1030
VHF radio	(2) Furuno FM-2610
Compass	Ritchie Magtronic digital display
Pumps	Jobco
Liferafts	Viking 10-person 10 DX
Devil	Nautical Structures Model YD 600 DC
Firefighting system	Kidde



Phineas Banning and Stephen M. White, two pilot boats Willard Marine constructed and outfitted for Los Angeles.

Circle 223 on Reader Service Card For Detroit Diesel

Twin Detroit Diesel main engines dominate Phineas Banning's engine room.



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USSC 4148 - 13 Stidd Seats aboard. photo by Don Hervey

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## INFORMATION TECHNOLOGY

### MMS, ABS Info Integration Project Wins ARPA Funding

The Integrated Shipboard Information Technology (ISIT) Platform project has been selected for funding by the Department of Defense's Advance Research Projects Agency (ARPA), and the project is now in development. ISIT is a \$3.8 million, 18-month project undertaken by a team of seven firms and headed by Marine Management Systems of Stamford, Conn.

The ISIT Platform will provide a shipboard information and communication base that, for the first time, will integrate the various "islands of information" that exist onboard modern commercial ships, into one central and accessible database. Although significant amounts of important management and technical data exist in the navigation, cargo and machinery control systems, this data has been unavailable from a single shipboard source and therefore is largely unavailable to shore-based management while the ship is at sea. ISIT will also provide a standard open architecture platform to run shipboard software and will include a standard data satellite communications path to shore systems. The trends in the maritime industry for more complex ships, smaller crews and dramatically increased regulatory requirements are all converging to create a critical and urgent need for the ISIT platform.

"Industry consensus standards for data transfer are a critical ingredient in the ISIT project, and there is tremendous interest from shipowners and operators," according to Eugene D. Story, president of MMS and chairman of the American Society for Testing and Materials (ASTM) working group that will be responsible for developing the standards. In addition, the American Bureau of Shipping will develop guidelines for shipboard data management systems as part of the project.

The ISIT development team consists of seven companies, each a leader in its field, and each contributing in its area of specialization. MMS, a provider of ship-to-shore communications and shipboard operations management software, will act as the project leader. Ultimateast Data Communications will provide satellite communications technologies, including development of a Virtual Earth Station. Radix Systems will contribute maritime systems testing, integration and project management. ABS Marine Services, an affiliate of the American Bureau of Shipping, will develop standards and implementation guidelines. General Electric Marine Systems will contribute to the development of standard data interfaces to machinery and cargo control systems. M. Rosenblatt & Son, naval architects and marine engineers, will provide shipboard design and installation services, coordinate the shipboard installation, and work to develop dual use (commercial and military)

October, 1995

applications of the technology.

In addition, an advisory board, consisting of principal ship operating companies, shipyards and satellite communications companies, will support the project and provide critical comment and review.

ARPA announced in May the selection of 24 new projects for nego-

tiations as a result of the FY 1995 Maritech competition. Now in its second year, the five-year Maritech program is a federal effort to develop and apply advanced technology to improve the competitiveness of the U.S. shipbuilding industry and thereby preserve the capability for Navy ship construction. Maritech is

matching industry investments with federal funds on a competitive basis to develop and implement technologies and advanced processes to increase the competitiveness of ship design, marketing, construction and support.

For more information from MMS  
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## INFORMATION TECHNOLOGY

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For more information on ShipNet  
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### Armada Data Offers Module-Based Shipping Software

Armada Data offers a series of integrated software packages developed over the course of 20 years' shipping experience on the part of its parent company, the Armada Group.

The Armada Shipping System presently consists of software modules for control of key areas of the shipping business, from communications and accounting to vessel, voyage and cargo control. The modules can be implemented individually or as an integrated system to provide overall control of shipping operations. Available modules include:

— The Voyage Estimate module allows the user to carry out sensitivity analyses on the basis of freight rates, bunker prices and loading quantities. It also facilitates world scale tariff calculations for tanker businesses.

— Voyage Operation is designed to control the specific voyages and to register all relevant details of the shipping contract.

— Liner Operations is used by shipowners and agents. By means of this module, the loading port agent reports cargo bookings and Bill of Lading details via the shipowner to the discharge port agent.

— Container Tracking keeps track of both owned and leased containers, containing various search functions.

— The Claims module is used for administration of claims and for generating reports on claims handling at various stages.

— The Accounting module is a multidimensional system which offers accountancy specifically for the shipping industry. As many as three currencies per transaction are supported.

— Cash Flow is a module used to analyze the cash flow of the company during a selected period of time. It is possible to make cash flow statements for one day, one week, or one month, as well as to draw monthly liquidity balances.

Other modules are also available. The system is designed to operate on the full range of IBM AS/400 computers, allowing expansion of the system from a few to more than 2,000 terminals or PCs without software changes.

For more information on Armada Data  
Circle 56 on Reader Service Card

### Performance Prediction Software From Napa Oy

Onboard-NAPA is a program devised by Napa Oy for car ferries, cruise liners, tankers, and naval ships, which enables on-board calculations of ship loading, damage stability analysis and ship performance predictions.

In NAPA — also developed by Napa Oy — all calculations are based directly on a 3D geometry model, affording greater accuracy and reliability. Graphics and data management are based on a unique ship model concept, which enhances accuracy and consistency in both the calculations and user information.

October, 1995

The data are stored in one uniform database for flexible management of loading cases and providing impressive output report with powerful statistics. That accuracy and reliability are also features of Onboard-NAPA, as both systems use the same data and procedures. The design database used for production at a ship-

yard is directly transferable to Onboard-NAPA, which is available for 486 PCs running the Solaris-UNIX operating system.

According to Napa Oy, the program improves safety by verifying loading conditions against rules and regulations before departure. It can also be used as an accurate damage

stability analyzer for training purposes and in case of an emergency. The program reportedly promotes maximum utilization of the ship's cargo carrying capacity by means of accurate cargo planning and the production of precise cargo reports.

For more information on Napa Oy  
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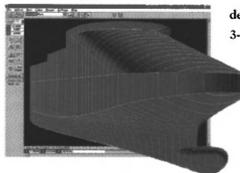
Next, we define all the tanks and compartments in **Autohydro**. Calculating volumes and balancing the ship is easy and quick, so we can spend more time to optimize the layout.

We define the structural members in **Autobuild**; the program automatically checks for interference and generates a bill of materials and a complete list of weights. That eliminates manual drafting, saves the yard manhours, and reduces the usual worry about weight.

To save even more, we can export directly to NC cutting machines, radically reducing lofting and nesting costs.

Yes, all these programs come from the same place — Autoship Systems, the world's largest developer of Windows™-based marine software. With Autoship, the entire design process, from concept to cut plates, is a smooth, seamless flow.

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Circle 205 on Reader Service Card

## TEXTRON Marine & Land Wins \$26.6 Million USCG Contract



*With options, contract could total 140 boats, \$165 million*

Textron was awarded the initial contract for the construction of twenty 47-ft. (14.3-m) Motor Lifeboats (MLB) for the U.S. Coast Guard (USCG). The contract is valued at \$26.6 million and includes associated training, spares and other incidentals. The new MLB significantly enhances the USCG's ability to perform search and rescue operations in heavy weather.

"This is a great victory for Textron Marine & Land Systems, our employees, and our community," said **John J. Kelly**, president of Textron. "We are proud to be able to produce this technical innovation with its significant humanitar-

ian implications for marine safety at sea. Further, there is a strong international interest in this unique design."

Textron Marine & Land Systems designed and manufactured the prototype 47-ft. MLB in 1990 and later won a contract for the five pre-production boats. During the pre-production phase of the program, the company made significant investments to develop innovative engineering solutions and initial manufacturing processes for the prototype and five pre-production craft.

The latest contract for the construction of the MLBs was won

competitively under a full and open competition. Following construction of the initial 20 vessels, the USCG plans to exercise options for up to 120 additional craft. The contract value, with all options, is approximately \$165 million.

#### **Packed with technological advances**

The 47-ft. MLB design incorporates many technological innovations. It features a lightweight, rugged aluminum hull designed to withstand 20-ft. (6.1-m) breaking waves at three times the force of gravity. The vessel is fast — sporting a top speed of 25 knots — which

provides for faster response times in life-threatening situations. The MLB also has a self-righting capability which enables it to pitch-pole or roll into swells and self-right in less than 30 seconds. The crew can operate from an open bridge or an enclosed bridge in heavy weather, for added safety and better visibility. Headquartered in New Orleans, Textron Marine & Land Systems will do all of the manufacturing work at its facility in New Orleans East. Work is scheduled to begin in the third quarter of 1995, and delivery of the first craft should commence in late 1996.

For more information from Textron  
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Maritime Reporter/Engineering News

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# Trimble

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## Blohm + Voss Sports New Corporate Structure

The Supervisory Board of Blohm + Voss AG adopted resolutions which open the way to a new structure for the Blohm + Voss group.

Blohm + Voss AG is to separate its operational activities into two legally independent companies and will, in the future, function purely as a holding company under the name Blohm + Voss Holding AG.

The companies to be formed as a result of the separation are Blohm + Voss Maschinenbau GmbH, which will be wholly owned by Blohm + Voss Holding AG, and Blohm + Voss Werft GmbH. The shares of the latter will be brought into a new Thyssen Werften GmbH, as will the shares in the shipyard of Thyssen Nordseewerke GmbH in Emden. The shares of Thyssen Werften



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## TRANS MARINE PROPULSION SYSTEMS' 2ND ANNUAL DIESEL ENGINE SEMINAR

at The Edgewater Hotel  
Seattle, Washington, U.S.A. November 15 & 16, 1995

TMPS' second annual diesel engine propulsion seminar is devoted to vibration control onboard ships, reliability and maintenance aspects of diesel engines and the latest developments in diesel engine propulsion systems.

Speakers include representatives of major diesel engine manufacturers from Europe and the Far East.

Maintenance aspects of diesel engines will be discussed by technical representatives from two major vessel operators.

For more information and program details please contact:

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Phone: (206) 282-9142 Fax: (206) 282-6514

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GmbH will be owned by Thyssen Industrie AG and Blohm + Voss Holding.

### New focus on offshore

Blohm + Voss is concentrating on the offshore market, particularly three main areas for business opportunities: shuttle tanker conversions and maintenance; offshore unit conversions; and conversions of ships into FPSOs.

B+V contracted the conversion of three shuttle tankers to maintain the vessels' operation and to update the submerged turret loading systems. The vessels include *Dicta Knutsen*, *Jorunn Knutsen* and *Hanne Knutsen*. All three serve the Heidrun field for shuttling and floating storage.

Also, B+V has an agreement with Fred Olsen A/S to develop a conversion concept for one of its tankers to be used later as an FPSO. The concept vessel has a storage capacity of 650,000 barrels, and will be outfitted with a process deck, turret for 16 raisers and offloading equipment.

For more information from B+V  
Circle 184 on Reader Service Card

## BSB Electronic Charts Licensed By NOAA

Under an exclusive license with NOAA, new electronic charts are now available from BSB Electronic Charts of Rockland, Mass. The charts are reportedly accurate, high-quality raster images scanned from the film transparencies used to make NOAA paper charts.

Under the Cooperative Research and Development Agreement (CRADA) with the National Ocean Service branch of NOAA, BSB produces and distributes up-to-date charts both on CD-ROM and floppy diskettes. An automatic update service will also be available to commercial vessels to ensure the use of the most current chart.

BSB electronic charts are now available for many areas and more than 35 companies are licensed to use the charts in their navigation products.

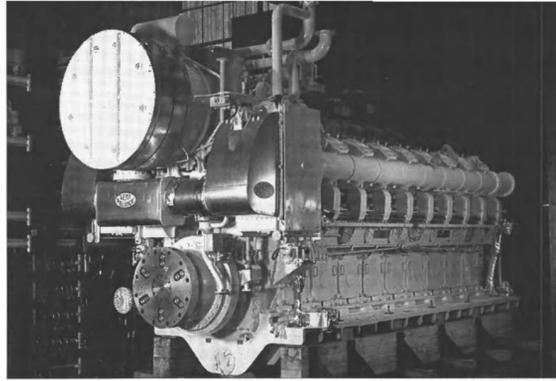
For more information on  
BSB Electronic Charts  
Circle 59 on Reader Service Card

Maritime Reporter/Engineering News

## S.E.M.T. Pielstick Propulsive Units Supplied For Japanese Newbuilds

In recent months, several Japanese newbuilds have been equipped with S.E.M.T. Pielstick engines. Japanese licensee Nippon Kokan (N.K.K.) ordered four 14PC2-2V Pielstick diesel engines, producing 23,100 hp each, for the propulsion of 574-ft. (175-m) car ferries for Kyuetsu Ferry Co. N.K.K. will also supply two 16 16PC2-6 Pielstick diesels, with 12,000 hp, for a car ferry ordered by Arimura Sangyo Co. Japan's Mitsui Shipyard delivered the *Neptune*, a 36.8-knot vessel to Tokushima High Speed Ship, fitted with two 16PA4-200VGA Pielstick engines built by Niigata Engineering. Niigata delivered a total of 47 of the company's PA4 engines to the Maritime Safety Agency and Tokushima High Speed Ship. Diesel United also constructed a super high-speed car ferry with two 18PC4-2B engines. Hankyu Ferry Co.'s two ferry newbuilds each feature two 9PC40L Pielstick diesels. A car-ferry built for SNCM at Chantiers de l'Atlantique was also fitted with Pielstick engines, four 18PC2-6B diesels on elastic suspension.

For more information on S.E.M.T. Pielstick  
Circle 63 on Reader Service Card



Pictured is the Pielstick propulsion unit chosen to power Suzaran, a Diesel United-constructed super high-speed large car ferry.

### Marco Seattle Christens New Tug



Following a string of vessel conversions and modifications, Marco Seattle Shipyard has returned to new construction with the recent delivery of reverse tractor tug *Gyrfalcon*. The new 105-ft. tug is operating in Dutch Harbor, Alaska, under the operation of Alaska Marine Charters, Inc. The *Gyrfalcon* is under long-term charter to Sea-Land Service, Inc. for ship assist and offshore towing in and around Dutch Harbor, and will also be available for other commercial work in the area. The vessel is powered by two Caterpillar 3516 B Series diesels, each rated at 2,000 bhp, driving twin Ulstein Model 1650 Z-Drives with 86-in. four-bladed propellers set in Type 19A nozzles.

The vessel was christened at the Marco yard in early September in a unique two-champagne-bottle ceremony. Commenting on his firm's newest vessel, Alaska Marine Charters President Bob Schoenbachler said, "We're very proud of *Gyrfalcon*, and happy to have been able to build in the Pacific Northwest."

For more information on Marco Seattle Shipyard  
Circle 67 on Reader Service Card

#### Gyrfalcon Specifications

Length ..... 105 ft. (32 m)  
Width ..... 34 ft. (10.4 m)  
Depth ..... 16.6 ft. (5 m)

#### Equipment List

Main engines ..... (2) Caterpillar 3516 B diesels,  
..... 2,000 bhp each  
Z-drives ..... Twin Ulstein Model 1650  
..... with props set in 19A nozzles  
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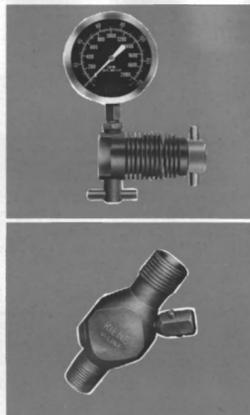
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## Legislative Update

On the heels of the late-August California state government action increasing the minimum financial responsibility for spills to \$700 million, on September 5, the National Research Council (NRC) released a study that analyzed marine pollution regulations and how the enforcement of legislative standards can be implemented. Among its recommendations, the NRC said that the Maritime Administration should develop a research and development program that examines the needs of a variety of large vessels in the area of on board garbage treatment equipment. The report also said that efforts to control ocean dumping have been hampered by the fact that no national plan for managing vessel waste exists, and because the oversight duties are dispersed among numerous federal agencies, including the Environmental Protection Agency (EPA), the National Marine Fisheries Service of the National Oceanic and Atmospheric Administration (NOAA), and the U.S. Coast Guard (USCG). This echoes a sentiment expressed in a U.S. General Accounting Office (GAO) report issued in the second quarter of 1995, commissioned by the Senate Subcommittee on Transportation and Related Agencies Committee on Appropriations, which recommended that the Secretary of Transportation direct the USCG Commandant to work with the Administrator of the Animal and Plant Health Inspection Service (APHIS) to explore "areas of mutual interest and ways to improve cooperation between the U.S. Coast Guard and APHIS on enforcing MARPOL V."

## Alden Electronics Wins Navy Contract

Alden Electronics, Inc. was awarded a contract, worth more than \$500,000, by the U.S. Naval Air Warfare Center's Aircraft Division for 820 units of the company's SATFIND-406 Survival Emergency Position Indicating Radio Beacons (EPIRBs). The units, classified as Category 2 units, are manually deployable and will be installed on lifeboats. Delivery is scheduled to take place during the next few quarters. Alden also manufactures a Category 1 unit, which is manually deployable, and was recently chosen by the National Marine Electronics Association as being the best in its category.

Alden manufactures and distributes marine electronics, specializing in weather, safety, and communication products and services.  
For more information on Alden Electronics  
Circle 64 on Reader Service Card

## Newport News Cuts Steel For First Double Eagle Tanker

On September 20, Newport News Shipbuilding (NNS) cut the first piece of steel for the first Double Eagle product tanker the yard will build for Eletson Holdings of Piraeus, Greece. The yard is building four 46,000-ton Double Eagle product tankers for the Greek company. As widely publicized upon the signing of the contract, these vessels will be the first commercial ships to be constructed by an American yard for an international customer since the late 1950s.

The steel for the first ship was cut by a newly-installed robotic machine, part of NNS's World-Class Shipbuilder Project, a \$68 million capital investment program designed to improve and automate processes for both commercial and military shipbuilding. The automated steel cutting was activated by **Eric Kertsikoff** and **Gregory Hadjieleftheriadis**, vice presidents of Eletson Holdings. Members of the Virginia delegation were also present, including Senator **John Warner**, Senator **Charles Robb**, and Congressman **Herb Bateman** and **Bobby Scott**.  
For more information on Newport News Shipbuilding  
Circle 68 on Reader Service Card

Maritime Reporter/Engineering News

## ABB Flakt Refits Supply Vessel With Emissions Reduction System

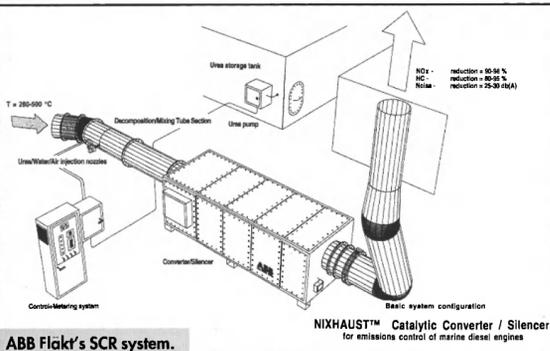


ABB Flakt's SCR system.

ABB Flakt Marine, based in Gothenberg, Sweden, has been commissioned by The National Maritime Administration of Sweden to supply Selective Catalytic Reduction (SCR) systems for one of its supply vessels, *M/S Scandia*, built in the early 1980s.

*Scandia* is equipped with two Hedemora main engines and four Scania diesel auxiliary engines, with a total installed power of 3.7 MW. ABB will supply its Nixhaust cata-

lytic converter/silencer system for a multiple engine configuration with two converters serving three engines each. The retrofit entails the removal of two existing silencers, replacing them with catalytic converters with integrated silencers, as well as the conversion of a lub oil tank to a storage tank for the reagent — urea — needed for the SCR process. The Nixhaust system has been designed to reduce the concentrations of NOx and hydrocarbon

(HC) in exhaust gas by 90 and 80 percent, respectively. A similar ABB SCR system was installed on Swedish RoRo ferry *Aurora* in 1992, and has reportedly been in continuous and trouble-free operation for 13,000 hours, with NOx and HC reductions of 96 and 90 percent, respectively.

According to ABB, the purpose of installing the SCR system on *Scandia* is to demonstrate the applicability of the technology on existing vessels;

the system has already been successfully installed on newbuildings. The aim of the Swedish National Maritime Administration is to encourage the reduction of NOx and HC from ships on dedicated trades such as ferries and RoRos, in preparation for compliance with developing regional emissions legislation in northern Europe.

For more information on ABB Flakt Marine  
Circle 47 on Reader Service Card

### SmartMATE Software For Oil Spill Management

Seaborne Information Technologies, Ltd. offers SmartMATE, software that provides emergency management of oil spill incidents. Seaborne says its software enables ships' officers to efficiently and effectively carry out Oil Pollution Emergency Plans (OPEPs) — the execution of which can suffer from inappropriate or delayed responses due to stress or lack of crew preparedness.

SmartMATE's features include Situation Input — rapid input of the incident, environment and ship's status information; Action Lists, which synthesizes a list of prioritized actions specific to the current situation; Notification, which identifies required/alternate

contacts in the event of a spill according to the vessel's geographic position, allows selection of the information which each receives, and initiates automatic distribution of reports; Situation Reports, which provides a log of reports sent by fax to various contacts and allows the viewing of each; Archive, which provides a time and date stamped record of all inputs to and outputs from the system for legal purposes after the event.

According to Seaborne, the system is user-friendly and requires little proficiency or computer training, is structured in compliance with regulations and corporate oil pollution emergency procedures, and can even be used for simulated training exercises.

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## Weeks Marine Helps Army In Artificial Reef Exercise

Weeks Marine, Inc. participated in a joint task force sponsored by the U.S. Army Materiel Command (AMC) in the submersion of over one hundred obsolete U.S. Army tanks and other tracked vehicles off the coastlines of New York, New Jersey, Dela-

ware and Maryland, to become part of the artificial reef systems of those states.

The military equipment was placed in specified locations with Loran coordinates chosen by the respective states. The equipment,

which had been stored at Fort Dix, N.J., was demilitarized and thoroughly cleaned before being trucked to Naval Weapons Station Earle main base for transshipment via rail to NWS Earle Port facility.

On arrival at the port facility, the



equipment was loaded aboard both the *Weeks 246*, a 250-ft. by 73-ft. (76.2-m by 22.3-m) ABS-certified loadline deck barge, and the *Weeks 291*, a newly constructed 180-ft. by 54-ft. (54.9-m by 16.5-m) ABS-certified loadline deck barge. Once loaded, the barges were moved to their drop sites by the Weeks tugs *Robert* and *Alexandra*. At the drop sites, Weeks Marine used heavy front-end loaders to remove the equipment from the barges.

### The Program

Reef Exercise (Reefex) is a joint Department of Defense (DOD) program in which obsolete combat armament such as M-60 and M-48 tanks and M-113 armored personnel carriers are submerged in coastal waters as artificial reefs, attracting sea life and increasing commercial and recreational fishing opportunities while subtracting from the estimated 20,000 excess pieces of Vietnam-era equipment in storage in the U.S.

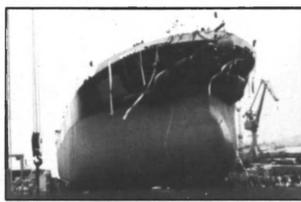
Reserve Component personnel—Army Reserve, Army National Guard, Navy, U.S. Coast Guard (USCG) and Air Force Reserves—gain valuable experiences demilitarizing equipment, cleaning it to meet national environmental standards.

The Army Materiel Command (AMC), the Army's executive agent for Reefex, owns the tanks and other vehicles. AMC's Tank-automotive and Armaments Command works with the Defense Logistics Agency's Defense Reutilization and Marketing Service, and the General Services Administration, to release obsolete/excess equipment to states for their artificial reef programs.

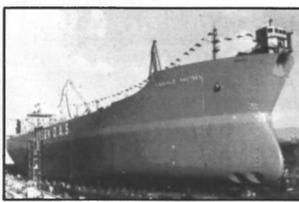
Before the vehicles can be used to construct reefs, Reserve Component soldiers and sailors performing their two weeks of annual active duty training drain all fluids and remove components such as engines, transmissions and hydraulic systems. A national environmental assessment plan was developed and approved by the U.S. Environmental Protection Agency (EPA), U.S. Army Corps of Engineers (USACE), the USCG and the receiving states. All main battle tanks and combat vehicles are inspected by the state EPA representatives, the USCG and ASACE prior to movement to reef sites. Sites are selected by the coastal state and approved by the USACE. Once in place, ownership and responsibility for the reefs transfers to the states.

Reefex is funded by the Office of the Assistant Secretary of Defense for Reserve Affairs (Civil-Military Cooperation Program) and participating commands with additional cost-sharing from the recipient states.

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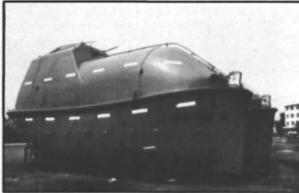
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## FOCUS ON CLEAN SEAS

### USCG Awards Honors For Excellence In Marine Environmental Protection

On September 8, Admiral **Robert E. Kramek**, Commandant of the U.S. Coast Guard, announced the recipients of the first William M. Benkert Awards, recognizing excellence in all aspects of marine environmental protection. These awards have been established to call attention to outstanding company achievements that exceed environmental compliance with industrial and regulatory standards, in honor of Rear Admiral **William M. Benkert**, a distinguished USCG officer known for leadership and vision in marine environmental protection. Awards were given to companies in four categories: Kirby Corporation of Houston, Texas, won in the large vessel category; Yutana Barge Corporation of Nenana, Alaska, won in the small vessel category; Occidental Chemical Corp. of Ingleside, Texas, took the award in the large facility category; and Portland Pipeline Corp., S. Portland, Maine, won the small facility category. A total of 61 companies participated in this first annual awards program. The presentation ceremony was scheduled to take place at USCG headquarters in Washington, D.C., on September 20.

### AAPA Names Environmental Award Winners

On September 19, the American Association of Port Authorities (AAPA) named the ports of Seattle, Houston, Canaveral, and Greater Lafourche winners in its 1995 Environmental Improvement Awards competition.

The highest honor, the Calvin Hurst Award for Outstanding Achievement, was awarded to the Port of Seattle for its Southwest Harbor Cleanup and Redevelopment Project, site of the planned American President Lines (APL) container terminal and intermodal yard.

The Port of Houston Authority won a community/public involvement award for its Beneficial Users Group, formed to determine the best possible uses for disposal of large volumes of dredged material generated from its proposed harbor deepening project. Canaveral Port Authority also received a community/public involvement award for a program involving distribution of sea oats and beach grass to community residents.

The Greater Lafourche Port Commission, located in Galliano, La., won an Environmental Enhancement Award for its efforts to beautify Bayou Lafourche. For more than two decades, the Port Commission has conducted various cleanup programs including removal of over 100 derelict vessels from the waterway,

removal of countless pilings and wharves, public awareness and involvement campaigns, weekly bayou patrols and cleanups, as well as embankment beautification and enforcement of ordinances.

A ceremony was scheduled for

October 18, at the Sheraton New Orleans, at which **Joseph J. Birgeles**, chairman of AAPA's Harbors, Navigation and Environment Committee, and manager, External Affairs, Port Authority of New York and New Jersey, was to present the

Environmental Improvement Awards to the honorable recipients.

The AAPA represents virtually every U.S. public port agency, as well as major port agencies in Canada, Latin America, and the Caribbean.

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## Technology, R&D: Charting A Steady Course For Cleaner Seas

by Bridget A. Murphy, assistant editor

As the buzz concerning MARPOL regulatory compliance continues to gather energy, an issue surfacing is that of design-related compliance. Advancements in technological research and development, along with the implementation of subsequent equipment applications, could, in effect, serve to facilitate dual accountability, with environmental responsibility being placed not only with shipowners and operators, but also with vessel designers and builders. This would remove some of the burden of enforcement that has fallen the U.S. Coast Guard and other regulatory agencies, effectively eliminating one of the greatest obstacles to the success of MARPOL. Waste management system improvements have dominated the spotlight thus far, most likely due to the fact that vessels with garbage that is efficiently stowed, incinerated, or otherwise compressed are not subject to a high frequency of offloading procedures, which are costly and cumbersome; and are less likely to participate in the potentially more expensive alternative practice of illegal dumping.

A report — *Clean Ships, Clean Ports, Clean Seas* — released on September 5, 1995, by the U.S. National Research Council (NRC), the principle operating agency of the National Academy of Sciences and the National Academy of Engineering, includes a discussion of shipboard technologies and practices as related to solid waste management. The report lauds ship designs that incorporate waste management equipment into technical arrangements, stating that they "...provide the best possible means of complying with Annex V. This approach elevates the mundane task of garbage handling to the same level of importance as all the other auxiliary systems considered during ship construction." Navy officials and executives at Newport News Shipbuilding (NNS) are among influential maritime agents in agreement with this conclusion, as evidenced by the Westinghouse Electric Corp./Naval Sea Systems Command \$7.3 million contract for plastic waste processing (PWP) systems, and by an R&D program begun in early 1995 at Newport News — Environmentally Compatible Product Lines — that is assessing how

ships' systems, on both commercial and military vessels, can be developed for compliance with marine pollution standards.

### MARPOL-Inspired Solutions Surface

According to Phil Wright, manager of special product sales for Westinghouse Marine Division's Business Development department, Westinghouse Electric Corp.'s August 9th contract with Naval Sea Systems Command is the culmination of a four to five-year-old Navy project aimed at effectively reducing the volume of plastics on all its vessels. "They recognized they had a problem with waste building up on ships, and knew they had to address it," said Mr. Wright.

After examining the commercial shipping industry, Navy engineers devised plans for adapting a plastic waste processing system for installation on military vessels, and then contracted with Westinghouse Machinery Technology Division in Pittsburgh, Pa., to build prototypes consisting of three system components: shredders; compressed-melt units; and closed loop cooling units.

Following the successful construction of prototype PWP systems, the Navy awarded two contracts for building and supplying the systems; a contract for 22 systems was given to Westinghouse Electric Systems

Co., Baltimore, Md., with final machinery assembly to be completed at the Westinghouse Marine Division in Sunnyvale, Calif.; and a contract for 21 systems was awarded to Universal Technologies Inc. in Tennessee. Extendable options include provisions for the construction of more than 200 additional PWP systems.

### Tech Developments Lend A Practical Spin To Waste Management

The PWP equipment is designed for three-step operation, although the process is adaptable depending on the needs of specific vessel applications. After plastic garbage collection, the primary step is insertion of the waste into a shredder, which measures approximately 6-ft. by 2-ft. by 2.5-ft. (1.82 m x .6 m x .76 m), and is equipped with a bin with teeth on the inside. The teeth grind the plastic, and the byproducts descend to a recycling bin at the bottom of the unit. The shredded materials then proceed to the compressed-melt unit — a circular chamber, about two feet deep. "Shredded up plastic put here electrically heats up to over 300 degrees, emitting no noxious fumes, yet melting plastic," said Mr. Wright.

A piston compresses the plastic as it melts into a 20-in. diameter disk, and shuts off when the process is completed. And disk storage? "They're (naval engineers) just stacking them up. Where they had a problem was when they had thirty times the amount. Once you're got

them reduced, they take up a tremendously less amount of space, and (you) no longer have the problem of offloading," said the Westinghouse representative. Reportedly, the Navy has plans for reusing the disks in different applications, including in the construction of pier pilings.

### Equipment Design Emphasizes Easy Adaptability For Vessel Applications

The PWP equipment requires that only minimal retrofitting be performed on recipient vessels, a characteristic which adds to the ease of installation already incorporated in the design. Provisions for convenient maintenance of the waste management system are also inherent in the design scheme. Since the PWP equipment fits easily in a small room, and accepts every kind of plastic, including food-contaminated waste, the next important factor is cost assessment. In terms of maintenance costs, according to project engineers, once the equipment installations are completed, which will be in two years' time, the Navy will perform all maintenance. "Sailors onboard will be able to maintain the equipment," said Mr. Wright. "The complexity was designing it and building it to fit in a small space."

Peter McGraw, plastics programs engineer in the Environmental Dept. of the Naval Surface Warfare Center's Carderock Division at Annapolis, pointed out that in considering expenses, space preparation costs overran equipment costs, although the extent of necessary retrofitting work will vary considerably according to the vessel or class of vessels on which the PWP systems are installed. "We've designed it (PWP equipment) to fit through standard passageways for easy installation, without burning holes. Depending on the ship and class of ships, some will require space preps, putting up



## FOCUS ON CLEAN SEAS

sheathing, tearing out equipment, or possibly running seawater or ventilation lines," said Mr. McGraw.

He illustrated this point by explaining that while a frigate might require two compressed-melt units and a cooling unit, an estimate of the PWP equipment required for an aircraft carrier would include five or six shredders, 14 compressed-melt units, and seven cooling units. The Naval Surface Warfare Center representative said that the retrofit work will be completed at U.S. yards, both Navy and commercial, adding that the equipment was designed to also allow installation at sea.

### R&D Focuses On Green Ship Applications

Westinghouse is currently adapting PWP equipment for use in the commercial sector. "We're developing plans for (a) potential (ly) huge market in the cruise ship, merchant marine, offshore and land-based market, and, of course, other NATO navies," said Mr. Wright. This is possible due to the fact that "...the cost in production, compared to the cost of non-compliance with MARPOL, or the cost of incineration service ... is attractive," he concluded.

The tightening of MARPOL standards has also prompted the Navy to address the design of ships' systems in addition to waste management systems. Currently, Naval Sea Systems Command is conducting research and development projects in the areas of oily water and grey water systems.

Newport News Shipbuilding's Environmentally Compatible Product Lines project is also striving to improve ships' systems in the attempt to design "green" ships. The NNS project goal, according to Jerri Dickeski, senior communications representative, "is enhancing our ships' marketability." "We're looking at different waste streams on ships we build, as well as systems that meet or exceed (MARPOL) regulations," she said. According to the NNS representative, research is being done on systems already created, or in the process of being developed, for the purpose of "assessing the environmental compatibility of our ships with the systems." For example, the yard is examining the E3 tanker design. Specifically, NNS is looking at what systems the vessel uses, as well as any products or systems to do with the waste stream of the vessel, such as air and water discharges.

### Progressive Vessel Design Will Spark Environmental Progress

Establishing clear-cut environmental responsibility is vital to carrying out the steps necessary for compliance with MARPOL regulations. While modern vessel design dictates the brunt of responsibility be assumed by vessel owners and operators, research programs and the technological developments that have ensued are making progress towards incorporating environmental responsibility into the vessel de-

sign stage. Essentially, two obstacles currently exist for shippers seeking to follow MARPOL standards: first, the absence of adequate onshore waste disposal facilities; and second, the lack of space for storing waste onboard vessels. According to Linda Sheehan, pollution programs manager at the Center for Marine

Conservation, "I think technology can go a long way in addressing these problems. Complying with MARPOL is not necessarily a matter of figuring out what needs to be done. We need to keep waste on the ship, and take it back to shore. Technology can assist in the practical aspects of getting it done."

For more information on MARPOL Annex V regulations, and shipboard recycling and waste management programs, contact Linda Sheehan at the Center for Marine Conservation, tel: (415) 391-6204. For a copy of *Clean Ships, Clean Ports, Clean Seas*, contact the NRC at tel: (202) 334-2000.

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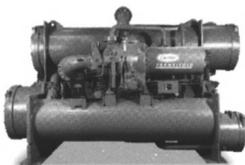
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## Clean Seas Products

# SPOTLIGHT: Pollution Management

The following products and systems share a common characteristic: —all have been designed to balance the relationship between the environment and the maritime industry. Some of the products are geared toward preventing marine pollution, and others toward implementing the cleanup process. Achieving the goal of producing "green ships" becomes more viable each year as manufacturers emphasize product lines that strive to strike an equilibrium between profit-producing techniques and the maintenance of natural resources.

**General Rubber Corp.**'s single arch maxi-joint expansion joint was designed to handle more movement, as well as higher temperatures and

pressures as compared with conventional expansion joints, making it a viable option for harsh operating conditions as found in water treatment plants, and other environmental applications in which corrosive and abrasive flows are processed.

Reportedly, the 1015 maxi-joint will not corrode, and the continuous flexing of rubber prevents the formation of scales, making the product a sensible choice for use in sulfur dioxide recovery on fly ash

The *Oriana* is equipped with Deerberg Systems' multipurpose waste management system, as pictured.

stances of abrasive media and outdoor installations, offering protection against ozone.

An advanced wash water recycling system has been introduced by **RGF Environmental Systems, Inc.** The *Ultrasorb Model LD2* has been designed specifically for medium-pressure cleaning use, and functions to eliminate problems associated with contaminated water discharge by processing and recycling water back to a pressure steam cleaner for reuse.

The closed loop system works on the principles of a catalytic oxidation process which oxidizes contaminants to harmless carbon dioxide and water. The system can process up to 16 gpm, and the polytank has an 800-gallon storage capacity.

**Deerberg Systems** has supplied three of the latest cruise newbuilds—*Oriana*, *Legend of the Seas*, and *Imagination*—with waste management systems. The mul-

tipurpose system onboard *Oriana* is designed for the treatment of unsorted waste, which means

that all waste can be passed through the incineration process, or alternatively, can be pre-sorted and separately treated. Equipment within the scope of the system includes waste shredders, waste silos, incinerators, sludge oil processing tanks, food and wet waste pulpers and processing tanks, bone and glass crushers, waterpresses, and a densifier. Food waste is handled by decentralized installed pulpers, which are connected to waterpresses, which are linked to the incinerators. Special burners in the incinerators burn the sludge oil that accumulates onboard.

**Mitsubishi Heavy Industries, Ltd. (MHI)** has debuted its new biological oily water separator, which operates by using bacteria to convert oil to water and carbon dioxide through the use of a bioreactor. According to company reports, the separator can remove oil from contaminated bilge or ballast water until it is below 15 parts per million, so the water can be discharged overboard.



A powerful induction pump behind a Filterbelt system draws heavy oils and debris to a Marco offshore recovery vessel.

and is available in various sizes.

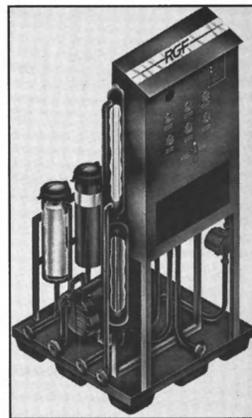
On the cleanup end of the spectrum, **3M Marine** has produced a bilge pillow made of lightweight, highly sorbent materials, capable of soaking up and containing up to two quarts of oil from boat bilges, engines, and drip trays. According to the manufacturer, the 7-in. by 15-in. product will not deteriorate, even after existing in bilge for months at a time. Lanyard openings in the pillow allow the user to

tether the product easily, to inspect for point of saturation characteristics. A reclosable bag is

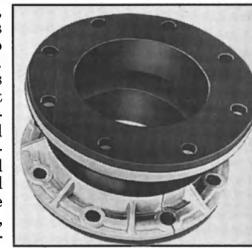
included to facilitate convenient disposal of the product. Another manufacturer of products aimed at maintaining clean seas, **Hyde Products, Inc.**, produces separators that feature ultrafiltration for bilge water processing. Ultrafiltration is a semi-permeable, pressure-activated process which is capable of removing emulsified oil and suspended solids from wastewater.

**Marco Pollution Control** lists the U.S. Navy, the Australian Marine Safety Authority, National Response Corporation, and China Petroleum Corp. among its customers.

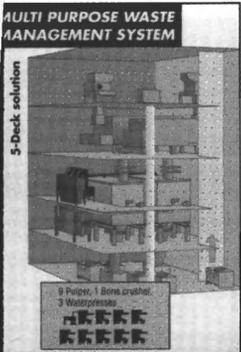
In providing oil spill recovery services, Marco frequently relies on its Filterbelt oil spill recovery vessels, which function by recovering viscous and debris-contaminated materials, while maintaining free water proportions reportedly under 10 percent. The Filterbelt recovery system utilizes a powerful induction pump behind a continuous,



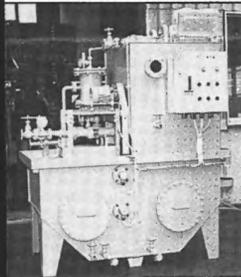
RGF's wash water recycling system, *Ultrasorb Model LD2*.



General Rubber Corp.'s environmentally-resistant expansion joint.



The *Oriana* is equipped with Deerberg Systems' multipurpose waste management system, as pictured.



MHI bioreactor is the heart of the company's new biological treatment system for bilge in the engine room.

### For Your (Free) Information

For more information on the companies mentioned above, circle the corresponding number on the Reader Service Card.

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## The Future of Marine Coatings — Environmental regulations, safety factors drive product development.

The future of marine coatings will be driven by environmental, health, and safety regulations through the year 2000. The key to success for coatings manufacturers and users will be determining how to develop and implement new or improved coating technologies that will permit regulatory compliance while addressing traditional marine coating problems.

Corrosion protection of marine vessels is vital to preserving the basic functional integrity and operating status of vessels. Advancements in coating technology in the areas of waterborne coatings and high solids will enable the industry to comply with VOC and Identified Hazardous Air Pollutants (HAPS) regulations; however, the need for regulatory compliance and im-

proved service life presents a challenge to the marine industry due to higher material costs and the learning curve associated with the application dynamics of new coating systems. This discussion of marine coatings will be limited only to hard coatings with a focus on the future of these coatings as a viable means of corrosion protection. It will discuss the coating selection process,

coating performance criteria, and will conclude with coating technologies.

### Coating System Selection

Coating system selection is complicated by the number of coating vendors and the plethora of products offered by each. Additionally, a generic maze must be negotiated if the coating of greatest value is to be identified. This discussion is limited to the consideration of marine coatings from a performance perspective. However, it is important to keep in mind that there are a number of factors which define value, including price, delivery, quality, service, warehousing (availability), environmental acceptance and safety. In total, there are approximately fifteen recognized broad generic classes of protective coatings, i.e., alkyds, epoxies, chlorinated rubbers, latex coatings, etc. Anti-foulant coatings and zinc rich primers are not included in this listing since they are specialty coatings and will be considered separately.

### Alkyds

Alkyds can generally be described as vegetable oil-modified phthalate resins that air dry by oxidation. Alkyds are characterized as economical and easy to apply, offering fair durability in marine environments. TT-E-489 enamel, alkyd, gloss (for exterior and interior surfaces) and TT-P-645 Primer Paint, zinc molybdate, alkyds are two of the most widely used alkyds in marine coating work. These alkyds along with many others are the focus for reformulation for compliance with VOC and HAPS regulations. In the past, alkyd primers have been rather effective corrosion inhibitors through the use of zinc chromates and basic lead silico-chromate pigments, which are now prohibited. Fortunately, excellent replacement inhibitive pigments have been identified, such as zinc molybdates, calcium boro-silicates, etc. Alkyds can be modified in different ways to enhance specific performance attributes, such as with silicone to provide color and gloss retention (MIL-E-2463B Enamel Silicone Alkyd Copolymer). They may also be used to modify epoxies, urethanes, and other coating types.

### Waterborne Acrylics

Waterborne acrylics are colloidal dispersions of high molecular weight acrylics. They are water-based materials that are economical and easy to apply. Waterborne acrylic coatings offer high gloss with outstanding color and gloss retention. Technological advances have resulted in considerable improvements in toughness, durability, and chemical resistance of these coatings. Waterborne acrylics are generally low VOC coatings. Corrosion-inhibitive latex primers are continuing to show improved performance in marine environments. MIL-E-24763A (Navy) characterizes performance criteria for a 95

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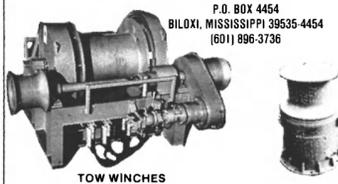
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percent acrylic water-based emulsion enamel for use over primed metal surfaces.

#### Epoxy Coatings

Epoxy coatings for marine use fall into two broad categories: epoxy esters (single package materials) and catalyzed epoxies (two package materials). Epoxy esters are alkyd or vegetable oil modified epoxies. They have enhanced chemical resistance and durability as compared with conventional alkyds. These types of epoxies see limited use in marine coating specifications. Two-component catalyzed epoxies, however, are widely used as protective coatings in marine environments. One of the most widely used epoxies in marine coating work is MIL-P-24441-Paint, epoxy-polyamide.

#### Polyurethanes

Polyurethanes can be divided into two categories: single package moisture cure urethanes; and two-package polyisocyanate-polyol polyurethanes. The single pack coatings contain moisture curing polyisocyanate terminated prepolymers. The two-package urethanes consist of two parts which, when mixed together, cross link to form the cured polyurethane coating. Urethanes are generally used as top coats over more economical primers such as epoxies.

#### Vinyl Coatings

Vinyl coatings can be divided into the following categories: polyvinyl butyral; polyvinyl chloride; and polyvinyl acetate.

Polyvinyl butyral coatings are used as wash primers to inhibit corrosion and promote adhesion. These coatings contain basic zinc chromate and phosphoric acid. Chromates contain chromium, which is on the Environmental Protection Agency's (EPA) HAPS list.

Polyvinyl chloride and polyvinyl acetate coatings are thermoplastic coatings that dry by solvent evaporation into very durable films, with excellent performance in corrosive and marine environments. Vinyl copolymers are the backbone for many effective anti-foulant coatings.

#### Chlorinated Rubber Coatings

Chlorinated rubber coatings are thermoplastic coatings that dry by solvent evaporation. They have excellent chemical and moisture resistance, and have enjoyed significant success in marine environments.

#### Zinc Rich Coatings

Zinc rich primers are classified in SSPC-PAINT 20. Essentially, they can be divided into two broad categories: inorganic and organic zinc rich. The terms inorganic and organic refer to the resin or binder type rather than the zinc metal. Type I-C inorganic self-curing vehicles are of particular interest due to their wide use in coating steel plates in marine environments. This type of zinc-rich coating is based on an ethyl silicate resin, and cures by a reaction with atmospheric moisture, thereby providing cathodic protection to steel surfaces.

Type IA inorganic zinc rich coatings are post-cured with a separate wash solution which is usually mildly acidic. Type II zinc rich coatings employ an organic vehicle that may be an epoxy, urethane, chlorinated rubber, styrene, or vinyl. Organic zinc rich coatings may have a zinc dust content of 80-95 percent as opposed to inorganic zinc rich coatings which are above 75 percent with a nominal value of 85 percent. In spite of the difference in zinc loading, inorganic materials offer longer cathodic protection due to zinc particle contact within the zinc/silicate matrix. The organic zinc rich coatings are less demanding with respect to surface preparations, and develop better adhesion. While more demanding than their solvent based counterparts with respect to surface preparation, type IB inorganic self-curing, water-reducible zinc rich coat-

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ings may offer a viable low VOC alternative to solvent-based zinc rich coatings as pre-construction primers.

### Coating Performance Criteria

There are a number of factors to be considered in the coating selection process that define coating value. A major factor in determining a coating's value is the ability of the coating or coating system to meet the requisite performance as defined by the owner or specifier. If a coating system fails, then all other criteria of value become meaningless. One method of defining performance criteria is to match the coating system's performance attributes and limitations with the anticipated exposure conditions.

### Underwater Hull (Keel to Waterline)

#### Performance Criteria

- Anti-Foulant
- Corrosion Resistance (Galvanic and Cavitation)
- Immersion (Saltwater)
- Abrasion Resistance

A ship bottom coating system consists of an anti-corrosive coating, over-coated with an appropriate anti-fouling paint. Traditional underwater anti-corrosive coatings have consisted of materials such as: bituminous coatings; chlorinated rubbers; vinyl tars; vinyls; catalyzed epoxies; and coal tar epoxies. Anti-corrosive coatings for underwater use are not only selected based on durability, but also for ease of maintenance, top coat acceptability, and economics. In recent years, two additional criteria have become major factors in the selection process: environmental acceptance and worker safety.

#### Anti-Corrosive Coating Advantages

##### Bituminous coatings:

Effective, economical, ease of maintenance

##### Coal tar epoxies:

Excellent durability, minimal maintenance

##### Chlorinated rubbers:

Fast dry, cured at low temperature, ease of maintenance

##### Anti-Foulant Advantage

##### Resin based A.F.:

Economical, ease of maintenance, fair durability

##### Vinyl A.F.:

Good durability, abrasion-resistant, fast dry, Low temp. application

##### Chlorinated rubber A.F.:

Good durability, fast dry

### Topside Coatings: Freeboard, Decks, and Superstructure

#### Performance Criteria

- Corrosion Resistance
- Color and Gloss Retention
- Salt Water Resistance
- Low Maintenance

Topside coating systems have traditionally consisted of anti-corrosive primer and an appropriate finish coat. Generically, coatings used on topside have been catalyzed epoxies, vinyls, vinyl/acrylics, chlorinated rubbers, alkyls and polyurethanes. These types of coatings have been specified for use in topside marine environments because of their effective performance, ease of maintenance, and economy. Selection of a specific generic type of coating is based on specific attributes and limitations. Inorganic zinc rich primers are frequently recommended for new construction topside coating work, and also for maintenance painting in those areas where maximum corrosion protection is required.

#### Topside Coatings Type Advantages/Limitations

**Alkyls:**  
Low cost, ease of application, fair durability, temperature

50 degrees F to cure  
**Catalyzed:**  
 Toughness and durability, extended maintenance painting intervals  
**Epoxies:**  
 Slow cure below 50 degrees F  
**Vinyls, vinyl/acrylics, chlorinated rubbers:**  
 Fast dry, excellent inter-coat adhesion, low temp. cure  
**Silicone alkyds:**  
 Excellent color and gloss retention, poor low temp. cure  
**Polyurethanes:**  
 Excellent color and gloss retention

All of the coating types shown above are impacted to varying degrees by environmental health and safety regulations. Compliance of many types of coatings for use in topside environments has been accomplished.

### TANKS

**Performance Criteria**

- Cargo Specific
- Intermittent Wet & Dry

Protective coating systems for tanks are cargo-specific. Coating system selection is also determined by method and degree of surface preparation achievable, current surface condition, and economics. Proper surface preparation is critical if satisfactory coating performance is to be achieved within a storage or ballast tank environment. A wide variety of protective coatings have been employed in the coatings of tanks on ships, including: catalyzed epoxies, coal tar (vinyls), coal tar epoxies, etc. Coatings for potable water storage tanks must be approved by the National Sanitation Foundation and be listed in NSF Standards 60/61. Economic and regulatory considerations are driving the development of high performance coating for ballast tanks and other areas that are difficult to protect and maintain. Significant monetary savings will be realized by the enhancement of coating performance and the extension of maintenance painting intervals in tank environments.

### BILGE AREA

**Performance Criteria**

- Corrosion Resistance
- Salt Water Immersion (intermittent wet and dry)
- Chemical Resistance

Bilge areas require high performance coatings due to the aggressiveness of the environment. Protective coatings used in new construction bilge areas should be high performance materials applied over the best degree of surface preparation achievable. Phenolic epoxies, epoxy amines, and mastic epoxies are representative of coating types used in bilge areas. Volatile organic compounds are generally low in the high-solids, high-build epoxies selected for bilge areas. Hazardous air pollutants and materials such as crystalline silica may require reduction or elimination depending on the specific products and levels of objectionable material.

### MACHINERY & INTERSPACE

**Performance Criteria**

- Corrosion Resistance
- Color and Gloss Retention (exterior surfaces only)
- Adhesion with Minimal Surface Preparation
- Ease of Application

Machinery and interspace areas are generally top-coated with an alkyd coating preceded by a vinyl wash primer and/or an alkyd anti-corrosive primer (note: alkyds should not be used over zinc-coated or galvanized surfaces). Exterior machinery frequently receives a silicone alkyd topcoat to provide long term color and gloss retention. High temperature machinery is usually coated with a heat resistant coating such as a silicone aluminum. Alkyd primers and enamels have required extensive reformulation to comply with VOC and hazardous material regulations.

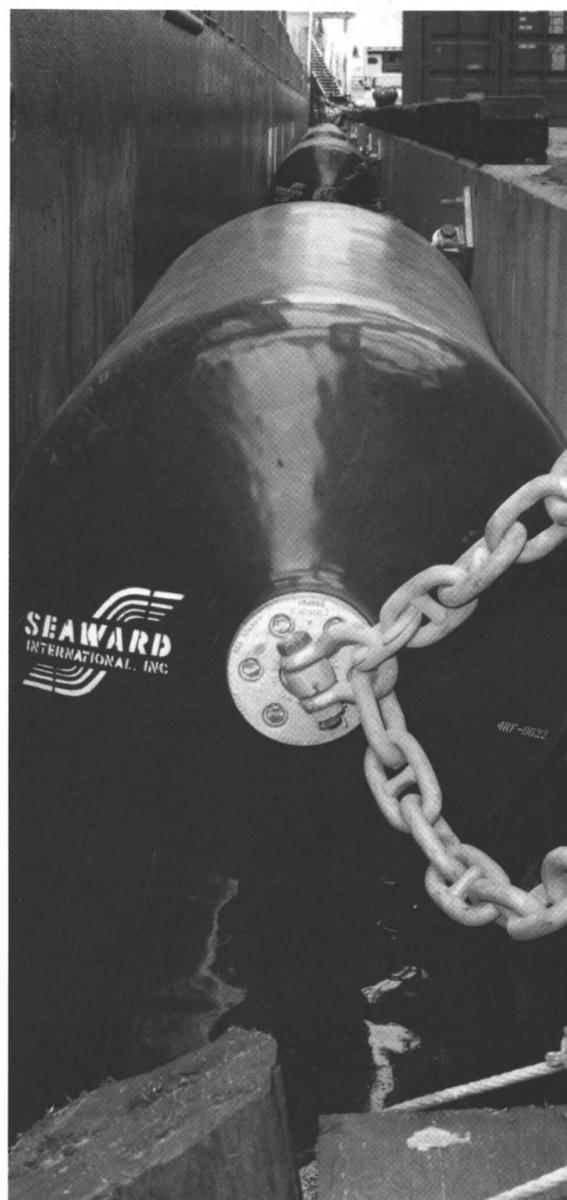
**Marine Coating Technology**  
 Compliance with environmental regulations and improvements in marine coating performance can-

not be accomplished completely by modification and tweaking of existing products. As with any technology, research into new and improved products is the way to create a better future. In the area of industrial and marine coatings, technical advancements will come not only from the research and development laboratory, but from successful transfer of coating technology in related industries to solve marine

coating problems. Many of the new high solids and waterborne technologies will not resemble conventional materials with respect to application, performance, and maintenance. Therefore, a learning curve will be required to optimize the use of these coatings. The coating technologies discussed in the following paragraphs range from budding new coatings that are truly the result of innovative work by

coating manufacturers and their raw material suppliers, to technologies that have existed for some time, but have not been used in marine coating work. This listing is by no means all inclusive, but rather a sampling of areas worthy of consideration.

• **Polyurea Elastomeric Coatings:**  
 Polyurea has been used for some time as a reaction injection molded (RIM) plastic, but only recently has



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its potential been considered as a spray applied coating. Chemically, the coating is a two component material: Part "A" can be either an aromatic isocyanate or an aliphatic isocyanate; Part "B" is a blend of polyether polyamines and amine chain extenders, along with the appropriate pigments and additives.

Polyurea Advantages include: Imperviousness to water; fast cure; 100 percent solids, zero VOC; high

tensile strength — 880-1,713 psi; excellent abrasion resistance; high thermal stability - 3,50 degrees F; low temperature cure; adhesion to moist surfaces; excellent ultraviolet light stability

• **Waterborne Polyurethanes:** Waterborne polyurethanes are dispersions of polymeric particles in a continuous aqueous phase. Coatings based on this technology offer environmental compliance, low

temperature curing, abrasion resistance, and conventional urethane performance regarding weather resistance.

• **Epoxy Phenolic Novolac Coatings:** Epoxy phenolic novolac resins cured with aromatic amines have demonstrated very good performance in salt water and fuel immersion testing per MIL-C-23236. Novolac epoxy resins have an average molecular weight of approxi-

mately 650, and 3.6 functional epoxy groups per molecule.

• **Water Based Wash Primers:** Water based wash primers which are low in VOC (less than 150 g/l) are available. These materials are one component systems, are heavy metal free, have a wide re-coat window, and do not have the critical film thickness limitations associated with solvent based counterparts. This coating also has worked well as a seal/barrier coat over inorganic zinc rich primers.

• **Inorganic Silicone Coatings:** These inorganic coatings based on silicone/oxygen chemistry offer outstanding chemical resistance, extraordinary durability, and high heat resistance. These coatings have been used in the aerospace industry, and on railcars, bridges, and ships. Topside use over inorganic zinc rich primers provide outstanding performances. They are commercially available.

• **100 Percent Solids Epoxy:** Two part epoxy plural component spray application materials have exhibited excellent corrosion protection when applied directly to properly prepared steel surfaces. These coatings were originally developed for the rail industry and cure hard in 12 hours at 770 degrees F. They are commercially available.

• **Waterborne Epoxy Coatings:** This group of coatings offers good corrosion resistance, good chemical resistance, low VOC, and high film build. These coatings have also shown promise as pre-construction primers. Epoxy water based dispersions rival their solvent based counterparts with respect to performance. They are commercially available.

• **Waterborne Acrylic Coatings:** Waterborne acrylic coating technology offers perhaps some of the most exciting opportunities for meeting regulatory compliance with coating systems that have very low environmental impacts. There are several areas of water based resin technology that may offer innovative coatings for marine applications:

— High performance acrylic coatings with gloss retention equal to two-package polyurethane after two years exposure in Florida

— Ambient cured selfcross linked water-based acrylics with significant improvement in chemical resistance and toughness over conventional latex coatings

• **Coatings For Marginally Prepared Surfaces:** Coatings for marginally prepared steel surfaces (in-tact rusted steel) have been commercialized for quite a few years (i.e., epoxy mastic coatings pigmented with aluminum, platey silica, or other barrier forming pigments). Most recently, very low viscosity epoxy coatings with extraordinary wetting properties have been used as pre-primers to tie down intact rust, primarily in repainting of bridges.

The preceding was excerpted from a paper presented by Frank J. Windler — field technical director, industrial & marine coatings, southeastern division, Sherwin-Williams Company — at Corrosion '95.

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## EUROPEAN UPDATE



### Specialization spells success for U.K. yard:

**FBM to seek U.S. licensees  
in wake of PBI pullout**

By Carol Fulford & Andy Smith, contributing editors

**T**he decision by U.K. yard FBM to specialize in the fast ferry market appears a good one in light of an unconfirmed (but authoritative) report that three more of its 50-knot gas turbine powered TriCat ferries will be ordered by a Hong Kong operator. If confirmed, this will bring to 12 the total number of 45-m FBM fast ferries ordered in the last two years.

Three of the superfast deluxe TriCats are already operating in Hong Kong, and the first of the markedly different diesel-engined TransCat commuter ferries arrived in Lisbon, Portugal, in mid-August. *Alges*, as the vessel has been named, enjoyed a trouble-free 36-hour delivery trip across the Bay of Biscay, during which the vessel averaged 20 knots. On the final leg of the journey up the River Tagus, a maximum speed of 29 knots was achieved.

Although the vessel, the first of four 500-passenger commuter ferries ordered by Lisbon-based operator Transtejo S.A., is designed for relatively sheltered, shallow water routes across the River Tagus, Force 5-6 winds and open sea conditions did not cause the delivery crew any problems during the voyage from the yard. Indeed, *Alges* arrived early for the welcoming celebrations.

While featuring the TriCat's futuristic superstructure by renowned megayacht designer **Terence Disdale**, the TransCat is a pure catamaran, a larger development of the Solent class which has been extensively proven on Red Funnel's high-speed service from Southampton to the Isle of Wight. It has therefore retained its low wash and wake characteristics with long,

thin hulls, providing low fuel consumption and the ability to operate in just 6 ft. (2 m) of water.

To facilitate a speedy turn-round at low height pontoon berths, two entrances are provided on each side with hydraulically operated ramp doors, designed and manufactured by FBM. For repeated berthing operations, the craft has an especially heavy duty sectioned fendering system which allows damaged segments to be easily removed and replaced.

Each hull contains a 960-kW Deutz MWM diesel coupled to a Lips waterjet via a ZF gearbox and Kopflex carden shaft. This particular propulsion package has been selected to meet the operator's requirements of high maneuverability in confined areas, a top speed of 23 knots at maximum payload, and a cost-effective operating speed of 20 knots. As proven during the delivery voyage, the craft actually achieves 29 knots lightly laden.

The second TransCat, to be named *Castelo*, sailed for Lisbon one month later. Two additional craft are being built at Estaleiros Navais do Mondego S.A. in Portugal, with a significant proportion of the sub-assembly work, pre-cut components, and all the high-tech elements produced at FBM.

Considerable time and effort have been expended promoting the complete FBM portfolio of fast ferries which includes water taxis, tourist craft, Swaths and monohulls, in the U.S. However, since the decision of PBI to pull out of shipbuilding, FBM will have to review its U.S. licensee arrangements, and it is probable that two will be sought, one on each coast.

### RoRo developments revive historic Dutch yard's fortunes

Although Dutch yard Van der Giessen-de Noord is celebrating its 175th anniversary, it could be argued that the last five years have been the most significant. The government's withdrawal in the mid-1980s of much (of its considerable) financial support led to a period of retrenchment, reorganization, and inevitably, redundancies. In the end the yard came through, and since 1990 has won orders for 10 RoRo ferries and a number of cargo vessels.

Standardization has played a major part in the yard's success. For example, nine of the 10 RoRos are built to a standard hull design, with variations to suit the owner's individual requirements. According to the yard, the benefits include a reduced tendering period, short delivery times and competitive pricing.

The basic design has a 77-ft. (23.4-m) beam, and is available in lengths from 443 ft. (135 m) to 597 ft. (182 m). The design — first developed for a series of four vessels for an Italian owner — was refined in the form of *Norbank* and *Norbay*, a pair of identical 6,790-dwt ships for North Sea Ferries.

The three most recent orders are, however, of particular interest. Nearing completion are two identical 443-ft. versions for Dalian Marine

(Continued on next page)

## EUROPEAN UPDATE

Transport of China, claimed to be the first newbuilds of this type ordered by Asian owners from a European yard. The vessels have sleeping accommodations for 938 passengers, as well as a capacity for 215 cars and 80 trucks. Two 5,760-kW Stork Wartsila W38 engines will provide the power, turning a pair of Lips CP propellers. A 900-kW bowthruster is also fitted.

*Isle of Innisfree*, which entered service with Irish Ferries in May this year, illustrates the time-saving advantages of the standard design principle. The 596-ft. (181.6-m) vessel was delivered within 14 months of design work completion. The customer—in an effort to maximize profits during the peak summer season—decided to stretch the ferry by inserting an extra 49-ft. (14.85-m) mid-section. This decision was made at the tank testing stage. The result is a highly effective ship with day accommodations for 1,650 passengers and more than 100 articulated freight vehicles. Four Sulzer ZA40S engines—developing a total of 23,000 kW—drive a pair of KaMeWa highly skewed propellers via Lohmann and Stolterfoht gearboxes. A pair of 1,500-kW KaMeWa bowthrusters are fitted, and powered by ABB shaft alternators.

In contrast, the 10<sup>th</sup> RoRo is not like any of the previous nine. Realizing the limitations of its 76.7-ft. (23.4-m) beam, and seven-vehicle lane, the company began the development of a new eight-lane standard design in 1993. Although this work was nearing completion, the team had to make a complete reappraisal when the *Estonia* sank. Modifications were made, and in April, Stena Line ordered a 595-ft. (181.5-m) x 91-ft. (27.8-m) RoRo/train/passenger ferry with a projected delivery date of May 1996. The vessel will have a train track length of 1,870 ft. (570 m), a trailer lane length of 6,900 ft. (2,100 m) and will be able to accommodate 1,500 passengers and 550 private cars.

Damaged stability on the new design has been tackled by a variety of measures. The design includes two 11.5-ft. (3.5-m) high longitudinal bulkheads which stretch three-quarters of the ship's length. Topping watertight doors at each end form two enclosed freight vehicle lanes on each side of the ship. A second inner bow door will be incorporated, and a new bow door/ramp arrangement—devised by Kvaerner Ships Equipment—will be fitted. This is a system which meets all the new Scandinavian requirements, including: the ability to withstand higher sea loads; improved locking devices; and separation of the inner and outer parts of the ramp when stowed.

Subsequently, the yard's financial situation has improved. In 1993 it was able to sever all fiscal ties to the Dutch government, and additional investment has been made or is planned. The CAD/CAM system originally installed in 1990 was re-

cently upgraded to the TRIBON system from Kockums Computer Systems. A new plasma cutting machine began work at the beginning of the year, and a shot-blasting and painting hall is currently under construction. The next project is to extend the existing outfitting quay by around 200 ft. (60 m).



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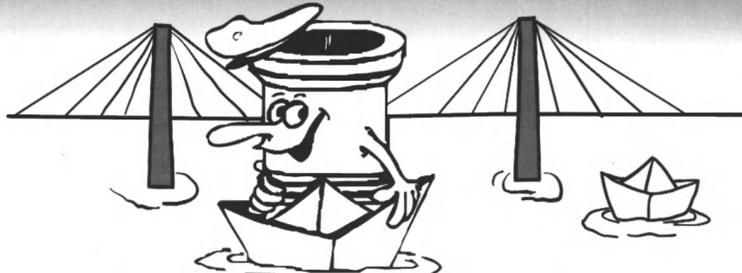


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**EUROPEAN UPDATE**

**Scottish builders bounce back**

A recent influx of orders at both Rosyth Royal Dockyard and Ferguson Shipbuilders at Port Glasgow have given renewed vigor to Scottish vessel builders. It has also countered the news that yet another Scottish builder — Jones Buckie, one of Scotland's premier fishing boat builders — is in the hands of the receiver. (Although the receiver is reportedly "cautiously optimistic" about being able to

sell the yard). At one time the outlook for the Rosyth Royal Dockyard on the East Coast appeared precarious, but the activities of sister company, Babcock Rosyth Defense Ltd. (BRDL), look set to extend the security of the 3,500 employees at the yard. The



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latest orders — all received from the U.K. Ministry of Defence — comprise more than \$82 million worth of major refit work.

The largest single contract is for work on HMS *Newcastle*, a Type 42 destroyer, including additions and alterations to the ship's mechanical and weapons systems. This will be the fourth Royal Navy Type 42 vessel to undergo substantial modifications at Rosyth, all completed ahead of schedule; HMS *Edinburgh* is approaching trials stage and HMS *York* has recently been delivered.

At the same time the company will be working on its first Type 22 frigate, HMS *Coventry*. The 12-month package, won against stiff competition at around \$16 million, includes a substantial accommodation conversion, main machinery overhaul, and improvements to the sonar and communications systems.

Three smaller vessels, HMS *Dumbarton*, HMS *Cattistock* and HMS *Shelland*, are coming to Rosyth for refit in a combined contract worth \$25 million. This is part of an ongoing program of work on the Hunt and Sandown class minehunters and the Castle and Island class patrol vessels that is expected to continue beyond the year 2000. The latest in the series to be rededicated is HMS *Orkney*, an Island class vessel which has returned to fishery patrol duties following a 29-week refit.

The company also has glass reinforced plastic expertise, exemplified by the recent strip down and rebuild of HMS *Leadbury*, a Hunt class mine countermeasures vessel. At 615 tons, the vessel is one of the largest plastic ships in the world. Following its eight-month refit, it has rejoined its 12 sisters in what has become known as the "Tupperware Fleet." All refits to these vessels take place inside Rosyth's five-berth Synchrolift building.

BRDL's Managing Director **David Batty** said, "We have responded well to the value for money and efficiency demands which the Ministry of Defence require. I am pleased that our workforce has demonstrated that it has the flexibility, skills and willingness to consistently deliver high standards on some of the most demanding refit programs."

Meanwhile, at Port Glasgow, Ferguson Shipbuilders is maintaining the long Clydeside shipbuilding tradition by securing three orders totaling \$80 million. Five years ago Ferguson employed 40 people. Last year it turned a significant profit on a turnover of \$30 million with 320 employees, and the current order intake looks set to increase this to around 400. Chief Executive **Bill Scott** told *MR/EN* that more orders were in the pipeline and, "We expect to be signing contracts within the next eight weeks."

The most recent order is for a platform supply vessel, built to a design by the Norwegian naval architectural firm of Vik & Sandvik. Placed by Stirling Shipping, a subsidiary of Harrison's (Clyde) Limited, the contract was won for \$19.5

(Continued on next page)

## EUROPEAN UPDATE

### Taiwanese Yard, Krupp Fordertechnik Team On Dredger

In cooperation with the Taiwanese shipyard Lien Ho Shipbuilding, Krupp Fordertechnik GmbH's Lubeck-based marine technology unit is to build a plain suction dredger and convert a cutterhead dredger. Both projects were commissioned by Taiwan Salvage Corp., Kaohsiung. The plain suction dredger, which can be converted to a cutterhead dredger if needed, has a total installed power rating of 18,000 kW, making it the most powerful unit built in cooperation with the Lubeck-based company to date. The conversion of the cutterhead dredger is to take place within seven months. Once construction is complete, tests will be carried out off the Taiwanese coast.

### Scottish builders bounce back

(Continued from preceding page)

million in competition with 17 other yards worldwide. The 271-ft. (82.5-m) x 62-ft. (19-m), 4,500-dwt vessel will have a propulsion system comprising two 3,300-hp diesel main engines driving CP propellers. An azimuthing thruster at the bow will augment the complement of three transverse tunnel thrusters.

Currently under construction at the yard are two 58-ton bollard pull Voith tractor tugs for Shetland Towing Ltd. Fully equipped with a 2,400-cu.-m./hour firefighting system and oil dispersant tanks, the vessels will be powered by a pair of Caterpillar 3606 diesels developing 2,030 kW at 1,000 rpm. Valued at \$7.5 million each, the tugs will operate at the Sullom Voe terminal for BP Exploration. Another vessel currently under construction at the yard is a 271-ft. (82.4-m) ferry for the Southampton-based Red Funnel Group. The third in a series of similar craft for the same customer, it will have capacity for 900 passengers, 140 cars and 16 coaches.

The recovery of Ferguson has been nothing short of dramatic since the yard was privatized under the leadership of **Bill Scott** in 1990. Major impetus was created when the yard obtained the contract to build the *Ile of Lewis*, a 331-ft. (101-m) car ferry, from Caledonian MacBrayne. This order immediately gave the newly reorganized Ferguson a high profile in the ferry market. Expansion has also taken place with the formation of new companies within the Ferguson Marine Group, which include Newark Joiners Ltd. and Alder Marine Consultants Ltd. Further proof of newfound stability is the decision to purchase and completely rebuild a 426.5-ft. (130-m) fitting out quay which will effectively double capacity.

### Hydraudyne Wins Order For Largest Shiplift

The Hydraudyne Group won an order to build a high-capacity shiplift for Volkswerft GmbH Stralsund (Bremer Vulkan). Hydraudyne Systems & Engineering is a subsidiary

of the Hydraudyne Group (Mannesmann Rexroth).

The shiplift order is 754.6 ft. (230 m) long and 113.2 ft. (34.5 m) wide, with a lifting capacity of more than 21,000 tons. It is the largest, modern generation, shiplift in the world, according to the manufacturer. The technical concept of the shiplift is

characterized by advanced AC servo technology with planetary drives.

The shiplift, which must be operated with great precision, causes a minimum loading of the mains supply. Hydraudyne has delivered shiplifts for decades, to countries such as Sweden, Portugal, Italy, Turkey, and the Netherlands.

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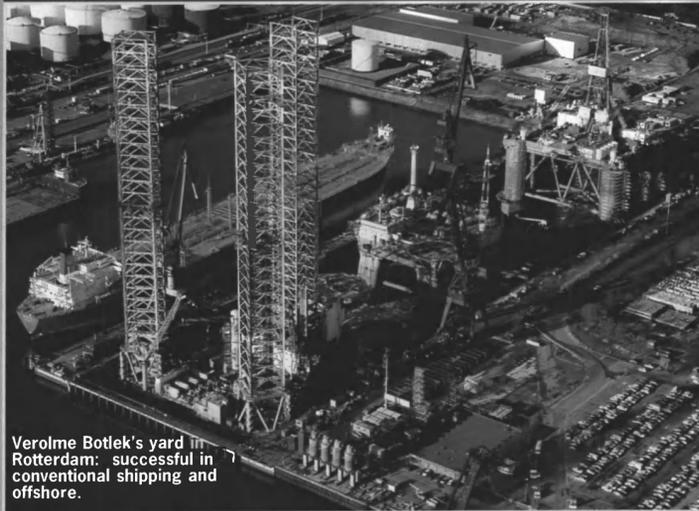
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## BENELUX REVIEW



Verolme Botlek's yard in Rotterdam: successful in conventional shipping and offshore.

### Dutch Builders Enjoy Influx Of International Orders

By Alan Thorpe, international editor

The Dutch shipbuilding industry has been very active in the newbuilding sector recently, with many yards winning new orders not only from the domestic scene but also from international owners. A complicated tax system, which allows Dutch owners financial benefits from ordering within the Dutch shipbuilding industry and using Dutch registries and crews, has allowed the yards to win some work from the domestic market over recent months. However, it is currently uncertain as to whether this system will be allowed to continue. Rotterdam's van der Giessen de-Noord has continued its success in the ferry market with yet another order, this time from Sweden's Stena line. The \$95 million contract involves a 1,500-passenger capacity vessel, which is due for delivery during May 1996. One of the main reasons behind the Stena-awarded contract was the use of designs from previous ferries for North Sea Ferries, thus guaranteeing a short delivery time. Also currently on order at the yard are two 1,000-passenger capacity ferries for Dalian Marine Transport in mainland China.

Another new order placed this summer in Holland was a \$98 million contract from U.K.-based Westminster Dredging, a subsidiary of Holland's Royal Boskalis Westminster NV, for a 23,000-cu.-m. trailing suction hopper dredger to be built at Verolme Heusden, part of the Wilton Fijenoord Holdings BV group. The vessel, which will be one of the largest of its kind in the world, will be delivered during the spring of 1997. The yard is also currently building two specialized products tankers for domestic owner Gebr. Boere.

Following an order placed last year for a 7,280-dwt specialized heavy lift vessel to be built at YVC Ysselwerf, Rotterdam, Khan Shipping, part of the Jumbo Shipping operation, has now placed an order for a second ship.

Damen Shipyards recently won two orders from the international market, a series of three harbor tugs for Africa's Ghana Ports Authority, and a series of smaller harbor tugs for Australia's Howard Smith, a company which controls a

great deal of tug operations in the U.K. De Schelde, located at Vlissingen, has for many years concentrated on the naval building industries, although over recent months has moved successfully back into the commercial market. The current orderbook comprises two RoRo vessels for Commodore Shipping, and, placed during the summer months, an order for a catamaran ferry from Greek shipowner A. Valsamis.

IHC Holland, one of the largest dredger-building companies throughout the world, has recently completed a series of such vessels for mainland China and is now working on a dredger order for the Suez Canal Authority, and an 18,000-dwt capacity dredger for Jan de Nul, which was originally ordered from Belgium's Boelwerf and then taken over by IHC after the Belgian yard went bankrupt.

In the north of Holland there are a number of small shipbuilding yards situated along the Westdiep Canal, near Groningen. Many of these yards are marketed by Conoship, a central design and marketing organization set up to assist the smaller yards on the international market.

Recent new contracts for the north Holland shipyards include a 4,250-dwt general cargo vessel to be built by Bijlholt for Germany's Bockstiegel, as well as two sisterships for Dutch owners; a series of 4,200-dwt dry cargo vessels for various Dutch and German owners to be built at Bodewes Volharding; a series of four 2,000-dwt chemical tankers to be built by Damen for Germany's Gefo; one 4,200-dwt, and two 6,000-dwt dry cargo vessels to be built by Pattje for Germany's Hartmann; and a 6,100-dwt reefer vessel ordered from Van Diepen by reefer specialist Vroon, in Breskens.

Meanwhile, the first in a series of newly-designed Cono Feeder 200 container feeder ships, the 205-TEU *Bermuda Islander*, was launched at Tille Shipyards, Kootstertille, on August 26,



The shipdock facility in Amsterdam.



The Cono Feeder 200 containership *Bermuda Islander* being side-launched at Tille Shipyards in north Holland.



Ferus Smit's building yard in northern Holland is one of many small shipbuilding facilities along the Westdiep Canal near Groningen.

marking a return to full shipbuilding activities for the shipyard. For the past five years, the shipyard, part of Central Industry Group (CIG), Groningen, has been utilized as a section-only building yard.

The ship will be operated by Armawa Shipping & Trading, Groningen, and will enter a long-term charter of three years with Bermuda International Shipping Ltd. (BISL) with three option periods of one year each, when she is delivered during October of this year. She will operate on the New Jersey to Hamilton (Bermuda) feeder service, a service operated by BISL since 1985. Although she will be operating on the U.S. eastern seaboard, the vessel will remain under Dutch flag and will be crewed, both officers and ratings, by Dutch nationals.

The shipyard has built the vessel in record time, with the keel laid during April this year, the launching during August, and delivery scheduled for mid-October. The order from Armawa Shipping comprises one further sistership with an option, dependent upon financial support from

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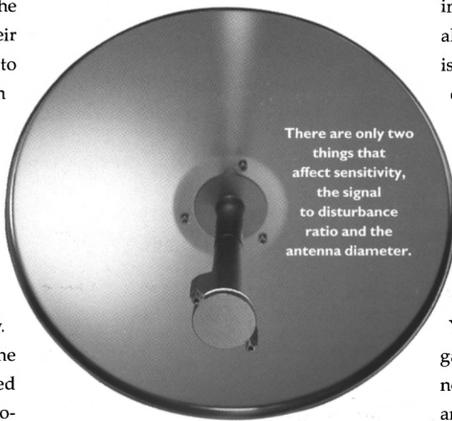
#### INTRINSICALLY SAFE OR FLAMEPROOF.

**It is true** that an intrinsically safe instrument is the best way to improve safety on board. There is not enough electrical energy in an intrinsically safe instrument to cause a spark that could ignite the explosive gas. Furthermore, an intrinsically safe instrument is resistant to human error, and can be safely opened and serviced while it is powered.

On the other hand, **it is false** to claim that a flameproof instrument is equally safe. A flameproof instrument allows an explosion to take place inside the enclosure. Therefore the enclosure must be able to

withstand the pressure, and must have well-defined, clean gaps that release the flames to the outside in a controlled way, so as not to ignite the explosive gas. Before servicing a flame-proof instrument, the deck must be gas-free, or the instrument must have been switched off for about one hour.

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**It is false** to say that there are any advantages in increasing the power when using radar to measure the distance to the liquid surface in tanks. **The truth is** that sensitivity is the single most important factor in the performance of a radar level gauge. And sensitivity is unaffected when the transmitted power is increased. In fact, there are only two things that affect sensitivity; the signal to disturbance ratio and the diameter of the antenna. The signal to disturbance ratio is also totally unaffected by the amount of transmitted power. The more power, the

more noise. It's comparable to listening to a radio that is not correctly tuned into a station. If you increase the volume, you increase the noise as well. But if you carefully tune into the correct frequency, you hear sweet, static-free music.

And, one more fact about sensitivity. **It is true** that a large diameter not only improves the sensitivity of an antenna. It also produces a narrow radar beam, which is an advantage when you're measuring in difficult conditions such as deep tanks, when there are waves on the surface or in tanks with a lot of internal structures. The most practical way of having a large antenna diameter is to use a parabolic antenna.

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## DENELUX REVIEW

the Dutch Government through the tax laws, for an additional two ships. The practical yet flexible design will be marketed by Conoship International, Groningen, which handles the marketing activities for a total of nine north Dutch shipyards, including Tille. The design will also be marketed, along with Tille Shipyards, by Shipkits International, London, also part of CIG, as a ship-kit.

Armawa Shipping is also building two similarly designed ships at Frisian Shipyard, also part of CIG, although these two ships will be geared with a single 40-ton crane on the main deck. For delivery reasons, the two building at Frisian Shipyard have been subcontracted from Tille.

The Dutch ship repairing industry has had to undergo various reorganization programs over recent months as competition from a number of sources continues to bite. Cheaper steel prices in the former eastern European and Soviet nations, especially Poland, along with added competition on the conversion market by Germany, and more recently, Scandinavia, has proved tough for many of the yards. Cheaper overall repair prices in the U.K. also contributed to losses in the general repair market for the Dutch yards.

Holland also leads Europe's "green" lobby regarding the cleanup of heavy industries such as ship repair. Discharge controls in all the yards are monitored by the authorities; which some believe puts Holland at a disadvantage compared with yards from the Mediterranean and former eastern European areas.

Rotterdam's Wilton Fijenoord, part of Wilton Fijenoord Holdings BV, has been one of the main losers in this latest fight for survival, the workforce being recently reduced from 750 to 450. The yard, which was once part of Holland's naval building industry, now survives on the general repair market, although

it is keen to re-enter the conversion market with the yard's 40,000-dwt capacity covered graving dock.

Meanwhile, Verolme Botlek, also part of Wilton Fijenoord Holdings BV, has managed to survive due to its ability to operate in both conventional and offshore industries. On the commercial shipping scene, and as part of guarantee requirements, New Sulzer Diesel Ltd., Winterthur, placed an order with Verolme Botlek to remove, transport to Sulzer Works, and then reinstall one out of four nine-cylinder engines (ZA40S) onboard the North Sea Ferries-owned passenger/car vessel *Norbank*. Through holes in the main deck and lower deck, the yard's 80-ton capacity crane took the engine ashore for transport to the Sulzer Works, reinstalling the unit on the return to the shipyard.

Simultaneously, Verolme Botlek also carried out general repairs to *Norbank*'s sistership *Norbay*, both vessels being drydocked together in the large No. 7 graving dock.

Major projects on the offshore side of the yard's activities carried out in the course of this year thus far include repairs to jack-up rigs *Enesco 71*, *Enesco 80* and *Enesco 85*, the *Maersk Giant*, *Arethusa Scotian*, and semi-submersible rig *Sedco Explorer*. In the case of the *Enesco* rigs, work was carried out on a simultaneous basis.

The *Enesco 80* was one of the largest offshore contracts carried out at Verolme Botlek this year, the rig being converted from a slot type unit into a cantilever unit, for which, in addition to the fabrication and installation of the cantilever itself, extensive structural reconstruction work had to be carried out. The assembling and installation of a new derrick, including the top drive, was also pertinent to project completion. Other major items included enlargement of the mud storage capacity, modification of the accommodation, four new lifeboat platforms, a new exhaust gas system, and fabrication/installation of two sponson

tanks to port and starboard front sections.

Apart from the two large yards in Rotterdam, there are a number of smaller yards — for example, YVC Bolnes, Van Brink, Niehuis & van den Berg and Vlaardingen Oost — all of which operate successfully in the small ship market. Other yards in Holland include Shipdock Amsterdam and Scheldepoort, Vlissingen, both of which operate successfully in the general repair market. One of Shipdock's largest repair contracts this year involved the 6,750-dwt Netherland Antilles-registered trailing suction hopper dredger *Alpha B*. The vessel, which is owned by Explorer NV of Curacao, suffered an engine room fire on May 7th.

YVC Bolnes recently began the conversion contract involving the 7,780-dwt Dutch heavy-load general cargo vessel *Fairlift*. The contract involves increasing heavy lift capability from 250 tons to 400 tons, the vessel and general vessel repairs and survey operations. The owner of the vessel is Kahn Scheepvaart BV, and she is operated by Jumbo Shipping Co. S.A. of Switzerland. YVC has also booked the 2,446-dwt Dutch LPG carrier *Coral Actinia*, which is owned by Dutch shipowner Anthony Veder & Co., Rotterdam. The vessel will undergo a 78.7-ft. (24-m) mid-body lengthening operation, and an additional gas tank (1,000 cu. m.) will be installed, with completion during early 1996. A similar lengthening operation is expected to be carried out at YVC Bolnes onboard a sistership during 1996.

Rotterdam ship repair yard Niehuis & van den Berg BV has recently completed the conversion of the cable-laying and burial ship *Dock Express 20*. The vessel underwent modifications to increase her cable-carrying capacity to 11,000 tons, and a new accommodation block was installed for the 90 officers, crew, and a specialized project crew from AT&T Submarine Systems Inc., that will be onboard. The vessel is to complete outfitting work at AT&T's Baltimore facility, after which she will load an ITUR cable system at Newington for installation between Istanbul and Sicily. The ship, which is owned by Dockwise NV of Belgium, is now the largest cable-layer in the world.

The Belgian shipbuilding industry is still awaiting the outcome of negotiations between the Belgian government and various interested parties over the future of Boelwerf, the country's largest shipbuilding complex, which has now been closed for some months following bankruptcy. Germany's Bremer Vulkan has been one of the leading parties interested in taking over the yard, although subsidies would have to be guaranteed by the Belgian government before the Germans signed any deal. Meanwhile, while the yard's future is decided, half-com-

## EU Reports Favorable Trade Figures

According to trade figures released by Eurostat, last year was a better year for the European Union (EU). Not including new members Austria, Finland and Sweden (which joined in January 1995), the EU posted a trade surplus with the U.S. while reducing its trade deficit with Japan. In 1994, the EU posted a \$2.43 billion trade surplus with the U.S.; and a \$28.4 billion trade deficit with Japan.

EU imports from the U.S. were up 11.3 percent (to \$119 billion from \$107 billion) in 1994 as compared to the prior year, and EU exports to the U.S. were up 11.7 percent (to \$122 billion from \$109 billion). The U.S. accounts for 17.6 percent of the EU's total trade.

Germany is the main EU exporter to the U.S., accounting for 30 percent of the EU total. The U.K. is the main market in the EU for U.S. imports, taking 27 percent of the total. Manufactured products dominate this trade relationship. In value terms, machinery, electrical equipment, and optical and photographic instruments make up more than 46 percent of the imports, and 36 percent of the exports.

### EU-Japan Trade

The improvement in the EU's deficit with Japan was mainly due to a 19.2 percent rise in EU exports (from \$29 billion to \$34 billion), and a 3.6 percent increase in imports (from \$60 billion to \$62 billion).

In 1994, the most important product group in total EU imports from Japan (58 percent, up 9.5 percent from 1993) included machinery, electrical equipment, and optical and photographic instruments.

pleted ships remain at the yard.

Belgium Shipbuilding Corp. (BSC), which is a sales organization set up for three Belgian shipyards — Fulton, Langebrugge and Ruplemonde — has recently won a six-ship order from German chemical tanker specialist Gefo. It has yet to be decided which shipyards will participate in this order, although it is expected that all three will play a part. On the ship repair side of Belgian maritime activities, Antwerp Shiprepairers, now part of Rotterdam's Kopke Group, has returned to the general repair industry and will play an important role in northern Europe's repair industry. Since re-opening on December 12, 1994, Antwerp Shiprepairers repaired a total of 134 ships, 31 of which involved drydocking operations that lasted until mid-June of this year.

## DYNEEMA USED TO REINFORCE TANKER BOTTOMS

In June 1995, Dutch shipbuilder Royal Schelde, together with TNO (the Dutch organization for applied scientific research) and Mitsubishi Heavy Industries, carried out a full-size crash test on an inland tanker whose hull had been reinforced with DSM's super-strong Dyneema fiber. The goal of the test was to determine if the reinforcement could effectively prevent disasters involving tankers and other ships. The tanker, with a specially designed bottom incorporating sheets of Dyneema and aluminum, was steered onto an

artificial rock, and the bottom remained watertight.

The test ship, weighing 700 tons, hit the artificial rock at a speed of 13.5 knots per hour. The force of the impact was more than 200 tons. Reportedly, the energy-absorption capacity of the Dyneema fiber enabled the forces to be absorbed and dissipated. The aluminum inner skin remained completely undamaged, and even the relatively weak welded joints did not give way.

For more information on Dyneema from DSM Circle 7 on Reader Service Card

## Evergreen To Build 10 New Containerships In Japan

35 containerships ordered by company in Japan since 1993  
— Further expansion a possibility

The Evergreen Group announced it will order ten 4,173-TEU containerships from Mitsubishi Heavy Industries. The formal contract signing was to take place at the end of September, and the production schedule calls for deliveries to commence in 1997, with all 10 vessels in service by mid-1998.

The new contract reaffirms Evergreen's confidence in the Japanese shipbuilding industry, and especially in Mitsubishi's Kobe Shipyard, said Dr. Y.F. Chang, the Evergreen Group's chairman. This facility was badly damaged in the January 1995 earthquake, but Mitsubishi still delivered the 4,229-TEU *Ever Result* to Evergreen on schedule.

The Panamax ships, designated D-types, are a further development of the company's successful 4,229-TEU R-type vessel. Ten of these have been built in Japan, five by Mitsubishi at its Kobe yard. The last vessel, *Ever Repute*, is currently fitting out and should enter service in late November. Mitsubishi is also building five 5,365-TEU post-Panamax U-type containerships for Evergreen, with deliveries scheduled for 1996/97.

The D-types differ from the R-type in that they are significantly faster, capable of 25 knots as compared to 23 knots. Similarities include the capability to transit the Panama Canal, enabling both to participate in the company's Round-the-World service.

Counting existing vessels and vessels to be built, the Evergreen Group containership fleet will number 105 vessels with a total capacity in excess of 250,000 TEU.

Since 1993, the Evergreen Group has ordered 35 containerships in Japan: 10 R-type ships; five U-type ships; 10 A-type ships and 10 D-type

ships. In capacity terms, this amounts to approximately 120,000 TEU. Seven of the ten 1,162-TEU A-class ships are building for Ever-

green affiliate Uniglory, which recently disclosed that it was discussing terms with Taiwan's China Shipbuilding Corp. for four additional

vessels of this type. Of the 35 vessels ordered by Evergreen in Japan, 16 have been built or will be built in Kobe.

Evergreen and Uniglory are both now investigating new routes, and following Uniglory's successful experience in the Far Eastern/South Africa/South America trades, further expansion in the southern hemisphere is considered a strong possibility.

### Japan Ship Center Announces New Contracts

New orders for ships recorded in Japanese yards in August 1995 totaled 30 vessels of 627,000 gt. This figure is 44.5 percent higher (193,000 more gt, 15 more vessels) than July. However, it is 16.6 percent lower than the number achieved for the same month in FY '94.

Of the new orders, one vessel (49,000 gt) is for a domestic owner, while 29 vessels (578,000 gt) are for export. Seven of the vessels are scheduled for delivery in 1995; 22 for delivery in 1996; and one for delivery in 1997.

New orders in this FY total 3,839,756 gt, a 24.5 percent decrease from the same period a year before.

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## SHIP REPAIR UPDATE

# Heightened Environmental Pressures, Rising Freight Rates Buoy Ship Repair Industry



**LEFT:** A&P Southampton; the U.K. is now a major player in the European market. **TOP RIGHT:** Singapore's Sembawang Shipyard. Singapore remains a world leader in the repair industry. **BOTTOM RIGHT:** INMA, La Spezia. Ferry work is expected to be a major market in the next few years.

By Alan Thorpe, international editor

All of the fundamental reasons why the ship repair industry should be experiencing fairly better times are now in place. Pressure on the shipowners' standards by classification societies and other legislative organizations have precipitated an increase in the number of repair contracts available throughout this year, and the increase in freight rates across the board also forecasts an increase in contract value as the year progresses.

Currently, the main market battle in the ship repair industry seems to be between the Singapore area, where there are five large shipyards, and the Middle East, where there are two. Despite recent inroads into its more traditional markets by Middle Eastern yards, the Singapore area remains a world leader in the ship repair and conversion industries. However, the level of activity between the two areas is becoming fiercely competitive. Figures released by the Association of Singapore Marine Industries (ASMI) showed that a total of 71 VLCCs were drydocked in the Singapore area during 1994. As compared with the Arabian Gulf yards, for the same period, Dubai Drydocks repaired 15 ULCCs and 37 VLCCs, and Bahrain's ASRY reported three ULCCs and 10 VLCCs. This equals a total of 65 large tankers repaired in the Arabian Gulf.

One of the main methods by which the Singaporean government is assisting the yards is by increasing the ratio between Singaporean and foreign workers in the various shipyards from the past ratio of one Singaporean to two foreign workers to a ratio of 1:3. Expectedly, this move will allow the yards to maintain low prices and carry out expansion plans. Jurong Shipyard Ltd. (JSL) has already made moves to increase its labor force by announcing that it is building

necessary housing for foreign workers.

This likely increase in worker levels is complemented by an expansion of facilities; and most Singapore yards have been involved in expansion projects, committing some \$394 million in new docks, additional berths, equipment and machinery. The two largest expansion programs currently underway within the Singapore repair industry are: a 400,000-dwt capacity graving dock being built at the existing Tanjong Kling shipyard of JSL, the scheduled operational date being 1996; and the construction of a graving dock, capable of handling vessels up to 350,000 dwt at Keppel's Tuas facility. This new facility, which will complement two existing large docks at Tuas, will eventually replace Keppel's City yard, which is due for redevelopment. Apart from general repair work, Singapore has been at the forefront of the conversion industry for the past number of years, especially Keppel, Sembawang and JSL. These have recently been joined by Pan United, one of the most successful exponents of the conversion industry in the smaller end of the ship market, and Singapore Technologies.

The largest conversion contracts include the 137,684-dwt former NIS-registered conventional tanker *Ellida*, which arrived in Keppel during May this year for a nine-month conversion contract to change her application from a conventional crude carrier to that of a Floating Production & Storage Offshore terminal (FPSO) for use by Shell in the Mauri Field off the coast of New Zealand. Keppel also recently completed work on a similar project involving the 149,494-dwt *Cossack Pioneer*, formerly the *Chevron London*, for Woodside Petroleum's operations in the Cossack Field off the Australian coast. JSL also

recently made inroads into this market with a \$20 million contract converting the 134,000-dwt tanker *Mega Eagle* into a FPSO, the first such conversion contract won by JSL from this specialized offshore market.

Meanwhile, Sembawang has been involved in both the FPSO and other offshore-related conversion work over recent years, the latest being the 127,435-dwt Panamanian bulk carrier *Solitaire* conversion, reportedly the largest such contract awarded to the ship repair industry on a worldwide basis. The project is currently underway in Sembawang, with the ship due for delivery as a specialized pipelayer to Allseas Engineering BV, Delft, during the latter part 1995.

As is the case with the Singapore area, the two large yards in the Middle East are also looking to a healthy future, and therefore are both in the expansion mode. Earlier this year, Bahrain-based Arab Shipbuilding & Repair Yard (ASRY) unveiled an ambitious \$87 million expansion plan. The expansion program is aimed at increasing the present activities of the yard and maximizing profits, with financing likely to be provided via a mixture of bank loans and company resources.

The ASRY project includes dredging a channel and building a new quay, and construction is expected to begin next year. This new basin will be constructed in three phases, the first to involve a new 1,312-ft. (400-m) quayside space, with phases two and three involving 2,296.5-ft. (700-m) and 3,281-ft. (1,000-m) extensions to this berthage. This will allow for a greater amount of alongside work to be carried out, with the yard also beginning to look at the conversion market as well as general repairs. The yard

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## SHIP REPAIR UPDATE

already owns one of the industry's largest facilities, with a 1,230-ft. x 246-ft. (375-m x 75-m) graving dock for vessels up to 500,000 dwt and two floating docks, 826.7 ft. x 147.6 ft. (252 m x 45 m) and 774.7 ft. x 134.5 ft. (227 m x 41 m), with lifting capacities of 33,000 tons and 30,000 tons, respectively. There are plans for a second graving dock at a cost of \$120 million, assuming favorable financial resources and market conditions.

The yard reported that the number of ships repaired in the first five months of this year rose 16 percent on comparable 1994 figures to total 55. Operating income was also up with a 13 percent increase to \$28 million. Meanwhile, Dubai Drydocks, with three graving docks capable of handling large tankers, leads the Middle East in this trade. During the latter part of last year Dubai Drydocks inaugurated its new 40,000-dwt capacity floating dock, which allowed the yard to enter the smaller market available in the Arabian Gulf. Apart from Singapore and the Middle East, others throughout the world have been involved in expansion programs, namely: Hong Kong United's (HUD) new floating dock, now fully operational, which was built in Singapore by Far East Levingston, part of the Keppel

Group; the panamax capacity floating dock — which was purchased by Bergen's Mjellam & Karlsen (M&K), Norway, during 1994 — docked its first vessel in June 1995. Two former naval yards in the U.S., located in Philadelphia and Charleston, are currently being put under the privatization hammer, with the intention of attracting European bidders with desire to branch into

which was once part of Swan Hunter; Wear Dockyard Group's takeover of the lease on the Hebburn Dry Dock, also once part of Swan Hunter; Coastline Industries' purchase of the three former Cammell Laird drydocks in Birkenhead; the Antwerp Shiprepairers re-opening; a management buyout at Cantieri Mediterraneo, Naples; new operators for the drydocks at Genoa;

the Spanish yards may lie down the path of privatization, although the problems faced by both Greece and Italy over privatization problems have been many, and therefore may not be a good solution for the Spanish industry. One of the main problems faced by both northern and southern Europe is the emergence of former naval yards in eastern Europe, both in the Baltic and Balkan states, onto the commercial market. This particularly applies to steelworking yards, where prices are below those of other European nations. Within northern Europe, the ferry refit market is about to become one of the most lucrative. The recent *Estonia* disaster in the Baltic Sea, the worst in European ferry and maritime operation, has again highlighted the problems of RoRo passenger/car ferries.

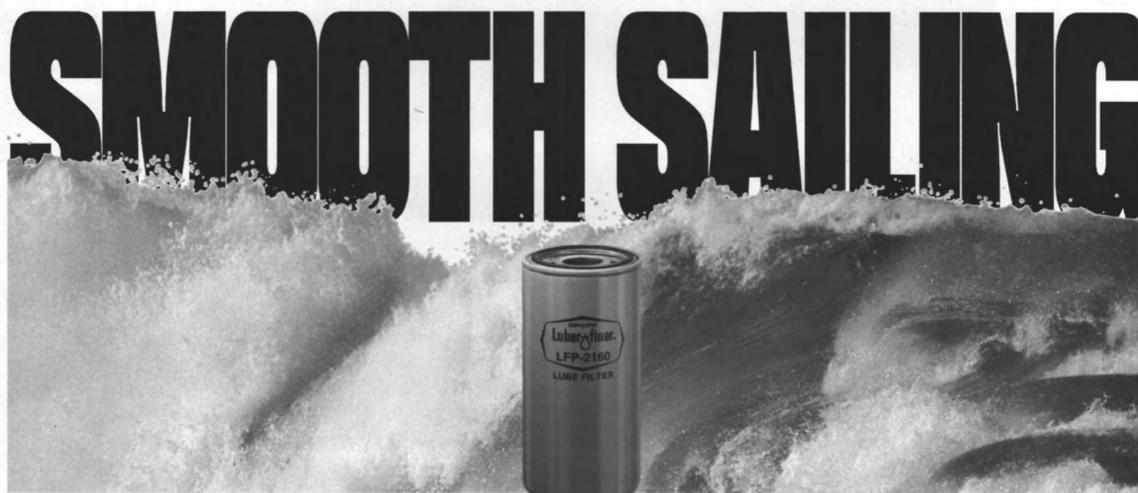
The main design fault of such ships is very clear. Designed like a large box, the main car deck, if penetrated by seawater, will swiftly fill up and cause the ship first to roll over, and then, inevitably, to sink. This disaster prompted the various authoritative organizations to rethink safety requirements onboard such ships and it will be to the repair industry that the ferry owners will turn to implement such design changes.

*Pressure on the shipowners' standards by classification societies and other legislative organizations have precipitated an increase in the number of repair contracts available throughout this year*

the U.S. commercial repair (or even newbuilding) market.

This is all in addition to various new yards becoming operational and old yards re-opening over the past two years. These include: Thailand's Unithai, which is now virtually fully operational; Keppel's re-opening of Subic Bay Shipyard in the Philippines, and Cairncross Dockyard in Australia; Greece's Neorion Shipyard re-opening, A&P Appledore's lease of the former Neptune yard,

Vancouver Shipyard's return to operation of the large dock at Victoria, British Columbia; and Hong Kong's Yiu Lian Dockyard transfer of one of its floating docks to its new shipyard at Shekai, part of mainland China. The Mediterranean area is also one of re-organization. Portugal is about to lose its largest repair yard, Lisnave's Lisbon shipyard, with repair activities to be centralized at the company's Mitrena yard in Setubal. The future for some of



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### Mobil Awards Bunker Analysis Contract

Mobil Shipping has awarded a two-year contract for fuel oil bunker analysis for its entire deep sea fleet of 24 vessels to Lloyd's Register FOBAS. FOBAS has been working with Mobil for the past decade, covering half of its deep sea fleet. The FOBAS program for Mobil covers a fast worldwide analysis service to ensure that all fuels bunkered meet required international standards, and alerts Mobil to any potential problems, providing advice and guidance on the storage, handling, and use of bunkered fuel on board.

### Sonsub Enters Negotiations With Shell Offshore

Sonsub Inc. and Shell Offshore Inc. have finalized an interim agreement which will lead to a multi-year alliance between the companies. Under the alliance, Sonsub will support Shell's deepwater and ultra-deepwater exploration and production program in the Gulf of Mexico. By adopting the team approach, the companies will share the financial risks and rewards associated with developing and applying cost-effective technologies.

### IACS Takes Key Step For Safer Ships

A key step enabling progressive implementation in the world merchant fleet of the International Maritime Organization's (IMO) International Safety Management (ISM) Code has been taken with adoption by members of the International Association of Classification Societies (IACS) of formal Procedural Guidelines for the code's verification.

The ISM Code is designed to improve compliance with international rules and regulations and to support safe practices in shipping. By creating a unique opportunity to develop a new safety culture for the industry, the code is held as a very important development in maritime safety.

Approximately 25,000 IACS-classed vessels — more than a third of the world's fleet — and their 7,000 owners/operators alone will require auditing and certification under the Code in the next few years.

The IACS Procedural Guidelines and Unified Interpretations of the ISM Code have been developed over the past year by an association working party, and will be fully implemented, effective January 1, 1996.

IACS Unified Interpretations of the Code Procedural Guidelines for certification will be crucial instruments in verifying vessels' Safety Management Certificates (SMCs) and the Document of Compliance (DOC) for owners/operators' shore-based operations. Both will become mandatory to validate continuing compliance with the Code.

"Compliance monitoring presents the industry with a huge challenge," said James Bell, IACS permanent secretary, "with clarity on the requirements and verification procedures being a critical early step."

### LR Debuts New Software Certification Product

Lloyd's Register (LR) introduced Software Conformity Assessment (SCA), a software product certification service which provides users with an assurance that a product conforms to high standards of quality, usability and integrity.

For more information on the product from LR  
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Bay Transportation's *Kinsman Hawk*, the first of three new tractor/escort tugs powered by Wartsila 6L32E engines.

Wartsila Diesel Inc. received a \$1.2 million order from Trinity Marine Group's Halter Marine Shipyard for a pair of Wartsila 6L32E propulsion engines to power the third tractor/escort tug built for Bay Transportation.

Wartsila 6L32E engines were also selected for the first two tugs of this class. The vessels are designed and built to comply with new U.S. Coast Guard requirements for tanker escort service in such environmentally-sensitive areas as Alaska's Prince William Sound.

The new Bay Transportation tugs incorporate pioneering propulsion technology design, with improved hull design, comfort, reliability and environmental safety. Twin independent propulsion systems provide for reportedly exceptional maneuverability, as well as redundancy — important factors when tanker emergencies require split-timing and precise directional control.

For more information from Wartsila  
Circle 18 on Reader Service Card

### Seacor Concludes Agreement To Purchase Graham's Marine Assets

Seacor Holdings, Inc. announced the conclusion of a definitive agreement with John E. Graham & Sons and affiliated companies of Bayou La Batre, Ala., to purchase all of the marine assets and certain real estate owned by the sellers. The assets will be purchased by several Seacor subsidiaries.

The purchase price will be \$72 million, subject to certain adjustments at the time of closing. The definitive agreement follows the terms of a letter of intent signed last May but excludes from the transaction a shipyard and certain real estate which will be retained by the sellers. The Graham fleet includes seven offshore supply vessels, 37 crewboats, five mini-supply vessels, and 79 utility boats.

The transaction was expected to close by September 30. Seacor will finance the acquisition with its cash on hand and borrowings under an \$85 million credit line established with Den norske Bank AS, New York branch.

Seacor Chairman **Charles Fabrikant** said, "the Graham assets will broaden Seacor's ability to serve its offshore energy customers, and benefit the company's environmental subsidiary, National Response Corporation (NRC), which specializes in marine emergency response and oil spill cleanup."

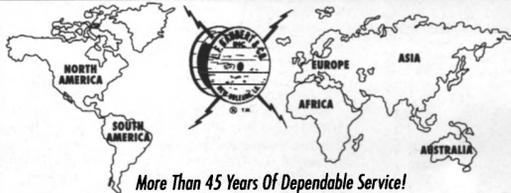
He continued, "NRC has expanded its customer base during the last year by entering into long-term contracts with PDV Marina, a subsidiary of Petroleos de Venezuela S.A., the Venezuela-based oil

producer, and its U.S. subsidiary CITGO, a domestic based refiner and distributor, and Sun Oil. The Graham acquisition provides flexibility for NRC to customize programs for clients by re-deploying some of Graham's assets. We are considering Puerto Rico, Lake Charles, Corpus Christi, the Caribbean and the West Coast as areas for expansion."

NRC President **Mark Miller** said that the enhanced capability within the Seacor family would facilitate the prompt action and flexibility needed for effective response to oil spills. He said major spills have required as many as 80 support vessels like those in the Graham fleet. "We believe that NRC is the only company in the U.S. with environmental experience that can commandeer the broad array of diverse marine equipment necessary to respond to such events." He said that NRC's ability to access equipment through its sister company is an advantage in expediting response. NRC now has another 128 vessels in its marine response network.

Seacor provides offshore marine transportation and environmental services to the energy and maritime industries. The company's two primary lines of business are: the operation of a diversified fleet of marine vessels primarily dedicated to supporting offshore oil and gas exploration and development in the U.S. Gulf of Mexico, Mexico, the North Sea and West Africa; and the provision of environmental contracting services domestically and internationally, specializing in the planning for and response to oil spills. Seacor's environmental services are provided primarily through NRC.

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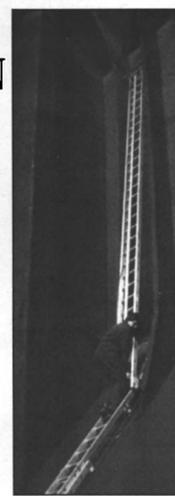
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Maritime Reporter/Engineering News

## MARCO CONVERTS RUSSIAN FISHING VESSEL



MARCO Shipyard Seattle completed a major conversion of the Russian vessel *Auda*, owned by Marine Technologies Company of Magadan. The vessel had made a long voyage from her original port

of Riga in Latvia, on to Kalingrad for removals, across the Atlantic Ocean, through the Panama Canal, and up the North American coastline to the MARCO Seattle facility. "This vessel owner is the most focused

company I have met in Russia," said MARCO Director of Russian Business Development **Joseph M. Hunter**. "They knew exactly what they wanted and pursued their business plan for years to bring this project to life ... We were particularly fortunate to have an experienced U.S. captain and vessel owner, **David Shoemaker**, involved in every phase of the vessel's conversion. His expertise was the key factor in the successful outcome of this project."

Upon arrival in Seattle, *Auda* was an STR-503 sterntrawler like hundreds in the former Soviet Union — but left MARCO reportedly competitive with any crab catcher/processor in the North Pacific. MARCO removed the antiquated trawling and seining equipment, fabricated a new steel shelterdeck, and installed all-new crab fishing and processing systems.

Several of Mr. **Shoemaker's** ideas were utilized. Notably, cooking will be by steam, generated from a custom-designed Seattle Boiler Works marine boiler. Teknothem provided new refrigeration equipment for brine freezing and product storage.

On deck, the vessel has the ability to fish single pots or longline pots of any dimension, as the MARCO Shipyard installed a full complement of MARCO Marine fishing

machinery: J0124 Kinahauler for single-pot fishing, a JPL07 double-acting pot launcher, the high-capacity J0136 deep-sea linehauler and MARCO's new J2115 automatic coiler for longlining pots. MARCO Marine also provided the vessel's hydraulic power units, and Alaska Marine Crane provided two deck cranes. Below deck, MARCO removed the incinerator, sternthruster, and unused fishing equipment, then combined the net hold and fish hold to create a single larger refrigerated cargo hold. MARCO also modified the wheelhouse to make room for an aft fishing station with new electronics and a television camera for a better view of the pot hauling operation.

*Auda* left Seattle with more than 220 large U.S.-style crab pots on deck, fully outfitted and geared for the next several months of crab fishing. Both the Russian captain and the U.S. fish master were visibly pleased with the vessel's performance on sea trials. The vessel will operate with a crew of four Americans and 21 Russians.

"They were an excellent group to work with," said MARCO Shipyard General Manager **Bob McMahon**. "We look forward to future projects with them."

For more information on MARCO  
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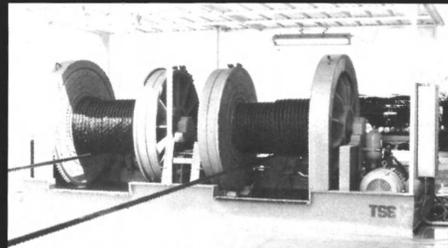
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The Costa Victoria, an 820-ft. (250-m) cruise ship being built for the Italian company Costa Crociere S.p.A., recently had its hull completed at Bremer Vulkan shipyard, and left the dock destined for the Lloyd shipyard in Bremerhaven for outfitting.

The shipbuilder used about 14,800 tons of steel for the 74,000-ton luxury vessel. In Bremerhaven, Lloya — the ship repair and conversion specialist — will install more than 1,000 cabins. The ship is due for its first technical voyage in February 1996, and its maiden voyage in June 1996.

The vessel is being built to meet the latest international safety standards, and will be one of the most technologically advanced luxury liners in the world. Joint responsibility for the project is being taken by four Vulkan Group companies: Bremer Vulkan, Schichau Seebeck and Lloyd shipyards; as well as STN Atlas Elektronik.

For more information on Bremer Vulkan  
Circle 14 on Reader Service Card

## VULKAN-BUILT CRUISE SHIP LEAVES DOCK FOR BREMERHAVEN

### 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 (212) 997-0966.

Date	Name	Type	DWT	Year	Price
9/11	Grand Fortune	Bulker	12,201	76	\$1.5
8/29	Joint Success	Bulker	17,583	77	\$4.0
9/8	Ken Gale	Bulker	22,800	79	\$5.7
9/8	Nancy	Bulker	23,360	83	\$9.0
8/21	Aditya Prabha	Bulker	25,063	82	\$9.45
8/21	Pine Forest	Bulker	26,300	89	\$16.5
9/11	Prime Unity	Bulker	26,650	84	\$12.1
9/8	Huldra	Bulker	28,000	76	\$5.45
8/29	Eva	Bulker	31,881	74	\$3.5
8/29	Sanko Humanity	Bulker	33,022	84	\$13.45
9/04	Aethoussa Iii	Bulker	34,124	77	\$8.5
8/29	Wilmaster	Bulker	34,416	77	\$7.5
9/08	Neptune Schedar	Bulker	37,600	76	\$12.0
9/04	Ereosmus	Bulker	38,287	79	\$7.5
8/29	Neo Cymbidium	Bulker	38,888	85	\$14.75
8/29	Bergen Malaya	Bulker	42,069	85	\$16.5
8/21	Milla	Bulker	46,650	85	\$16.5
8/29	Colima	Bulker	46,650	85	\$16.6
9/11	Toscana	Bulker	50,202	76	\$6.0
8/21	Yellow Island	Bulker	52,162	70	\$2.17
8/21	Petra Treasure	Bulker	63,990	77	\$7.75
9/04	Popago	Bulker	64,730	82	\$15.15
9/11	Nena	Bulker	571,706	74	\$6.6
8/29	Jalavihar	Bulker	76,583	76	\$3.65
9/08	Equinox	Tanker	13,687	73	\$2.375
9/11	Larici	Tanker	24,593	83	\$7.750
9/04	Portoria	Tanker	24,853	69	\$2.0
8/21	Lisbet	Tanker	28,610	90	\$14.75
9/04	Elana	Tanker	30,990	79	\$7.5
9/08	Rabigh Bay I	Tanker	31,177	77	\$5.75
9/11	Silvera	Tanker	33,401	77	\$6.2
9/08	Gunta	Tanker	44,200	92	\$25.0
8/29	Emerald Sun	Tanker	60,945	80	\$11.0
8/29	Ocean Spirit	Tanker	61,391	82	\$13.5
8/29	Narita	Tanker	83,890	86	\$27.5
8/29	Corbeia	Tanker	88,325	81	\$13.0
9/04	Temnyssan Maru	Tanker	89,039	80	\$12.5
8/21	Nyheron	Tanker	123,596	77	\$6.35
9/08	Captain John G.P. Livanos	Tanker	255,557	77	\$12.5
8/21	Mimoso	Tanker	357,647	77	\$13.0

### Kvichak Marine Delivers First Six Of 29 Spill Response Boats



Kvichak Marine Industries of Seattle delivered the first of 29 spill response boats being built under a contract with the U.S. Navy. The vessels — to be deployed worldwide — feature the Marco Filterbelt oil and debris recovery system. Of the six vessels completed, the first went to Port Hueneme, Calif.; the second to La Madalena, Italy; two to the Naval Station San Diego; and one each to the Naval facilities at Oak Harbor and Sand Point.

The rapid-response, shallow-water vessels are designed for use on spills in waterways, bays and harbors. Each measures 28.6 ft. (8.75 m) long, with an 8-ft. (2.4-m) beam and a 13-in. (.3-m) draft. Each is powered by a 135-hp MerCruiser inboard/outboard, which provides a response speed of more than 15 knots.

The remaining 23 vessels in the order are in various stages at Kvichak's Seattle facility, and will continue to be delivered between now and the end of the year.

For more information on Kvichak  
Circle 198 on Reader Service Card

### Keppel Subsidiary Buys Semi-Submersible From Norwegian Co.

Far East Levingston Shipbuilding Ltd. (FELS), a member of the Keppel Group, has purchased the semi-submersible *Polyportia* from Rasmussen Offshore, Norway, for \$22.5 million. Currently, there are a number of available offshore drilling contracts which will require this vessel to be converted for drilling in deeper waters. Built in 1979, *Polyportia* is expected to arrive in FELS' yard in Singapore this month.

FELS constructs rigs, and has extensive experience in conversion and repair of offshore vessels. The company recently completed a major conversion of a semi-submersible to a floating production system for Reading & Bates.

For more information on Far East Levingston Shipbuilding Ltd.  
Circle 34 on Reader Service Card

### R.A. Stern To Provide Detail Design For Self-Unloading Cement Barge

R.A. Stern (RAS), naval architects and marine engineers of Sturgeon Bay, Wis., a division of John J. McMullen Associates, Inc., has been awarded a contract from Bay Shipbuilding Corp., of Sturgeon Bay, to provide design and engineering services in support of the construction of a self-unloading cement barge.

The barge, which will operate on the Great Lakes, will measure 460 ft. by 70 ft. by 37 ft. (140 m by 21.3 m by 11.3 m), and will have a capacity of 14,000 tons. The contract involves the preparation of all construction drawings and associated calculations and analysis. RAS will also provide NC lofting support that includes parts generation and nesting of steel parts.

The barge will be delivered in summer 1996.

R.A. Stern is a full-service naval architectural firm, servicing commercial and government clients, both U.S. and foreign.

For more information on R.A. Stern  
Circle 31 on Reader Service Card

### Tanker Forum And IACS Publish Double Hull Guidelines

Designed as a practical reference manual for a key sector of the tanker industry, a new book on double hull tanker inspection, maintenance, and repair has been published through the Tanker Structure Cooperative Forum, in association with the International Association of Classification Societies (IACS). The book, titled *Guidelines for the Inspection and Maintenance of Double Hull Tanker Structures*,

is a 130-page hardback, with 70 pages of diagrams showing typical structural details.

The manual is the third in a series on tankers published by the Tanker Structure Cooperative Forum, whose membership comprises seven oil majors, eight independent tanker owners, and six classification societies. The book is being published by London-based Witherby & Co. Ltd., tel: +44 171 253 54132.

### Intertanko Offers Updated Guide To Port Costs

The International Association of Independent Tanker Owners (Intertanko) produced a new guide for tanker owners, operators and shipbrokers, detailing the latest port cost figures.

The publication, called *Disbursements for Tankers*, provides information for use in voyage calculations before ships are fixed. *Disbursement for Tankers 1995* presents a considerable amount of port cost information, according to sources at Intertanko, with more than 3,000 disbursement figures and recent estimates from tanker owners and port agents used, referencing calls of large and small tankers at nearly 500 tanker ports and terminals worldwide.

For more information on Intertanko  
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The ultra sensitive, pull cord speed regulation, built into every PROFI hoist, was key to this precision Navy operation. The ability of the hoists to be left running indefinitely without damage adds to the exceptional versatility of the PROFI Line.

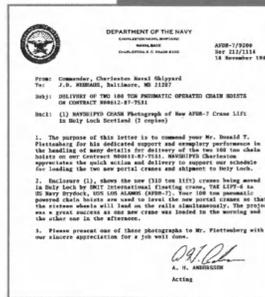
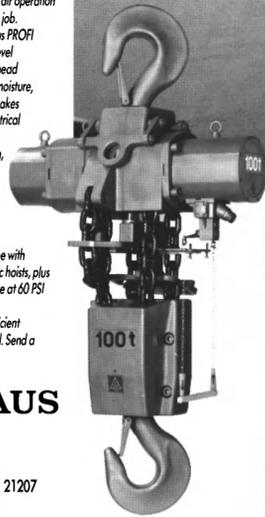
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## Acomarin Engineering Develops Innovative Seawater Intake Solution

International patent pending on JAK-System

Acomarin Engineering is offering what it terms an innovative solution for seawater intake and cooling systems. The system is designed to eliminate the potential problem of locating a sea chest in the forward end of the engine room — a system which requires space for all necessary equipment, including valves, filters, pumps, large pipelines, etc.

The JAK-System was invented by Jaakko Kallio, who was responsible for design and construction of machinery systems at a medium-sized Finnish shipyard. Mr. Kallio's goals in the design of the JAK-System were threefold: providing better construction of a sea chest; providing optimum flow/quantity of seawater at all times according to actual load of the machinery; and providing optimum control and balance of the seawater temperature and pressure in the system.

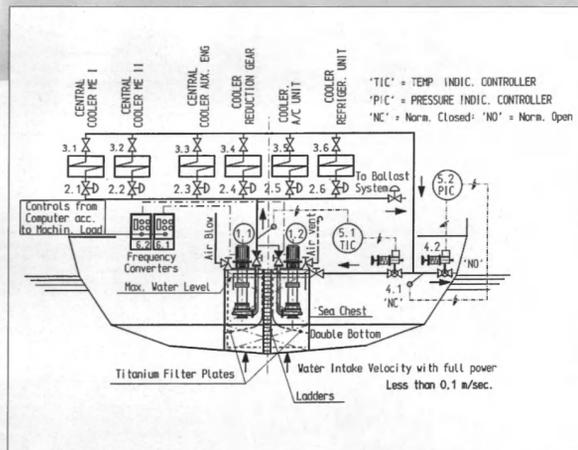
### Construction of the new JAK-System sea chest

With safety a priority, the sea chest was designed as a part of the hull of the vessel so there would be no holes in the vessel below sea level. With the computer-aided design tools, it is possible for the company to design — for every vessel size — the optimum size of the new system.

After discussions with the classification societies, it was decided that only one large well/sea chest located in the center line of the vessel, or close to it, would be sufficient — a factor which allows the location of the chest to be much more flexible. Ultimately, the forward end of the engine room is no longer required for the large suction pipelines with valves, equipment and fittings. The chest will normally be equipped with protective zincs, but the recommendation is a Pro-Coat, 2 mm-thick rubber coating method which is guaranteed for 10 years.

To eliminate the suction pipelines, the pumps were designed to be located below the waterline in the well/chest. To account for the variation in the waterline in tankers and bulk carriers, the designer split the drive shaft into several flanged sections so that the pump assembly could be pulled out for service, piece by piece.

The filter material will be 1 mm-thick titanium plate, with 3 mm perforation and 1 mm necks. The filter plates will be located in the groove assemblies, mounted vertically in both side walls of the well,



allowing the cleaning of the filter plates almost any time. In the JAK-System, the net area of the filter plate was decided to be approximately three to four times larger than that of existing ones, and the water flows across the plate evenly through the entire surface. The bottom plate of the sea chest is designed to have gratings, which are recommended to be cut directly into the bottom plate.

### Optimum seawater flow

The pumps — as mentioned — will be submersible and vertically mounted into the sea chest. There will be only two or three pumps required, with one or two pumps running, and the second or third pump

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standing by. The electric motors of the pumps are to be located on the top platform of the sea chest, in the dry space.

The new system requires standard cooling water pumps with suitable material specifications and construction.

Depending on the machinery load, the optimum water flow will be automatically controlled by either a personal computer (with software provided by the system designer) or the common board computer via the frequency converter.

All of the seawater return flow will be collected in one tube, and controlled via specially designed control valves, for routing either back to the sea chest or overboard. For more information on the JAK-System Circle 6 on Reader Service Card

#### Goode Joins MAN B&W



MAN B&W announced that **Jack Goode** has joined the company as assistant sales manager. Mr. Goode has more than 20 years of sales and service experience in the marine and navy mar-

kets with General Electric Co. He will report to **Lars Krieger Thomsen**, sales manager, and will be located in the company's New York office.

#### Intermodal Transportation Names Account Executive

"K" Line America, Inc., a fully integrated intermodal transportation company linking the Pacific Rim with North America, recently announced the appointment of **Maria Catsadimas** to the position of account executive.

Ms. **Catsadimas** has had several years of experience in trans-Pacific trade, and has been previously employed with Evergreen America Corp., as an import sales representative, and with AT&T, as an account executive. "K" Line America, Inc. and "K" Line Canada Ltd. operate 24 offices throughout the U.S. and Canada.

#### Stolt Comex Acquires Australian Co., Appoints VP For Asia Pacific Region

In mid-August, Stolt Comex Seaway S.A., a diversified contractor to the offshore oil and gas industry, announced the acquisition, subject to due diligence, of Australian company Drillsupport International Pty. Ltd. The Perth-based company, founded in 1990, is a remotely operated vehicle (ROV) operator which has patented an ROV design,

dubbed "Toolpusher," four of which are in operation in Australia and Vietnam. Following this acquisition, Stolt Comex Seaway plans to integrate all of its drill support and ROV capability in the Asia Pacific region into one group based in Western Australia. The company's Asia Pacific Region will be led by newly appointed Vice President **Brian Butler**, who was previously employed as managing director of

Swire Pacific Offshore, based in Singapore.

#### Renk AG Concludes Merger With Renk Tacke GmbH

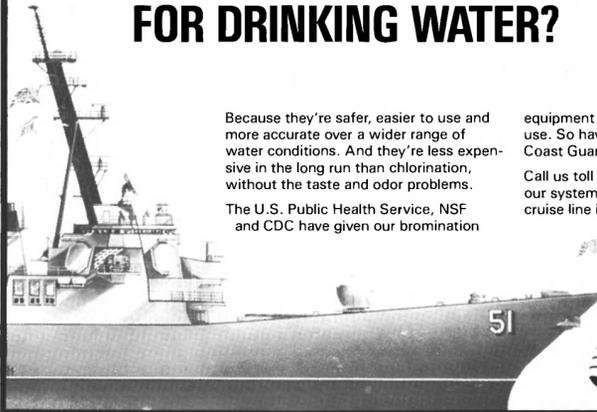
As of July 1, the merger of Renk Tacke and Renk Aktiengesellschaft (Renk AG) was completed. Renk AG acquired the assets of Renk Tacke in 1991, and since then, ex-

tensive organizational measures have been implemented with the aim of combining the manufacturing and administrative sectors of the two companies.

The initiated merger represents a continuation of this process of streamlining and structural improvement, according to company sources.

All assets of Renk Tacke will be completely transferred, with all

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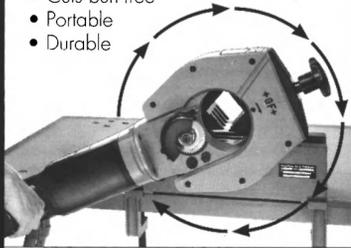
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Tacke employees reportedly being retained for employment by Renk AG.

### White Named Sales And Marketing Director For Tech Development

**John White** has joined Tech Development Inc. (TDI) as the sales and marketing manager.

Tech Development, located in Dayton, Ohio, is involved in the design and fabrication of propulsion simulation equipment and the use of turbine technology as applied to the starting of reciprocating and gas turbine industrial engines. Mr. White's responsibility will entail managing TDI's air starter products for industrial and marine applications as well as the industrial and chassis automatic lubrication sys-

tems of subsidiary Robertshaw Interlube.

### Denison Hydraulics Appoints New Managers

Denison Hydraulics has appointed **J. Michael Mattingly** to the newly created position of manager of hydraulic piston PV pump manufacturing. He joins Denison

from Ranco, North America, an Ohio manufacturer of valves and appliance controls, where he was employed as senior supervisor for reversing valve production. Prior to that, Mr. Mattingly was senior supervisor and tooling engineer for a Pennsylvania manufacturer of fire protection systems.



J. Michael Mattingly



Carl L. Robinson

**Carl L. Robinson** has been named to the position of after-market manager. Mr. Robinson will be responsible for all projects and procedures related to customer service, spare parts sales, and authorized repair centers. Having previously worked for the company for 18 years, he has already held a variety of sales and managerial positions at Denison. Denison Hydraulics manufactures hydraulic components and systems for industrial equipment, including ships' equipment.

For more information on Denison  
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### Moran Mid-Atlantic Appoints Executives

The Hampton Roads Division of Moran Mid-Atlantic Corporation announced the promotion of **Paul Horsboll** and **Richard M. Qua**. Mr. Horsboll will serve as vice president and general manager of Moran Towing of Virginia. Since 1960, he has served in various capacities for the company, including as a dispatcher, assistant manager of harbor operations, and port captain. Mr. Qua has been promoted to operations manager of Moran Towing. He has worked for Moran for more than six years as a captain of offshore and harbor tugs operating on the East Coast.

Moran operates towage and marine transportation services along the U.S. eastern seaboard, with ports in Portsmouth, N.H.; New York; New Jersey; Philadelphia, Pa.; Baltimore, Md.; Hampton Roads, Va.; Jacksonville and Miami, Fla.; and Beaumont, Port Arthur, and Orange, Texas.

### Blue Star Appoints Nolan

Blue Star (North America) Ltd., has named **Theresa Nolan** the account executive in charge of the company's new office located in Detroit, Mich. Ms. Nolan is responsible for sales in Michigan, Indiana, and northern Kentucky for Blue Star Line (BSL), which provides northbound and southbound shipping service between North America and Australia, New Zealand, and several Pacific islands. Ms. Nolan's appointment enables BSL to provide Midwest shippers with consistent and personal service.

Maritime Reporter/Engineering News

**Baltec Names Feichtinger  
R&D Director**

Baltec Corp., a manufacturer of highly-engineered core materials used in the marine industry, has named Dr. Kurt A. Feichtinger to the directorship of the Research and Development department.



Kurt A. Feichtinger

Dr. Feichtinger returns to his previously held position at Baltec, following a hiatus with Rubatex Corp. and Sentinel Products, during which time he was responsible for reformulating polyethylene foam with environmentally friendly blowing agents, developing a high-temperature structural foam for the aerospace industry, developing an ISO 9000 quality system, and performing product research on flexible cellular products.

The Baltec Corp. headquarters

and manufacturing facilities are located in Northvale, N.J., and the company's worldwide locations include offices in France, the U.K., Denmark, Japan, and Taiwan.

**Worldport LA Receives  
Go-Ahead For Activation Of  
Foreign Trade Zone**

The U.S. Customs Service has approved Crescent Warehouse Co., Ltd.'s application to activate a foreign-trade zone (FTZ) operation in Foreign-Trade Zone 202 at the Port of Los Angeles.

A division of Stevedoring Services of America, the company has 65 years of experience as an operator of customs-bonded cargo warehouses. As an FTZ 202 operator, Crescent will use a Port-owned, 73,125-sq.-ft. facility for storing metals for the London Metal Exchange. Traders of foreign and domestic merchandise brought into an FTZ can benefit from substantial cost-saving incentives on duties and

taxes. FTZ 202 includes sites at Los Angeles International Airport and the proposed International Trade and Transportation Center in Bakersfield, Calif.

Worldport LA's Marketing Director, Al Fierstine, announced that Akio Segawa has been appointed to the presidency of Japan Marine Services, Ltd., the Tokyo-based company that provides marketing representation in Japan for the Port.

**Brekke Joins Stewart Tech.**

Stewart Technology Associates (STA), an engineering company specializing in the design and analysis of lifeboats, jack-ups, semi-submersibles, and risers, has announced that James N. Brekke has joined the company as senior consultant. Prior to employment at Stewart, Mr. Brekke worked for Exxon Production Research. He will be responsible for managing a variety of onshore and offshore projects, and will be involved in all

aspects of engineering consultancy work.

**Trinity Builds Fourth Ferry  
For Texas**

Halter Marine, Inc. of the Trinity Marine Group, has been awarded an \$8.3 million contract from the Texas Transportation Commission for the construction of a 263-ft. (80.1-m) by 65-ft. (19.8-m) by 10-ft. (3.04-m) passenger/vehicle ferry for operation between Port Bolivar, and Galveston, Texas. The ferry, named Ray Stoker, Jr., will be the fourth ferry built by a Trinity yard for Texas.

It will be powered by two diesel engines developing 1,250 bhp each, driving Voith-Schneider cycloidal propulsion and steering units mounted below the bow and stern, which provide for excellent steering and maneuverability. Pilot-houses will be located fore and aft to facilitate steering and mooring.

For more information on Trinity Marine Circle 29 on Reader Service Card



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Circle 317 on Reader Service Card

## Flender Werft Launches Containership *Santa Elena*

On September 8, Flender Werft launched its latest containership, *Santa Elena*, for shipowner Claus-Peter Offen. Eva Maria Zehm, spouse of Flender Werft's chairman of the board, acted as the sponsor for the vessel. The ship is a further development of the Flender series FW 1200-4500, vessels which are reportedly distinguished by effective economy and a large stowage capacity of 14-ton containers at low fuel consumption. The vessel will be classed by Germanischer Lloyd.

Propulsion is executed by a cross-head engine of the long-stroke MAN B&W 8L80MC type, having a rating of 27,440 kW at 93 rpm. The engine transmits its power to a CP propeller plant. For electrical power at

sea, *Santa Elena* is fitted with a shaft generator having an output of 1,500 kW. Delivery of the vessel is scheduled for December, after which it will enter into a five year charter contract with Messrs. Senator Lines. Flender Werft has won a follow-up contract for five additional vessels to be built for the same owner after delivery of the current project.

For more information on Flender Werft  
Circle 27 on Reader Service Card

### Santa Elena Main Data

Overall length	810 ft. (247 m)
Overall width	105 ft. (32.2 m)
Depth	ft. 59.05 ft. (18.8 m)
DWT	45,000 tons
Speed	14 knots
Container capacity	20,40, 45-ft. containers

## Astilleros Españoles Contracts To Build Train Ferry For Swedish Interest

Astilleros Espanoles has contracted with Swedish shipowner Sweferry for the construction of a large ferry for the carriage of trains, road vehicles, cabins, with a capacity of 600 passengers, to be operated between Sweden and Germany. According to Astilleros, the vessel will be built at the Puerto Real yard and will be delivered in 23 months. The ship's dimensions will be 659.1 ft. by 95.1 ft. (200 m by 29 m), with a dwt of 7,290 metric tons.

Sweferry, a subsidiary of Swedish national railway company Statens Jarnvagar, currently owns a fleet of 10 highly specialized vessels. The new ferry will enter service in the Trelleborg-Rostock line, and will be able to complete five round trips per day, cruising at 21 knots, and completing a loading and unloading cycle in 75 minutes.

The ferry will be driven by four main engines geared to two shafts, and due to its large dimensions and the difficult access at the Port of Trelleborg, will be fitted with three transverse thrusters as well as an extra rudder located at the bow, to allow for maneuvering astern at 14 knots in a narrow channel. A duplicated navigation bridge will also be located at the aft. IMO regulations governing RoRo safety have been

accounted for in the ferry's design.  
For more information on  
Astilleros Espanoles  
Circle 26 on Reader Service Card

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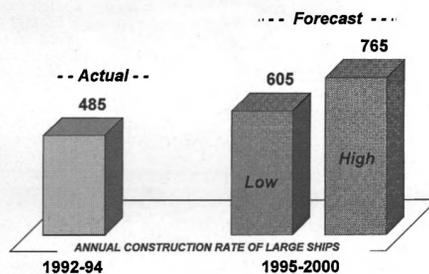
## INDUSTRY TRENDS

by

James R. McCaul, President  
IMA Associates, Inc.  
Washington, DC

### OUTLOOK FOR SHIP CONSTRUCTION.

An average of 485 large ships have been built annually over the past three years. Our analysis indicates the rate of construction will increase to between 605 and 765 large ships annually during the second half of the 1990's. With 52 percent of existing large ships over 15 years of age, replacement demand will be the principal driver of future construction requirements.



This increased demand will produce excellent opportunities for shipbuilders and marine equipment suppliers during the second half of the 1990's. But... When will the growth begin? Will there be a spike — or more gradual increase? What types of ships will be required? How many of each type? What's the value of the available market? Who are the customers? Who are the builders? What technology changes are occurring? An in-depth 550 page study completed by IMA in September addresses these questions.

Circle 22 on Reader Service Card



### NNS Chairman Announces Retirement

On September 1, Pat Phillips, chairman and CEO of Tenneco's Newport News Shipbuilding division (NNS), announced that he would retire on November 1 after more than 46 years



with the company. He began his career at the yard in 1949 as an apprentice machinist, during which time he contributed to the production of Newport News' most famous ship, the passenger liner S.S. *United States*, which set a world speed record in its crossing of the Atlantic. While Mr. Phillips rose from his apprenticeship in 1949 to president in 1992, and chairman in 1994, the yard produced more than 100 ships, including: aircraft carriers *John F. Kennedy*, *Nimitz*, and *Dwight D. Eisenhower*; cruisers *Virginia*, *Texas*, and *South Carolina*; submarines *Los Angeles*, *Hampton*, and *Newport News*; and crude oil tankers *Pacific* and *Atlantic*.

"Many challenges remain for Newport News Shipbuilding," Mr. Phillips said. "But I leave the company in November encouraged by the fact that we continue to win new business, and encouraged by a current backlog of orders, roughly \$5 billion, that is the envy of every shipbuilder in the world."

Assuming the additional responsibilities of CEO is William P. Fricks, president of NNS, who has spent his entire 29-year career at NNS. As president, and previously as executive vice president, he has been responsible for all business operations at the shipyard since 1992.

For more information on Newport News  
Circle 28 on Reader Service Card

### Fincantieri And Kvaerner Fjellstrand Install Renk Gears In Ferry Newbuilds

Renk AG's PLS/PWS gear series has recently been chosen by Fincantieri and Kvaerner Fjellstrand for installation on the yards' ferry newbuildings. PLS/PWS (Planetary Reduction Gear Units, Planetary Reversing Gear Units) are low-noise, compact gear units that reportedly have proved efficient in the many vessels on which they are installed. The Fincantieri newbuild is for Ocean

Bridge Investment: a 311.6-ft. (95-m) ferry that will achieve speeds of 36 knots, with the capacity to accommodate 600 passengers, 170 cars, and seven double-decked buses. It will be driven by four MTU diesel engines, together developing 24,000 kW at speeds of 1,230 rpm. This power will be transmitted by four Renk PLS 50 gear units to the KaMeWa waterjets with 570 rpm. The Kvaerner newbuilding is a 196.8-

ft. (60-m) jumbo catamaran ferry for Emeraude Lines of France. It will transport 430 passengers and 52 vehicles, and will be driven by two MTU engines with 5,400 kW each, at speeds of 1,200 rpm, through Renk PLS 25 planetary gear units, and transmitted to KaMeWa waterjets at 661 rpm. Top speed will be 33 knots.

For more information on Renk AG  
Circle 30 on Reader Service Card

### Mitsubishi To Develop Two New UE Marine Diesels

Mitsubishi Heavy Industries, Ltd. (MHI) has begun development of two new UE series engines — large-sized, slow-speed engines — called UEC37LSII and UEC43LSII. These two engines will be developed for use as main engines on a variety of ships, including medium and small-sized tankers and bulk

carriers. With the addition of these new models, MHI will strengthen its UE series line, offering both small-bore and large-bore engines.

Both new engines will be available with cylinder numbers between four and eight. The power output range of the UEC37LSII is from 4,200 ps to 8,400 ps; and the output of the UEC43LSII ranges from 5,720 ps to 11,400 ps.

For more information on MHI  
Circle 32 on Reader Service Card

#### Major Specifications Of UEC37LSII And UEC43LSII

	UEC37LSII	UEC43LSII
Cylinder bore:	370mm	430mm
Piston stroke:	1,150mm	1,500mm
Maximum output:	1,050 PS/cylinder	1,430 PS/cylinder
Engine speed:	210 rpm	160 rpm
Fuel oil consumption:	129 g/PS hour	127 g/PS hour
Overall length:	4,512 mm	5,131 mm
Weight:	76 tons	124 tons

\*Figures for overall length and weight are for the six-cylinder model.

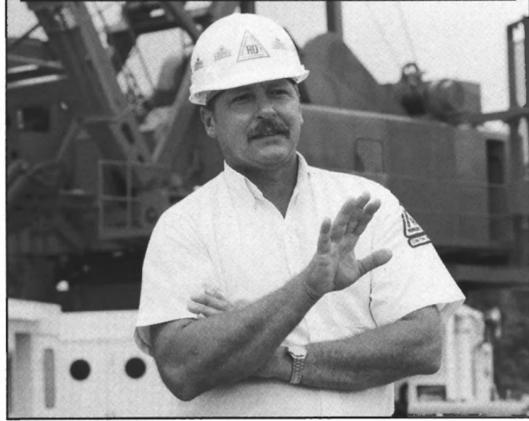
### STN Atlas Calls For Improved Testing Of IBS Installations

Renewed demands for improved procedures for installation and testing of integrated bridge systems to internationally-approved standards by shipyards and owners have been made by STN Atlas Elektronik. Common practices of fitting subsystems and components from different suppliers without contracting established systems' companies to oversee overall system integration and verification of operation can affect safety and efficiency of use, the company warns. This follows a call by the U.S. National Transportation Safety Board (NTSB) for a review of integrated bridge systems as a result of the grounding of Majesty Cruise Line's *Royal Majesty* off the Massachusetts coast in June.

The vessel was equipped with an Atlas NACOS 25 navigation command system with proprietary radars, a doppler log, autopilot, and control and monitoring equipment. Other non-Atlas systems included gyro, steering and wind sensor instruments, as well as GPS and Loran-C positioning receivers, and a nautical alarm panel. According to STN Atlas, a total system integration in the case of the *Majesty* would have ensured authoritative checking and testing of all interface compatibility and fail-safe functions, preventing the grounding, which was later discovered to have been precipitated by a loose wire in the GPS antenna which resulted in the transmission of false position data.

For more information on STN Atlas Elektronik  
Circle 33 on Reader Service Card

## JOHN DEERE ENGINES ARE COMIN' ON STRONG



### IN CRANE BARGES.

"Very little maintenance." Joel Smith, of R&D Maintenance Service operates a new 54' x 160' crane barge with two Deere gen-set engines. He also uses two Deere powered compressors elsewhere in the project. "To my knowledge v haven't had to do anything but r service on any of them."

"Seven years old and the engines r with no problems."

Smith likes the way even older Deere engines keep delivering the performance he needs. "The compressor engines have been in service for 7 years now, and they still work like the new ones. They just keep running. They give us the dependability we need on projects like ours."



John Deere engines from 70-300 hp (52-224 kW) are being used on more workboats of all kinds every day. Talk to the people who use them and find out why.

Circle 22 on Reader Service Card

## SAFETY AT SEA ILU CASUALTY REPORT

# Casualty Numbers Drop

At the half-year mark, merchant ship casualty experience was showing a significant improvement compared to the same period in 1994, according to a recent report from the Institute of London Underwriters (ILU). Statistics compiled by the ILU, applying to ships of 500 gt and more, reveal that although the second quarter's experience was marginally worse than the first quarter, the overall decrease in accidents at sea continued.

In the three-month period to the end of June, the number of ships confirmed lost was 20, representing 135,057 gt. In the full six months, taking account of major casualties confirmed as total losses through the end of June, 38 ships totaling 223,858 gt were lost. The comparable figures for 1994 were 48 ships totaling 621,037 gt.

"These totals represent reductions of approximately 21 percent and 64 percent, respectively, compared with the same period in 1994," the ILU said in a statement. "As usual, however, some major casualties, or partial losses, during the six months will probably convert to total losses or Constructive Total Losses (CTLs), thereby increasing the totals."

"Casualty experience in 1994 was very disappointing for marine underwriters, so the reduction in the first half of 1995 is all the more welcome."

The ILU continued: "The figures support recent comments from Salvage Association surveyors that the condition of vessels is improving, and this must reflect the hard line being taken on ship surveys and classification, and the increasing pressure on shipowners and managers from the IMO, Port State Control, the P&I clubs and marine insurers themselves."

#### Bulker Loss Boosts Total

The second quarter, like the first quarter, was notable for the absence of tanker losses. Cargo vessels accounted for 12 of the 20 losses (11 in the first quarter). Three bulk carriers were lost in the six months, and the one in the second quarter was the most serious and biggest loss, accounting for 87,709 gt.

In June the Liberian-flag *Mineral Dampier*, built in 1985, on a voyage from Ponta da Madeira to Pohang, loaded with 167,000 tons of iron ore fines, sank after a collision with another Liberian-flag bulker, the *Hanjin Madras*, 77,650 gt, built in 1990, which was in ballast about 160 miles south of Chuju Island in South Korean waters. The accident resulted in two crew deaths and 25 reported missing. The *Mineral Dampier* was insured for \$25.2 million, with an additional Increased Value policy for \$10.8 million. Her cargo, it was reported, had an insured value of \$2.75 million.

A second quarter loss was that of the Liberian-flag cargo vessel *Alexandria*, 8,328 gt, built in 1982, which had an insured value of \$14.4 million. She sank after colliding with another cargo vessel, the *Xin Hua 7*, four miles off Busan. A first quarter casualty that was declared a CTL in June was the Greek-flag RoRo cargo vessel *Galini*, 9,399 gt, built in 1979 and insured for \$7 million.

#### Loss of Life

The ILU's casualty reports indicate that 53 people were either killed or reported missing as the result of total losses and major casualties in the April-June quarter. "Although this is substantially below the total of 172 in the

first quarter, it is still a matter of concern that the total for the six months was 225," the ILU said.

Updated totals for the calendar years 1993 and 1992 were, respectively, 615 and 386. The year

1994 showed a doubling of the figure compared with 1993, but the updated total of 1,478 was distorted by the *Estonia* ferry disaster.

The ILU adds its usual cautionary note that it is

extremely difficult to collate loss of life figures accurately. Also, its statistics apply only to ships of 500 gt and over, thus excluding many fishing vessels and other craft.

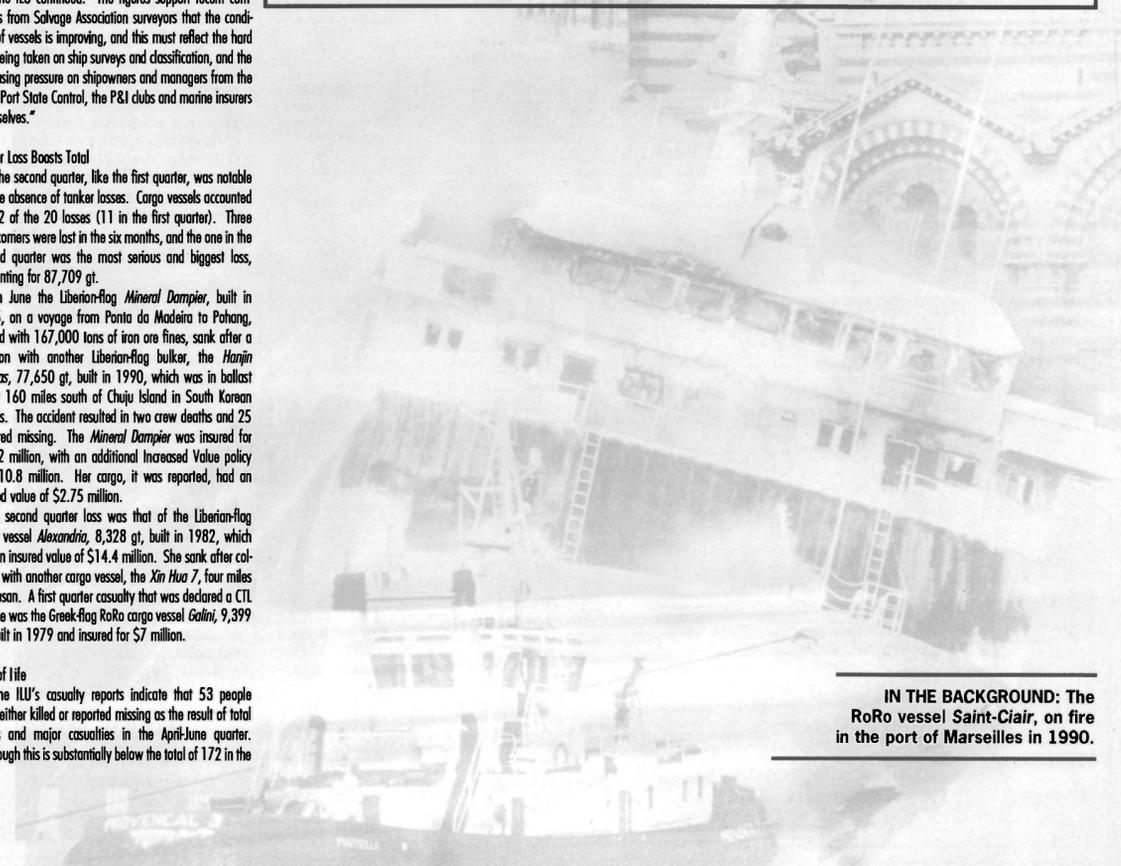
By vessel type, the 38 total losses in the first half of 1995 include:

General cargo	23
Fishing/trawling	4
Bulk carriers	3
Refrigerated cargo	3
RoRo cargo	2
Dredgers, pontoons, etc.	2
Tug/salvage	1
Total	38

By flag of registry, the 38 total losses represented:

Honduras	4
----------	---

Panama	2	Italy	1
Antigua & Barbuda	2	U.S.	1
Liberia	2	Dominica	1
St. Vincent & Grenadines	2	Paraguay	1
Greece	2	Norway	1
Netherlands	1	China	1
Cyprus	1	Belize	1
Malta	1	Japan	1
Philippines	1	Taiwan	1
India	1	Hong Kong	1
Turkey	1	Cuba	1
Argentina	1	Thailand	1
Portugal	1	Peru	1
Russia	1	Germany	1
France	1	Total	38



IN THE BACKGROUND: The RoRo vessel *Saint-Claire*, on fire in the port of Marseilles in 1990.

**Compact Firefighting Device  
Delivers 55 GPM**

The Augustus Fire Tool is a compact unit designed to combat fires in confined spaces, while eliminating the need to attempt immediate, time-consuming, forcible entry operations. Designed for the automotive industry, the portable extinguisher model was designed to be carried or stored in small convenient locations, and to work well with existing carbon dioxide extinguishers. However, the manufacturer reports the same tool works equally well with dry chemical and liquid foam portable extinguishers. The Hose Line model delivers about 55 gpm into the enclosed area. The model reportedly could be effective in combatting fires in shipping containers and air ducts.

For more information on the Augustus Fire Tool  
Circle 12 on Reader Service Card



**Sperry, Ocean Systems In  
Agreement With MarAd To  
Develop Safety System**

The Maritime Administration (MarAd) has entered into a cooperative agreement with Sperry Marine and Ocean Systems, Inc. to develop an expert vessel optimization and safety system. The purpose of the project is to provide technology for a closed loop, feedback voyage optimization system. The system would continually update a vessel's voyage plan as weather, current, sea, scheduling, ballast/cargo and propulsion systems change. It would also have an expert damage control, collision/avoidance system and an alarm system.

**Petro-Safe Set For '96**

The Seventh Annual Petro-Safe Conference & Exhibition is scheduled as part of Energy Week '96, and will be held from January 30 to February 1, 1996 at the George R. Brown Convention Center in Houston. Conference organizers expect 14,000 attendees and 1,000 exhibits. For more information on the conference, contact **Sean Guerre** at tel: (713) 621-8833; fax: (713) 963-6284.

**USMSA Sets '96 Show Dates**

The U.S. Marine Safety Association announced that its Seventh Annual Safety Seminar is scheduled for June 24 - 26, 1996, in Kodiak,

Alaska. The seminar will focus on hands-on familiarity with marine safety equipment, as well as topics such as understanding the marketplace, and factors influencing buyers and users of marine safety equipment.

For more information on the USMSA event, contact **Shannon Coghlan** at tel: (215) 564-3484; fax: (215) 963-9785.

**Marioff Hi-Fog Fights Fire  
Fast**

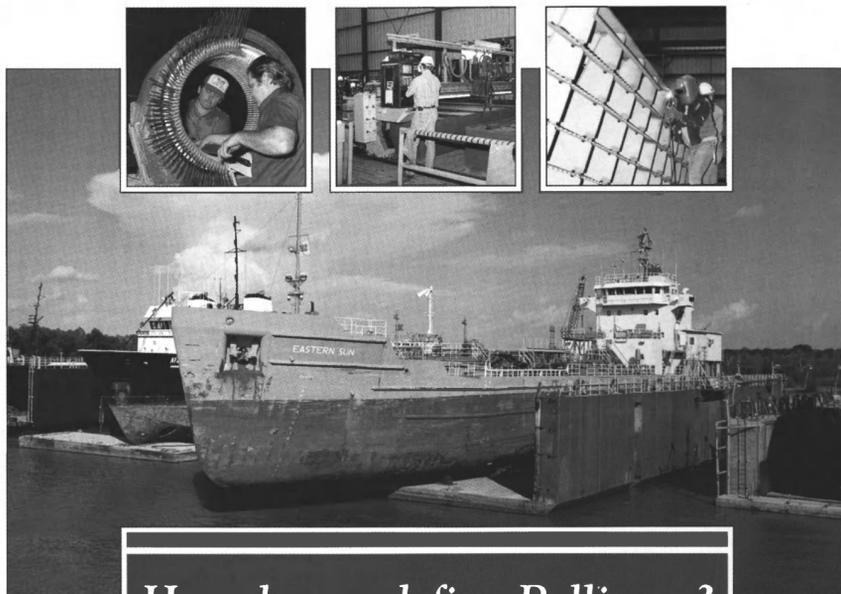
Marioff's Hi-Fog firefighting product is an innovative fire protection technology which combines standard hydraulic pressures and small amounts of fresh water.

Hi-Fog works by propelling very small droplets of water with high

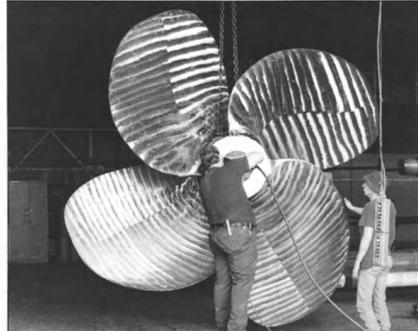
momentum to penetrate hot flue gases and reach the combustion source, even in large "hidden" fires. Hi-Fog absorbs a fire's energy, cools the surrounding hot air and gases, and works to prevent oxygen from entering the combustion area.

Hi-Fog provides effective extinguishing, suppression and control for all types of fires.

For more information on Marioff Hi-Fog  
Circle 9 on Reader Service Card



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Circle 21 on Reader Service Card

### Waterman Offers Wide Range Of Lifeboats

All Waterman lifeboats meet the regulations of SOLAS 1974 Chapter III, Amendments 1983, paragraph 41. The company's line of enclosed lifeboats feature large, outward-opening hatches to allow fast embarkation, rapid launching and safe rescue of survivors from the water. They are also self-righting, even while the hatch is open.

For more information from Waterman  
Circle 8 on Reader Service Card

### Thorn's New Saturn II Featured On Oriana

Thorn Security — offering a full

range of fire detection equipment — supplied the cruise vessel *Oriana* with the Saturn II safety management system, the first ship in the world to use the system. The Saturn system is capable of controlling and monitoring up to 6,000 devices in addition to fire doors, sprinklers, low location lighting, ventilation systems and dampers.

For more information from Thorn Security  
Circle 11 on Reader Service Card

### ABS Authorized By USCG To Type-Approve Safety, Life-Saving Equipment

The American Bureau of Shipping (ABS) was authorized by the U.S.

Coast Guard (USCG) to approve life-saving, fire protection, and pollution-prevention equipment required to be placed on commercial vessels operating in U.S. waters (in accordance with Subchapter Q, Title 46 of the U.S. Code of Federal Regulations).

For more information on  
ABS Type Approval  
Circle 13 on Reader Service Card

### Lifesling OK'd By Coast Guard For Commercial Vessels

Port Supply announced that the Coast Guard-approved Lifesling for commercial vessels is now available. The Lifesling is a Coast Guard-ap-

proved type V (160.050/152/0) F because it has restricted approval approved only as a substitute for Type IV PFD (standard 24-in. r. buoy) aboard uninspected commercial vessels with a lift point at least 10 ft. (3.1 m) above the deck.

For more information on Lifesling  
Circle 10 on Reader Service Card

### Offshore Systems Wins ECPINS Contracts

Offshore Systems Ltd. (OSL) won a contract from Canada Steamship Lines (CSL) for four Electronic Chart Precise Integrated Navigation Systems (ECPINS) for use on four cargo vessels which ply the waters between the U.S. East Coast and the Caribbean.

OSL also won a contract from USS Great Lakes Fleet for an ECPINS for the *M/V Munson*, a bulk carrier and self-unloader.

For more information from OSL  
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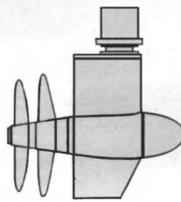
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Circle 101 on Reader Service Card

### Quick-Release Product Designed For Safety



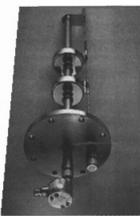
John McMillan Design developed the Sea Catch Toggle Release, a high-tech quick-release designed for safety during the release of a line under load. The product incorporates an old and proven toggle linkage principle, and is constructed from computer-generated parts, precision-cut from stainless steel plate.

The unit is reportedly durable, offering a simple design with no springs or parts that can break under heavy marine wear. Several innovative features include: perpendicular or parallel release directions; a hitch-pin lock for device locking safety; and a low-friction, lanyard-style release for maximum user safety.

For more information on the product  
Circle 3 on Reader Service Card

**ensor Provides  
Independent  
Alarms In Single Unit**

Midland Manufacturing Corp.'s Model B-595 High Level/Overfill sensor provides independent alarm signals for both high level and overfill conditions from a single tank access.



The unit is FM-approved and intrinsically safe to comply with U.S. Coast Guard regulations. The sensor features a single mounting flange, with an integral float guide tube that requires only one mounting port. Dedicated floats activate each alarm sensor independently, while

a stainless steel manual lifting handle verifies the freedom of travel and alarm functions for each float prior to loading.

A new feature enables O-ring seals on the sensor to be replaced in the field within five minutes.

For more information from Midland  
Circle 5 on Reader Service Card

**Insulation Manufacturer  
Offers Solutions**

Pacor, a leading insulation blanket manufacturer, offers a solution to insulation repair and replacement for all types of workboats.

The company offers a line of standard blankets for schedule 40 piping systems, which can be installed by yard or ship personnel. The product is available in standard or custom sizes.

For more information from Pacor  
Circle 1 on Reader Service Card

**AlliedSignal Fibers Offers  
Free Brochure**

AlliedSignal Fibers recently released a new brochure featuring a technical discussion about its polyester fibers for narrow fabrics. The four-page brochure features test results documenting physical properties, as well as a simplified explanation of the production process.

For a copy of the brochure  
Circle 4 on Reader Service Card

**Aker Oil And Gas  
Technology Adds  
Marine Division**

Aker Marine, Inc. has been founded as a wholly-owned subsidiary of Aker Oil and Gas Technology, Inc., to be based in Houston. The new company provides specialized marine contracting services

based on engineering solutions for installation of deepwater mooring systems, pipelines and outfalls, terminal systems, and subsea systems.

Aker Marine will concentrate on projects in the Gulf of Mexico and the Caribbean, while its Norwegian affiliate, Aker Marine A.S., will coordinate other worldwide efforts.

The new company will draw upon the experience and technology developed by the Marine Services Department of Aker Omega, Inc., which recently was awarded a contract for the structural design of Amerada Hess Corporation's South Marsh Island 192 platform.

Senior management of the company includes:

- Ulf Henriksen, president/CEO;
- Pete Dove, general manager;
- Harry Wilson, operations manager;
- Don Hardin, technical manager; and
- Hans Treu, chief engineer.

For more information on  
Aker Marine, Inc.  
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## ELECTRONICS UPDATE

# SATCOMS For Salvage

Today's tugs must be all-rounders, and *Anglican Duke*, operated off the east coast of the U.K. by Lowestoft firm Klyne Tugs, is typical of the breed. The vessel is charged with a wide range of duties, including serving as an oceangoing tow and performing rig moves, salvage work, or just plain odd-jobbing.

Although fully certified for oceangoing work, *Duke* operates mainly around the U.K. coast and southern North Sea.

"We prefer to keep her close to home," said Operations Director **Carl Beare**.

But does a mainly local operating regime mean that the Inmarsat-A radome, so prominent above her wheelhouse roof, is just an adornment, or perhaps a now-superfluous relic from a previous incarnation?

Far from it. "The satcom is a vital piece of the operation," said Mr. **Beare**.

For Klyne Tugs, the Inmarsat-A serves two distinct requirements. It keeps the tugs, their tows and their progress at the forefront of their charterers' minds; and it allows the head office and the tugs to communicate privately.

*Duke's* charterers come mainly from the offshore world. "She's worked for Statoil, Stena, Shell, Mobil, Conoco and many of the big construction companies, such as Balfour-Beatty," said Mr. **Beare**. "A lot of them want a day-by-day report of where the tug is, what speed she's doing, what the weather is like, the fuel consumption, condition of the tow and so on."

Klyne finds the fax capability of Inmarsat-A invaluable for this kind of requirement. "We did a job for a company recently that gave us a standard form to be filled in each day. We simply put copies aboard the *Duke*, where the captain filled them in and faxed them directly to the charterer," explains Mr. **Beare**.

The daily report also keeps charterers and brokers at bay. "They used to say, 'You've been so many days on this tow, where the hell's the

tug?' But if they know the wind's been force seven or eight and there's been a four-meter swell, they know why there's a delay," said Mr. **Beare**.

*Duke* is classed as an anchor handling tug supply vessel, or AHTS. At 141 ft. (43 m) long, 39 ft. (12 m) in breadth, 8,400 bhp and 100 tons bollard pull, she ranks as one of the largest in the southern North Sea, where power requirements are continuing to rise.

"In the southern North Sea, most rig moves now require a vessel of 80 to 100 tons bp," said Mr. **Beare**. "A few years ago, 50 or 60 tons was adequate, but safety considerations have pushed



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## ELECTRONICS UPDATE

demands higher." Although considerably less powerful than the 13,000 to 16,000 bhp Aberdeen-based tugs that work the rough northern North Sea between the Shetlands and the Norwegian coast, *Duke* is no stranger to blue water. Last year she undertook a six-month round trip, picking up an offshore barge in Brazil and towing it to the west coast of Africa before returning to the U.K. "The satcom came into its own on that trip," he said.

But it is in the salvage-related aspects of *Duke's* work that the confidentiality of satcoms has become crucial. "Modern communication has really changed the face of the salvage industry," said *Duke's* captain, **Martin Burnaby-Davies**. The signing of a Lloyd's Open Form (LOF) — the traditional arrangement by which salvors and the master of a stricken vessel agree to

postpone financial negotiations in the interests of speed — is rare today. Most salvage work is now carried out under contract.

"It's vital that we get accurate information to and from our head office when we're undertaking salvage work," said Mr. **Burnaby-Davies**. "They need to know just what the situation is if they're going to negotiate a favorable deal, and we need to know exactly what they've agreed we should do. The satcom runs red-hot during a salvage."

He recalled how, on her last trip, *Duke* became involved in salvaging the reefer *Shofu* after engine failure in the English Channel. "The third mate went aboard *Shofu* and spent about three hours on the satphone to her interests in the U.S. negotiating a deal. Eventually he got the master's signature on a contract, faxed it to head office over our Inmarsat-A, and we got on with the job." *Shofu* was

towed into Zeebrugge, where her cargo of bananas was off-loaded undamaged.

Mr. **Beare** stressed the need for confidentiality in a salvage situation. "Although we don't usually discuss rates with a master anyway, there are things you don't want a competitor or even the owner of a vessel in trouble to be aware of. You might want him to sweat for a little in the hope of getting an LOF — which you won't if he knows your tug is round the next headland."

But if a vessel is in real danger, everything takes second place to speed. "The tugs are kept fully mobilized," said Mr. **Beare**. "Even though the bowthruster engine on the *Duke* is down and we're doing some other work, if there was a real emergency, she'd go. I'd give them their orders once she was underway." Indeed, sometimes the scramble

has been so intense that crew members have unwittingly been left behind, "We wouldn't go without the master," said Mr. **Beare**, "but you can survive without a cook or a third engineer. It has to be a logical decision at the time. But if it's a life-or-death situation and we've got enough people on board to render assistance, we go."

Of course, it's not all drama. From day-to-day, *Duke* and her fellow tugs operating in Klyne colors live on a diet of varied but routine work. But even then, the need for fast, reliable communication can arise. Mr. **Beare** recently had cause to rue the lack of an Inmarsat-A aboard the *Anglian Earl*. He recounts the story:

"A couple of weeks back, *Earl* was working off Sennen Cove, near Lands End. Normally that's in cell phone range but, as she was working

(Continued on page 68)



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67

## SATCOMS For Salvage

(Continued from page 67)

right under the cliff, picking up a cable for Cable & Wireless, she was in an area of 'shadow.' We needed to contact a crew member urgently concerning a personal medical problem; his wife was unwell. As we couldn't reach him on the cell phone, we had to go via Lands End radio, which took about an hour. That hour meant he missed the last train home. If we'd had the satcom, we could have got in touch straight away, put him in a rubber boat, taxi to Penzance, and home on the next train.

"In a situation like that," adds Mr. Beare, "it allows you to talk to someone privately, without everyone in the North Sea knowing what your problems are. It is completely personal." And expensive too? Yes, said Mr. Beare. "Expensive to buy and to use, particularly the telephone. But you have to weigh that against the advantages — like the ability to have an instantaneous contact. If there's a vital call from a tug to us concerning an incident or a call from us to locate a tug when we hear of an incident, I'd say it was mission-critical."

For more information from Inmarsat  
Circle 25 on Reader Service Card

The preceding story was submitted by the editor of Ocean Voice, Inmarsat's quarterly magazine.

## Changes In Finnyards' Directorship

Mr. Kari Airaksinen will become the new managing director of Finnish shipbuilding company Finnyards Ltd. when Mr. Aamo Mannonen resigns his present duties in February 1996. Mr. Jukka Laitera, formerly of Deltamarin Ltd., was appointed director of sales and marketing at Finnyards, effective September 4.

His predecessor at Finnyards, Mr. Vesa Airaksinen, has joined the newbuilding group of P&O Cruises Limited.

## Companies Combine To Form Harding-Watercraft

A newly founded international marine group, called Harding-Watercraft, brings Harding, Watercraft, Waterman, and the Schat-Davit Co. brands under the umbrella of Ulltveit-Moe A.S., the Norwegian group which also parents Harding Safety A.S.

## Perin To Head Petrochemical Companies

Two privately-held Louisiana marine and industrial service companies, Petrochemical Services, Inc. (PSI), and Surface Systems, Inc. (SSI), have announced that Jeffrey M. Perin will join their companies as chief operating officer. PSI provides solutions for petrochemical cleaning challenges. SSI, formerly a PSI division, provides flooring,

decking, and secondary containment solutions to the marine industry. Mr. Perin served as a captain in the U.S. Navy, in the position of Commanding Officer, Supervisor of Shipbuilding Conversion and Repair, and was responsible for the administration of DOD conversion and repair contracts in private shipyards.

## Southwest Marine Receives Training Program Funding

Southwest Marine Inc. (SWM), a West Coast network of ship repair firms, received state funding for the implementation of an employee training program. The two-year training program will begin by late fall, with 55 percent of the cost of the \$1 million program contributed by SWM.

The program, which will take place at the company's San Diego headquarters, will train 450 production workers at the improver, journeyman, leadman, and foreman levels.

For more information on Southwest Marine Inc.  
Circle 38 on Reader Service Card

## Lyle Named Intermarine Sales Rep

Sherrill L. Lyle will serve as a sales representative for Intermarine, Inc. In her new position, Ms. Lyle will be responsible for sales and customer service for the company's regularly scheduled breakbulk and project cargo services to the growing Pacific rim countries.

## Portland-Based Shipping Names New President

Lasco Shipping Co., a Portland, Ore., private company that manages a fleet of 22 vessels specializing in the transport of dry bulk cargoes, has announced that Andreas L. Theoharis has been named president of the company. Mr. Theoharis has more than 20 years of experience in international shipping management, and has served in various capacities, including as vice president of a similar operation, and in the areas of chartering, operations, ship acquisitions, and as a surveyor and boating agent.

## Mathers Controls Creates New Divisions

Mathers Controls Inc., maker of marine control systems, has consolidated its operations and created two divisions for the manufacturing and marketing of its products. According to Harold Mathers, president of the Burlington, Wash. company, the MicroCommander division will deal in the company's light commercial and pleasure craft control. The Advanced Controls division will be responsible for the ClearCommand control, which has parallel communication and is intended for commercial vessels and megayachts. The MasterCommand, with serial communication using a closed loop system with engine feedback, is designed for larger commercial craft.

For more information on Mathers  
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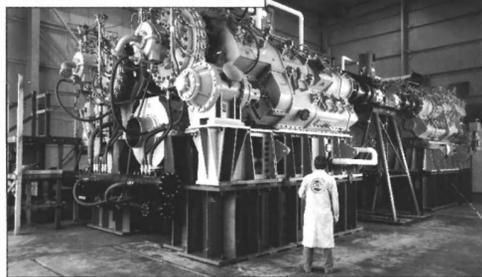
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WA LINE	NIPPON KKK	JAPAN	BULK CARRIER	1	96	45.5	WESTMINSTER DREDGING	YSCOME	NETHERLANDS	DREDGER	1	97
MOBIL / WINDROSK	DALIAN	CHINA	BULK CARRIER	2	97	86	QATAR NAVIGATION	KAWASAKI	JAPAN	ING	1	98
JN OLDENDORFF	WUHU SHIPYARD	CHINA	BULK CARRIER	2	97	31	DAIICHI TANKER CO.	HYUNDAI	KOREA	ING	1	98
I OCEAN	DAEJONG	KOREA	BULK CARRIER	2	97	57	AGRI INTERNATIONAL	HITACHI	JAPAN	ING	1	97
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DWA LINE	IMABARI	JAPAN	BULK CARRIER	1	97	41	SANSAI KK	KAWASAKI	JAPAN	ING	1	97
J CHONG CHEANG	JIANGNAN	CHINA	BULK CARRIER	1	4/97	48	EXMAR	MITSUBISHI	JAPAN	ING	2	97
UK MARITIME	TSUNEISHI	JAPAN	BULK CARRIER	2	96/97	22	STOCK COMPANY	TRECCO	CROATIA	MULTIPURPOSE	4	96
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OOYANG	DAEJONG	KOREA	BULK CARRIER	2	97	40	MISC	HYUNDAI	KOREA	TANKER	2	97
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OCEAN PINE	SHIN KURUSHIMA	JAPAN	BULK CARRIER	1	96	33						
JAPANESE INTERESTS	TSUNEISHI	JAPAN	BULK CARRIER	1	2/97	62						
SOUTH PACIFIC	DAEWOO	KOREA	CONTAINER	2	8/97	56						
PAN OCEAN	HANJIN	JAPAN	CONTAINER	1	96	45.4						
MISC	MAIAYSA SHIPYARD	MAIAYSA	CONTAINER	2	96/97	56						
KOREA MARINE	SAMSUNG	KOREA	CONTAINER	2	97	45.4						
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69

### China Navigation Installs BMT System

China Navigation has reportedly become the first cape-size bulk carrier operator to install an automatic interface between a bulk carrier hull stress monitoring system and a vessel's loading instrument.

The system, developed by British Maritime Technology (BMT), was

fitted to the 162,000-dwt China Navigation carrier *Erradale* while the vessel was docked in Immingham—and, said David Mitchell, fleet manager for China Navigation, was a direct response to the recent call by the IMO Maritime Safety Committee for the introduction of interfaced systems which prevent the inadvertent structural overloading of bulk carriers.

"We are always looking for ways

to improve safety procedures and this BMT system is a significant addition to the onboard monitoring systems already in place," he said.

Previously, the *Erradale* operated with a BMT SMART for Windows stress monitoring system, developed by BMT SeaTech and Shipboard Informatics SEAMASTER/SEADAM damage response software.

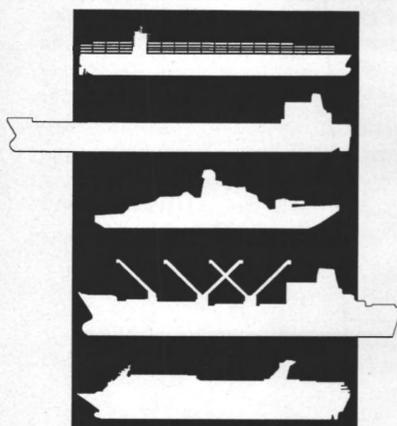
The automatic interface fitted by BMT to the *Erradale* links the out-

put of both systems and monitors any departures from the loading sequence which could overstress the ship during cargo loading and de-ballast operations.

To ensure continuous monitoring of the combined system, the predicted sequence is confirmed by constant interrogation of the hull girder and local loads during loading processes through a direct link between draft and tank gauging.

Dr. Phil Thompson, managing director of BMT SeaTech Southampton, said that since the IMO recommendation, "more owners are accepting that automatic monitoring vessel stresses during loading and de-ballasting can be critical safeguard to avoiding possible hull structure failure."

For more information on BMT Circle 46 on Reader Service Card



## THE FOURTH INTERNATIONAL EVENT FOR REPAIR & CONVERSION

## Where the business is...

Now established as the industry's international meeting place, the *Shiprepair & Conversion* Conference and Exhibition will be held at Olympia 2, London on November 7/8th.

The conference programme includes the most important issues currently affecting shiprepairing and fleet maintenance. Speakers from all sectors of the industry, including owners and operators, will discuss repair, maintenance and conversion trends along with technical, safety and legal aspects.

Additional features of the programme are specialised *Technical Workshop Sessions* which will be held during each morning, the content developed to assist delegates with specific technical problems of repair and maintenance.

Other highlights of the event include the A&P Group's hosting of the official evening reception on November 7.

For the fourth year running, the *Shiprepair & Conversion Exhibition* has grown with representations from more than 94 shiprepair yards from 40 countries alongside displays of new developments from many specialist service and equipment companies.

# ShipRepair & Conversion 95

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### Tidewater Launches Second Double-Hulled Barge

As part of a recently announced \$30 million equipment upgrade program, Tidewater Barge Lines, of Portland, Ore., introduced its second major piece of double hull marine tank equipment. *The Explorer* barge was launched at Zidell Marine in the early morning of August 24. This barge joins *The Pioneer*, launched last spring, in providing liquid petroleum service from Portland/Vancouver to points on the Columbia/Snake River waterway systems. *The Explorer* offers the latest in technological and environmental design, with features such as spill prevention mechanisms, deck containment, vapor recovery systems, overflow alarm systems and automatic tank gauges. The \$5 million barge joins *The Pioneer* as the largest inland double-hulled tank barge in the U.S., with measurements of 274 ft. by 84 ft. by 18.5 ft. (83.5 m by 25.6 m by 5.63 m) and a 62,000-barrel capacity. OPA 90 regulations state that all inland barges must convert to double hull configurations by the year 2015.

### Holland America Selects FM Mattsson Product Line For Three Vessels

Holland America Line Cruises has chosen FM Mattsson shower valves for three of its ships, the *Ryndam*, the *Maasdam*, and the *Veendam* — which is due to be launched in early 1996. The valve is designed to aid in solving the general problem of scalding, as well as play a role in the battle against harmful bacteria, such as Legionella, in marine shower systems. FM Mattsson, of Sweden, has combined two technologies to create a thermostatically-controlled and pressure-balanced shower valve. According to Pieter C. Rijkaart, director of newbuilding for Holland America, passenger comfort combined with avoiding pos-

Maritime Reporter/Engineering News

sible liability were important reasons for choosing the FM Mattsson line.

For more information on FM Mattsson  
Circle 36 on Reader Service Card

### Canadian Department Of National Defense Awards EDO \$1.4 M Contract

EDO Corporation, of College Point, N.Y., announced that its Defense and Space Systems Division's Combat Systems business unit based in Chesapeake, Va., has been awarded a production contract in excess of \$1.4 million from the Department of National Defense, Canada.

Under the contract, EDO will manufacture and deliver Link-11/Radar Consoles and Portable Tactical Link Systems to Canadian Maritime Command Headquarters. These systems will enhance the Canadian Navy's command and control capabilities and provide more effective data transfer within the fleet. Manufacturing and delivery is scheduled to be completed during 1995.

EDO designs and manufactures advanced electronic, acoustic, aerodynamic and hydrodynamic equipment for military applications and marine markets. The company is pursuing the application of its defense-related technologies to civilian and commercial markets, with particular emphasis on the natural gas vehicle equipment marketplace.

For more information on EDO  
Circle 37 on Reader Service Card

### LR Signs Agreement In Vietnam

Lloyd's Register (LR) signed an agreement with the Vietnam Register of Shipping under which the parties in cooperation agree to pursue and carry out inspection, certification and advisory services for land-based installations throughout Vietnam. The objective of the agreement is to extend and improve the safety standards of on-shore installations within Vietnam. LR services provided through the joint venture will include quality services and certification, design appraisal and inspection, in-service inspection certification, and management services.

### Furuno Offers Instruction Video For Compact Radars

Furuno introduced three new instructional videos for its compact radar series. One video covers the 1621 radar, a micro-radar offering a full-range of high-tech features. Another reviews use of the 1700 series; the third covers Furuno's 1831, 1931 and 1941 radars, which are designed for workboats, tugboats, fishing vessels and any medium-sized craft.

For more information on the videos  
Circle 16 on Reader Service Card

### Racal-Decca Integrated Bridges For Saudi VLCCs

The National Shipping Company of Saudi Arabia chose the Racal-Decca MIRANS 4600 integrated bridge system for its five new VLCCs being built in Japan at Mitsubishi Heavy Industries. The 300,000-ton double hulled tankers are being built to comply with OPA 90.

The contract was signed between

Mitsubishi and SENA, Racal-Decca's agent in Japan. At the heart of each MIRANS 4600 is the ChartMaster electronic chart system, which has been designed to be upgraded to ECDIS when ECDIS charts become available.

Racal-Decca Marine was chosen to supply the Royal Navy with a second navigational radar for use on some frigates and destroyers. The contract is to supply type 1008 radars operating in the E/F band,

units which complement the existing mandatory I band navigation. The type 1008 radars will be fitted with Autotrack and Geographics facilities, features which allow operators to create on-screen maps which can be used to display special features such as navigation marks, hazards, traffic separation schemes, minefields, etc.

For more information on  
Racal-Decca navigation products  
Circle 15 on Reader Service Card

# BENDER FORGES AHEAD!

For more than 75 years Bender Shipbuilding & Repair Co., Inc. has forged new ground in shipbuilding. The innovative team at Bender has brought a tradition of quality to a long list of vessels including casino riverboats, passenger vessels, offshore supply vessels, patrol boats, shrimp boats, oil rigs, factory trawlers, oil spill recovery vessels and tuna seiners.

This list continues to grow as Bender meets the challenges of modern shipbuilding with versatility and innovation. When a landlocked location presented obstacles to building America's largest casino riverboat last year, Bender mobilized an entire shipyard to build the vessel on-site, on-time and on-budget.

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Circle 207 on Reader Service Card

**Ashtech And Philips Semiconductors Enter Agreement**

Ashtech, Inc. and Philips Semiconductors unveiled a joint effort to develop a two-chip Global Positioning Systems (GPS) chipset ideal for cellular phones and other wireless technology. The GPS receiver chipset will provide the user with

GPS receiver function as well as an embedded controller to convert the raw satellite data to a navigation solution.

"This venture fits with Ashtech's company road map to sell technology at all levels of integration and enter the mass consumer market through a board/chipset strategy," said **Chuck Boesenberg**, president and CEO of Ashtech. "Philips was selected because of their domi-

nant position in wireless and communications technology."

For more information on Ashtech  
Circle 195 on Reader Service Card

**Comsat Introduces Enhanced Data Messaging**

Comsat Mobile Communications upgraded its Inmarsat-C satellite data messaging service for ships.

Customers using Comsat's new enhanced Inmarsat-C service will reportedly find it easier and faster to send data, telex, fax and e-mail messages. In addition, users will now have only one mobile address number.

Comsat is completing beta-testing of the service in the Atlantic Ocean Region West and East, and expected to make it available in September. Commercial introduction in the Pacific Ocean Region is planned for October 30.

According to **Ed Ryznar**, vice president and general manager, the improvements will come on line automatically, and will be available to all users without the need to modify their equipment.

The new Comsat Inmarsat-C service will reportedly make it easier to prepare, edit and send messages from shore to shipboard Inmarsat-C terminals, using new streamlined procedures. The system is designed to simplify the message sending process, featuring new menu-prompted, plain language commands that resemble a typical e-mail system.

Electronic mail access for Comsat Inmarsat-C users has been expanded to major Internet providers such as CompuServe, America Online, MCI Mail and Prodigy.

For more information from Comsat  
Circle 193 on Reader Service Card

**Jumbo-Sized Diesel Engine Test Bed In Korea Taps Alfa Laval Equipment**

Alfa Laval Korea Ltd. recently won an order from Hyundai Heavy Industry Co. (HHI) for lube oil cleaning equipment for a jumbo-sized diesel engine test bed installation. Before being installed at HHI's test bed facility at Ulsan, South Korea, the lube oil purifier module, comprising one Alcap LOPX 713 for lube oil, two Heatpac electric heaters, an IMO feed pump, and other accessories, was tested at Alfa Laval's Cheonan facility.

HHI is one of the largest shipbuilders in the world and a major manufacturer of marine diesel engines. Its test bed installation is used for testing powerful engines, including prime movers developing 54,720 kW (74,520 bhp.)

**Alfa Laval Wins Two Contracts In The Netherlands**

Alfa Laval B.V., the Netherlands, recently won a pair of orders. One is an order for an oil treatment system, central cooling systems and freshwater generators for a dredging vessel being built at Merwede Shipyards. The second is to supply an oil treatment and central cooling system for a passenger/car ferry being built at the Dutch yard of Vander Giessen-de Noord. Commissioned by Stena Line, the 6,500-dwt ferry will be equipped with four MAN engines rated at 25,680 bhp. It is scheduled for delivery in the summer of 1996.

For more information on Alfa Laval  
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Circle 130 on Reader Service Card

## ELECTRONICS UPDATE

### Rydex Wins Contracts From Trio Of U.S. Shipowners

Rydex Industries signed contracts to provide state-of-the-art ship/shore communications networks for a trio of U.S. shipping companies, two of which opted for the new Rydex PSSN, a company-private network which is fully managed by Rydex.

"Sea-Land Service and Keystone Shipping have selected a Rydex-managed private network, endorsing our decision to introduce this innovative and unique service option for the maritime industry, said **Dan Steiner**, president, Rydex. Rydex PSSN was launched following con-

sultation with major marine companies and has reportedly attracted interest from the U.S. and Far East.

Sea-Land, which operates from three U.S. offices, opted for the Rydex PSSN reportedly to give the company additional freedom to concentrate on shipping activities.

Lasco Shipping, based in Portland, Ore., has grown steadily in recent years and has plans to grow more, expanding on its current 22-vessel fleet of bulk carriers. The company exports about one million tons of scrap metal a year, making

it one of the major shipping organizations on the U.S. West Coast. In addition to the Rydex ship/shore network for the vessels, the Lasco headquarters in Portland will have a private communications center incorporating industry standard MHS e-mail and fax/image gateways.

#### Rydex Enhances Fax Services

Rydex Industries Corp. has added two powerful new fax and image handling options to its successful packaging of marine communications solutions. These options use Rydex's satellite optimized exchange protocol—REP2—to eliminate poor image quality, performance problems, and reportedly, to help reduce costs. Both options are designed to integrate fully with Rydex Marine Solutions and add value to existing systems so that clients can build a long-term, strategic and fully

integrated communications infrastructure.

The Rydex Image Capture Facility (ICF) module allows the simple and high performance scanning, viewing and transmission of both standard and nonstandard-size documents. Images are treated as attachments to messages and integrated with the electronic mail environment for transmission and delivery.

The fax images are compressed and transferred to the shore for delivery as conventional faxes, or directly to another user's workstation for printing or viewing as a file.

The Rydex Fax Gateway is an optional component of the Rydex Mail Manager that facilitates the distribution of images and messages to any fax destination worldwide.

For more information from Rydex Circle 196 on Reader Service Card

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**Conference Papers  
Now Available**

Computational Mechanics announced the availability of the proceedings from the Second International Conference on Computer Modeling of Seas and Coast Regions, which was held in Cancun, Mexico, from September 6-8.

The conference was an important tool in studying and predicting

coastal behavior, addressing the computer modeling of seas and coastal regions.

For information on receiving the papers  
Circle 191 on Reader Service Card

**Scale Reproductions  
Expands To Larger Facilities**

Scale Reproductions Inc. — producers of scale models — has moved into a new 7,000-sq.-ft. facility, which

will allow the company to add a computer lab and CNC laser and router cutting equipment, said **Randy Skinner**, the company's founder. The construction area for display models has been tripled in size, and all new work stations have been added along with a central inventory area. Display and tank test models up to 20 ft. in length can be easily handled. With the new space, Scale Reproductions will now produce a collector series of models

covering a wide variety of vessel types. Delta Queen Steamboat was the first to take advantage of these models, when it ordered 200 highly detailed scale models of its newest steamboat, the *American Queen*.

For more information on  
Scale Reproductions  
Circle 189 on Reader Service Card

**Webb Institute To Begin  
Master's Degree Program**

Webb Institute was granted approval by the New York State Board of Regents to begin a Master of Science program in Ocean Technology and Commerce. The decision was made to expand the curriculum in order to better prepare graduates for leadership roles in the maritime and associated industries in America.

**Port Of Portland  
OKs Three Projects**

The Port of Portland Commission has approved requests to relocate a post-Panamax container crane from Terminal 2 to Terminal 6, replace 15 older model container chassis with 15 new ones, and pave a graveled section of the Terminal 6 container yard. Action on the three projects was prompted by the need to keep the Port's Terminal 6 marine facility productive and capable of meeting growing container handling operations.

**Norshipco Receives  
ISO 9000 Certification**

Norshipco has been approved to one of the ISO 9000 series of quality management system standards. The company received its international certification from Lloyd's Register Quality Assurance.

Reportedly the first exclusively ship repair yard in Virginia, and one of the first in the U.S. to be internationally accredited, Norshipco received certification to ISO 9002 — one of five standards in the ISO 9000 series — which applies to companies involved in the production, installation and service of a product according to customer specifications.

For more information on Norshipco  
Circle 187 on Reader Service Card

**Engine Analyzer Helps  
Optimize Performance**

A new portable precision diesel engine analyzer — the Malin 3000 — permits the operator and superintendent to determine the health of their engines, as well as permitting them to return and operate engines at optimum performance.

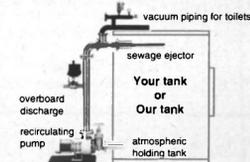
The product is designed to save the operator money in many ways. For example, it can be used to determine if repair work on injectors and fuel/air systems was satisfactory.

For more information from FCS Inc.  
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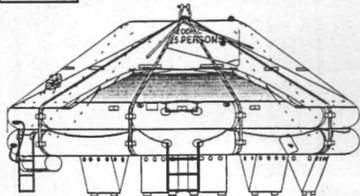
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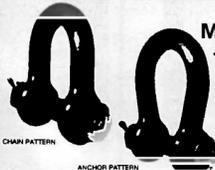
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## SHOW PREVIEWS

# EuroPort

EuroPort '95 is slated to take place at the Amsterdam RAI Exhibition Centre in the Netherlands, from November 14-18. This exhibition is designed to be one of the most successful business exhibitions for the maritime industry, and in the span of the three decades since its creation, has become renowned as a closing site for a large number of contracts. EuroPort '95 will highlight three areas of maritime involvement, namely: ship design and building; oceangoing and inland waterway ship operation, maintenance, and repair; and port and harbor planning, construction, operation, and maintenance.

Europort '93 attracted exhibitors from around the world; out of a total of 507 exhibitors in attendance at the '93 event, 195 exhibitors represented countries other than the Netherlands, home sponsor of the conference. Conference officials have reported that worldwide participation in the upcoming event is expected to rival '93 show fig-

ures. Another conference to be held in conjunction with EuroPort '95 is the Fourteenth World Dredging Congress, Dredging Benefits.

Conference delegates will be provided with the opportunity to meet with technicians that are designing the ships of the future with computerized tools, and will learn how futuristic ships are being shaped to be more complex and certain than designs of the past.

Paralleling the exhibition of marine inspection equipment, international classification society examiners and surveyors will be on hand to demonstrate how radiography, lasers, sensors, and other metering and measuring tools are used to ensure safety at sea. Expertise will also be demonstrated in the area of heavy metals fabrication.

For more information on the event, contact Alexander H.J. Bitter, EuroPort '95, Amsterdam RAI, P.O. Box 77777, 1070 MS Amsterdam, Netherlands, tel: +31 20 549 12 12; fax: +31 20 646 44 69.

## Shiprepair & Conversion '95

According to event coordinators, more than 90 shipyards from 40 countries, as well as an equally impressive number of marine suppliers are booked to participate in Shiprepair & Conversion '95: The Ship Maintenance Conference and Exhibition, scheduled to take place on November 7-8, at the Olympia 2 Conference & Exhibition Centre in London. This year's event will showcase the repair industry at a time when improving rates are encouraging greater investment in ship maintenance and repair.

Seminar discussions will make mention of topics from all sectors of the industry, including sessions covering repair, maintenance, and conversion trends, along with treatment of the technical, safety, and legal aspects of the three linked industries. Two topics that will be targeted for discussion are: ISM Code — The Maintenance Factor and Repair; and Maintenance Considerations in Newbuildings.

A new feature of the conference program will be specialized technical workshops, to be held each morning of the conference, with a goal towards assisting delegates in understanding the more technical problems associated with ship repair and maintenance. The conference will end with an open examination of the industry, during which time delegates and speakers will be encouraged to debate each other and pose inquiries as to the state of the industry within the repair, maintenance, and conversion sectors.

For more information on Shiprepair & Conversion '95, contact **Simon Smith**, conference secretariat, BML Business Meetings Ltd., 2 Station Rd., Rickmansworth, Herts WD3 1QP, U.K., tel: +44 1923 776 363; fax: +44 1923 777 206.



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October, 1995

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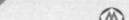


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## SHOW PREVIEWS

# Australian Shows Focus On Technology, Market Expansion

A series of summer maritime conferences is scheduled to kick off in the city of Melbourne, Australia, in November. The Maritime Technology Exhibition & Conference, a key event strongly supported by Australian industry and government, offering first-rate opportunities for maritime interests to expand market shares, will headline the southern hemisphere country's annual maritime events, complemented by the 2nd International Aluminum Ship Forum, as well as Offshore Australia: The 3rd International Oil, Gas, & Petrochemical Exhibition and Conference (Petrochem '95).

The Maritime Technology Exhibition & Conference has been designed to meet the needs of shipbuilders and designers, as well as owners, operators, marine engineers, naval architects, ships' officers, and port authorities.

Products from maritime nations worldwide will be showcased in the estimated 100 exhibition booths that are expected at the event. According to the event's organizers, the exhibited technology will cover vast territory, including equipment such as: communication and navigation systems and equipment; integrated bridge systems; port and harbor planning construction and operating systems equipment; sea rescue and fire control equipment; information technology; educational and training systems; and engine, transmission, and propulsion equipment.

Concentration will also be placed on ship repair and maintenance, aluminum ships and boats, as well as maintenance services, systems and equipment.

Another Australian maritime event — Ferries Down Under, the International Marine Transit Association's 20th Annual Conference — was scheduled to take place from October 23-26, at the Regent Hotel, in Sydney. This conference was organized to provide an information exchange for ferry operators worldwide. For information regarding this event, contact the International Marine Transit Association, 1 Mafeking Ave., Lane Cove, Sydney, NSW 2066, Australia, tel: +61 2 427 2822; fax: +61 2 427 7238.

For more information on the Maritime Technology Exhibition Conference, the Forum on Aluminum Ships, or Offshore Australia, contact Australian Exhibition Services Pty. Ltd., Illoura Plaza 424, St. Kilda Rd., Melbourne, VIC 3004, Australia, (tel): +61 3 867 4500; (fax): +61 3 867 7981.

### Marine Shows In Australia

**Ferries Down Under: International Marine Transit Association 20th Annual Conference:** October 23-26, Regent Hotel, Sydney.

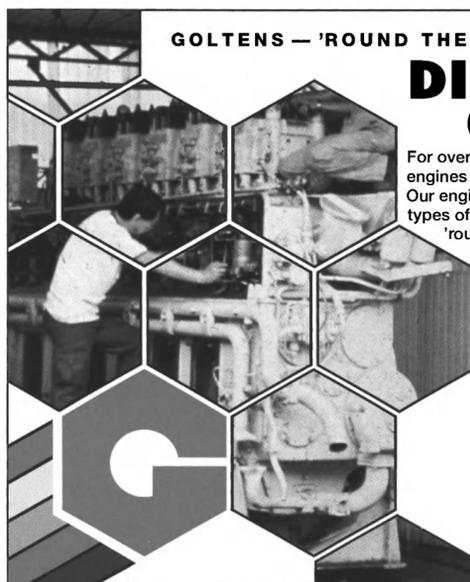
**2nd International Aluminum Ship Forum:** November 22-23, Royal Exhibition Building, Melbourne.

**Maritime Technology Exhibition Conference 1995:** November 22-24, Royal Exhibition Building, Melbourne.

**Offshore Australia: The Third Australian International Oil, Gas & Petrochemical Exhibition and Conference (Petrochem 95):** November 23-24, Royal Exhibition Building, Melbourne.



Pictured is Sydney Harbor, a hub of marine transportation, located in the host city of the International Marine Transit Association's 1995 conference, Ferries Down Under.



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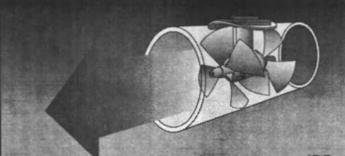
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**COMPANY PROFILE**

**Zodiac Targets Safety With Technology**



The Rigid Inflatable Boat (RIB) is understood to have begun as a U.K. phenomenon, but Zodiac of North America, a company with roots in France, has enjoyed great success in the market.

Zodiac of North America, with principal offices in Stevensville, Md., is involved in the manufacture and distribution of inflatable boats, rigid-hulled inflatable boats, life rafts and associated safety equipment and supplies. A member of the Zodiac Group — which had sales totaling approximately \$550 million for the fiscal year ending in August 31, 1995, and which is headquartered near Paris, France — Zodiac of North America supplies RIBs to a host of commercial, military, governmental and even recreational customers.

Zodiac is essentially a maker of material for inflatable products, and indeed was created in 1896 as an airship manufacturer. But the company expanded into the marine market in 1937 with, according to the company, the world's first inflatable boats. The company is still active in aviation markets (its operations include Air Cruisers, Pioneer Parachute and Weber Aircraft).

Over a decade ago, a company called C.W. Lucas entered the RIB business. At about the same time, Zodiac was distributing through a company called Zodiac Marine in Victoria, B.C. When Zodiac took over its own distribution, Zodiac Marine asked if it could enter the RIB business using the Zodiac name.

Zodiac allowed this, and C.W. Lucas and Zodiac Marine began competing heavily. Eventually it was decided that this competition was hurting both rather than helping either, so Zodiac came up with a solution and C.W. Lucas agreed. Lucas would be acquired by Zodiac.

Zodiac Hurricane was the resultant company. It began supplying RIBs to organizations such as the Canadian Coast Guard and military, and still does, making a variety of craft for special operations and a wide range of mission profiles.

Zodiac makes liferafts and rescue vessels of just about any size or configuration, and **J.J. Marie**, president/CEO of Zodiac of North America, says its production methods allow a great deal of flexibility in what kinds of custom configurations it can create.

What's different about Zodiac inflatable boats? The company has made RIBs using fabrics coated with PVC (polyvinyl chloride) as well as Hypalon-neoprene-coated fabrics. The PVC-coated fabrics are joined using a proprietary method of thermal welding called thermobonding. The method is so proprietary, in fact, the welding



J.J. Marie, president/CEO of Zodiac North America.

machines are designed and built by Zodiac; the technology was borrowed from Zodiac's high-altitude balloon division. Seams welded with this process are stronger than the fabric itself: tests in which the welded material is subjected to stress have shown that failure will occur in the fabric rather than the weld. The Hypalon-neoprene-coated fabrics are hand-glued, and this requires skilled labor, but the tooling costs involved in the thermobonding process are also significant.

There are advantages to both methods, but Zodiac feels the thermobonding process, which can be carried out through automation, allows greater quality control. In addition, PVC boats may require air only about once a month, whereas Hypalon-neoprene boats usually need air every few days.

These elements, plus a rustproof firing pin mechanism Zodiac feels is more foolproof than others and which allows inflation in less than three minutes, add up to a product the company feels is superior — and a superior product is of the utmost importance for safety and rescue applications.

Zodiac's line of SOLAS liferafts and rescue craft are approved by a great number of regulatory bodies internationally. The company has developed a system of approvals whereby it invites a number of maritime authorities to its test site in France, allowing the required approval tests for each country to be carried out simultaneously. Just as it was able to streamline the production of its craft, this method allows the streamlining of the approvals process, which can be complex, difficult and expensive due to the different regulations in each of the many countries in which Zodiac

does business.

With a product line as diverse as its clientele, Zodiac's innovative approach to approvals should come as no surprise to those familiar with the company's record for finding the best method to accomplish a given task.

For more information on Zodiac  
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### Hamworthy To Supply Rudder For RoRo Freighter

Hamworthy Marine Ltd. was awarded a contract to supply a Schilling Monovec rudder for a 5,500-dwt RoRo freighter being built at Karls Kronavarvet in Sweden for domestic owners. The vessel, designed to meet Swedish/Finnish 1A classification for ice conditions, will be used mainly to carry paper products between Sweden and northern Europe. Hamworthy's Schilling rudder with its one-piece construction is ideal for vessels operating in icy seas with high loads and high speeds which require the capability to reverse in ice conditions. The vessel will feature stern loading, which requires excellent slow-speed maneuverability. Hamworthy Marine worked closely with the ship's design consultants, Deltamarin of Finland, to ensure the optimum rudder-propeller-hull configuration was obtained.

For more information on  
Hamworthy Marine Ltd.  
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October, 1995

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# BUYERS DIRECTORY

This directory section is an editorial feature published in every issue for the convenience of the readers of MARITIME REPORTER/Engineering News. A quick-reference readers' guide, it includes the names and addresses of the world's leading manufacturers and suppliers of all types of marine machinery, equipment, supplies and services. A listing is provided, at no cost for one year in all issues, only to companies with continuing advertising programs in this publication, whether an advertisement appears in every issue or not. Because it is an editorial service, unpaid and not part of the advertisers contract, MR/EN assumes no responsibility for errors. If you are interested in having your company listed in this Buyers Directory Section, contact John C. O'Malley at (212) 477-6700.

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Branton Ind., 1101 Edwards Ave., Jefferson, LA 70181  
Insulations, Inc., 1101 Edwards Ave., Harahan, LA 70123  
Mapoco Walz & Krantz, Inc., 90 Forest Ave., Locust Valley, NY 11560  
Marine Accommodations, 835-3 Baymeadows Rd., Jacksonville, FL 32256

**DRY DOCKS-Design**  
Central Industries, 1501 Front Street, P.O. Box 790, Morgan City, LA 70361

**DUCTORS**  
Via Molitor, 568 Parker St., Newark, NJ 07104

**ELECTRICAL ENCLOSURES**  
Science Applications International Corp., 3990 Old Town Ave., Ste 303C, San Diego, CA 92121

**ELECTRICAL EQUIPMENT**  
L. F. Gaubert & Co., Inc., P.O. Box 53520, New Orleans LA 70150  
MMC International, 60 Inp Dr., Inwood NY 11996

**ELECTRICAL WIRE DEVICES**  
Melnir Corp., 1955 Ace World Wide Lane, Cudahy, WI 53110

**ELECTRONIC DISPLAY**  
Kokum Sonics, Inc., 819 Veterans Blvd., Suite 201, Kenner, LA 70068  
Scandinavian Micro Systems, P.O. Box 155, N-1411, Kolbotn, NORWAY

**ELECTRONIC INFORMATION SUPPORT**  
Scandinavian Micro Systems, P.O. Box 155, N-1411, Kolbotn, NORWAY

**EMISSION CONTROLS**  
Haldor Topsoe Nymkolevej 55, DK-2800, Lyngby, Denmark

**EMPLOYMENT**  
Boat Crews, 1 Seine Court, Suite 309, New Orleans, LA 70114

**ENGINEERING SERVICES**  
AmClyde, 240 E. Pluto Blvd., Saint Paul, MN 55107-1609  
Scientific Marine Services, Inc., 101 State Pl., Suite F, Escondido, CA 92029

**ENGINE ROOM LIGHTING**  
Fusion Electric Mfg. Co., Inc., 1616 N. Main, P.O. Box 63, Pearland, TX 77561

**ENGINE TEST EQUIPMENT**  
General Thermodynamics Corp., P.O. Box 1105, 210 S. Meadow Rd., Plymouth, MA 02560

**ENVIRONMENTAL SYSTEMS**  
Eco Environmental Systems, 7440 West Marginal Way So., Seattle, WA 98108-4141

**EXPLOSIVES**  
ACR Electronics, Inc., 5757 Ravenswood Rd., P.O. Box 5247, Ft. Lauderdale FL 33310-5247  
Alien Electronics, 40 Washington St., Westborough, MA 01581

**EQUIPMENT - Marine**  
Borhnet & Associates, 1150 Rue Rochelle, Sidel, VA 70458

**EVAPORATORS**  
Alla-Laval Separation, Inc., 955 Meams Rd., Warminster, PA 18974  
Beard Industries Inc., P.O. Box 31115, Shreveport, LA 71130

**FAHNS - VENTILATORS - BLOWERS**  
Jon M. Lis Associates, Inc., 411 Borel Ave., San Mateo, CA 94402

**FASTENERS**  
Helmens Distributors, 28 Narragansett Ave., P.O. Box 348, Jamestown, RI 02835  
Okabe Co., Inc., 645 Forest Edge Drive, Vernon Hills, IL 60061-3106

**FENDERING SYSTEMS/BUOYS - Dock & Vessel**  
B.F. Goodrich, 150 Division Drive, Wilmington, NC 28401  
Kahlenberg Bros. Co., P.O. Box 358, Two Rivers, WI 54241  
Schuyler Mfg. Co., Inc., 19901 Woodville-Redmond Rd., Woodville, WA 98072  
Seaward International, Inc., Clearbrook Industrial Park, P.O. Box 98, Clearbrook, VA 22624  
Ultra Poly Inc., 2926 South Steeple, Tacoma, WA 98409  
Viking Fender Co., 1160 State St., Perth Amboy, NJ 08861

**FIBERS**  
Allied Signal, Meyer 1 Box, 101 Columbia Rd., Morristown, NJ 07962

**FILTER SYSTEMS**  
Everbrite Inc., 660 N. Blackhawk Dr., Westmont, IL 60559

**FIN STABILIZERS**  
Borch & Voss AG, P.O. Box 10 07 20, D-2000 Hamburg 1, GERMANY  
U.S.A. Repr. Simplex-Turner Inc., P.O. Box 168, Little Neck, NY 11363-0168

**FINANCIAL LOANS**  
Helmens Nat'l Bank, 812 Gravier St., 10th Fl., New Orleans, LA 70130

**FIRE DETECTION SYSTEMS**  
Autonica Marine AS, Drammensveien 126, N-0277 Oslo 2, NORWAY

**FIRE SUPPRESSION AGENT**  
American Pacific Corp., 3770 Howard Hughes Pkwy, Las Vegas, NV 89109

**FLAME CUTTING MACHINE**  
Eco-Systems, 3003 West Carson St., Pittsburg, PA 15204

**FLEXIBLE COUPLING**  
American Vulcan, P.O. Drawer 673, Winter Haven, FL 33882

**GALLEY EQUIPMENT**  
Branton Ind., 1101 Edwards Ave., Jefferson, LA 70181  
Jamestown Metal Marine Sales, 4710 Northwest Second Ave., Boca Raton, FL 33431  
Marine Accommodations, 835-3 Baymeadows Rd., Jacksonville, FL 32256

**GAZWAYS, LADDERS**  
Sea Systems Inc., 187 Ward Hill Ave., Ward Hill, MA 01835-0679  
Woolstar Products Inc., 1000 Spruce St., P.O. Box 896, Wooster, OH 44691

**GENERATORS**  
Sasakura Engineering 7-32 Takeshima 4-Chome, Nishiyodogawa Ku Osaka, JAPAN

**HATCH COVER SEAL RENOVATION**  
Seaward Int'l, Inc., 3941 Sandridge, Beltsville, MD 208263  
KIBI Corporation, U.S. Repr. Simplex-Turner Inc., P.O. Box 168, Little Neck, NY 11363-0168

**HEAT EXCHANGERS**  
Alla-Laval Separation Inc., 955 Meams Rd., Warminster, PA 18974  
Beard Industries Inc., P.O. Box 31115, Shreveport, LA 71130  
Kokum Sonics, Inc., 819 Veterans Blvd., Suite 201, Kenner, LA 70068

**HYDRAULICS**  
Cunningham Marine Hydraulics Co., 201 Harrison St., Hoboken, NJ 07030  
Del Gaudio Marine Hydraulics Inc., 619 Industrial Rd., Catskill, NJ 07022  
Engine Monitor, Inc., 179 Hickory Ave., Harahan, LA 70123  
Hamilton Jet, P.O. Box 709, Chatsworth, New Zealand

**INERT GAS SYSTEMS**  
Halar Systems, 3710 Lakeside Court, Mobile AL 36693

**INFORMATION TECHNOLOGIES**  
Marine Management Systems, 102 Hamilton Ave., Stamford, CT 06902

**INSULATION**  
Insulations, Inc., 1101 Edwards Ave., Harahan, LA 70123

**INTERIORS**  
Croschich Design, 11457 Olive Cabin Rd., Ste. 100, St. Louis, MO 63141  
Hopman Brothers, 435 Essex Ave., Waynesboro, VA 22980  
Insulations, Inc., 1101 Edwards Ave., Harahan, LA 70123  
Interior Design Int'l, 701 Dexter Ave. N., Ste. 100, St. Louis, MO 63141  
Jamestown Metal Marine Sales, 4710 Northwest Second Ave., Boca Raton, FL 33431  
Marine Accommodations, 835-3 Baymeadows Rd., Jacksonville, FL 32256  
Maritime Services Corp., 3457 Guilford Dr., Hood River, OR 97031

**JOINER - Watertight Door-Paneling-Ceiling System-Decking**  
Alfa Infratec, Inc., P.O. Box 489865, Cincinnati, OH 45249  
Branton Ind., 1101 Edwards Ave., Jefferson, LA 70181  
CustomShip Interiors, Inc., P.O. Box 237, Lusty, MO 20657  
Hopman Brothers, Inc., P.O. Box 620, Waynesboro, VA 22980  
Insulations, Inc., 1101 Edwards Ave., Harahan, LA 70123  
Slud Systems, Inc., 220 Carpenter St., Greenport, NY 11944  
Walz & Krantz, Inc., 90 Forest Ave., Locust Valley N.Y. 11560

**KEEL COOLERS**  
R.W. Fernstrom & Co., 1716 Eleventh Ave., Menominee, MI 49858  
Kahlenberg Bros. Co., P.O. Box 358, Two Rivers, WI 54241  
The Walker Machine Co., Inc., 84-90 Cambridge Avenue, Jersey City, NJ 07307

**LIFEBOATS/RAFTS**  
American Eagle Mfg., Inc., 780 Peaslee Jensen Way, LaConner, WA 98257  
Norsafe AS, P.O. Box 115, N-4818 Faerik, Norway  
Revere Survival Products, 3 Fairfield Crescent, West Cessant, NJ 07006-6204  
Willard Marine Co., Inc., 1250 N. Grove St., Anaheim, CA 92805  
Zodiac of North America, P.O. Box 400, Stevenville, MD 21166

**LIFERAISING EQUIPMENT**  
MCI International, 119-225 West 1st St., North Vancouver, B.C. CANADA  
Stearns Manufacturing, P.O. Box 1468, St. Cloud, MN 56302

**LIGHTING EQUIPMENT - Lamps, Fixtures, Searchlights**

ACR Electronics, Inc. 5757 Ravenswood Rd., Ft. Lauderdale, FL 33310-5247  
 Archway Marine, 4501 Swan Ave., St. Louis, MO 63110  
 Clancy, 44 Austin Street, P.O. Box 1922, St. John's, NEW CANADA A1B 4B6  
 Golden Marine, 160 Van Brunt St., Brooklyn, NY 11231  
 Kookum Sonics, Inc., 619 Veterans Blvd., Suite 201, Kemmer, LA 70068  
 Paulich Electric Mfg. Co., Inc., 1616 N. Main, P.O. Box 53, Pearland, TX 77581  
 Franca Searchlight & Stam Supply Co., 4415 6th N.W., Seattle, WA 98107

**LIQUID COATINGS**  
 Ferro Corp., 1301 North Flora St., Plymouth, IN 46563

**LIQUID LEVEL GAUGES**  
 Eugene Ernst Products Co., 116 Main St., Farmingdale, NY 11737  
 King Engineering Corp., P.O. Box 1228, Ann Arbor, MI 48106

**LIQUID LEVEL INDICATORS**  
 Midland Mfg. Corp., 7733 Gross Point Rd., Skokie, IL 60076-0226

**LIQUID OVERFILL PROTECTION SYSTEMS**  
 E.R.L. Marine Products, P.O. Box 1026, New Albany, IN 47151-1026  
 Merritts, Inc., 59 Potter Rd., Littleton, MA 01460  
 Midland Mfg. Corp., 7733 Gross Point Rd., Skokie, IL 60076-0226

**LOGISTICS**  
 Newport News Shipbuilding, Logistics & Technical Services, 12129 Jefferson Ave., Newport News, VA 23603  
 QED 4646 N. Witchduck Road, Virginia Beach, VA 23455  
 V. Logistics Consultants, Inc., 3420 Bienville Blvd., Ocean Springs, MS 39564

**LUBRICANTS**  
 Tonaco International, 2000 Westchester Avenue, White Plains, NY 10650

**MACHINERY MAINTENANCE, REPAIR, OVERHAUL, AND TESTING**  
 Del Gavio, 619 Industrial Rd., Carlstadt, NJ 07072  
 Golden Marine Company Inc., 160 Van Brunt Street, Brooklyn, NY 11231  
 New England Trawler Equipment Co., 291 Eastern Avenue, Chelsea, MA 02150

**MACHINERY MONITOR AND CONTROL SYSTEMS**  
 Electronic Marine Systems, 800 Fenwick Pl., Mahwah, NJ 07055

**MARINE ACCOMMODATIONS**  
 Directions In Design Inc., 1457 Oak Cabin Rd., Ste. 103, St. Louis, MO 63141  
 Hopeman Brothers, P.O. Box 620, 435 Essex Ave., Waynesboro, VA 22980  
 Johnson Marine, 2553 Baymeadow Rd., Jacksonville, FL 32256  
 Marine Accommodations, 3533 Baymeadow Rd., Jacksonville, FL 32256  
 Maritime Services Corp., 3457 Guilford Dr., Hood River, OR 97031

**MARINE CEILING**  
 Hydromatronics, Vik Verk, N-5880 VIK 1 SOGN, Norway

**MARINE DECKING**  
 Hopeman Brothers, Inc., P.O. Box 620, Waynesboro, VA 22980  
 P.O. Box 1600, Oak Creek, WI 53091

**MARINE ELECTRONICS**  
 Frank L. Beer Radio, 2001 Ridgeway Dr., Metairie, LA 70001  
 Kookum Sonics, Inc., 619 Veterans Blvd., Suite 201, Kemmer, LA 70068  
 Saab Marine Electronics AB, Box 13045, 402 S1 Göteborg, SWEDEN  
 Scientific Marine Services, Inc., 101 State Pl., Suite F, Escondido, CA 92029

**MARINE ELEVATORS**  
 Alimak Elevator Co., 1100 Boston Ave., Bridgeport, CT 06601  
 E-Drivey Machine, 1001 Lorraine Rd., Bixio, MI 39535-4454

**MARINE EQUIPMENT**  
 McElroy Machine, P.O. Box 4454, Bixio, MI 39535-4454

**MARINE FINANCING**  
 Safeco Credit Co., Inc., 4909 156th Ave. NE, Redmond, WA 98052

**MARINE FIRE PROTECTION**  
 Hiller Coatings, 3710 Lakeside Court, Mobile, AL 36693  
 Union Ship Service Inc., 2375 West Esther Street, Long Beach, CA 90813

**MARINE FURNITURE**  
 Jamestown Metal Marine Sales, Inc., 4710 NW Second Ave., Boca Raton, FL 33431  
 Maritime Services Corp., 3457 Guilford Dr., Hood River, OR 97031

**MARINE GEARS**  
 Cincinnati Gear Co., 5657 Woodster Pike, Cincinnati, OH 45227  
 The Falk Corp., P.O. Box 492, Milwaukee, WI 53201-0492  
 Marine Gears, P.O. Box 689, Greenfield, MA 01301  
 Westech Gear Corp., 2650 East Imperial Hwy., Lynnwood, CA 90262  
 ZF Industries Inc., 777 Hickory Hill Drive, Vernon Hills, IL 60061

**MARINE HYDRAULICS**  
 Del Gavio Marine, 619 Industrial Rd., Carlstadt, NJ 07072

**MARINE INSURANCE**  
 John G. Adam, 1300 SE 7th St., Fort Lauderdale, FL 33316

**MARINE INTERIORS**  
 Jamestown Metal Marine Sales, 4710 Northwest Second Ave., Boca Raton, FL 33431  
 Johnson Construction Specialists, Inc., 3420 Rusk, P.O. Box 1920, Houston, Texas 77251  
 Marine Services Corp., 3457 Guilford Drive, Hood River, OR 97031

**MARINE LADDERS**  
 Sea Systems, Inc., 75 Avo Rd., Ward Hill, MA 01835

**MARINE LUBRICANTS**  
 Royal Lubricants Co., 6 Campus Drive, Parsippany, NJ 07054

**MARINE PUMPS**  
 R-1 Enterprises, Inc., 4995 Ocean Pines, Berlin, MD 21811

**MARINE PUMPS**  
 Gilles Inc., P.O. Box 628, Seabrook, TX 77586

**MARINE SUPPLIES SALES**  
 Defense Reutilization & Marketing Service, 2163 Airways Blvd., Memphis, TN 38114

**MARINE TRAINING & SPILL PREVENTION**  
 Center for Marine Training, P.O. Box 1073, Galveston, TX 77553  
 Center for Maritime Education, 241 Water St., New York, NY 10038

**MULTI-CABLE PENETRATION DEVICES**  
 NMP, 12427 E. 6th, Tulsa, OK 74115

**NAVAL ARCHITECTS, MARINE ENGINEERS, SURVEYORS**  
 Advanced Marine Enterprises, Inc., 1225 Jefferson Avenue, Newport, VA 23602  
 Donald L. Blount, 2550 Elmer Ave., Ste. K, Norfolk, VA 23513  
 CDI Marine Co., 4040 Woodcock Dr., Suite 200, Jacksonville, FL 32207  
 Childs Engineering Corp., Box 333, Medfield, MA 02052  
 Cranford Dry Dock Engrs., Inc., 21 Pottery Ln., Dedham, MA 02026  
 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  
 Arthur D. Darden, 3200 Ridgeway Dr., Suite 403, Metairie, LA 70002  
 Dabney & Leibel, Inc., 1734 Emerson Street, Jacksonville, FL 32207  
 Design Associates Inc., 14360 Chief Menteur Highway, New Orleans, LA 70129  
 Designers & Planners, 2120 Washington Blvd., Ste. 200, Arlington, VA 22204  
 Diversified Technologies, 616 Live Oak Dr., Chesapeake, VA 23350  
 Elton Bay Design Group, 5301 Shishole Ave. N.W. Ste. 200, Seattle, WA 98107  
 Erion Mgmt & Engineering Consultant Services, P.O. Box 7780, Beaumont, TX 77708  
 GHM Inc. (Ind. Measurement Consultants), P.O. Box 1636, Newport News, VA 23601  
 Gibbs & Cox, Inc., 50 West 23rd St., New York, NY 10010  
 John W. Gilbert & Assoc., Inc., 58 Long Wharf, Boston, MA 02110  
 The Gloster Assoc. Inc., 600 Mutual Life Bldg., 605 First Ave., Seattle, WA 98104  
 Guido Perle & Assoc., 720 3rd Ave., Ste. 1200, Seattle, WA 98104  
 Morse Gustafson Associates, Inc., 130 Sutter St., Ste. 400, San Francisco, CA 94104  
 C. Raymond Hunt Associates, 69 Long Wharf, Boston MA 02110  
 Hydromat, Inc., 202 C Packard Court, Williamsburg, VA 23185  
 JRI Inc., 3412 Progress Dr., Bensalem, PA 19009  
 R.D. Jacobs & Associates, 11406 Main St., Roscoe, IL 61073  
 James S. Kroger, 799 Brickell 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., 2820 South Gessner, Houston, TX 77063  
 McElroy Machine & Mfg. Co., Inc., P.O. Box 4454, Bixio, MI 39535-4454  
 John J. McMullen Associates, Inc., 1 World Trade Ctr., Ste 3000, N.Y. NY 10048  
 Fardal Maritime, P.O. Box 2321, Annapolis, MD 21401  
 Marine Design & Operations, Inc., 228 Chestnut St., Rosalee Park, NJ 07024  
 Marine Management Systems Inc., 102 Hamilton Ave., Stamford CT 06902  
 Marine Power Associates, 1010 Turnpike St., Ste 217, San Diego, CA 92109  
 Maritech, Seacraft, Bay Road, Newmarket, NH 03857  
 Marina Design, Inc., 3020 Hanley Rd., Jacksonville, FL 32257  
 R.J. Muller & Co., 71 Hudson St., New York, NY 10013  
 Nautical Designs, Inc., 2101 S. Andrews Ave., Suite 202, Ft. Lauderdale, FL 33316  
 Ocean Motions Co., P.O. Box 130, 49 Shore Drive, Barrington, RI 02806-0130  
 Olsen Marine Surveyors Co., P.O. Box 283, Fort Jefferson, NY 11777  
 QED Systems Inc., 4646 Witchduck Rd., Virginia Beach, VA 23455  
 M. Rosenthal & 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, 16812 Gandy Boulevard, St. Petersburg, FL 33702  
 Seaworthy Systems Inc., P.O. Box 965, Essex, CT 06430; 7 Battery Pl., New York, NY 10004; P.O. Box 975, Barnegat Light, NJ 08006; 2 Skyline Pl., 5203

Leesburg Pike, Suite 700, Falls Church, VA 22041  
 50 Vahell Way, Orlinda, CA 94553  
 George G. Starr, Inc., 100 Church St., New York, NY 10007  
 R.A. Steam, Inc., 253 N. 1st Ave., Sturgeon Bay, WI 54235  
 A.K. Suda & Ass., 3002 18th St., Metairie, LA 70002-4989  
 TIMSCO, P.O. Box 91360, Mobile AL 36691

**NAVIGATION & COMMUNICATIONS EQUIPMENT**  
 Auronca Marine AS, Drammensveien 126, N-2277 Oslo 2, NORWAY  
 Cetnet Corp., 400 Main St., Stamford, CT 06901-3004  
 Comsat Marine Services, 950 L Enfant Plaza SW, Washington DC 20024  
 Crutcher, 2100 Park Central N., Pompano Beach, FL 33064  
 Electronic Marine Systems, 800 Fenwick Pl., Mahwah, NJ 07055  
 Furuno U.S.A., 271 Harbor Way, S. San Francisco, CA 94080  
 Hesse-McCann, 1241 W. Newport Center Dr., Deerfield Beach, FL 33442  
 ICS Electronics Ltd., Unit V, Rodford Industrial Estate, Ford, Arundel, West Essex, UK  
 Macbay Communications, 300 Columbus Circle, Edison, NJ 08837  
 Megacouze, Inc., 8 Preston Court, Bedford, MA 01730-2386  
 Mobile Teletypes, Inc., 200 Professional Dr., Gaithersburg, MD 20879  
 Negrin Marine Consultants, 840 Bond Street, Elizabeth, NJ 07201  
 Offshore Systems Ltd., 107-933 West 1st St., North Vancouver, B.C. V7P 3N4 CANADA  
 Raytheon Marine Co., 676 Island Pond Rd., Manchester, NH 03109-5420  
 Rosa Engineering, 12005 E. Sawyer Rd., Largo, FL 34643  
 Scandinavian Micro Systems P.O. Box 155, N-1411, Kolbotn, NORWAY  
 Scientific Atlanta, 4291 Communications Dr., Norcross, GA 30093  
 Sea, Inc., 7039 220th St., Mountlake Terrace, WA 98042  
 Seacoast Electronics, Inc., 240 Talleyrand Ave., Jacksonville, FL 32202  
 Simrad, 18210 33rd Avenue West, Lynnwood, WA 98036  
 Simrad Robertson, 1091 Harmony, Suite 100, Houston, TX 77043-1923  
 Sperry Marine Inc., 1070 Semetree Trail, Charlottesville VA 22901  
 Standard Communications, P.O. Box 92151, Los Angeles, CA 90009  
 Starlink, Inc., 6400 Highway 260 East, Suite 202, Austin, TX 78752  
 Trimble Navigation, 565 North Mary Avenue, P.O. Box 3842, Sunnyvale, CA 94086  
 Wireless Communications System, Inc., 453 E. Park Pl., Jeffersonville, IN 47130

**NOZZLE SYSTEM**  
 Rice Propellers, Av. Rio Espinosa 888, Mazatlan, MEXICO 82180

**OIL**  
 Luber-Finer, Inc., 5050 Quorum Drive, Dallas, TX 75240  
 Mobil Oil Corporation, 3225 Gallops Road, Fairfax, VA 22037-0021  
 Tonaco International, 2000 Westchester Avenue, White Plains NY 10650

**OIL SPILL CONTAINMENT**  
 Cass Environmental, 7440 W. Marginal Way S., Seattle, WA 98108-4141

**OIL/WATER SEPARATORS**  
 Alfa Laval Separation, Inc., 955 Meams Rd., Warminster, PA 18974-0556  
 Blom & Voss AG, P.O. Box 10 07 20, D-20457 Hamburg 1, GERMANY  
 U.S.A. Rep: Simplex-Turner Inc., P.O. Box 168, Little Neck, NY 11363-0168  
 Fast Systems, 3240 North Broadway, St. Louis, MO 63147  
 IMC International, 80 1/2 Inp. Dr., Inwood, NY 10986  
 National Fluid Separators, 827 Hanley Industrial Ct., St. Louis, MO 63144  
 Nelson Industries, Highway 51 West, Stoughton, WI 53589  
 Newco Coatings, 4200 Dupont Circle, Louisville, KY 40202

**PAINT-COATING CONTROL**  
 Ashland Chemical Co., One Drew Plaza, Boonton, NJ 07005  
 Corrosal, Inc., 1045 12th Ave. NW, FSA, Issaquah, WA 98027  
 Devco Coatings, 4200 Dupont Circle, Louisville, KY 40202  
 Esgard, Inc., P.O. Drawer 2698, Lafayette, LA 70502  
 Jamestown Dshb, 28 Narragansett Ave., P.O. Box 348, Jamestown, RI 02835  
 Hempel Coatings, 6901 Lakeside St., Houston, TX 77028  
 International Zinc, 450 Seventh Ave., New York, NY 10123  
 Microphor, Inc., Marine Div., 452 E. Hill Rd., P.O. Box 1460, Willis, CA 95499  
 Ferrarato, Ltd., 294 South Main St., Wallingford, CT 06492  
 Product Research System, Inc., 229 Hwy 23, PO Box 159, Beta Chasse, LA 70037  
 Royal Chemical, 2705 Concord Road, Belle Glasse, LA 70257  
 Sigma Coatings, 5979 Market St., Houston, TX 77029, 330 River Rd., Harvey, LA 70059, 1100 Adams St., Hoboken, NJ 07030  
 Inter-Ship, P.O. Box 1528, Pascagoula, MS 39367  
 Ashland Chemical Co., One Drew Plaza, Boonton, NJ 07005

**PIPE FITTING/CUTTING/CONNECTING SYSTEMS**  
 George Fischer Pipe Tools, 407 Huxley St., Box 40, Holly, MI 48442  
 Corinn, 298 Hillside, New York, NY 10448

**PLATING EQUIPMENT**  
 PPO Selective Plating, 5708 Schaaf Rd., Cleveland, OH 44131-1394

**POLLUTION CONTROL/PRODUCTS/MARINE SERVICES**  
 Foss Environmental, 7440 W. Marginal Way S., Seattle, WA 98108-4141  
 Dr. Moo, 117-221 Rue De Jean, Lafayette, LA 70508

**PORTLAND CEMENT**  
 Cornet Carr, P.O. Box 253, Monroe, CT 06468

**PREDICTIVE MAINTENANCE**  
 Predictrol, 233 Winslow Way West, Bainbridge Island, WA 98110

**PROPELLERS**  
 Cincinnati Gear Co., P.O. Box 1528, Pascagoula, MS 39367  
 Rola SP Propellers SA, Via Silva 5, P.O. Box 251-6828 Balema - SWITZERLAND  
 Rola SP Propellers USA Inc., 4030 Mustang Road, Melbourne, FL 32934 USA  
 Rola SP Propellers, 100 Fairview Avenue E., Seattle, WA 98102

**PROPULSION EQUIPMENT**  
 -Bowthrusters, Diesel Engines, Gear, Propellers, Shafts, Turbines  
 Monaco Industries, 11600 Highway 101, P.O. Box 116, Henly, VA 70058  
 American Air Filter, P.O. Box 35390, Louisville, KY 40432  
 ABB Drives Inc., P.O. Box 372, Milwaukee, WI 53201-0372, USA  
 ABB Industry Co., P.O. Box 105, 181 Healden Rd., Buxton, NJ 08602  
 ABB TURBOCHARGER, Inc., 1460 Lyngton Avenue, N. Brunswick, NJ 08902  
 Aquamaster-Ruma Ltd., Box 220, 28151 Middle River, Long Beach, CA 90813  
 Aquamaster-Ruma Inc., 2315 North Woodlawn Ave., Ste. 103, Metairie, LA 70001  
 Bid Johnson Company, P.O. Box 1528, Pascagoula, MS 39367  
 Lehmann & Sichelstein, P.O. Box 1850, D-58409 Witten, Germany  
 Caterpillar, 100 NE Adams Street, Peoria, IL 61629-2320  
 Cincinnati Gear Co., 5657 Woodster Pike, Cincinnati, OH 45227  
 The Falk Corp., P.O. Box 492, Milwaukee, WI 53201-0492  
 Fincantieri, Diesel Engines Div.-G.M.T., Bagnoli della, Rosandra 334, Trieste, ITALY  
 GE Naval & Drive Turbine Systems, 166 Boulder Dr., Fitchburg MA 01420  
 Gollers Marine Company, 180 Vandurft St., Brooklyn, NY 11231  
 Hotel Engineering, Inc., 1320 Kemper Meadow, Ste. 500, Cincinnati, OH 45240  
 In-Pace Machine Co., Inc., 1929 North Buffalo Street, Milwaukee, WI 53212-3793  
 Kahlenberg Bros. Co., P.O. Box 356, Two Rivers, WI 54241  
 Kupp Mak, 7555 Danbro Crescent, Mississauga, Ontario, CANADA L5N 6P9  
 Kibbel Manufacturing, 11722 Horseshoe Way, Richmond, BC Canada V7A 4V5  
 LIPS U.S.A., P.O. Box 6, 5151 RP Dunren, The Netherlands  
 LIPS U.S.A. Inc., 3617 Koppens Way, Chesapeake, VA 23323  
 Lehmann & Sichelstein, P.O. Box 1850, D-58409 Witten, Germany  
 Le-Rex Vibration Control, 186 West 8th Ave., Vancouver, BC CANADA, V5Y 1N2  
 Mapco Products Inc., 90 Forest Ave., Locust Valley, N.Y. 11560  
 Markovic Work, P.O. Box 1442, D-6884 Haver, GERMANY  
 MAN B&W Diesel, 17 State St., New York, NY 10004  
 MAN B&W Diesel AS, Colbjørns Vej, DK-4960 Hvideb, DENMARK  
 MAN B&W Diesel AG, Altona Duesel, New-Jueli 16 15, DK-6900  
 Frederikshavn, DENMARK  
 MAN B&W Diesel GmbH, Stadthausstrasse 1, D-86153 Augsburg 1 GERMANY  
 North American Marine Ltd., P.O. Box 1232, Benton, AR 72015  
 Orin Corp., Inc., 5915 Sorrento Ave., Santa Fe Springs, CA 90670  
 Orin Corp., 1111 Cedar Creek Rd., Grifton, WI 53024  
 Rola SP Propellers SA, Via Silva 5, P.O. Box 251-6828 Balema SWITZERLAND  
 Rola SP Propellers USA, 4030 Mustang Road, Melbourne, FL 32934, USA  
 Karl Seener, Inc., 25 W Third, Kenner, LA 70022  
 Schottel-Werft, Manizer Strasse 99, D-56322 Spayrtheim, GERMANY  
 Schottel North America, Inc., 1505 Colton Ave., Hammond, LA 70403  
 Siemens Electric Ltd., 11601 Courtneypark Rd., Mississauga, ONTARIO  
 Stewart & Stevenson, 1400 Debrahan, P.O. Box 8, Harvey, LA 70059-0008  
 Ustlen Bergen Diesel AS, P.O. Box 824, N-5032, Bergen, NORWAY  
 J.M. Voith GmbH, Marine Division, Postfach 1940, D-7620, Hohenheim/Benz, GERMANY U.S. Rep: Voith Schneider America Inc., 121 Susquehanna Ave., Great Neck, NY 11021  
 Oy Wärtsilä, Vasa and Abo Divisions, P.O. Box 244, SF-05100 Vasa, FINLAND

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 Zoske, d N. America Thompson Creek, P.O. Box 450, Stevensville, MD 21666

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 IHI, Tokyo Chuo Bldg. 62, Chiyoda Tokyo 100 Japan  
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 A.S.T. Corp. PO Box 10392, Fairfield, NJ 07004

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

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 U.S.A. Rep: Roland Marine Inc., 90 Broad Street, New York, NY 10004

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 Markey Machinery Co., 79 South Horton St., Seattle, WA 98134  
 McEroy Machine & Mfg. Co., Inc., P.O. Box 4454, Bates MS 39235-4454  
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 Sea-Mac Marine Products, 10134 Olga Lane, Houston, TX 77041  
 Slocum/RopelMaster, P.O. Box 280, Hubbard, OR 97022  
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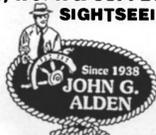
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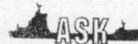
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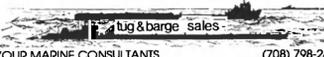
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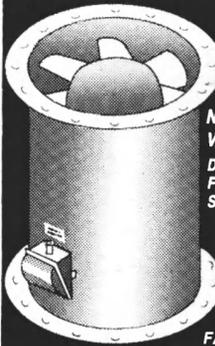
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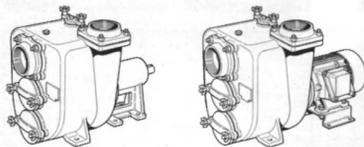
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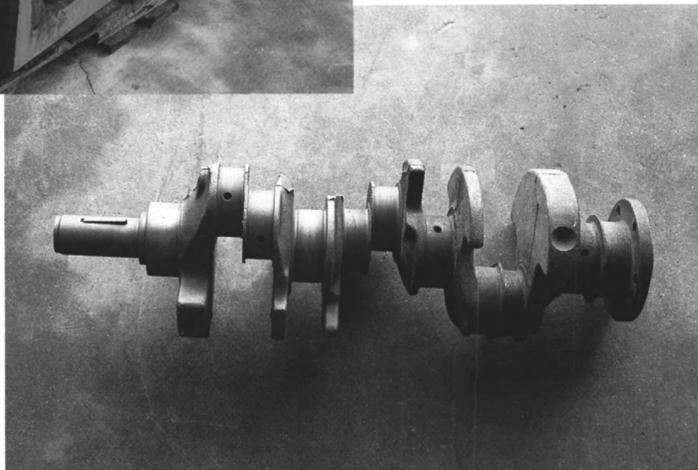
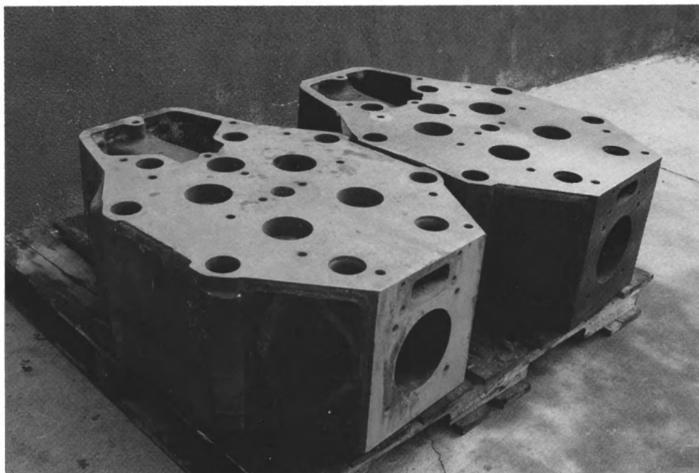


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