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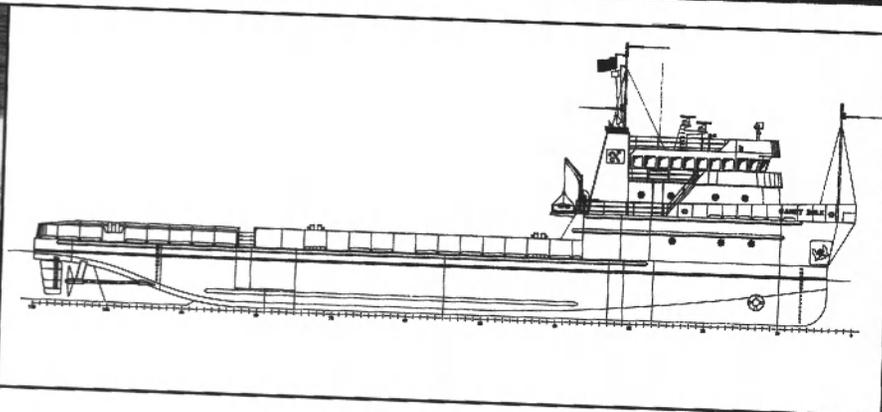


"REVOLUTIONARY" FIND

A 220-year-old gunboat — employed by Benedict Arnold in the American Revolution — has been discovered in pristine condition

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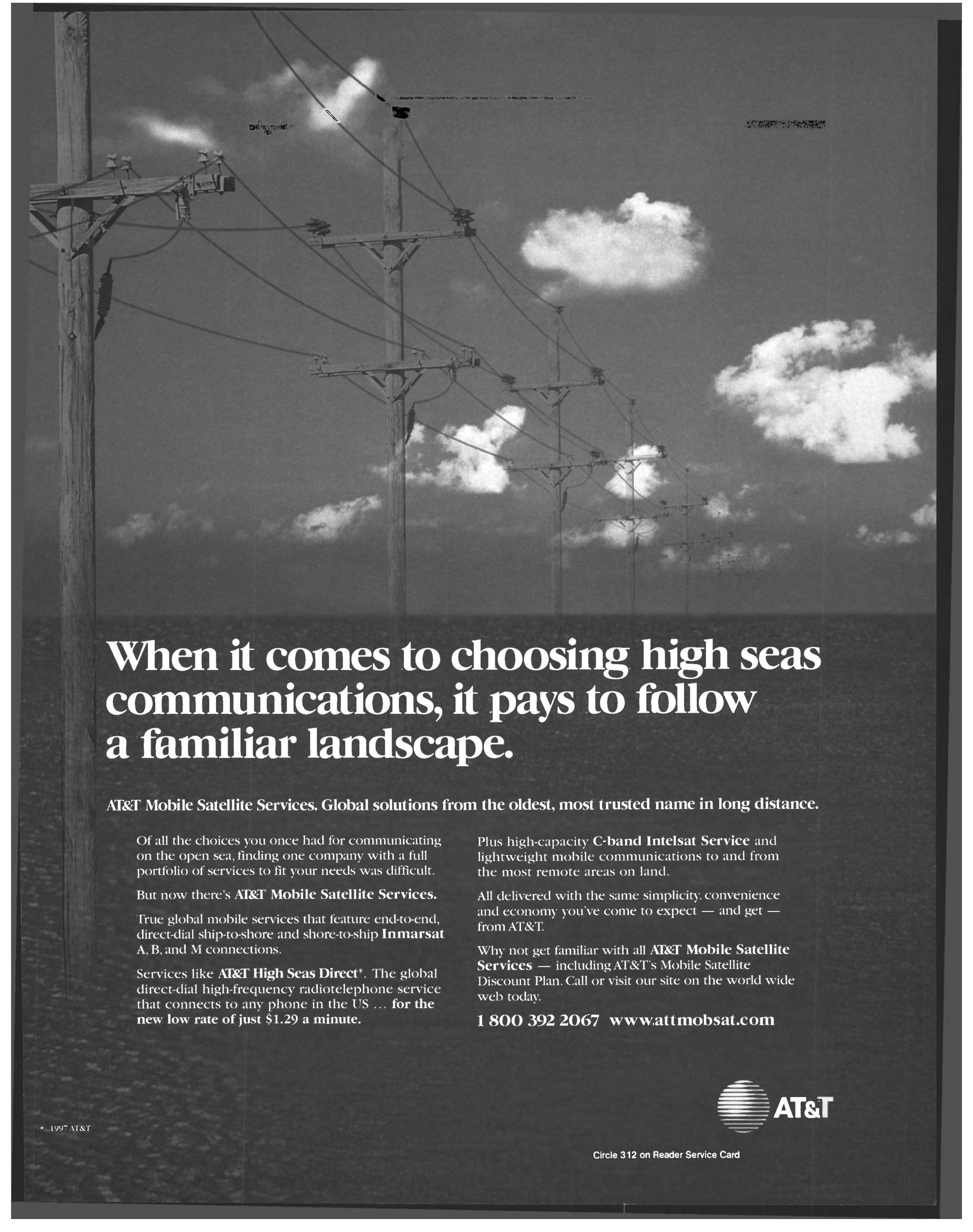
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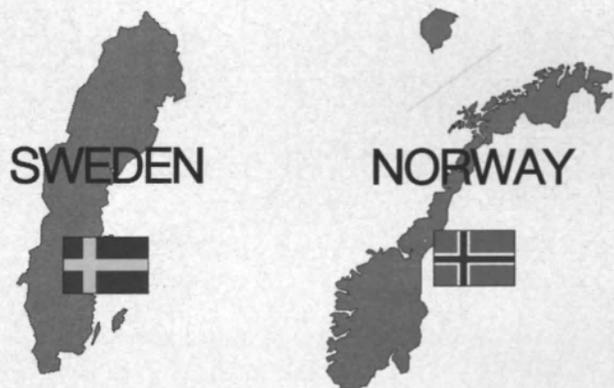
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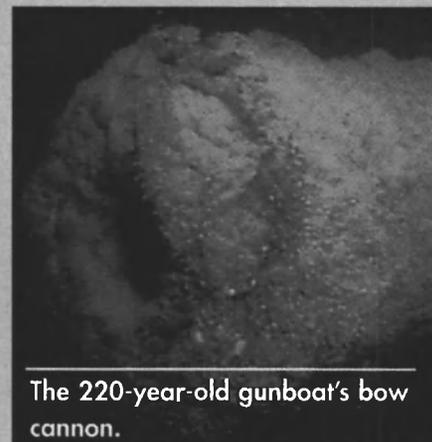
Pictured on the cover: Alabama Shipyard has helped lead the U.S. maritime industry charge, winning prestigious newbuild, repair and conversion contracts. Pictured is V. Ships' *Skaunord*, which recently underwent work at Alabama.

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8 SCORE ONE FOR "THE COLONIES"

Lake Champlain in Burlington, Vt., is the site of one of the most historic maritime finds in some time: A 220-year old, near pristine gunboat which served as part of Benedict Arnold's fleet during the American Revolution.

— by Nina D. Miller, associate editor.



The 220-year-old gunboat's bow cannon.

25 BORN IN THE USA

U.S. ship and boatbuilders are seeing investments in facility improvements and a popular MarAd program pay off in the form of new build, conversion and repair orders, from navy to commercial and deep to shallow draft.

48 FINNISH MARITIME REVIEW

Finland's maritime business is keeping its course by maintaining its allegiance to developing and delivering technologically advanced, market-driven solutions. — by David Tinsley, technical editor.

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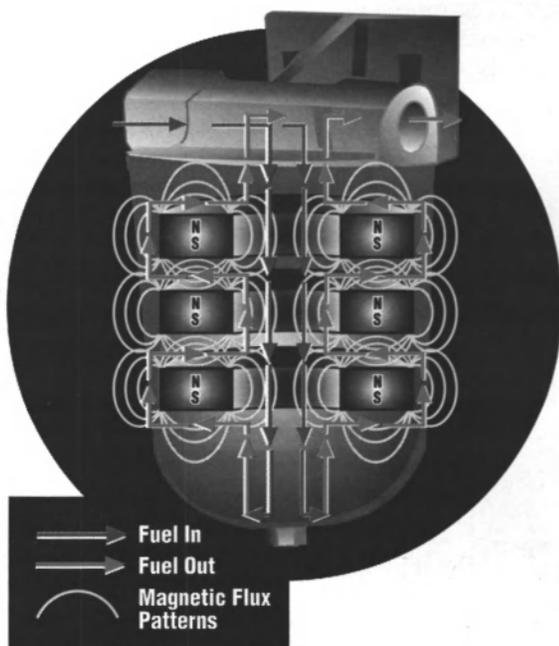
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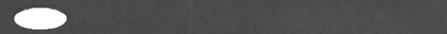
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EDITOR'S NOTE

The U.S. commercial shipbuilding effort received yet another major boost with the recent order for two tankers from ARCO for Avondale Industries. While some industry analysts have derided the contract's \$332 million price tag as too high, it seems the unique design of the ships — including a redundant machinery package — justifies the expenditure. The U.S. ship and boatbuilding industry's recent success is a major focus of this edition. The main story, which highlights the diversity of products and services delivered by the U.S.' large and medium-sized yards, starts on page 25.



While the Maritime Administration's popular Title XI loan guarantee program has worked well in helping to deliver shipyard upgrades and vessel contracts to U.S. builders, another piece of pending legislation could similarly help drive business for the next five years. H.R. 1630, the Ferry Intermodal Transportation Act, was introduced in mid-May. According to Art Dimopoulos, a lawyer with Washington, D.C.-based Fort & Schlefer, LLP, the act is indicative of the U.S. Congress' recent attention to maritime matters in the U.S.

H.R. 1630 provides for a total of \$90 million to be made available to the Secretary of Transportation for extensive feasibility, logistical and related studies, including identifying potential domestic ferry routes. The act would deliver \$35 million, over a five-year span, for a program similar to the Title XI loan guarantee program — with the exception that application and compliance process would be simplified. The \$35 million appropriation authorizes MarAd to provide guarantees valued in excess of \$2.5 billion, or more than \$500 million per year from 1998 to 2002. (Note: Mr. Dimopoulos is a regular legislative columnist in *MR/EN's* new sister publication, *Maritime Week*. If you would like a free trial subscription, fax or e-mail your contact information to my attention.)

While H.R. 1630 may help provide for the U.S.' maritime future, a recent find at the bottom of Lake Champlain puts the focus squarely on the U.S.' maritime past. Associate Editor Nina Miller's story, starting on page eight, details the high-tech search for and discovery of a 220-year-old gunboat, in near pristine condition. Having served as one of 15 vessels in Benedict Arnold's fleet during the American Revolution, the gunboat is now being hailed as one of the most exciting maritime finds in 50 years.

Gregory R. Trauthwein, editorial director

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SHIPWRECK DISCOVERY

Ship Of A Traitor Makes For "Revolutionary" Find

by Nina D. Miller, associate editor

What was once the site of a fight for independence is now the setting of what could be the most momentous find the maritime industry has seen in the last 50 years. Below the surface of Lake Champlain in Burlington, Vt., a team of researchers has discovered the wreck of a gunboat which was part of Benedict Arnold's fleet during the American Revolution. A year-long survey in response to an outbreak of zebra mussels has given way to a vessel miraculously kept intact by cold waters, up to 409 ft. (125 m) deep, which harbored the treasure for more than 220 years.

Defeated Fleet Delivers Winning Outcome

The 54 ft. (16 m) long gunboat was part of a 15-ship squadron — made up of schooners *Royal Savage* and *Revenge*, sloop *Enterprise*, gunboats *New Haven*, *Providence*, *Boston*, *Spitfire*, *Philadelphia*, *Connecticut*, *Jersey* and *New York*, cutter *Lee*, and row galleys *Trumbull*, *Congress* and *Washington* — led by Arnold, who commanded the American naval fleet on Lake Champlain during the Revolutionary War before committing treason. The eight gunboats were built in what was then Skenesborough (now Whitehall), N.Y., to Arnold's specification and direction. Though defeated, the fleet effectively thwarted Britain's attempt to advance down the Lake Champlain-Hudson River corridor and cut off New England from the middle and southern colonies, forcing the British to retreat into Canada, and eventually leading to the victory of the colonists.

The recently discovered vessel (the name of which had not been determined at press time) is only

one of four to "survive" the Battle of Valcour Island which occurred on the lake in October 1776. *Jersey* was captured by the British and abandoned. *Congress* wreckage was found in 1984, and *Philadelphia*, which was discovered in 1935, is now on display at the Smithsonian Institution's National Museum of American History.

Anatomy Of A Search

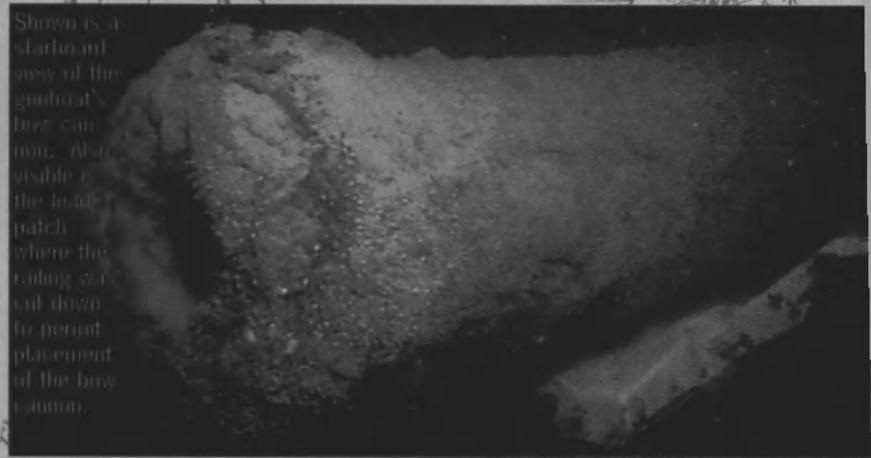
Attempting to prevent an invasion of non-indigenous zebra mussels on shipwrecks believed to be entombed in Lake Champlain, a team of researchers conducted the lake-wide survey which led to the discovery of the last "survivor" of Arnold's flotilla. Organized by Lake Champlain Maritime Museum (LCMM) Director Art Cohn, a team consisting of veteran lake researchers Capt. Fred Fayette and Peter Barranco joined forces with Middlebury College geologists Patricia and Tom Manley and set sail on research vessel *Neptune*, owned and operated by Capt. Fayette. The 40-ft. (12.2 m), steel-hulled vessel is powered by two Chrysler 225 engines and features a Kohler 7.5-kW generator.

Using a zone and grid system, sections of the lake were divided and survey lines were set one to two miles long and 246 ft. (75 m) apart. Navigation and positioning was achieved through a Northstar 941X DGPS which, along with a Cetrek auto pilot system and video plotter and a Raytheon R40 raster scan radar system, guided the vessel down each grid line. Geophysical information was collected and stored using a Klein 595 side scan sonar. A dual frequency transducer was towed behind

Pictured is the top of the recently found gunboat (right) and the very end of the stern (left).



Shown is a charcoal view of the gunboat's bow cannon. Also visible is the lead patch where the railing was cut down to permit placement of the bow cannon.



Neptune 32.8 ft. (10 m) off the bottom of the lake. A Wesmar SS2645 forward-looking sonar was used to protect the transducer and to avoid any obstacles. Primary depth information was collected with a Furuno FCV667 color video sounder.

The heart of the data acquisition system was a Triton ISIS system which digitized and stored the side scan sonar image information. The result was a sonar image record stored on optical disk in real time, with exact position, depth, heading, speed and the storage and indexing of target information.

Parasitic Plague Spurs Historic Find

"We have found the missing gunboat," remarked Mr. Cohn upon surfacing from an initial dive operation. His decades of extensive research on Arnold's squadron shared with other historians led to the belief that one member of the fleet would be found in Lake Champlain. After a promising sonar print out, he plunged in and surfaced with news of a positive identification. "From the shape, size and outfitting, we know it's a Philadelphia-class gunboat. There is no question it is part of the

(Arnold) fleet," reported the expert.

While the survey team had discovered 10 new shipwrecks in 1996 — including a construction scow which was burned but contains more than 70 percent of its hull; a canal boat completely intact and sitting upright on the lake bottom; a steam-powered, propeller-driven tugboat intact and upright on the bottom; and a sailing canal boat circa 1840 — it was not until June 1997 that the Arnold vessel was discovered.

After Mr. Cohn's description of an intact, 54-ft. long gunboat sitting upright on the bottom of the lake, with a mast standing more than 50 ft. (15.2 m) high and a large bow cannon still in place, a special ROV survey was implemented with the assistance of Benthos Inc. to further investigate the wreck. "The apparently excellent condition of the gunboat is highly unusual for an artifact this old and is one of the reasons the discovery is so significant," said Dr. Phillip Lundeborg, curator emeritus of Naval History at the Smithsonian Institution's American History Museum.

(Continued on page 110)

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Celebrity Seals Deal With RCI

A Celebrity Cruises/Royal Caribbean International (RCI) definitive merger agreement was sealed in the first week of July after the former upped its bid for the five-ship cruise line by \$15 million, after Carnival Corp.'s hostile offer. The agreement is still subject to regulatory clearance.

Carnival withdrew its bid after its stock prices plummeted following its offer to take on Celebrity's \$800 million debt.

Detroit Diesel And Outboard Marine Propose Merger

On July 9, Detroit Diesel Corp. (DDC) and Outboard Marine Corp. (OMC) signed a definitive agreement for DDC to acquire OMC in a transaction valued at \$500 million, including the assumption of OMC's \$180 million debt.

DDC will shortly commence a two-step transaction to acquire the outstanding common shares of OMC for \$16 per share. The agreement, which is subject to customary conditions, provides for the merger of a newly-formed subsidiary of DDC with OMC following tender offer completion.

Detroit Diesel Chairman **Roger Penske** said, "Our objective is to further expand our worldwide marine capabilities beyond diesel engines with the OMC enterprises ... We look forward to the prospect of further developing OMC's proprietary FICHT(TM) fuel injection technology to optimize the performance, fuel economy and emissions capability for the next generation of marine and other engines."

Combined net revenues for Detroit Diesel and Outboard Marine Corporation in 1996 would have been \$3.2 billion.

For more information on
Detroit Diesel
Circle 10 on Reader Service Card

Portsmouth Naval Yard Work Contracted Out

Fay, Spofford & Thorndike, Inc. of Burlington, Maine, was selected to design repairs to drydocks and bridges at the Portsmouth Naval Shipyard in Kittery, Maine.

Work will include overhaul of the drydock dewatering system,

including pumps and valves.

Avondale Contracts For Two Crude Carriers

Avondale Industries, Inc. signed a \$332 million contract with ARCO Marine, Inc. of Long Beach, Calif.,

for the construction of two 125,000-dwt crude carriers, with an option for three more ships. Detail design of the ships is to begin immediately with construction scheduled to start in December and delivery of the first ship expected in the first quarter of 2000.

"This is a significant event in our strategic plan for increasing our commercial competitiveness and obtaining a more desirable balance of our work between commercial and military contracts," said Avondale CEO **Al Bossier, Jr.**

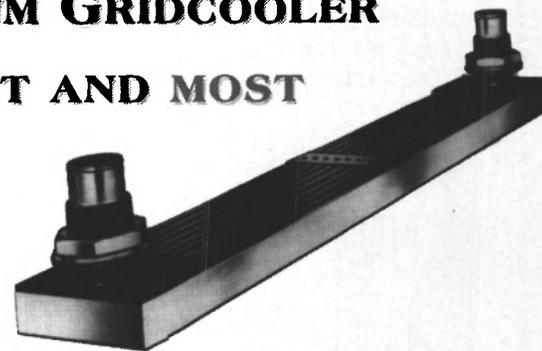
For more information on Avondale
Circle 9 on Reader Service Card

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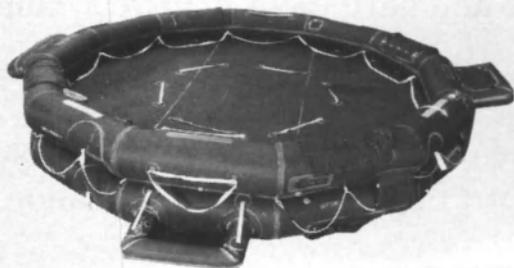
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MARINE FINANCE

Global Marine To Buy Two Rigs For \$250 M

Global Marine Inc. will reportedly buy two deepwa-

ter drilling rigs from A.P. Moller subsidiary Maersk for \$250 million. Global Marine will reportedly pay \$150 million for *Maersk*

Vinlander and \$100 million for *Maersk Jutlander*. Both rigs are operating in the North Sea.

Navy Awards Contract Potentially Worth \$18.4 M

Analysis & Technology, Inc. won an add-on contract with a potential value of \$18.4 million over five years with the U.S. Navy's Coastal Systems Station in Panama City, Fla. The company will provide engineering services for diving and life support, salvage and ocean engineering systems. Work will include redesigning a commercial off-the-shelf (COTS) atmospheric dive system to extend its capability to greater depths, enhancing transportable recompression chambers and supporting development of a diver head-up display.

Hughes Wins \$6.4 M Navy Contract

The U.S. Naval Air Systems Command has awarded Hughes Aircraft Co. a \$6.4 million contract to supply a fixed underwater test and training range for support of fleet antisubmarine warfare training exercises. The company will deliver an undersea sensor array system, a shore electronics station and data communications links by next May. Subcontractor Cable and Wireless Marine will perform the installation.

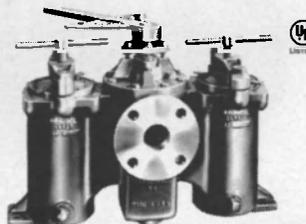
Navy Awards BPA Worth \$30 Million

Computer Data Systems Inc. (CDSI) won a blanket purchase agreement (BPA) from the Department of the Navy, estimated to be worth \$30 million, which will run through June 2002 if all options are exercised.

The company will provide information technology planning, analysis and evaluation, as well as IT development, implementation, testing, training and maintenance for DoD and USCC clients. Team partners are: Advanced Communications

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For fuel oil, lube oil, cooling water or any fluid service. Protects pumps, nozzles, meters, heat exchangers and process lines. Size 1/4" to 12" and larger. High pressure/temperature special designs available.

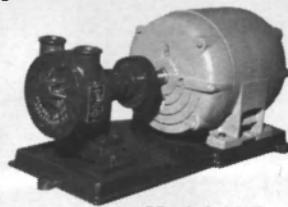
Model 73 Sea-View Strainers Simplex-Duplex

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



Model 72AA Transfer Valves

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



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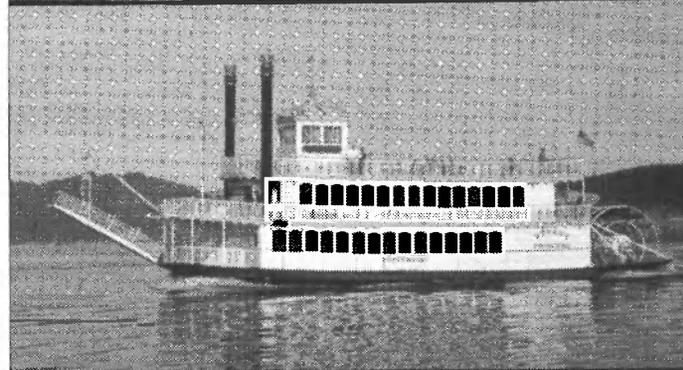
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(Center) SkipperLiner's newest sternwheeler, the M.S. Dixie II operates as a sight-seeing and dinner cruiser. At 141' x 33', certified for 600 passengers, she is one of three SkipperLiners earning for their owners on Lake Tahoe.

(Bottom) Nostalgic SkipperLiner paddlewheelers from 49 to 800 passengers generate significant revenues for dinner cruise operators throughout the U.S.

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Systems, Inc; Data Networks Corp.; Teleconsult; and Walcoff & Associates, Inc.

DRS Wins Navy Contracts

DRS Technologies, Inc. was recently awarded multiple U.S.

Navy contracts. One \$7.6 million deal (an add-on) specifies provision of additional AN/SQR-17A sonar signal processing systems, upgrade kits and engineering services for the Navy's Mobile Inshore Undersea Warfare Systems Upgrade (MIUW-SU) program. Under another contract, valued at

\$5 million, DRS will manufacture additional quantities of AN/SQQ-Ti Readiness Trainer Systems, and provide engineering and support services for MIUW-SU.

On July 10, the company announced a \$1.3 million Navy contract to supply Radar Data Distribution Switchboards (RDDS)

and support services for land-based facilities.

For more information on DRS Technologies, Inc. Circle 2 on Reader Service Card

Louisiana Supplier Wins USCG Equipment Contract

Richard's Galley Equipment, based in Houma, La., was awarded the first galley equipment contract for the U.S. Coast Guard's (USCG's) Marine Species class patrol boats. The vessels are building at Bollinger Shipyards in Lockport, La.

The five-year contract covers supply of specialized equipment for 51 to 61 vessels.

For more information on Richard's Galley Equipment Circle 1 on Reader Service Card

SPD Technologies Acquires Power Paragon

SPD Technologies, headquartered in Philadelphia, Pa., has acquired Anaheim, Calif.-based Power Paragon, Inc. (PPI), which will become a subsidiary. This deal will give SPD capabilities in the design and manufacture of complete source-to-load electrical power delivery products for the navy and commercial markets.

"This acquisition also strengthens SPD's ongoing efforts to support the Navy's request to utilize COTS (commercial-off-the-shelf) technology for cost and performance advantages," said SPD President Larry Colangelo.

Johnson Brothers Completes AHL Project

Johnson Brothers Enterprises, Inc. (JBE) is completing a turnkey design and installation effort on the heating, ventilation and air-conditioning (HVAC) systems for the fourth in a series of American Heavy Lift double-hulled product tankers.

This work was subcontracted by Avondale Shipyards, and is the sixth project the yard has passed along to JBE. The other two projects involved work on casino vessels.

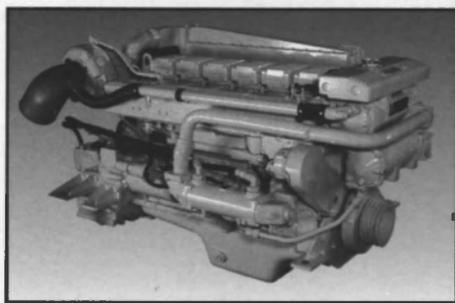
For more information on Johnson Brother Enterprises Circle 3 on Reader Service Card

LUGGER TECH TALK # 2

A Technical Information Series From Alaska Diesel Electric

Check performance charts to set your course to the best engine value.

The more you know about the engines you are comparing the better. Performance charts are a valuable tool in assessing which engine is right for your vessel. Here is what to look for:



L6140AL2, 500-700 HP. One of nine Luggers models from 67-1300 hp

LOW END TORQUE:

Look for an engine designed to produce its maximum torque at a low RPM (1200 to 1400 RPM). These heavy duty, non-automotive engines are built for moving heavy loads and working hard to put high speed vessels up on plane.

All Luggers produce peak, prop twisting, torque at low RPM.

USABLE POWER:

Engines with steep power curves give you a high max HP rating but fall on their face when brought back to cruise. Choose an engine that gives you the power you need at cruise RPM. *Lugger's cruising speed of only 200 or 300 rpm below max give you more usable power.*

CONSERVATIVE RATINGS:

A high Continuous Duty Rating indicates that the manufacturer has confidence in the engine. Look for an engine with a small difference between the Maximum and Continuous ratings. If the manufacturer requires a large reduction to assure engine life, you should ask yourself why. *Lugger's conservative ratings promote long engine life.*

FUEL CONSUMPTION:

Fuel is your largest operating expense. Look for an engine that minimizes fuel consumption. Gallons per hour figures are

estimates based on theoretical horsepower draw by the propeller and vary depending on hull design, prop efficiency and other operational factors.

For comparing engines it is better to look at their Brake Specific Fuel Consumption (BSFC) numbers. BSFC is the weight of fuel used by an engine to produce one horsepower for one hour.

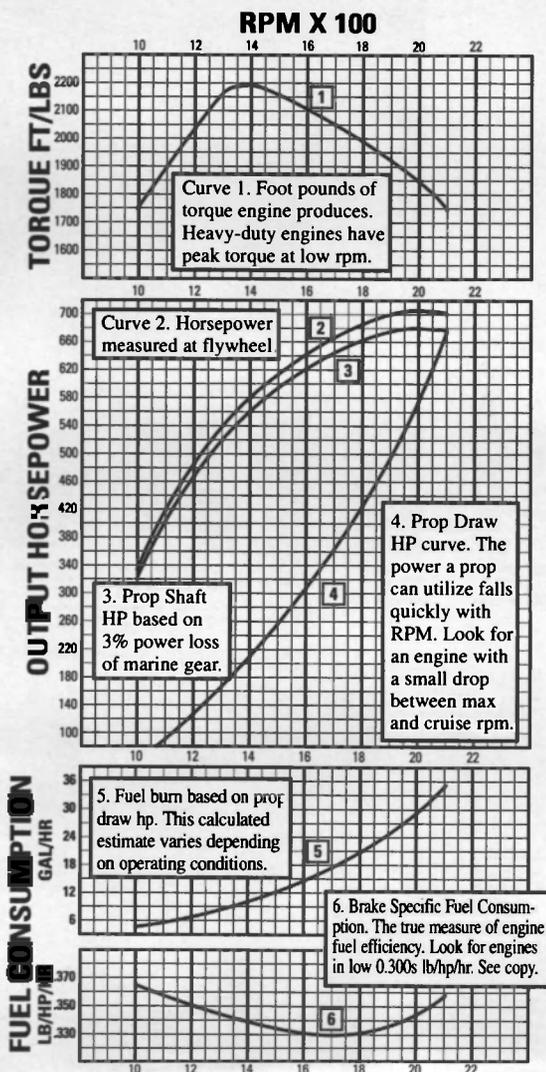
Look for an engine that gives you a BSFC of 0.330 to 0.350 lb/hp/hr. Remember a reduction of only 1/100th (ie; 0.360 to 0.350 lb/hp/hr) can mean thousands, even tens of thousands, of fuel dollars saved over the engine's life.

Compare a Lugger's BSFC and see how much you save at the fuel dock.

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LUGGER
The Pro's Choice.
The charts show why.

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Circle 317 on Reader Service Card

Stewart & Stevenson To Supply Second CMI Towboat

Stewart & Stevenson, Inc. announced a follow-on order to supply CMI Corp. of Jackson, Miss., with a new towboat. The 112 x 32-ft. (34.1 x 9.7-m) vessel is being built by Halter Marine and will be used for commercial service in Asuncion, Paraguay. The unnamed vessel has a slightly higher hp than sistership *Asunceno*, and features two General Motors EMD 8-6-F7 diesel engines providing 3,400 hp.

CMI has also ordered 10 barges, for which Stewart & Stevenson de las Americas in Asuncino will provide deck fittings and hatches.

For more information on Stewart & Stevenson Circle 5 on Reader Service Card

TDI-Halter Awarded Conversion Contract

TDI-Halter, Inc. has signed a contract with Diamond Offshore Drilling, Inc. of Houston for the conversion of the *Levingston III* slot drilling unit *Ocean Warwick* to a cantilevered drilling unit. The work will be done at the company's North Yard in Port Arthur, Texas, and completion is expected in eight months.

For more information on TDI-Halter, Inc. Circle 6 on Reader Service Card

Daedong Announces Multiple Contracts

In collaboration with Samsung Corp, Daedong Shipbuilding Co., Ltd. of Korea secured an order for three 45,000-dwt, oil/chemtankers from clients of Monte Carlo-based ship management agency Cogema.

The vessels will be built at the yard's Chinhae facility, are scheduled for delivery in the first half of 1999, and are the first orders secured by Daedong following the takeover of the yard by the Soosan Group earlier this year.

In addition, Suisse Atlantique signed with the yard for two, 72,700-dwt Panamax bulk carriers for delivery next June and in early 1999.

For more information on Daedong Shipbuilding Circle 7 on Reader Service Card

Halter To Acquire Bludworth Bond Shipyard

Halter Marine Group, Inc. of Gulfport, Miss., signed an agreement to acquire the stock of Bludworth Bond Shipyard, Inc., which owns and operates two ship-

yards in Texas. The two shipyards, which combined produce estimated annual revenues of \$25 million, specialize in drydock and dockside repair and conversion of boats and barges, and will become the eighteenth and nineteenth shipyards of Halter. Terms of the deal were not disclosed and closing

of the purchase is subject to various approvals.

"This acquisition is an ideal fit for Halter because Bludworth Bond has a large, loyal and similar customer base to ours. Expanding Halter's presence in the repair and conversion business is one of our strategic goals, and this acquisi-

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Half-round piling covers. PHS now offers a complete components package for fendering systems.

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The Avondale Alliance

The LPD 17, built by the Avondale Alliance, will sustain the Navy's Amphibious Lift capability well into the next century. A fully integrated advanced network system from navigation to machinery controls to C4I systems, the LPD 17 represents the new generation of ship design.

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Circle 313 on Reader Service Card

MARINE FINANCE

on is an opportunity that will help us achieve that objective," said Halter CEO **John Dane III**. For more information on Halter Marine Circle 57 on Reader Service Card

Keppel Clinches \$43 Million Conversion Contract

Keppel Shipyard in Singapore secured a \$43 million contract from Falcon Drilling Co. Inc. to convert a 12,000-dwt barehull to a dynamic positioning drillship. Upon completion in mid-1998, *Peregrine IV* will work off the coast of Brazil.

Work — to DNV standards — includes lengthening the hull by 39.3 ft. (12 m), the addition of a new moonpool midship section, installation of sponsons on both hull sides, installation of drilling systems and structural steel modifications.

The vessel will be outfitted with a drillfloor substructure to support a 180-ft. (54.8-m) dynamic derrick; six variable speed thrusters (remote-controlled by advanced dynamic positioning computers); three revolving cranes; pipe handling systems; and a 130-person accommodation block.

For more information on Keppel Shipyard Circle 4 on Reader Service Card

GEC Alstom To Acquire French Yards

GEC Alstom has reportedly signed a preliminary agreement with French group Leroux et Lotz to acquire its shipyards in the western towns of Lorient and Saint Malo.

The agreement also concerns engineering and design facilities in the Paris area. The deal is to be finalized by November 1997 at the latest. The acquisition will strengthen GEC Alstom's shipbuilding holding Chantiers de l'Atlantique by extending its scope of supply to include high-speed car ferries and other ships.

Northrop Grumman Declares Q2 Earnings

On July 16, Northrop Grumman Corp. reported second quarter net income of \$100 million, up 16 percent from the \$86 million recorded

in the second quarter of 1996.

Electronics business segment sales and operating profit for the second quarter both declined due to lower sales volume recorded on surveillance aircraft and electronic countermeasures programs.

Earnings per share for the first six months of 1997 were \$3.02

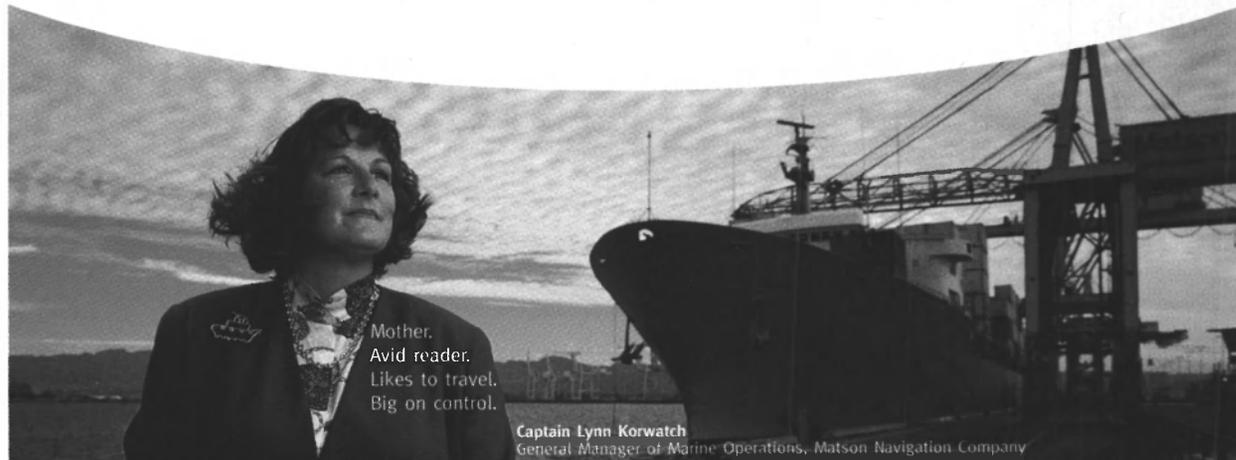
compared with \$2.92 in the first half of 1996.

Last year's first half results included only four months of operations of the defense electronics and systems business of Westinghouse, which was acquired in March 1996, and now operates as its Electronic Sensors and

Systems Division (ESSD).

Last month the company announced a definitive agreement to merge with Lockheed Martin Corp. Following shareholder approvals and government reviews, this deal will create a company with estimated 1997 revenues of \$37 billion. The transac-

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The TracPhone™ has a 19-inch actively stabilized antenna that can be mounted easily and unobtrusively on any commercial vessel—including yours.

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MARINE FINANCE

is expected to close this year.

Nigel Parkes Shipping Contracts With Tank Container Service

TTRMP (Through Transport Repair Maintenance Program) is a joint venture between Unicon International and the TT Club which provides a fully insured, comprehensive maintenance and repair service for tank operators. Specialist tank operator Nigel Parkes Shipping is the latest customer to take advantage of the program.

"TTRMP controls and reduces the cost of operating tank containers and decreases the amount of administrative time spent managing the process," said Unicon Europe Sales/Marketing Director Anthony Newton. "Repair costs from zero up to and including constructive total loss are fully covered by the insurance specialist policy underwritten by the TT Club."

For more information on
Unicon International
Circle 58 on Reader Service Card

CSI Wins Carnival Contract

Custom Ship Interiors, Inc. (CSI) won a contract from Carnival Cruise Lines to design, fabricate and install a new casino cashier cage aboard *Celebration*. Work on the project was to begin this month. Directions in Design, Inc. assisted in the design development stage of the project.

For more information on CSI
Circle 56 on Reader Service Card

NNS Reports Q2 Results

On July 11, Newport News Shipbuilding (NNS) reported net earnings of \$14 million, or \$0.39 per share, for the second quarter of 1997. Earnings before interest and taxes were \$37 million, compared with \$40 million in last year's second quarter. Revenues for the quarter were \$450 million versus \$477 million a year ago. Overhaul work continued on aircraft carrier *Enterprise* and advanced planning activities accelerated for the *Roosevelt* overhaul and the refueling and overhaul of *Nimitz*. NNS also made gains in the construction of aircraft carri-

ers *Harry S. Truman* and *Ronald Reagan*.

Gilliland, the second of two containership conversions for the Military Sealift Command, was delivered in May, and Double Eagle construction also progressed in Q2. *American Progress* underwent final modifications and

Agathonissos was launched in June and entered the outfitting and testing phase.

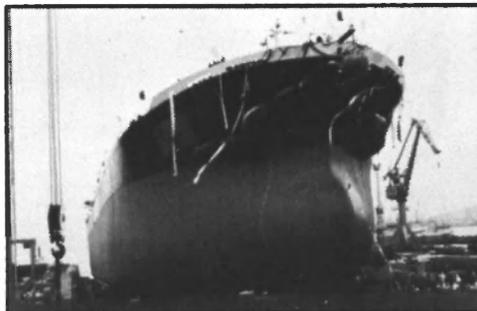
Construction of the third ship is underway in Dry Dock 12, and units of the fourth ship are being readied for keel laying.

For more information on NNS
Circle 51 on Reader Service Card

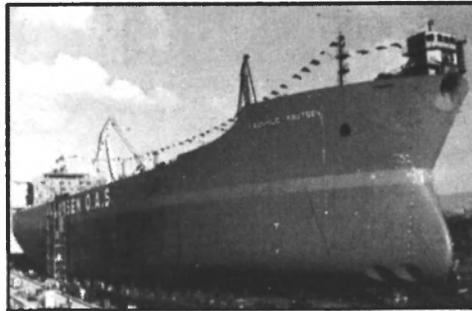
Container Company Wins \$100 Million In Orders

News reported in Korean wire services on July 11 included a contract of Jindo Corp.'s. The company recently won \$100 million worth of orders for special and

SHIP-REPAIR, SHIP-BUILDING, MARINE EQUIPMENTS



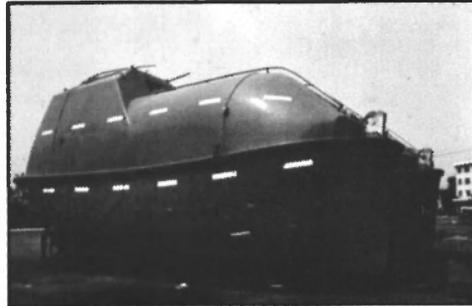
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115,000 dwt Shuttle Oil Tanker



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It is also handling export of big power marine diesel engines with cylinder bore 50,60,70,80,90 cm of MC/MCE series-one of the most advanced low-speed and big power diesel engines in the world, adopting design concept and technique of advanced marine main engine. It also undertakes building various fishing boats, life-boats, petroleum drilling platforms, ship projects, anchor, anchor chains, marine valves, marine equipments, spare parts, etc.



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refrigeration containers from Hanjin Shipping, JR of Japan, and U.S.-based Carlisle. The order is for 4,000 reefer containers and 3,000 special containers.

With this order, following the \$200 million order awarded earlier this April, Jindo is expected to remain busy until the end of this year. Jindo has had an annual production of 220,000 to 230,000

TEUs of containers in its Uyang and Inchon plants, and three Chinese plants in Guangzhou, Shanghai and Qingdao.

Bouygues Signs Contract With Mobil Interest

On July 9, French company

Bouygues Offshore S.A. announced that its subsidiaries, Saibos C.M.L. — a 50/50 joint venture with Saipem — and Nissco signed a contract with Mobil Producing Nigeria Ltd., the operator for the NNPC and Mobil joint venture, for the supply of three new platforms and the laying of six pipelines.

The contract has a \$70 million value for Bouygues Offshore and

calls for engineering, procurement and construction, transport, installation and commissioning of the project in Nigeria's Oso field.

These installations will increase the gas supply and collection through a connection to the Usa field, at the existing gas compression platform on the Oso field. This project follows the startup of the NGL recovery project which was carried out by Bouygues Offshore as part of a project consortium.

FCS To Market Digital Torque Meter System

FCS, Inc. is scheduled to market its precision Digital Torque Meter System manufactured by Instruments, Computers and Controls Corp. (IC3). The system measures shaft hp and rpm by employing fiber optics to detect the twist in a rotating shaft. Real time measurement at all speeds is accomplished without signal conversion by processing the digital outputs from two stationary sensors as interrupters mounted on the shaft pass through a beam of visible light once per revolution. Installation reportedly requires no drilling, welding or machining. Calibration is accomplished at start-up by programmable means, without the need for any additional test equipment, and can be verified by operating personnel.

For more information on FCS, Inc.
Circle 13 on Reader Service Card

Alfa Laval To Equip New Dredger

Alfa Laval B.V. has won a contract from van Oort ACZ B.V. for oil treatment, central cooling systems and freshwater generators for a dredging vessel currently under construction at IHC Holland Dredgers B.V.

The vessel, a 20,000-sq-m twin-screw suction hopper dredger — powered by two Wartsila 18V. 38 engines providing a combined power output of 22,000 kW and one Wartsila 9L 38 rated at 5,500 kW — is scheduled for delivery in August 1998.

The dredger will be fitted with the following equipment from Alfa Laval: two Alcap FOPX fuel oil separators; three Alcap MOPX 309s for lube oil cleaning; and one MSPX 303 sludge treatment and oil recovery system.

The order also includes two M20

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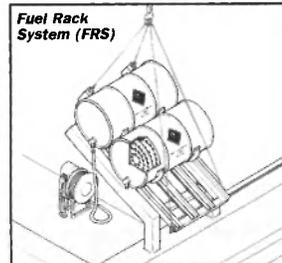
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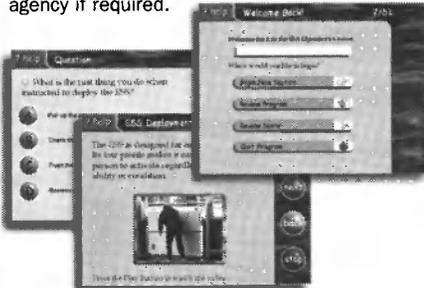
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MFM plate heat exchangers and one M15 FFM 8 for central cooling, as well as two low temperature coolers — types M20 MFM and M15 FFM 8.

The new vessel will also be equipped with a JWP 26-C80 freshwater generator with a capacity of 15 tons per day, and a booster unit which includes a Visocohef viscosity control system and CBM

heaters using thermal oil as the heating medium.

For more information on Alfa Laval
Circle 15 on Reader Service Card

Alfa Laval To Supply Alcap Separators On Cenargo Vessels

Alfa Laval Spain has received an

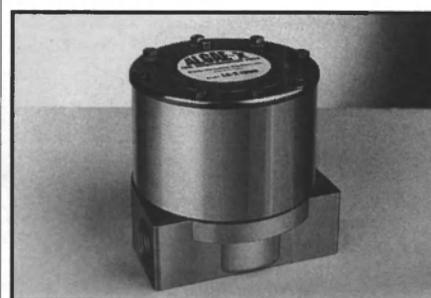
order for oil treatment and desalination equipment for two passenger/RoRo vessels currently under construction at Astilleros Espanoles. The order includes Alfa Laval's latest Alcap Mark 2 separators. Ordered by Cenargo, each of the two 6,300-dwt vessels will be equipped with two Alcap FOPX 614, four Alcap LOPX 707 and one MMPX 303. Alfa Laval will also

supply two JWSP 26-C80B freshwater generators, each with output of 20 tons per day. Each ferry will be fitted with a 31,200 hp Wartsila main engine and two Alfa Laval M10-BFM plate heat exchangers for main engine jacket water cooling. Due for delivery in April and July of 1998 respectively, the vessels will be operated by U.K. company V Ships Ltd.

In addition, Kvaerner Masi Yards has selected Alfa Laval oil treatment systems, freshwater generators and plate heat exchangers for two car/passenger ferries on order by Attica Enterprise of Greece. The vessels *SuperFast III* and *SuperFast IV* will operate in the Greek/Italian market. Both of the 30,000-gt vessels will be equipped with four Sulzer 16ZA40S main engines. Alfa Laval plate heat exchangers will be installed for main engine central cooling and lube oil cooling, as well as auxiliary engine central cooling. Two Alfa Laval freshwater generators will also be supplied to each vessel.

For more information on Alfa Laval
Circle 17 on Reader Service Card

EnviroResponse Adds To Fuel Decontamination Product Line



EnviroResponse Products, Inc. has added models LG-X2000, LG-X4000 and LG-X5000 to its Algae-X series of fuel decontamination units. The new units have port sizes of 1, 1.5 and 2 in., respectively. These fuel conditioners reportedly eliminate problems associated with microbial contamination of diesel fuel and other light distillates. They can be installed in-line for direct engine applications, and can be used with recirculating systems to prevent deterioration of fuel and sludge buildup in storage tanks. The new models are available in sizes ranging from 1/4 to 2-in.

For more information on EnviroResponse
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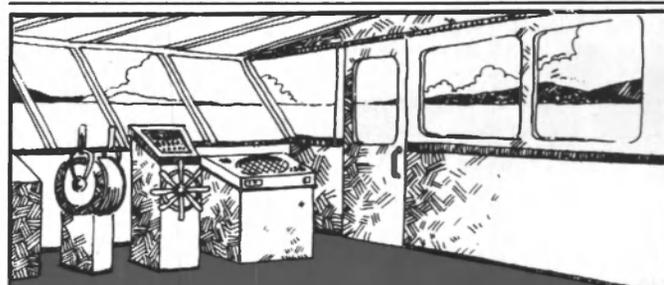
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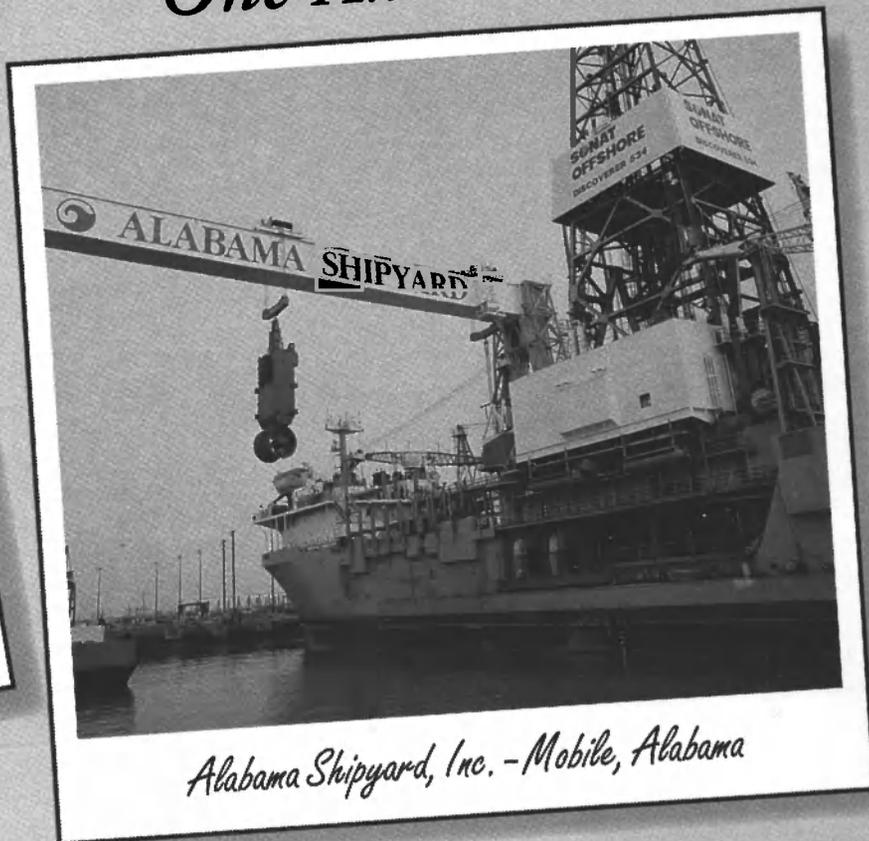
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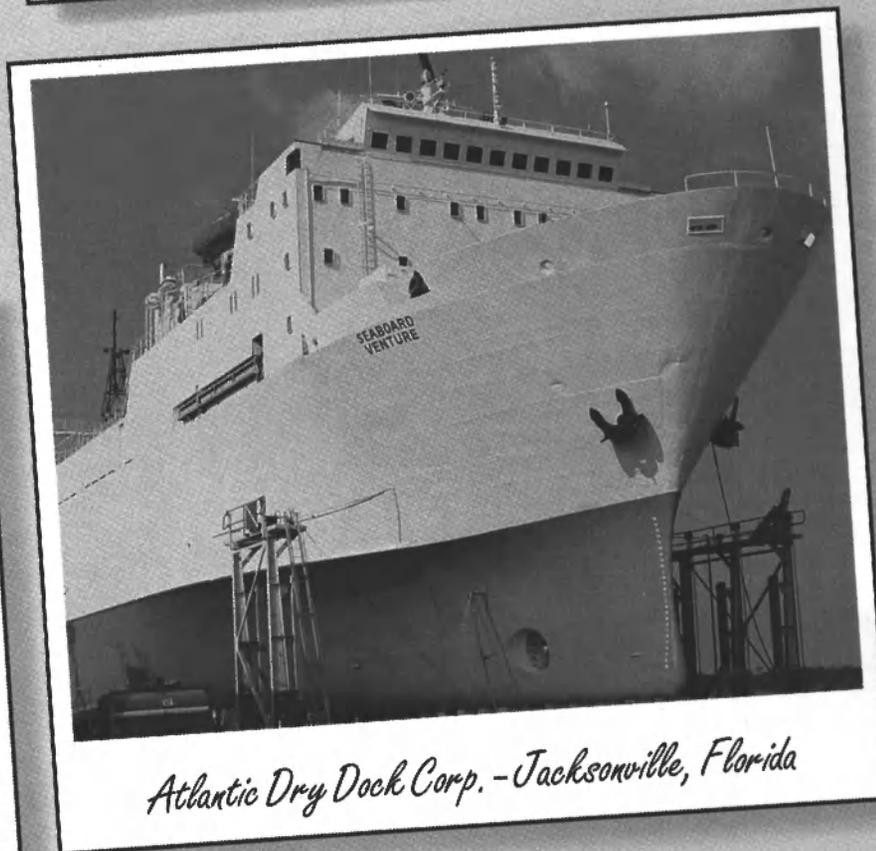
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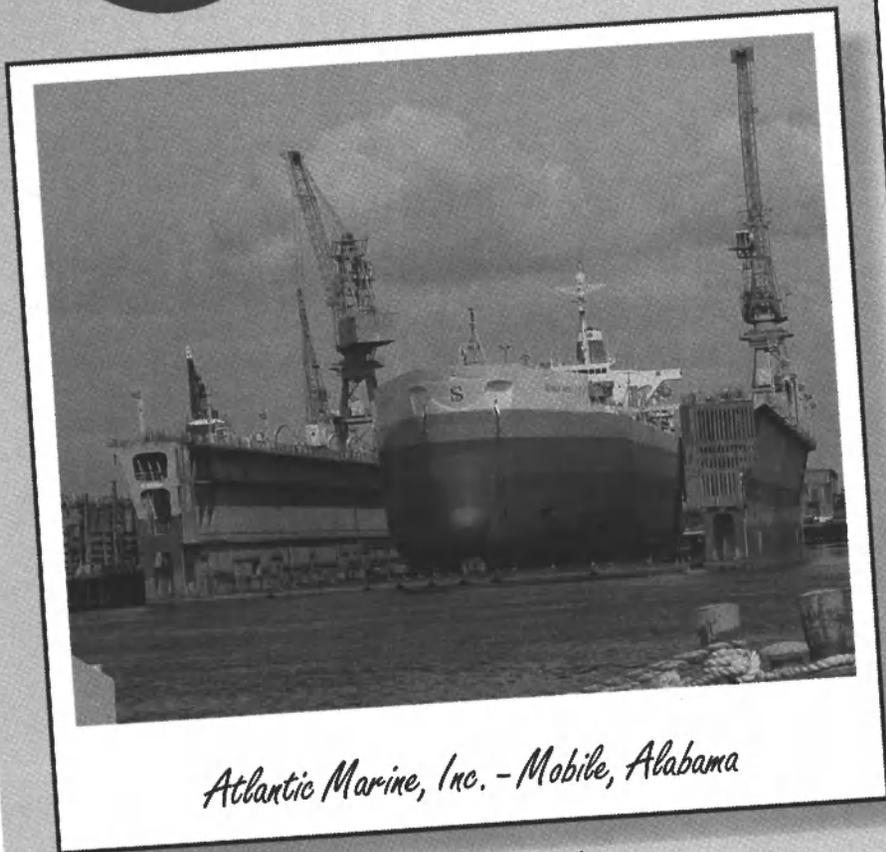
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The U.S. shipbuilding industry is as diverse as the country itself. It is still dominated by the "Big Six" and the billions of dollars worth of Navy work these yards garner, but the industry has been very chameleon-like in the past few years, constantly changing and re-inventing itself to take advantage of the market at hand or the market to come.

While the big shipyards generate most of the 72-point headlines, the second tier yards are perhaps enjoying greater success overall, as several renowned builders have successfully positioned themselves in order to capture business at home and abroad.

Without a doubt change is the constant in today's downsizing, consolidating business environment, and the common thread which unites this diverse group is a strong commitment to improving the processes and equipment to build modern ships and boats efficiently, to a world standard of quality and price.

Powered with political backing, specifically the Maritime Administration's (MarAd) revamped, re-energized Title XI

program, ship and boat-builders have been encouraged to invest dollars to make these changes a lasting reality.

Not only has Title XI allowed ship and boatbuilders to invest in new systems, it has helped deliver the business which is crucial to maximizing these new efficiencies. In all of FY96 and the first half of FY97, MarAd approved 23 applications for Title XI financing, including four export projects and three shipyard modernization projects. The total estimated cost of these projects is \$1.7 billion, with the government vouching for \$1.3 billion.

All momentum driving the U.S. market has not been MarAd-induced however, as the surging offshore business has driven most Gulf Coast yards into a controlled frenzy. Reports of builders with full orderbooks and labor shortages are a welcome change after the oilfield collapse in the early 1980s left so many with damaged psyches and little, if any, business.

OPA 90 continues to leave its mark as well, and this legislation, combined with a three-year run of improving grain freight rates, have made mas-

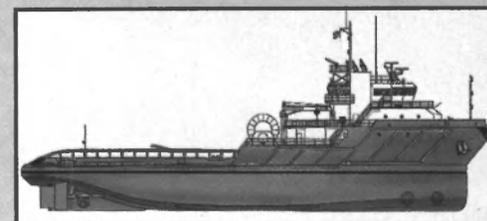


Alabama Shipyard: Aerial photo shows the first chemical tanker for Dannebrog Rederi nearing completion afloat, and the second tanker under construction at the erection site.

sive barge building projects the norm, attracting some larger players to the game. It is anticipated that the surge in new barge orders will continue, as inland operators still have about 500 single-skinned barges that must be replaced.

The U.S. orderbook is healthier than in recent memory, a fact emphasized by the ever-growing size of the quarterly Shipyard Activity Report published by MarAd. The following section details some notable projects currently running in U.S. yards:

Atlantic International Ltd. has entrusted **Service Marine Industries (SMI)** with the conversion and refurbishment of *Louis Eymard*. Once a supply vessel used for towing, the vessel will be cut in half and extended 20 ft. (6 m) with the addition of a midbody section,



The HLX2225 from Halter Marine Group is a 225-ft. (68.5-m) anchor handling/tug supply



With a 30-ft. (9-m) beam, four V-12 KTA 38 Cummins engines easily fit across Paula Kay's engine room. Diamond Services put the 170-ft. (51.8-m), Hamilton jet-powered boat into service in Gulf of Mexico offshore oilfields in June.

(photo credit: Skeets Photo)

U.S. Maritime Review



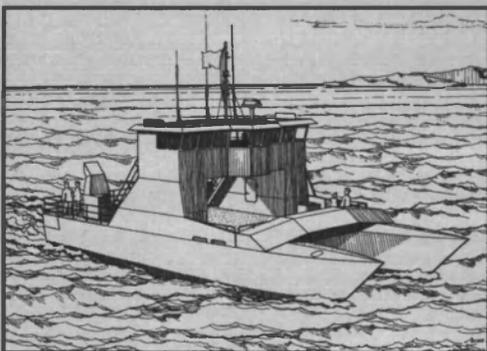
DDG 71, named USS Ross, was built by Ingalls and recently commissioned for the U.S. Navy.



Block Island was recently delivered by Eastern Shipbuilding.



Diamond Offshore Drilling's Ocean Clipper recently underwent a major deepwater upgrade at Atlantic Marine.



Artist's drawing of the seismic research catamaran designed by Elliott Bay Design Group for Northern Geophysical.

leading to reclassification as a U.S. Coast Guard Subchapter-L supply boat.

"We have completed numerous conversions of this size and scale on offshore supply and multi-purpose vessels," said Ronnie Chiasson, SMI's vice president and Repair Division manager. "In fact, steel and aluminum vessel conversions have become an SMI specialty." As the new vessel will be used as an offshore supply vessel, SMI will modify existing ballast tanks to carry liquid mud, and will outfit the new midbody to transport bulk mud. The vessel is scheduled for completion in October.

Avondale Industries of New Orleans recently won a \$332 million contract to build two tankers for Arco. As further proof of the yard's growing commercial presence, it delivered its third double-hulled tanker conversion to AHL Shipping. *New River* for AHL is a double hull vessel designed to conform with OPA 90 and Jones Act regulations. Each ship sports a new 510-ft. (155.4-m) long, double-hulled forebody constructed by Avondale. The new forebodies were joined to the renovated and modified existing stern sections.

North Florida Shipyard has added a panel line to its Commodore Point steel fabricating facility, adding to its newbuilding and conversion capability. The yard recently converted a bulker to a cable storage vessel, and added a midbody section to the LPG tanker *Atlantic Breeze*.

Eastern Shipbuilding Group of Panama City, Fla., recently completed a passenger/vehicle ferry for Block Island, R.I., named after the island, effectively marking the yard's return to the new-build market. *Block Island*, a 208-ft. (63.4-m) vessel, is operating on runs between its home island and Pt. Judith, R.I. It can carry approximately 45 vehicles and 1,000 passengers. The vessel is the first new ship for

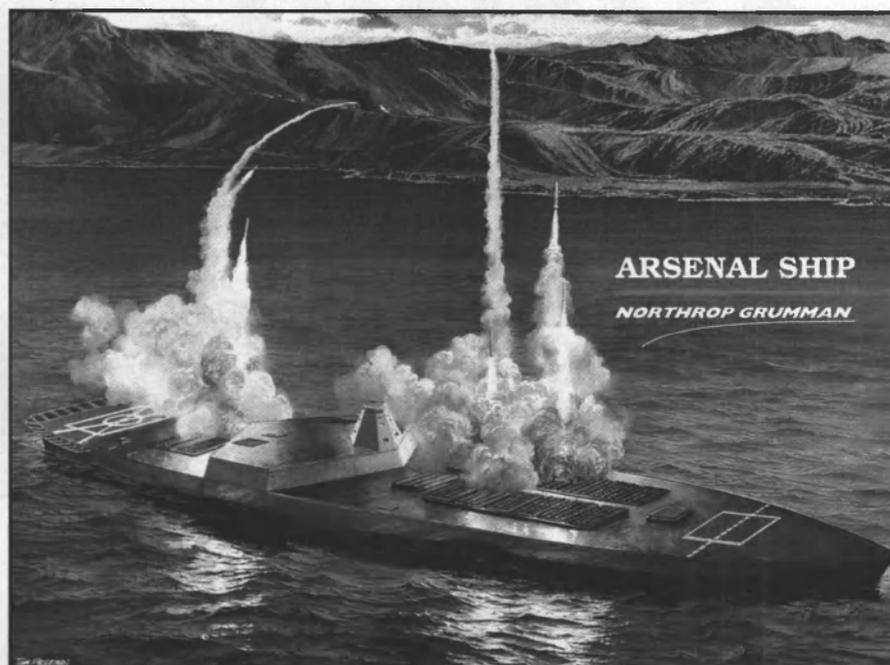
Interstate Navigation since 1984. *Block Island* performed well during sea trials, according to the owner, and during emergency crash stop tests the vessel went from 18.2 knots to a dead stop in 45 seconds.

Block Island is powered by twin 2,000-hp EMD model 8-710 diesel engines driving Bird Johnson propellers through Reintjes marine gears. Engine Systems Inc. provided the engines, and Karl Senner furnished the gearboxes. The vessel is also outfitted with flap-type rudders from Willi Becker GmbH, a Schottel bowthruster driven by a Detroit Diesel engine, Jastram controls and a McElroy capstan. John W.

Gilbert Associates provided engineering and design work for the \$7.5 million vessel.

Halter Marine Group has adjusted from its split from Trinity, as its reputation continues to extend around the globe. The company continues to be expansion-minded, and recently announced plans to acquire **Bludworth Bond Shipyard**, which owns and operates shipyards in Houston and Texas City, Texas. The two shipyards will be the eighteenth and nineteenth yards of the Halter Marine Group stable.

The New Orleans-based company builds just about anything, and it has enjoyed great success with orders for its anchor han-



DESIGNS ON THE FUTURE: The U.S. Navy's Arsenal Ship Project is the next major procurement focus for U.S. yards. Above is the design from the team consisting of Northrop Grumman, NASSCO, Vitro, Solipsys, Band Lavis & Associates and J.J. McMullen Associates. The design below is the entrant from the team consisting of Lockheed Martin, Newport News Shipbuilding and Ingalls Shipbuilding.



ling tug supply (AHTS) vessels. Pictured on page 25 is a rendition of its HLX2225 AHTS, which measures 225 ft. (68.5 m) long, with a clear deck area of 144 x 50-ft. (44 x 15-m). The vessel is designed with a SMATCO model, double drum

tow winch with a 330-ton line pull, four EMD diesel engines generating a total of 12,280 bhp, Berg CP propellers in kort nozzles, Caterpillar generators and a Skum fire monitor.

In 1997, traditional navy builder

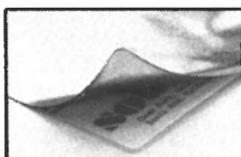
Ingalls Shipbuilding re-entered the commercial market in two areas. The company is building a series of deepwater offshore supply vessels, in 190 and 240 ft. (58 and 73 m) lengths for Edison Chouest Offshore. If all options are carried

out, the contract will total 31 vessels for approximately \$120 million. Fabrication for the first of the vessels began in June. In addition, Ingalls is nearing completion of repair work on a 142-ft. (43-m) offshore jack-up rig, owned by

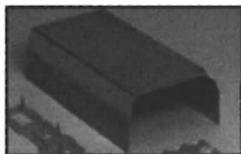
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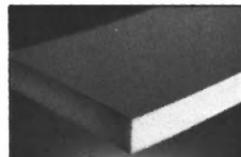
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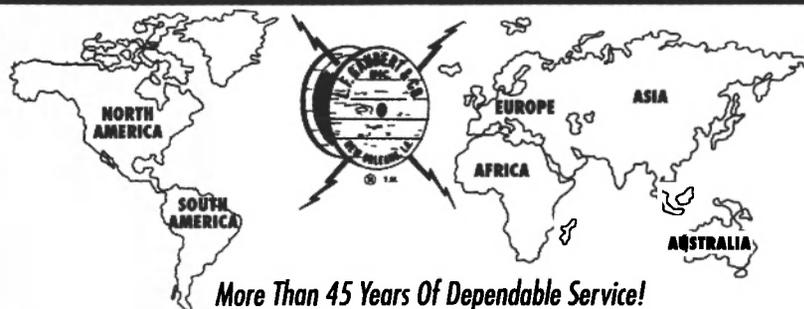
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U.S. Maritime Review

Sundowner Offshore Services. *Dolphin Titan 110* was brought ashore for horizontal welding and repair work on its four 190-ft. (58-m) legs.

Alabama Shipyard, Inc. has had considerable commercial success to report on both the new-build and repair sides. Its current newbuild workload includes a pair of 16,000-dwt chemical tankers for Dannebrog Rederi of Denmark; four liftboats for SeaRex of Louisiana; and four 1,432-TEU containerships for China's COSCO. To ensure the newbuildings pass through the shipyard in an efficient manner, the yard has incorporated numerous upgrades, including a highly automated pipe shop; an enclosed unit blast and coat facility; a steel storage yard with a 30-ton magnet crane system; a new profile and web shop; and a revamped panel line shop.

On the repair and conversion side, **Atlantic Marine Inc.** won contracts for Phase III of the conversion of Global Marine Drilling's *Glomar Explorer*, which will include 550 tons of steel fabrication. Expected to take five months, the project is scheduled to commence September 15. The yard also won a contract to convert tanker *Cora* to a dynamically

positioned early production vessel for Protexa of Mexico. To ensure the yard maintains its repair and conversion excellence, the yard renovated its 50 and 150-ton cranes; upgraded its piers, renovated its machine shop building and installed new wingwalls on the small dock.

Atlantic Marine's Jacksonville, Fla., facility recently launched its thirteenth gaming vessel built in



Pictured is a Kvichak gillnetter built as an enforcement vessel for the Alaska Department of Fish and Wildlife Protection.

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the last six years. *Majestic Star* is a 360 x 76-ft. (110 x 23-m) vessel with 43,000 sq. ft. of casino space and 2,200 gaming positions. The vessel can accommodate 3,500 passengers and crew. Once outfitting and interiors are completed in September, the vessel will sail for its homeport in Indiana. *Majestic Star* features Schottel Z-drives powered by GE motors, and electrical power is provided by four Caterpillar diesel generator sets. **Guido Perla & Associates** designed the vessel, and **Directions in Design** handled interior design.

Sister company **Atlantic Dry Dock Corp.** (ADDC), also of Jacksonville, recently completed the 40-ft. (12.1-m) midbody installation and conversion of *Seabulk New Jersey*. Major work included the midbody installation, which contained liquid mud and fuel tanks; dry bulk system installation; all new auxiliary engines and pumps; all associated pipe system continuation and new installation; and complete re-wiring.

HAM Marine in Pascagoula, Miss., was a recipient of a \$24.8 million loan guarantee from MarAd earlier this year. HAM plans to lease 100 acres of land on Greenwood Island in order to expand and modernize its ship-building facility. HAM offers a 30,000-ton lift capacity dual carrier, reportedly the only towable dry-dock on the Gulf Coast. In addition, it currently offers 160,000 sq. ft. of covered building space.

Houma Marine Fabricators has newbuilding contracts in place with two clients, which will supply business into the third quarter of 1998. The yard has also started a five-year yard expansion and modernization program, which includes enlarging fabrication facilities and constructing module-movement apparatus. **Brown Marine Service** has started construction of vessels at its Pensacola repair yard. Later this year, the company plans to build small vessels and deck barges at its Bayou Chico yard under the direction of Operations Manager Ed Taylor.

Gulf Cooper Manufacturing, in business for more than 46 years, has recently undergone several changes including the installation of a new upper management team, facilities upgrades, the acquisition of a code boiler repair company and market penetration in the offshore

and power generation markets. The company also completed a \$3 million contract with Noble/Neddrill for the conversion of drillship *Neddrill Muravlenko*.

Warren, R.I.-based **Blount Industries** recently delivered

Grand Caribe, a 187-ft. (57-m), 100-passenger small cruise vessel for American Canadian Caribbean Line. A sistership is currently being built, due for delivery in early 1998. *Grand Caribe* will operate overnight coastal cruises

covering areas from Canada to South America. The ship's steel hull is topped with an aluminum superstructure. *Grand Caribe* is powered by a pair of MAN diesel engines which produce 575 bhp at 1,800 rpm. The engines turn two

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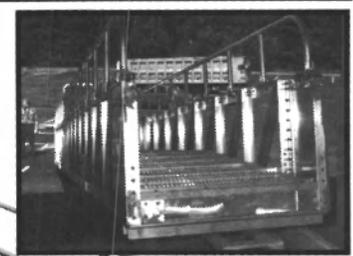
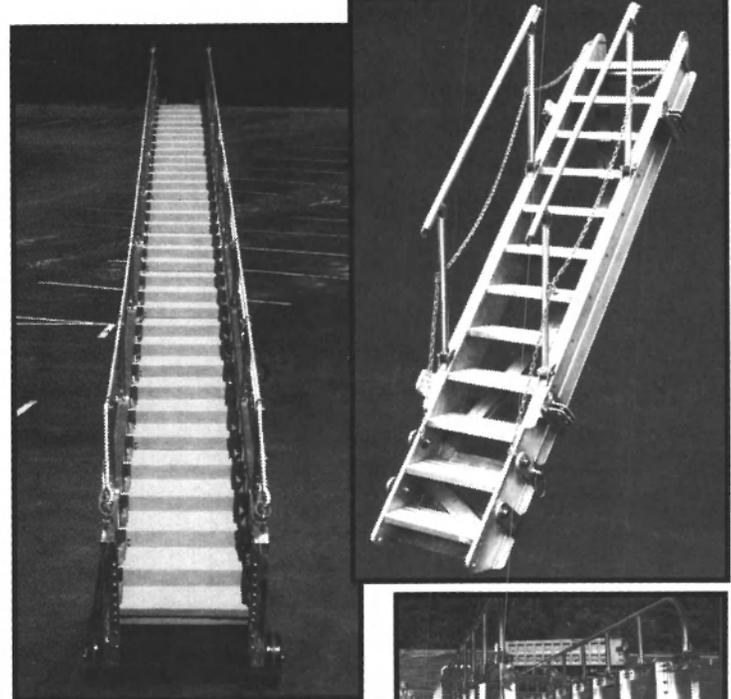
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U.S. Maritime Review

four-blade propellers through Twin Disc gears, providing a service speed of 10 knots. This ship is reportedly the two hundred ninety-fourth vessel and tenth cruise ship designed and built at Blount Shipyard. *Grand Caribe* features a bow ramp, stern swimming platform, shallow draft (6.25 ft./1.9 m) and a retractable pilot-house. New features include a 100-passenger vista view lounge on the sundeck, sound dead-

ening enclosures for all of the ship's machinery; and individual air conditioning for each state room. Other equipment includes: a Cummins emergency generator; a Wesmar bowthruster; Mathers MicroCommander engine controls; Furuno radars; an Omnipure marine sanitation device; and Icom radios.

Passenger vessels — specifically offshore casino boats — continue to be a source of revenue for Boothbay, Maine-based **Washburn & Doughty (W&D)**, evidenced by the company's recent contract for another of this type. This will be the seventh vessel currently under construction at the yard. The new vessel, for Florida-based Lara Cruises Inc., will measure 155 x 36-ft. (47 x 11-m). It was designed in-house at W&D, and **Cunningham & Walker** of Florida designed the HVAC system and **John W. Gilbert Naval Architects** of Boston was tapped to develop the final lines, which will be optimized to minimize pitch and roll using computer-generated models. The vessel will be powered by a pair of Caterpillar 3412C DIT engines rated at 635 bhp at 1,800 rpm. The engines will be fitted to ZF Model 191-1 reduction gears with a 4.5:1 gear ratio.

Detyens Shipyards Inc. has quietly transformed the former navy yard in Charleston, S.C., to a viable commercial facility. The yard now has facilities, equipment and deepwater access to provide services to ships of up to 740 ft. (225.5 m). Detyens has two additional locations which conduct all phases of ship repair.

National Steel and Shipbuilding

Co. (NASSCO) was chosen to create a new design for a million barrel capacity, double hull tanker for British Petroleum. The design development phase will be a joint project with BP and Maritime Overseas Corp. In the last 12 months NASSCO has been busy otherwise, signing contracts to build two additional Sealift ships (bringing the total to six), laying the keel for the second Sealift ship, and delivering the second Sealift conversion. In the near future, the San Diego-based yard will launch the first Sealift ship and deliver the third Sealift conversion. NASSCO has also completed facility improvements, including: installation of a transverse deck beam line, a box girder line, a new turning center lathe in the Machine Shop.

Seattle-based **Kvichak Marine** recently delivered a 30-ft. (9.1-m), multi-purpose boom barge to Clean Rivers cooperative of Portland, Ore. The all-aluminum, shallow-water barge was designed to interlock with eight existing barges operated by Clean Rivers. For Clean Sound Cooperative, Kvichak delivered a 36-ft. (11-m) oil spill response vessel. The new boat is the fortieth vessel in the Edmonds, Wash.-based fleet stationed throughout Puget Sound.

This boat is an enhanced version of Kvichak's 32-ft. (10-m) rapid response vessel, and features two engines, a bowthruster and independent hydraulics for oil recovery and anchor handling systems. The all-aluminum boats have an 11.8-ft. (3.6-m) beam and a nominal draft of 1.7 ft. (.5 m).

Marco Shipyard, also of Seattle, has been awarded a contract to build a 90-ft. (27.4-m), 149-passenger classroom vessel for the Marine Science Institute in Redwood City, Calif. When delivered later this year, the new boat will replace *Inland Seas*, a WW II-vintage wooden

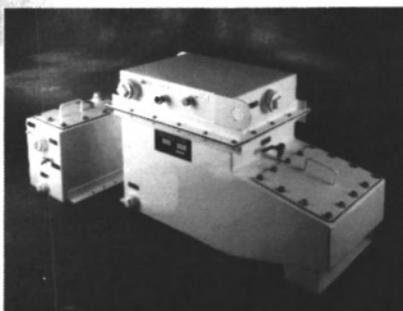
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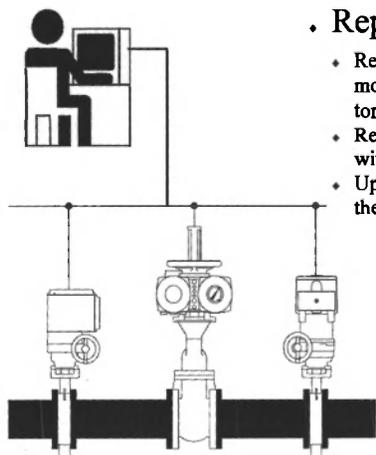
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For additional information on the shipyards mentioned in this review, please circle the appropriate number on the Reader Service Card in this edition.

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Maritime Reporter/Engineering News

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LOA.....	204'	Deck Cargo	1,200 L-tons approx
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Depth	18'	Water	225,000 gal
Draft (max.op.)	15'	Liquid Mud	3,800 bbls.
Deadweight: ..	1,800 L-tons	Dry Bulk	8,010 cu.ft.
Cargo Deck	143' x 46'		18 accommodation spaces

DISCOVERY 2200

Higher Capacity Offshore Supply Vessel (OSV)

LOA.....	227'	Deck Cargo	1,400 L-tons approx
Breadth	54'	Fuel	220,000 gal
Depth	18'	Water	280,000 gal
Draft (max.op.)	15'	Liquid Mud	4,250 bbls.
Deadweight:..	2,300 L-tons	Dry Bulk	9,345 cu.ft.
Cargo Deck	150' x 46'		30 accommodation spaces

DISCOVERY 2600

Deepwater Anchor Handling, Towing, Supply Vessel (AHTSV)

LOA.....	265'	Deck Cargo	1,800 L-tons approx
Breadth	70'	Bollard Pull	225 tons approx
Depth	25'	Fuel	315,000 gal
Draft (max.op.).....	21'-06"	Water	425,000 gal
Deadweight:..	4,300 L-tons	Liquid Mud	4,400 bbls.
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	33 accommodation spaces		Full Anchor Handling Equipment

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Atlantic

air-sea rescue vessel now in service. The vessel will be powered by a pair of 250-hp Cummins diesels driving 34-in. propellers through Twin Disc 3:1 reduction and reversing gears. It will be named after Robert G. Brownlee, a philanthropist.

Nichols Brothers Boat

Builders recently refurbished *Cat Express*, installing new interiors and a ride control system especially designed for the vessel by **Maritime Dynamics, Inc. (MDI)**. MDI's ride control system for *Cat Express* consists of a hydraulically operated trim tab on each hull.

These are automatically posi-

tioned by an electronic controller to maintain optimum platform trim and to reduce accelerations arising from pitch, roll and heave motions that cause passenger discomfort and motion sickness.

MDI worked closely with the vessel's designer, **International Catamarans (Incat)**, and Nichols

Brothers to design this system for the vessel, taking into account prevailing sea conditions of its route. MDI provided the detailed design and hull integration of the trim tabs, the hydraulic specifications and the electronic controller. Nichols Brothers fabricated trim tabs and designed and procured the hydraulic parts.

Elliott Bay Design Group (EBDG) has designed a specialized seismic research catamaran (pictured on page 26) that disassembles for shipment to remote sites. Based on a preliminary design by **Coastwise Engineering**, the catamaran is now under construction at **Peregrine Marine** in Anchorage, Alaska. "While the vessel itself is not highly unusual, its ability to be taken apart and trucked or barged to a new site is," said EBDG's Jim Cole, project manager.

The catamaran — due for completion in July — will carry seismic equipment on a cargo deck, spanning the space between the two hulls.

The aluminum catamaran will be 78 ft. (23.7 m) long, with a 34.5-ft. (10.5-m) beam and a three-ft. draft. It will be powered by four 800-hp Luger diesels, driving Traktor model jets.

For more on the U.S. Maritime Industry, turn to page 108.

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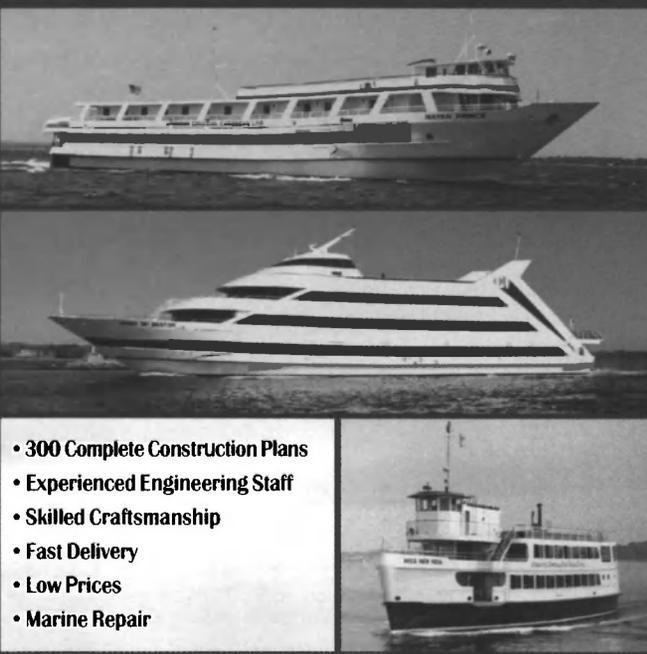


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Newbuilding Contracts Continue To Boost Market

by Alan Thorpe, international editor

An additional domestic VLCC newbuilding project has reached the contractual stage in Japan, extending the number of orders placed this year by Japanese operators to six. Iino Kaiun Kaisha's contract with Ishikawajima Harima Heavy Industries (IHI) for a 258,000-dwt VLCC, which is most suited to trade at Japanese terminals, has been implemented on the basis of an understanding with prospective charterer Tokyo Tanker. The double-hulled newbuilding is scheduled for delivery at IHI's Kure yard in mid-1999.

Kawasaki Heavy Industries (KHI) has signed a contract with Hong Kong's Golden Ocean Group for three double-hulled VLCCs at Y10bn (\$78.9 million) each. The prices of VLCCs fell below the Y8bn mark in 1994/95, but recovered to the Y9bn mark in 1997. Sources believe that the contract between KHI and the U.K. company could indicate another upturn in the VLCC price mark. The three VLCCs will be built at KHI's Sakaide Shipyard in the fall of 1999 and are scheduled to be completed by the spring of 2000.

Kawasaki Kisen Kaisha (K Line) has chosen a Japanese yard for the construction of two 100,000-dwt Aframax crude oil tankers. They will be built at Imabari Shipbuilding, with delivery dates scheduled for the summers of 1998 and 1999. Shoei Kisen, the wholly-owned shipowner/operator of Imabari Shipbuilding, will become the owner of the two vessels. K Line will operate them under a seven-year time charter contract with Shoei Kisen.

Sumitomo Heavy Industries (SHI) is poised to launch the so-called 'parallel' shipbuilding system at its dock in Oppama Shipyard. In August last year, the Japanese Ministry of Transport lifted the restrictions, which prevented the side by side construction of several vessels at one dock. The ministry acted to allow Japanese shipbuilders to boost their efficiency and productivity to compete with South Korea.

Ugland International Holdings has expanded its vehicle carrier

interests with an investment in new tonnage potentially worth \$162 million. The contract, placed with Tsuneishi Shipyard, calls for one newbuilding, with a capacity to transport 6,100 cars at a speed of 20.1 knots, plus options for the construction of two similar vessels. Delivery is scheduled for May 1999.

Euro Marine Carriers (EMC) has placed an order with Japan's Shin Kurushima Dockyard for the construction of two autocarriers, each with a capacity of 900 vehicles, with one on option. They will be delivered to the Netherlands-based, intra-European auto carrier in March, June and September 1999, and will replace the present fleet of vessels.

Japanese shipbuilders attracted contracts for 8.2 million grt of merchant ships to be registered with foreign firms in the financial year ended in March. The figure, which includes tonnage to the account of overseas subsidiaries of Japanese companies, is virtually on par with that recorded in the preceding fiscal period. There has been a reduction in the number of vessels, though, from 265 to 246. Well over half of the new orders are comprised of bulkers, contributing 4.4 million grt, with tankers being the next largest generic group at 2.6 million grt.

Tokyo-based think tank Japan Maritime Research Institute (Jamri) has forecasted that Japan stands to lose more of its world share of newbuildings to China and South Korea. **Seji Nagat-suka**, chief researcher at Jamri, said that Japan's share of the world's newbuildings slipped below 40 percent for the first time in 1996. He argued that Japan's worldwide market share could soon be down to 30 percent, continuing a trend of losing business to South Korean and Chinese counterparts which started in the early 1990s.

Japan and South Korea have agreed to suspend 15-year bilateral shipbuilding summit talks by making the latest two-day meeting held in Cheju, South Korea, the last. Meanwhile, Japanese ship-

builders are cautiously expanding their capacity on the back of a weak yen, the growing demand for VLCCs and strong orderbooks. A report by the Japan Ship Exporters' Association (JSEA) showed a total of 407 export ships, totaling 14.5 million grt, in national orderbooks as at the end of April.

Japanese shipbuilders are looking to recovery after being challenged by South Korean counterparts since 1993, and have set about increasing their competitive

edge with a combination of drastic rationalization and modernization. Many of the major builders have cut building costs substantially, taking advantage of newly developed computer systems.

Iran's long-awaited project for a series of Suezmax crude oil carrier buildings has been awarded to South Korea's Daewoo Heavy Industries (DHI). DHI hopes to fulfil the entire NITC delivery program over a 12-month period from mid-1999 onward, following the



A coastal tanker newbuild by Malaysia Shipyard & Engineering is shown above.



Red Teal is pictured undergoing FPSO conversion at Keppel Tuas.

FAR EAST UPDATE

delivery of the two VLCCs for Euronav. NITC is planning to follow up its recently implemented Suezmax newbuilding program with a contract for a series of Aframax tankers.

Malaysian Int'l. Shipping Corp. (MISC) has strengthened its contractual ties with South Korea's Hyundai Heavy Industries (HHI) by awarding the yard a multiple chemtanker deal. The project calls for five 30,000-dwt newbuildings, worth an estimated \$225 million, in a deal partially financed through a \$150 million, five-year loan from a consortium of foreign banks.

U.S.-based drilling contractor Reading & Bates and Conoco are forming a new joint venture to fund construction of a \$200 million advanced deepwater drillship, the second of its class. South Korea's Samsung Heavy Industries (SHI) has been selected to build the vessel. Launch date is set for the first quarter of 1999. The vessel will be designed to drill in water depths of

up to 10,000 ft., and will be capable of carrying out extensive well tests.

The two recent containership additions to the orderbook at Halla Engineering & Heavy Industries (HEHI), thought to be linked with German principals, are for a company known as Petropolars. Deliveries are somewhat earlier than had originally been rumored, with the ships actually having been contracted for completion in September and October 1998, respectively. Rated at 3,400 TEU capacity on 45,000 dwt, each vessel has commanded around \$44 million, about \$3 million higher than the unit price for the 2,500-TEU containership pair in hand for German owner Friedrich Detjen.

Halla also recently announced that it has signed contracts with Singapore's Tai Chong Cheang Group (TCC) to build two 170,000-dwt bulkers worth \$87 million. The company and the Singapore government's Trade Development Board said that an agreement was signed by the honorary chairman

of the Halla Group, **IY Chung**, and the chairman of TCC, **KH Koo**.

The bulkers will be delivered to Concord Navigation Ltd., a subsidiary of the TCC group. The first vessel is scheduled for delivery in April 1999.

Tai Chong Cheang Steamship, meanwhile, is set to put fresh momentum behind the investment flow for Aframax tanker tonnage. The Singapore-based company, previously domiciled in Hong Kong, has signed a letter of intent with Halla for the construction of two 105,000-dwt crude oil carriers. The tentative commitment to the tanker projects coincides with its \$87 million contract at Halla for two 168,000-dwt bulk carriers.

Tonnage replacement and renewal of Cosco's fleet is the primary target of Kawasaki Heavy Industries' (KHI) joint venture yard on the lower Yangtze. Located at Nantong, in the northern province of Jiangsu, the joint undertaking between the Japanese group and Cosco will have the

capability to construct vessels up to 160,000 dwt, by way of a new shipbuilding dock. The total area of the redeveloped shipyard, at a site where operations have previously been based on floating docks for ship repair, is about 500,000 sq. m. The enterprise is expected to be ready to start newbuilding production in early 2000, with technology transfer from Japan.

The largest repair/refit contract currently underway at Sembawang Shipyard is the three to four-month refit of Vietnamese FPSO *Chi Linh*, which arrived in the yard two months ago. The vessel was converted to a FPSO 10 years ago and will undergo a major refurbishment before returning to its station off the Vietnamese coast. Sembawang is also building the necessary process module for the Statoil FPSO currently under construction at South Korea's Samsung Heavy Industries (SHI). The modules will be installed by Jurong Shipyard Ltd (JSL).

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Keppel Shipyard is completing the conversion of 59,642-dwt, St. Vincent-registered tanker *Red Teal* to a FPSO. The vessel will be renamed *Armada Pekasa* for its new role off the Malaysian Coast for Petronas. The \$12 million contract began three months ago and the ship was due to leave the yard in June. Keppel recently completed the Nortrans conversion of

Endeavour for use as a FPSO off the Indian coast, and the yard is currently carrying out an 11-month refit operation onboard FPSO *Erawan* for Unical (Thailand). Keppel Fels has two newbuilding projects currently underway: the *Galaxy 2* semi-submersible rig for Sante Fe, which is due for delivery in August 1998; and 110,000-dwt FPSO *Varg*, due

for delivery to Norway's Saga Petroleum by the end of 1997. The FPSO was recently floated out of Keppel Fels' large building dock.

Malaysia Shipyard & Engineering (MSE) — which recently inaugurated a syncrolift system purchased from Todd Shipyards, San Pedro — is currently building a series of small tankers for local owners.

ABS Releases Reefer Ship Guide

ABS has developed and published its *Guide for Building and Classing Vessels Intended to Carry Refrigerated Cargoes*, which covers all types of refrigerated cargo vessels, equipment and systems. The guide was developed with the close cooperation of reefer ship operators, designers and equipment manufacturers, and the requirements update and replace those included in the 1997 ABS Rules for Building and Classing Steel Vessels.

"We felt that the advances of environmentally-sensitive technology which have been adapted by the refrigerated-cargo transportation industry demanded a completely new approach from the classification society perspective," said ABS President **Robert Somerville**. "ABS has produced a unique standard, not only to promote the highest levels of safety, but also to take into account operational demands and regulatory requirements affecting this increasingly sophisticated sector."

The ABS reefer ship guide is applicable to steel vessels intended to carry refrigerated cargoes such as fruits, meats, vegetables, fish, liquid or other perishable goods whether bulk, break bulk, palletized in hold spaces or in refrigerated containers of the porthole or plug-in type. In addition to covering the more standard-type refrigerated cargo carrier, there are also sections dedicated specifically to refrigerated-cargo container carriers, edible bulk liquid tankers and fish-processing vessels. Other specialized sections address the following: controlled atmospheres; ammonia refrigeration systems; refrigeration machinery; ancillary systems; cargo-handling systems including automatic pallet-loading and unloading systems; instrumentation control and monitoring; hull construction; plan submittals; electrical systems; fire extinguishing systems; testing; and post-construction surveys.

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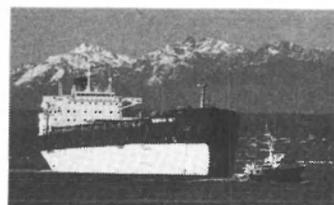
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Model S-120 Piston Horn

Chosen for use on aircraft carriers as well as commercial vessels over 200 meters in length, the S-120 utilizes an oscillating piston driven by 7-1/2 horsepower 3 phase 220/440 volt electric motor producing 143 dB and a fundamental frequency of 94 Hz in 1/3 octave band at one meter.



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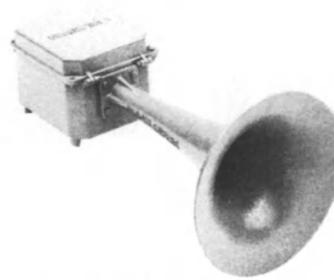
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Hamburg's Dr. Hans Ludwig Beth to Head IAPH Committee

Dr. **Hans Ludwig Beth** of Port of Hamburg Marketing and Public Relations department was elected to chair the Committee on Combined Transport and Distribution of the International Association of Ports and Harbors (IAPH). The election was held recently in London at the 20th World Ports Conference.

The Committee was created to investigate present and future port and port service providers' activities in the fields of distribution and logistics as well as hinterland transport. Special emphasis is being placed on promoting ports as an interface in the transport network and as a node in the overall transport chain.

Based in Tokyo, the IAPH is an association of 112 ports from 86 countries. The association's main objectives are:

- to develop and foster good relations and collaboration among all

ports and harbors of the world;

- to promote and increase the efficiency of ports and harbors by exchanging information relating to new technologies in port development, organization, administration and management;

- to facilitate the formulation of common viewpoints, policies or plans on questions of common interest; and

- to initiate measures designed to protect the legitimate interests and rights of association members within intergovernmental and other international organizations in order to improve the conditions and efficiency of ports on a worldwide basis.

Maritime Research and Education Institute Established at Kings Point

The U.S. Maritime Administration (MarAd) announced that it is establishing a National Institute for Maritime Research and Education at the

U.S. Merchant Marine Academy in Kings Point, N.Y.

MarAd said that the institute will use resources of the academy to support maritime fields by enhancing the technical and professional expertise of people who work in those industries.

The institute will conduct applied research and provide support with information about intermodal transportation and logistics, shipbuilding, ship component design and manufacturing, vessel operations and human factors.

Its work will focus on three major areas: engineering research; logistics and intermodal transportation research; and continuing education. To help identify needs and opportunities for research, the institute will seek continuous feedback from the maritime and transportation industries, military services and government agencies.

The National Institute for Maritime Research and Education originated under the direction of **Albert J. Herberger**, who retired July 1 from his post as MarAd administrator.

"The faculty and laboratory facilities at the U.S. Merchant Marine Academy represent great untapped resources for improving the technical and professional expertise of people in marine industries," Adm. **Herberger** said. "These resources can help the U.S. marine industry become more competitive."

Mitsubishi Heavy Starts Development Of New Diesel Engine

Mitsubishi Heavy Industries has started to develop a new fuel-efficient marine diesel engine.

The UEC52LSE reportedly requires only 123 grams of oil fuel to produce one horsepower per hour, compared with the existing model which consumes 126 grams of fuel to produce the same amount of power. The company expects to be able to supply the new engines in one to two years.

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Lucent Technologies Gets Contract With Chinese Shipbuilder

Lucent Technologies was chosen by New Tech Shipbuilding and Management Limited to provide a local area network for wireless data transmission in New Tech's 300-acre office and shipyard complex in Nansha, Panyu, Guangdong province in southern China.

New Tech claims to be the first shipbuilder in China to produce high-speed commercial catamarans to meet the rising demand for passenger vessels that commute between Hong Kong

and southern China.

Through Lucent Technologies' WaveLAN(R) wireless technology, New Tech's operations staff is able to access data when they are mobile, whether they are in the shipyard, office premises, or the remote offices within New Tech's corporate and shipbuilding complex. The system was installed in April.

Lucent Technologies' WaveLAN products provide a flexible means of connecting mobile and

desktop computers within a facility, and linking multiple facilities.

New Tech has two 1,000-ton slipways and a 1,000-ton floating dock, as well as an aluminum manufacturing division that enables multiple vessel construction and is located on the Pearl River Delta.

"We strongly believe that our corporate vision of meeting the growing demand for quick transportation between Hong Kong and China — along with adapting the technologies that are right for us — will spell success for New Tech," said **Benjamin Fok**, chairman of New Tech Shipbuilding and Management Ltd. and director of Henry Fok Ying Tung Group.

To manage its inventory, budget and implementation schedule, New Tech has six client PCs, two Windows NT and Novell servers. These are connected via a 10Mbps wired Ethernet LAN.

This solution is a complete, integrated hardware and software system that can extend wireless connectivity to an existing LAN.

Two WaveLAN systems were strategically deployed to cover both the shipyard and office area.

Two additional WavePOINT bridges were installed to act as repeating stations to forward signals from the remote office to the shipyard, which are separated by hilly terrain.

The project implementation, including site survey, software, hardware and antenna installation and testing, was reportedly completed within one week.

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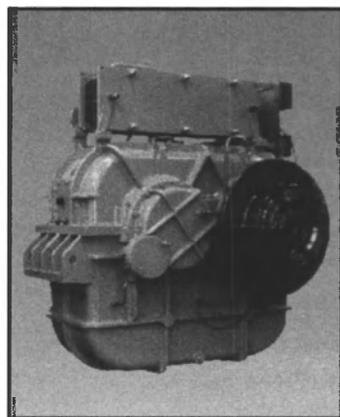
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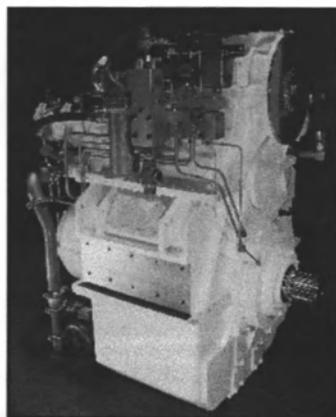
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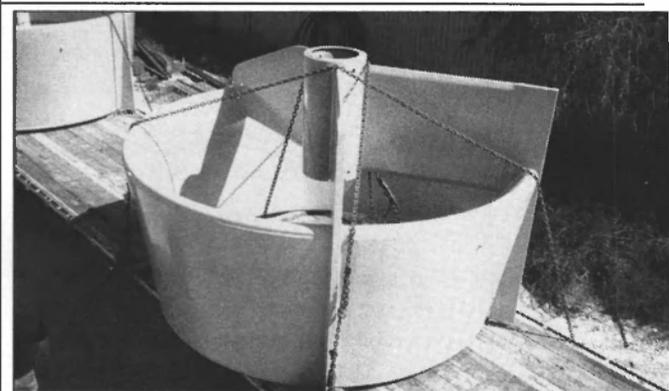
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Maritime Reporter/Engineering News

HIGH-SLUDGE DIETS CAN SNEAK UP ON YOU.

Who needs shorter engine life and higher oil consumption caused by sludge?

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OWNER OPERATOR	COUNTRY SO	SHIPYARD	COUNTRY SB	TYPE	SUBTYPE	No	TEU	DWT	GT	DELIV	PRICE M\$
SANKO STEAMSHIP	JAPAN	KVAERNER KLEVEN AS	NORWAY	AHTS	—	1	—	—	2,900	5/99	24
CHINA NAT CEREALS	CHINA	OSHIMA SHIPBUILDING	JAPAN	BULK CARRIER	—	1	—	30,000	—	1999	—
CHINA NAT CEREALS	CHINA	OSHIMA SHIPBUILDING	JAPAN	BULK CARRIER	—	4	—	74,000	—	1999	—
CHINA STEEL	CHINA	CHINA SHIPB. CORP.	TAIWAN	BULK CARRIER	—	1	—	154,550	—	1998	—
COSCO	CHINA	HUDONG SHIPYARD	CHINA	BULK CARRIER	—	2	—	27,000	—	1998	37
MITSUBISHI	JAPAN	NAMURA ZOSENSHO	JAPAN	BULK CARRIER	—	1	—	70,850	—	1998	—
NORTHERN SHIPPING	RUSSIA	SLOVENSKE	SLOVAKIA	BULK CARRIER	—	6	—	3,700	—	—	—
NYK LINE	JAPAN	HAKODATE DOCK	JAPAN	BULK CARRIER	—	1	—	31,800	—	1998	21
PAPADAKIS INTERESTS	GREECE	MITSUMI	JAPAN	BULK CARRIER	—	1	—	75,000	—	1999	28
SUISSE-ATLANTIQUE	SWITZERLAND	BOHAI SHIPYARD	CHINA	BULK CARRIER	—	2	—	28,000	—	—	—
TOP GLORY	HONG KONG	OSHIMA SHIPBUILDING	JAPAN	BULK CARRIER	—	4	—	74,000	—	98/99	—
TOP GLORY	HONG KONG	OSHIMA SHIPBUILDING	JAPAN	BULK CARRIER	—	1	—	47,000	—	1998	20
LOUIS-DREYFUS	FRANCE	DAEWOO	KOREA	BULK CARRIER	CAPE SIZE	2	—	98,000	—	8/99	—
TAI CHONG CHEANG STEAMSHIP	HONG KONG	HALLA	KOREA	BULK CARRIER	CAPE SIZE	2	—	170,000	—	1999	87
PAN OCEAN SHIPPING	KOREA	HYUNDAI	KOREA	BULK CARRIER	COAL	1	—	135,000	—	1999	—
ALASSIA STEAMSHIP	GREECE	SAMSUNG	KOREA	BULK CARRIER	PANAMAX	2	—	73,000	—	99/2000	54.6
CHINA NAT CEREALS	CHINA	HALLA	KOREA	BULK CARRIER	PANAMAX	4	—	74,000	—	—	—
ORIX	JAPAN	SASEBO	JAPAN	BULK CARRIER	PANAMAX	1	—	72,000	—	1998	27
SUISSE-ATLANTIQUE	SWITZERLAND	CHINA SHIPB. CORP.	TAIWAN	BULK CARRIER	PANAMAX	2	—	—	—	—	56
NYK LINE	JAPAN	IMABARI SHIPBUILDING	JAPAN	CAR / TRUCK CARRIER	—	1	—	—	—	1/99	—
NYK LINE	JAPAN	SHIN KURUSHIMA	JAPAN	CAR / TRUCK CARRIER	—	1	—	—	—	12/98	—
JAN ERIK DYVI A/S	NORWAY	ULJANIK	CROATIA	CAR CARRIER	—	2	—	12,500	—	1999	72
NYK LINE	JAPAN	IMABARI SHIPBUILDING	JAPAN	CAR CARRIER	—	1	—	—	—	1/99	50
NYK LINE	JAPAN	SHIN KURUSHIMA	JAPAN	CAR CARRIER	—	1	—	—	—	12/98	45
UGLAND INTERNATIONAL	U.K.	TSUNEISHI	JAPAN	CAR CARRIER	—	1	—	—	58,600	—	59
UGLAND INTERNATIONAL	U.K.	TSUNEISHI	JAPAN	CAR CARRIER	—	1	—	—	—	—	59
SIMONSEN & SLANG	NORWAY	ABG SHIPYARD	INDIA	CARRIER	—	2	—	5,000	—	1998	34.3
VINALMAR	SWITZERLAND	YSSELWERF	NETHERLANDS	CHEMICAL TANKER	—	1	—	10,000	—	1998	31
PROGRESS	DENMARK	NORDSOVAERFTET	DENMARK	CHEMICAL TANKER	STAINLESS-STEEL	4	—	6,000	—	—	—
IVER SHIP	NORWAY	HALLA	KOREA	CHEMICAL/OIL	—	4	—	46,000	—	1999	142
ULTRAGAS	CHILE	SPLIT	CROATIA	CHEMICAL/OIL	—	1	—	45,000	—	1999	—
MATTHIAS DETJEN	CYPRUS	HALLA	KOREA	CONTAINER	—	2	3,500	—	—	1998	—
MITSUMI & CO.	JAPAN	IMABARI SHIPBUILDING	JAPAN	CONTAINER	—	1	1,560	—	—	1998	—
OOCL	HONG KONG	DAEWOO	KOREA	CONTAINER	—	1	1,800	—	—	1998	—
EURONAV	LUXEMBOURG	DAEWOO	KOREA	CRUDE OIL TANKER	—	2	—	300,000	—	1999	170
RCI	U.S.	KVAERNER MASA	FINLAND	CRUISE	—	1	—	—	133,000	2001	500
SOUTH COAST SHIPPING	U.K.	MERWEDE SHIPYARD	GERMANY	DREDGER	HOPPER SUCTION	1	—	9,130	—	1998	—
DEME	BELGIUM	IHC HOLLAND	NETHERLANDS	DREDGER	SUCTION	1	—	—	—	—	90
PENTA-OCEAN CONSTRUCTION CO.	JAPAN	IHC CALAND NV	NETHERLANDS	DREDGER	SUCTION	1	—	—	—	1999	103
CONOCO	U.S.	SAMSUNG	KOREA	DRILLSHIP	—	1	—	—	—	1999	—
EXPRESS FERRIES	—	KVAERNER FJELLSTRAND	NORWAY	FERRY	CATAMARAN	2	—	—	—	1999	50
CHILEAN INTERESTS	CHILE	ASMAR	CHILE	FISHING	—	1	—	—	—	1997	—
LIQUID GAS SHIPPING	U.K.	HYUNDAI	KOREA	GAS CARRIER	—	2	—	6,300	—	1999	40
CARBOFIN	ITALY	FINCANTIERI	ITALY	LPG	—	1	—	17,400	—	1999	—
EXMAR	BELGIUM	KANREI SHIPBUILDING	JAPAN	LPG	—	2	—	3,800	—	98/99	25

MR/EN Review: Deck Machinery & Cargo Handling Equipment

Company Profile: Marine Travelift

Study Finds Vessel Slings Benefit Hull Stress Levels

A recent study commissioned by Marine Travelift and conducted by Bay Engineering, entitled *Hull Bending In Vessels Supported By Slings*, shows that vessels supported by slings on the 300, 500 and 800 BFM models of Marine Travelift mobile boat hoists are not overstressed. The maximum stresses occurring in the vessels are well below allowable stress levels.

"Marine Travelift is moving forward," explained **Al Lamer**, executive vice president of Marine Travelift. "And as our new models of lifts shatter past capacity records, we decided it was time to provide the industry with mathematical proof that these increased capacities were justified."

Bay Engineering is an architectural firm specializing in the design of large commercial self-unloading cargo vessels.

A literature search gave the engineers the range of data needed to develop average and extreme vessel characteristics for each one of the three subject boat hoist models. A total of 160 different vessels were used, in sizes up to 200 ft. in length, and in displacements up to 1,300 tons.

The displacement, depth, width and draft were all plotted versus length, and a regression analysis was performed to obtain a power equation for each of these characteristics as a function of length. Displacement was considered to be the "light ship weight" plus a small variable load. Also, a second subset of the data consisting of all vessels with high length to weight ratios was generated. This subset allowed the test to account for the special features of longer vessels.

When available, steel weight, machinery weight and outfitting weight were plotted as a ratio of total weight versus the volume parameter (LBD/100), also known as a vessel's cubic number. A regression analysis was performed on each of these graphs in order to

get component weights for a typical weight distribution curve for the vessels.

The midship hull girder section modulus was determined using minimums required by the American Bureau of Shipping

(ABS) for average boat characteristics. The midship moment of inertia was also determined using a minimum ABS formula. A typical vessel shape was then assumed in order to calculate the moment of inertia and section modulus distri-

bution curves for each vessel.

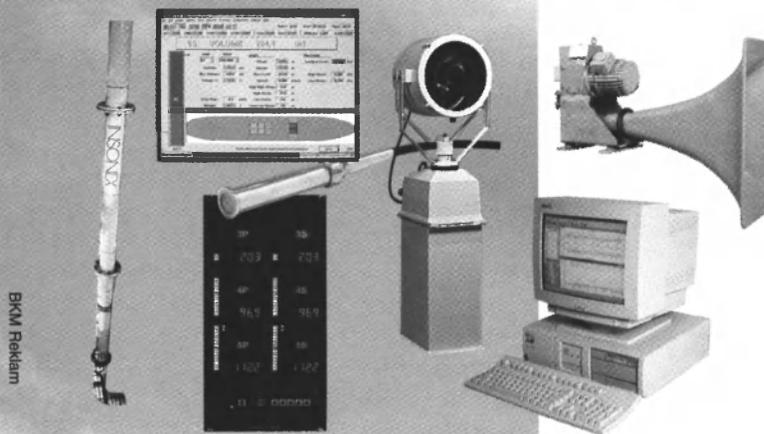
Analyses were performed using the typical vessel characteristics of average and long length vessels for the following conditions: A typical weight distribution was assumed for all vessels investigated. The

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DECK MACHINERY & CARGO HANDLING EQUIPMENT REVIEW

steel, machinery, and outfitting weight coefficients (the ratio of each weight category to the boat lightweight), were calculated from the regression analysis formula, using the hull cubic number, (length x beam x depth)/100, for the various vessels.

It was concluded that the maxi-

mum stress levels occurring on the hulls of vessels being lifted in slings is well below allowable tension stress levels. The stress levels are less than one-third the allowable tension and are unlikely to exceed the allowable compression. The critical buckling stress for compression can only be deter-

mined on a case-by-case basis for any vessel. The two sling analysis of the 300 BFM and 500 BFM models show maximum bending stress levels that are approximately equal to those in the corresponding three sling analysis when hoisting boats of the same size and weight. Actual stresses and deflections will

probably be less than calculated as this study used minimum values from ABS rules.

"This test proved conclusively what our customers and engineers have known for over 30 years," said Mr. Lamer. Crusinn Boat Yard is an example of one company that has chosen Marine Travelift's 200 BFM. Their model is equipped to lift up to 200,000 kg and features full instrumentation in the operator's compartment and automatic load equalization.



Cranes shown are installed aboard the American Heavy Lift vessel, Captain H. A. Downing. The vessel is built by Avondale Industries Avondale, Louisiana.

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Marine
Cranes

Ulstein Offers Customized Winch Configurations

Based on Ulstein Deck Machinery's standard product and options program, users can reportedly tailor winch and windlass requirements to meet budgetary constraints or exacting technical and performance criteria.

Contracts to supply new-generation winches to ships building in South Korea, China, Italy, Spain, Turkey and Sweden are providing valuable references for Ulstein's latest winch technology.

Ulstein's anchor winch is a new design and its mooring winch is a refined version incorporating substantial improvements.

The new winches are the result of the expertise of both Brattvaag and Norwinch in the creation of a new range of mooring and anchor-handling deck machinery. The new products feature a new foundation design which reportedly improves and simplifies transfer of external forces to the ship structure.

Furthermore, the new winch design is easier to manufacture, making delivery time shorter, and the one-piece anchor winch foundation simplifies shipyard steelwork preparation and cuts installation times.

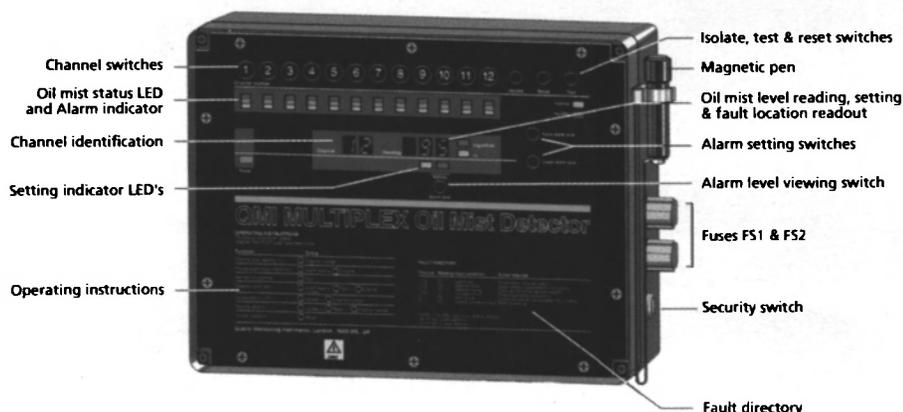
Less steel is now used to create a stronger but lighter and more compact overall design. The driving force behind this program was to create an attractive and a price-competitive product.

According to Helge Vatnehol, Ulstein technical manager, the compact dimensions of the new design have a layout advantage when applied to restricted foredecks such as on containerships. The designs for both mooring and anchor winches can also be customized with the addition of optional modular packages to pro-

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AISE '97 Booth #532

additional features without affecting the basic design concept, including high pressure hydraulic and electric drive units as well as additional low pressure drive motors. The high pressure hydraulic option is expected to be phased in the second half of 1997 and the electric drive variant in early 1998.

cranes, winches, windlasses and capstans for both military and commercial shipbuilding.

Recent applications include offshore cranes and anchor pre-tensioning winches for various FPSO

installations.

Appleton cranes are rated for 15 metric tons with outreaches of up to 131 ft (40 m).

Pre-tensioning winches feature line pulls of up to 400 metric tons

with rope storage and spooling winches included when multiple rope sizes are used. Four double drum, waterfall winches with power units are presently on order for the Panama Canal

Go To Test IMC Monitoring System

Bremer Lagerhaus-Gesellschaft (BLG) is scheduled to test IMC engineering's digital camera monitoring system Dicamos. One dayside gantry crane will be fitted with the system and upon successful results, the remaining BLG gantries will be equipped with the IMC system. The Dicamos system reportedly improves damage control on discharged and loaded containers by providing digital images of damaged boxes to a central claim computer where repair and handling claims decisions can be performed. The system has already been delivered to the Port of Gothenburg, Sea-Ro Terminal Zeebrugge, Purfleet Thames Terminal, Maersk Container Terminal in Algeciras, Eurobridge Terminal in Gent and HLA in Hamburg.

Intercon

Intercon offers a complete line of winches, hoists, ATB couplers and specialized material handling equipment for commercial and military applications. Recent applications include shipsets of ATB couplers on vessels including Amoco's *Atlanta Bay* and *Columbia Bay*, Penn Maritime's *Theresa* and *Julie* and Bouchard's *Danielle Bouchard*. Current winch orders include SD-200 mooring winches for a Santa Fe jack-up rig, swing and ladder hoists for PCC dredge *Mindi*, a DD-225 double drum winch for Guidry Brothers and a 30-KIP FADOSS traction winch package for military salvage operations. Production is also in the works on seven shipsets of booms and slewing platforms for 57-ton twin cranes to be installed on new strategic Sealift ships. Deliveries to Avondale and NASSCO are scheduled through 1998.

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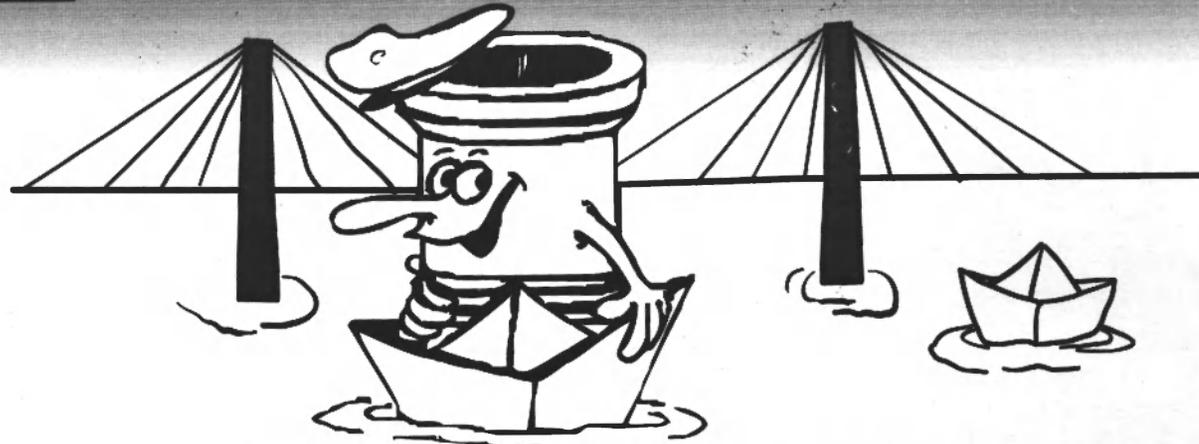
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DECK MACHINERY & CARGO HANDLING EQUIPMENT REVIEW

Commission.

Appleton Marine also continues to supply shipsets of deck equipment for the U.S. Coast Guard.

Techcrane International

Techcrane International offers a range of EBI marine cranes with

lifting capacities from 2.5 tons to 75 tons; boom lengths from 15 ft. to 100 ft.; and fixed and telescopic booms. The telescopic booms have a unique rack and pinion mechanism which means fewer repairs and less costly down time. All cranes are reportedly in compliance with API, OSHA, ABS, Lloyds

and the U.S. Coast Guard.

Almon A. Johnson, Inc.

Almon A. Johnson, Inc. (AAJInc) is currently building a variety of equipment for both government and commercial applications. Under contract to NAVSEA, the

company has installed new sol state electro-hydraulic drive a control systems for the automa towing machines on three ARS Class salvage tugs. AAJInc finished bow and stern haws winches on two tractor tugs built by Halter Marine for Tug International, and is supplyin

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A Marine Travelift model 35BFM mobile boat hoist at work in Brewer's South Freeport Marine.

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 ges being built for the U.S.
 my. The company has also
 veloped an emergency towing
 stem for tankers designed to
 et IMO and OPA 90 regulations,
 well as ABS type approval.

CW Marine, Inc.

TCW offers HIAB sea cranes
 ncluding seven different models.
 he company specializes in han-
 ling equipment which features
 ABS, DNV and U.S. Coast Guard
 approvals. TCW has offices in
 Newport Beach, Calif., Fort
 Lauderdale, Fla., and will soon
 open a location in Philadelphia,
 Pa.

Alimak Elevator Co.

Alimak provides elevators for
 container cranes, offshore rigs,
 shipping vessels and drydocks.
 These elevators feature rack and
 pinion drives, galvanized compo-
 nents and safety devices.

Alimak now offers a new SE
 Series, the first unit of which has
 reportedly been installed on a con-
 tainer crane in Singapore.

Allied Systems Co.

Allied Systems, manufacturer of
 specialized cranes and winches,
 recently supplied RIB davits for
 use on U.S. Army LSV-4 *William B.*
Bunker and on the Navy's LPD-12
Shreveport. These davits are
 equipped with Allied's CT-5 con-
 stant tension winch. Allied is also
 under contract to supply slewing
 arm davits for the Navy's LHD-7
 and USS *Enterprise*, as the compa-
 ny continues to supply davits for
 U.S. Coast Guard coastal buoy ten-
 ders and buoy cranes for the seago-
 ing buoy tenders currently under
 construction at Marinette Marine
 Corp.

Fascan International, Inc.

Fascan International, Inc. has
 introduced the FM line of Fassi
 marine cranes, specifically built for
 the marine industry and designed
 to operate in salt water environ-
 ments.

Inner and outer ram rods on the
 FM marine cranes have been spe-

cially treated with hardened chem-
 ical nickeling to a thickness of 50
 microns, and chromium plating to
 a thickness of 100 microns.

The cranes are painted with
 epoxy bicomponent primer to a
 thickness of 40/50 microns, with
 two finishing coats of bicomponent
 polyurethane enamel to a thick-

ness of 60/80 microns. The
 hydraulic system is equipped with
 standard double-acting rams with
 piloted check valves and a load-
 limiting device.

The cranes also feature a double-
 piloted check valve with a flow reg-
 ulator and end-stroke antishock
 system.

Accessories of the FM marine
 cranes include: dual motor reduc-
 ers on models with slew ring and
 bearing continuous rotation; fold-
 able hydraulic extensions and tele-
 scope manual extensions;
 hydraulic winches fitted to crane
 boom; and electro-hydraulic power
 packs with a variety of design spec-



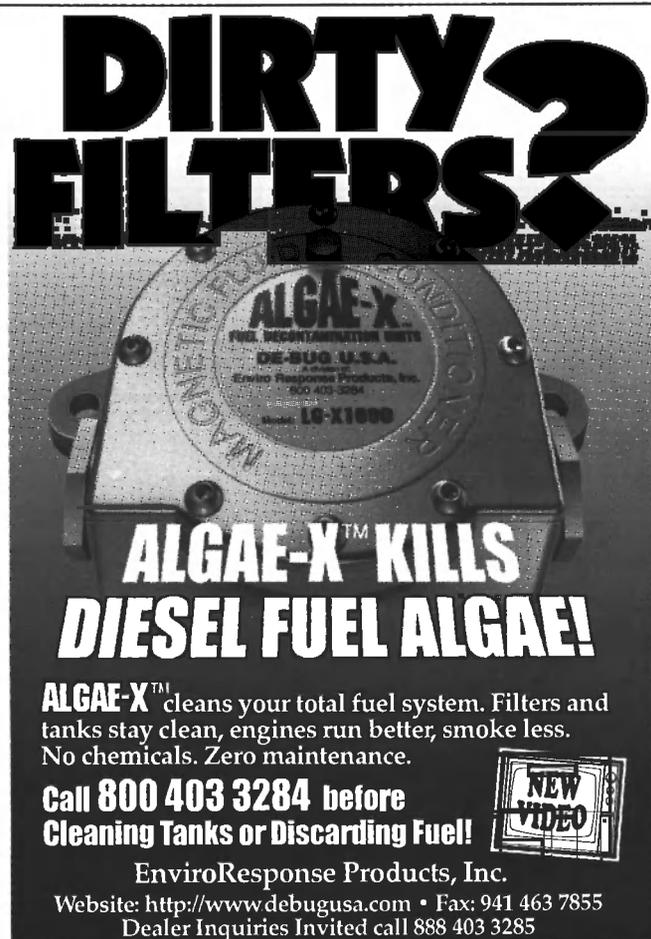
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DECK MACHINERY & CARGO HANDLING EQUIPMENT REVIEW

ifications to power different crane configurations.

Loeffler Corp.

Marine hardware manufacturer Loeffler Corp. has added a deck drain, formerly manufactured by

the Desanno Co., to its product line. The flange-mounted drain is designed for use with non-metallic decks and is held in place with screws, rather than welding. These deck drains are available with or without traps or valves, and can be used with either 1.5 or

2-in. drain lines.

McElroy Machine

McElroy engineers and manufactures deck machinery for application on vessels ranging from crew-boats to oil carriers. Recent con-

struction in the oil and gas industry has spurred McElroy's new line of OSV windlasses and jack-boat hose reels.

Skookum

Blocks and rigging manufacturer Skookum has added the 20-in., 3-ton BCM fullsided trawl block to its product line.

The new block has been designed with a fully enclosed shrouded sheave to eliminate wire rope cutting and fouling.

The block is constructed of galvanized steel and features pressure lubrication at all critical areas. In addition to the new block, the BCM trawl block line is also available in six, 12, 16, 18 and 20-in. blocks.

Jeamar Winches Inc.

Jeamar Winches has introduced a new line of air tuggers, designed for heavy duty continuous operation under rugged conditions. The new air tuggers can reportedly be mounted in any position and offer options such as grooved drums and automatic braking. The product line is available with 550 to 4,000 lb. line pull.

Markey Machinery Co., Inc.

Markey Machinery, producer of custom deck equipment for work-boat and research vessels, offers a line of products including two winches, capstans, research winches, windlasses, mooring winches, traction winches and hawser winches.

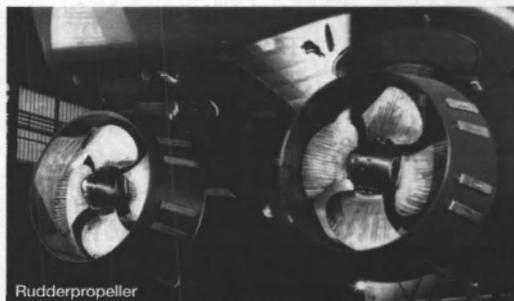
Recent activities at the company include the installation of equipment aboard AGOR research vessels *Revelle*, *Atlantis* and *Ron Brown*; and sales of deep-sea research winches to the Chilean Navy vessel *Vidal Gomez* and to Harbor Branch Oceanographic Institute.

HATLAPA

HATLAPA Utersener Maschinenfabrik GmbH has supplied the deck machinery for Royal Schelde-built ferry *HSV Captain George*.

The equipment consists of two hydraulically-driven rope anchor winches with two fairleads and two capstans.

Producing Thrust



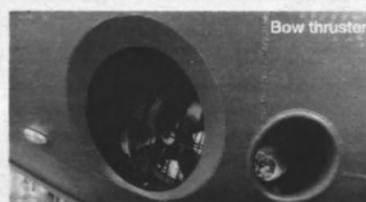
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TEC, Inc.

NETEC recently supplied direct remote control mooring winches and a remote radio-controlled capstan windlass for Blue Circle Cement Barge *Alexandra* which was refurbished at Trinity Gulf pair.

In addition, NETEC has supplied two sets of hydraulic mooring winches, capstans and horizontal windlasses for Morania/Penn Maritime barges being built at Tretna Machine & Iron Works and at Gulf Coast Fabrication, as well as hydraulic capstans and diesel hydraulic power units for two Morania tugs being built at Moss Point Marine.

Additional projects at NETEC include a 100-hp direct torque control winch in use at a hydro-electric dam site in interior Costa Rica and a hydrographic winch for the city of New York.

NETEC's Chelsea factory is supplying a 120,000-lb. line pull hydraulic towing winch for Allied Towing Corp. with a 200-hp diesel hydraulic power unit and two hydraulic towing winches with power units for the U.S. Space Alliance/NASA to recover rocket boosters at the Cape Canaveral space center, and six more sets of deck machinery for the WLM series of Coast Guard buoy tenders being built at Marinette Marine.

Smatco Industries, Inc.

Southern Machine and Tool Company (Smatco) offers a standard line of winches with models ranging in size from 10,000 lb. line pull to the newly designed two million lb. line pull mega winch. The company recently delivered a new Smatco Model 116-EAW-660W anchor handling winch with a line pull of 660,000 lbs. and a cable capacity of 8,000 ft. of three-in. wire rope to Seacor Smit Inc. In addition, Smatco also supplied Seacor with a complete deck machinery package consisting of storage reels, stern roller, tuggers and a windlass for installation onboard 225-ft. *Seacor Vision*. Smatco has also received additional contracts to outfit two 255-ft. anchor handling vessels for Seacor. These units will have a line pull

of one million lbs. on a single drum unit with cable capacity of more than 10,000 ft. of three-in. wire rope and a continuous pull of 750,000 lbs. on the traction winch unit. In the third quarter of this year, Smatco is scheduled to deliver the second Model 140-EAW-1000/1000 anchor handling winch for Ensco Marine.

For information on the companies featured in this section, circle the appropriate number on the Reader Service Card in this edition.

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Finnyards' Rauma Yard. The HSS-type cat ferry plus jack-up rig *Marawah* in the exceptionally wide building dock.

Free-thinking innovation expressed in ship design, engineering, and propulsion systems and concepts has been the central factor in Finland's steady role as a maritime producer and driver of marine technology.

Intensified competition and market pressures demand ever-increasing resourcefulness, and the cluster of Finnish builders and equipment suppliers has responded accordingly. Specialization, quality and contractual performance are cornerstones of its equipment and system suppliers, shipyards and ship operators. As in other main areas of the Finnish industry, the marine sector has a history of providing designs and solutions to project and logistical requirements.

A limited domestic market, in an economy based on just five million inhabitants, has forced Finnish companies to be international in scope. Despite the growing role played by the service sector, manufacturing and industrial production remains the key to Finnish well-being.

Self-reliance and the ability to make business out of a need to provide a product or logistical solution is seemingly endemic to a country which has to cope with every port and maritime artery, the keys to year-round economic life, being icebound for a significant part of each year.

by David Tinsley, technical editor

Often cited, along with Denmark's Odense Staalskibsvaerft, by Japanese shipbuilders as one of Europe's best yards in terms of work practices, technology, performance and hard-nosed competitiveness, Kvaerner Masa-Yards (KMY) has accented passenger ship and gas carrier construction in recent years.

Currency relationships can have a signal bearing on contractual decisions, and in this respect KMY presently has an especially tough task on its hands in the LNG tanker field, for instance, competing with Japanese yards which are currently benefiting from the

weaker yen. But the Finnish shipbuilder — the only Kvaerner-controlled shipbuilder outside Norway headed by local rather than Norwegian management — reasserted its strengths in advanced, quality tonnage by landing the Project Eagle class from Royal Caribbean International (RCI).

The two-ship, \$1 billion contract represents a significant boost to the industry and the Finnish economy. RCI also has an option on a third ship. The remarkable ship type, record-breaking in terms of cruise vessel size, will provide a new showcase for Finnish engineering, by incorporating the Azipod

diesel-electric drive system and Wartsila NSD power plant.

Out of the ice

KMY has considerable experience in designing and building vessels for operation in ice-bound waters. It is convinced of the long-term business scope offered by the logistical problems of transporting materials and oil in Russia's hostile Arctic waters.

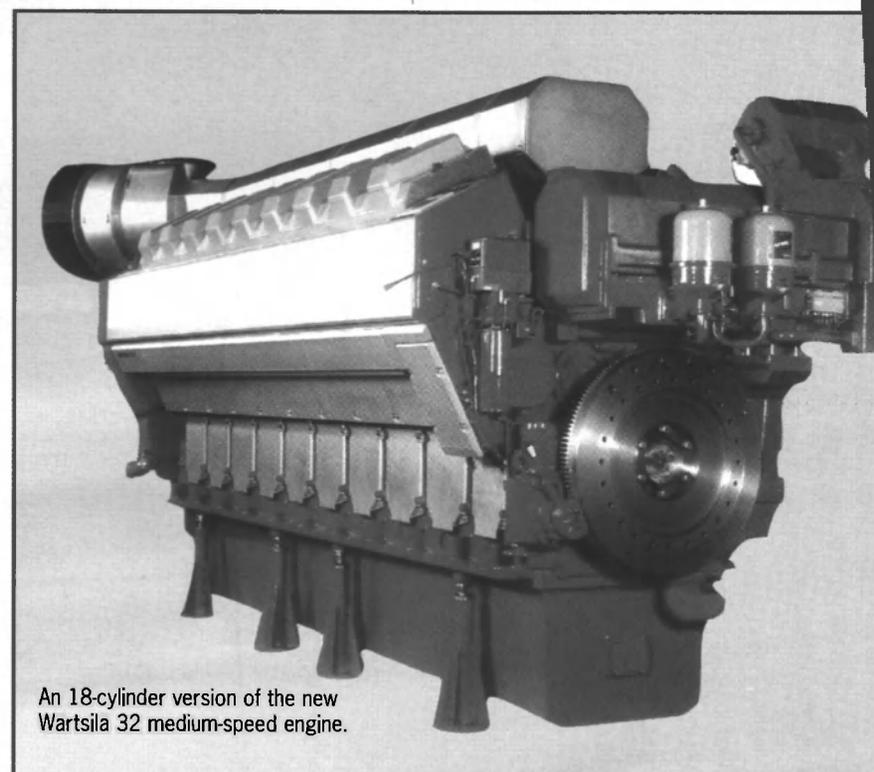
The region has enormous resources still to be tapped, and shipping crude oil, condensate and other liquids by tankers through the North East Passage is widely regarded as the only cost-acceptable transportation possibility in most cases. The revolutionary Double Acting Tanker (DAT) concept has ensued from development work

carried out by KMY and its associated Masa-Yards Arctic Research Centre (MARC).

The subject of close interest by the shipping arm of Finnish energy group Neste, the design provides for astern-going navigation in heavy ice, using an ice bow-like form in the stern together with an Azipod propulsion unit, leaving the actual bow to be faired along the best hydrodynamic lines, while incorporating ice-strengthening.

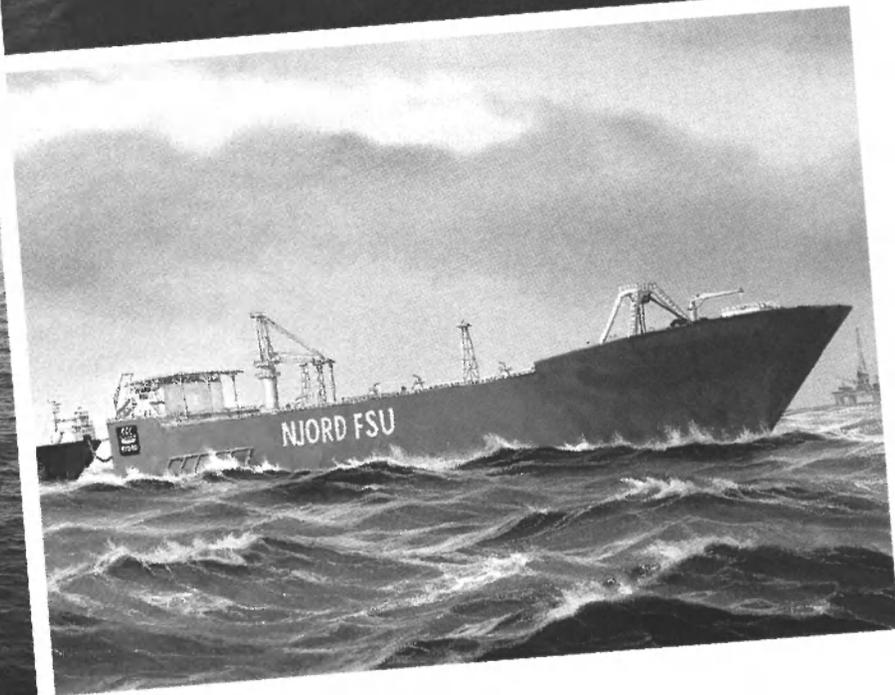
In this way, the ship is more effective in the most demanding ice conditions, and more efficient in open-water navigation, when sailing bow-first.

Studies indicate a 10 to 15 percent higher efficiency factor in open-water conditions compared with vessels incorporat-



An 18-cylinder version of the new Wartsila 32 medium-speed engine.

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ing the usual icebreaking bow arrangements.

Since the stern of the DAT is designed to break the ice, and with the use of a "pulling" Azipod propulsor, it is claimed that such a tanker could reach the required

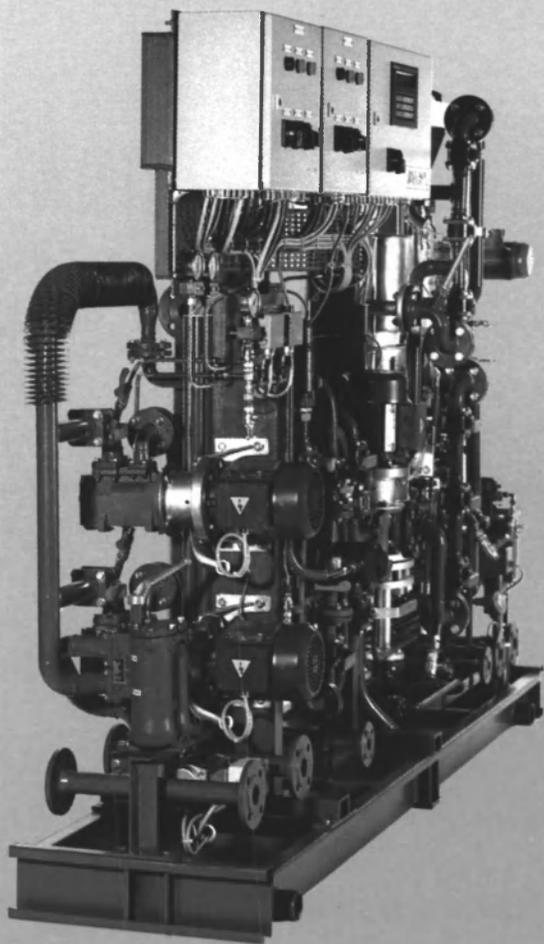
icebreaking capability with a power level of just 60 to 70 percent of that required by a "conventional" icebreaking hull form. Neste, one of the world's most skilled practitioners of Arctic navigation, is valuating the concept in connec-

tion with projects for tankers of around 90,000 and 140,000 dwt.

The latter is the largest size permitting access into the Baltic to Finnish refineries, while the 90,000-dwt type could trade into Russia's western Arctic region.

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ABB MARINE

Helsinki-based ABB Marine, key exponent of variable A propulsion drives, has landed contract from a New Zealand fer newbuilding project in Spain.

The company's Sami Megastar PWM (pulse width modulated) system has been specified for the rail vehicle and passenger ferry awarded by TranzRail to the Astillero Espanoles (AESAs)-controlled Barreras yard in Vigo. Each of the vessel's two propellers will be powered by two 2.6-MW Sami Megastar drives through twin-input/single-output reduction gearing.

The two Danish-owned, double-ended ferries under construction in the Orskov yard in Frederikshavn for the Rody/Puttgarden route also incorporate PWM technology to power four 3-MW Contaz propellers.

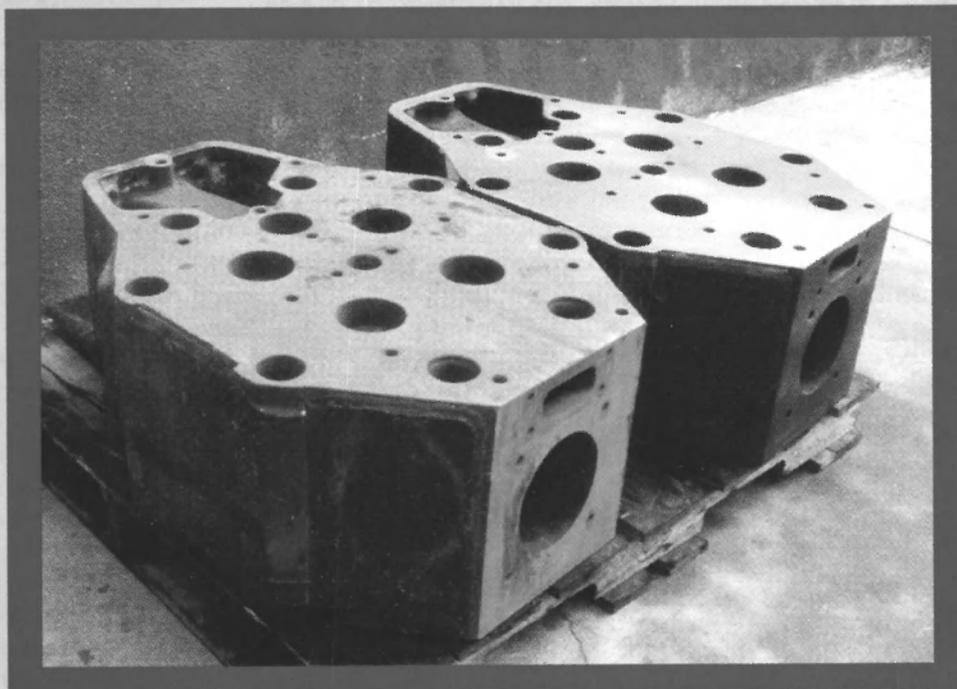
ABB will also supply electric propulsion and power plants for the 130,000-gt Project Eagle liners for RCI, distinguished by the adoption of three 14-MW, cycloconverter-controlled Azipod propulsion units. Two five-MW, Sami Megastar PWM-controlled Azipods are also to be installed in the multi-purpose icebreaker and offshore construction vessel ordered at Finnyards by the Finnish maritime authorities.

Finnyards

Having demonstrated an inherent organizational as well as technical flexibility by undertaking the world's largest-ever aluminum fast ferry project, Finnyards has subsequently responded to new opportunities in the offshore and ice-strengthened vessel sectors.

Taking on the trio of giant HSS 1500 catamaran RoRo ferries for Stena Line was one of the sternest tests of any shipbuilder, and the execution of the contract, following the April handover of third-of-class *Stena Discovery*, has been at some cost to Finnyards' financial results. But the project has equipped the Rauma company for further, potentially fruitful engagement in the field, in which it must now rank as one of a world elite.

It has formulated a range of high-speed designs, embracing monohull as well as catamaran proposals, applying the know-how in pro-



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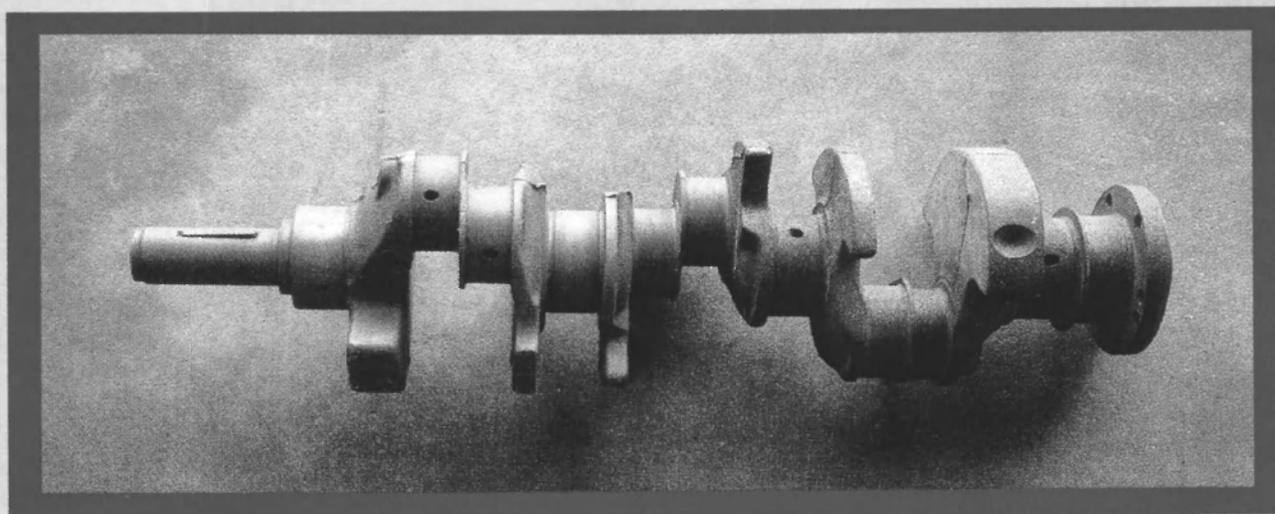
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Finnish Maritime Review

duction procedures and materials technology acquired in the HSS program. The new additions to the ferry portfolio offer speeds from 25 to 45 knots, passenger capacities of 600 to 1,500, and RoRo capacities for 160 to 350 cars.

Given the current investment

hesitancy in the ferry market, Finnyards is developing business in the buoyant offshore sector while promoting long-standing skills in ice-going vessel technology.

Since June this year it has landed a FM80 million contract from

Offshore & Marine of Norway for drillship deck modules, and a FM150 million deal for a 13,200-dwt bulker designed to ensure year-round transits of the northern Baltic.

The Norwegian order entails six modules, to a total steelweight of

2,500 tons, for the adaptation Norway of a multi-purpose shuttle tanker newbuilding presently on hand at the Samsung yard in South Korea. Finnyards is also hoping to attract more offshore work of the type involved in the preparation of jack-up rigs. *Marawah*, formerly used in the Middle East, for transfer through the inland waterway network to the Caspian Sea.

The latest bulker deal awarded by ESL Shipping of Helsinki calls for a geared ship able to transport commodities year-round to Finland's industrial ports, including the northernmost harbors, in the worst ice conditions. Two similar vessels have been produced by the builder and its predecessors during the past six years.

Aquamaster-Rauma: Contaz Benefits Abound

Combining the benefits of contra-rotating propellers with steerable thrusters, the Contaz propulsion concept has found new application this year on double-ended ferries built for a primary, southern Baltic shuttle service.

The latest bearing, gear and shaft technology have been the keys to creating Contaz, developed by Aquamaster-Rauma, part of the Vickers-owned Kamewa Group.

Central to the new system is the principle of juxtaposed, contra-rotating propellers, offering proven advantages in efficiency, maneuvering precision and reduced noise and vibration. The high efficiency factor relative to a standard, single screw installation arises from the near doubling in propeller disc area, and from the absorption of the rotational energy lost in the wake with a conventional solution. Lateral thrust is minimal.

Contaz applies the azimuthing, 360-degree steerability synonymous with the Aquamaster name, while incorporating a streamlined body form to permit higher sailing speeds than those obtainable with conventional thrusters.

The diesel-electric Contaz design is expected to produce fuel consumption savings of 20 percent in a new breed of ferry for the traffic between Denmark and Germany. The partners in the service linking Rodby with Puttgarden, DSB Rederi and Deutsche Fahrgesellschaft Ostsee (DFO),

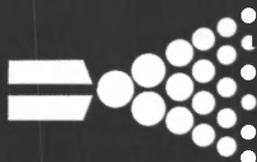
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are now taking delivery of a series of 465.8-ft. (142-m), combined passenger/car/train ferries. Two apiece were ordered from the Orskov yard in Denmark and Van der Giessen-de Noord in the Netherlands.

Each ferry employs four 3,000-

kW Contaz units, mounted two apiece at either end of the vessel. The design flexibility conferred by the propulsors has enabled a bulbous forefoot and streamlined underbody to be used at both ends of the new ferry type, providing further efficiency and speed gain

compared with other "double-enders."

The concept had its first application in the diesel-electric platform supply vessel *Skandi Marstein*, delivered in mid-1996, equipped with twin 2,200-kW Contaz units aft, and a retractable Aquamaster

thruster forward.

Wärtsilä NSD Corp.

Wartsila Diesel's decline in operating profit last year from 5.6 percent to 4 percent of net sales was attributed mainly to cost overruns in production. These, in turn, were a factor of the vigor and scale of the company's renewal program encompassing both its engine range and manufacturing facilities.

The downturn was not reflective of sales activity, in a year which saw Wartsila Diesel deliver a record volume of marine engines and gain 19 percent of the diesel power generation market.

The twin-track emphasis on competitive engine design and in-house production capability, combined with selective acquisitions and partnerships, has been at the root of the company's success in attaining the top slot in the medium-speed sector, and in securing an increasing share of the high-speed field.

Finland's Metra Group, for which Wartsila Diesel constitutes the single largest business area, is confident that the merger of its engine activities with New Sulzer Diesel (NSD), will provide a significant boost in competitive strength. The new company, Zurich-headquartered Wärtsilä NSD Corporation, "offers wide scope for improvements in profits," according to Metra President **Georg Ehrnrooth**.

"However, this will depend on our ability to carry through systematically and with determination the changes that the merger of these companies will require," said Mr. **Ehrnrooth**. Rationalization is inevitable, and is essential in an industry compelled to continuously invest heavily in research and product development and ensure competitiveness with European costings in a business under acute price pressure.

The move to center commercial production of the Finnish-conceived Wartsila 64 diesel, the world's most powerful medium-speed engine, in Italy is an early expression of the intention of the largely Finnish-controlled Wartsila NSD to employ all available facilities in the 'network' to optimum effect.

The new, merged entity has a 40 percent stake in Fincantieri's

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engine building division, Grandi Motori Trieste (GMT), which is best equipped to handle the heavy unit sizes entailed with the 640-mm bore machine, which can deliver a remarkable 2-MW per cylinder.

As the most powerful engine in

the Finnish-originated range until the recent development of the 64 type, the Wartsila 46 has retained its competitive edge since it first went to sea in 1988, over a period of considerable change in market requirements.

Annual sales volume has steadily

risen, and the demand prognosis is such that the company is ploughing some FM 80 million into the development of the Turku plant to efficiently cope with an anticipated doubling in output between 1995 and 2000.

A 5,000-sq.-m. extension to the

factory, to provide a new engine block manufacturing cell and heavy assembly areas, is scheduled to be completed in 1997, with new portal machining facilities due to be ready next year.

Activity at Turku is indicative of two key facets of company: firstly, a strategy of focused production, whereby each factory concentrates on the manufacturing just one or two engine types; and secondly, a policy of maintaining investment in the production facilities in the interests of: unit cost and engine price competitiveness.

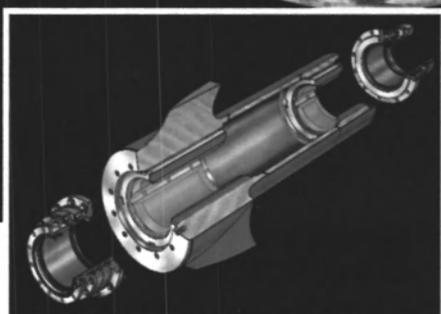
Keeping close control of the manufacturing process, rather than relying heavily on licensees, has always been at the heart of the Wartsila Diesel business philosophy.

Elsewhere in the Finnish domain, the Vaasa factory is also the subject of heavy capital expenditure. This is directed at getting the Wartsila 20 production unit on-stream, and bolstering capacity for the 320-mm bore engines, represented both in the latest versions of the ever-popular Vasa 32 type and in its new, long-term successor, the Wartsila 32.

Notwithstanding the burden it has placed on profits, cash flow and the balance sheet, the virtual renewal of the entire engine range and the modernization of factories in Finland, France and the Netherlands, in particular, underpin the company's long-term growth.

Wartsila NSD's net sales are expected to exceed FM 11 billion in 1997, including more than FM2 billion from various NSD companies. However, costs arising from the restructuring of operations are likely to hamper performance, so that profits in relation to net sales are forecast to remain almost unchanged.

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AZIPOD: Higher Efficiencies Proven In Tank Testing

A classic example of the Finnish propensity for design innovation and high added-value engineering is the Azipod concept, which looks set to revolutionize passenger

(Continued on next page)

(Continued from previous page)

ship propulsion.

It embodies two areas of particular Finnish expertise, namely azimuthing drives and diesel-electric AC power systems. The melding of the two into a product offering economic and operational benefits is characteristic of the Finnish ability to maintain a technological advantage, enabling global competition.

A product of collaboration between Kvaerner Masa-Yards and ABB Industry, Azipod is a podded electrical propulsion unit designed to azimuth through 360 degrees. An AC electric motor located inside the pod gives direct drive to a fixed pitch propeller at either the forward or after end of the unit. Thus, depending on the application, the unit can "pull" tractor-fashion, or "push" in conventional propulsion manner.

The original development work was focused on devising an efficient new means of propulsion for icebreakers and merchant ships intended for the most demanding ice navigation. The scope was subsequently perceived as being much wider, such that the Azipod appendage is set to assume a critical role with the two most prominent U.S.-based cruise operators.

Last month saw the float-out in Helsinki of Carnival Cruise Lines' (CCL's) 70,400-gt *Elation*, equipped with two "pulling" Azipod units, with the propeller at the forward end, for an aggregate propulsive effect of 28 MW. Not only does the installation constitute a breakthrough for the system in the passenger ship field but also entails the most powerful azimuthing drives ever built.

Elation and newbuilding consort *Paradise* testify to an enduring business association between Kvaerner Masa and CCL, registering as the seventh and eighth ships in the Fantasy class. The adoption of twin Azipods enabled the designers to dispense with propellers, shaftlines, rudders, steering gear, inboard electrical propulsion motors and triple stern thrusters employed in the preceding vessels. The space released within the hull has been employed to the benefit of hotel services, through increased sewage treatment, incineration and fresh water capacity.

Model tests indicate a five to seven percent gain in overall hydrodynamic efficiency, which translates into a reduction of 1.4 MW to 2 MW in power needs to achieve the top speed of 22.3 knots

in the earlier ships, or a speed increase of 0.3 to 0.4 knots using the full 28-MW from the two Azipods. Using an aftship underbody form optimized to the podded propulsors, rather than perpetuating the previous hull form, would have attained higher efficiency gains.

The podded propulsors offer enhanced maneuverability — as demonstrated by retrofit installations in Neste's Arctic-going products tankers *Uikku* and *Lunni*.

While *Elation* and *Paradise* will lead application of the system in the cruise ship sector in 1998, RCI has also endorsed the Finnish initiative by specifying Azipod propulsors for its Project Eagle post-Panamax generation of newbuildings from Kvaerner Masa's Turku premises. Each installation will comprise two "pulling" azimuthing units of 14 MW and a centerline, non-azimuthing fixed pod of identical power operating in "pushing" mode.

The first of the 130,000-gt sister-ships, which will rank as the world's largest cruise vessels, is due out in September 1999. One of the design targets for Project Eagle was to achieve a high comfort level throughout the ship, and it was determined that the adoption of three podded propulsors instead of two traditional, heavily-loaded propellers in a variable wake field would significantly help meet this criteria while conferring operational and economic benefits.

The system is an integral part of another capital-intensive newbuilding project in Finland, in the shape of the multi-purpose icebreaker and offshore construction vessel booked with Finnyards by the nation's Board of Navigation. The two 10-MW units in the multi-role vessel will facilitate summer season commitments in the North Sea with installation and workover jobs, and will also provide a further reference for the system in the ice-covered Gulf of Bothnia during the winter months.

Positive results with the initial sea going references in the Neste-operated tankers *Uikku* and *Lunni* could stimulate future applications in Arctic vessel projects.



Kvaerner Masa-Yards' Helsinki yard, with Carnival cruise ships under construction.

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national, regional and local — surrounding these transits have helped forge an alliance of sorts, making operational partners out of oil companies and tug companies. Two of these companies — ARCO Marine, Inc. and Crowley Marine Services, Inc. — along with pilots from Los Angeles/Long Beach, San Francisco, Puget Sound and Valdez — have extended that partnership to crew training.

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The U.S. Coast Guard's interim rule implementing the Standards of Training, Certification and Watchkeeping (STCW), adopted from the International Maritime Organization, is expected to take effect later in 1997. STCW went into effect internationally on February 1, 1997, with full implementation mandated for 2002. Similar regulations con-

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tions and problem-solving.
tional requirements for train-
exist in Alaska in the Valdez
el Emergency Response Plan,
area-specific requirements for
and tanker crews operating in
ce William Sound have been
orth in draft form by the state
aska.

We wanted to get in front of
issue and stay in front of it,"
l **Mike Godbey**, Training
nager, Crowley Marine
vices. "What we have here is
vate industry meeting a
uirement before the govern-
nt imposes it."

The joint ARCO/CMS simulator
ining program — which started
t fall at the MarineSafety facil-
in San Diego — reportedly sat-
es all of the above require-
nts for training aforementioned
ssel crews, including the
askan draft-form stipulations
d the STCW requirements.

New Team

The teaming of ARCO and CMS
r simulator training serves the
al purpose of satisfying regula-
ry requirements while reducing
erall training costs for both com-
nies. Though it is unusual for a
nker company and a tug compa-
y to team up for training, it is a
gical outgrowth.

Two years ago the Alyeska
ipeline Service Co., of which
RCO is a member, and CMS
ntered into an alliance for marine
esponse equipment and services
n Prince William Sound that con-
entrated a majority of oil spill
esponse equipment located in
Valdez under the management of
Crowley. In addition, ARCO has
een a customer of CMS on the
West Coast for many years.

The philosophical basis for sim-
ulator training that would involve
the two companies, in collabora-
tion with other marine and com-
munity partners in all four major
West Coast ports, was discussed in
a conversation between **Vic
Goldberg**, ARCO Marine
Operations vice president, and
Gary Faber, who serves in the
same capacity for CMS. It was

soon followed up by meetings orga-
nized by **Frank Lee**, ARCO
Marine's director of Fleet
Training, and CMS' **Mike
Godbey**.

Both ARCO and CMS had had
previous experience with simula-
tor training facilities; in fact,

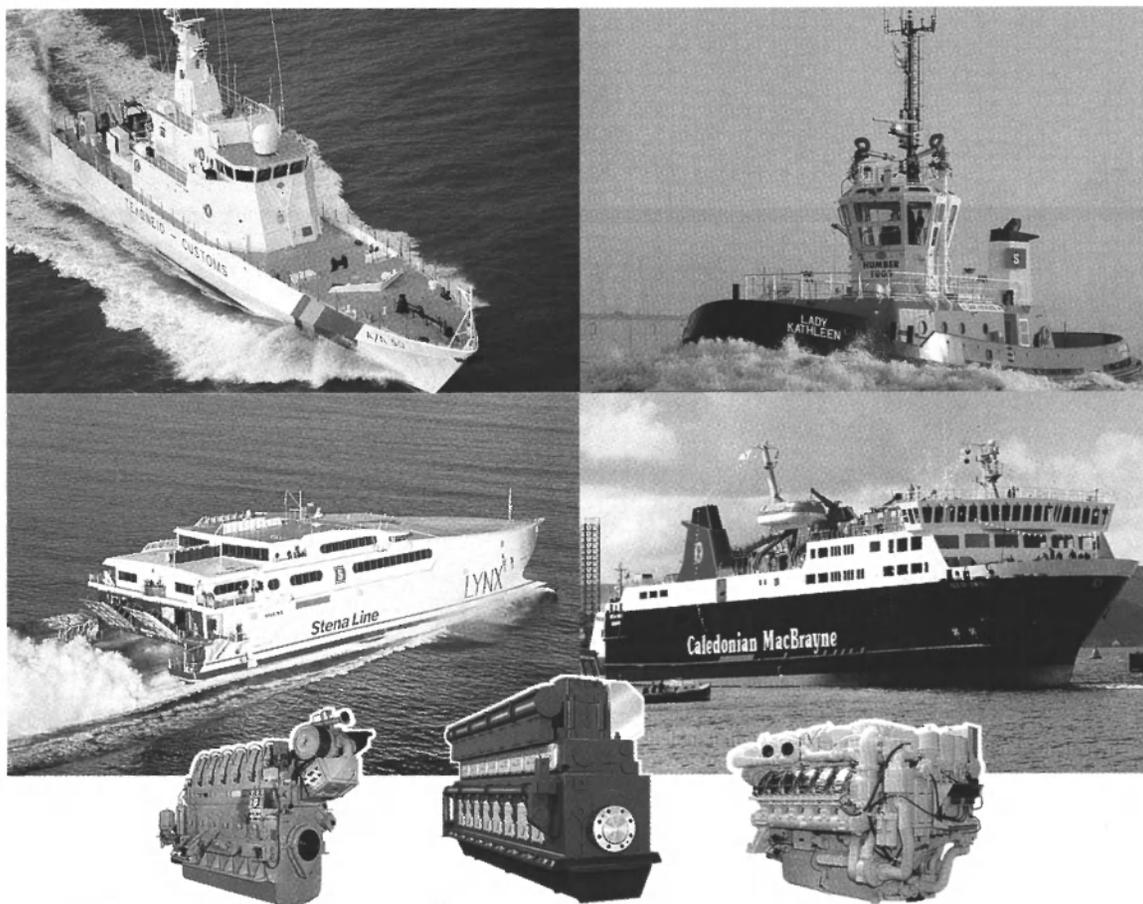
ARCO had already completed a
Bridge Team Management pro-
gram that began in 1993 and is
currently in the refresher phase.

"Our focus in our earlier train-
ing was also more towards the
teamwork side, the communica-
tions issues, and changing the cul-

ture on the ship from the hierar-
chical military-type structure to a
more team-based structure for
running a ship," said Mr. **Lee**.

For the joint program, ARCO
and CMS chose MarineSafety
International (MSI) to seve as the
simulation facility. The manual

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SAFETY AT SEA

for the program was put together as a team effort by ARCO, Crowley and MSI, using as a basis Alyeska's Vessel Escort Response Program Procedures and a disabled tanker towing study developed by The Glosten Associates, Inc. in Seattle, plus materials pre-

viously produced by ARCO and CMS.

The resultant simulation scenarios address real-world situations in real-world conditions. Valdez-specific scenarios, for example, force trainees to deal with such potentially catastrophic

situations as tanker steering failure and tanker propulsion failure in the restricted operating arena of the Valdez Narrows.

"Each time we conduct the training, we continue to refine what we do and the scenarios we run," said Adm. **Dave Ramsey**

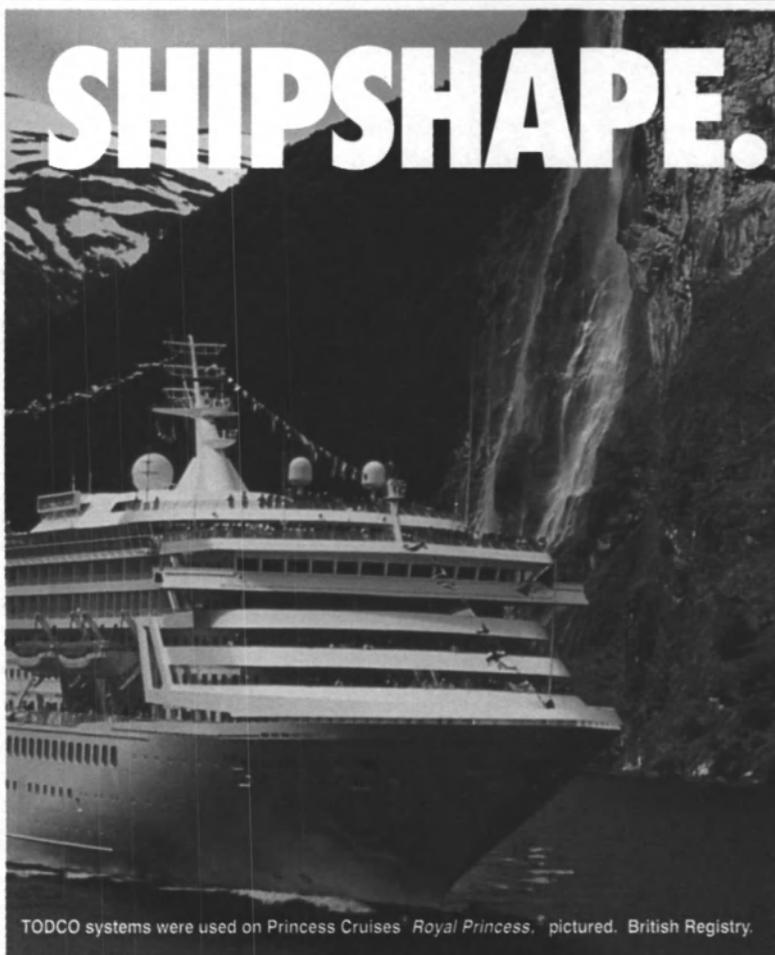
(U.S. Navy ret.), who is director of MSI's West Coast simulator facility. "It's an evolutionary process because we're keeping it up to date based on any changes that come out of the Alyeska Operations Procedures Manual. We make it exciting that nobody can afford to sit back and put it in automatic mode."

The joint training utilizes interactive simulators that enable the tanker crew, tug crew, and pilots to train on the same scenarios simultaneously.

In addition to three scenarios related to Alyeska/Valdez operations, scenarios have been developed covering Puget Sound, San Francisco Bay, and the harbors of Los Angeles/Long Beach. CMS crew and pilots from all these locations are participating in this training, and ARCO is reportedly covering the full cost of the pilots' participation.

To date, six joint sessions have been conducted, and monthly sessions are scheduled for the remainder of this year.

Each session consists of five days for six CMS masters and mates, joined for the last three days by six ARCO captains, chief mates and helmspeople. Pilots from the Southwest Pilot Association in Alaska have been invited to participate on a regular basis, and ARCO expects to also include pilots from Puget Sound, Long Beach/Los Angeles, and San Francisco.

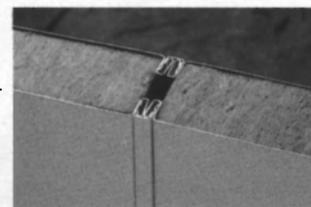


TODCO systems were used on Princess Cruises' Royal Princess, pictured. British Registry.

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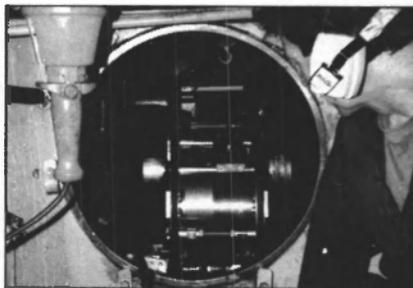


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Cooperative Training

"The real power of our simulator training program comes from the perspectives that the personnel learn to share, that is, gaining the perspective of the other party," said Mr. Lee. The most important difference, and perhaps the most important training tool is the insight gained from the opportunity for all participants to interchange roles.

"It's a big eye-opener for everybody involved," said Mr. Godbey. "Everyone comes away with a better understanding of what they are expected to do and why, as well as how it looks from the other perspective."

At the outset, CMS considered a more traditional classroom-based training program to fulfill the needs of its personnel and satisfy regulatory requirements. The company realized, however, that taking personnel off the vessel for training was taking them out of

lement.

Value of the simulator is for personnel in situations they have to react, and they do so by communicating to someone else what they are doing," says Mr. Godbey. "Seventy to 70 percent of all marine accidents are caused by human error, that's what we're trying to address by using the simulator for training in that kind of interaction between different crews."

ARCO's Frank Lee pointed to the additional advantage of using simulator training to reinforce operational issues such as the proper way to steer when a tug is pulled up astern and other assistances are being applied. "Not only do our people learn in a situation where there is no risk of hurting anyone or the environment," said Lee, continuing, "But also, we can accelerate the learning in time because we can end an exercise where it has its most impact and move on to the next learning point something we can't do when we're conducting an exercise on a ship."

"The overarching mission is safety at sea, including safety of the ships and of the people, as well as safety of the environment," said Adm. Ramsey. "What we have

done with the specific scenarios is to provide in a benign situation an opportunity for companies, pilots, tanker people and tug people to flesh out any sort of misunderstanding that might occur either in communications systems or in the company policies that govern pro-

cedures. In addition, the training allows for a better understanding of the interaction of the units in order to achieve safe passage."

MSI's San Diego simulator facility is one of several the company operates. Other MSI simulators are located at Newport, R.I.;

Vallejo, Calif.; and Rotterdam in the Netherlands. A new complex is being built in Norfolk, Va. MSI in San Diego provides approximately 2,500 hours of training annually for the U.S. Navy, in addition to its commitment to ARCO Marine, Inc. and Crowley Marine Services.



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Circle 307 on Reader Service Card

Maritrans To Buy Sun Transport For \$30 Million

Maritrans Inc. agreed to buy the remaining assets of Sun Co. Inc.'s Sun Transport for \$30 million, said **Stephen A. Van Dyck**, Chairman and CEO. Under the agreement, Maritrans said it will buy six vessels, which are:

- The MT *New York Sun*, a 34,000-dwt petroleum tanker currently on charter to the Military Sealift Command;
- The MT *Philadelphia Sun*, which will continue to be employed by Sun Company in its lube oil trade;
- Two tug and barge units, the *Puerto Rico Sun/Borinquen Sun* and the *Seminole Sun/Caribe Sun*, which will remain in service to Sun's Puerto Rico operations.

Mr. Van Dyck said, "We are extremely pleased with this logical expansion of our fleet and service capability. We expect these acquisitions will contribute positively to our net income and cash flow both in the short and long term."

Stena Line Expects EU Approval Of Merger

Swedish ferry operator Stena Line AB said at the end of July that it expects the European Union (EU) commission to approve its proposed merger of cross-channel ferry operations with P&O. The

plan involves the two ferry lines pooling resources on Dover-Calais, Dover-Zeebrugge, and Newhaven-Dieppe routes to compete mainly with the Eurotunnel.

Stena Line and P&O received a "letter of serious doubts" from the EU commission in early June regarding the merger.

The cooperation also requires

approval from the British government. The French government has already given its approval. While there is no timeline for expected approval, at press time it appeared that a decision would not be made by the start of August, which is the route's traditional high season.

The new company has estimated total restructuring costs would be

\$58 million.

The new group's operation will be controlled jointly and equally by the British and Swedish operators, but Stena Line will own 40 percent and P&O will hold a 60 percent financial stake.

South Korean Ship Orders Up

South Korean shipyards received a new order level almost triple the level recorded in the same period last year.

According to several sources, South Korean shipbuilders received orders for 92 ships totaling 1.94 million gt for the first six months of 1997, versus 49 ships totaling 1.94 million gt for the first six months of 1996.

Backlogged orders at the end of June reportedly totaled 294 ships or 15.1 million gt, compared to 270 ships and 11.9 million gt a year ago.

Industry experts point to the aging fleet — particularly VLCCs — and the growing use of double-hull tankers as helping to drive demand for new ships. The demand for double hulls may increase following the recent *Diamond Grace* spill in Japan. The Japanese Shipowners Association will reportedly promote a switch to double-hulled tankers. This was part of an announcement during which the association also divulged that it planned a review of navigation conditions for large tankers entering congested ports in Japan.

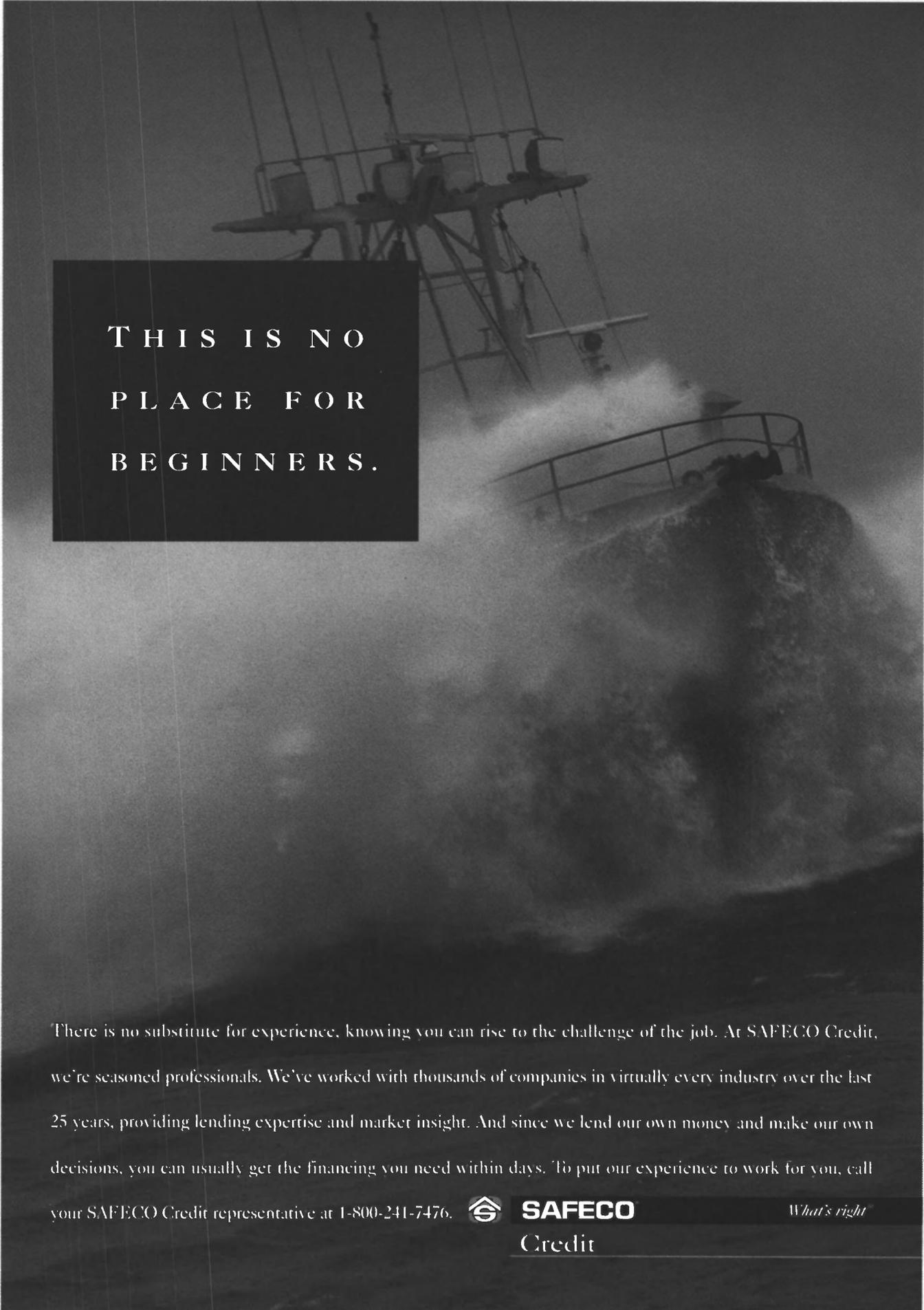
South Korea's annual shipbuilding capacity is estimated at about eight million gt, while Japan has a capacity of about 10 million gt.

AESA Wins Offshore Conversion Contract

Astilleros Espanoles Astano has been contracted by Esmeril of Brazil to convert a 300,000-dwt VLCC into a floating, storage and offloading (FSO) unit for \$14.4 million.

The converted vessel is scheduled for delivery in November 1998. The FSO will be moored at a depth of 3,300 ft. (1,000 m) in the Roncador field for servicing production units operated by Petrobras in the Brazilian offshore area.

Astano has also designed and is



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currently building a floating drilling monohull unit for Transocean, capable of operating in waters 3,000-fsw deep for work in the Mexican Gulf.

MHI Improves Marine Diesel Engine

Mitsubishi Heavy Industries, Ltd. (MHI) has improved upon its UEC37LSII marine diesel, the most recent of the company's UE series.

The new UEC37LSII will be available with five to eight cylinders, and power output ranging from 5,250 to 8,400 ps.

For more information on MHI
Circle 14 on Reader Service Card

UEC37LSII specifications

Cylinder Bore 370 mm
Piston stroke 1,290 mm
Maximum output 1,050 ps/cyl
Engine speed 186 rpm
Fuel oil consumption 129 g/ps h
Length, o.a. 4,861 mm (6-cylinder model)
Weight 76 tons (6-cylinder model)

Cummins-Powered Boats Prepared For Delivery

M/V Sir Winston

A steel-hulled dinner cruise vessel for the Florida market was scheduled to be delivered in early August for owner Winston Knauss of Ft. Lauderdale. Designed by DeJong and Lebet of Jacksonville, Fla., the 400-passenger vessel is powered by a pair of Cummins 6CTA 8.3-M engines producing 300 hp at 2,500 rpm.

The engines will turn four blade 30 x 27-in. propellers through ZF 300C IRM 301 A-2 gears with a 2.91:1 ratio. Designer **Andrew Lebet** said, "This is the third vessel that we have designed for that company with the same power package and the second from Marine Builders."

The new boat has a pair of Cummins/Onan 95 kW gensets and a 76-hp Cummins 4B3.9M powered bowthruster.

"Hydraulics whine, they don't work right, you need to make sure you have the right generator up and running," explained Mr. **Lebet**. "If a diesel engine will fit, we prefer to use that."

Sir Winston has crew accommodations and a galley capable of serving guests with an elevator to move people and food between

decks.

"The boat is one of the first to be approved under Subchapter "K" of the U.S. Coast Guard," said Mr. **Lebet**.

"It is a good-looking little tug," said **Bill Preston** of Pensacola-based Marine Design of the boat building to his drawings at Marine

Builders in Utica, Ind.

The 50 x 16.5-ft. (15 x 5 m) tug-boat will be responsible for moving a barge which services navigation aids for the St. Lawrence Seaway Corp.

Slated for an August 30 delivery, the boat will be powered by a pair of Cummins NTA-855 diesels

delivering 270 hp each to a pair 46 x 30-in., four-bladed props through Twin Disc MG-5091 3.82:1 gears.

Interior spaces of the heavily constructed steel hull and cabin will be served by a hot water heating system.

For river use, the boat will be equipped with water lubricated,

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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.

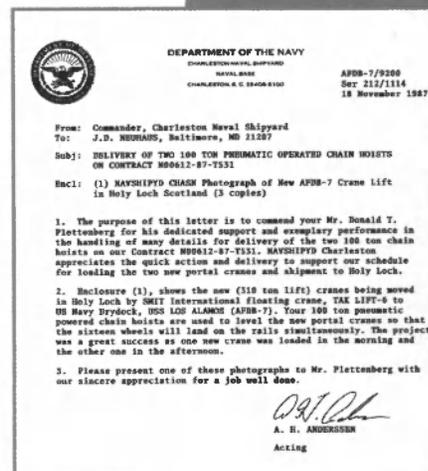
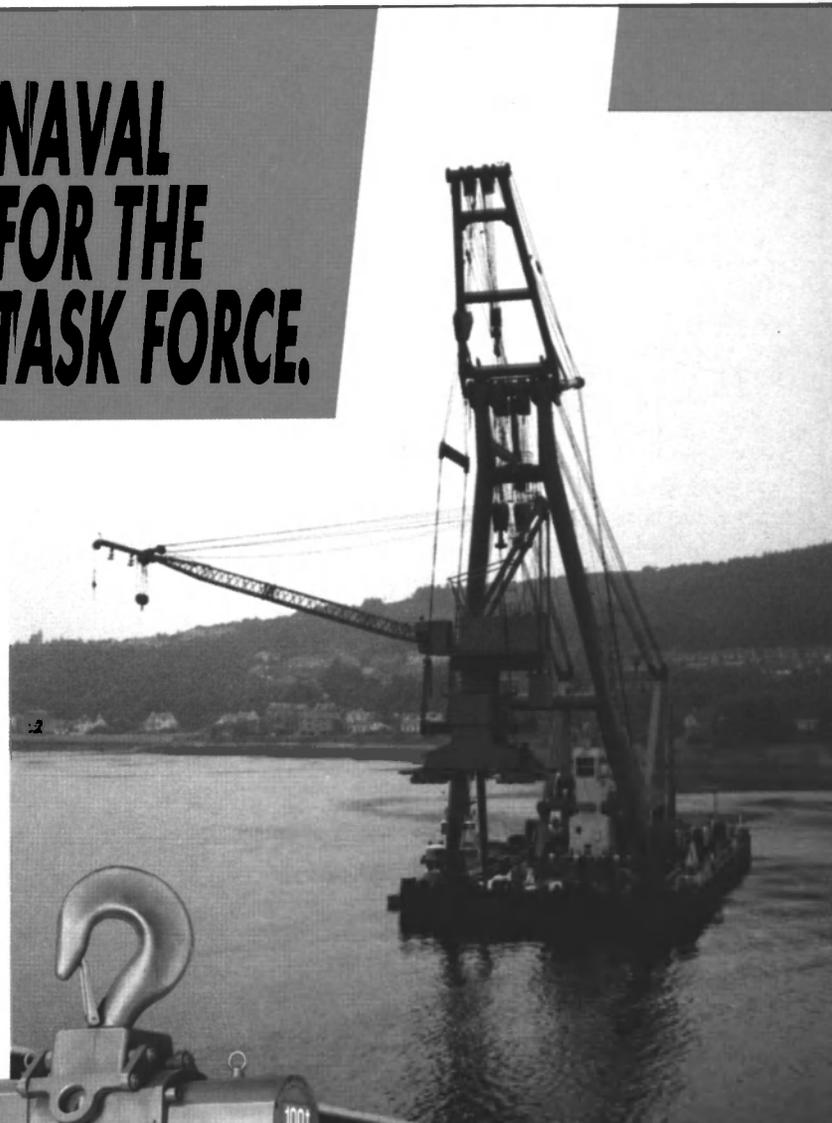
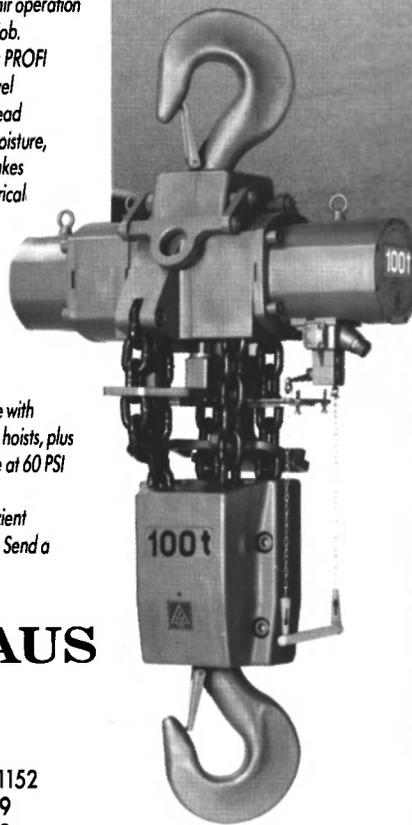
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MES Delivers Bulk Carrier *Lepta Mercury*

The 46,670-dwt bulk carrier *Lepta Mercury*, built at the Tamano Works of Mitsui

Engineering & Shipbuilding Co., Ltd. (MES), has been completed and delivered to owner Lepta Shipping Co., Ltd.

The new handy-sized bulker features five cargo holds with a total of four cranes. *Lepta Mercury* is the twelfth sistership of MES 46,500-dwt bulk carriers.

For more information on MES
Circle 23 on Reader Service Card

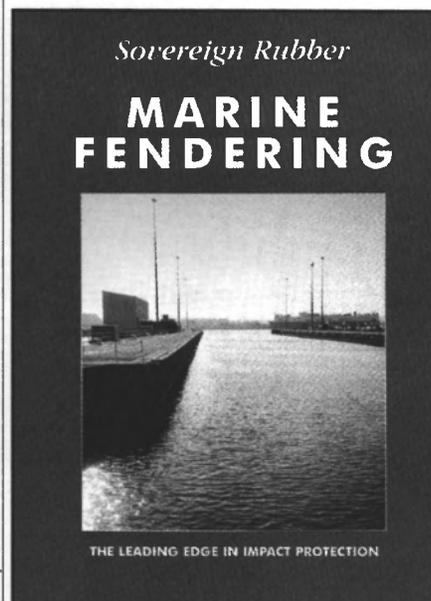


Lepta Mercury is shown above.

Lepta Mercury main particulars

Length, o.a.	623 ft. (189.8 m)
Breadth, molded	102 ft. (31 m)
Depth, molded	54 ft. (16.5 m)
Draft, molded	38 ft. (11.6 m)
DWT	46,670
Main engine	Mitsui-MAN B&W 6S50MC diesel
Speed	16.83 knots

SRA Unveils Fender Line Data Brochure



Sovereign Rubber America (SRA) has released an eight-page, color brochure providing important technical and performance data on its fender line featuring extruded, molded and wrapped designs. One SRA fender type has been specified and used by Saint John Shipbuilding Ltd. of Canada for two Z-drive 4,000-hp tugs purchased by Atlantic Towing Ltd.

For more information
Circle 22 on Reader Service Card

Marinetics Signs New Reps

Marinetics Corp. has selected the following new representatives: Ocean Marketing/Ocean Southeast, Atlantic Coast; Anchor Associates, Great Lakes region; Barr Leanord, Pacific Northwest and Western Canada; Midwestern Sales, Plains states; and G.W. Clapper and Associates, Gulf

(Continued on page 67)

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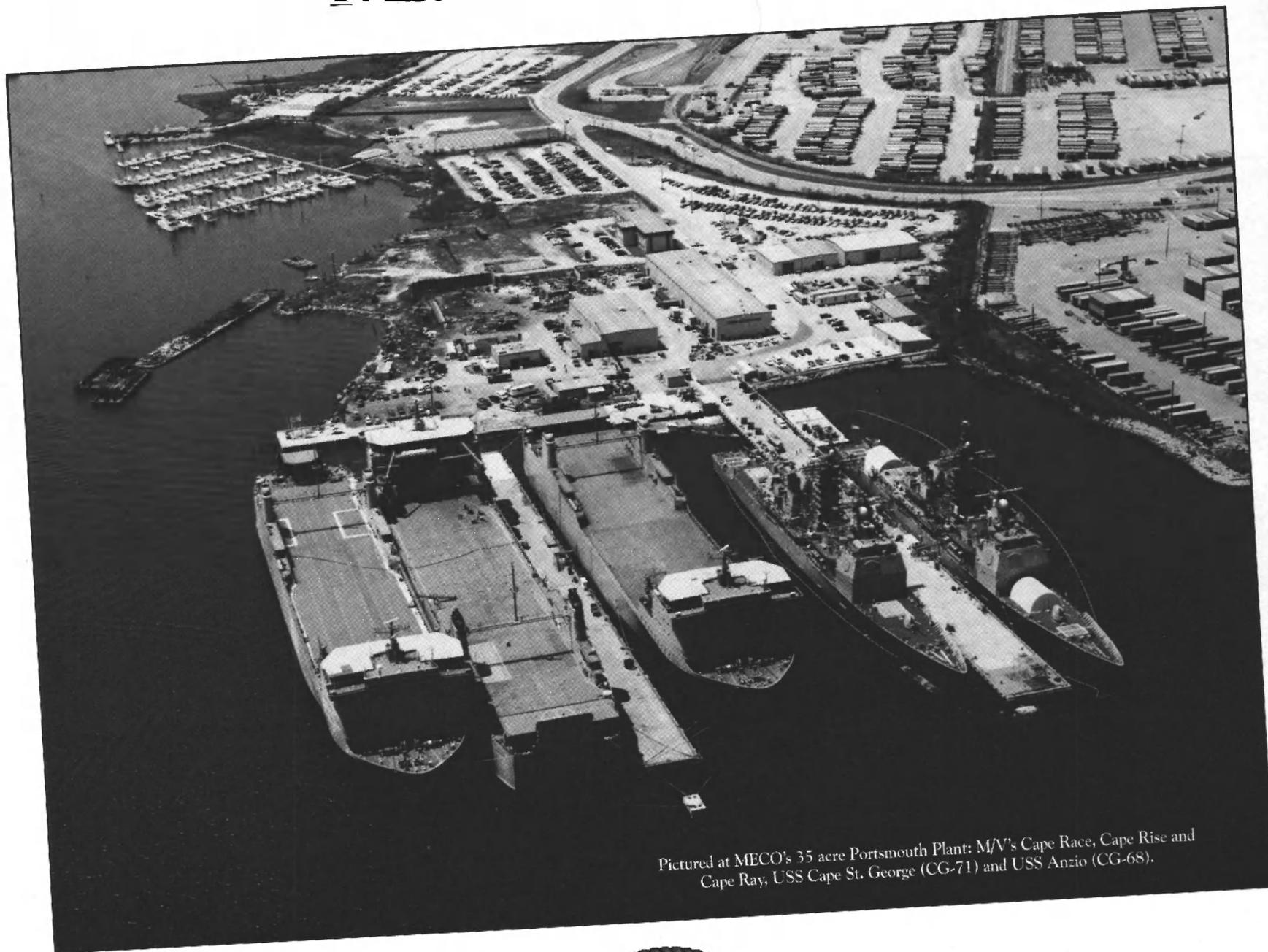
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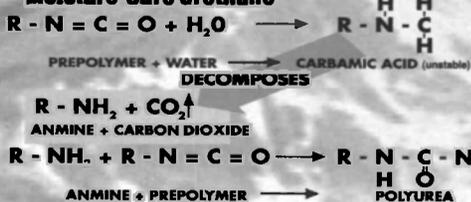
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Continued from page 64)

more information on Marinetics
Circle 21 on Reader Service Card

Introduces New Inmarsat C Satellite

SEA, Inc., a unit of Datamarine International, Inc., has introduced SEASAT 3 Inmarsat C satellite, type approved for GMDSS in accordance with the specifications stated in Change Notice #114 of the Inmarsat C System Definition Manual.

SEASAT 3 is a high-technology data communications transceiver which utilizes the Inmarsat C satellite data network to digitally transmit and receive text messages.

SEA offers various computer peripheral devices designed specifically to support data terminal requirements when using SEASAT 3 in GMDSS applications.

For more information on SEA, Inc.
Circle 24 on Reader Service Card

Hitachi Zosen Completes One Order And Wins Another

Oinoussian Leader, a 71,694-dwt bulk carrier ordered by Nissho Iwai Corp., was completed and delivered to its owner by Hitachi Zosen's Maizuru Works.

The Panamanian-flagged vessel is the 87th Hitachi Panamax and the ninth Hitachi Panamax Optima vessel and is equipped with a MAN-B&W 6S60MC main diesel engine, with a Hitachi Zosen Super Stream Duct (SSD) at its stern.

Maizuru Works will also build Hitachi Zosen's first order for two Panamax Jumbo class vessels for South African Marine Corp. Ltd. (Safmarine), through Nissho Iwai Corp. and Golden Ocean Group. The contract was made with Golden Ocean Group and time-chartered to Safmarine for 12 years.

The first of the new vessels will be delivered in the first quarter of 1999, with the second following in the second quarter.

The vessels will each feature a dwt in excess of 75,000 and a cargo volume of approximately 90,000 sq. m. ABS Safe Hull, and IACS' unified requirements for new bulk carriers will be applied to each vessel.



In addition, SOLAS visibility requirements will be satisfied by six-layer accommodations.

For more information on
Hitachi Zosen
Circle 20 on Reader Service
Card

On the left, *Oinoussian Leader*.

Oinoussian Leader specifications

Length, o.a.	705.4 ft. (215 m)
Breadth	106 ft. (32.2 m)
Depth .....	.61 ft. (18.6 m)
Full draft	44.1 ft. (13.5 m)
Gross tonnage	37,808
DWT	71,694
Speed	16.6 knots
Classification	LRS



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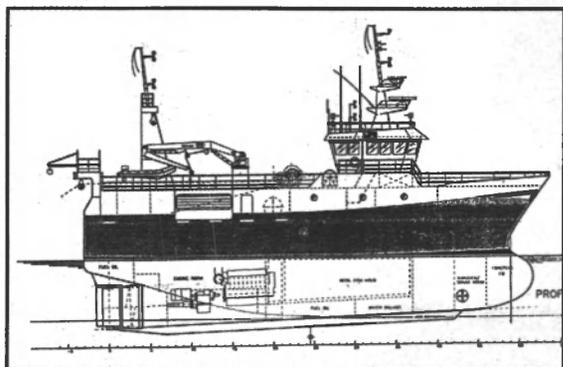
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SSS-100K
Side Scan Sonar
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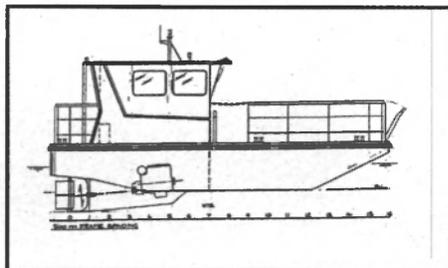
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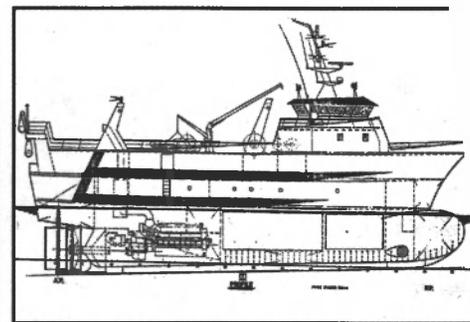
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On the left, Vik and Sandvik-designed trawler.



On the right, McAllister-designed barge.



McDuff-designed trawler.

Groveready Wins Ailsa Troon Contract

Groveready Ltd. has been chosen by Ailsa Troon Ltd. to design, manufacture and supply steering gear for five vessels being built by the shipyard.

The first vessel, a 44-ft. (13.4-m) barge designed by S.C. McAllister, is currently the final stages of fitting out.

Construction will commence shortly on two 131-ft. (40-m) white fish trawlers designed by McDuff Ship Design, and a

Vik and Sandvik-designed 112-ft. (34-m) vessel.

In addition, a fifth set of steering gear is to be fitted to a 27.2-ft. (8.3-m) barge designed by S.C. McAllister, being built at the yard for Manchester Ship Canal.

For more information on Groveready
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75009 Paris, France
Telephone: +33 1 4246 9571
Fax: +33 1 4246 8508

HMI Moves Forward With Thruster Production

Harbormaster Marine Inc. (HMI) has begun a scheduled production run of Model BT-200 thrusters.

The BT-200, designed for ships under 150 ft. (46 m), uses a 36-in., four-blade propeller turning at 643 rpm and powered by diesel, hydraulic or electric power of 150 to 200 hp at 1,800 to 2,000 rpm.

Fairbanks Morse And Baylor Provide Platform Engines

The Fairbanks Morse Engine Division of Coltec Industries has received an order to supply two 2,365-kW dual fuel engines to be coupled with two Baylor Co. totally enclosed, 2,365-kW generators. The units will generate power to China National Offshore Oil's *Weiz Hou* platform located in Beibu Bay, South China Sea.

For more information on
Fairbanks Morse
Circle 25 on Reader Service Card

For more information on
Baylor Co.
Circle 26 on Reader Service Card

HATCHES



quick-
open or
bolt down
8" round
to
33"x48"

We also specialize in
POT HAULERS

10" and 12"

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cleats • blocks • deck irons •
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FAX (360) 855-0916

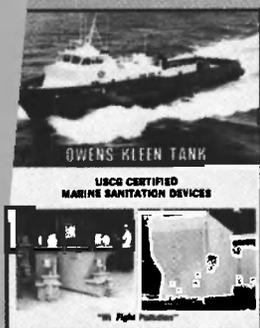
\$1.75 Billion Order 7 LNG Carriers Ordered By Korea Gas

Korea Gas Corp. has reportedly awarded seven liquefied natural gas (LNG) carrier orders to four domestic firms, a Korea Gas official said. Hyundai Merchant Marine Co., Yukong Line Ltd. and Hanjin Shipping Co. each won orders for two carriers and Korea Line Corp. for one.

Each selected firm teamed up with a shipbuilding company: Hyundai with Hyundai Heavy Industries Co.; Yukong with Samsung Heavy Industries Ltd.; Hanjin with Hanjin Heavy Industries Co.; and Korea Line with Daewoo Heavy Industries Co. South Korea plans to put the carriers in operation in the year 2000 to transport LNG imports. Each LNG carrier is estimated to cost approximately \$250 million, bringing the seven-ship order total to about \$1.75 billion.

Marine Literature

Review



Marine Wastewater Treatment Systems

The OWENS KLEEN-TANK utilizes aeration and operates as an extended biological aeration system. It is self-contained and delivered to site ready for operation when site electrical and mechanical connections are in place. The Kleen Tank can be designed for small, hard to fit areas and have a capacity range from 33 GPD to several thousand GPD.

CIRCLE NO. 105



High Technology Products

ITW Philadelphia Resins provides proven products for all types of vessels, offshore platforms, mooring buoys, crane rails and other shipboard and dockside installations are featured in an informative brochure. Applications include poured-in-place epoxy chocks for main propulsion systems.

CIRCLE NO. 106



Fire Suppression Systems

Halotron, Inc. develops and manufactures and markets environmentally friendly fire suppression agents. The first generation of products are designed as successors to ozone-depleting halons. Halotron I is designed for streaming applications in portable and handheld extinguishers to replace halon 1211.

CIRCLE NO. 197



A Leader in the Marine Industry

Houma Fabricators is a full-service shipyard capable of turnkey construction and conversion from design to finished product. Houma produces a quality product that is second to none. Our diverse capabilities also include vessel conversion, barge construction, and oilfield fabrication.

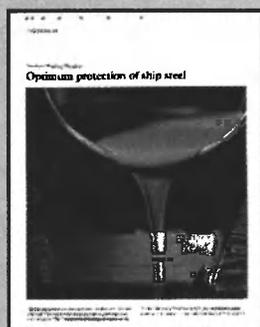
CIRCLE NO. 198



Cleanable Spin-On Oil Filters

Nelson Division has announced the publication of an EcoClean® Cleanable Spin-On Filter Product Guide. The new guide provides cross reference information by part number and manufacturer and also covers installation, cleaning and element change instructions.

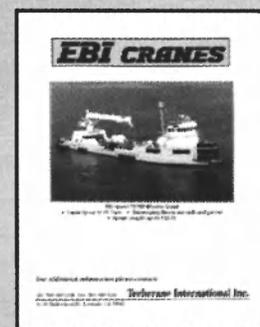
CIRCLE NO. 199



Optimum Protection of Ship Steel

The life expectancies of coating systems on ships are often not achieved. TNO's Product Testing Division can help to establish the exact cause of premature corrosion and other forms of deterioration. TNO is regularly conducts damage inspections for clients in the maritime, inland navigation and yacht building sectors.

CIRCLE NO. 100



EBI Cranes

Techcrane International offers a range of EBI Marine Cranes with lifting capacities from 2.5 tons to 75 tons; boom lengths from 15 ft. to 100 ft.; fixed and telescopic booms. The telescopic booms have a unique rack and pinion mechanism which means fewer repairs and less costly down time. All cranes are in compliance with API, OSHA, ABS, Lloyds and the US Coast Guard.

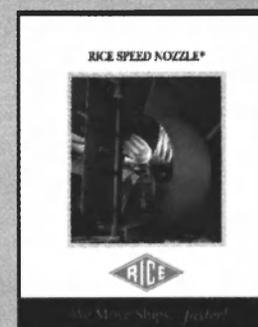
CIRCLE NO. 101



Oil Mist Detection Systems

QMI Oil Mist Detection Systems provides protection from the hazards of oil mist: the QMI engine detector for crankcases, gear and chain cases, pumps, compressors, gear boxes and thrust bearing housings; and the QMI Atmospheric Detector for all machine rooms with fuel, lubricating or hydraulic oil lines, etc.

CIRCLE NO. 102



We Move Ships ... Faster!

The major supplier of propellers and nozzles for the USA and the Americas, Rice Propellers features the following products: propellers from 30" to 144" in diameter in 3, 4 and 5 blades; Rice Speed Nozzles (patent pending) from 40" to 150" ID; and complete propulsion packages for FP systems.

CIRCLE NO. 103

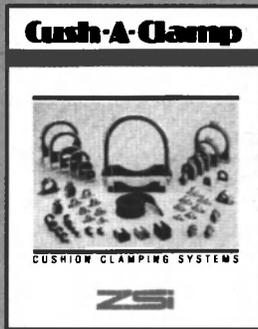


FF-W Copper-Nickel Socket Weld Fittings

Flagg Brass has been a leading manufacturer of bronze fittings for the shipbuilding industry for over fifty years. The name "Flagg-Flow" is synonymous with quality piping connections.

For more information call 1-800-877-3524.

CIRCLE NO. 104



Cushion Clamping Systems
Cush-A-Clamp cushioned clamping systems for securing pipe, tube, and hose are featured in this brochure from ZSI. Patented "Controlled Squeeze" clamps prevent overtightening and a "Living Hinge" allows the cushions to be spread easily for quick installation. accessories.
CIRCLE NO. 107



Synthetic Marine Lubricants
Mobile Marine Sales and Service, Fairfax, VA, has published a brochure about its complete range of marine-specific synthetic lubricants. More than 700 equipment manufacturers approve and recommend Mobil synthetic lubricants. Mobil, 3225 Gallows Road, Fairfax, VA 22037-0001. Tel: 732-225-3084.. **CIRCLE NO. 108**



Seaworthy Choices
Choose Smith Berger for the highest quality deck hardware for your offshore, towing, oceanographic, dredging and workboat needs. Products include: fairleads • deck sheaves • chain stoppers • flag blocks • tow pins • stern rollers. Smith Berger had been the leader in deck hardware for over 60 years.
CIRCLE NO. 109



Marine Tank Level and Draft Monitoring
KING-GAGE Marine Systems service the needs of both ocean-going and freshwater vessels. They have been used extensively on commercial and naval fleets for tank level gauging and vessel draft measurement. System components are well suited to the unique rigors of marine service.
CIRCLE NO. 110



Electronic Charting and Tides & Currents ... Made Easy
Nautical Software produces two navigation tools: Tides and Currents for Windows and ChartView. Tides and Currents predicts tides for thousands of stations through the year 2100 and comes in Dos or Windows 3.1 and Windows 95 versions.
CIRCLE NO. 111



Original MAN B&W Diesel Spare Parts
MAN B&W Diesel works supply top quality products to customers all over the world. From parts for engines that are over 50 years old, to the development of spare parts that meet the demands of the future, MAN B&W's commitment to quality continues to ensure their leading position.
CIRCLE NO. 112



Coated Abrasives Manufacturers Institute
"Coated Abrasives: Modern Tool of Industry," a series of pamphlets sponsored by the Coated Abrasives Manufacturers Institute, has been prepared and published to answer the need for an up-to-date reference on coated abrasives and the real variety of their uses and methods of application.
CIRCLE NO. 113



New Swirl-Off Scarifier Catalog
Swirl-Off scarifier catalog shows many models and styles of rotary tools to strip away unwanted marine growths, paint, coatings or rust. Tools mount on pneumatic grinders for underwater use or any portable grinder, drill or polisher. Easier than scraping, blasting or chemicals.
CIRCLE NO. 114



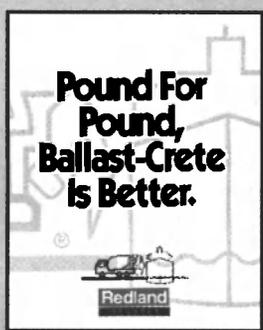
Serious Air for Serious Places
Dry Air Technology designs, engineers and manufactures environmental control equipment for the marine industry. Products include high-performance, light-weight ventilators and commercial dehumidifiers for complete control in all types of work environments.
CIRCLE NO. 115



Flange Facing Systems
Wachs make flange facing fast, affordable and easy. Now, anyone can produce a lathe quality surface finish on flat and raised face flanges in minutes. Wachs flange facing systems feature fast and easy set up, simple operation, solid performance and built in versatility.
CIRCLE NO. 116



Marine Maneuvering and Propulsion Systems
For over twenty-five years, OmniTHRUSTER™ has been a world leader in the development of waterjet maneuvering systems. Our unique patented designs provide diverse maneuvering ability and auxiliary propulsion.
CIRCLE NO. 117



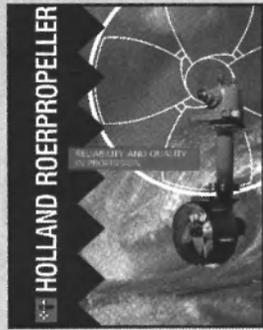
The Ballast-Crete Advantage
Ballast-Crete has fast become the referred choice in ballasting for shipyards, naval architects and engineers around the world. Its superior performance under demanding conditions coupled with the expertise of Redland Genstar's technical staff have allowed us to answer just about any stability concern.
CIRCLE NO. 118



Baldt Anchors

Because the anchor is the key to effective mooring or anchoring, it is essential to know what to expect from various types. Baldt Incorporated's Anchors brochure provides detailed descriptions of all Baldt anchor products, as well as the recommended applications and minimum performance characteristics of each.

CIRCLE NO. 119



Holland Roerpropeller

The line of Holland Roerpropeller products comprise 360° steerable propulsion units, retractable azimuth thrusters and transverse bowthrusters. With the background of the impressive Dutch maritime market, specific knowledge and over 25 years experience, the HPR has become a name known worldwide.

CIRCLE NO. 120



Safeguard Your Investment with MotoSafe

The Electrical Code only mandates motor protection against overloads of short circuits while the motor is running, to minimize the risk if fire. MotoSafe guards your motor against adverse conditions when it is not running.

CIRCLE NO. 121



Kvichak Marine Industries

Kvichak Marine Industries of Seattle is known for its wide variety of dependable aluminum vessels for oil spill response, law enforcement, commercial fishing, aquaculture, and general work boat applications. Customers include the NRC, U.S.N., U.S.C.G. and a large number of cooperatives.

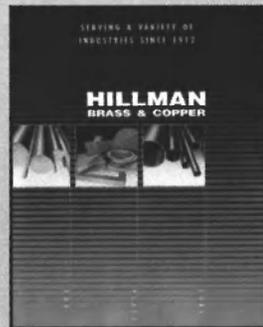
CIRCLE NO. 122



Joiner Bulkhead Wall Panels by PSI

Thermax non-combustible, non-toxic marine construction boards are used worldwide for joiner bulkheads, panels, liners, ceilings, door cores, and furniture cores. Thermax has all major regulatory body certificates and meets the requirements of IMO/SOLAS resolutions.

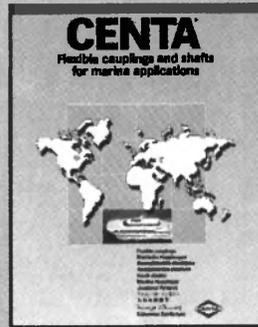
CIRCLE NO. 123



Expert Service and Advanced Capabilities

Hillman Brass & Copper supplies industry and government with the most hard-to-find alloys, including copper nickel, silicon bronze, aluminum bronze, leaded muntz and naval brass -- all to level I requirements. Hillman sets itself apart with exceptional service, quality and unmatched experience.

CIRCLE NO. 124



Flexible Couplings and Shafts for Marine Applications

CENTA is an innovative designer of flexible couplings and shafts for difficult torsional vibration applications covering industrial and marine drives worldwide. Today, CENTA is one of the world's leading manufacturers of advanced power transmission products.

CIRCLE NO. 125



Autocall Fire and Life Safety Systems from Grinnell

The Autocall TFX name has long been associated with quality fire protection and life safety products and systems, as has Grinnell, the company behind them. For flexibility, easy service, reliability and protection, call on Grinnell.

CIRCLE NO. 126



Lalizas Life Saving Equipment

This 4-color brochure features life jackets manufactured in accordance with SOLAS 83 amendments to the International Convention of the Safety of Life at Sea 1974. Also featured are several life-saving accessories including life jacket lights, batteries, nautical whistles and life buoy lights.

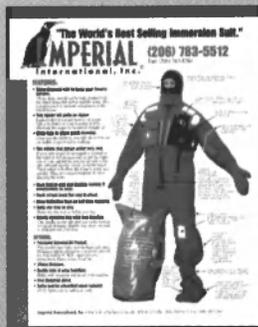
CIRCLE NO. 127



Marine Coating Inspection

NACE International offers a three-day Marine Coating Inspection Specialty Course for Certified NACE Coating Inspectors and other personnel working in the maritime industry. The specialty course addresses coating and coating inspection issues unique to ship building, repair and maintenance.

CIRCLE NO. 128



The World's Best Selling Immersion Suit

Imperial International's best-selling immersion suits feature: Three fingered mitt to keep fingers warmer • Two zipper tab pulls on zipper • Wide legs to allow quick donning • Toe valves that purge water very fast • Soft, flexible and comfortable face seal • Back straps keep ring in place • Extra reflective tape on suit

CIRCLE NO. 129



Commercial Marine Liferrafts

Surviva liferafts incorporate the latest innovations in design and manufacturing techniques to provide a range of optimum quality, durable, cost effective, liferafts. Available in either throwover or davit launched models, Surviva liferafts are suitable for use on all types of commercial and military marine craft.

CIRCLE NO. 130



Crew Analysis and Team Training

AGI brings the training to your ship or facility. Our team develops customized programs designed to enhance your emergency response team skills. This creates maximum flexibility for your company while reducing the cost associated with training.

CIRCLE NO. 131



Full-Service Marine and Offshore Electronic Equipment

Mackay is a turnkey provider of equipment, service and airtime. From safety and communications equipment to engine room monitoring devices, Mackay delivers. We back you with a 24-hour-a-day repair service and satellite airtime links via INMARSAT and AMSC.

CIRCLE NO. 132



Davies Rail & Mechanical Works, Inc.

DRMW combines contracting as well as heavy mechanical expertise enabling to bring customers a wide range of experience and knowledge to better serve the needs of today's industry. The firm's experienced professionals offer the services necessary for a portable relationship with clients.

CIRCLE NO. 133



Motor Operated Valves

Circle Seal Controls offers a full color, four page brochure, including technical data, specifications and illustrations on motor operated valves that have been designed to meet the most stringent aerospace specifications for an extra long life. Among the valves shown are Ball, Butterfly, Gate and Spool Valves.

CIRCLE NO. 134



Advanced Digital Drive for Coordinated Drive Systems

Avtron provides a complete line of digital drives from 5-3000hp, including SCR drives, generator field supplies and motor field supplies. The firm has 30+ years experience in the manufacture, engineering and service of electric drive systems.

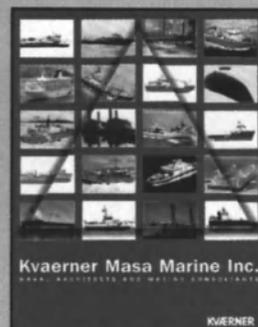
CIRCLE NO. 135



Marine Refrigeration

RTF Manufacturing offers refrigerators, refrigerators/freezers and cold food counters. Features include stainless steel construction, CFC-free urethane insulation, thermostatic expansion valves and wrapped refrigeration systems.

CIRCLE NO. 136



Kvaerner Masa Marine Inc.

KMM offers its clients a full range of technical, management and procurement services, including: all aspects of ship design and construction supervision; model tests and full scale trials; technical feasibility studies and economic analyses; ship production technology; project management; research and analytical investigations.

CIRCLE NO. 137



Gas-tight Chemical Tank Gauging

MMC International designed this Closed Trimode to deliver fast and accurate gauging, sounding and sampling for tanks carrying chemicals, while keeping operators in compliance with the growing body of safety and environmental regulations.

CIRCLE NO. 138



Lightweight Insulated Decking

Insulite Decking, manufactured by E.H. Oneill Co., is an insulated underlayment recommended for a variety of uses including for use in void spaces and behind bulkheads. Insulite can be used on all classes of ships and has been specified and installed on Navy ships, passenger ships, freighters, tankers, ice breakers, ferries, casino boats and drilling rigs.

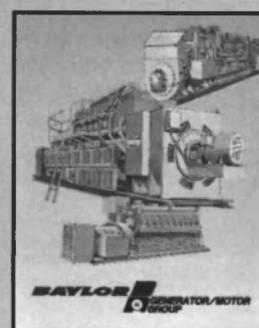
CIRCLE NO. 139



Maximum Protection Through Innovation

Seapile® and Seatimber® Composite Marine Piling and Timbers from Seaward International are the optimum choice for long-term protection of piers and docks. Made from 100% recycled plastic and reinforced with fiberglass rebar, the products are used in multiple marine industry applications worldwide.

CIRCLE NO. 140



Baylor Company's Generator/Motor Group

The Generator/Motor Group manufactures a complete line of A.C. Generators, from 50Kw to 500Kw, voltages from 208 to 13.8KV and speeds from 600 to 1800 RPM and practically every combination in between. These generators have earned a reputation for quality and dependability.

CIRCLE NO. 141



Harbormaster Tunnel Thrusters

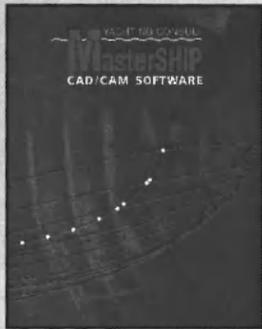
Harbormaster has been a pioneer in the development and application of tunnel-type thrusters to commercial vessels. Today, Harbormaster Tunnel Thrusters are built for adaptability, high efficiency and rugged service, ensuring improved vessel control and easier maneuvering over a long life.

CIRCLE NO. 142



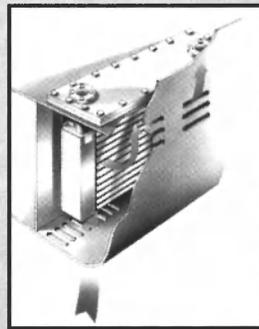
Hellenic Shipyards

Hellenic shipyard is the largest Shipyard in Greece, and one of the largest in the Mediterranean. The main activities of the yard include repair, newbuildings and industrial work. The yard's facilities can service every conceivable need; over 8,300 vessels of all sizes, typed and nationalities have been successfully repaired over the years. **CIRCLE NO. 143**



MasterShip CAD/CAM Software

MasterShip is comprised of independently operating modules. The complete system addresses all phases in the building preparation flow. From the making of the workshop drawings, the expansions and the nesting, up to and including the computer-controlled machining of woods and metals. **CIRCLE NO. 144**



Ships Machinery International

A WEKA boxcooler is the perfect solution for cooling auxiliary and main engines for inland and seagoing vessels, WEKA has more than 30 years of experience in producing coolers in 90/10 CU-NI, coated brass and galvanized material.

CIRCLE NO. 145



The Power to Predict

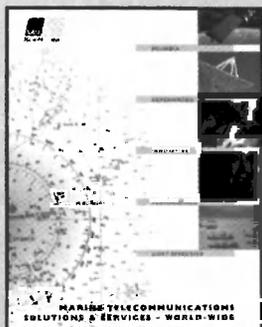
Introducing the first complete motor management solution, providing automated predictive maintenance, as well as motor performance and quality monitoring — all while you motors are in operation. This unique new solution is available as both a portable instrument and a permanently installed device

CIRCLE NO. 146



Transas GMDSS Simulators

To implement GMDSS by 1999, over 4,000 officers will need to be trained each month. Suitable for very complex communication tasks without sacrificing user friendliness, of the highest quality but at a comparatively low cost; Transas GMDSS Simulators are a key element for any GMDSS training ashore and onboard. **CIRCLE NO. 147**



INMARSAT-Phone mini-M

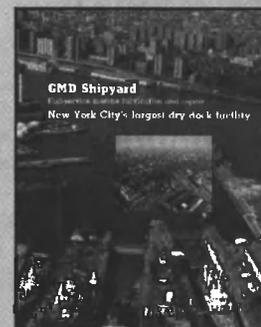
SAIT RadioHolland in association with France Telecom has developed a portable mini-M telephone service specifically designed to meet the needs of commercial vessels both offshore and on in-land waterways. The Inmarsat-Phone package contains a subscriber identity module (SIM) allowing access in remote areas. **CIRCLE NO. 148**



TIVAR® Marine Wear Components

A new flyer details TIVAR Dockguard components, which comprise half-round fenders, fender facings, piling rub strips, patented fastening systems and custom extrusions, molds and fabrications. The package includes TIVAR engineering plastic formulations.

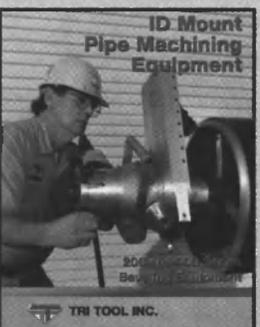
CIRCLE NO. 149



New York City's Largest Dry Dock Facility

GMD Shipyard is the largest dry dock facility in New York City, within a 24-acre industrial park. It's a facility with a deep water pier space and dry docks managed by marine fabrication and repair professionals and staffed by skilled craftsman, technicians and specialists.

CIRCLE NO. 150



ID Mount Pipe Machining Equipment

Tri Tool Inc. has introduced a new catalog for ID Mount Pipe Machining Equipment. The catalog features Tri Tool's complete line of 200 and 900 series tools which mount on the inside diameter of pipe with self centering mandrels and provide precision pipe end machining for weld preparation. **CIRCLE NO. 151**



CAM-SET® Line-Blind Valves

Fetterolf Cam-Set line Blinds were developed over 20 years ago to eliminate the necessity of moving the adjacent piping when changing a line blind as well as to provide a fast blind change by one person. Climbing back and forth over the piping is eliminated as is flange bolt removal.

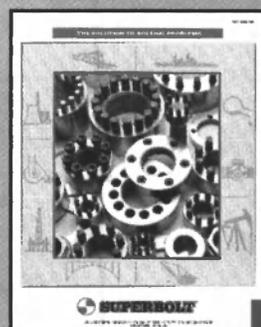
CIRCLE NO. 152



Hydraulic Power Systems, Maintenance Tools and Equipment

Power Team's latest catalog, PT97, features 168 pages of hydraulic know-how. The catalog is divided into nine sections including cylinders, accessories, hydraulic tools, pulling systems, pumps, valves, lifting and jacking, presses and equipment and mechanical tools.

CIRCLE NO. 153

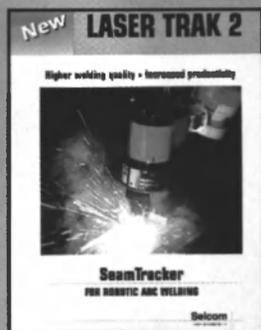


Solutions to Bolting Problems

The completely revised SUPER-BOLT catalog contains technical information on mechanical stud/bolt tensioners and data on many new series. Multi-jackbolt tensioners require only hand torque wrench to tension bolts tighter than any other method. They eliminate the need for hydraulic wrenches, sledgehammers and heating methods commonly used. **CIRCLE NO. 154**



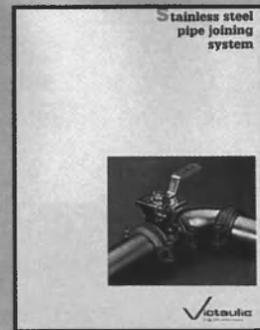
ROFRY Means No Fry
ToasterMaster introduces the oil-less fryer that will revolutionize the frying industry—the ROFRY. With this amazing fryer, consistent fried food quality can now be achieved without deep fat frying.
CIRCLE NO. 185



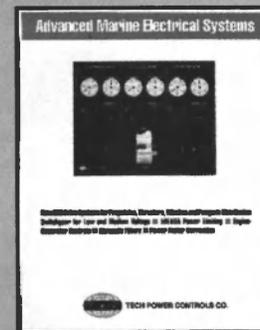
Robotic Arc Welding
Now available from Selcom, Inc., a four-color brochure describing their precise, durable, high performance LaserTrak2 SeamTraker System for robotic arc welding. The system is fully integrated from sensing to maintenance for higher welding quality and increased productivity and possesses features unique to the industry. **CIRCLE NO. 155**



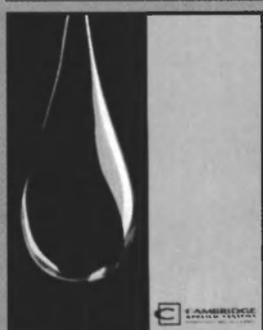
Belmont Metals, Inc.
Belmont Metals, Inc. is an exceptionally diversified and recognized source for a large variety of non ferrous metal compositions and forms. They offer over three thousand metal formulations and shapes, a number which continues to grow, and will customize shapes, alloys, sizes and quantities to meet any need.
CIRCLE NO. 156



Stainless Pipe Joining Systems
Victaulic Company of America has issued a 48-page brochure on its new line of grooved components for installing stainless steel piping systems. Included in the catalog are Victaulic's full lines of couplings, fittings and valves. Also detailed is the company's recently expanded Pressfit® System.
CIRCLE NO. 157



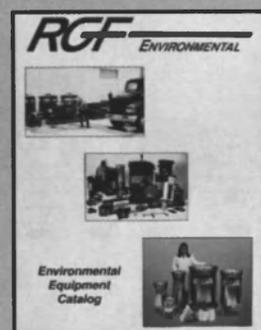
Advanced Marine Electrical Systems
Reliability is the key to success in the marine industry. Tech Power Controls offers the engineering design, manufacturing, and 24-hour installation and service support for all you marine propulsion, thruster and power control requirements.
CIRCLE NO. 158



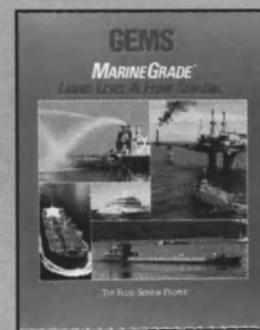
Leaders in Viscosity Management
Cambridge Applied Systems viscosity measurement and control products include a wide range of sensors, a choice of electronic control systems, and portable viscometers for laboratory and at-line use.
CIRCLE NO. 190



Marine Heater-Blowers and Furnace Systems
ThermeX Ship's Heating System taps the engine heat and warms the entire interior. It's inexpensive—no furnaces, no steam—just two hot water lines, baseboard radiators and heater-blowers. Heated/cooled fresh air ventilation small auxiliary furnaces and a/c chillers are also available.
CIRCLE NO. 159



Environmental Equipment Catalog
RGF Environmental Group introduces the first Environmental Technical Reference/Equipment Catalog containing design information, engineering data and a full line of equipment for water, wastewater and odor treatment.
CIRCLE NO. 160



MarineGrade Liquid Level & Flow Sensors
20 page brochure includes flow switches, level switches, tank level indicating transmitters and receivers, self-checking liquid level switches, SureSite® and DIPSTICK™ liquid level indicators, and solid-state accessories. Full of operation and application photos and illustrations.
CIRCLE NO. 161



Anchors • Chains • Winches
G.J. Wortelboer Jr. B.V. specializes in supplying marine products—essentially anchors, chain-cables, winches and windlasses—with deliveries on a worldwide basis. The company is headquartered in Rotterdam, where a substantial stock is kept, guaranteeing immediate delivery to virtually every port in the world.
CIRCLE NO. 162



Rack & Pinion Lifts
Alimak introduces its new SE Series. Based on its ingenious rack and pinion drive principle introduced in 1962, the SE Series incorporated new technical solutions which give the rack & pinion lift new qualities.
CIRCLE NO. 196



Programmable Gantry System
The Programmable Gantry System is a two-axis gantry that has two synchronized drives running on parallel tracks, and a second axis drive carrying a cutting torch that runs on a crossbeam. It can be used for a flame or plasma cutting or for welding, or a variety of shapes.
CIRCLE NO. 163



Largest Stocking US Distributor
Instruments East is the one-stop problem shop: free estimates of repair and calibration • prompt service • same day shipment • worldwide • large inventory new, surplus and refurbished • buy, sell and trade • system troubleshooting • obsolete instruments found and replaced • and more!
CIRCLE NO. 164



Marine Panels
TODCO marine panels meet tough military specifications. We utilize laminate, fiberglass, aluminum and steel facings, combines with nomex, aluminum, stainless steel and rock wool cores. We engineer and manufacture custom interior doors, bulkhead and sanitary partitions, and more.
CIRCLE NO. 165



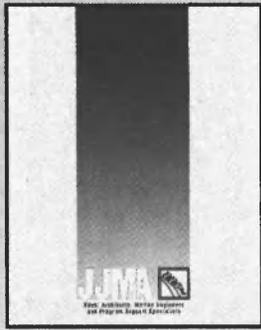
Lips: A Driving Force
Lips, leaders in propulsion, is the only major propeller manufacturer in the world to produce fixed pitch propellers, controllable pitch propellers, side thrusters, steerable thrusters, waterjets and electronic control systems to its own design. The company is involved in all sectors of this sophisticated and highly competitive market.
CIRCLE NO. 166



Strainers, Filters, Transfer Valves, Transfer Pumps, Air Pumps

The Kraissel Company is a long-time manufacturer of heavy duty simplex and duplex strainers and filters. Products include the Model 72 Simplex & Duplex Strainers to protect pumps and expensive pipeline equipment.

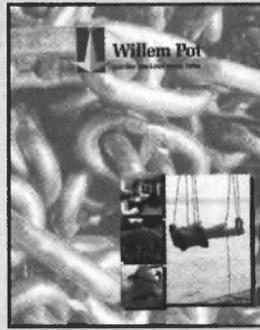
CIRCLE NO. 167



Excellence in Engineering Quality by Design

John J. McMullen Associates, Inc. has earned a reputation for excellence in naval architecture and marine engineering by consistently providing quality products and services to the US and international maritime communities.

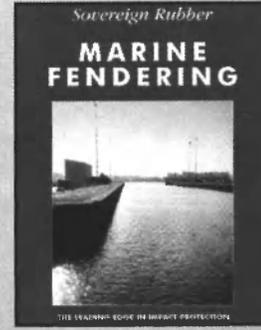
CIRCLE NO. 168



Willem Pot BV

Marine stockists, trading house and innovators since 1899. Long standing experience in anchors and chaincables, survival systems, grp repair and service. New products include software for anchoring vessels, framework for inspection of frames of bulk carriers and a novel concept emergency towing system. CAD design ability.

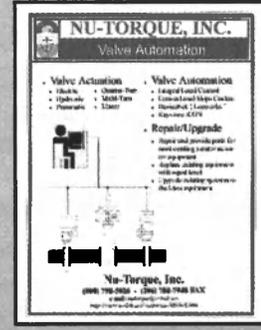
CIRCLE NO. 169



Solving Problems and Setting Standards

Sovereign Rubber is a leading manufacturer of rubber products for the marine industry. Over a quarter of a century's experience in this international market has enabled us to produce the widest range of hollow and solid extruded products.

CIRCLE NO. 170



Valve Automation Specialists

From "Smart" computer control to system repair and upgrade of valve actuation. A complete line of hydraulic, electric, pneumatic, mechanical actuators, hydraulic gear pumps and motors, and actuator control systems.

CIRCLE NO. 95



Sentinel Network Protectors

SPD Technologies is the world's leading supplier of innovative shock-hardened circuit breakers and switchgear for harsh-environments for military and commercial applications. SPD has taken this experience and technical expertise to develop the Sentinel line of Network Protectors for various applications.

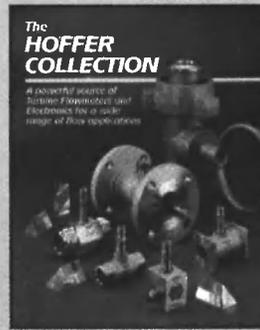
CIRCLE NO. 171



Mini-Pullers

With four new compact pullers, POSI LOCK Puller, Inc. offers more selection than ever before. Choose from 1 to 40 tons in the manual puller line or 10 to 100 tons in the hydraulic puller line. The patented safety cage design provides an effective means for removing stubborn gears, bearings, pulleys and other press fit items.

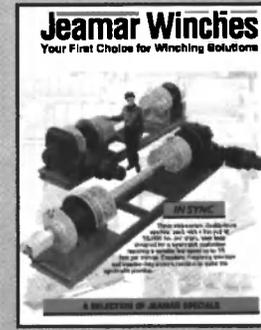
CIRCLE NO. 172



Turbine Flowmeters

Hoffer Flow Controls provides a catalog which includes various product certification marks indicating successful testing to Canadian and European standards. Also included is information about product ACC 96, a new universal signal conditioner and the teflon flowmeter product series.

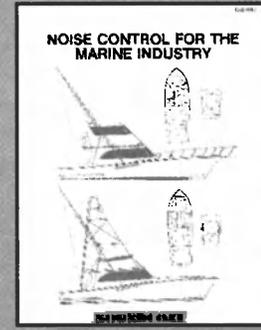
CIRCLE NO. 173



Jeamar Winches

Jeamar has recently published this 8-page catalog illustrating a wide variety of unique winches built in non-standard configurations. The catalog also illustrates Jeamar's capability of designing and manufacturing winches specifically to a client's requirements.

CIRCLE NO. 174



Noise Control for the Marine Industry

Working with naval architects, the Navy, and boatyards Soundcoat has provided solutions to a wide variety of noise problems for vessels of all sizes including ferry boats, research vessels and tankers.

CIRCLE NO. 96



Ship To Shore Access

Gangways • Ladders • Battens • Brows • Treads • Grating. From the initial design concept through the finished product, ACL Industries has the in-house capabilities to handle the complete project. Our broad spectrum of capabilities encompass welding, machining, engineering, finishing and process painting.

CIRCLE NO. 175

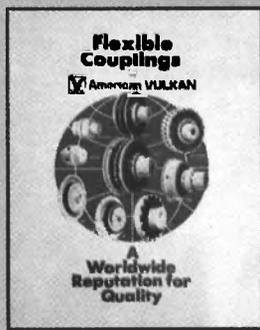
August, 1997



Naval Architecture Software for the Professional

FastShip is an easy-to-use, yet powerful program for designing hulls, superstructures, appendages and other marine structures. It is currently being utilized by shipyards, navies and design firms around the world. Fast Ship is easy to learn and does not require full-time use to be a design tool.

CIRCLE NO. 176



Flexible Couplings

American Vulkan offer a 4-page, color catalog on its main product lines, including the RATO family and EZR line for diesel and electric motor driven equipment such as marine propulsion, compressors, two-bearing generators, pumps, etc. Also featured are the VL, VKL, VKE and Flexmax® couplings.

CIRCLE NO. 177



Cygnus Application Spotlight

Cygnus Instruments manufactures multiple echo ultrasonic thickness gauges. Accurate wall thickness measurements without grinding or removing coatings. Gauges measure just the steel and exclude the coatings. Cygnus also distributes simple-to-use quanax coating thickness gauges and mechanical pit gauges available in inch or metric.

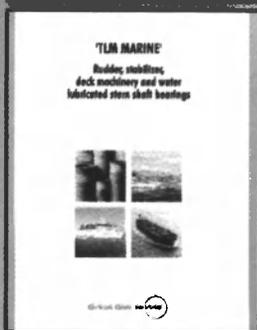
CIRCLE NO. 178



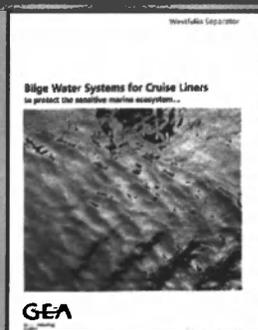
Uniservice: Marine Products and Services

The Uniservice worldwide group today consists of a supply network of over 750 ports around the globe. Uniservice manufactures a complete line of Marine Chemical Products

CIRCLE NO. 97



Orkot Composites
A non-asbestos laminated material incorporating solid lubricants, Orkot® "TLM Marine" has exceptional wear resistance, and virtually no swell in water, giving dimensional stability. Orkot tolerates edge loading and misalignment. **CIRCLE NO. 179**



Bilge Water Systems for Cruise Liners
Westfalia Separator offers a brochure detailing its new generation of separators type WSC. There are two available models: the WSC5 and the WSC 25. **CUT NO. 180**



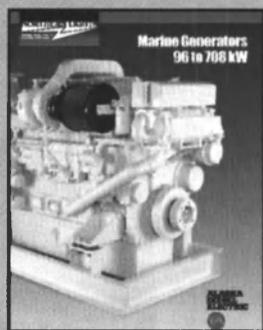
Safenet Advisory — from ABS
ABS using this advisory to gather information on various problems, causes and their solutions. With Safenet Advisory, ABS hopes to alert the industry, aid in their prevention and increase safety. **CIRCLE NO. 181**



Portable Air Plasma Cutting System
Hypertherm has added the Powermax 1100 to its Powermax family of products. The Powermax 1100 is designed for superior, heavy-duty, high-capacity metal cutting. **CIRCLE NO. 182**



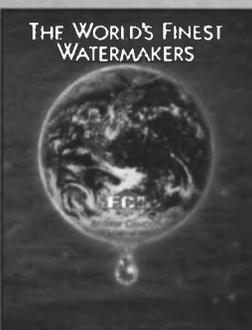
Bronze Fittings for Braze Joints
Since their introduction, Flagg Brass's Flag-Flow® threadless bronze fittings have been accepted into a constantly widening number of applications in the piping field. **CIRCLE NO. 186**



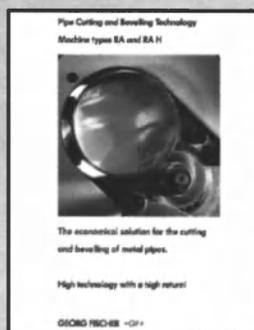
Northern Lights Diesel & Electric Power Systems
With so much depending on your generator, it pays to choose the very best. A set built up to the highest quality, and not down to a low initial price. **CIRCLE NO. 183**



Remote Valve Operators
B.W. Elliot offers a "Remote Valve Operators" catalog for engineers, designers and buyers involved in the design, specification and purchasing of ship parts and Remote Operating Gear (ROG) systems. **CIRCLE NO. 192**



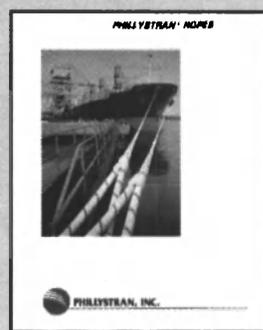
Watermakers for the Professional Captain
FCI Dolphin Watermakers 500 -1600 GPI Direct drive series with full microprocessor quality control and safety shutdown features. Separate literature for Commercial Series 1200 - 26,000 GPD. **CIRCLE NO. 188**



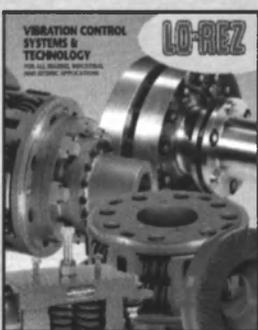
Economic Solution to Cutting and Beveling Metal Pipes
George Fischer's various pipe cutting and beveling machines will produce a square, burr-free cut on 1/4 to 12 inch tube or pipe. The pipe stays stationary while the cutter is rotated. **CIRCLE NO. 187**



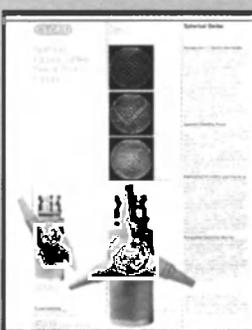
Diesel Engine Performance Analysis
The Doctor Systems, from Icon Research, provide extensive information on the performance of engines quickly, simply and accurately. Older engines can benefit just as much as new ones. **CIRCLE NO. 189**



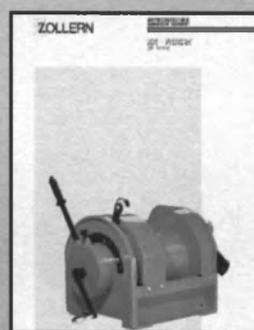
Phillystran Ropes
Phillystran, Inc. designs and manufactures synthetic fiber ropes and strength members from high tech fibers such as Kevlar®, Technora®, Twaron®, Vectran®, Spectra®, and Trevira® polyester. **CIRCLE NO. 191**



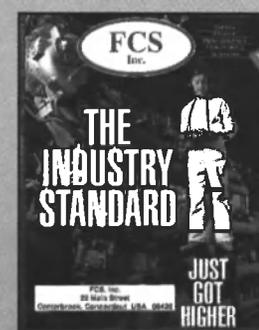
Vibration Control Technology
Lo-Rez Vibration Control Ltd. has been dedicated to the design and manufacture of vibration control equipment since the 1950's. **CIRCLE NO. 184**



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Since 1964, Cloud has been setting standards for other rotary tank cleaning machine manufacturers to follow. Cloud builds the highest quality and most consistently reliable tank cleaning machines in the world. **CIRCLE NO. 193**



Zollern Winches
Zollern supplies all leading manufacturers of construction machinery with individually dimensioned slewing gears, hoist winches, pulling winches and free-fall winches. **CIRCLE NO. 194**



The Industry Standard
FCS offers the "award winning" industry standard MALIN 3000 MK-5 and low cost MALIN 2000 precision diesel engine analyzers, and other precision analyzers. **CIRCLE NO. 195**

The Application Of Advanced Composite Technology To Marine Drilling Riser Systems: Design, Manufacturing And Test

Lightweight structures fabricated using advanced composite materials have the potential to reduce life cycle costs for deepwater field development by virtue of their corrosion resistance, fatigue tolerance and lower weight as compared to steel. An industry/university team began a project in April 1995 which involved applying advanced composite technology to marine drilling riser systems in order to accomplish these noted objectives.

The following describes the progress to date on the design, fabrication and test of an advanced composite drilling riser pup joint:

- A concept has been developed which appears to meet performance requirements, while providing significant weight and cost benefits.

- Two riser main body prototypes have been fabricated, one which has undergone a successful collapse pressure test. The second is scheduled for similar testing.

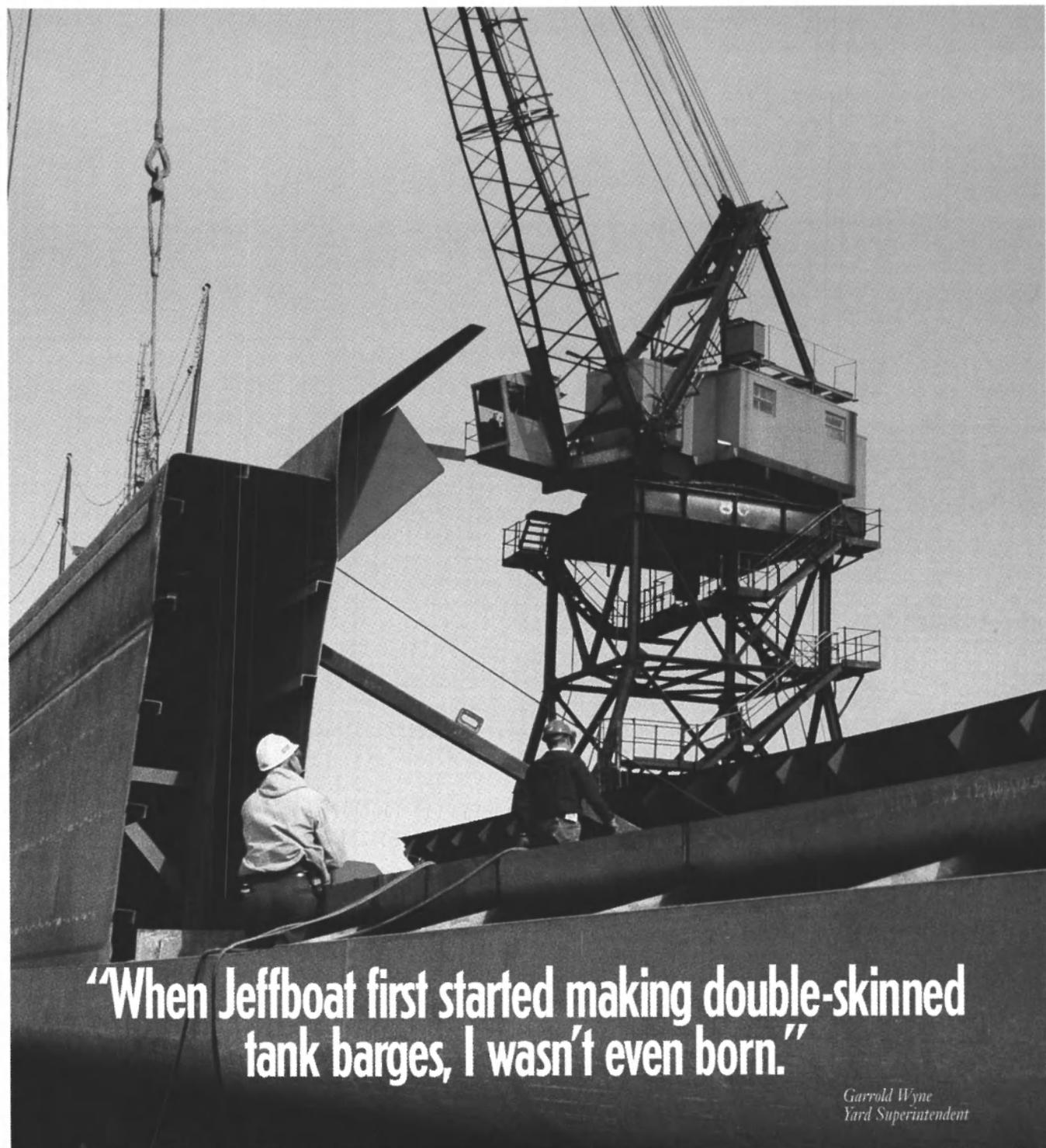
- A choke and kill line pipe manufacturing prototype has undergone pressure cycling and burst pressure testing with very positive results.

- A plan is in place and progress is being made towards demon-

strating the utility of advanced composition drilling riser systems and their potential to reduce the life cycle costs of deepwater E&P.

The preceding was excerpted from a paper presented at this year's Offshore Technology Conference by **W.F. Andersen,**

J.J. Anderson, C.S. Mickelson/Northrop Grumman Marine Systems; T.F. Sweeney/ABB Vetco Gray.



"When Jeffboat first started making double-skinned tank barges, I wasn't even born."

*Garrold Wyne
Yard Superintendent*

Deepwater Gulf Contract Signed

Mobil Exploration & Producing U.S. Inc. (MEPUS) and Phillips Petroleum Co. signed a long-term rig contract with Falcon Drilling to explore for oil and gas in the deepwater Gulf of Mexico. The companies said drillship *Peregrine VI* will be converted from 925.1-ft. (282-m), double-hulled, bulk/ore carrier *Coastal Golden*. Delivery of the vessel is expected in the fourth quarter of 1998. (See Marine Finance section for more details.)

MEPUS and Phillips established an alliance in 1996 to jointly explore for oil and gas in the deepwater Gulf of Mexico. The alliance reportedly holds joint interests in 123 blocks.

At Jeffboat we've been building double-skin tank barges since 1942—long before governmental regulations mandated them. You see, we've always had a commitment to building the highest quality, most durable barges we can. Which means, we take the time to build our barges with wheelabrated steel, sturdy epoxy coating systems, and, of course, double-skin hulls.

No wonder Ashland Petroleum

Company, the nation's largest transporter of petroleum on the inland waterways, chose us to build 68 new, state-of-the-art tank barges for its fleet. For more information about our quality-built tank barges, including our competitive prices, give us a call at 812-288-0200.

Whether you want a standard design or have your own specs, we can build what you need. After all, we've been doing it for over 50 years.

JEFFBOAT

America's largest inland shipbuilder.

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Top Oil Drilling Gear Suppliers To Merge

On July 10, Falcon Drilling Co., Inc. and Reading & Bates Corp. (R&B) announced a definitive merger agreement expected to close in the fourth quarter which would combine their companies and collectively operate the world's largest offshore drilling fleet.

Subject to regulatory and shareholder approvals, a new holding company (R&B Falcon Corp.) worth \$5 billion would be formed.

Including vessels on order, the new company would have a fleet of 14 ships capable of drilling in depths greater than 3,000 fsw, in addition to 25 jack-up rigs. R&B CEO Paul B. Loyd, Jr. would serve as chair of the new company and Falcon CEO Steven A.

Webster would become president and CEO.

Commenting on the merger deal, Mr. Webster said, "This combination represents a very significant consolidation opportunity in the fast growing, highest margin segment of the drilling industry — deepwater."

Mr. Loyd told *The New York Times* that one of the objectives driving the merger was to create a company large enough to finance the building of ships.

Amoco Sells Drilling Unit

Amoco Corp. sold its wholly-owned Canadian Marine Drilling (Canmar) unit to Livingston Marine Co. Ltd., Oakland Shipping Co. Ltd., Richfield Shipping Co. Ltd., Richland

(Continued on bottom of page 82)

Kvaerner Delivers Floating Storage Unit

Njord B floating storage unit (FSU) for Norsk Hydro Produksjon A.S. was delivered by Kvaerner Masa-Yards' Turku New Shipyard on June 30. The unit was towed directly to the *Njord* field off Norway on July 8 and oil production is expected to begin in October.

The FSU will be anchored in 1,082.6 fsw using a passive turret mooring system located in its forebody. Submerged turret loading (STL) will be used for loading crude oil from the *Njord A* FPU, located 1.3 nm away.

The offloading of stabilized oil to shuttle tankers will be accomplished through a flexible hose in the FPU's stern. It is possible to

operate *Njord B* unmanned when offloading is not taking place. The unit can then be remotely operated from the production unit. *Njord B* will be manned with a permanent crew for its first year of operation and further manning decisions will be made based on this experience. The structure is designed for 15 years of continuous operation and the hull has a fatigue life of 25 years.

For more information on KMY
Circle 52 on Reader Service Card

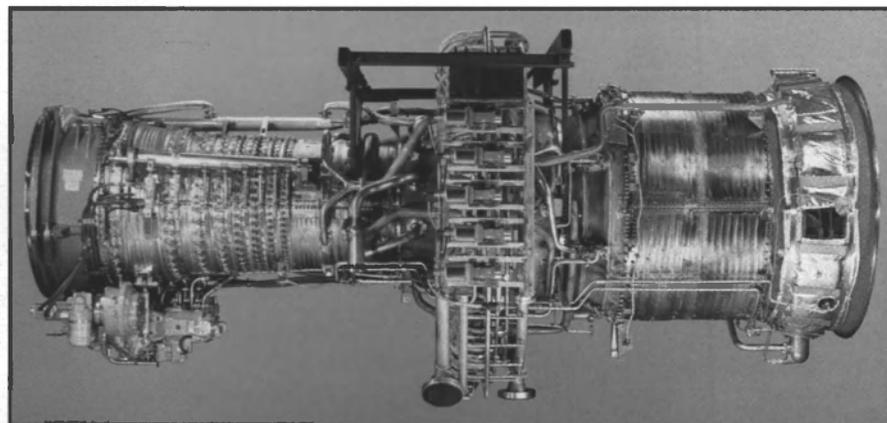
***Njord B* Data**

Length	.....	763.1 ft. (232.6 m)
Width	.....	136.1 ft. (41.5 m)
Draft	.....	50.8 ft. (15.5 m)
DWT	.....	100,000
Storage capacity	.....	112,000 cu m.
Offloading rate	.....	8,000 cu. m/h
Classification	.....	.DNV



EQUIPMENT PROFILE

**GE & Dresser-Rand:
Bringing New Efficiencies To
Offshore Platforms**



Statoil's Asgard field, slated to produce 200,000 bpd and associated gas for re-injection in the third quarter of 1998, will rely on two GE LM6000 aeroderivative gas turbines for power generation and two GE LM2500+ aeroderivative gas turbines which will drive Dresser-Rand DATUM high-efficiency centrifugal compressors. By employing turbomachinery equipment, Statoil will be able to minimize government-imposed CO2 emissions taxes. This state-owned gas/oil exploration and production company also expects to see increased efficiencies of two to five percent above the industry standard of 83 percent by using DATUM compressors.

In early 1996, Statoil awarded Dresser-Rand a \$250 million contract to provide turbomachinery and related equipment and services for North Sea projects over five years. The contract included the Gullfaks, Asgard and Troll fields, and future fields. The contract also provides extension options for up to five additional years.

The Asgard field marks the first worldwide application of the LM2500+, the latest of GE's Marine Industrial Engines' (M&I's) aeroderivative gas turbines. Manufactured by M&I in Evendale, Ohio, the two Asgard LM2500+s are nominally rated at 37,000 to 40,200 shp for continuous operation with natural gas.

LM2500+

In June 1994, M&I announced that the LM2500+ would fill a niche in the 34,000 shp to 40,000 shp range. The gas turbine is designed for a variety of compressor drive applications.

The LM2500+ is based on the technology of M&I's LM2500, and is expected to provide lower installed unit hp and life cycle costs than its predecessor. Given its derivative design, the LM2500+ gas turbine is expected to achieve the same standards as the LM2500 for reliability and availability which are in excess of 99.7 percent and 97.5 percent, respectively.

The two-shaft LM2500+ also can be applied in the industrial and commercial marine markets: various 50 and 60-Hz power generation applications; pipeline compression; gas injection; and fast ferry commercial marine uses. In addition to the DLE combustion system for applications requiring low emissions, the LM2500+ is available with water or steam injection using a standard combustor for emissions abatement.

The LM2500+s for the Asgard vessel will feature M&I's six-stage power turbine, which has been uprated to match the LM2500+ gas generator capability in mechanical drive and power generation applications. This low-stage power turbine is ideal for applications in the

(Continued on page 84)

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ALL OR WRITE
OR OUR **FREE**
CATALOG
TODAY!

NO MOVING PARTS
NO MAINTENANCE



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PUMPS BILGES, TANKS
AND HOLDS DRY

VM DECK EDUCATORS

Only the hose goes into tank to vacuum liquids at rate of 10-15 gpm at suction lifts up to 70 or more.



VM BILGEMATE

Ideal for pumping bilges—stripping ballast, etc. Peripheral jet design handles liquids, solids, air. 2½" to 6" sizes available.

VM PORTABLE EDUCATORS

Handy auxiliary pump for regular or emergency pumping of liquids from ballast, bilge, cargo spaces and tanks. Just attach hose from fire main and lower educator into space to pump large quantities of liquid quickly and easily.



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- Makes present ECDIS Navigation worldwide a reality, not just 15 miles off the coastal U.S.
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A single ½" dia., high-tensile, stainless steel flexible shaft assembly

Output Gear Box

Cyclo gearing, extreme load capacity up to 333 ft. lbs. output torque; complete system ratios of 2:1, 4:1, 6:1, 9:1 and 15:1

Valve Couplings

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NAVSEA Approved Tech Manual now Available

Less means more. Less weight (up to 40% less than other remote operating gear systems) and less complex installation (single-shaft design) mean more speed, greater payloads and more cost savings (maintenance, repair and operation) for your company. And, our system is remarkably efficient. With as little as 50 ft. lbs. of input you can generate as much as 333 ft. lbs. output torque.

Tested, tried and true. All components are heat resistant, noncorrosive, Shock- and Vibe-tested. Plus, the Uniflex system is flame tested to API-607 and submergence tested to MIL-STD-810E. Our growing list of satisfied customers speaks for itself—call for references.

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GEN SET 90KW Cat 3116 135 HP 4 units available Price: \$10,500.00ea

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Clyde Single drum with level wind, w/o power Price: \$11,500.00
A.J. 232 Single Drum, level wind 2000' 1-1/2" Price: \$19,500.00
A.J. 244 Single Drum, level wind 2500' 2" Price: \$38,500.00
A.J. Stainless Steel Tow Winch, Model 320 approx. 1400' 1-1/2" cable - hydraulic drive. Price: \$68,500.00
A.J. 250 Single Drum Tow Winch, excellent condition Price: \$45,000.00
Nordic Anchor Winch, Model 26-20RB
Galv. 670' of 3/4" Cable Price: \$5500.00

BARGES
110'x34'x11' Steel Price: \$45,000.00
130' x 50' x 6' with ramp & diesel hyd. winch, size 24'L x 18'W Price: \$125,000.00
110' x 34' x 11' Steel Price: \$38,500.00
160' x 40' x 10' Steel with concrete wear deck Price: \$295,000.00
330' x 76' x 18' Steel, Ex. ABS Flatdeck with Moon Pool Price: \$650,000.00
Location: Seattle, WA

200' x 50' x 13.5' Steel Crane Barge with spuds anchor winches
ABS Load Line & 240 ton Manitowoc 4600 SII Crawler Crane. Price: \$1,350,000.00
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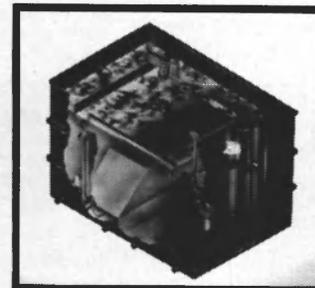
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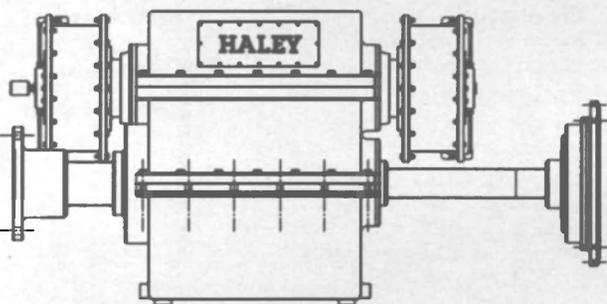
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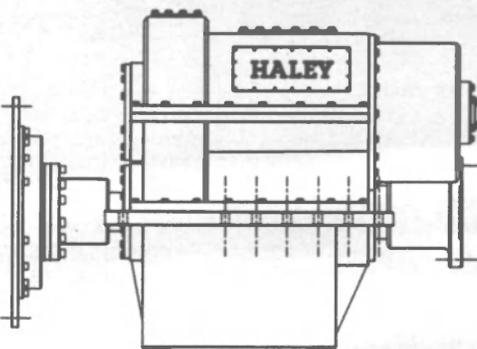
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Improvements In Design Of Converted FPSOs Regarding 20 Years' Operation Without Docking

This paper presents improvements on engineering design of converted VLCCs that will be operated as FPSOs in Brazil's Campos Basin. Conversion was scheduled to be completed and operations kicked off by mid-1997. Project economics demand that the units be operated without docking for 20 years due to the complexity of pull-in and pull-out operations, and therefore Petrobras applied maintenance expertise and innovative technologies to meet the unique operating conditions. The actual conversion process of the FPSOs allowed personnel the opportunity to gather reliable data about the vessel, its equipment and systems, which aided in designing the final unit for a 20-year lifespan.

These conclusions of this study will be used in the design of next-generation FPSOs planned for the Marlim South, Albacora East, Salema-Bijupira and Roncador fields. The main recommendations are listed as follows:

- In the case of converted FPSOs, only re-use the hull because re-use of other equipment has proved uneconomical.

- Improve painting schemes, aiming at greater coatings durability and maintenance workload reduction.

- Enhance the use of special coatings, such as resistant aluminum spray, and the utilization of plastic materials, in cooperation with class society standards.

- Enhance the automation of operations, providing reliability and safety gains.

- Reduce the amount of equipment installed, adopting solutions that include greater capacity equipment in smaller quantities.

- Install equipment in sheltered places and concentrate facilities inside engine rooms to facilitate

operation and maintenance work.

- Enhance equipment and general load handling facilities.

The preceding was excerpted from a paper presented at this year's Offshore Technology

Conference by S. Assayag, E. Prallon, F. Sartori/Petrobras - E&P Campos Basin.

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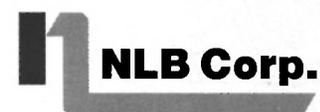
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Latest Breakthrough In Turret Moorings For FPSO Systems: The Forging Tanker/Turret Interface

Ship-shaped vessels have seen a tremendous growth in their use as floating production and/or storage vessels. Along with this growth has come a need to moor in deeper water depths and with more flow lines. The most efficient means of dealing with the mooring of these vessels has been the incorporation of a turret, which allows a vessel to weather-vane while providing a geostationary hull area and to bring in flow and mooring lines.

It is desirable to have turret systems weather-vane passively, which requires an efficient bearing system, particularly as many turrets are retrofitted into converted vessels. Interfacing these bearing systems with the turret and vessel structure requires extensive design and analysis to assure their mutual deformations will not affect the longevity of the bearing system.

A two bearing turret support system was designed and implemented as a result of this study.

The design is self-aligning by the incorporation of spherical elastomeric support in the turret/vessel interface, maximizing the axial bearing capacity available for carrying large vertical loads of deck water, multiple riser systems. The interface absorbs deformations, thus isolating the turret from moonpool deformations and the moonpool from turret deformations, simplifying bearing design interfaces. A hydraulic grout alignment method eliminates the need for tedious shipyard machining of bearing foundations and results in a short turret-to-vessel integration. All components in the turret system reportedly lend themselves to standardization and have been proven in the offshore environment.

The preceding was excerpted from a paper presented at this year's Offshore Technology Conference by J. Pollack, R.F. Pabers, P.A. Lunde/IMODCO Inc.



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LOOKING FOR MASTER DISTRIBUTORSHIPS AND DEALERS

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(Continued from page 78)

Shipping Co. Ltd. and Westland Shipping Co. Ltd., all of Cyprus. The terms of the sale were not disclosed.

Calgary-based Canmar provides Arctic offshore drilling and marine services contracting, with a fleet of four drilling systems and six support vessels. Amoco Canada determined the services Canmar provided were outside its core business and that the assets might be a better strategic fit for another company.

"The sale marks another example of Amoco's

commitment to aggressive portfolio management," said Richard Flury, executive vice president for Amoco's E&P business. "We are focusing our global upstream business on those core operations that will serve as the foundation of operational and financial success for many years to come."

Marine Drilling Wins Consortium Contract

Marine Drilling Co. Inc. shares rose 10.83 percent to 21-3/4 after the company announced it had been awarded a contract by a group of companies led by West Australian Petroleum Pty. Ltd. (WAPET).

"The contract is currently projected to commence on or before January 1, 1999, and is expected to produce total revenues of \$164 million to \$188 million," the company said in a statement. Drilling will reportedly take place in the Pacific Rim, Southeast Asia, and offshore Australia and New Zealand. The day rate will be adjusted for each operating area to compensate for the respective expenses incurred in each area.

The company said its Marine 500 second-generation semi-submersible will be upgraded for the contract to work in depths up to 5,000 fsw with 15,000 lbs. psi drilling equipment. These upgrades have been projected to cost between \$70 and \$80 million.

WAPET is the operator of a joint venture between Chevron Corp., Texaco Inc., Royal Dutch/Shell and Mobil Corp.

Aker Maritime Introduces New Floating Platform

Norwegian offshore services company Aker Maritime ASA has developed a new type of floating platform especially suited to smaller fields which previously would have been considered uneconomical.

Aker said preliminary estimates showed that the platform, Buoyform, could be built in 23 months and at a cost of approximately NOK500 million less



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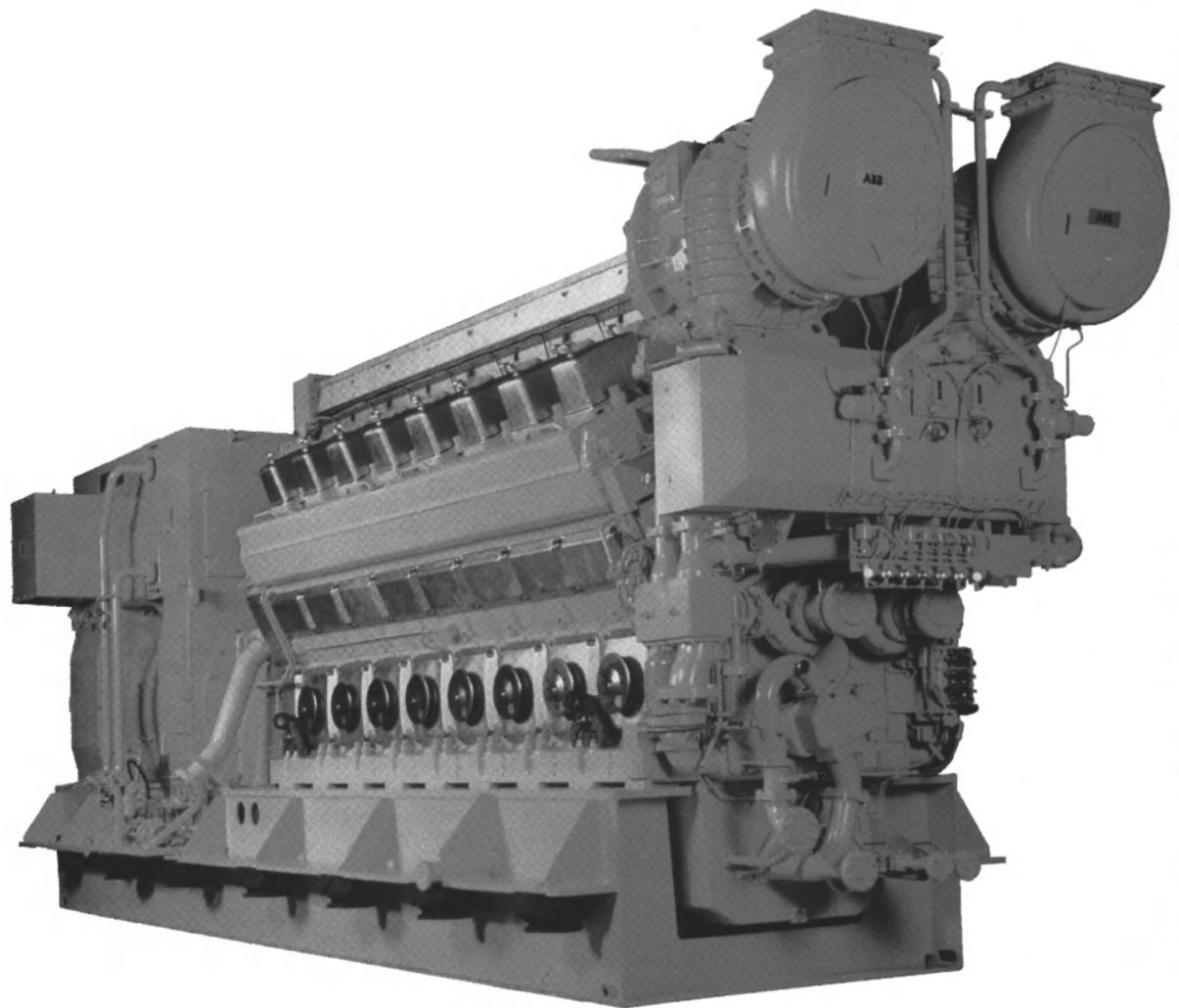
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than comparable solutions. Buoyform comprises a conical storage tank beneath sea level and a deck with living quarters and processing equipment above it. It reportedly can be moved relatively easily between several smaller fields as each is depleted.

Aker Maritime said that with a 269-ft. (83-m) diameter and a 1,312.3-ft. (400-m) draft, the platform's structure has smaller and calmer motions in the sea than either a production ship or a semi-submersible platform. Unlike a production vessel, Buoyform does not require a turret to accommodate mooring lines and risers — tubes bringing produced oil to the surface from the well — but is held in position with conventional anchor lines.

The combination of drilling, processing and storage facilities avoids investment in a separate storage system and the cost of hiring a separate drilling rig. Buoyform also can be delivered as a dedicated drilling platform. Aker Maritime said the development solutions evaluated so far have a 60,000 bpd production capacity

and a storage capacity of 570,000 barrels.

Hernis To Provide CCTV For FPSO

Norwegian company Hernis Scan Systems A/S will supply closed circuit television systems (CCTV) for a FPSO building at Korea's Samsung Heavy Industries for Australian oil company Woodside. The FPSO will reportedly be the largest in the world.

The systems are due for delivery in the latter half of this year, and have a contractual value of approximately NOK1.5 million including options for top site camera stations.

In addition, Hernis CCTV systems will be installed on two Ramform generation ships for PGS currently building at Langsten Skip & Båtbyggeri in Norway. Delivery of the systems is scheduled for the fall, and the contract is worth a reported NOK2.3 million.

**For more information on
Hernis Scan Systems
Circle 12 on Reader Service Card**

(Continued from page 78)

3,000 to 3,600 rpm output shaft speed regime and geared high speed (to 11000 rpm) compressor drive service. This power turbine is an upgraded version of the power turbine currently available on production LM2500s.

For applications in the 6,100 to 6,200 rpm speed regime, both M&I and Dresser-Rand provide a two-stage, high-speed power turbine (HSPT). Dresser-Rand's HSPT is known as Vectra DR61P.

Continuous operation of both HSPTs is possible over the speed range 3,050 to 6,500 rpm. Like the LM2500+ equipped with low-speed power turbine, both the Dresser-Rand and M&I HSPTs will be available with M&I's DLE and standard combustion systems.

The LM2500+ first-engine-to-test (FETT), a gas generator with a DLE combustor, successfully completed trials in August 1996. The LM2500+ reportedly achieved 105 percent overspeed, and showed compressor airflow and efficiency tracking pre-test predictions with NOx emissions below 25 ppm.

The LM2500+ second-engine-to-test (SETT) was successfully completed in November 1996, resulting in qualification of the power

turbine design and confirmation of power turbine flow function. All performance parameters were reportedly met or exceeded. A third test using a DLE gas generator and M&I's HSPT began in January 1997. Dresser-Rand's Vectra DR61P power turbine also began testing in February 1997.

To date, 33 LM2500+ gas turbines have been ordered for a variety of gas compression and power generation applications throughout the world.

DATUM

Dresser-Rand introduced the DATUM line of compressors in September 1995. These compact compressors are designed to increase well output more efficiently. DATUM, in some cases, can handle the same pressure ratio as currently required by multiple compressors. DATUM compressors feature standard components for easier maintenance. The bundle assembly is modular, and can be removed for maintenance in the shop rather than in the field. Dresser-Rand was able to significantly reduce the cost for its DATUM line, while decreasing delivery cycle times for these products. To date, Dresser-Rand has received more than 30 orders for DATUM compressors for a wide

EQUIPMENT PROFILE

Heatec Supplies Waste Recovery Units For Offshore Platform



Pictured is an offshore platform with two Heatec waste heat recovery units.

Schenzhen Petroleum Technology and Development Import and Export Co. engaged Heatec Inc. to build two waste recovery units for the Shengli oilfield offshore platform in the Gulf of Bo Hai near mainland China. The Schenzhen company is part of the Chinese government and is headquartered in Dong Ying.

Both units recover waste heat from the exhaust of two gas turbines used aboard the platforms to drive electrical generators. Each unit recovers 3,500 kW per hour and the heat is used in the processing of oil and gases from the offshore well.

The exhaust stack of each generator has a diverter gate that routes the exhaust gases through the Heatec units and into the atmosphere. When heat is not needed, the gate diverts the gases so they bypass the heat exchangers and pass through silencers before entering the atmosphere.

Each of the units has a coil that scavenges heat from exhaust gases. The coils, in turn, heat thermal fluid flowing through the coils. The thermal fluid passes through heat exchangers that use the heat for heating the crude oil and drying gases that accompany the oil. For this contract, the Chattanooga, Tenn., based company also supplied a pump package, expansion tank for thermal fluid and electrical and pneumatic controls for the unit.

**For more information on Heatec Inc.
Circle 8 on Reader Service Card**

variety of oil/gas pipeline and platform applications. DATUM compressors are manufactured at Dresser-Rand's Turbo Products Division facilities in Olean, N.Y., and LeHavre, France.

Statoil was able to use Dresser-Rand's calculations to determine the benefits of using the DATUM compressor. A large North Sea oil and gas field has a 250 to 300-MW capacity. The compressors represent about 50 percent of the installed capacity and up to 75 percent of the power actually consumed. Factoring in a 15 to 20-year life cycle of the DATUM unit, operating 75 percent of the time over those years, and the cost of the fuel and CO2 tax to operate, there is an improved efficiency reflected in savings of \$3,000 a kilowatt. Hence, when a five percent reduction in power consump-

tion is achieved, the life cycle costs are lowered by more than \$11 million. By using the most sophisticated turbomachinery equipment available, Statoil will be able to meet the strict environmental regulations in place in Norway. Statoil will benefit from this technology by the resultant increased efficiency, reduced CO2 and NOx emissions during oil production as well as reduced life cycle costs for the fields.

*The preceding was excerpted from an article submitted by **Elias Ray**, of GE Marine & Industrial Engines (Evendale, Ohio), and **Odd Guldsten**, of Dresser-Rand A/S (Kongsberg, Norway).*

**For more information on the LM2500+
Circle 30 on Reader Service Card**

**For more information on DATUM
Circle 31 on Reader Service Card**

PRODUCT UPDATE

Coatings & Corrosion Control

HEMPEL

Layout: Art-et, Photo: Husmo

The importance of coatings in the marine environment is often discussed, but it can never be overstressed. Coatings and corrosion control products serve as the primary line of defense for steel against rust, but in reality, serve a greater purpose.

Properly applied and maintained coatings systems guard owner/operator's bottom lines, helping to ensure a multi-million dollar investment don't crumble.

Coatings and corrosion control products also help to maintain the integrity of vessels, in turn protecting the environment and crews.

Many advances in coatings and corrosion control systems have been logged in recent years, and this section is dedicated to highlighting some of the more notable recent developments.

APS Launches New Coatings System

Advanced Polymer Sciences, Inc. (APS) has launched SteamLine, a polymer-based, anti-corrosion and steelwork protection coatings system for the marine industry. The product has been developed to overcome pipe coating damage problems caused by high thermal shock in extreme

August 1997



W O R L D

W I D E

Circle 236 on Reader Service Card

PRODUCT UPDATE • Coatings & Corrosion Control

maritime conditions. It reportedly provides external protection to exposed hot steam pipes and shipboard cargo transfer pipes on deck, combating the corrosive effects of seawater and chemical cargo spillages.

For more information on APS
Circle 76 on Reader Service Card

Hempel Presents Extended Product Line

Hempel recently presented an extended assortment of ballast tank and cargo hold coatings at a press conference in London. The company's range includes several products for newbuilding and maintenance purposes.

"Apart from developing and tailor-making the coating systems, we have focused a lot on internal training of Hempel sales and technical service staff in order to provide the best solutions for our cus-

tomers," said Executive Vice President B. van Rijn.

A new product development is the lightly-colored Hempadur ballast tank coatings and the abrasion-resistant Hempadur Multi-Strength series for cargo holds in dry bulk carriers.

For more information on Hempel
Circle 75 on Reader Service Card

United Coatings Provides Full-Service Solutions

United Coatings strives to provide cost-effective solutions to coatings removal and application challenges. The company is experienced in ultra-high pressure water jetting surface preparation and abrasive blasting and containment technologies. United Coatings' application experience includes the application of a wide variety of coatings and specialty products, including: epoxies; urethanes; vinyl esters; latexes; zincs;

novolacs; belzona; rubber; anti-foulants; silicone; and strippable coatings.

For more information on
United Coatings
Circle 77 on Reader Service Card

Waterjet Systems Provides Mobile Coatings Removal Equipment

Waterjet Systems, Inc., a subsidiary of United Technologies Corp.'s Pratt & Whitney — a supplier of jet engines — specializes in ultra-high pressure waterjet technology for use in the overhaul and repair industry.

The company supplies Automated Robotic Maintenance Systems (ARMS), which resemble telephone wire repair trucks, although the systems are remotely controlled. The closed-loop waterjet stripping process is said to contain nearly 100 percent of the effluent, and it reportedly removes the

solid waste, recycles the water, eliminates expensive containment costs. Ship surfaces are said to remain dry, without flash rust.

For more information on
Waterjet Systems, Inc.
Circle 78 on Reader Service Card

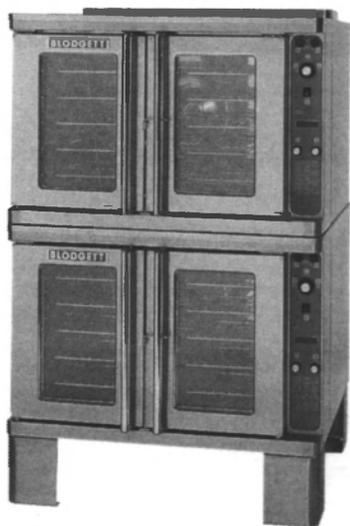
Bentzen Touts Environmentally-Conscious Products

Bentzen Inc., based in Seattle, holds an exclusive patent for the H-15 silicone stainless steel bi-release coatings system for marine and industrial products. The company claims that its products are environmentally safe and user friendly. According to the manufacturer, H-15 paint is reportedly non-toxic in marine environs, lasts longer than other paints and reduces boat drag.

For more information on Bentzen Inc.
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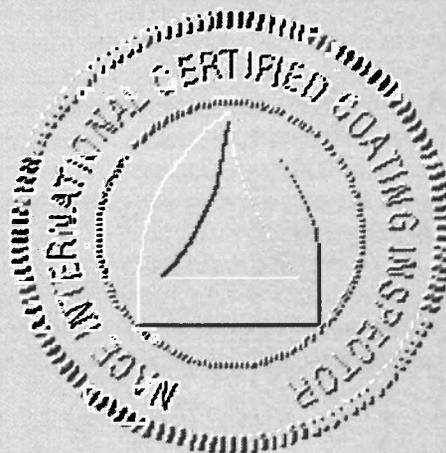
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**Sherwin-Williams Introduces
Fast-Drying Coatings**

The Sherwin-Williams Co. has introduced ArmorSeal 1000HS, a fast-drying, heavy-duty coating that can reportedly withstand direct contact with acids, alkalies, jet fuels, grease and other harsh chemicals. The product's thermoset coating also has a high crosslink

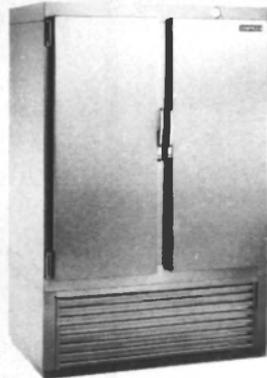
density and is designed to withstand impact and abrasion. It can be rolled or airlessly sprayed for application due to its chemical composition, exhibit flow and leveling characteristics. Armor 1000 HS is recommended for marine commercial and industrial applications for a heavy-duty epoxy coating is required.

For more information on Sherwin-Williams
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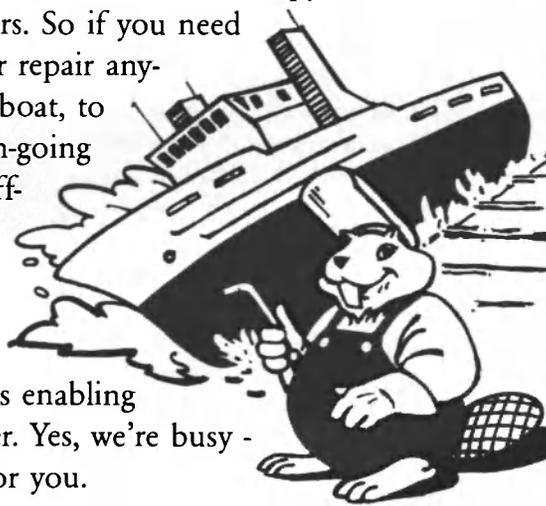
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Circle 248 on Reader Service Card

**Wasser Coatings
Wins Japanese
Approval**

Wasser High-Tec Coatings, Inc. of Ken Wash., has completed more than three years of product testing with significant results. The company's coatings have been approved by the Japanese government for application on state-owned structures — reportedly making Wasser the first non-Japanese coatings manufacturer to enter the country's market.

Toray Industries, Inc. — Wasser's Asian representative — was recently awarded the coatings supply contract for Okinawa's largest bridge. Last month, Toray started manufacture of Wasser's MC-Coatings at its Shiga plant. The two interests have jointly applied for patent protection of the coatings system throughout Asia. The two companies originally signed an exclusive distribution agreement in 1994.

According to Wasser CEO Bill Brinton, recent successes of the Wasser/Toray partnership include a coatings supply contract from Alabama Shipyard for six COSCO newbuilds, and a contract for coatings application on two large shiplifts in Singapore and Malaysia.

For more information
Circle 80 on
Reader Service Card

employees, Isotrol can be applied by brush, roller, airless spray or dipping, and has a shelf life of up to seven years. The coating prevents deterioration by repelling moisture and encapsulating existing rust, and surface preparation is minimal, involving no sanding, just the brushing off of flaking rust.

Used in conjunction with aklyd paint Isoguard to provide ultraviolet protection and additional durability, the coatings system is guaranteed for up to 15 years and can reportedly be used as a shop primer on new surfaces.

For more information on
PermaStopRust products
Circle 83 on Reader Service Card

Aqua-Dyne Unit Performs Tank Cleaning

Aqua-Dyne Inc.'s new magnetic rotary cleaner was designed for cleaning and coatings removal on ship hulls and the inside and outside of tanks as small as 50 ft. (15.2 m) in diameter. The unit's 30-in. diameter deck can be disassembled into two sections for insertion through tank manways as small as 18 inches in diameter. The rotary cleaning head is attached to a two track, hydraulically-driven carriage that moves and positions the unit. The carriage also contains a proprietary magnetic holding system that holds the unit against the side of the tank/ship.

The unit requires a hydraulic unit and

waterjet pump to operate, and is reportedly capable of handling flows up to 20 gallons per minute at pressures of 40,000 psi.

For more information on Aqua-Dyne
Circle 86 on Reader Service Card

RGF Introduces New Cleaning Equipment

RGF Environmental Systems, Inc. has introduced an advanced, light-duty pressure and steam cleaning unit — Ultrasorb Model LU-10 — which is reportedly ideal for use in marinas. The unit contains a coalescing separator designed to remove heavy solids and oils, as well as a pressurized bag filter and polishing filter for particulate filtration.

A hydrocarbon accumulator automatically removes oils and fuels from the wash pad without replacement parts. The structure is composed of non-ferrous metals.

For more information on
RGF Environmental Systems, Inc.
Circle 85 on Reader Service Card

ABS Connects Coatings With Double-Hulled Tanker Performance

"Early reports indicate that coatings in the ballast spaces could become the key concern in the operation of double hull tankers," ABS Senior Vice President Dr. Donald Liu advised delegates at an Intertanko event held recently

in Athens. His observations are based on a paper he authored, titled *Double Hull Tankers: What We Have Learned*. The paper was written based on extensive owner feedback and a pilot study of ABS survey and engineering reports.

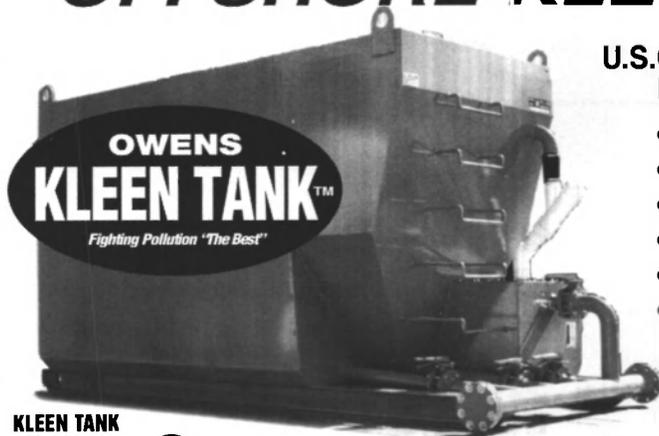
Although acknowledging some inconsistencies, the paper suggests growing evidence that the quality and maintenance of coatings should be a primary area of concern in double-hull tanker operation.

This finding is supported by an operational database of ship performance that is being compiled by the class society.

In-service reports indicate that even with most of a coatings application appears to perform well, breakdowns on free edges, in high stress areas and on stringers and internal fittings within ballast spaces often take place. "These localized breakdowns are occurring after periods as short as three years," said Dr. Liu, adding, "Other evidence is beginning to suggest that corrosion rates of the underdeck plating in uncoated tanks can be two to three times the normal expected rate." ABS sources concluded that while operational experience regarding coatings reliability varies widely, more attention should be paid to coatings techniques while double-hulled tankers are in the design stage, specifically in the areas of tank accessibility and ventilation.

For more information on the ABS report
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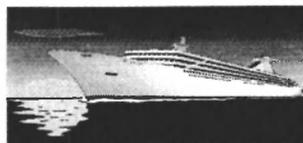
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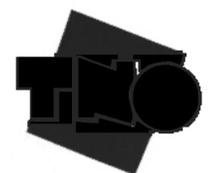
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Circle 378 on Reader Service Card

Maritime Reporter/Engineering News

Bull Frog Corrosion Inhibitors Offer Two-Year Protection

Now widely available to commercial users, Bull Frog corrosion inhibitors are reportedly widely used by the U.S. Navy for protecting steel from rust and corrosion.

All Frog products contain chemical ingredients known as Vapor Corrosion Inhibitors (VCIs) which protect from rust for up to two years.

Bull Frog emitters are foamed devices (cups, shields and pipes) containing VCIs which are attached to ship areas, protecting against rust formation. The chemicals are not known to be hazardous, toxic or flammable.

The Bloomington, Minn., manufacturer also produces lubricants and rust blockers, cleaner degreasers, electronic cleaners and oil, coolant and fuel additives.

For more information on Bull Frog Inc. Circle 88 on Reader Service Card

Drew Marine Corrosion Solution Protects Aging Ballast Tanks

Ashland Chemical Co.'s Drew Marine Division just introduced a solution to the challenge of protecting aging ballast tanks from rust.

Drewgard WB corrosion preventative is a water-based coatings system that reportedly meets class society requirements for hard-film protection at a reportedly lower cost than other hard coatings, without necessitating drydocking.

The product is formulated as an air-dry wax sulfonate emulsion using a proprietary process for replacing typical solvents with water as a carrier. This emulsifies the wax components in combination with a synthetic polymer to form a hard film barrier that bonds to the surface of metals, preventing oxide formation and rust as long as the barrier remains in place. The film reportedly displays good flexibility and will not crack or peel.

For more information on Drew Marine products Circle 35 on Reader Service Card

Norshipco Conducts Paint Removal Project

Hammelmann Dockmaster U.S. representative Milt Lindgren recently called *MR/EN* to report

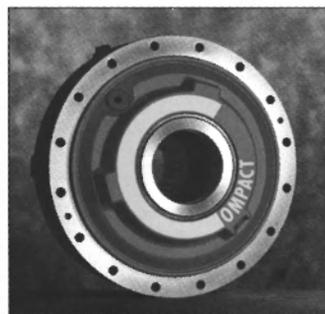
that the first full-scale use of automated, ultra high pressure (UHP) paint removal equipment in the U.S. was scheduled to take place at Norshipco in Norfolk, Va., from July 21 to 24. *Seariver Wilmington* was the ship involved in the project.

According to Hammelmann literature, UHP water blasting is an ecological alternative to open dry blasting and is used for cleaning, coatings removal and paint stripping in a variety of industries. Specifically for the marine industry, Hammelmann supplies a

range of equipment, from jetting guns with rotor jets to semi-automatic Dockmaster ship stripping systems complete with waste water recovery capabilities.

For more information on Hammelmann Circle 89 on Reader Service Card

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Circle 233 on Reader Service Card

Austal-Built Ferry To Enter Service In Japan

Austal Ships-built catamaran *Marine View* was scheduled to enter service for Kumamoto Ferry of Japan last month. The 98.4-ft. (30-m) aluminum passenger vessel is the second Japanese-flagged vessel built by Austal and marks the first collaboration between Austal and Image Marine Group. It is also Austal's first contract to be financed by Maritime Credit Corp. (MCC) of Japan.

With a passenger capacity of 140, *Marine View* will operate five return trips daily on a route between Kumamoto City and Hondo City in Amakusa. At a speed of 33 knots, the vessel will make the run in less than one hour. The control bridge has been geared for two-person operation and features a portable Kamewa harbor mode remote joystick



Austal Ships catamaran *Marine View*.

which can be operated from wing stations. Navigation and communications equipment is provided by JRC. The propulsion system comprises twin MTU 12V 396

TE74L diesel engines driving Kamewa 56 S62/6 waterjets through ZF BU 465 gearboxes.

For more information on Austal Ships Circle 29 on Reader Service Card

NNS Appoints Program Directors

Newport News Shipbuilding (NNS) announced the appointment of program directors for two ers that will enter service in the 21st century.

Michael G. Shawcross has been appointed director of the 77 program, the Nimitz-class nuclear-powered craft carrier for the U.S. Navy, scheduled for delivery in 2008. He will be responsible for overall coordination of design and construction.

Robert E. Davis has been appointed program director for the following carrier, scheduled for delivery in 2013.

RCI Announces Executive Changes

Royal Caribbean International (RCI) has promoted **Adair Goldstein** from vice president to senior vice president of the cruise line's Marketing department. Since

joining RCI in 1988, he has held executive positions in domestic and international marketing, market development and international sales. He will join the company's executive committee, which is being expanded to include company Treasurer **Ken Dubbin** and Market Planning and Development Vice President **Brian Rice**.

P&O Nedlloyd Announces Appointments

P&O Nedlloyd North America has announced three senior appointments at its North American headquarters in East Rutherford, N.J.

Pieter Bas Bredius has been named senior vice president, North Atlantic Trade,

(Continued on page 94)

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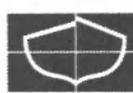
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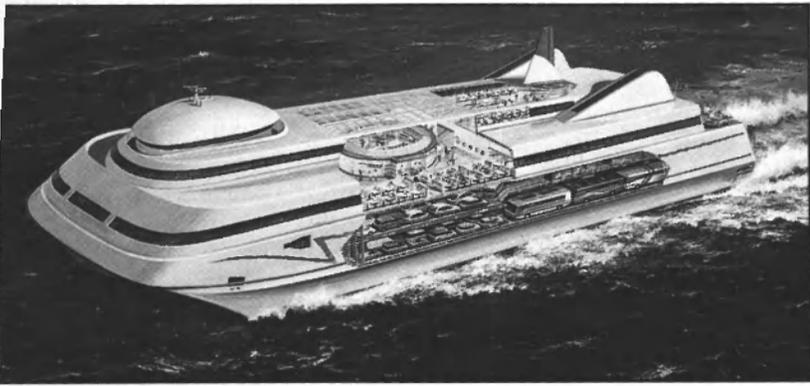
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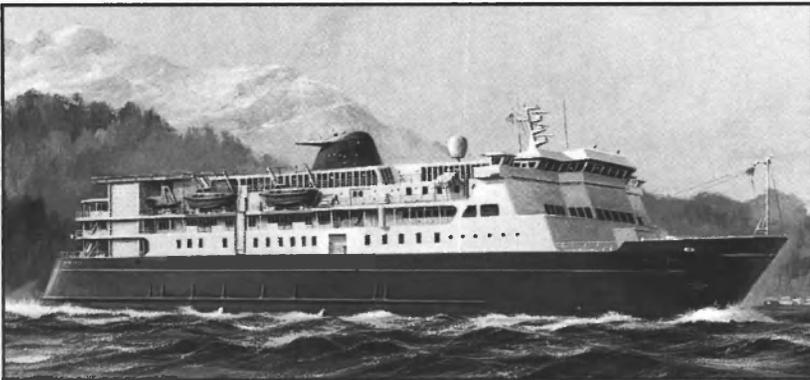
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New Vessel To Battle Environmental Hazards

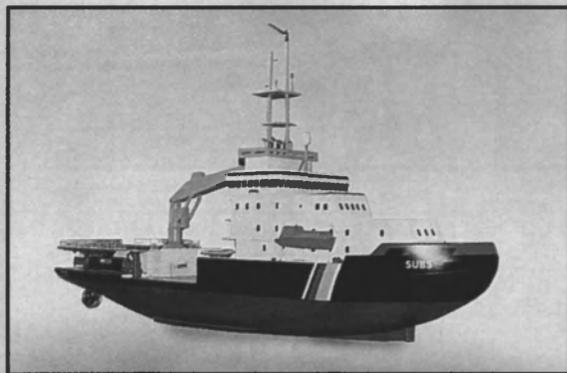
The German Institute for Hydraulic Engineering has commissioned Volkswerft Stralsund shipyard to

build a new pollution combat vessel. Dubbed *Neuwerk*, the vessel will be stationed in Cuxhaven, Germany, by

the end of this year. The vessel will reportedly be able to pick up chemicals in four integrated tanks with an aggregate capacity of 1,000 cu. m. The tanks will be made of Nirosa 4462 stainless steel from Krupp Thyssen Nirosa GmbH. Nirosa 4462 has been used in tankers carrying chemicals, acids and alkaline solutions for the past 10 years. *Neuwerk* will feature an engine exhaust system which will cool exhaust fumes

before discharging them into the atmosphere. This process takes place in double-walled funnel heads. For this application, Krupp Thyssen Nirosa is supplying Nirosa 4565 S stainless steel with high concentrations of chromium, nickel, molybdenum and nitrogen to provide high corrosion resistance in chloride-containing solutions such as seawater.

For more information on Krupp Thyssen Nirosa Circle 27 on Reader Service



Pictured is a model of the pollution combat vessel.

(Continued from page 92)

and will relocate from Et where he led efforts to deter which ocean carrier alliance company would participate in lowing the merger.

Paul DuVoisin, previously responsible for Atlantic Trade, has been named senior vice president of North/South America Trade. **Judith Firth** has been appointed senior vice president, International Communications and Human Resource Development.

Slater Affirms MarAd's Denial Of Lykes Petition

Transportation Secretary **Rodney Slater** has affirmed MarAd's June 20 decision denying Lykes Bros.'s petition to transfer its Operating Differential Subsidy and Maritime Security Program (MSP) payments to Canadian Pacific Ltd. (CP). Sea Crews II, Lykes would be known under Chapter 11 reorganization, and the National Maritime Union petitioned the Secretary's review.

"The principal issue in this decision was real control and independence from foreign influence. Ships benefiting from the Maritime Security Program must be controlled by United States citizens. These ships, without question must be available in time of national emergency or war," said Secretary Slater.

MarAd then released a decision saying that the transfer of modified time charters of First American Bulk Carrier Corp.-owned ships *Tillie Lykes* and *Tyson Lykes* to Lykes Lines Ltd. would be allowed after Lykes Bros. Steamship's reorganization plan under Chapter 11.

MarAd said the transfer of the modified time charters would not convey excessive control of the shipowner to non-citizens since these charters differ significantly from the charters originally proposed.

The vessels can be chartered through 1998, with the following conditions: the time charterer cannot force the sale of the vessels or effectively control labor agreement negotiations; the shipowner retains OPA 90 liability; the charter hire is a set amount, subject to adjustment which does not constitute a pass-through of owner's cost; and the shipowner is an existing company, actively managing the vessels, and not precluded from taking

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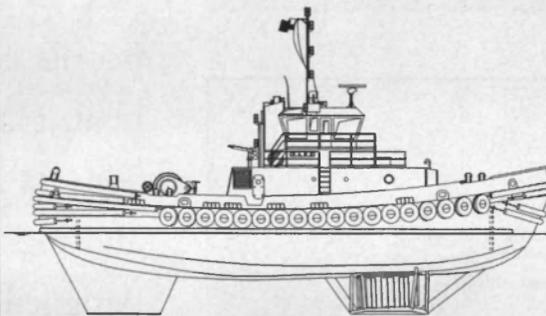
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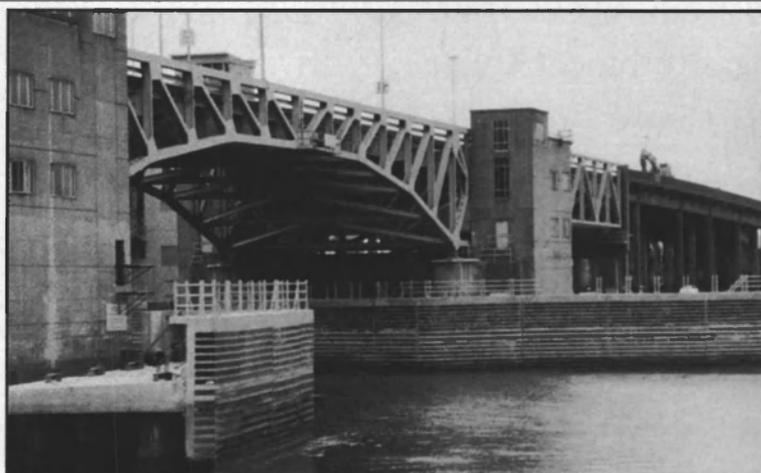
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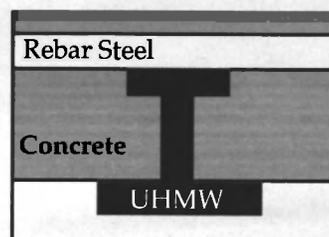


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Estimates are that \$650,000 was saved by using this new design.



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ditional unrelated business.

Ornblower Marine Wins Contract

Ornblower Marine Services of Francisco, Calif., has been awarded a contract by the city of Jacksonville, Fla., to operate the John's River Ferry Service. The service utilizes tow car ferries *Ribault* and *Blackbeard*. *Ribault*, built by Atlantic Marine and designed by Birmingham and Walker, has a capacity of 200 passengers and 40 seats, and will be used as the primary vessel for the Duval County routes served. *Blackbeard* will be used as a back-up and to carry out day cruise and harbor tours.

Denholm To Handle Prison Ship

Denholm Ship Management has been named to manage prison ship *Weare*, which is moored in Portland Harbour off the southern coast of England. The company was also responsible for transporting the prison ship from New Jersey in the U.S. to its present location.

Scamp Underwater Names Agent

Scamp Underwater Services Worldwide Network of Gibraltar has appointed CG Marine & Offshore of Houston as its exclu-

sive agent for Texas and Louisiana. Scamp provides a complete range of underwater services to support ship and rig owners worldwide. Services include: in-water class surveys; propeller polishing and repair; and underwater hull cleaning, damage surveys and welding.

ARCO Chooses Raytheon And C-MAP Products

Atlantic Richfield Co.'s (ARCO's) Marine Unit, in Long Beach, Calif., has reportedly selected Raytheon Marine Pathfinder ST ECDIS models as well as C-Map electronic chart databases for installation on nine oil tankers.

Pathfinder ST ECDIS provides high-resolution, digital chart display and real-time integration of

shipboard sensors on a 26-in. color monitor. It was designed to utilize C-Map's CM-93 S57/DX90 database of charts, which are also being used for the ARCO installations.

DNV Recommends V. Ships For ISO Certification

Classification society Det Norske Veritas (DNV) has recommended V. Ships Marine, Ltd., of Mineola, N.Y., for ISO 9002 certification.

The company has been advised to proceed with the scheduling of external audits for its vessels. According to V. Ships Safety and Quality Vice President **David Walton**, a tanker audit was scheduled to take place in late July. With the successful completion of

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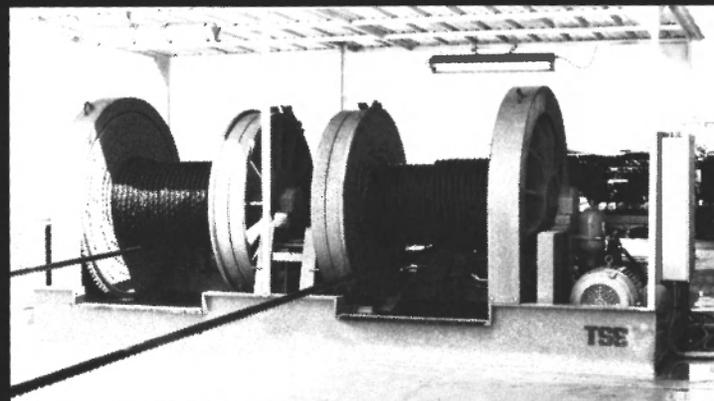
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SEALION SHIPPING	U.K.	VAN DER GIESSEN	NETHERLANDS	MULTI-PURPOSE SUPPORT	—	1	—	3,830	—	—	3
HERMAN BUSS KG	GERMANY	H PETERS	GERMANY	MULTI-PURPOSE	—	1	624	—	—	1998	—
KLAUS BRAACK	GERMANY	H PETERS	GERMANY	MULTI-PURPOSE	—	1	268	—	—	1998	—
REEDEREI RORD BRAREN	GERMANY	H PETERS	GERMANY	MULTI-PURPOSE	—	1	268	—	—	1998	—
SOLSTAD SHIPPING	NORWAY	ULSTEIN VERFT	NORWAY	MULTI-PURPOSE OFFSHORE	—	1	—	—	—	1999	—
WESTFLEET MANAGEMENT	NORWAY	HYUNDAI	KOREA	OBO	—	1	—	109,747	—	1999	5
U.S. COAST GUARD	U.S.	MARINETTE MARINE CORP.	U.S.	OFFSHORE	—	1	—	1,000	—	1998	3
TOISA	—	VAN DER GIESSEN	NETHERLANDS	OFFSHORE SUPPLY	—	1	—	4,630	—	6/98	3
COMPAGNIE CHAMBON	FRANCE	AUSTAL SHIPS	AUSTRALIA	PASSENGER/CAR FERRY	—	1	—	—	—	4/98	—
TIRRENIA SOC. NAV.	ITALY	CANTIERI NAVALE RODRIQUEZ	ITALY	PASSENGER/CARGO	—	3	—	—	3,500	1998	30
ERIK DYVI A/S	NORWAY	ULJANIK	CROATIA	PCC	—	2	—	—	—	1999	71
UGLAND INTERNATIONAL	U.K.	TSUNEISHI	JAPAN	PCC	—	1	—	—	—	5/99	55.7
OTTO CANDIES	U.S.	BENDER/MOBILE	U.S.	PLATFORM SUPPLY	—	4	—	2,500	—	1999	—
COGEMA	MONACO	DAEDONG SHIPBUILDING	JAPAN	PRODUCT CARRIER	—	3	—	45,000	—	1999	96
CHANDRIS	GREECE	DAEWOO	KOREA	PRODUCT CARRIER	AFRAMAX	2	—	105,500	—	5/99-8/99	103
KRISTEN NAVIGATION	GREECE	DAEWOO	KOREA	PRODUCT CARRIER	AFRAMAX	1	—	105,500	—	2/99	43.5
KRISTEN NAVIGATION	GREECE	DAEWOO	KOREA	PRODUCT CARRIER	SUEZMAX	1	—	158,000	—	2/99	52.5
KIRISHIMA KAIUN	JAPAN	MIURA	JAPAN	PRODUCT TANKER	—	1	—	3,500	—	1997	—
LATSIS	—	HYUNDAI	KOREA	PRODUCT TANKER	—	6	—	45,000	—	1999	183
SCI	INDIA	HYUNDAI	KOREA	PRODUCT TANKER	—	2	—	30,000	—	1999	56
SINGAPORE INTERETS	SINGAPORE	JIANGNAN	CHINA	PRODUCT TANKER	—	1	—	17,500	—	1999	—
CARL BUTTNER	GERMANY	3 MAJ	CROATIA	PRODUCT/CHEM TANKER	IMO-2 coated	2	—	13,000	—	1999	44
LAVINIA/YUGREFTRANSFOR	UKRAINE	61 KOMMUNAR	UKRAINE	REEFER	—	2	—	—	—	1998	—
U.S. MILITARY SEALIFT COMMAND	U.S.	NASSCO	U.S.	RoRo	—	1	—	28,525	—	2001	227
LOUIS-DREYFUS	FRANCE	CHANTIERS DE L'ATLANTIQUE	FRANCE	SEISMIC	—	1	—	—	—	—	70
UGLAND + STENA	NORWAY/SWEDEN	TSUNEISHI	JAPAN	SHUTTLE TANKER	—	1	—	125,000	—	8/99	80
SEATANKERS MANAGEMENT	CYPRUS	KVAERNER VYBORG	FINLAND	STAND-BY	—	10	—	2,000	—	1999	70
FRENCH INTERESTS	FRANCE	UNION NAVAL DE LEVANTE	SPAIN	TANKER	—	1	—	17,500	—	1999	—
GLAFKI MARITIME	GREECE	NKK CORP.	JAPAN	TANKER	—	2	—	150,000	—	1999	—
GOLDEN OCEAN GROUP	HONG KONG	KAWASAKI H.I.	JAPAN	TANKER	—	3	—	310,000	—	2000	236.7
MISC	MALAYSIA	HYUNDAI	KOREA	TANKER	—	5	—	30,000	—	2000	225
NYK LINE	JAPAN	ISHIKAWAJIMA HARIMA H.I.	JAPAN	TANKER	—	2	—	260,000	—	98/99	166
SEATANKERS MANAGEMENT	CYPRUS	HYUNDAI	KOREA	TANKER	—	1	—	308,700	—	1999	80
SEATRANS ANS	NORWAY	UNION NAVAL DE LEVANTE	SPAIN	TANKER	—	1	—	17,500	—	1999	—
TORM A/S	DENMARK	HALLA	KOREA	TANKER	—	1	—	45,000	—	1999	30
YUKONG LINE	KOREA	HALLA	KOREA	TANKER	PRODUCTS	1	—	45,000	—	1999	30
NATIONAL IRANIAN TANKER CO.	IRAN	DAEWOO	KOREA	TANKER	SUEZMAX	5	—	150,000	—	99/2000	255
NORDSTROM & THULIN	SWEDEN	DAEWOO	KOREA	TANKER	SUEZMAX	2	—	158,000	—	—	103
CAMBRIDGE PARTNERS / CH SORENSEN & SONNER	U.S./NORWAY	DAEWOO	KOREA	TANKER	VLCC	2	—	—	—	1999	160
EURONAV AGENCIES	LUXEMBOURG	DAEWOO	KOREA	TANKER	VLCC	2	—	300,000	—	1999	158
FREDRIKSEN	CYPRUS	HYUNDAI	KOREA	TANKER	VLCC	1	—	—	—	10/99	82.5
MOBIL CORP.	U.S.	SUMITOMO	JAPAN	TANKERS	AFRAMAX	2	—	105,000	—	1999	90
ARCO	U.S.	AVONDALE	U.S.	TANKERS	—	2	—	—	—	—	332
CROWLEY MARITIME CORPORATION	U.S.	NICHOLS	U.S.	TRACTOR TUG	—	6	—	—	—	98/99	—
EUROMARINE CARRIER	NETHERLANDS	SHIN KURUSHIMA	JAPAN	VEHICLE CARRIER	—	2	—	8,000	—	1999	—

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P) of Malaysia, has
a delivered. NKK
ounced that it has
eived a third order
a similar vessel.
e ship has a low-
perature mem-
ine cargo contain-
nt technology built
NKK, based on

technology licensed
from a French energy
company.

The 426.5 x 84.3 x
54.4-ft. (130 x 25.7 x
16.6-m) vessel will be
used to transport LNG
from Malaysian gas
fields to Japan.

Maritime Academy Orders Simulator

Advanced Marine
Enterprises, Inc. of
Arlington, Va., will
deliver a full-mission
ship bridge simulator
to the Massachusetts
Maritime Academy.
The simulator will be
used to train cadets,
professional mariners,
pilots and docking

masters in ship han-
dling, navigation and
other bridge crew
duties on commercial
vessels.

The unit will
include seven chan-
nels of visual scene
display, creating a
225-degree field of
view.

Image generation
will be delivered by
two Silicon Graphics
Inc. Onyx I-Station
workstations. The
bridge mockup will
feature equipment
from Sperry, Raytheon
and Buffalo Computer
Graphics.

The simulator will
be delivered next
January, with opera-
tions commencing the
following month.

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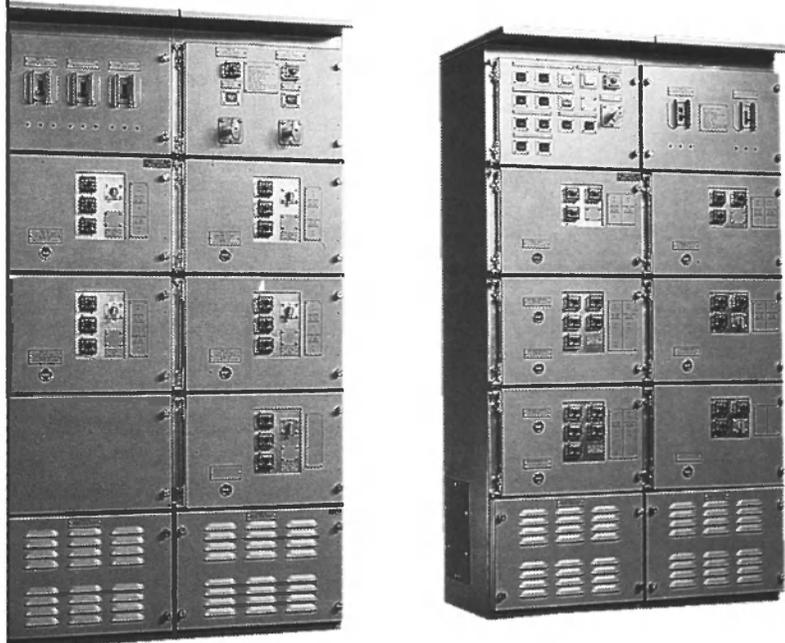
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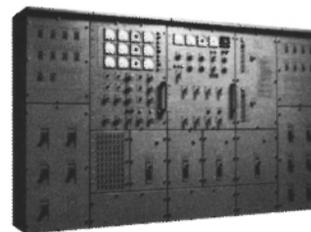
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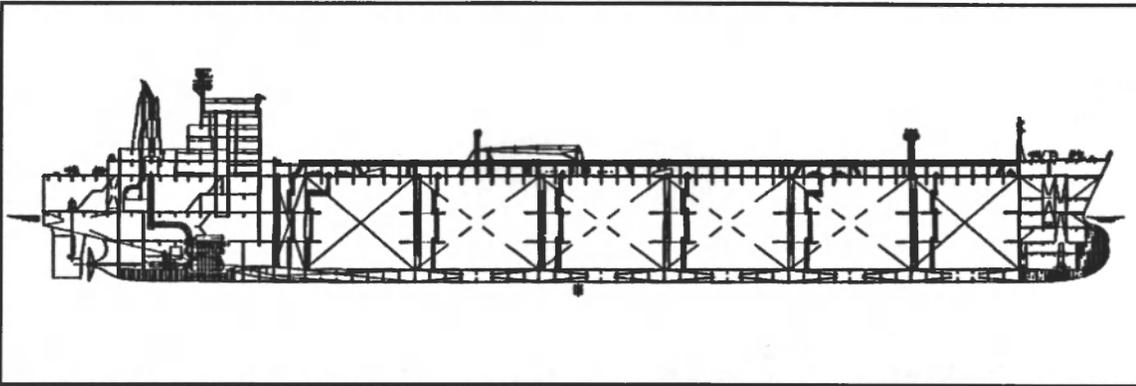
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New ARCO Tankers "Far Exceed OPA 90"

Avondale Gets Order For Two Tankers
\$166 Million Each

by Greg Trauthwein

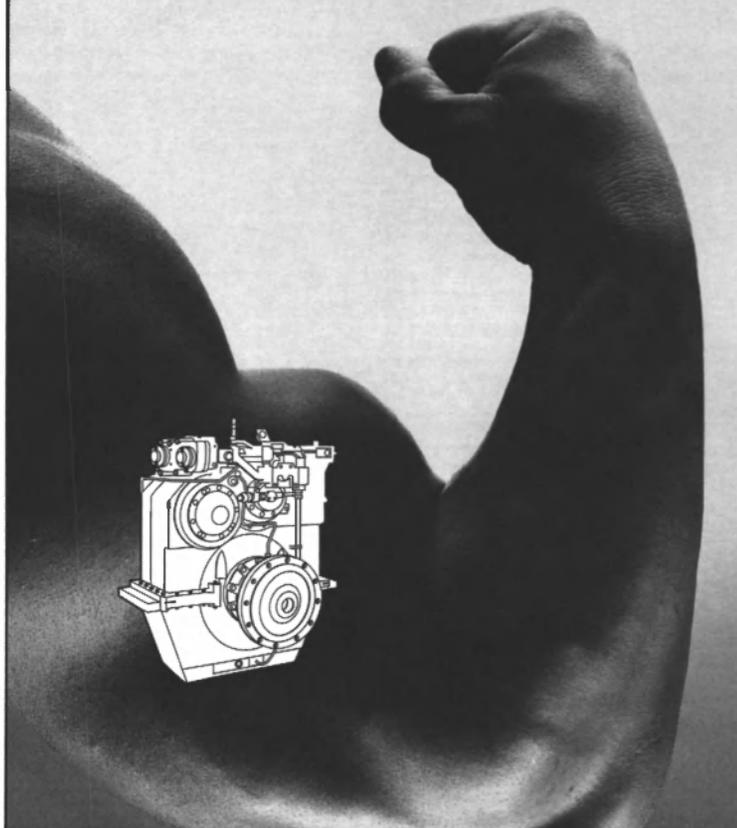
The cover was officially taken at the new ARCO tankers press conference in Washington, D.C., in late July, and it's a safe bet that the new Millennium-class ships will turn more than a few heads.

The 125,000-dwt tankers, ordered by ARCO, the U.S.'s eighth largest oil company, for construction at New Orleans-based Avondale Industries. The contract includes options for three additional vessels as well.

The ships were custom-designed by ARCO to service the environmentally sensitive Alaska and Washington state trade. As ARCO spokesperson pointed out, the ships exceed OPA 90 requirements in several ways. The ships are designed, of course, for a long productive life. But averted tragedy was in the forefront of designers' minds, as the ships feature extra separation between the double hulls; two independent engine rooms, each controlling separate propellers; large, independently controlled rudders; back-up power generation; and control of the ship from a single joystick. The two independent engine rooms will be separated by a fireproof, water-tight bulkhead.

ARCO's design also calls for a 3,000-hp bowthruster, which is designed to be capable of turning the bow into a 27-knot wind, said **Bill Rusnack**, president of ARCO Production Co., the parent company of ARCO Marine. With bowthrusters and reversible propellers, the ships will be capable of

Transmission muscle.



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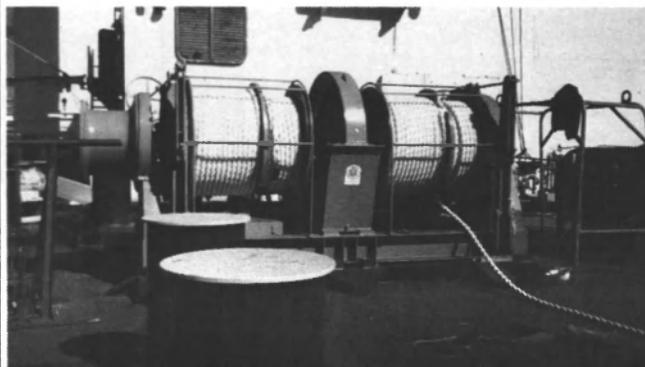
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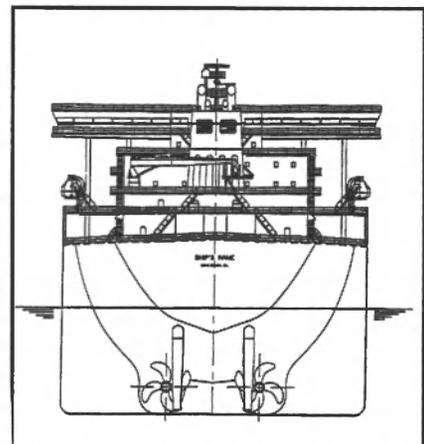
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Stern view.

in a complete circle within their own lengths. The latest heavy machinery is an obvious highlight design, no detail was spared in bridge outfitting, and pumps will be equipped with the latest navigational tools, including ECDIS, three automatic plotting collision avoidance radars and GMDSS. The class is based on proven technologies, and was developed in partnership with leading naval architectural and engineering firms, including John J. McMullen Associates, MCA Engineers, SSPA Maritime Consulting AB, Fort Engineering Co., Glostén Associates Inc., Anna Sørensen and Astilleros Espanoles,



Artist's rendition.

According to an ARCO spokesperson, the company has ordered the tankers to service the increased demand associated with developing Alaskan oilfields. Last year, the company announced plans to develop a major new oilfield on Alaska's North Slope. The Prudhoe Field has proven potential reserves of 250 to 300 million barrels, and initial production is scheduled for the year 2000. The company has considerable experience on the Alaska to Washington route, having made more than 3,500 round trips, transporting more than three billion barrels of crude.

Millennium Class Main Particulars

Length, o.a.	894.6 ft. (272.7 m)
Length, b.p. (design)	847 ft. (258.2 m)
Beam, molded (design)	151.5 ft. (46.2 m)
Depth, molded (at side, design)	83 ft. (16.3 m)
Draft, design	53.5 ft. (16.3 m)
Draft, scantling	57.5 ft. (17.5 m)
Lightship weight	32,664 lt
Deadweight, at design draft	125,000 lt
Deadweight, at scantling draft	137,909 lt
Displacement, at design draft	157,664 lt
Displacement, at scantling draft	170,573 lt
Cargo tanks (number)	12
Cargo tanks (capacity)	1,017,161 bbls
Engine type	(2) diesel, low speed
Speed (trial) @ 90% mcr	16 knots
Propellers	2
Engine (mcr) (each)	15,015 hp

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New Ship Will Be Non-Smokers' Paradise

Carnival has announced its decision to implement a no-smoking policy for its \$300 million new-build *Paradise*, currently under construction in Helsinki, Finland. The vessel will sail from the Port of Miami offering week-long itineraries in the eastern and western Caribbean beginning in the fall of 1998. Officials from the American Cancer Society applauded Carnival's move. "We hope Carnival's bold and innovative action spurs others in the travel industry to follow their lead," said

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a society spokesperson.

AmClyde Promotes Long

AmClyde Engineered Products, Inc. promoted **Wayne Long** to the position of Products vice president, responsible for the company's unit cranes and lucker systems. Before accepting this appointment Mr.

Long was the general manager of AmCane, an AmClyde joint venture in the sugar processing industry.

AmClyde designs and builds large specialty equipment for lifting, pulling and mooring heavy loads in offshore environments, shipyards and at U.S. government installations.

Crowley Announces Management Changes

Crowley Marine Services, Inc. has realigned its petroleum barge transportation management organization. **Steve Collar** has been named general manager, Petroleum Transportation, respon-

sible for the company's oil fleet operating in coastwise offshore services.

Walt Partika has been appointed sales manager in the same position. He was previously a sales account executive. Both employees will continue to work out of Seattle.

Crowley's present fleet includes 14 oceangoing oil barges.

TODCO Wins Grande Caribe Contract

TODCO (The Overhead D Corp.) won a contract to supply sandwich panels for the outfitting of new American Caribbean Cruises vessel *Grande Caribe*. The company is reportedly providing partitions, linings and panels for the ship which is scheduled for summer delivery.

PanCanadian Strikes Oil Off Australia

PanCanadian Petroleum Ltd. reported that one of its offshore wells off the western coast of Australia tested light oil at a rate of 7,600 bpd.

The well — Tenacious-1 ST1 or exploration permit AC/P17 in the Timor Sea — was the company's second discovery in the region in two months. Other partners in the operation include operator Cultus Petroleum NL, Cosmo Oil Co. Ltd. and Gulf Canada Resources Ltd.

Tenacious-1 ST1 reportedly encountered an oil column of 130 ft. (39.5 m) in the Upper Jurassic Tithonian sandstone at a depth of 9,212 ft. (2,808 m). A drillstem test flowed 7,667 bpd of 49 degree API gravity oil and 4.02 million cu. ft. of natural gas. The maximum flow rate was limited by the 3.5-in. tubing used for the test.

Hvide Announces Corporate Changes

Hvide Marine Inc. announced a series of promotions, effective August 1, designed to strengthen operating efficiencies and position the company for continued rapid growth.

Andrew W. Brauning, president of Hvide's Seabulk Offshore, Ltd. affiliate in Lafayette, La., was promoted from corporate vice president to corporate senior vice

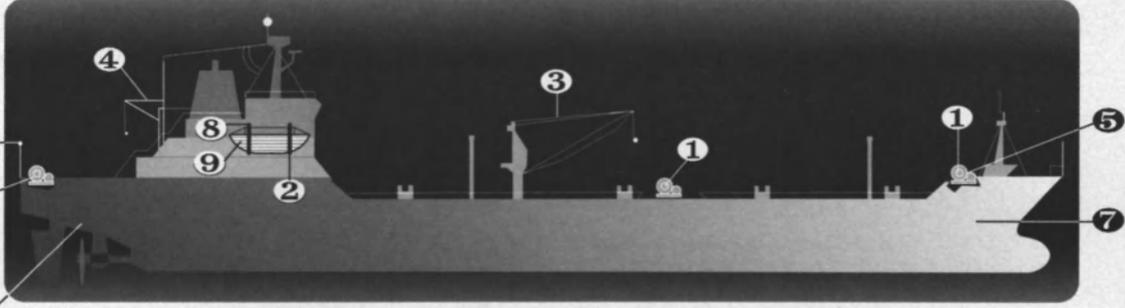
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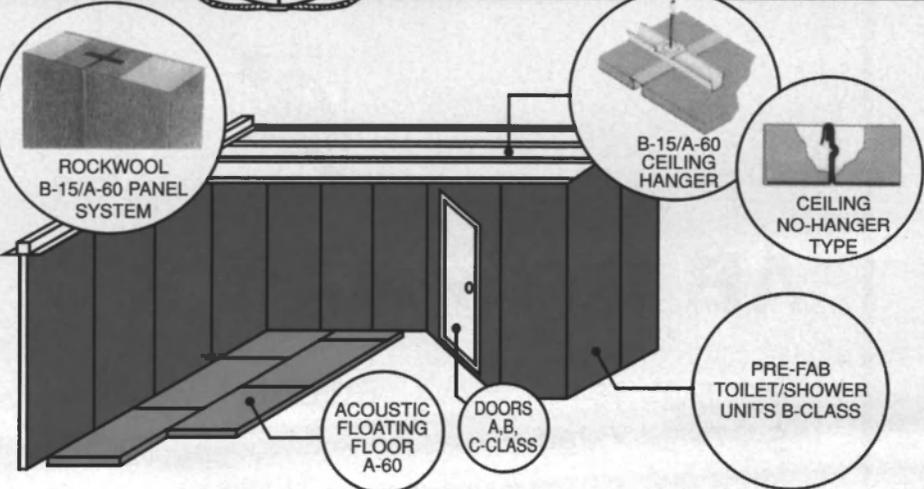
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- B-15/A-60 CEILING HANGER
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CORPORATE HEADQUARTERS

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Keppel Builds Bridge Cranes For Port Of Singapore

Through its wholly-owned subsidiary Keppel Engineering Pte Ltd., Keppel Integrated Engineering Ltd. (KIE), along with Mitsui Engineering and Shipbuilding Co. Ltd. (MES) has completed the first two units of a total of 44 overhead bridge cranes (OHBCs) for the Port of Singapore Authority's (PSA's) new container terminal at Pasir

Panjang. Incorporating state-of-the-art technology, the OHBC at Pasir Panjang features an automatic crane control system which comprises an automatic position indicating system, automatic travel control system, stack profile scanning system and automatic fine alignment system.

For more information on Keppel Circle 16 on Reader Service Card



(Continued from previous page)

president, Offshore Division. With 110 vessels based mainly in the Gulf of Mexico and the Arabian Gulf, Seabulk Offshore is the company's largest operating unit and is reportedly the third largest operator of offshore energy support vessels in the Gulf of Mexico.

Christopher D. Strong, director of Finance and treasurer, was promoted to vice president reflecting the increasing importance of Treasury-related functions to the company's strategy of growth through acquisition.

A. Thomas Denning, director of Engineering, was promoted to vice president, Engineering. Mr. Denning oversees the company's newbuilding programs, including the five Hvide Van Ommeren Double Eagle product carriers currently on order at Newport News Shipbuilding, and the Ship Docking Module tractor tug, the first of which is scheduled for delivery by the end of this year.

Steven L. Willrich, vice president of Hvide's Ocean Specialty Tankers Corp. (OSTC) subsidiary in Houston, was promoted to senior vice

president of OSTC. OSTC is the marketing arm for the company's five chemical tankers.

China To Launch Ocean Exploration Satellite

China plans to launch its first ocean exploration satellite in the second half of 1999, an official of the State Oceanography Bureau said recently.

The satellite would also allow exploration and study of marine organisms, landforms under shallow water, water temperatures and ocean pollutants by distinguishing colors of

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the sea. It might be launched with another meteorological satellite on the same rocket, but other details have not been decided.

The satellite would cover huge areas of the sea, providing real-time data that would benefit the fishing industry and study of ocean resources. China plans to launch the Filipino communications satel-

lite Mabuhay and the Apstar 2R orbiter owned by Beijing-controlled Hong Kong firm APT Satellite Holdings Ltd. in August and September.

China is relying on the successful launch of Mabuhay and Apstar 2R to restore confidence in its space industry after a series of disasters since 1995.

Mexico Moves To Suspend Plans For Coastal Canal

A Mexican senate panel recently urged Texas to suspend a \$756 million plan to build a coastal canal that would provide a shipping link with the state. The panel argued the plan suffered from several

administrative oversights and would cause serious ecological damage on both sides of the border

The 270-mi. canal would link ports in Tamaulipas, on the Gulf of Mexico, to 28,000 mi. of waterways in the U.S. via Brownsville, Texas. The project would take advantage of natural canals between the main coastline and thin strips of land that run along the coast of southern Texas and northeastern Mexico. But Mexico would have to dig out new canals to extend the waterway as far south as the Port of Tampico.

Stena Wins \$640 Million Shell Contract

Stena Tay Ltd. of Bermuda, part of Swedish group Stena AB, has won a drilling contract from Shell International Petroleum Company Ltd. worth \$650 million over 10 years.

Stena said in a statement that drilling unit Stena Tay will be upgraded for the contract in the Keppel FELS shipyard in Singapore for delivery in late 1998. The unit will be a state-of-the-art, deepwater, dynamically positioned drilling vessel capable of operations in water depths of 7,500 ft. (2,286 m) and able to drill to 30,000 ft. (9,144 m).

Drilling operations will be managed by Stena Drilling of Aberdeen, Scotland, which presently owns and manages four semi-submersible drilling units active in the North Sea and Far Eastern markets.

Wärtsilä Forges Agreement In Japan

Wartsila NSD has set up a 50/50 diesel engine joint venture with Japanese Hitachi Zosen Corporation. The company will manufacture Wartsila 20 and 32 diesel engines, and will sell other Wartsila propulsion packages in the Japanese market. Wartsila's investment in the share capital is 4.6 million markka. Nippon Wartsila Diesel, the local subsidiary in Japan, will be merged with the joint venture company. The purpose of the move is to strengthen Wartsila's presence in Japan, which is world's largest shipbuilding market.

The new company will commence operation on September 1, 1997, and will be called Wartsila Diesel Japan Co. Ltd.



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Detroit Diesel Promotes Sharp

Calvin Sharp was named senior vice president of Administration of Detroit Diesel Corp. Prior to his appointment he served as Director of Industrial Relations and Administration for the company. Mr. Sharp replaces **Paul Walters** who has been named executive vice president of Penske Corp.

Port Of Oakland Names Engineering Director

Joseph K. Wong has been named director of Engineering at the Port of Oakland, succeeding **Rick Ferrin** who went to work for Jacksonville Port Authority. Mr. Wong is responsible for a \$14.8 million budget in the coming fiscal year.

"As a Chinese American, he will be a tremendous asset for Oakland in our growing business relationships with our customers in the Asia Pacific region," said Port Board President **Celso Ortiz**.

Mr. Wong worked for the Port

from July 1979 to April 1984 and rejoined the staff in 1990, following six years at the Oakland's Office of Public Works.

"The biggest challenge will be to provide the engineering needed for our billion dollars worth of capital improvements for our Airport Development Plan (ADP), the development of Oakland's Middle Harbor Marine Terminals and our joint intermodal rail terminal (JIT) within our urgently needed timeline," said Mr. Wong.

NOAA Appoints Atlantic Recreational Fisheries Coordinator

Ginny Fay was named Atlantic Recreational Fisheries coordinator for the National Oceanic and Atmospheric Administration's National Marine Fisheries Service (NMFS). She fills a newly created position, and will coordinate and implement agency recreational fisheries programs for East Coast states and the Caribbean from agency headquarters in Silver Spring, Md., in the Office of

Intergovernmental and Recreational Fisheries.

Ms. Fay joined the fisheries service in 1990, after serving as a fisheries biologist with the state of Massachusetts and as an employee of Maryland's Department of Natural Resources.

Commerce Dept. Appoints Fishery Management Council Members

U.S. Commerce Secretary **William A. Daley** recently announced the appointment of 30 members to eight regional fishery management councils that work with the federal government to manage U.S. marine fishery resources.

The councils, established by the Magnuson-Stevens Fishery Conservation and Management Act, prepare management plans for fish stocks which are reviewed by the National Oceanic and Atmospheric Administration's (NOAA's) National Marine Fisheries Service and approved by

the Commerce Secretary.

A recent amendment to Magnuson-Stevens also called for an Indian tribe member to serve as a voting member of the Pacific Fishery Management Council — a position now filled by **James E. Harp**, policy representative of Natural Resources for the Quinault Indian Nation.

Mobil Employee Honored For Offshore Work

The Republic of Kazakstan has awarded a state medal to Mobil Corp. Environmental Manager **Phil Manella** for his contributions to the development of its offshore oil and gas industry.

Mr. Manella assisted the Caspian Sea Consortium (CSC), an alliance of Kazak and energy companies who worked to determine the hydrocarbon potential of the sea's Kazak sector. Consortium members included AGIP, the BP/Statoil alliance, British Gas Exploration and Production, Mobil, Shell, TOTAL and Kazakstancaspishelf (KCS).

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PEOPLE & COMPANY NEWS

Rosenblatt Creates New Division



Feridun Serim



Greg Terwilliger

M. Rosenblatt & Son, Inc. (MR&S) announced the creation of a new division and the promotion of two employees. The new division is headquartered in Newport News, Va., and serves the southern U.S., with additional offices situated in Norfolk, Charleston and New Orleans.

Feridun Serim, former manag-

er of the company's office in Newport News and a 29-year Rosenblatt employee, will direct the daily operations of the new division as vice president and manager, Southern Division. **Greg Terwilliger**, part of Rosenblatt since 1980, will serve as Newport News branch manager, in addition to fulfilling his current capacity as chief engineer of the branch office.

KVH Promotes Palmer

KVH Industries, Inc., provider of navigation and mobile satellite communications equipment, has promoted **Ian Palmer** to North America Marine Sales manager. Formerly Commercial Marine Sales manager, he will now oversee all aspects of sales and distribution and will direct KVH's domestic and Canadian sales forces.

O'Sullivan Joins Halter Marine

Maureen O'Sullivan has joined Halter Marine Group, Inc. as senior vice president and general counsel. Prior to accepting this position, she was a partner in New Orleans law firm McGlinchey Stafford, LLC, and was the founding and managing partner of the firm's Dallas office.

Ms. O'Sullivan has worked with Halter Marine Group since 1983 as outside counsel for company predecessor Halter Marine, Inc. She also served as outside counsel for Trinity Industries, Inc., the current company's former parent.



Maureen O'Sullivan

expansion of the class society activities and new product innovations for the U.S., Canada and Mexico. Mr. **Kimball** has previously been employed by M. Rosenblatt & Son and C.F. Cushing & Co., Inc.

This appointment accompanies BV's recent effort to target the North American market, which was launched with a \$5 million development project in March.

ASRY Wins British Safety Award



Marketing Director Jonas Svedberg (pictured right) accepts ASRY's safety award from Sir Neville Purvis.

The Arab Shipbuilding and Repair Yard Co. (ASRY) of Bahrain won a safety award from the British Safety Council for achieving a below-average accident rate. "By making safety an important

BV Names New VP

Bureau Veritas (BV) announced that **Philip Kimball** joined its Stamford, Conn., office as vice president of Marine Business Development for North America. His responsibilities will include



Philip Kimball

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PEOPLE & COMPANY NEWS

ature of every day work practice, 3RY is reducing accidents and ill-health while improving its productivity and profitability," said **Sirleville Purvis**, director general of the safety council.

Forest Lines Promotes Ackerman

Formerly with American President Lines until he joined Forest Lines as an assistant pricing manager last year, **Ronald Ackerman** was recently promoted to Marketing manager by his employer, which is a New Orleans subsidiary of International Shipholding Corp.



Ronald Ackerman

Boatrac's Announces Board Appointments

Boatrac's Inc., a distributor of satellite-based marine communications and tracking systems, announced the appointment of two new board members. **Julius Trump**, co-chairperson of a private investment group, and **Mitchell Lynn**, president of a consumer goods manufacturing firm, will sit on the San Diego-based company's board.

3M Marine Announces Appointments

3M Marine has named seven-year company veteran **John Dell'Angelo** to the position of Market Development supervisor for its consumer and cruise ship markets. The St. Paul, Minn., based company also appointed **Joe Parks** as Eastern Region Sales manager. Mr. Parks has 13 years of 3M sales experience.



Joe Parks

"K" Line Announces Senior Appointments

"K" Line America, Inc. has named **Theodore Prince** to the position of senior vice president and chief operating officer, and **Stein Kruse**

to the position of senior vice president and chief financial officer.

Mr. Prince will be responsible for the management and profitability of the company's North American trades. He was most recently senior vice president, Operations. Mr. Kruse is vice chairman of Cruise Lines

International Association (CLIA) and before accepting a "K" Line position, served as executive vice president and COO of Radisson Seven Seas Cruises.

Short Joins AGMA Board

Gear Products, Inc. President

Michael Short joined the American Gear Manufacturers Association's (AGMA's) board recently. The association represents more than 380 manufacturers of gears and related gearing and coupling products, as well as suppliers and consultants to the industry.

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OTECH Gets New GM

Oceanering International, Inc. announced the promotion of **John Kreider** to vice president and general manager of Oceanering Technologies (OTECH). OTECH develops and operates specialized hardware systems, primarily marine systems including diver-operated tools and underwater welding, ROVs, underwater construction and submarine rescue systems.

Mr. **Kreider** was previously vice president of Programs for OTECH and has been an employee of Oceanering for more than 10 years.

Nobeltec Reorganizes

To capitalize on its market share position in the marine navigation software industry, Nobeltec has reorganized its Sales and Marketing departments and made staff changes. **Jeff Hummel**, formerly Sales manager, has been promoted to vice president of Sales and Business Development. **Katherine Malmo** was hired to manage dealer accounts and trade

shows.

Haggerty Joins Oronite Sales Team

Timothy S. Haggerty has joined Chevron Chemical's Oronite Additives Division as a technical sales representative. In the past, he served as an account manager at Shell Chemical Co. and Texaco Additive Co., and as a sales engineer at Nalco Chemical Co. Mr. **Haggerty** brings 11 years of industry experience to his new position.



Timothy Haggerty

LaMonica Joins Lang Mftg.

Guy LaMonica joined Lang Manufacturing Co. as director of Service. The Everett, Wash., company supplies marine cooking equipment.

Mr. **LaMonica** has more than 26 years of management experience, and spent three years directing a national and worldwide service network within the food service

industry.

Automated Marine Propulsion Re-named

The company previously known as Automated Marine Propulsion Systems has changed its name to EquaDyne International to better convey its scope of services and mission. The new name focuses on the primary benefit of the company's engine technology and the philosophy behind its repair services: the equal distribution of power for optimum engine efficiency. The company specializes in large engine applications for the marine, railroad and power generation industries.

Kamewa/Aquamaster Appoints Rep Firm

Kamewa/Aquamaster (U.S.A.) — manufacturer of azimuthing Z-drive units, tunnel thrusters, propellers and waterjets — appointed Anchor Marine, Ltd. as its Gulf Coast sales representative firm for offshore support vessels.

Anchor Marine also represents Allweiler Marine Pumps; C.C.

Jensen, Inc.; McElroy Machine & Mfg. Co.; and Wortelboer Anchor and Chain; and is an agent for Belgium's Antwerp Shiprepair and China's Lmiec Marine Group.

Port Of Galveston Elects Top Board Officials

The Port of Galveston, Texas, has elected **John W. Ford** to serve as chairman and **Dr. Elbert B. Whorton, Jr.** to serve as vice chairman of its board of directors. Other newly named board members are: **Charlotte O'Rourke**; **Don Schattel**; and **Radm. William T. McMullen**.

Katica Joins ZF Sales Force

Tom Katica, formerly with MER Equipment, has been appointed West Coast account manager for marine gear supplier ZF Marine. He has an extensive sales background, including 12 years with his former employer.



Tom Katica

Flowdata Promotes Carrell

Robert D. Carrell has been named vice president of Flowdata, Inc.'s FuelCom Products. For the past six years, he has served as Sales and Marketing vice president of Flowdata. Mr. **Carrell** will now be responsible for the FuelCom line of fuel monitoring equipment.

GL Execs Retire

Two Germanischer Lloyd (GL) executives went into retirement after decades of work for the classification society. Naval architect **Martin Böckenhauer** is reknown as a tanker design and development expert, and his presence was strongly felt on IMO and IACS committees.

Mechanical Engineer **Hans-Helmut Moller** has taken leave of GL after 33 years of service, many spent as group leader of the Marine Diesel Engines department. Before joining GL, he developed deck machinery designs at KGW, and supervised the inspection of steam boilers and pressure vessels at the Technical University of Schwerin.

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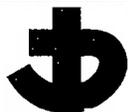
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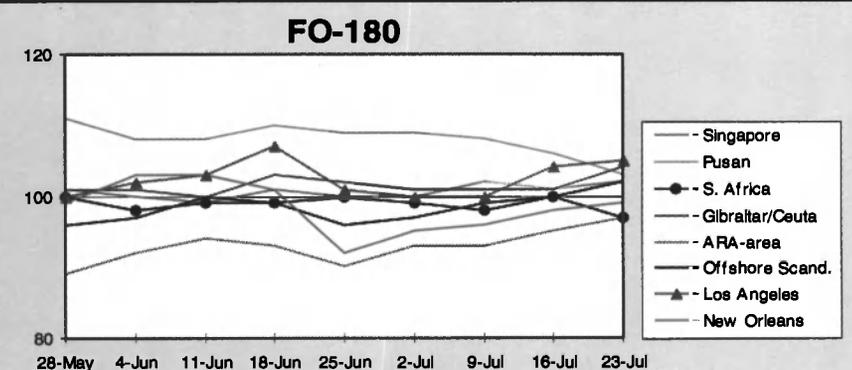
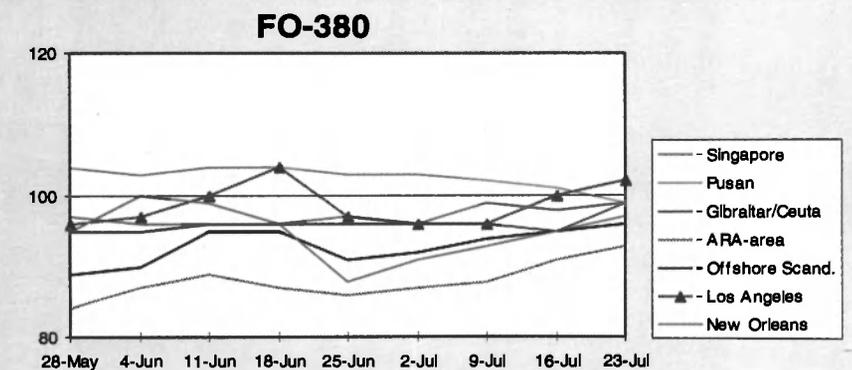
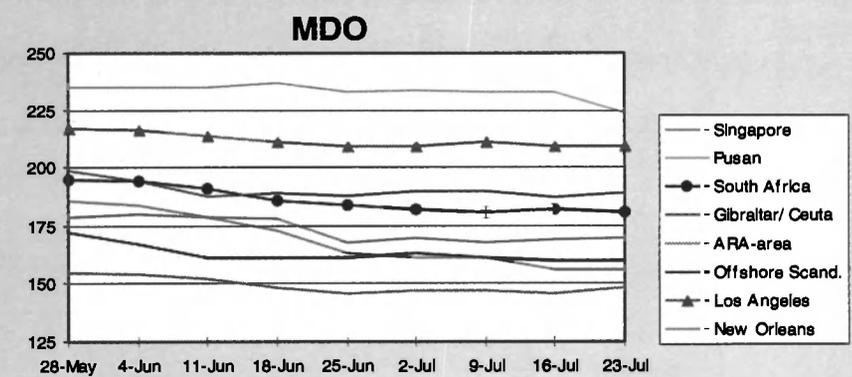
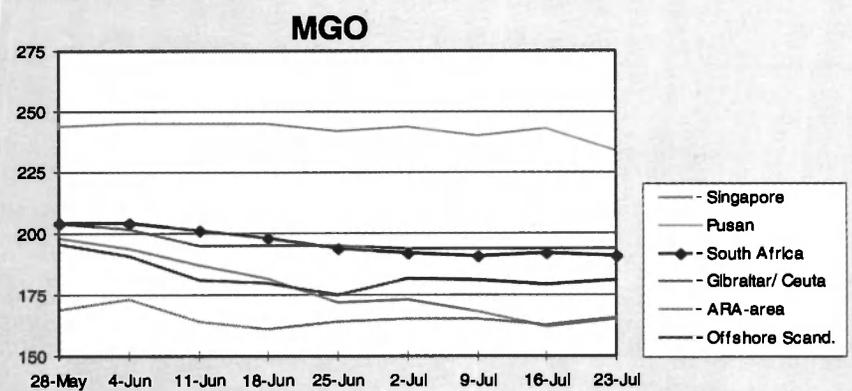
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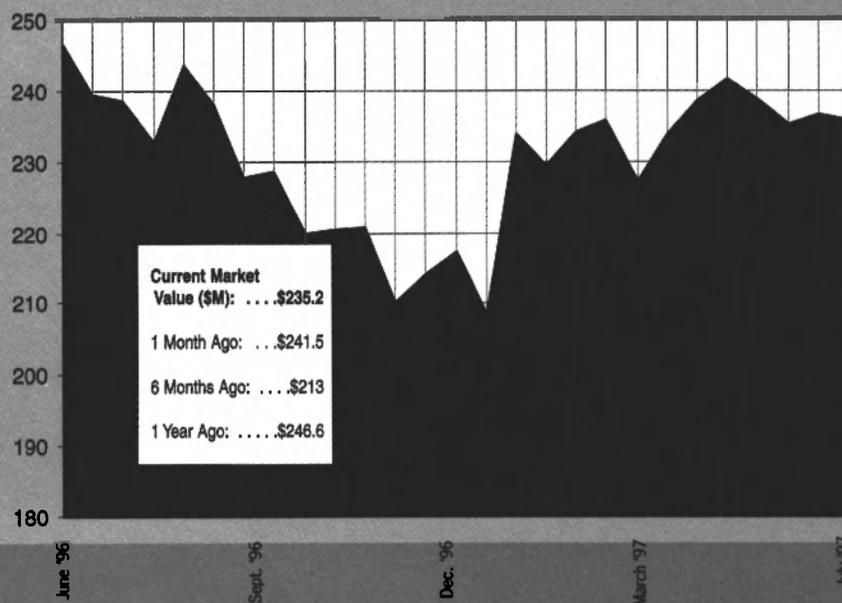
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Recent Ship Sales

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

Date Reported	Vessel Name	Vessel Type	DWT	Year Built	Sale Price (M)
6/6/97	Plover	Bulker	21,259	82	\$6.2
6/6/97	Royal Venture	Bulker	21,649	86	\$8.5
6/6/97	Ocean Steamer	Bulker	21,973	81	\$5.5
6/6/97	Samos	Bulker	22,312	74	\$1.5
6/20/97	Cynthia Pioneer	Bulker	23,300	94	\$14.8
6/27/97	May Star	Bulker	23,803	77	\$2.3
6/6/97	Peonia	Bulker	25,439	82	\$7.8
6/6/97	Young Sprout	Bulker	25,517	84	\$9
6/27/97	Trans Aspiration	Bulker	30,311	77	\$3.8
6/20/97	Neo Hibiscus	Bulker	37,732	85	\$11.2
6/6/97	General Pradzynski	Bulker	37,844	77	\$3.3
6/13/97	Oriental Farm	Bulker	38,888	85	\$11.5
6/6/97	Uniwersytet Wroclakski	Bulker	52,020	74	\$2.3
6/27/97	Orion II	Bulker	61,771	82	\$9.5
6/6/97	Lia Hua	Bulker	63,996	77	\$4.9
6/27/97	Evniki	Bulker	64,926	77	\$4.1
6/6/97	Red Cherry	Bulker	66,980	83	\$10.6
6/13/97	Far Eastern Grain	Bulker	68,337	87	\$16.5
6/6/97	Ocean Rose	Bulker	69,306	90	\$19
6/13/97	Cereza	Bulker	69,808	89	\$18
6/6/97	Toxotis	Bulker	79,491	75	\$3
6/27/97	Silvergata	Bulker	105,577	82	\$8.2
6/27/97	Iron Master	Bulker	127,774	82	\$12
6/13/97	Berge Master	Bulker	143,745	82	\$14
6/13/97	Matsuyama Maru No 22	Tanker	5,499	85	\$3.2
6/6/97	Thorstream	Tanker	21,217	75	\$2.9
6/27/97	Sea Topaz	Tanker	25,097	75	\$3.9
6/27/97	Ace Trader	Tanker	60,961	87	\$22.3
6/27/97	Sienna	Tanker	69,999	86	\$26.5
6/6/97	Hellespont Hope	Tanker	96,550	74	\$4.1
6/20/97	Marina	Tanker	97,839	80	\$12.8
6/20/97	Juno	Tanker	357,600	78	\$15

Index Fleet Valuation



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

U.S. Maritime Review

HMI Completes Glomar Explorer Project

Harbormaster Marine Inc. (HMI) has completed Phase One and Two of "Project Glomar

Explorer" for Global Marine Drilling Co. and Intermarine Services.

The 15-month project includes major upgrade and overhaul of the five existing thrusters, which were installed in 1971. HMI worked

closely with Nautex Co. of Houston and Philadelphia Gear in the design and manufacture of new input pinion gear sets to accommodate the increased horsepower. More than 90 percent of the assembly components for the thrusters

were replaced.

Phase Three of the project is scheduled to start in September and will entail the installation of drilling equipment.

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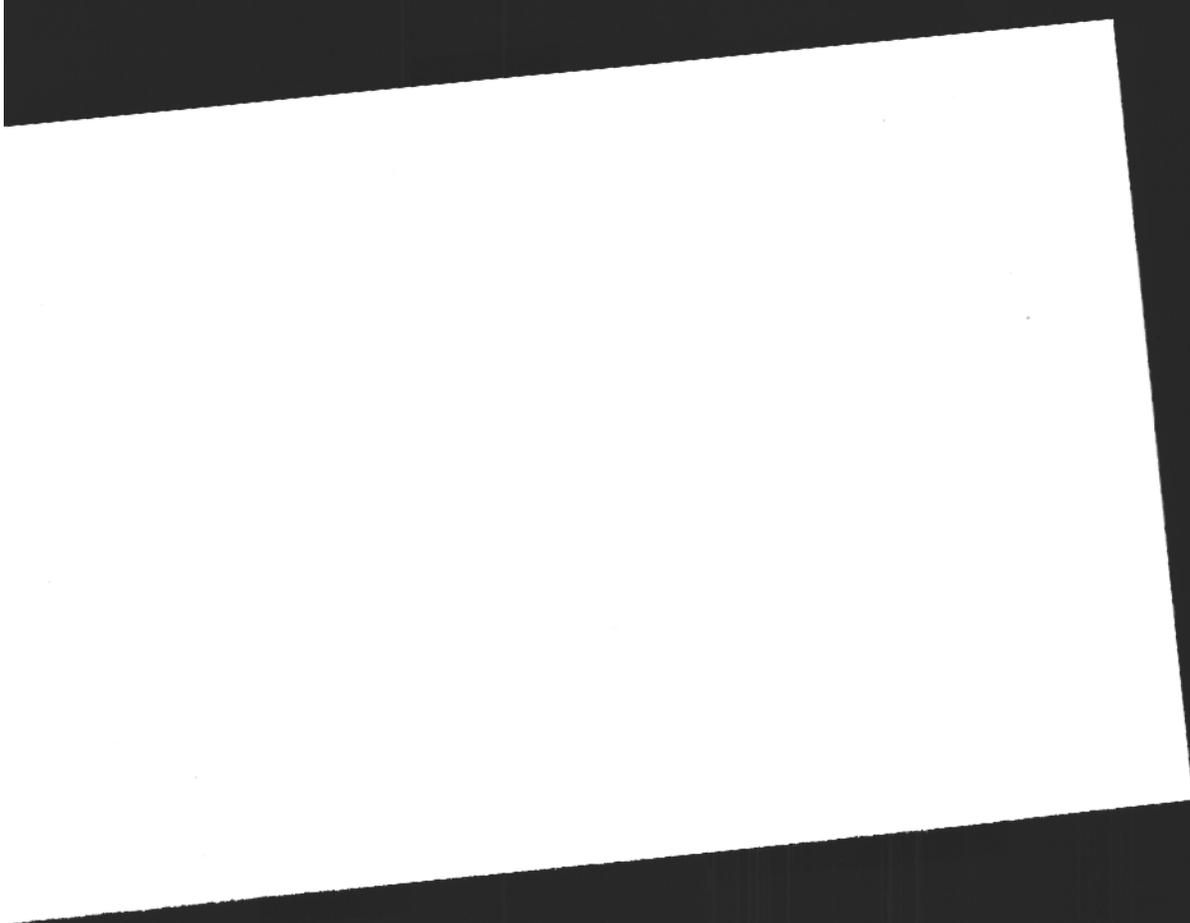
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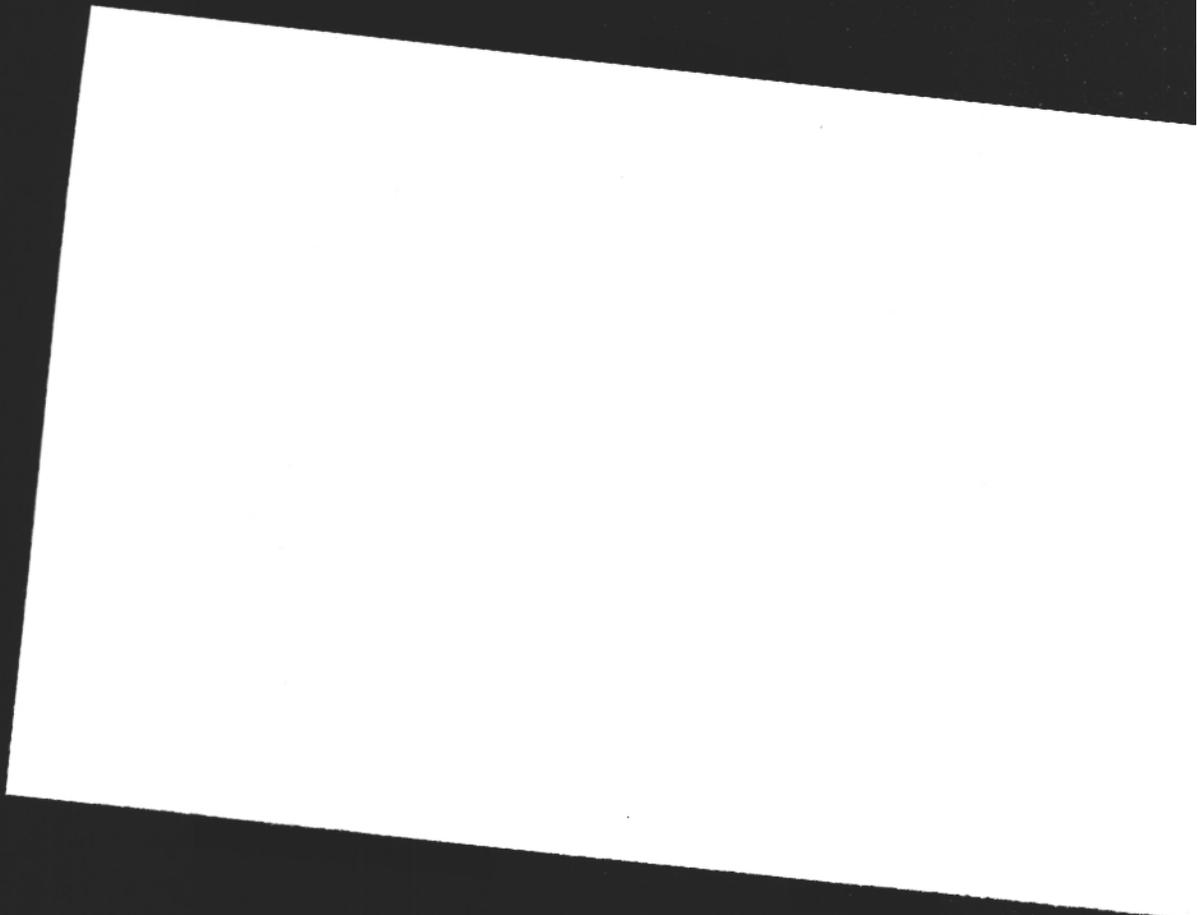
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SMI: Diverse Job Load Keeps Morgan City Yard Busy

Service Marine Industries (SMI), based in Morgan City, La., has enjoyed the work swell produced by the still-growing oilfield business.

Recently, Offshore Marine Service entrusted SMI with the conversion and refurbishment of *M/V Louis Eymard*. Once a supply vessel used for towing, the vessel will be cut in half and extended 20 ft. (6.1 m) with the addition of a midbody section, leading to its reclassification as a USCG Subchapter L supply boat for load-

lined vessels. The boat will measure 185 ft. (56.4 m) when complete, and will be outfitted with a larger bowthruster for increased maneuverability.

"We have completed numerous conversions of this size and scale on offshore supply and multi-purpose vessels," said **Ronnie Chiasson**, SMI vice president and Repair Division manager. The lengthened *Louis Eymard* is to be used as an offshore supply ves-

sel.

SMI also won a contract from Oceaneering Int'l. to design and build a 243-ft. (74-m), 4,000-hp multi-service vessel. The contract — which includes an option for a second vessel — is significant because it is the first newbuild ordered in the company's history.

The MSV will be classed to ABS DP-2 (double redundant). In addition, it will SOLAS and ABS classed for unrestricted ocean service, and equipped with a fully integrated GMDSS for area A3 operation. The vessel will sport a 6,000-sq.-ft. aft deck will be able to accommodate a cargo deck load of 1,200 long tons.

Finally, SMI signed a contract with Kim Susan Inc. to build a 210-ft. (64-m) offshore supply vessel. Having sold its fleet to Trico last year, Kim Susan now plans to rebuild its fleet, starting with the SMI newbuilding. The vessel will be powered by two EMD Model L-16-645-E6 marine engines, rated 1,950 bhp at 900 rpm.

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Circle 357 on Reader Service Card

Avondale Positioned To Capture More Commercial Business

Avondale Industries — not resting on the laurels (or \$332 million) of its recent ARCO contract — reportedly expects new opportunities to win contracts to build commercial oil tankers. The New Orleans-based naval and commercial shipbuilder won a \$332 million order to build two 125,000-dwt Suezmax crude oil tankers for Atlantic Richfield Co. (ARCO) Marine.

An Avondale spokesman said the shipbuilder was in the running for further commercial tanker newbuilding contracts, pointing to a number of rumored tanker deals which could end up in U.S. yards. Speculation of late has centered on new orders from British Petroleum in collaboration with Overseas Shipholding Group Inc. and Sea River Maritime.

Maritrans Inc. currently has an order for six Jones Act handsized products tankers pending with Avondale. Maritrans is reported to be in the process of securing finances for the deal.

Avondale announced second quarter net income of \$6.4 million, compared with \$14.3 million a year earlier which included an income tax benefit of \$9 million. Second quarter net sales were \$145.8 million against \$152.6 million a year earlier. The ARCO tankers are both due to be delivered in 2000 and will be employed in the Alaska-U.S. West Coast trade. While some have questioned the high cost of the tankers, Avondale explains that this is due to a high specification design incorporating duplicate propulsion systems.

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SHIPWRECK DISCOVERY

(Continued from page 8)

"This is a much sought after artifact, one of the undiscovered treasures of Lake Champlain. One of the most important aspects of the discovery is that it highlights Lake Champlain's vital role in our nation's history," said Mr. **Cohn**, who has been involved in numerous shipwreck projects. "I have always thought the War for Independence was one of the most profound moments in history and this boat, providing a tangible link to that period, makes it the most important boat from my personal perspec-

tive."

Discovery Prompts New Research

"This discovery provides new light on the maritime aspects of the Revolutionary War and the American nation. It will be a great catalyst to new research through nautical archaeology," said **Dr. William Dudley**, director of the Naval Historical Center in Washington, D.C.

The LCMM will work with the U.S. Navy and the states of Vermont and New York to develop a management plan for the gunboat. Analysis will focus on two basic preservation strategies:



Pictured is *Philadelphia II* — a full-sized working replica of Benedict Arnold's gunboat *Philadelphia* — which was launched in 1991 at the Lake Champlain Maritime Museum.

preserving the ship in place; versus raising and exhibiting it. It has been determined that whatever the verdict, the gunboat will stay in the Champlain Valley. Determining which vessel has been found, out of three possibilities — *New Haven*, *Providence* or *Spitfire* — will also become part of the management plan.

The foreboding agenda of the zebra mussels has not yet affected the vessel. According to Mr. **Cohn**, there is still a leeway of a few years before the mussels become an imminent threat. Meanwhile, researchers anticipate a systematic examination of the entire bottom of Lake Champlain to continue for the next five to seven years. The survey, with a current annual budget of \$200,000, is funded through a combination of public and private sources, specifically the Lake Champlain Basin Program, the National Park Service, the Environmental Protection Agency and the Lintilhac Foundation. Surveyors hope to discover the exact number of historic shipwrecks and their approximate sinking dates, as well as to gather geophysical information about Lake Champlain which will lead to significant new analyses about the geology of the region.

The Silver Lining

"This could prove to be the most significant maritime discovery in American history in the last half century," said **Dr. Lundeberg**. A vessel once commanded by a traitor, defeated in battle and a near-victim of an underwater plague is on its way to becoming a shining star of maritime history. While in life **Benedict Arnold** betrayed the U.S. by giving away its military secrets to the British, he has posthumously paid a great service to his country.

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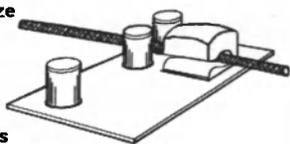
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SEPTEMBER 1997

BaltExpo '98: September 1-4, Gdansk, Poland.

For more information: tel/fax: +22 6255 23 98/22 628 72 95.

1997 Manning and Training Conference: September 3, Institute of Marine Engineers, London, U.K.

Contact: Shantel Costen, International Shipping Federation, 12 Carthusian St., London EC1M 6EB, U.K., fax: +44 171 417 8877.

International Maritime Lecturers' Association (IMLA) Conference/Workshop '97:

September 7-9, Fisheries and Marine Institute of Memorial University, Newfoundland.

Contact: Les O'Reilly, executive director, P.O. Box 4920, St. John's, Newfoundland, Canada A1C 5RC, tel: (709) 778-0200; fax: (709) 778-0346.

1997 American Int'l Ship Expo (AISE):

September 9-11, New York Coliseum, New York City.

Contact: McNabb Expositions, Inc., P.O. Box 418, Rockport, Maine 04856-0418, tel: (207) 236-6196; fax: (207) 236-0369.

Offshore Europe '97: September 9-12, Aberdeen, Scotland.

Contact: International Expositions, Inc., 1635 W. Alabama, Houston, TX 77006, tel: (713) 529-1616; fax: (713) 529-0936.

NEVA 97 (The Int'l Shipping Exhibition with Russia and the Republics): September 9-13, St. Petersburg, Russia.

Contact: Pedro Svensson, P.O. Box 28, S-184 21, Akersberga, Sweden, tel/fax: +46 8540 24105.

MCMC '97 (Conference on Vessel Maneuvering/Control of Marine Craft): September 10-12, Brijuni, Croatia.

Contact: Prof. G.N. Roberts, University of Wales College, Newport, Faculty of

Technology, Allt-yr-yn Campus, P.O. Box 180, Newport NP9 5XR, U.K., tel: +44 1633 432 441; fax: +44 1633 432 430; e-mail: geoffr@gwent.ac.uk.

Gas Trading And Transportation Forum: September 17-18, London, U.K.

For more information, tel: +44 171 878 6888.

World Fishing - Vigo '97: September 17-21, Vigo, Spain.

Contact: Nexus Media Ltd., Top Floor, 84 Kew Rd., Richmond, Surrey TW9 2PQ, U.K., tel: +44 181 332 9273; fax: +44 181 332 9335.

AAPA's 86th Annual Convention: September 22-26, Marriott at Sawgrass, Jacksonville, Fla.

Contact: Eileen Denne, P.R. director, American Association of Port Authorities, 1010 Duke St., Alexandria, Va. 22314, tel: (703) 684-5700; fax: (703) 684-6321, e-mail: aapa@ix.netcom.com.

SNAME Propeller/Shafting Symposium: September 23-24, Virginia Beach, Va.

Contact: Kevin Prince, Designers and Planners, 2120 Washington Blvd., Sequoia Plaza, Arlington, Va. 22204; tel: (703) 920-7070; fax: (703) 920-7177.

Bunkers '97: September 23-26, Miami, FL.

Contact: Carleen Lyden-Kluss, International Marketing Strategies, 28 Southfield Ave., Stamford, CT 06902, tel: (203) 406-0106; fax: (203) 406-0110.

Seatrade North European Cruise and Ferry Conference: September 24-26, Amsterdam Rai, Amsterdam, The Netherlands.

Contact: Seatrade, Seatrade House, 42 North Station Rd., Colchester CO1 1RB, U.K., tel: +44 1206 545121; fax: +44 1206 545190.

ASNE Combat Systems Symposium: September 29-30, Kossiakoff Center,

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Argentina Oil & Gas Show: September 29-October 3, Buenos Aires, Argentina.

Contact: International Expositions, Inc., 1635 W. Alabama, Houston, TX 77006, tel: (713) 529-1616; fax: (713) 529-0936.

Contact: Paddy Payne, Baltic Conventions, Regal House, 70 London Rd., Twickenham TW1 3QS, U.K., tel: +44 181 892 2892; fax: +44 181 892 6767.

International Disaster and Emergency Response (IDER '97): October 7-9, The Hague.

For more information, tel: +44 1985 846618; fax: +44 1985 846163.

15th World Petroleum Congress: October 12-16, 1997, Beijing, China.

Contact: Chinese Organizing Committee Secretariat, c/o China National Petroleum Corporation, P.O. Box 766, Liu Pu Kang, Beijing 100724, China, tel: +86 10 209 5455/5446; fax: +86 10 209 544/5459.

Ocean Technology Workshop: September 30-October 3, Sea Crest Ocean Front Resort and Conference Center, North Falmouth, Mass.

Contact: Massachusetts Ocean Technology Network, tel: (617) 740-1456; fax: (617) 749-1120.

OCTOBER 1997

Container Asia '97: October 7-9, Shangri-La Hotel, Kuala Lumpur, Malaysia.



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9th International Conference On Computer Applications In Shipbuilding (ICCAS '97): October 13-17, Yokohama, Japan.

Contact: ICCAS Secretariat c/o Int'l Communications Specialists, Inc., Kasho Bldg., 2-14-9, Nihombashi, Chuo-ku, Tokyo 103, Japan, tel: +81 3 3272 7981; fax: +81 3 3273 2445; e-mail: iccas97@ics-inc.co.jp.

Intertanko Conference And Exhibition: October 14-16, London, U.K.

Contact: Barbara Ann Viken, Oslo, tel: +47 22 12 26 56.

ASNE's 6th Fleet Maintenance Symposium: October 14-17, Town and Country Hotel, San Diego, Calif.

Contact: Rich Caccese, tel: (619) 556-2623, or Cdr. Chuck Goddard, tel: (619) 556-1627.

SNAME International Maritime Exposition: October 15-17, Westin Hotel, Ottawa, Ontario, Canada.

Contact: SNAME, 601 Pavonia Ave., Jersey City, N.J. 07306, tel: (201) 798-4800.

AWO 1997 Fall Convention and Board of Directors Meeting: October 16-17, The Four Seasons Olympic Hotel, Seattle, Wash.

Contact: Tina Gardner, manager, Administrative & Member Services, American Waterways Operators, 1600 Wilson Blvd., Ste. #1000, Arlington, Va. 22209, tel: (703) 841-9300; fax: (703) 841-0389.

Women In Shipping: October 16-17, Washington, D.C.

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Contact: **Carleen L. Kluss**, International Marketing Strategies, 28 Southfield Ave., Stamford, CT 06902, tel: (203) 406-0106; fax: (203) 406-0110.

1997 Permanent Int'l Association of Navigation Congresses (PIANC) National Conference: October 28-30, Hilton Hotel, Wilmington, N.C.
Contact: Office of U.S. Section, PIANC, 7701 Telegraph Rd., Alexandria, Va. 22315-3868, tel: (703) 428-6286; fax: (703) 428-8171.

Society of Accredited Marine Surveyors Annual Conference and Education Training Symposia: October 29-31, Downtown Riverfront Holiday Inn, St. Louis, Mo.
Contact: **Mary Stahler**, executive secretary, tel: (800) 344-9077; fax: (800) 388-3958.

Fort Lauderdale International Boat Show: October 30-November 3, Fort Lauderdale, Fla.
Contact: Show Management, Inc., 1115 Northeast 9th Ave., Fort Lauderdale, Fla. 33304, tel: (954) 764-7642; fax: (954) 462-4140.

NOVEMBER 1997

Seatrade Pacific Cruise Convention: November 3-5, Cairns, Australia.
Contact: The Seatrade Organisation, Seatrade House, 42 North Station Rd., Colchester CO1 1RB, U.K.

International Symposium On Shell & Spatial Structures: November 10-14, The Orchard Hotel, Singapore.
Contact: CI-Premier Pte. Ltd., 150 Orchard Rd. #07-14, Orchard Plaza, Singapore 238841, tel: +65 733 2922; fax: +65 235 3530.

ASNE Environmental Symposium: Environmental Stewardship, Ships and Shorelines: November 12-13, Virginia Beach Pavilion, Virginia Beach, VA.
Contact: American Society of Naval Engineers, 1452 Duke St., Alexandria, VA 22314-3458, tel: (703) 836-6727; fax: (703) 836-7491; e-mail: asnehq.asne@mcimail.com.

1997 Tri-Service Conference On Corrosion: November 17-21, Blockade Runner Hotel, Wrightsville Beach, N.C.
Contact: **David A. Shifler**, NSWC - Carderock Division, tel: (301) 227-5128.

Europort 97: November 18-22, Amsterdam, The Netherlands.
Contact: Amsterdam RAI, P.O. Box 77777, NL-1070 MS Amsterdam, tel: +31 (0) 20 549 1212; fax: +31 (0) 20 644 5059; e-mail: press@rai.nl.

Fish Expo Seattle: November 20-22, Washington State Convention and Trade Center, Seattle, Wash.
Contact: Diversified Expositions, P.O. Box 7437, Portland, ME 04112-7438, tel: (207) 842-5508; fax: (207) 842-5509.

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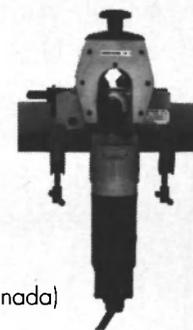
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ASNE Modeling, Simulation and Virtual Prototyping Conference II: November 24-25, Hyatt Regency, Crystal City, Arlington, Va.

Contact: American Society of Naval Engineers, 1452 Duke St., Alexandria, VA 22314-3458, tel: (703) 836-6727; fax: (703) 836-7491; e-mail: asnehq.asne@mcimail.com.

2nd Asia-Pacific Conference On Shock & Impact Loads On Structures: November 25-27, Hotel Sofitel, Melbourne, Australia.

Contact: CI-Premier Pte. Ltd., 150 Orchard Rd. #07-14, Orchard Plaza, Singapore 238841, tel: +65 733 2922; fax: +65 235 3530.

DECEMBER 1997

Marichem '97: December 2-4, Cologne, Germany.

Contact: Julie Caulkett, RAI Exhibitions London Ltd., Armstrong House, 38 Market Square, Uxbridge, Middlesex UB8 1TG, U.K., tel: +44 1895 4545 45; fax: +44 1895 4546 47; e-mail: 100730.1313@compuserve.com

JANUARY 1998

ASNE 21st Century Combatant Technology Symposium: January 27-28, Mississippi Coast Coliseum, Biloxi, Miss.

Contact: American Society of Naval Engineers, 1452 Duke St., Alexandria, VA 22314-3458, tel: (703) 836-6727; fax: (703) 836-7491; e-mail: asnehq.asne@mcimail.com.

MARCH 1998

ASNE Day 1998: March 3-4, Sheraton Washington Hotel,

Washington, D.C.

Contact: American Society of Naval Engineers, 1452 Duke St., Alexandria, VA 22314-3458, tel: (703) 836-6727; fax: (703) 836-7491; e-mail: asnehq.asne@mcimail.com.

Seatrade Cruise Shipping Convention: March 3-7, Miami Beach Convention Center, Miami, Fla.

Contact: Miller Freeman (Princeton) Inc., Princeton Forrestal Village, 125 Village Blvd., Ste. 220, Princeton, N.J. 08540-5703, tel: (609) 452-9414; fax: (609) 452-9374.

Ports '98: March 8-11, Long Beach Convention Center and Hyatt Regency Hotel, Long Beach, Calif.

Contact: American Society of Civil Engineers (ASCE), 1801 Alexander Bell Dr., Reston, Va. 02191-4400, tel: (800) 548-2723; fax: (703) 295-6144.

Oceanology International '98: March 10-13, The Brighton Metropole, Brighton, U.K.

Contact: Spearhead Exhibitions Ltd., Ocean House, 50 Kingston Rd., New Malden, Surrey DT3 3LZ, U.K., tel: +44 181 949 9222; fax: +44 181 949 8168.

Fishing '98: March 19-21, Scottish Exhibition and Conference Centre, Glasgow, Scotland.

Contact: Sue Hill, EMAP Highway Events, Meed House, 21 John St., London WC1N 2BP, tel: +44 171 470 6340; fax: +44 171 831 2509.

Seatrade Tanker Industry Convention: March 23-24, Royal Lancaster Hotel, London, U.K.

Contact: Sue Cleary, the Seatrade Organisation, tel: +44 1206 545121; fax: +44 1206 545190.

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Universal Minerals, P.O.B. 986, Tucson, AR 85714

BASKET STRAINERS

Beaird Industries, P.O. B. 31115, Shreveport, LA 71130
Kraissl Co., 299 Williams Ave., Hackensack, N.J. 07601-5225

BEARING—Rubber, Metallic, Non-Metallic

Blohm & Voss Industrie GmbH, P.O. B. 100720, D-2000 Hamburg 1, GERMANY;
Simplex-Turmar Inc., P.O. B. 168, Little Neck, NY 11363-0168
U.S.A. Reps:
Railko Ltd., Loudwater, High Wycombe, Bucks
Hampshire ENGLAND HP1090V
Kahlenberg Bros. Co., P.O. Box 358, Two Rivers, WI 54241
Orion Corp., 1111 Cedar Creek Rd., Grafton, WI 53024
Thordon Bearings Inc., 3225 Mainway, Burlington, Ont., CANADA L7M 1A6
Vesco Plastics, P.O. B. 40647, Cleveland 2022 SOUTH AFRICA

BILGE SYSTEMS

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

BOAT SHAFTING

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

BOILERS

Clarke Chapman Canada, 1075 North Service Rd. West, Oakville, Ontario CANADA

BOX COOLERS

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

BRIDGE WIPERS

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

BROKERS

151 Maritime Services, 34062 El Encanto/B, Dana Pt. CA 92629
Captain Astad Company, Inc., P.O. Box 350486, Ft Lauderdale, FL 33335
Jack Faulkner, 2419 Caddy Lane, P.O. Box 371, Flossmoor IL 60422
Mowbray's Tug & Barge Sales Corp., 35 De Hart St., Morristown NJ 07960

BULKHEAD SEALS/PANELS

Blohm & Voss Industrie GmbH, P.O. B. 100720, D-2000 Hamburg 1, GERMANY
Panel Specialists, Inc./Thermax, 3115 Range Rd., Temple, TX 76501
Railko Ltd., U.S.A. Reps: Simplex-Turmar Inc., P.O.B. 675, Tonawanda, NY 14151-0675
Rox Corp., 12402 E. 60th St., Tulsa, OK 74146-6922
Thermax, 3115 Range Rd., Temple, TX 76501
Todco, P.O.B. 1087, Marion, OH 43302

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O-Z Gedney • Nelson Firestop, P.O. B. 726, Tulsa, OK 74101-0726
Rox Corp., 12402 E. 60th St., Tulsa, OK 74146-6922

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Albacore Research, 3080 Uplands Rd., Victoria, B.C. CANADA V8R 6B4
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Creative Systems, Inc., P.O. B. 1910, Port Townsend, WA 98368
Kockums Computer Systems AB, PO Box 50555, S-202 15 Malmo SWEDEN
Scientific Marine Services, Inc., 101 State Pl., Suite F, Escondido, CA 92029
TIMSCO, P.O. B. 91360, Mobile, AL 36691

CARGO MONITORING & CONTROL SYSTEM

Ian-Conrad Bergan, Inc., 3409 Gulf Breeze Parkway, Golf

Breeze, FL 32561
Radio-Holland USA, 8943 Gulf Freeway, Houston, TX 77017

CEILING

Todco, P.O.B. 1087, Marion, OH 43302

CHARGE AIR COOLERS

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CHEMICALS

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

CLAMPING—Pipe, Tubes, Hose

ZSI, 39074 Webb Ct., Westland, MI 48185

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

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

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Hempel, 6901 Cavallade St., Houston, TX 77028
Royal Chemical Corp., 2705 Concord Rd., Belle Chasse, LA 70037
TMT Services Corp./RUSTECO, P.O.B. 11398, Torrence, CA 90510-1398

COMMUNICATIONS SERVICE

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

COMPOUNDS

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Chand Corporation, 157 Hwy 654, Mathews, LA 70375
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Creative Systems, Inc., P.O. Box 1910, Port Townsend, WA 98368
Marine Management System, 470 West Ave., Stamford, CT. 06902
Sener, C/Severo Ochoa, 4 Parque Tecnologico de Madrid, 28760 Tres Cantos - Madrid SPAIN

CONDENSERS/SEPARATORS

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CONSOLE-GMDS

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Radio-Holland USA, 8943 Gulf Freeway, Houston, TX 77017
Sea, Inc., 7030 220th S.W., Mountlake Terrace, WA 98043

CONSULTANT

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

CONTROL SYSTEM—Monitoring

Engine Monitor, Inc., 179 Hickory Ave. Harahan, LA 70123
GEC ALSTHOM Diesels Inc., 10801 Kempwood Drive, Suite 1, Houston, TX 77043-1412
Ian-Conrad Bergan, 3409 Gulf Breeze Pkwy, Gulf Breeze, FL 32561

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

MMC International, 60 Inip Dr, Inwood NY 11096
Prime Mover Controls, 3600 Gilmore Way, Burnaby V5G 4R8 CANADA

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

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

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

CONTROL SYSTEM—Steering

AutoNav Marine Systems Inc., 55A Clipper St., Coquitlam, B.C., Canada V3K 6X2
Engine Monitor, Inc., 179 Hickory Avenue Harahan, LA 70123
Kockum Sonics, Inc., 819 Veterans Blvd., Suite 201, Kenner, LA 70068

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

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

CRANES

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Tech Crane Int'l., Inc., 5001 Hwy, 190 Unit D3, Covington, LA 70433

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New England Trawler Equipment Co., 291 Eastern Avenue, Chelsea, MA 02150
Skookum, Inc., P.O. Box 280, Hubbard, OR 97032
Smith Berger Marine Inc., 516 South Chicago Street, Seattle, WA 98108

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Cummins Engine Co., 4500 Leeds Ave., Ste. 301, Charleston, SC 29405-8521
Cummins Mid-South, Inc., 110 E. Airline Highway, Kenner, LA 70062
John Deere, John Deere Rd., Moline, IL 61265
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Klattenberg Marine, 17 Grandview Ave., W. Orange, NJ 07052
Liberty Technologies, 555 North Lane, Conshohocken, PA 19428
MAN B&W Diesel AG, Stadtbachstrasse 1, D-86153 Augsburg 1, GERMANY
MAN B&W Diesel A/S, Teglholsmøge 41, DK-2450 Copenhagen SV, DENMARK
MAN B&W Diesel, 17 State St., New York, NY 10004
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Marine Accomodations, 8535-3 BayMeadows Rd., Jacksonville, FL 32256
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Heger Dry Dock Engineers, Inc., P.O.B. 6605, Holliston, MA 01746
Poly Hi Solidur, 2710 American Way, Fort Wayne, IN 46899

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MMC International, 60 Inip Dr, Inwood NY 11096
Semo Marine Inc., 3721 SW 47th Ave., Ste 309, Ft. Lauderdale, FL 33314

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Tech Power Controls, 10850 S. Wilcrest, Houston, TX 77099

ELECTRONICS/ELECTRONIC DISPLAY

Kockum 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

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Marine Jobs, Inc., 800 Downtowner Blvd. Ste. 111, Mobile, AL 36609

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

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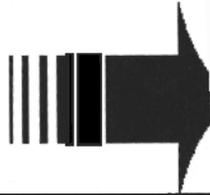
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SC 29204-4148
Cospolich Refrigerator Co., 949 Industry Rd., Kenner LA 70062
Jameson Metal Marine Sales, Inc., 4710 Northwest Second
Ave, Boca Raton, FL 33431
Lang Manufacturing, P.O. B. 905, Redmond, WA 98073
Marine Accommodations, 8535-3 Baymeadows Rd.,
Jacksonville, FL 32256

LANWAYS, LADDERS

ACL Industries, 177 Gay St., Manchester, N.H. 03103
SlipNot Safety Flooring, 2545 Beaufait St., Detroit, MI 48207
Wooster Products Inc., 1000 Spruce St., P.O. Box 896,
Wooster, OH 44691

DEAR REPAIR

Haley Marine Gears International, Inc., 2600 N. Concord Belle
Chasse, LA 70037

GENERATOR

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

HATCH COVER SEAL RENOVATION

Baywood Inc., 3841 Soundway, Bellingham, WA 982263

HEAT EXCHANGERS

Alfa-Laval Separation Inc., 955 Mearns Rd., Warminster, PA
18974
Beard Industries Inc., P.O. Box 31115, Shreveport, LA 71130
Crane Heatex, 17 Grandview Ave., West Orange, NJ 07052

HOISTS

JD Neuhaus Corp., 2603 Rolling Rd., Gwynn Oak, MD 21207

HORN/WHISTLES

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

HOSES

Apollo International, 78 Degraw St., Brooklyn, NY 11231

HYDRAULICS

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

INFORMATION TECHNOLOGIES

Marine Management Systems, 470 West Ave., Stamford, CT
06902

INSTRUMENTATION

Instruments East, Inc., 1037 West 45th St., Norfolk, VA 23508

INSULATION

Blohm & Voss Light Insulation, Bartels & Laders GmbH,
Nordereibstrasse 15, 20457 Hamburg GERMANY
Panel Specialists, Inc./Thermax, 3115 Range Rd., Temple,
TX 76501
Insulations, Inc., 1101 Edwards Ave., Harahan, LA 70123
Superior Energies Inc., P.O. Drawer 386, Grovas, TX 77619

INTERIORS

Custom Ship Interiors, Inc., P.O. Box 237, Lusby, MD 20657
Hopeman Brothers, P.O. Box 820, 435 Essex Ave.,
Waynesboro, VA 22980
Insulations, Inc., Rt. 5, 12360 Leisure Rd, Baton Rouge, LA
70807
Jameson Metal Marine Sales, Inc., 4710 NW Second
Ave, Boca Raton, FL 33431
Marine Accommodations, 8535-3 Baymeadows Rd.,
Jacksonville, FL 32256
TODCO, Inc., P.O. Box 1087, Marion, OH 43302

JOINER—Watertight Door—Paneling—Ceiling System—Decking

All Alpha Int'l., Inc. P.O. Box 498985, Cincinnati, OH 45249
Branton Ind., 1101 Edwards Ave., Jefferson, LA 70181
Commercial Products, 3924 Forest Drive, Ste. 11, Columbia,
SC 29204-4148
CustomShip Interiors, Inc. P.O. Box 237, Lusby, MD 20657
Hopeman Brothers, Inc., P.O. Box 820, Waynesboro, VA
22980
Insulations, Inc., 1101 Edwards Ave., Harahan, LA 70123
Marine Accommodations, 8535-3 Baymeadows Rd.,
Jacksonville, FL 32256
Panel Specialists, Inc./Thermax, 3115 Range Rd., Temple,
TX 76501
Walz & Krenzer, Inc., 90 Forest Ave. Locust Valley N.Y.
11560

KEEL COOLERS

R.W. Femstrum & Co., 1716 Eleventh Ave., Menominee, MI
49858
Kahlenberg Bros. Co., P.O. Box 358, Two Rivers, WI 54241
The Walter Machine Co., Inc., 84-98 Cambridge Avenue,
Jersey City, NJ 07307

LASER ALIGNMENT

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

LIFEBOATS/RAFTS

American Eagle Mfg., Inc., 780 Pearle Jensen Way, LaConner,
WA 98257
DBC Marine Safety Systems, 12351 Bridgeport Rd., Richmond,
B.C. CANADA V6V1J4
Norsafe AS, P.O. Box 115, N-4818 Faervik, Norway
Viking Life Saving Equipment, 1625 N. Miami Ave., Miami, FL
33136
Willard Marine Co., Inc., 1250 N. Grove St., Anaheim, CA
92806
Zodiac of North America, P.O. Box 400, Stevensville, MD
21666

LIFESAVING EQUIPMENT

MGI International, 119-225 West 1st St., North Vancouver,
B.C. CANADA
Stearns Manufacturing, P.O. Box 1498, St. Cloud, MN 56302

LIGHTING SYSTEMS / EQUIPMENT—Lamps, Fixtures, Searchlights

ACR Electronics, Inc., 5757 Ravenswood Rd., Ft. Lauderdale,
FL 33310-5247
Archway Marine, 4501 Swan Ave., St. Louis, MO 63110
Datrex Inc., P.O. Box 1150, Kinder, LA 70648
Gollen Marine, 160 Van Brunt St., Brooklyn, NY 11231
Kockum Sonics, Inc., 819 Veterans Blvd., Suite 201, Kenner,
LA 70068
Pauluhn Electric Mfg. Co., Inc. 1616 N. Main, P.O. Box 53,
Pearland, TX 77581
Francis Searchlights/Stam Supply Co., 4415 6th N.W.,
Seattle, WA 98107

LIQUID LEVEL GAUGES

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

LIQUID OVERFILL PROTECTION SYSTEMS

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

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

LOGISTICS

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

LUBRICANTS

Exxon Co. USA, 800 Bell St., Houston, TX 77002
Royal Lubricants, P.O. Box 518, East Hanover, NJ 07936

MACHINERY MAINTENANCE, REPAIR, OVERHAUL, AND TESTING

Golden Marine Company Inc., 160 Van Brunt Street, Brooklyn,
NY 11231
Maritime Power 200 Henderson St., Jersey City, NJ 07302
New England Trawler Equipment Co., 291 Eastern Avenue,
Chelsea, MA 02150
Wallace Coast Machining, 1920 Waukegan Rd., Glenview, IL
60025

MARINE CALIBRATION DEVICES

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

MARINE CEILING

Hydro-Aluminium, Vik Verk, N-5880 VIK I SOGN, Norway
Insulations, Inc., Rt. 5, 12360 Leisure Road, Baton Rouge, LA
70807

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

MARINE DECKING

E.H. O'Neill Co., 1405 Chippendale Rd., Lutherville, MD
21093
Hopeman Brothers, Inc., P.O. Box 820, Waynesboro, VA
22980

Insulations, Inc., Rt. 5, 12360 Leisure Road, Baton Rouge, LA
70807

Seiby, P.O.Box 1600, Sapulpa, OK 74067

MARINE DRILLING & BLASTING

Marine Drilling & Blasting, Inc., P.O. Box 18098,
Beverly Hills, CA 90209-4098

MARINE ELECTRONICS

Frank L. Beier Radio, 2001 Ridgelake Drive, Metairie, LA
70001
Kockum Sonics, Inc., 819 Veterans Blvd., Suite 201, Kenner,
LA 70068

Saab Marine Electronics AB, Box 13045, 402 51 Goteborg,
SWEDEN
Scientific Marine Services, Inc., 101 State Pl., Suite F,
Escondido, CA 92029

MARINE ELEVATORS

Alimak Elevators, 1100 Boston Ave., Bridgeport, CT 06610
McElroy Machine, 1101 Lorraine Rd., Biloxi, MI 39535-4454

MARINE EQUIPMENT

Bonnet & Associates, 1150 Rule Rochelle, Sidell, VA 70458
McElroy Machine, P.O. Box 4454, Biloxi, MS 39535-4454

MARINE FINANCING

Safeco Credit Co. Inc. 4909 156th Ave. NE, Redmond, WA
98052

MARINE FIRE PROTECTION

Insulations, Inc., Rt. 5, 12360 Leisure Road, Baton Rouge, LA
70807
Unitor Ship Service Inc., 2375 West Esther Street, Long
Beach, CA 90813

MARINE GEARS

The Falk Corp., PO Box 492, Milwaukee, WI 53201-0492
Haley Marine Gears, Inc. P.O. Box 689, Greenville, MS
38702
Marine Gears, P.O. Box 689, Greenville, MI 38701

MARINE INSURANCE

John G. Alden, 1300 SE 17th St., Fort Lauderdale, FL 33316

MARINE PUMPS

Gilkes Inc., P.O. Box 628, Seabrook, TX 77586

MARINE SURPLUS SALES

Defense Reutilization & Marketing Service, 2163 Airways
Bld., Memphis, TN 38114

MARITIME ARTWORK

Sarba Art Studio, 6 Ridge Drive, Old Saybrook, CT 06475

METERS

Seico USA, 2508 Lakebrook Ct., Atlanta, GA 30360

MOORING LINES

Phillystran, Inc., 151 Commerce Drive, Montgomeryville, PA
18936-9628

MOTOR PROTECTION EQUIPMENT

Marine Sale Electronics, 37 Staffern Dr., Concord, Ontario
L4K CANADA

NAVAL ARCHITECTS, MARINE ENGINEERS, SURVEYORS

Advanced Marine Enterprises, Inc., 1725 Jefferson Davis
Hwy., Arlington, VA 22202
Bay Engineering, 253 N. First Ave., Sturgeon Bay, WI 54235
Donald L. Blount, 2550 Ellsmere Ave., Ste. K, Norfolk, VA
23513

C. Baxter & Associates, P.O. Box 9006, Mobile, AL 36609
CDI Marine Co., 4040 Woodcock Dr., Suite 200, Jacksonville,
FL 32207
Childs Engineering Corp., Box 333, Medfield, MA 02052
Crandall Dry Dock Engrs., Inc., P.O. Box 505804, Chelsea,
MA 02150

Crane Consultants, 15301 First Ave S., Seattle WA 98148
C.R. Cushing, 18 Vesey St., New York, NY 10007
CT Marine, 56 Crooked Trail, Rowayton, CT 06853
Cunningham & Walker, 1762 Providence Hollow Lane,
Jacksonville, FL 32223

Arthur D. Darden, 3200 Ridgelake Dr., Suite 403, Metairie LA
70002
DeJong & Lebet, Inc., 1734 Emerson Street, Jacksonville, FL
32207

Design Associates Inc., 14360 Chef Menteur Highway, New
Orleans, LA 70129
Designers & Planners, 2120 Washington Blvd. Ste.200,
Arlington, VA 22204
Elliott Bay Design Group 5301 Shilshole Ave. N.W. Ste. 200,
Seattle, WA 98107

Encon Mgmt. & Engineering Consultant Services, P.O. Box 7760,
Baton Rouge, TX 77706
GHM Inc. (Ind. Measurement Consultants), P.O. Box 1836,
Newport News, VA 23601

Gibbs & Cox, Inc., 50 West 23rd St., New York, NY 10010
Heger Dry Dock Engineers, Inc., P.O.B. 6605, Holliston, MA 01746
J.J. McMullen, 2341 Jefferson Davis Hwy, Arlington, VA
22202

John W. Gilbert & Assoc., Inc., 199 State St., Boston, MA
02109
The Glisten Assoc. Inc., 600 Mutual Life Bldg., 605 First
Ave., Seattle, WA 98104
Guido Perla & Assoc., 720 3rd Ave., Ste. 1200, Seattle, WA
98104

Morris Guralnick Associates, Inc., 130 Sutter St., Ste. 400,
San Francisco, CA 94104
C. Raymond Hunt Associates, 69 Long Wharf, Boston MA
02110
J.H. Inc., 3412 Progress Dr., Bensalem, PA 19020
R.D. Jacobs & Associates, 11405 Main St., Roscoe, IL 61073
Kvaerner Masa Marine Inc., 201 Defense Highway, Suite 202,
Annapolis, MD 21401
James S. Krogen, 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., 2600 South Gessner,
Houston, TX 77063
McElroy Machine & Mfg Co., Inc., P.O. Box 4454, Biloxi, MS
39535-4454
John J. McMullen Associates, Inc., 1 World Trade Ctr, Ste
3000, NY, NY 10048
Fendall Marbury, P.O. Box 2321, Annapolis, MD 21401
Marine Design & Operations, Inc., 225 E. 1st Ave., Roselle,
NJ 07023
Marine Management Systems Inc., 470 West Ave., Stamford,
CT 06902
Marine Power Associates, 1010 Turquoise St., Ste 217, San
Diego, CA 92109
Maritech, Seadiff, Bay Road, Newmarket, NH 03857
Maritime Design, Inc., 3020 Hartley Rd., Jacksonville, FL
32257
R.J. Mellusi & Co., 71 Hudson St, New York, NY 10013
Nautical Designs, Inc. 2101 S. Andrews Ave, Suite 202, Ft
Lauderdale FL 33316
Ocean Motions Co., P.O. Box 130, 49 Shore Drive,
Barrington, RI 02806-0130
Olson Marine Surveyors Co., P.O. Box 283, Port Jefferson,
NY 11777
M. Rosenblatt & Son, Inc., 350 Broadway, New York, NY
10013 and 620 Fulson St.,
Ste. 301, San Francisco, CA 94107
Sargent & Herkes, 225 Baronne St., Suite 1405, New Orleans
LA 70112
Scientific Marine Services, Inc., 101 State Pl., Suite F,
Escondido, CA 92029
Sea School, 10812 Gandy Boulevard, St. Petersburg, FL
33702
Seaworthy Systems Inc., P.O. Box 965, Essex, CT 06426; 17
Battery Pl., New York, NY 10004; P.O. Box 975, Bamegat
Light, NJ 08006; 2001 N. Beauregard Street, Alexandria, VA
22311; 50 Vashell Way, Orinda, CA 94563
George G. Sharp, Inc., 100 Church St., New York, NY 10007
R.A. Stearn, Inc., 253 N. 1st Ave., Sturgeon Bay, WI 54235
A.K. Suda & Ass., 3004 19th St., Metairie, LA 70002-4989
TIMSCO, P. O. Box 91360, Mobile AL 36691

Navigation & Communications Equip-
ment
Furuno U.S.A., 271 Harbor Way, S. San Francisco, CA 94080
ICS Electronics Ltd., Unit V, Rudford Industrial Estate, Ford,
Arundel, West Sussex, UK
KVH Industries, Inc., 110 Enterprise Center, Middletown, RI
02842-5268
Mackay Communications, 300 Columbus Circle, Edison, NJ
08837
Negron Marine Consultants, 840 Bond Street, Elizabeth, NJ
07201
Radio-Holland USA, 8943 Gulf Freeway, Houston, TX 77017
Scandinavian Micro Systems P.O. Box 155, N-1411,
Kolbotn, NORWAY
Sea, Inc., 7030 220th S.W., Mountlake Terrace, WA 98043
Simrad, 19210 33rd Avenue West, Lynnwood, WA 98036
Simrad Robertson, 10801 Hammerly, Suite 100, Houston, TX
77043-1923
Standard Communications, P.O. Box 92151, Los Angeles,
CA 90009
Transas Marine, 19105 36th Ave. West, Bldg.#2, Suite 101,
Lynnwood, WA 98036
Trimble Navigation, 585 North Mary Avenue, P.O. Box 3642,
Sunnyvale, CA 94086
Waterway Communications System, Inc. 453 E. Park Pl.,
Jeffersonville, IN 47130

Nozzle System
Custom Nozzle Fabrication, P.O. Box 547, Pascagoula, MS
39568
Rice Propellers, Av Rios Espinoza #88, Mazatlan, MEXICO
82180

Oil—Marine—Additives—Testing
Mobil Oil Corporation, 3225 Gallows Road, Fairfax, VA
22037-0001

Oil Content Meters/Calibration
Hermont Marine, Inc., 3528 Griffith, St-Laurent, QUEBEC
CANADA H4T 1A7

Oil - Less Fryer
Ro-Fry, 1400 Toastmaster Dr., Elgin, IL 60120

Oil Mist Detectors
Autronica Marine, 234 Industrial Pkwy, Northvale, N.J. 07647
Hermont Marine, Inc., 3528 Griffith, St-Laurent, QUEBEC
CANADA H4T 1A7

Oil Tank Cleaning
Brain Industries Australia, Pty. Ltd., 21 Bearing Rd., Seven
Hills, NSW 2147 AUSTRALIA

Oil/Water Separators
Alfa-Laval Separation, Inc., 955 Mearns Rd., Warminster, PA
18974-0556
Blohm & Voss U.S.A. Repps:Simplex-Turmar Inc., P.O. Box
168, Little Neck, NY 11363-0168
Fast Systems, 3240 North Broadway, St. Louis, MO 63147
MMC International, 60 Inip Dr, Inwood NY 11096
National Fluid Separators, 827 Hanley Industrial Ct., St.
Louis, MO 63144
Nelson Industries, Highway 51 West, Sloughton, WI 53589
RGF Marine, 3875 Fiscal Ct., W. Palm Beach, FL 33404

Paint—Coating—Corrosion
Control
Ashland Chemical Co., Drew Marine Co., One Drew Plaza,
Boonton, NJ 07005
Corroscel, Inc., 1045 12th Ave. NW-F5A, Issaquah, WA
98027
Esgard, Inc., P.O. Drawer 2698, Lafayette, LA 70502
Ferro Corp., 1301 North Flora St., Plymouth, IN 46563
Jamestown Distrib., 28 Narragansett Ave., P.O. Box 348,
Jamestown, RI 02835
Hempel Coatings, 6901 Cavalcade St., Houston, TX 77028

Microphor, Inc., Marine Div., 452 E. Hill Rd., P.O. Box 1460,
Willits, CA 95490
Royal Chemical, 2705 Concord Road, Belle Chasse, LA
70037
Sigma Coatings, 8979 Market St., Houston, TX 77029, 330
Rover Rd., Harvey, LA 70059,
1100 Adams St., Hoboken, NJ 07030
TNO Institute of Industrial Technology, P.O.B. 3, 2600 AA
Delft, Netherlands
Unitor Ship Services Inc., 2375 West Esther Street, Long
Beach, CA 90813

Pipe Fittings/Cuttings/Connecting
Systems
Georg Fischer DISA Pipe Tools Division, 407 Hadley St.,
Holly, MI 48442
Lokring Corp., 396 Hatch Drive, Foster City, CA 94404
Victaulic Co., 4901 Kesslersville Rd., Easton, PA 18042

Pneumatic Hoists
J.D. Neuhaus, 9 Loveton Circle, Sparks, MD 21152

Pollution Control/Products/Marine
Services
Oil Mop, Inc., 221 Rue De Jean, Lafayette, LA 70508

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

Propellers
Associated Marine Technologies, 4016 Seaboard St.,
Portsmouth, VA 23701
Rice Propellers, Av. Rios Espinoza #88, Mazatlan, MEXICO
82180
Rolla SP Propellers SA, P.O. Box 251, Via Silva 5, 6828
Balerna, SWITZERLAND
S&S Propellers, 26-15 123rd St., Flushing, N.Y. 11354
Sound Propeller, 1608 Fairview Avenue E., Seattle, WA
98102

Propulsion Equipment
—Bowthrusters, Diesel Engines, Gears, Propellers, Shafts,
Turbines
Avondale Industries, Harvey Quick Repair, P.O. Box 116,
Harvey, LA 70058
American Air Filter, P.O. Box 35690, Louisville, KY 40432
ABB Drives Inc., P.O. Box 372, Milwaukee, WI 53201-0372,
USA
ABB Industry Oy, P.O. Box 185, 00381 Helsinki, FINLAND
ABB TURBOCHARGER, INC., 1460 Livingston Avenue, N.
Brunswick, NJ 08902
Aquamaster-Rauma Ltd., Box 220, SF-26101, Rauma,
FINLAND
Aquamaster-Rauma Inc., 2315 North Woodlawn Ave., Ste.
103, Metarie, LA 70001
Brunvoll A/S, P.O. Box 370, N-6401, Molde, Norway
Caterpillar, 100 NE Adams Street, Peoria, IL 61629-2320
Centa Corp., 8185 Cass Ave., Darien, IL 60561
Cincinnati Gear Co., 5657 Wooster Pike, Cincinnati, OH
45227
The Falk Corp., PO Box 492, Milwaukee, WI 53201-0492
Fincantieri, Diesel Engines Div—GMT, Bagnoli della
Rosandra 334, Trieste, ITALY
GE Naval & Drive Turbine Systems, 166 Boulder Dr.,
Fitchburg MA 01420
GEC ALSTHOM Diesels Inc., 10801 Kempwood Dr. Ste 1,
Houston, TX 77043-1412
Goltens Worldwide, 160 VanBrunt St., Brooklyn, NY 11231
Harbormaster Marine Inc., 31777 Industrial Rd., Livonia, MI
48150
Holset Engineering, Inc., 1320 Kemper Meadow, Ste. 500,
Cincinnati, OH 45240
In-Place Machining Co., Inc. 1929 North Buffum Street,
Milwaukee, WI 53212-3793
Kahlenberg Bros. Co., P.O. Box 358, Two Rivers, WI 54241
Krupp Mak, 7555 Danbro Crescent, Mississauga, Ontario,
CANADA L5N 6P9
LIPS B.V., P.O. Box 6, 5150 BB Drunen, The Netherlands
Lohmann & Stollerfoht, P.O. Box 1860, D-58408 Witten,
Germany
Lo-Rez Vibration Control, 186 West 8th Ave., Vancouver, BC
CANADA, V5Y 1N2
Mapeco Products Inc., 90 Forest Ave., Locust Valley, N.Y.
11560
Markischesch Werk, P.O. Box 1442, D-5884 Halver GERMANY
MAN B&W Diesel, 17 State St., New York, NY 10004
MAN B&W Diesel A/S, Ostervej 2, DK-4960 Høleby,
DENMARK
MAN B&W Diesel A/S, Alpha Diesel, Niels Juels Vej 15, DK-9900
Frederikshavn, DENMARK
MAN B&W Diesel GmbH, Stadtbachstrasse 1, D-86153
Augsburg 1 GERMANY
Omnithruster, Inc., 743 N. Main St., Orange, CA 92868
Orion Corp., 1111 Cedar Creek Rd., Grafton, WI 53024
Oy Wartsila Ab, Vasa and Abo Divisions, P.O. Box 244,
SF65100 Vasa, FINLAND
Rolla SP Propellers SA, Via Silva 5, P.O. Box 251, 6828
Balerna SWITZERLAND
S&S Propellers, 26-15 123rd St., Flushing, N.Y. 11354
Karl Senner Inc., 25 W Third, Kenner LA 70062
Schottel-Werft, Manizer Strasse 99, D-56322 Spay/Rhein,
GERMANY
Schottel North America, Inc., 1505 Corbin Ave., Hammond,
LA 70403
Siemens Electric Ltd., 1180 Courtney Park Rd., Mississauga,
ONTARIO
Stewart & Stevenson, 1400 Destrehan, P.O. Box 8, Harvey
LA 70059-0008
Thrustmaster of Texas, P.O. Box 840189-12227 IFM 529,
Houston, TX 77284-0189
Ulstein Bergen Diesel A/S, P.O. Box 924, N-5002, Bergen,
NORWAY
Ultra Hydraulics Limited, Cheltenham Road East, Gloucester,
GL2 9QN, ENGLAND
Voith Hydro Marine Technology, P.O.B. 1125, D89509,
Heidenheim, GERMANY
U.S. Rep: Voith Schneider America Inc., 121 Susquehanna
Ave., Great Neck, NY 11021

Pump—Repair—Drives
Gilkes, Inc., PO Box 628, Seabrook, TX 77586
Hamworthy Marine, Inc., 1129 Hospital Dr. Ste 3C,
Stockbridge, GA 30281
Kraissl Company, 299 Williams Ave., Hackensack, N.J.
07601-5225
Vita Motivator, 566 Parker St., Newark, NJ 07104

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

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

REFRIGERATION EQUIPMENT/SERVICES
Adrick Marine, 81 Mahan St., West Babylon, N.Y. 11704
Ashland Chemical Co., Drew Marine Co., One Drew Plaza, Boonton, NJ 07005
RTF Mfg., RD #1 Route 66, Hudson, NY 12534
Unitor Ship Service Inc., 2375 West Esther Street, Long Beach, CA 90813

REMOTE VALVE OPERATORS
American United Marine Corp., 5 Broadway, Rt 1, Saugus, MA 01906
Elliott Manufacturing, P.O. Box 773, Binghamton, NY 13902
Triumph Controls, 205 Church St., North Wales, PA 19454

RIGID INFLATABLE BOATS
American Eagle, 780 E. Pearle Jensen Way, LaConner, WA 98257
Willard Marine, Inc. 1250 N. Grove St., Anaheim, CA 92806
Zodiac of N. America Thompson Creek, P.O. Box 400, Stevensville, MD 21666

ROPE—Manila—Nylon—Hawsers—Fibers
American Mfg. Co., 200 Southpark Rd., Lafayette, LA 70508-3609
Bayer AG, D-41538, Dormagen, GERMANY
Phillystran, Inc., 151 Commerce Drive, Montgomeryville, PA 18936-9628
Puget Sound Rope, 1012 Second St., Anacortes, WA 98221
Wellington, P.O.B. 244, Madison, GA 30650

RUDDER BUSHES
Vesco Plastics, P.O. Box 40647, Cleveland 2022, South Africa

SAFETY DECKING
SlipNot Safety Flooring, 2545 Beaufait St., Detroit, MI 48207
Datrex, Inc., P.O. Box 1150, Kinder, LA 70648-1150

SAFETY LIGHTING
Datrex, Inc., P.O. Box 1150, Kinder, LA 70648-1150

SANITATION DEVICE—Pollution Control
Byrne, Rice & Turner, Inc., 1172 Camp Street, New Orleans, LA 70130
Exceltech International Corp., 1110 Industrial Blvd., Sugarland, TX 77478
Envirovac Inc., 1260 Turret Dr., Rockford, IL 61111
Fast Systems, 3240 North Broadway, St. Louis, MO 63147
Headhunter Inc., 214 SW 21st Terrace, Fort Lauderdale, FL 33312
ITT Jabsco, 1485 Dale Way, Costa Mesa, CA 92626
Jered Brown Brothers, Inc., 1608 Newcastle St., Brunswick, GA 31521-0904
Owens Mfg., Hwy 92, Youngsville, LA 70592
Research Products Blankenship, 2639 Andjon Dallas, TX 75220

SATELLITE COMMUNICATIONS
American Mobile Satellite Corp., 10802 Parkridge Blvd., Reston, VA 22091
Boatrac, Inc., 6440 Lusk Blvd. #D-201, San Diego, CA 92121-2758
Furuno USA, Inc., 271 Harbor Way, S. San Francisco, CA 94080
KVH Industries, Inc., 110 Enterprise Center, Middleton, R.I. 02842-5268
Mackay Communications, 2721 Discovery Dr., Raleigh, N.C. 27604-1851
Norwegian Telecom, Postboks 6701 St. Olavs Plass, N-0130, Oslo, Norway
PTT Telecom, Station 12, P.O. Box 30150-2500 JD The Hague, NETHERLANDS
Radio-Holland USA, 8943 Gulf Freeway, Houston, TX 77017
Singapore Telecom, 15 Hill Street, Telephone House, 2nd Storey, Singapore 0617
Telstra Mobile Satellite & Radio Services, 79 St. Hilliers Rd., Auburn NSW 2144, AUSTRALIA
Westinghouse Wireless Solutions Co., 930 International Dr., Linthicum, MD 21090

SCALE MODELS
Markitect, PO Box 225, Oconomowoc, WI 53066
Scale Reproductions, 16346 County Road 13, Fairhope, AL 36532
Sturgeon Bay Model Shop, 187 N Ninth Ave., Sturgeon Bay WI 54235

SCARIFIERS
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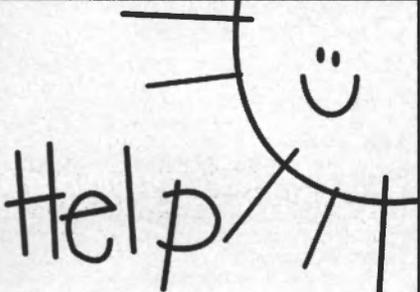
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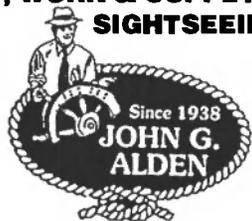
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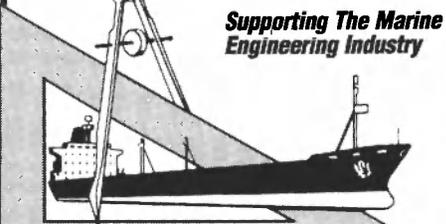
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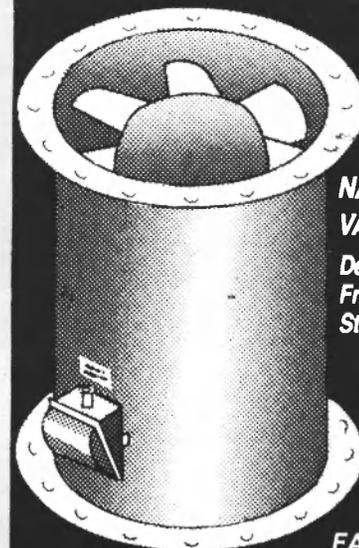
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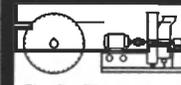
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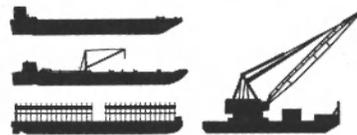
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