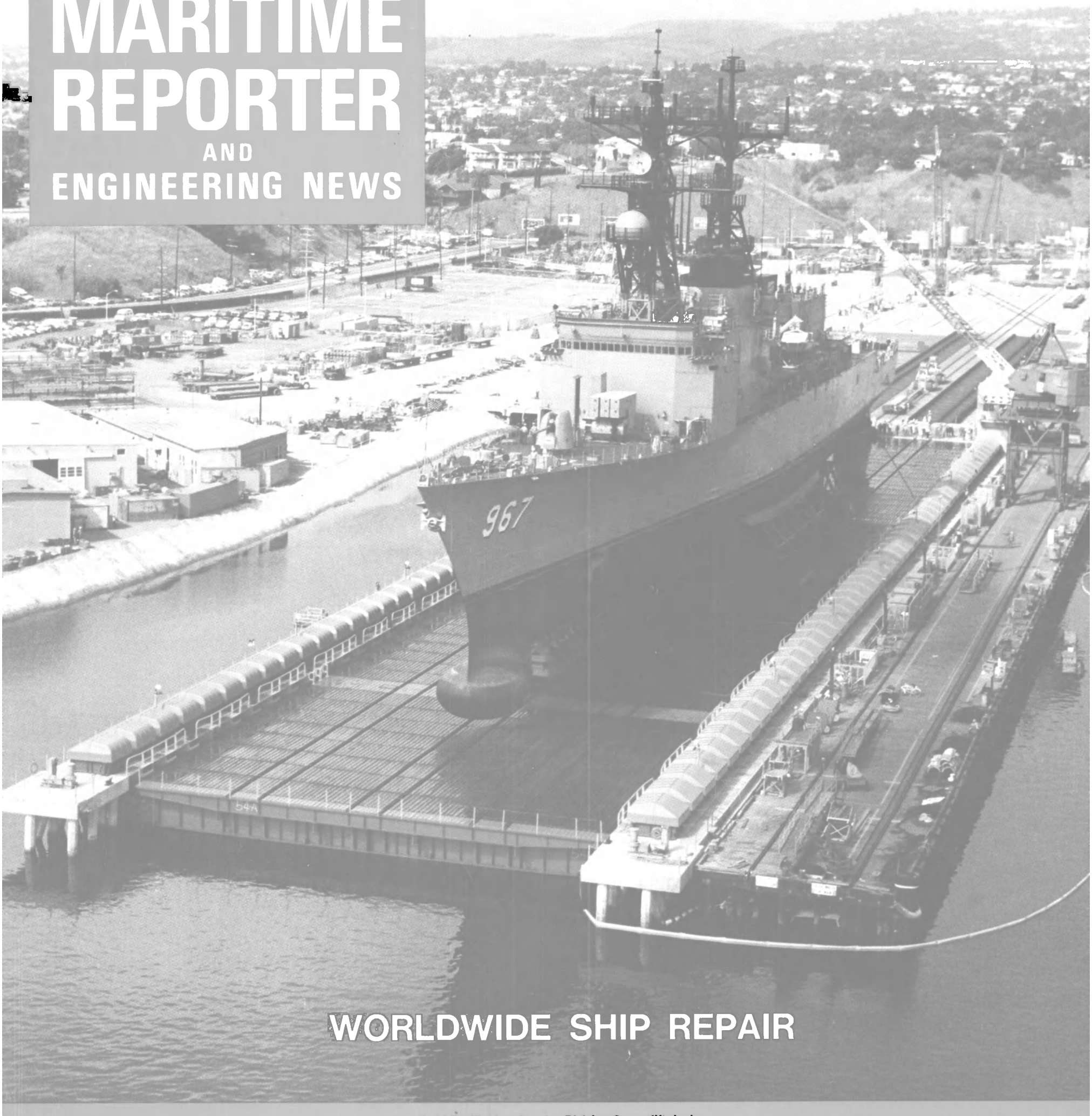
MARITIME
REPORTER
AND
ENGINEERING NEWS




# WORLDWIDE SHIP REPAIR

Todd Pacific, Los Angeles Division Syncrolift dock.

**SNAME Spring Meeting–**
**AWO Perspective–**
**Coatings Preview**

(SEE PAGE 4)

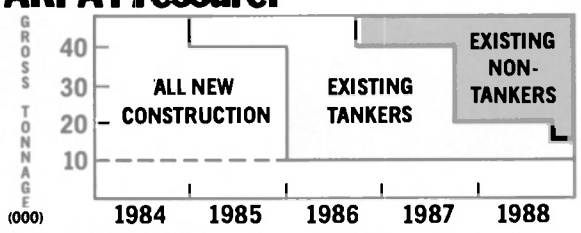
MAY 1, 1985

*NEW FROM RACAL MARINE*

# Modular Design Brings a Radical New Idea to Complex ARPA Systems:

# Simple Business Sense.

## ARPA Pressure:




The scope of IMO-mandatory ARPA continues to grow. In the near future, ARPA will be required on *all* larger vessels. The only variable is *when*.

## ARPA Relief:

RACAL-DECCA MASTER RADAR

**Modular Design: Economy without Compromise.** Racal-Decca Master Radar systems can cost less—to buy, to upgrade, to service—because of a modular design that fits several radar applications, not just ARPA systems. Major production economies and service simplicity are the results. And with over 500 radar service locations worldwide, quick efficient service helps control operating costs by keeping Master Radars...and ships...running.

Although the "building block" design is new, the Racal-Decca ARPA technology is extensively proven in operation around the world. ARPA 1690 meets or exceeds IMO standards. And collision-avoidance features of the AC module are an instant internal back-up to ARPA capabilities.

**Radar today...ARPA tomorrow.** You can start with the basic RM 1690 system and upgrade with AC and ARPA modules at low cost as you need them. Plan your smartest path to meeting ARPA requirements with Racal-Decca Master Radar.

**AC (Anti-Collision) 1690 Module**
True motion.
9 relative motion target markers for collision avoidance monitoring.

**RM (Relative Motion) 1690 Radar**
16" display.
Bright recycled video.
Clearscan® videoprocessing for best picture in foul weather.

**ARPA (Automatic Radar Plotting Aid) 1690 Module:**
Automatic tracking of 15 targets.
Automatic collision-prediction alarms.
Pre-plotting shows effects of trial maneuvers.
Easy to use "operator-proof" programming.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# ON THE COVER

**Cover:** The world's largest Syncrolift shiplift is now in operation at the San Pedro (Los Angeles) yard of Todd Shipyards. Photo—**John Graham,** Todd Pacific, Los Angeles Div.



## Metro Machine Awarded $3-Million Navy Contract For Maintenance Work

Metro Machine Corporation of Norfolk, Va., has been awarded a $3,187,496 cost-plus-award-fee Navy contract for planned maintenance and advance planning for the dock landing ship USS Whidbey Island (LSD-41). Work will be performed in Norfolk, and is expected to be completed by October 20 this year. Contract funds would have expired at the end of the current fiscal year. Three bids were solicited and three offers were received. The Naval Sea Systems Command, Washington, D.C., is the contracting activity (N00024-85-C-8575).

## Raytheon Gets $3-Million Navy Award For Search Radar Spare Parts

Raytheon Company's Equipment Division in Wayland, Mass., has been issued a $3,049,445 Navy modification to furnish 27 line items covering various CM/SPS-49 search radar program spare parts. Work will be performed in Waltham, Mass., and is expected to be completed by June 30, 1986. Contract funds would not have expired at the end of the current fiscal year. The Navy Ships Parts Control Center, Mechanicsburg, Pa., is the contracting activity (N00024-83-C-7122).


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ALL MATERIAL FOR EDITORIAL CONSIDERATION SHOULD BE ADDRESSED TO ROBERT WARE, EDITOR.

## Slaybaugh Named Vice President And COO For Bombardier/Alco Power

C. J. Slaybaugh

**Gilles Courville**, interim president of Bombardier/Alco Power Inc. in Auburn, N.Y., has announced the appointment of **C. Jay Slaybaugh** as vice president and chief operating officer.

Prior to joining Bombardier/Alco, Mr. **Slaybaugh** was president and chief executive officer of Rock of Ages Corporation in Barre, Vermont. He has served as CEO or COO of various manufacturing companies, and as manager of mangement consulting in the San Francisco office of Price Waterhouse and Company.

On the Editorial Board of the American Production and Inventory Control Society, he is a senior member of the American Institute of Industrial Engineers. He holds a BS degree in mechanical engineering and an MBA in marketing, both from the University of California at Berkeley.

Bombardier/Alco Power is a leading manufacturer of diesel engines used for marine propulsion, standby electric power generation, oil exploration, pumping, and locomotive applications.

## MARDATA Adds Baltic Index To Its Maritime Database Service

The Maritime Data Network (MARDATA) of Stamford, Conn., has added Baltic Freight Rate Index data to its on-line information service for ocean shipping. Subscribers can now access the Daily Baltic Index and year-to-date activity in addition to detailed information on dry cargo shipments in the MARDATA Charter Fixture database.

This index represents a statistically valid sample of dry cargo voyages, weighted according to the importance of various markets, trade routes, and historical data, and will be utilized to settle Ocean Freight Futures Contracts as announced by the Baltic International Freight Futures Exchange (BIBBEX) and the International Futures Exchange (INTEX).

Freight Futures data for the Bermuda-based INTEX will be available via MARDATA when trading opens in May. It is expected that BIFFEX activity will also be available for MARDATA subscribers.

MARDATA, a leading supplier of database services to the international maritime industry, has been compiling and disseminating Charter Fixture information on both tanker and dry cargo shipments since 1976.

For further information on these services,

**Circle 21 on Reader Service Card**

## Ogden Gets $26.5-Million Navy Contract For Charter Of Three Oil Tankers

Ogden Bulk Transport Inc. of New York City has been awarded a $26,442,248 fixed-price with cost reimbursement Navy contract for the one-year charter of three tankers—Courier, Ranger, and Rover—for the transport of Department of Defense petroleum products worldwide. The contract period ends by March 1986. Contract funds would not have expired at the end of the current fiscal year. Forty-five bids were solicited and 20 offers were received. The Military Sealift Command, Washington, D.C., is the contracting activity (N00033-85-C-7002).

# Self-Propelled Drillship for India Completed By Hitachi's Osaka Works

The self-propelled, anchor-moored drillship Sagar Vijay, built for the Oil and Natural Gas Commission (ONGC) of India, was completed recently at Hitachi Zosen's Osaka (Sakai) Works. Immediately following delivery, the vessel sailed for India, where it will be placed in drilling service off Bombay.

The Sagar Vijay is the first drillship built by Hitachi Zosen. It was designed and constructed under license of Gusto Engineering C.V. of the Netherlands. The vessel has an overall length of 448.8 feet, beam of 80.4 feet, depth of 36.75 feet, and draft of 22 feet. Propulsion is by four 1,000-hp dc motors driving twin screws for a speed of 10 knots.

The drillship is capable of operating in water of up to 984 feet deep, and can drill to a maximum depth of 19,685 feet. Designed to withstand harsh weather and sea conditions, it can operate in waves up to almost 15 feet high and maximum wave height of 61 feet.

Built to American Bureau classification, the ship contains drilling equipment, diving apparatus, eight-point mooring system to maintain position, and other special facilities. Total complement is 108 persons.

## CDI Marine Awarded $2.8-Million Navy Contract For Design Services

CDI Marine Company, headquartered in Jacksonville, Fla., has been awarded a $2.8-million Navy contract to provide design and engineering services to the Puget Sound Naval Shipyard in Bremerton, Wash. This award is in addition to the technical documentation services contract already held. Services will be provided through the CDI Marine office in Bremerton. The Naval Supply Center-Puget Sound is the contracting activity.

## NASSCO Orders MMC Tank Gauging Systems For Big Exxon Tankers —Literature Available

National Steel and Shipbuilding Company of San Diego has ordered from Marine Moisture Control Company (MMC) of Inwood, N.Y., complete portable tank-gauging systems for Exxon's two 209,000-dwt crude oil carriers under construction at the San Diego shipyard.

The order included: MMC's Tri-III-Mode, triple-function liquid level, portable tank gauging units that measure ullage, interface, and temperature in a single penetration; MMC's 3-inch Mini-S vapor control valves that are suitable for one-liter sampling; and MMC's sampling tapes.

The Tri-III-Mode, triple-function tapes read dryness and interface to within ⅜-inch of the tank bottom with extreme accuracy. The horn is silent in the temperature mode. An improved and proven tape-wiping mechanism is included to insure continued easy reading, and temperatures are shown on a large LCD readout.

For free technical literature from MMC,

**Circle 33 on Reader Service Card**

## A&T Wins $13.6-Million Navy Contract For Engineering Work

Analysis & Technology, Inc. (A&T) of North Stonington, Conn., recently received a $13.6-million contract from the headquarters of the Naval Electronics Systems Command in Arlington, Va. The contract covers a 2½-year period. Work will be performed both in the firm's offices in Washington, D.C. area, and the New London, Conn., area.

This new contract, which will include engineering, program planning, and field engineering, will be principally concerned with submarine electronics systems, and will involve growth in the company's staff in both Washington and Connecticut.



## Hanson Appointed New NAV-COM Sales Manager

Dean Hanson

NAV-COM Incorporated of Deer Park, N.Y., has named **Dean Hanson** to the position of sales manager. He will direct all marketing programs for the company's product line of marine electronics and computer systems.

Mr. **Hanson** has more than 20 years of experience in the marine electronics industry, with a strong background in the design, installation, and technical support of HF communications systems. Prior to joining NAV-COM, he was branch manager of the New York office for Radio-Holland USA.

NAV-COM Incorporated, a wholly owned subsidiary of the Magnavox Government & Industrial Electronics Company, specializes in integrated navigation, communications, and information systems for the maritime industry.

## Versatile Corporation Buys Davie Shipbuilding Yard From Dome Petroleum

The Canadian shipbuilder and repairer, Davie Shipbuilding Limited of Quebec, has been purchased by the Vancouver-based Versatile Corporation, already a significant shipyard operator and one of Canada's top 100 industrial manufacturers.

This acquisition makes Versatile a major force in Canadian shipbuilding and repairing, with approximately 40 percent of Canada's total shipyard capacity—on both the East and West Coasts—now under its ownership. Besides Davie (to be renamed Versatile Davie), Versatile owns the Burrard Yarrows Corporation, with yards in North Vancouver and Victoria on the West Coast, as well as the Versatile Vickers facility in Montreal.

Versatile Davie was acquired from Dome Petroleum Limited of Calgary, Alberta, for an undisclosed sum. The Versatile Corporation now employs some 3,200 people in Canadian shipbuilding and repairing.

Besides its extensive ship repairing activities, the Davie yard is currently completing a 4,000-dwt Gulfspan ferry, the Caribou, for C.N. Marine, with delivery scheduled for later this year. The yard is also expected to receive one-third of the value of a forthcoming C$650-million contract to upgrade four frigates for the Canadian Navy.

Versatile Davie's facilities include five newbuilding berths capable of building vessels of up to 100,000 dwt, and two drydocks capable of repairing vessels of the same size.

## Newly Formed Company Acquires Compressor Line From Allis-Chalmers

A-C Compressor Corporation of West Allis, Wisc., has acquired the compressor operation of Allis-Chalmers Corporation. Terms were not disclosed.

According to **Carl R. Hall,** chairman of the board and chief executive officer, the newly formed and independent A-C Compressor Corporation recently purchased the rotary sliding vane compressor and both multi-stage and single-stage centrifugal compressor product lines, along with the attendant technology and engineering, from Allis-Chalmers.

Included in the purchase were the Allis-Chalmers South Island plant in Appleton, Wisc., where the compressors are made; machinery and equipment within the plant dedicated to the manufacture of the products; and test facilities with capacities to 17,500 hp for closed loop and string testing at West Allis.

Besides Mr. **Hall,** A-C Compressor was formed by **William M. Conner,** president and chief operating officer, who was formerly general manager of the Allis-Chalmers compressor operation; **Kenneth B. Gardner,** executive vice president and chief financial officer; and other private investors.



## MTL Gets $187-Million Navy Contract To Operate Nine Tankers For MSC

Marine Transport Lines, Inc. (MTL) of Secaucus, N.J., has been awarded a $187,200,000 fixed-price Navy contract to operate and maintain nine Military Sealift Command tankers of the Sealift Class. The five-year contract becomes effective May 7 this year. MTL was determined to be low offer on a competitive procurement; 84 companies were solicited and nine offers were received.

The 27,000-dwt tankers transport Department of Defense refined petroleum products worldwide. They were delivered to MSC in 1974 and 1975 under the Navy's Build and Charter program. Four of the 587-foot ships were built by Todd Shipyards and five by Bath Iron Works.

## Chiasson Joins Conrad As Project Manager

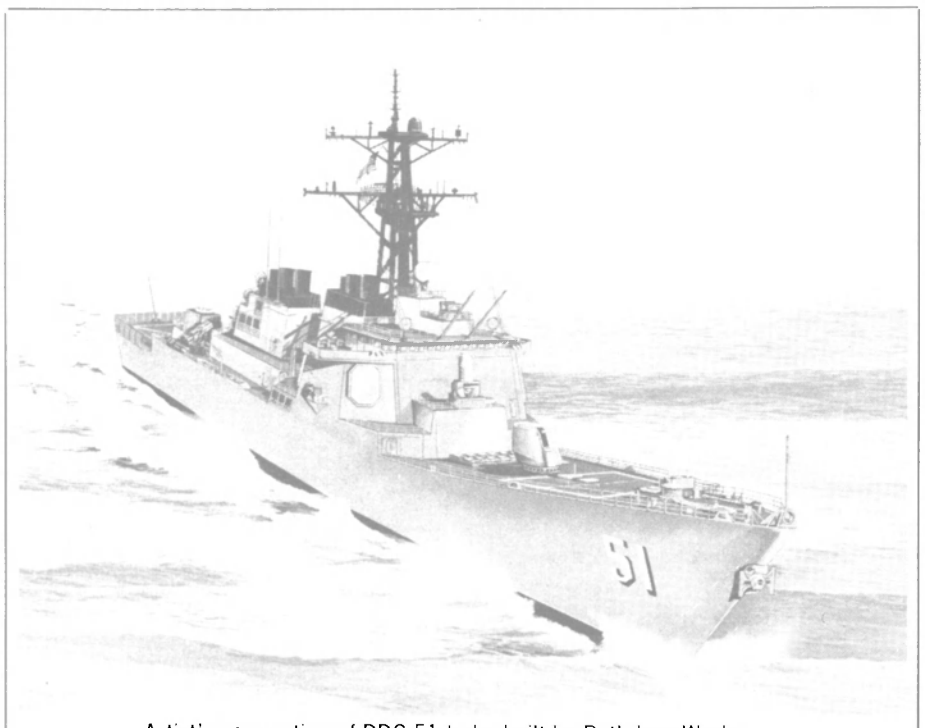
Conrad Industries, Inc. of Morgan City, La., has announced the addition of **Ronald P. Chiasson** to its management staff as project manager and estimator in both new construction and ship repair. He has 11 years of marine experience, including the past eight years with Delta Shipyard in Houma, La.

## AGL And Ciserv Sign Agreement To Be Exclusive Reps

AGL Transatlantic Ship Management Corp. of San Francisco and Ciserv of Gothenburg, Sweden have formed an exclusive representation to offer complete shipboard diesel maintenance and repair management including spare parts on a contract basis to American Owners—Ciserv has a worldwise network of repair services, riding crews and computerized maintenance programs.

AGL Transatlantic Ship Management Corporation together with Ciserv will provide total diesel management including class maintenance, casualties and spare parts for "a set fee per year." This service is especially valuable to owners of small fleets and/or owners who do not want to establish an expensive diesel organization.





Artist's conception of DDG 51 to be built by Bath Iron Works.

## Bath Iron Works Receives $321-Million DDG 51 Contract

Bath Iron Works Corporation has announced that it has been awarded the contract to design and build the lead ship in the DDG 51 Program. This award comes after a very extensive competition among the most capable surface combatant shipbuilding companies in the U.S. The $321-million fixed-price contract is effective immediately with initial efforts concentrating on development of the detail design and planning aspects of the program. Actual construction of the lead ship will begin in 1987 with the ship scheduled to be delivered in 1989.

**William E. Haggett,** president of Bath Iron Works, stated: "This is excellent news for Bath Iron Works. BIW has applied its very best resources and efforts over the past two years to win this contract against the top shipyards in this country. Developing a lead ship design and constructing the prototype of a class is that portion of the shipbuilding business where Bath really excels. This award is a fine tribute to our company and the reputation it has earned building ships for the Navy for many years.

"Award of the DDG 51 contract to Bath is vital to the future of the company, and of greater significance is the fact that it establishes a solid foothold for BIW as lead yard in the DDG 51 Program which is planned to include the construction of a minimum of 29 ships. As lead yard, Bath's chances of winning a majority of follow-on ships in the program is greatly enhanced," Mr. **Haggett** added.

"DDG 51 was the only new type surface combatant ship to be awarded this year, and no new classes are planned for the near future. As a result, competition for this award was fierce and BIW bid this contract very aggressively. Completing this program within the cost parameters will be a real challenge to BIW, but we are determined to do it, and I am confident Bath is up to the task," he added.

To perform its lead ship responsibilities, Bath Iron Works Corporation has teamed with Gibbs & Cox, Inc., of New York City who will be responsible for developing detailed working plans as part of the lead ship process. BIW and G&C have successfully teamed in the development of many lead surface combatant ship designs for the Navy in the past.

DDG 51 will be 505 feet in length with a 66-foot maximum beam and will displace 8,150 tons. It has been designed as a multipurpose destroyer incorporating the advanced AEGIS anti-air systems. The AEGIS destroyers are planned to be a cornerstone of the United States Navy battle groups well into the 21st century.

## Gibbs & Cox Firm Awarded $2.7-Million Navy Contract For Design Support Work

Gibbs & Cox, Inc., naval architects and marine engineers headquartered in New York City, has been awarded a $2,656,537 cost-plus-fixed-fee contract by the Naval Sea Systems Command for support of electrical systems and equipment development. The contract covers one year, and includes options for two additional years. The work will encompass system and equipment design, fleet support and life cycle management, refit and restoration, research, development, and testing.

## O'Sullivan Appointed President Of Fairbanks Morse Engine Division

Timothy V. O'Sullivan

**Timothy V. O'Sullivan** has been named president of the Fairbanks Morse Engine Division of Colt Industries, Beloit, Wisc. He joined the Division in 1983 as vice president and general manager of parts and service, and later assumed the additional duties of vice president of marketing and sales.

Prior to joining Colt, Mr. **O'Sullivan** was with General Electric Company from 1964 to 1983, where he served in a variety of managerial and marketing positions related to engineered cast products, turbine generator service, and spare parts and replacement sales for GE turbines.

Prior to joining GE, he was for two years an engineering officer aboard American Export Line ships. He is a 1962 graduate of Massachusetts Maritime Academy.

The Fairbanks Morse Engine Division is a leading producer of diesel and dual-fuel engines for commercial and military ship propulsion and electric power generation. Colt Industries is a diversified industrial products company with annual sales of close to $2 billion.

## Smit And National Foam Agree To Cooperate In Firefighting Endeavors

The Smit International group and National Foam System, Inc., have signed an agreement to cooperate in Smit's worldwide marine firefighting endeavors. Smit, based in the Netherlands, is a leader in the extinguishment of marine tanker fires. The company has firefighting vessels stationed at strategic locations around the world, and are capable of reaching any trouble spot within 24 hours.

Under the agreement, National Foam, a manufacturer of flammable liquid fire protection systems and foam liquid concentrates, will maintain stockpiles of foam concentrate available to the Smit firefighting teams as they are needed. This agreement will insure that an adequate foam supply will be available to quickly combat any flammable liquid marine disaster anywhere in the world.



## Annual CIMARE Meeting Scheduled For May 8-10 At Hyatt Hotel In Montreal

The Canadian Institute of Marine Engineers (CIMARE) will hold its Annual General Meeting and Seventh Annual Technical Conference, Mari-Tech '85, at the Hyatt Regency Hotel in Montreal on May 8-10. It will be hosted by the St. Lawrence Branch of Montreal.

CIMARE, a nationwide organization with more than 1,500 members from all provinces of Canada, and with many U.S. and worldwide members, was established to foster the needs and goals of all people associated with the oceans, seas, and inland waterways.

The theme of Mari-Tech '85, "Safety in the Marine Industry," will be addressed by authors of 14 technical papers covering all aspects of marine safety, from regulations to salvage to rescue operations. As this theme is paramount in the minds of all marine-oriented parties, the conference should be well attended by operators, owners, and government officials from throughout Canada and, hopefully, from the U.S. and abroad.

Luncheons with guest speakers are scheduled for May 9 and 10; the conference will conclude with a Dinner-Dance on the night of May 10.

## Raytheon Establishes New Ventures Unit—Steadman Named President

Raytheon Company of Lexington, Mass., has established a new office to arrange and manage venture investments for the diversified electronics company.

Chairman **Thomas L. Phillips** said the new enterprise would be coordinated closely with the company's strategic planning function, and would seek investments in young companies in business areas related to Raytheon's present and future lines. "Our objective," he said, "is to share in emerging technologies that are best participated in through investments in young entrepreneurial companies. Where we identify growth potential and useful links to Raytheon's own products and fields of technologies, we plan to take appropriate equity positions in those start-up firms."

**David R.A. Steadman** has been named president of Raytheon Ventures, and will direct the new office to be established at company executive headquarters in Lexington. He joined Raytheon in 1974 as manufacturing director of Cossor Electronics in England, where he was promoted to managing director the following year.

Mr. **Steadman** was responsible for the acquisition of Data Logic in 1977, and served as chairman of that subsidiary. He was elected a vice president of Raytheon Company in 1980, and served as president of Raytheon Data Systems until that business was sold in 1984.

## Brochure on Tensar® Geogrids Offered By Armco Construction Products

Advanced civil engineering soil design and cost-effective construction technology make Tensar geogrids the answer to a broad range of marine construction projects, according to an eight-page, four-color brochure now available from Armco Construction Products Division, a division of Armco Inc., Middletown, Ohio.

Tensar geogrids are high-strength polymer structures made from high-density polyethylene or polypropylene. They perform as a system of distributed anchorages with a soil matrix, interlocking within soils through the openings of the grids.

The geogrids can be constructed into gabion units that can be used for coastal structures, waterway channel linings, retaining walls, revetments, and scour-protection mattresses. High tensile strength, durability, and ease of installation are benefits cited in the brochure.

During the patented manufacturing process, polymer sheets up to ¼-inch thick are stretched laterally and longitudinally, producing the high tensile strength. Tensar geogrids come in lightweight, easy-to-handle rolls, and require no special tools or specialized labor.

For a free copy of the brochure,

**Circle 58 on Reader Service Card**

# Mitsui Delivers Big Ore Carrier With Many Energy-Saving Features

The 197,060-dwt ore carrier Asakasan Maru, built at the Chiba Works of Mitsui Engineering & Shipbuilding Company (MES), was delivered recently to joint owners Mitsui O.S.K. Lines and Sawayama Kisen Kaisha, Ltd. The big vessel has an overall length of 984.25 feet, beam of 164 feet, depth of 79 feet, and full-load draft of 58.5 feet. She is powered by a slow-speed Mitsui/B&W 7L80MCE diesel engine with a maximum continuous output of 20,700 bhp at 80.8 rpm. On sea trials the ship attained a speed of 16.35 knots.

A special feature of the new ore carrier is the superstructure located aft, which is shaped like a compact, streamlined tower. Such tower-shaped superstructures have been used by MES in the past for the construction of only four vessels—three tankers built in 1965 for Fred Olsen of Norway, and another in 1968 for Anders Wilhelmsen & Company, also of Norway. Reflecting the current increasing need for energy efficiency in ships, use of this unusual type of superstructure to reduce air resistance is now attracting renewed interest.

The Japan Marine Machinery Development Association, taking note of the advantage of this superstructure design, in 1981 set up a research subcommittee to study the resistance of offshore structures to wind pressures. As the effects of the tower-shaped superstructures had not been fully assessed in numerical terms, the subcommittee carried out research and investigation in various aspects, both theoretically and experimentally.

Participating in this research project, MES was commissioned to conduct an experimental study on the effect of reduced resistance on compact, streamlined superstructures on ships. With the cooperation of her co-owners, such a superstructure was incorporated into the design of the Asakasan Maru.

A Mitsui ATG-V turbogenerator system (mixed-pressure turbine system) is installed for maximum utilization of the waste heat of the main engine exhaust. The ship is also equipped with a thyristor converter-invertor type shift generator (that can be used as an emergency propulsion motor), and a power management system for maximum effective utilization of the turbogenerator's output.

Other energy-saving features include a Mitsui Integrated Duct Propeller, a reaction rudder, and extensive use of high-tensile steel in the hull structure. The hull bottom and waterline area are coated with self-polishing antifouling. Windlasses, mooring winches, and deck washing system are fitted with remote control systems with a view to reducing the crew's workload. The engine control room and cargo control room are integrated for more rational performance of the duties of both. The engine room is designed for unmanned operation, and has obtained NK's "MO-A" notation. •

## Wartsila And M.A.N.-B&W Sign License Agreement

Oy Wartsila Ab and M.A.N.-B&W Diesel A/S recently signed a license agreement concerning the manufacture of diesel engines at Oy Wartsila Ab, Turku Diesel Works. The license covers the right to manufacture M.A.N.-B&W two-stroke low-speed diesel engines to be marketed to Finnish yards.

The conclusion of this license agreement means that Oy Wartsila Ab joins the M.A.N.-B&W diesel two-stroke license family which worldwide comprises more than 25 members.

For literature containing full information,

Circle 38 on Reader Service Card

# SNAME SPRING MEETING/ STAR SYMPOSIUM

## Norfolk, Virginia—May 21-24

The 1985 Spring Meeting/STAR Symposium of The Society of Naval Architects and Marine Engineers (SNAME) will take place May 21-24 at the Omni International Hotel, located right on the waterfront in Norfolk, Va. The meeting will be hosted by the SNAME Hampton Roads Section.

The theme for this year's meeting, the ninth combined Spring Meeting/STAR Symposium, is "Innovative Marine Technology." (STAR is an acronym for Ship Technology and Research, a concept 10 years ago of SNAME past president, the late Phillip Eisenberg.) In keeping with this, the 1985 meeting will provide a forum for the presentation of state-of-the-art developments that are of major and practical importance to the interests of the industry.

The 21 technical papers to be presented during the three-day program will cover a diversity of topics, broad enough to interest everyone. The papers will discuss shipbuilding standards, machinery developments, CAD/CAM considerations, ship design topics and human factors.

An entertaining social program, mainly centered on Norfolk's exciting new waterfront development, will also be provided along with a special spouse/guest program and other events. The outstanding technical and social programs have been organized by the Hampton Roads Section—The Steering Committee under the chairmanship of **Richard Broad**, and the Technical Program Committee under the direction of **Roy L. Harrington**, both of Newport News Shipbuilding.

**Steering Committee**
Richard Broad, Chairman
R. Delia Rocca — R.L. Harrington
M.W. Steffens — G.D. Shulenburg
C.W. Coward — W.C. Ward, Jr.

R.L. Kelly

**Technical Program**
Roy L. Harrington, Chairman

**Social Activities**
M.W. (Marty) Steffens

**Registration**
Ralph Della Rocca

**Hotel Arrangements**
C.W. Coward

**Fund Raising**
R.L. Kelly

**Budget & Finance**
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D.P. Donohue, Vice Chairman
W.C. Ward, Jr., Secretary-Treasurer

### TECHNICAL SESSIONS
### Wednesday, May 22, 1985
### Poplar Session

**9:00 a.m. "The Role of the U.S. Coast Guard in the Development of Shipbuilding Standards," John D. Koski.**

This paper describes the standards-development program jointly sponsored by SNAME Panel SP-6 (Standards and Specifications) and ASTM Committee F-25 (Shipbuilding Standards). The active participation of the Coast Guard in the development of these industry standards ensures compliance with federal statutory requirements. The benefits include a reduction and simplification of government regulations, reduced plan review time, uniform approval criteria, and product quality assurance.

**10:00 a.m. "The Low Speed Diesel Engine, Now—And In The Future," Claus Windelev.**

During the last several years, the competitive market conditions for low-speed diesels have resulted in unprecedented improvements in these engines. This paper presents the results obtained from extensive prototype tests and reviews some of the current research concerning the engine working processes. Finally, predictions are made relative to possible improvements to the basic uniflow scavenging principle of the low-speed two-stroke cross-head diesel engine.

**11:00 a.m. "The Development of the DDG-51 High Power Density Gear," R. C. Bryant.**

The stringent space and weight design criteria for the DDG-51 suggest the use of surface hardened and ground propulsion gearing. By drawing upon the base of highly successful experience with this type of gearing in several NATO countries, the design and manufacture of surface-hardened and ground gears for the DDG-51 can be confidently undertaken. Recent advancements in the accuracy of grinding and metrology equipment are highly beneficial.

**2:00 p.m. "Propeller Blade Dynamic Stresses," J. F. Kuo and W. S. Vorus.**

The state-of-the-art for predicting propeller blade stresses is the quasi-static method, wherein the hydrodynamic pressure loads and the blade structural response are calculated separately. This paper presents a fully consistent structural/hydrodynamic model for predicting propeller blade dynamic behavior. The advanced theory and numerical model are applied to a skew series of propeller data, both with and without an allowance for blade dynamics.

**3:00 p.m. "Accuracy Control: The CAD/CAM Interface," Richard L. Storch and James N. Buttrick, Jr.**

An effective accuracy control system is required to evaluate the productivity of the individual work processes that comprise zone-oriented ship production methods. This paper describes the development of user-friendly computer software to support an accuracy control system, with emphasis on the logic required to provide links to a CAD/CAM system. File structure characteristics that facilitate computerized data collection, handling, and analysis are discussed.

### TECHNICAL SESSIONS
### Thursday, May 23, 1985
### Poplar Session

**9:00 a.m. "The Design of Tankers for Restricted Draft Service," Masao Ono, Katsuyoshi Takekuma, and Noboru Kawaguchi.**

In order to reduce crude-oil transportation costs in trade routes having restricted water depths, two series of shallow-draft tankers were developed. This paper is a presentation of the parametric studies and extensive investigations necessary to substantiate the development of these ships. It covers considerations such as: ship principal characteristics, propulsive performance, resistance in waves, maneuverability, seakeeping, vibration, and wave-inflicted bow damage.

**10:00 a.m. "Design Considerations for Energy Efficient Propulsion Plants," Y. Tanaka, S. Yabuki, S. Takahashi, H. Hamada, and H. Hatada.**

This paper presents engineering analyses conducted to formulate the design of an energy-efficient propulsion plant. Emphasis is placed upon a rigorous evaluation of a waste-heat recovery system. Several alternative means of producing electrical power are investigated, and an advanced turbo-generator system is introduced which includes a mixed-pressure turbine. Design alternatives to reduce energy requirements are also presented.

**11:00 a.m. "Experimental Study on Rough-Sea Performance of a Lower Powered Large Full Ship," T. Takahashi and S. Asai.**

Increased fuel costs have resulted in a world-wide trend to larger, full oceangoing vessels with less propulsion power and reduced service speeds. This paper presents model basin test results and analytical predictions of the impact of rough seas upon the speed and course-keeping ability of these ships. The results indicate that the propulsive performance and course keeping ability of lower powered ships are decidedly more severely affected by rough weather. A tentative minimum power limit is proposed.

**2:00 p.m. "Ship Design Considerations for Minimal Vibration," M. Mano, Y. Yoshida and K. Tanida.**

This paper describes several innovative methods of minimizing hazardous vibratory conditions such as those that can be caused by fuel-efficient, long-stroke diesel engines having few cylinders. Techniques discussed include the phasing of the propeller and engine alternating forces, the installation of a vibration balancer, the use of air-spring vibration isolators, the application of dynamic vibration absorbers, and the use of a recently developed friction stay.

**3:00 p.m. "The Innovative Design of the RACER Turbine-Condenser," U. Niatas and J. P. Vallar.**

The purpose of the RACER (Rankine Cycle Energy Recovery) system is to reduce the fuel consumption of gas-turbine powered naval combatant vessels. The novel aspects of the turbine-condenser module of the RACER system are presented in this paper. The turbine and condenser are structurally combined to minimize space requirements and improve shock resistance. Design details are presented, as are manufacturing techniques.

### TECHNICAL SESSIONS
### Thursday, May 23, 1985
### York Session

**9:00 a.m. "Human Factors: The Fleet Perspective," John W. Renard.**

While naval systems are becoming more complex, the quantity and

the quality of the personnel who will operate and maintain these systems is declining. An overview of U.S. Navy operability problems, relevant demographic trends, and Soviet personnel issues (in the context of the potential vulnerabilities they represent for the Soviet military) is presented. Also, the need to change the traditional approach to manpower, personnel, and training issues in the acquisition of new systems is discussed.

**10:00 a.m. "Human Factors in Naval Ship Design—An Update," R. Bost, J. Castle and J. Edwards.**

This paper is an update of the initiatives, primarily in the area of human engineering, to improve the design of naval ships. The results obtained from the application of human engineering principles are discussed. Lessons learned in the integration of human engineering requirements into ship specifications are reviewed as are new human engineering initiatives to improve fleet readiness and reduce operating costs.

**11:00 a.m. "Habitability Controls in Relation to Human Factors," Albert A. Saklem and Albert Almeida.**

The habitability standards of the United States Navy were originated to require and maintain a standard of living aboard ships and submarines that is supportive of the health, morale, and overall mission readiness of personnel. Human factors, as discussed in the paper, deal with the design of man-environment systems and are considered in terms of anthropometry (e.g. passage widths), physiology (e.g. air conditioning), psychology (e.g. privacy), and sociology (e.g. personnel grouping).

**2:00 p.m. "Innovations in the Control of Gas Turbine Propulsion Systems," Donald B. Malkoff and Herman L. Williams.**

Personnel are no longer able to fulfill the demands imposed upon them in their role as operators of gas turbine propulsion control units. Their greatest need is for assistance in the areas of fault diagnosis and the determination of proper corrective responses. Recommendations are offered for the most effective use of both humans and computers and their relationship in military shipboard propulsion control.

**3:00 p.m. "Microprocessor Based Real-Time Simulation of a Multiple Gas Turbine Generator Electric Plant for Embedded Training," A. Stypulkowski and E. Pollak.**

A technique is presented in this paper to simulate, in real time, a multiple gas turbine generator electric plant for an embedded training application. A typical naval electric plant was selected to demonstrate an application of the technique. The simulation includes the following plant operations: single generator operation, paralleling, load sharing and load shedding. Casualty simulations are included in the models.

**TECHNICAL SESSIONS**
**Friday, May 24, 1985**
**Poplar Session**

**9:00 a.m. "Non-Contact Measurement of Out-of-Plane Distortion of Welded Structures," Kiochi Masubuchi and Walter J. C. Cook.**

This paper describes a novel method of non-contact measurement of the out-of-plane distortion of welded structures. An optical laser interferometry procedure is used where two side beams of phase-

## SNAME SPRING MEETING/STAR SYMPOSIUM

**THE PROGRAM AT-A-GLANCE**

**Tuesday, May 21**

**4:00-8:00 pm**
Registration, International Promenade
**6:30-8:30 pm**
Early Bird Reception, Poplar Hall

**Wednesday, May 22**

**8:00 am-6:00 pm**
Registration, International Promenade
**7:30-8:45 am**
Author and Moderators' Breakfast
**9:00 am-3:00 pm**
Norfolk By The Sea Tour
**9:00 am-12:00 Noon**
Technical Sessions, Poplar Hall
**12:00 Noon-2:00 pm**
Lunch Break
**2:00-5:00 pm**
Technical Sessions, Poplar Hall
**6:30-9:30 pm**
President's Reception, The Mariners' Museum, Newport News

**Thursday, May 23**

**8:00 am-6:00 pm**
Registration, International Promenade
**7:30-8:45 am**
Author and Moderators' Breakfast
**9:00 am-3:00 pm**
Botanical Garden Tour and Fashion Show
**9:00 am-12:00 Noon**
Technical Sessions, Poplar Hall, York Hall
**12:00 Noon-2:00 pm**
President's Luncheon, Providence Hall, Stratford Hall
**2:00-5:00 pm**
Technical Sessions, Poplar Hall, York Hall
**6:00-10:00 pm**
Dinner Cruise Aboard Cruiseship NEW SPIRIT

**Friday, May 24**

**8:00 am-12:00 Noon**
Registration, International Promenade
**7:30-8:45 am**
Author and Moderators' Breakfast
**9:00 am-12:00 Noon**
Technical Sessions, Poplar Hall, York Hall
**1:15-3:45 pm Ship Tour**
at Norfolk Naval Base

## SNAME Spring Meeting

(continued)

locked monochromatic light are directed onto the surface of a weldment. When a minute deviation from a perfect plane exists on the specimen surface, the pattern of interference fringes is distorted. The shape and amount of distortion can be determined by studying the shape of the interference pattern.

**10:00 a.m. "An Analysis of the Factors Determining Preferred Windward Sail Shapes and the Application of the Resulting Concepts to a Fractionally Rigged Sailing Yacht, the J/24," Dan Winters.**

In fiercely competitive one-design sail boat racing, strict class rules minimize the differences in boats. In such racing, even the smallest gain in boat speed is extremely important. There is an ongoing search for differences in tune that will yield an increase in speed. This paper is based upon a detailed study of changes in rig tune on a J/24 and the resultant concepts which offer a greater range of adjustment and, thus, greater potential speed.

**11:00 a.m. "A Preliminary Design Method for FRP Sandwich-Cored Panels," Deborah Weissman—Berman.**

This paper presents a preliminary design procedure for the analysis of sandwich-cored composite panels. The designer can now predict the flexural behavior of cored laminate panels having outer layers of mat and woven roving which cannot effectively be analyzed using classical composite laminate theory. Predictions are compared with test results, and the failure modes of FRP sandwich-cored panels are discussed.

### York Session

**9:00 a.m. "Determining Effects of Ship Bridge Design on Ship Control," H. Schuffel.**

A paramount consideration in the design of a ship's bridge is the watch officer's ability to obtain and act upon the information required to effectively control the ship. This paper describes two experiments that were conducted to quantify the effects of specific design alternatives upon a ship's controllability. In the first experiment, the bridge arrangement is evaluated; in the second, the in-port use of radar is analyzed.

**10:00 a.m. "The Importance of Crew Training and Standard Operating Procedures in Commercial Vessel Accident Prevention," Paul J. Esbensen, Ralph E. Johnson, and Phyllis Kayten.**

Personnel failure or human error is listed as the primary cause in 43% of the thousands of accidents reported to the U.S. Coast Guard each year and is probably involved in 80% of all casualties. This paper discusses 10 specific accidents, ranging from the largest semi-submersible drill rig in the world to a 22-foot sailboat, where the lack of crew training or standard operating procedures contributed to the accident. Finally, the paper presents recommendations to improve the safe operation of commercial ships.

**11:00 a.m. "Marine Lubrication Systems," George E. Ponton.**

The design criteria specified for main and auxiliary lubrication systems can heavily impact the performance and reliability of a propulsion plant. This paper provides an in-depth discussion of various design considerations such as system design, pump selection, and noise characteristics. The paper also includes design guidelines developed to ensure that a lubrication system incorporates state-of-the-art technology.

SOCIAL EVENTS

**Early Bird Reception**

**6:30 p.m.-8:30 p.m.**
**Tuesday, May 21, 1985**
**Poplar Hall, OMNI Hotel**

To greet those who arrive early on the eve of the 1985 Spring Meeting, a reception (no host) will be held in Poplar Hall of the Omni hotel. Poplar Hall is located adjacent to the registration area.

**Special Breakfast**
**(by Invitation Only)**

Authors and Moderators: Authors and Moderators will meet for breakfast at 7:30 a.m. on the day of their session.

**President's Reception**

**6:30 p.m.-9:30 p.m.**
**Wednesday, May 22, 1985**
**The Mariners' Museum,**
**Newport News**

Society President **Perry W. Nelson** and **Mrs. Grace Nelson** will join with other officials to greet all registrants at a cocktail party and buffet dinner to be held in the inner courtyard of the Mariners' Museum. The museum's exhibit areas will be open for the exclusive viewing by registrants and the gift shop will be open. Transportation by bus from the Omni Hotel will be provided.

**President's Luncheon**

**12:00-2:00 p.m.**
**Thursday, May 23, 1985**
**Providence & Stratford Halls**

Preceded by a cash bar opening at 12:00 noon, a luncheon will be served at 12:30 p.m. Featured on the program will be the presentation of awards and an address by Society President **Perry W. Nelson.**

This luncheon is open to all registrants and their guests. Seating will be random.

**Dinner Cruise**

**6:00 p.m.-10:00 p.m.**
**Thursday, May 23, 1985**
**Aboard Cruiseship**
**NEWSPIRIT**

Chartered for the Society's exclusive use, the passenger cruiseship New Spirit will make a special sunset cruise of Hampton Roads. The sights will include a close view of Norshipco, Newport News Shipbuilding and the world's largest Naval Operating Base. See these and more while enjoying fine dining, dancing, and live entertainment. An open bar will commence with the 5:30 p.m. boarding and end with departure at 7:00 p.m. Cash bar thereafter. Tickets will be limited, so pre-registration is recommended.

## Patti Shipyard Moves To New Site On Bayou Chico In Pensacola

A continuing surge in boatbuilding has added a new feature to the waterfront in Pensacola, Fla., as Patti Shipyard recently began operations at a new location on Bayou Chico. Previously, the shipyard operated on properties leased from Patti Industries, Inc. on Pensacola Bay. The parent company will continue its operations at that site.

The new facilities, on five acres of land on the north bank of the bayou, will be used for new boat construction as well as boat and barge repairs, according to **Frank Patti**, general manager of the company. "We foresee significant growth, and our former location has become too small to meet work demand," he commented. "The growth in the Gulf area, the increasing demand for quality boats in a variety of forms, and the anticipated increase in traffic along the Intercoastal Waterway all prompted our decision," he said.

The new location includes two work buildings (150 by 100 feet and 90 by 60 feet), two covered mezzanine areas, and a new office. The site will also have a launching ways, and Patti has begun construction of a 1,500-ton drydock for boat/barge repairs.

The first vessel to be built at the Bayou Chico yard will be a sternwheel riverboat more than 200 feet long that will be used for excursion cruises out of St. Paul, Minn. Patti Industries is currently completing a workboat, the 100-foot George W. Britton, for the U.S. Army Corps of Engineers.

## Ingalls Yard Awarded $14.4-Million Navy Contract For Planning Yard Services

Litton's Ingalls Shipbuilding division in Pascagoula, Miss., has been awarded a $14,398,863 cost-plus-fixed-fee Navy contract for planning yard services in support of the DD-963 Spruance Class and DDG-993 Kidd Class destroyers. Work will be performed in Pascagoula, and is expected to be completed by September 30 this year. The Naval Sea Systems Command, Washington, D.C. is the contracting activity (N00024-85-C-2070).

## Babcock & Wilcox Moves Its Marine Headquarters

Babcock & Wilcox, a McDermott company, has relocated its marine headquarters from North Canton, Ohio, to 74 East Robinson Avenue, P.O. Box 351, Barberton, Ohio 44203. The new telephone number is (216) 860-6616.


Illman Jones, Inc. company officials display banner illustrating their new Powerhouse company logo. L to R: **Norm Nelson,** sales manager; **John Jones,** general manager; **Patrick Jones,** computer operations manager; **Andrew Katzin,** operations manager, and **Ivan Belanger,** director of government sales.

## Illman Jones Has New Location And Name To Meet Growth

Illman Jones, Inc. recently celebrated the grand opening of their new office and warehouse facilities in American Canyon, Calif. Previously located in Oakland, Illman Jones has been a major worldwide supplier of large-bore diesel engine parts and accessories for over 25 years.

The grand opening also marked the introduction of their new "Powerhouse" company logo. **John Jones**, general manager, remarked that the new identification describes their many services and long time association with the diesel power industry.

The five-acre site will include more than 40,000 square feet of enclosed warehouse space, allowing Illman Jones to continue to offer one of the largest inventories of new, rebuilt and/or reconditioned engines and parts including many components no longer available from OEMs.

For many years the company has specialized in securing and manufacturing many hard-to-find parts for a wide range of engines including Fairbanks-Morse, Nordberg, White Superior, Worthington, Cooper, Electro Motive, Alco, Atlas and Enterprise. With greatly expanded and modernized machine shop service, the company will now be able to provide special order work and rebuilding with special attention given to cylinder head, turbo charger, and fuel injection rebuilding service.

For further information on Illman Jones services and parts,

**Circle 10 on Reader Service Card**

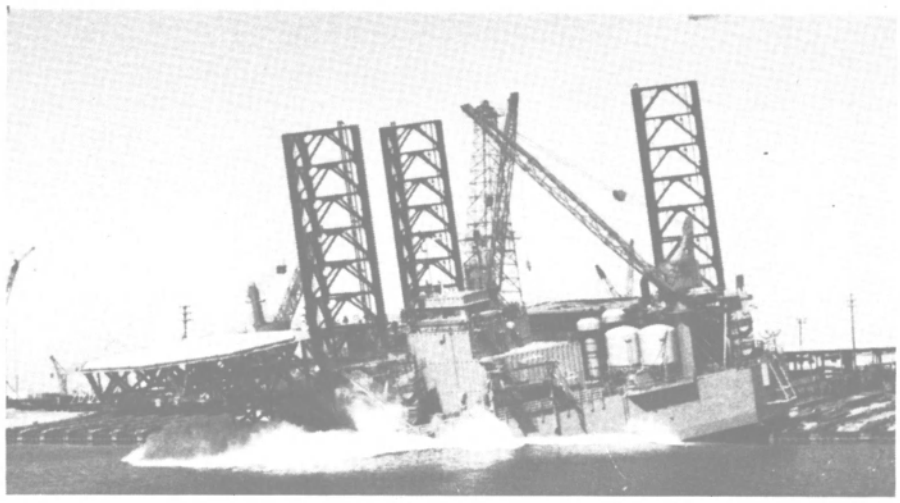
## Pugh Appointed Vice President Of Marketing For Lubriquip-Houdaille

**James R. Pugh** has been named vice president-marketing for Lubriquip-Houdaille, Inc. of Cleveland, with responsibility for worldwide sales and marketing operations. He comes to the company from Parker Hannifin Corporation.

According to Lubriquip president **Mark W. Baker**, "The appointment is consistent with Lubriquip's marketing emphasis on research and development of new products for distribution to worldwide markets."

A subsidiary of Houdaille Industries, Inc., Lubriquip manufactures a complete line of centralized lubrication systems for ships, machine tools, trucks, construction equipment, factory automation, and other industrial applications.

Houdaille Industries is a diversified manufacturer with worldwide operations in pumps, machine tools, mechanical sealing devices, and industrial products.



The 197,000-dwt ore carrier Asakasan Maru was recently delivered to joint owners Mitsui O.S.K. Lines and Sawayama Kisen Kaisha, Ltd.

# Marathon's Brownsville Yard Launches Jackup Rig For Penrod Drilling

The Penrod 99, a Marathon LeTourneau 82-SD-C shallow-draft, cantilever offshore jackup drilling rig, was launched recently (photo) at the company's Gulf Marine Division in Brownsville, Texas. With the rig in the water, the rest of the self-elevating platform's three legs, its drilling derrick, and other equipment are being installed. When completed, the rig's legs will be 360 feet tall, enabling it to drill in waters up to 250 feet deep. It is scheduled for delivery to Penrod Drilling Company in May this year.

Marathon LeTourneau Offshore Company designs and constructs jackup drilling rigs for all offshore environments. The company's line of jackups ranges from large, deep-water, hostile environments to compact, shallow-water units for mild environments. Marathon has rig-building facilities in Vicksburg, Miss., Brownsville, Texas, and the Republic of Singapore.

The company also builds other types of offshore drilling vessels, including semisubmersibles, drillships, and tenders, and performs repair and modification work on all classes of offshore drilling units. Marathon is a Penn Central company.


# Big Car Carrier Delivered By Hitachi Zosen's Hiroshima Yard

The 16,770-dwt motor car carrier Nissan Laurel (shown) was completed recently at Hitachi Zosen's Hiroshima Works and delivered to Intercontinenal Car Carriers S.A. of Panama. The ship, which can carry a total of 4,900 Japanese-size cars, has an overall length of 590.5 feet, beam of 105.8 feet, depth of 100.25 feet, and full-load draft of 29.2 feet.

Propulsion is provided by a single Hitachi/B&W 8L67GBE slow-speed diesel engine with a maximum continuous output of 16,800 bhp at 123 rpm. On sea trials the ship achieved a speed of 21.4 knots.

The Nissan Laurel is designed to carry trucks, large and small buses, car knock-downs, and containers, in addition to passenger cars. Including the upper deck, the ship has a total of 13 car decks, the fourth and sixth of which are hoistable to permit height adjustments. In addition to a midship shore ramp, there is a stern ramp over which large trucks and buses are loaded and unloaded.

## Fairbanks Morse Opens New Parts Distribution Center In Indianapolis

To complete its parts and service reorganization, the Fairbanks Morse Engine Division of Colt Industries has opened a new Central Parts Distribution Center in Indianapolis, Ind. This new facility (shown) replaces the division's former central warehouse at its Beloit, Wisc., manufacturing plant.

According to **Mark Parsons**, manager of the new distribution center, the 52,000-square-foot facility inventories some 12,000 different engine parts, and provides worldwide distribution of service parts for all Fairbanks Morse opposed-piston and Colt/Pielstick engines. The warehouse is computer-integrated with all Fairbanks Morse Service Centers to expedite parts on a 24-hour service basis to even the most remote locations.

**Mike Peterson**, manager, parts and service marketing for the Engine Division, further stated that the need for a new centralized parts distribution center has been recognized by the division because of the ever-increasing acceptance for the Colt/Pielstick Fairbanks Morse engines in the U.S. and world markets. The Indianapolis location was selected for its geographic location, close the the center of the division's markets.

The opening of the new distribution center is phase two in the reorganization of the division's warehousing and parts service facilities. Earlier this year a new Regional Warehouse was opened in Reno, Nev., to better serve the market needs of the West Coast, Alaska, and Hawaii.

For additional information,

Circle 14 on Reader Service Card

**READY FOR DELIVERY**—The first two of twenty-six 110-foot open lighter barges being built by Moss Point Marine, Inc. of Escatawpa, Miss., for the U.S. Navy are loaded aboard a seagoing barge for delivery to Benicia, Calif. The remaining 24 barges will be delivered to Navy facilities on the West and East Coasts. The shipyard reports the first two barges were delivered 140 days ahead of contract delivery date and the remaining barges are all ahead of schedule.

# Southwest Marine Yard Completes Renovation Of Rowan Jackup Rig

The Southwest Marine, Inc. shipyard in San Pedro, Calif., lost a landmark recently but gained a satisfied customer. The drilling rig Rowan Alaska has towered over the buildings, boats, and even big ships in the SWM yard for more than a year. As one skipper on the docks put it: "The Rowan Alaska has become sort of a landmark around here. No matter how big or small your boat was, you could always use the rig to navigate by . . . you could tell right where the yard was for miles away."

Based out of Houston, the Rowan Alaska has spent the past year in the SWM San Pedro yard having its leg sections extended by 100 feet for use in undersea oil fields that were previously inaccessible to this rig.

Owned by the Rowan Companies, Inc. of Houston, the rig is 210 feet long and 200 feet wide on the pontoon deck. Its three original 310-foot leg sections were extended to 410 feet, allowing the rig to now drill in up to 300 feet of water to a depth of 30,000 feet below the ocean floor.

The huge rig began a 30-day journey from San Pedro to Houston in dry tow with its sister rig, the Rowan Middletown, on the heavy lift ship Sibig Venture. From Houston, the Alaska will be dry-towed to Africa for drilling in the oil fields off that Continent's South Coast.

The drilling rig Rowan Alaska had become a landmark in the last year as it towered over San Pedro, Calif. (right)

## PIMA Agent For Three Repair Groups

**Louis W. Gomlick,** president of Penn International Marine Agencies, Ltd. (PIMA), New York, recently announced that PIMA has been appointed the exclusive agent in the U.S. for Companhia Brasileria De Raparos (COBRENA) of Rio de Janeiro, Brazil; exclusive worldwide agent for Mechanical Resources Inc. of Jersey City, N.J.; and exclusive agent in the U.S. for NAVIMOR of Poland which represents the Union of Polish Ship Repair Yards.

COBRENA specializes in, and is fully equipped for, the rebuilding and reconditioning of marine and industrial equipment and components including boilers and large diesel engines. Their repair shop is in the heart of Brazilian shipbuilding and ship repairs area. COBRENA's fleet of workboats is equipped with two-way radios and operates as support for onboard repair gangs working in the harbor. Their flying repair squads can service all Brazilian and South American ports on short notice.

Mechanical Resources Inc. is a full service organization with expertise in the manufacture and repair of marine/industrial refrigeration, air conditioning, heating and ventilation machinery equipment. They provide design services, custom-built refrigeration units, compressor rebuilding, spare parts supply and complete services on heat exchangers. They are geared to a quick response to emergencies with their trained engineers who are on call 24 hours a day.

The Union of Polish Ship Repair Yards has four major repair yards located in Gdansk, Gdynia and Szczecin.

The Gdansk Repair Yard has five floating docks that can handle vessels up to 60,000 dwt. The "NATUA" Repair Yard of Gdynia has three floating repair docks for vessels up to 6,000 dwt and the Szczecin Repair Yard has five floating drydocks that can handle vessels up to 10,000 dwt. Swinoujscie Repair Yard maintains two floating repair docks with up to 6,000-dwt capacity.

Located in the Baltic Sea, the Union is the largest ship repair facility in East Europe. Shoreside and floating cranes up to 100 tons lifting capacity service the 12 kilometers of repair piers that are contained in the repair yards. Their workshop areas are fitted with modern machinery and diagnostic equipment capable of handling all types of repairs.

## Atlantic Drydock Gets $4.7-Million Navy Contract For SRA Work On Frigate

Atlantic Drydock Corporation of Fort George Island, Fla., has been awarded a $4,749,158 firm-fixed-price Navy contract for the Selected Restricted Availability (SRA) and drydocking of the guided-missile frigate USS Clark (FFG-11). Work will be performed at Fort George Island, and is expected to be completed by July 19 this year. Contract funds would have expired at the end of the current fiscal year. Two bids were solicited and two offers were received. The Supervisor of Shipbuilding, Conversion and Repair, Jacksonville, Fla., is the contracting activity (N62670-70-C-0003).

## Thomas Products Offers Literature On In-Line Adjustable Flow Switch

Thomas Products Ltd. of Southington, Conn., is offering new literature on its Model 1200 in-line adjustable flow switch used for detecting insufficient flow rates in liquids. The factory-stocked switches are available in 1-inch NPT of bronze material. This model offers a simple screw-driver adjustment to change flow settings, ranging from .75 to 15.0 gpm.

Operation is simple—the shuttle housing a magnet is displaced by the liquid's flow or no flow condition to actuate a hermetically sealed S.P.D.T. reed switch. This switch is a safety device than can automatically shut down the system or activate an alarm before damage occurs from lack of flow.

For more information and free literature from Thomas Products,

Circle 24 on Reader Service Card

## Sonat Marine Acquires Tug And Barge Unit For Petroleum Transportation

**Stephen A. Van Dyck**, president of Sonat Marine, Inc. of Philadephia, a subsidiary of Sonat Inc., has announced the purchase of a 244,000-barrel barge and its associated 7,000-bhp tug. This tug/barge unit will join the Sonat fleet as the Liberty (ex Satoco) and the Ocean 244 (ex Chromalloy I). This purchase is part of Sonat Marine's aggressive program to improve and expand its petroleum transportation service from Gulf Coast refineries into the Florida market. The Ocean 244 is similar in size and capabilities to the company's 250,000-barrel barges that are the workhorses of its Gulf fleet.

Sonat Marine is taking other measures to increase the efficiency of its Florida service. The recent integration of its seagoing supervisors into management ranks is expected to result in significant productivity gains. The company has expanded the size of its Engineering Department, and is working on designs for a new generation tug/barge unit specially designed to serve the Florida market.

Sonat Inc., headquartered in Birmingham, Ala., is engaged in finding and producing oil and natural gas, field services associated with oil and gas operations, and transportation of energy products.

## Free Literature Available On ZF Marine Gearboxes

Zahnradfabrik Friedrichshafen AG (ZF) of Friedrichshafen, West Germany, is offering an attractive color brochure on ZF marine gearboxes. Titled "ZF Marine Transmission Systems," the 16-page publication is arranged in seven double-page sections.

The first section carries the heading "ZF marine gearboxes—there is a good reason for their success." The text points out that it is not just a coincidence that eight out of 10 West European navies fit ZF gearboxes to their fast craft—ZF marine gearboxes incorporate the comprehensive experience derived from all spheres of transmission work and everything that close cooperation and intensive exchange of ideas between ZF development departments and engine manufacturers and shipyards worldwide can bring. ZF invests a large and ever increasing proportion of their annual turnover in research and development and intensive testing is an integral part of all development, research and production phases. Test teams are at work continuously in laboratories, at test rigs and in the field. A highly qualified production staff has the necessary experience, and a very high standard of quality is achieved thanks to a sophisticated quality assurance system. This is why, the section concludes, ZF are approved transmission specialists and suppliers to the automotive industry and shipbuilding industry as well. A listing of types and capacities of ZF marine gearboxes is included in this first section.

The second section is given over to a description of ZF marine gearboxes and their advantages. Among the qualities noted are: small dimensions, maximum torque; only expertly selected and carefully selected materials are used; lubricant is carried to gears and bearings always at the optimum rate through a purpose-designed pressure lubricating system; quiet running—good ride; lightweight but robust; gears and shafts from specialists; rapid-acting clutches; servicing made easy; overhauling quite simple; service round-the-clock; and reliability and long life.

The other five sections are devoted to ZF gearboxes for various kinds of craft, each beautifully illustrated with color photos of the vessels in action and cutaway drawings of the gearbox types being used as examples for a particular type of craft. Shown are ZF gearboxes for fast craft, workboats and crewboats, the Navy, port authority craft and life boats, and ferries and passenger boats. A description is given in caption form for each of the gearbox types used for a cutaway illustration.

For more information and a free copy of the brochure from ZF,

**Circle 36 on Reader Service Card**


# WORLDWIDE SHIP REPAIR

**by Michael Hood**

The health of the world's shiprepairers is inextricably linked with the fortunes of the world's shipowners: when it's bad for the owners it's bad for the repair yards. The long recession has had a marked effect on the shiprepair yards around the world, but at long last there seems to be a glimmer of hope of the long awaited upturn in the market. Although most repair yards will take between 18 months to two years before they feel the upswing, increased activity is now developing in several areas.

The demise of the large tanker has been well chronicled, a factor which hit the large repair facilities around the world. Anticipated growth in the dry bulk trades did not materialize and therefore did not generate compensatory shiprepair demand. The arrival of a number of new facilities onto the market has increased competition in certain areas. Added to this are developments of planned maintenance condition monitoring and performance, high technology hull coatings and the Classification Societies willingness to extend Survey periods, all of which have led to drydocking intervals being increased with a proportionate decrease in opportunities for repair yards.

However, there are now certain signs for encouragement.

Increasing labor costs in a few traditionally lowest-cost areas are causing some shipowners to look elsewhere resulting in benefits for yards in other areas. Increased government support in some Western nations is beginning to pay dividends and, of course, the United States is in more than a comfortable position.

The U.S. Navy, over the next five years, plans to spend $105 billion on new ship construction, ship conversion work and ship overhaul work alone. (Total planned U.S. Navy expenditures—including weapons, other systems, production and development—over the next five years is $230 billion.) The bulk of the $105 billion ship work will go to the private sector with $30 billion of this earmarked for overhaul work.

The Far East is still the world's leading shiprepair center, although yards in Singapore are finding the going a bit tough, with Japan and Korea still competing on the basis of price. In the Philippines, the recent re-scheduling of the country's IMF loan is expected to see Philseco more active on the international scene this year. China is the biggest unknown quantity at the moment. It has made great gains in the shipbuilding league. Although it has yet to become active in the shiprepair market, it seems only a matter of time before it becomes a major force to be reckoned with. Meanwhile in Northern Europe and the United Kingdom the theme has been reorganization and rationalization.

Although most repair yards have set tariffs for work, these are very often ignored, with yards treating each individual inquiry on its own merits. The Far East is still the least expensive repair area (with Korea being the least expensive country), sometimes 40 percent less than European yards. But with the levels of State-support now available in some Western countries there is a growing awareness on the part of owners that it is sometimes more realistic to repair outside the Far East. One contract for a large scale jumboization last year went to a European yard at the eleventh hour because it had quoted "10 percent under the lowest bid received" by the shipowner so far. A Far East yard lost

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Photo above—The 37,061 dwt bulk carrier "Star of Texas" in the new GHH Sterkrade floating dock at Jacksonville Shipyards. Many yards in the U.S. have invested in new docks of late, nearly all floating docks, with the exception of Todd Shipyards, Los Angeles facility's new Syncrolift. **photo—M. Hood.**

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this order. High labor costs in certain countries pose another problem. Even yards in Singapore are now feeling the effect of increasing costs for labor. While many yards have embarked on productivity-increasing exercises as well as investing in labor-saving devices, shiprepair IS a labor-intensive industry and will always remain so. With labor costs now accounting for more than 50 percent of a shiprepairers total costs, many yards in high cost areas are unable to compete with yards in the low cost areas on run-of-the-mill type repairs. They have, therefore, switched their attention to the more sophisticated end of the market, ship conversions and major damage repairs. More yards and facilities are planned to open this year and in 1986. Due to enter service this year are docks in Colombo, Sri Lanka; Punta Arenas, Chile; San Francisco, California; Bandar Abbass, Iran; while other new facilities are set to enter service next year and the year after in Algoa Bay, South Africa; Melbourne, Australia; Madras, India and Jenjen, Algeria.

There is a difference of opinion in some quarters regarding these new additions. One view is they are the result of an anticipated increase in repair activity, while another holds they could result in increases in national protectionist policies if the anticipated increase in repair activity is insufficient.

This article examines each major shiprepair area in detail, outlining its policy changes over the past 12 months as well as highlighting significant developments during the past 12 months.

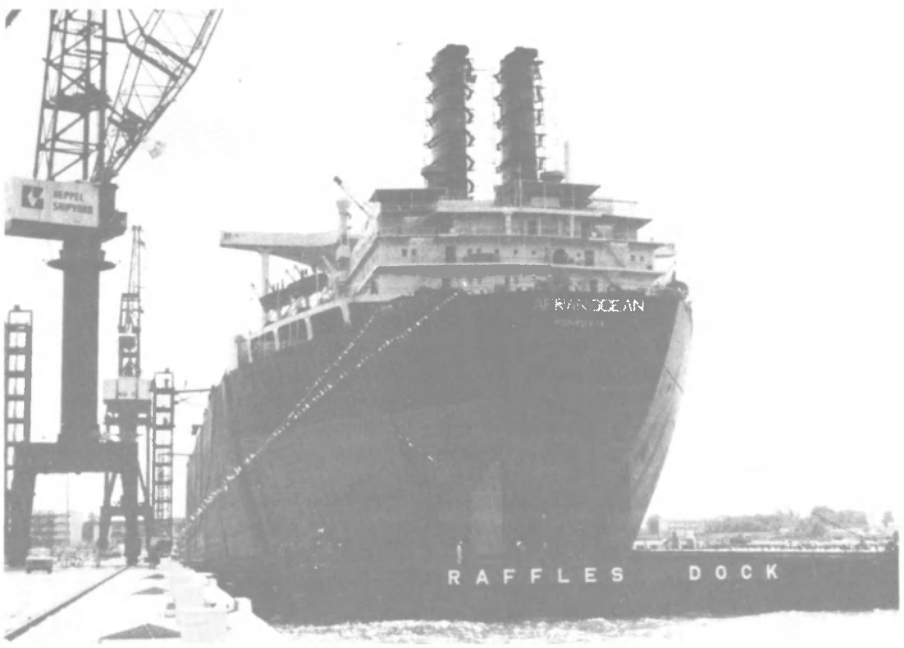
### THE FAR EAST

The yards in Japan, Korea, Hong Kong, Singapore, Malaysia and the Philippines have held onto the position of the number one shiprepair area in the world, but the leading shiprepair nation for the past few years, Singapore, saw shiprepair revenue decline for the fourth year last year.

**Singapore**: The repair yards in Singapore now face an overcapacity situation, a fact which they recognize and are working to correct. The government seems not to be too interested in getting involved directly with its shiprepairers' problems. Five yards in Singapore have diversified into other non-marine related activities, and most have embarked on investments in labor-saving devices. The yards also face a labor shortage, which could be a problem when the market does pick up. Keppel is proving the exception to the rule, with good success with large ship conversions.

**Hong Kong**: The British Crown Colony's major repairer, Hongkong United Dockyards Ltd underwent a major streamlining exercise last year, both in its management structure and yard structure. The restructuring seems to have worked. According to new commercial manager **Y.C. Chiu** "our pricing is now very competitive and good occupancy levels of our three floating docks are being achieved as a result. When this new pricing structure is combined with our reputation for good quality, the yard becomes an attractive package for any owner trading to and from the Far East and seeking value for money." In the three months, September, October and November last year, HUD drydocked a total of 60 ships for a number of prominent international owners, including Zim Israel, Nedlloyd Lines, and A. P. Moller. The offshore market is another area in which HUD sees a great potential, both for rigs and offshore support vessels. It has already had some success in this area, repairing semi-submersible rigs for Chinese and Western owners as well as OSVs.

**Japan**: Still holding the world number one position in shipbuilding, the Japanese shiprepair yards have been fighting an uphill battle with their neighbors, South Korea, during the past year, particularly with regard to prices. Figures released by The Japan Ship Exporter's Association for fiscal 1983 shows the total value of shiprepair work booked with local yards amounting to 203.8-billion Yen, down from the 1981 peak of 324.4-




Tanker-to-storage vessel conversions have been a specialty of late of yards in the Far East. Seen here is the VLCC "Afran Ocean" undergoing conversion in the Raffles Dock at the Tuas yard of Singapore's Keppel Shipyard. **Photo—M. Hood.**

billion Yen. The JSEA blames this slump on Korean competition and the downward trend in domestic repairs, although there was also a drop in repairs to foreign flag vessels in Japanese yards. The Shipbuilders Association of Japan's repair index puts Korea as the cheapest country by far to repair in the Far East, followed by Taiwan, Singapore and then Japan. If this situation continues, says the SAJ, the position of Japan's shiprepair yards will be further eroded.

While not being in a position to compete with the cheaper yards in the area on the "wash and brush-up" type of repairs, Japanese yards have carved out a particular niche in the market for themselves; large scale conversions (particularly of containerships). With the large number of newbuilding contracts placed in the past couple of years for the latest generation of containerships, many owners with aging existing tonnage have been left with a difficult decision. "Do I newbuild to stay in the race or do I convert?" Many owners have chosen the latter, with the lion's share of this business finding its way to yards in Japan. These conversions fall into two categories: jumboizations and lengthening and re-engining work. With many of the larger older containerships being steam turbine propelled, the latest generation of fuel efficient diesel engines have made re-engining work more and more attractive. One major contract to find its way to Japan was Sea-Land's 12-ship D9-class of containerships, which are all being lengthened by Mitsubishi Heavy Industries. Japanese tanker owners have also been active in the conversion market, mainly on the re-engining side.

On the yard facilities side, local yards have embarked on large-scale facility upgrading programs and automation programs. Hitachi Zosen started the ball rolling with the Kanagawa facility. This automation program is now being extended to docks at its Osaka and Hiroshima facilities. Kawasaki Heavy Industries and Imabari Zosen, on the other hand, ordered new floating drydocks during the year. Kawasaki's dock will be 230m length, 43.2m beam and will be capable of accommodating vessels of up to 59,000 grt, while Imabari's dock will be capable of accommodating vessels of up to 53,000 grt. Kawasaki's dock is ex-

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pected to enter service at the beginning of next year, while Imabari's will start operations at the end of next year.

**Philippines**: The only major shiprepair facility in the Philippines is the Philseco yard at Subic Bay which opened in 1982. This yard has yet to make a major impact on the international repair scene, but this year it is expected to pull in more overseas business, due to the rescheduling of the Philippines IMF loan. While relying heavily on domestic-flag vessels, this Kawasaki Heavy Industries-managed yard, has seen a number of U.S. owners stemm ships, notably U.S. Lines, American President Lines and Central Gulf.

On the new facilities front, the new offshore fabrication yard being built by Atlantic, Gulf and Pacific Co of Manila Inc, at Batangas Bay, 126 km south of Manila, is to have a 5,000 dwt capacity slipway and broadside marine railway for repairs. Major customers expected are offshore operators. AG&P's earlier plans to have a large floating dock and graving dock were shelved due to the depressed market. This slipway and marine railway will come into operation sometime this year and will provide competition for the smaller Philippine yards such as PNOC, Keppel Philippines, Bataan Shipyard, etc., which mainly rely on the local inter-island traders and offshore vessels.

**Malaysia**: Just across the Straits of Johore from Singapore lies Malaysia's largest shipyard, the Malaysia Shipyard & Engineering facility at Johore Bahru. Being so close to the Singapore yards, MSE is a major competitor. Quoting prices slightly cheaper than the Singapore yards, MSE has managed to pull in some tanker-to-storage vessels conversions during the past 12 months, notably on Indian vessels, as well as some major reactivation contracts on large tankers coming out of layup. Meanwhile over in East Malaysia, the A&P Appledore-managed Sabah Shipyard has pulled in a steady flow of repair work, mainly from local coastal vessels and offshore support craft, but as this yard is also a newbuilding yard, new orders have really been the highlight during the past 12 months.

A full house at the massive Dubai Drydocks facility in the Arabian Gulf.

**MIDDLE EAST**

The shiprepair scene in this important area has come on in leaps and bounds during the past few years and now is a major repair center. At the moment though the Iran-Iraq war is taking its effect on all of the yards, both in the large and medium size facilities.

**Kuwait**: Situated the closest of all to the war, the Kuwait Shipbuilding & Repair Co has been having difficulties of late, but its diversification into land-based areas has definitely helped business. The yard is now embarking on an entirely new pricing policy in shiprepair work which is expected to produce positive results in a relatively short time.

**Bahrain**: This group of islands has been the focal point of Middle East shiprepair activities for a number of years now as it had the only large repair facility in the Gulf in the shape of Asry, until Dubai Drydocks opened up for business. The downturn in large tanker repairs has caused Asry to look elsewhere for business, and this it has managed to do very well, maintaining its dock occupancy rate and pulling in a wide variety of tonnage, including rigs. The smaller yards in Bahrain, such as Bahrain Slipway and Basrec have still been kept busy by their traditional customers, as well as by the offshore customers.

**Dubai**: Since Dubai Drydocks entered service a couple of years ago its success has escalated, with this A&P Appledore-managed yard now being one of the most highly respected in the world. But its three massive drydocks could accommodate more work. 1984 saw the yard make a small profit, which is a rather good achievement considering the market. Dubai Drydocks, like Asry, has also been affected by the Iran-Iraq war, as well as by the drop in large tanker repairs, but it too has also managed very well to pull in a wide variety of vessels, including rigs.

**Saudi Arabia**: 1984 saw the entering into service of the second new Saudi repair yard: the King Fahad Ship Repair Yard in Dammam. Like the Jeddah yard on the Red Sea, the Dammam yard is equipped with two medium size floating docks and a modern array of workshops, etc. Although only having worked in smaller local flag vessels since starting up operation in September, the Dammam yard has set its sights on vessels using the Dammam port as well

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as on the Saudi merchant fleet, both of which offer substantial potential for more work.

### THE MEDITERRANEAN

The shiprepair yards bordering the Med (Greece, Southern France, and Malta) have seen a newcomer arrive on the scene at the start of this year, and a yard which is providing a great deal of competition: Gibraltar Shiprepair Ltd. Another A&P Appledore-managed yard, Gibrepair took over the former H.M. Naval Dockyard on January 1st, and since then has been doing brisk business. The yard's newly refurbished No. 1 dock (75,000 dwt capacity) entered service at the end of May and the yard is now fully operational. Proof, again, that sound management definitely pays dividends.

**Greece**: The Neorion yard on the island of Syros continues to do well with a steady flow of good reports regarding activity. However, other yards in Greece have been trying to sort out their difficulties during the the past 12 months, particularly labor problems in the Piraeus, Skaramanga area, but no firm details are yet known regarding progress.

**Italy**: Having just reorganized its shipyards into one state body, the Italian repairers must be eyeing Gibrepair with keen interest as they are this yard's major competitors. The former CNR yard in Palermo, now run by Cantieri Navali Italiani, had a relatively good past 12 months, increasing its drydockings by a massive 100 percent, with 50 percent of all foreign flag vessels drydocking in Italy during the period July 1983-June 1984 being stemmed in Palermo.

**Algeria**: The green light has finally been given for the establishment of a new repair facility at Jenjen in Algeria. OAPEC has decided to go ahead with this project. The new yard will be equipped with two drydocks of 70,000 dwt and 150,000 dwt capacity respectively. This yard though, is expected to be used by the Algerian fleet solely.

**Tunisia**: The former French Naval yard at Menzel Bourguiba, now run by Tunisia's Socomena, is soon to undergo a major upgrading exercise which will also increase its newbuilding potential.

### UNITED KINGDOM

The privatization of the shiprepair yards under the British Shipbuilders banner is now almost complete, with Vosper Shiprepairers alone remaining. March finally saw the long-awaited decision on the new owners of BS's "jewel in the crown," Falmouth Shiprepair. After much debate, Falmouth is now owned by a company made up of A&P Appledore and Bellway, with managing director **Denis Pascoe** staying on.

Another former BS repair yard now privatized, Tyne Shiprepair Ltd, has turned years of loss-making activities into a profitmaking first 12 months of operation. But unfortunately another former BS yard, Readhead Shiprepairs Ltd on the Tyne, has gone under and has been bought by Tynedock Engineering Ltd. Down on the South Coast, Thames Shiprepair Services in Chatham are still operating, but the decision as to whether they will still be allowed to operate out of the former Royal Dockyard has yet to be taken.

### NORTHERN EUROPE

The yards in France, Holland, and West Germany have all been involved in restructuring programs during the past year.

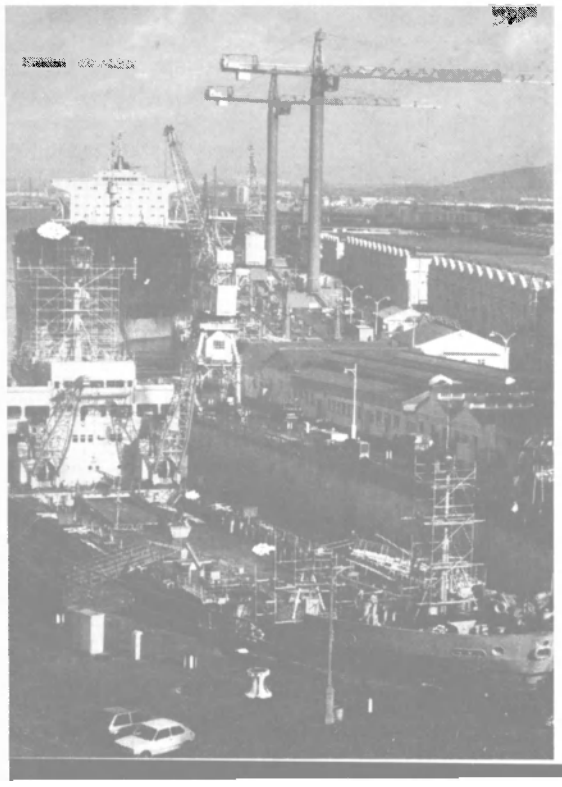
**France**: The two major yards in Dunkirk and LaCiotat have been grouped under the same company, while the future of Le Havre's AFOA still hangs in the balance after serious financial problems.

**Holland**: The Dutch repair industry has seen another casualty this year, the large Amsterdam Drydock yard, which followed Rotterdam's RDM into bankruptcy. The Government refused to provide further financial aid to ADM earlier this year and the yard was declared bankrupt in February. A rescue plan is currently being put together. Other Dutch yards are also having difficulties, and there are fears of further casualties.

**West Germany**: Re-structuring has also taken place in Germany, with a number of yards joining together, notably Bremerhaven's Hapag Lloyd Werft and Bremer Vulkan. Hamburg's HDW is waiting for the final go-ahead on the massive conversion contract on the passenger liner 'United States'. HDW says it is confident of winning it.

### SCANDINAVIA

The situation in the Scandinavian countries is basically the same as that in Northern Europe, although the lack of direct government support, coupled with high labor costs has affected all.



A busy scene at newly commercialized Gibraltar Shiprepair Ltd in January of this year. Pictured in No. 3 dock is the Royal Fleet Auxiliary's logistic support ship "Sir Lancelot" undergoing a major refit. The RFA is providing £14m worth of work to Gibrepair in its first three years of operation. Two of the seven new MAN cranes can be seen in the background. **Photo—K. Wright-Brown.**

New intermediate dock gate at Valmet's Helsinki yard. This gate has turned this large drydock into both a newbuilding and repair dock, with the Finnish yard being capable of repairing vessels of up to 60,000 dwt in this 'new' facility. **Photo—M. Hood.**

**Sweden**: The giant Cityvarvet group, with yards in Gothenburg, Landskrona, Malmo and Solvesborg, has been having some difficulties and has just placed its large floating dock at its Gothenburg facility on the market at a price reported to be somewhere in the region of £25 million. The Cityvar-

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vet group is increasingly relying on Scandinavian owners and Baltic traders for work, as well as the sophisticated end of the market.

**Denmark**: Here, once again, the domestic owners and local traders have provided the mainstay of work at the likes of Aalborg Vaerft, Fredrikshavn Vaerft, etc.

**Finland**: New facilities coming into operation at Wartsila's Turku yard, a new floating dock of 8,500 ton lifting capacity, and the remodeling of Valmet's large newbuilding dock in Helsinki, into both a shipbuilding and repair facility capable of accommodating vessels of up to 60,000 dwt for repair, have been the highlights of the year. This dock is being aimed at the jumbo-ferries now running between Finland and Sweden, as well as the large ro-ro/containerships in the Russian fleet running out of Leningrad.

## SPAIN & PORTUGAL

The restructuring of the shipbuilding and repairing industry in Spain is still underway, with the most likely outcome being that shiprepair activities will be centered around the northern and southern parts of the country. The large Astano facility at El Ferrol in the north is now looking towards the offshore construction and repair market as well as the conventional shiprepair market.

Meanwhile, in Portugal, the problems facing the country's largest shiprepairer, Lisbon's Lisnave, are being resolved. After facing the possibility of closure, Lisnave is currently in the process of trimming back its large workforce in an effort to streamline its operations. This is expected to be completed by the middle of this year with a strong possibility for renewed vitality.

While Lisnave has faced problems, the large Setenave facility at Setubal, south of Lisbon, has been doing relatively well pulling in repair work. Better known as a shipbuilding yard, Setenave (which split from Lisnave last year) has attracted a number of owners to repair at its giant facility in Setubal.

## NORTH AMERICA

One of the most significant factors in this part of the world during the past 12 months has been the change in the structure of the Canadian repair industry.

**Canada**: Halifax Industries two yards in Nova Scotia, Halifax Shipyard and the smaller Dartmouth Slip, were declared bankrupt at the end of last year, and are currently awaiting sale. The yard is still repairing ships while waiting for new owners. Eight domestic companies are believed to be interested, after Japanese and West German principals pulled out. Meanwhile, Davie Shipbuilding in Lauzon, Quebec, has been taken over by the Versatile Corporation (owners of West Coast-based Burrard Yarrows), making Versatile one of the largest shipyards groups in Canada.

**United States**: The American shiprepair yards are busy with continuing work from the U.S. Navy, Military Sealift Command and MarAd. The volume of work being supplied by these three parties is so great that a number of yards have had to embark on large-scale upgrading plans to cope with the volume of business. The commercial repair market in the U.S. is still declining, as U.S.-flag owners find ways of repairing vessels overseas. There have also been casualties with over 10 yards of various sizes closing down in the past two years. Foreign-flag repairs are still scarce at U.S. yards, mainly due to the high prices being quoted. Business realistically available from overseas owners comes from passenger/cruise vessels operating out of U.S. ports and casualty work.

On the new facility front, new docks have come into operation at Bath Iron Works (Portland, Maine), Braswell Shipyards (South Carolina), Jacksonville Shipyards (Florida), North Florida Shipyards (Florida), Todd Shipyards (Los Angeles), Southwest Marine (San Diego) and NASSCO (San Diego).

Meanwhile, San Francisco's Continental Maritime has ordered a large floating dock from GHH of West Germany which will start operation in the summer of this year and Bethlehem Steel is to open a new offshore rig repair yard at Sabina Island, near Port Arthur, Texas.

With $6-billion budgeted by the U.S. Navy for repairs and modifications last year, and 40 percent of this going to U.S. commercial yards, coupled with $319-million to be

spent by the Military Sealift Command this year on conversions and repairs, the U.S. repairers have a very healthy market to tap into. The only problem for the U.S. yards, though, is that when the upturn in the market does come about, there could be a shortage of docks in certain areas of the country, a happy situation for dock builders. Another problem is that of productivity. One leading U.S. yard has tied-up a technology-exchange agreement with Japan's Mitsubishi Heavy Industries to improve its productivity levels, especially on the ship conversion front.

In all, thanks mostly to the U.S. Navy, Military Sealift Command and MarAd, the U.S. repair sector can look forward to five years, at least, of very healthy activity with $30-billion slated for overhaul work alone during that period.

At present, the U.S. Navy, Coast Guard, M.S.C., MarAd and other U.S. government agencies operate approximately 4,000 vessels. Most of these must be repaired and maintained in U.S. yards. In addition, excluding the 1,828 U.S. owned and controlled deepsea commercial ships (which can be repaired overseas), there is an additional fleet of 21,716 domestically trading self-propelled commercial vessels plus 22,396 barges in the U.S. These must be maintained in U.S. yards.

An existing fleet of 4,000 U.S. government vessels plus 45,000 domestic commercial vessels adds up to a respectable and continuing U.S. maintenance and repair potential.

**SOUTH AMERICA**

**Brazil**: The situation with Rio de Janeiro-based Renave is still uncertain after this yard was declared bankrupt. Buyers are still being sought. It is more than reasonable to assume a country such as Brazil should be able to support a major shiprepair facility, especially when you consider the expected growth in iron ore exports from that country.

**Chile**: The country's leading shiprepairer, ASMAR, has recently increased the maximum size of ship able to be docked at its No. 2 drydock at its Talcahuano yard. This dock can now accommodate vessels of up to 90,000 dwt and will be capable of meeting the increasing and encouraging demand for large docking facilities in this country, especially from foreign-flag vessels. ASMAR is also involved in the building of a new small ship repair facility at Bahai Catalina, near Punta Arenas. This new yard, being set up jointly with South Africa's Sandock-Austral, is to be equipped with a marine railway and a land-side transfer system. Opening is set for the middle of next year. Generally, yards in Chile are optimistic and looking ahead to new growth in activity.

**Colombia**: "CONASTIL" (Compania Colonbiana de Astilleros Ltda) shipyard, located in the Caribbean port of Cartagena, Colombia, offers a full service facility to owners trading in the Caribbean or transitting the Panama Canal. The yard has a brand-new syncrolift system capable of accommodating vessels of up to 130 meters LOA. The yard also has eight land positions, thereby always having a drydock available on arrival. The yard has all new ships (electrical, machine, steel, etc.) and equipment and can affect all types of shiprepairs efficiently and at very competitive prices. Recently the yard successfully completed a major conversion/lengthening of an oil tanker and are presently building several tugboats for a northern Colombian coal port facility.

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The future for world shiprepair is, of course, assured as ships will always need to be repaired.

Activity is increasing in certain areas and there is cautious optimism regarding an increase in work levels expected in the next 18 months or so.

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## Gunderson Purchases FMC's Marine And Rail Equipment Division

A group of Oregon investors has purchased FMC Corporation's Marine and Rail Equipment Division in Portland, bringing corporate ownership back to the State. The new company, named Gunderson Inc., will re-establish more than 400 manufacturing jobs in the Portland area.

The acquisition was spearheaded by **C. Bruce Ward,** a former president of the FMC Division, and **William A. Furman,** president of Greenbrier Leasing Corporation, with financial assistance from Standard Insurance Company and the State of Oregon.

"We're excited about the public and private sectors working together to keep business in Oregon," said Mr. **Ward,** Gunderson president. "Thanks to state treasurer **Bill Rutherford,** and Standard Insurance, we've been able to form the new Gunderson Inc."

In 1984, FMC and Greenbrier Leasing entered into a joint development contract, funded by Greenbrier, to design, engineer, and build a new railroad car capable of carrying double-stacked intermodal containers. The result is the new Twin-Stack™ railcar that is rapidly gaining acceptance from the railroad industry and major container shippers nationwide. The success of this new product and FMC's subsequent decision to divest the Portland division encouraged the investors to make the acquisition.

Gunderson manufactures and repairs railcars of all types at its 75-acre plant along the waterfront in northwest Portland. It also builds and repairs barges and other marine equipment.

Founded in 1968, Greenbrier is a privately held railcar leasing company based in Oregon City. It specializes in leasing intermodal flatcars on an operating basis to Class I railroads, and is the second largest non-railroad owner of intermodal flatcars in the U.S.

For further information on Gunderson Inc.,

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## Bridge Named President And CEO For Volvo Penta Of America

Robert Bridge

**Bjorn Ahlstrom**, president and chief executive officer of Volvo North American Corporation, has announced the appointment of **Robert Bridge** as president and chief executive officer of Volvo Penta of America. Headquartered in Rockleigh, N.J., VPA will direct all of Volvo's marine activities in the U.S.

"The significant expansion of Volvo's business in North America during the past several years has necessitated a restructuring of our organization to keep pace with our rapid growth," explained Mr. **Ahlstrom**. Volvo's sales in North America have grown from $175 million in 1970 to an anticipated volume of close to $3 billion in 1985.

During his 20 years with Volvo, Mr. **Bridge** has been responsible for various activities within the accounting and financial areas at the corporate level, and with the Volvo Penta organization. He has been in charge of Volvo's marine operations in the U.S. since 1981.

## Richardson Named Manager Of Bethlehem Steel's New Yard In Texas

The appointment of **Frank W. Richardson III** as manager of Bethlehem Steel Corporation's new Sabine Yard in Port Arthur, Texas, has been announced by **David H. Klinges,** vice president, marine construction group. Mr. **Richardson** is advancing from the position of plant engineer at Bethlehem's Beaumont, Texas, yard.

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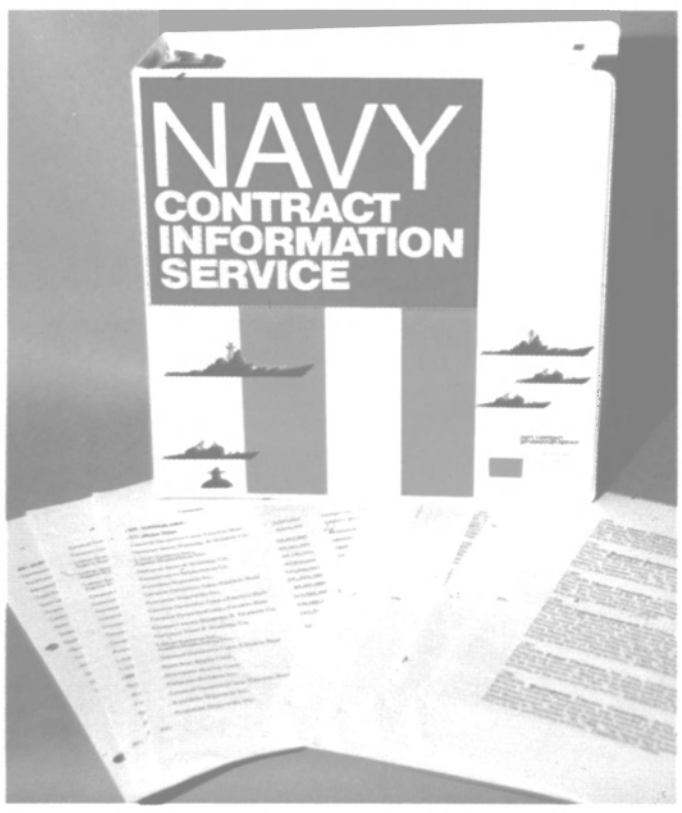


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# AWO PERSPECTIVE

# WHERE'S THE PORK BARREL?

**by Jeffrey A. Smith**
**Vice President—Public Affairs**
**The American Waterways Operators, Inc.**

Author **Jeffrey A. Smith** pauses in the lobby of the United States Senate Chamber, where much of AWO's efforts to debunk the industry's "Pork Barrel" image will take place.

Experts in the media and in the government who bother with the matter at all, like to characterize the domestic waterways industry as the "pork barrel industry." It must be great fun for journalists and other critics to glibly caricature a greedy parochial politician with his face stuck in the public trough, lapping up "pork barrel" water project goodies for the voters back home. It must also be great fun for critics to take shots at any given lock and dam project as a monumental and unnecessary boondoggle, promoted by Congressmen who snicker, wink, and elbow each other at election time over the waterways "pork" they have appropriated for their constitutents..

On the editorial pages of a well-known New York newspaper recently, the pundits portrayed the Congressional debate over last year's omnibus water resources bill as a "pig dinner." The editorial stated that "the squealing was unbearable," as members of Congress danced through the aisles shouting, "You get yours, and I get mine, we've all joined hands to feed the swine . . .".

To put it politely, it is an understatement to say that such indulgent cartoon characterizations are frustrating to us in the waterways industry, as well as to many in our government who understand the industry and support it. And our frustration is compounded because the facts, the cold hard statistical data on the importance of the waterways to the nation that truly profiles our industry, are in direct refutation to the "pork barrel" image.

And hardly anyone knows it.

Far from being "pork barrel," our industry, before the introduction of damaging government policies a few years ago, was an even more effective, productive and vital national resource than it is today. It provided an even greater wealth of benefits to the consumer and to the nation—not the least of which was the steady employment of thousands of Americans and the resultant millions of additional tax dollars for the U.S. Treasury—and it was one of the fundamental reasons for the economic stability of the 87 percent of major U.S. cities with which we do business. No other industry has provided more . . . for less. We would all benefit—from the highest industry executive to the shipyard worker, from the elected representative to the American consumer—if this truth were known. The "pork barrel" image is a *lie*.

Here are the facts.

Consider that the inland and coastal barge and towing industry operates on 26,000 miles of navigable waterways, a network of rivers, canals and waterways long enough to circle the earth. In addition we carry 13 percent of the nation's freight for just 2 percent of the national transportation cost, and we do it with the best safety record of any transportation industry. In a typical year, there will be 125,000 barge movements to and from over 200 U.S. inland and coastal ports.

Consider also that the barge and towing industry saves the American consumer money on the cost of their food, gasoline, electricity and building materials, because barges require less energy per ton to transport goods than any other means. On the Lower Mississippi, one towboat can push 40 barges that have the carrying capacity of 600 rail cars or more than 2,200 trucks. Where's the pork barrel?

Consider that our industry forces the railroads, by their own admission, to charge about $1 billion *less* per year in freight rates because of the healthy competition we provide. Such competition has a direct effect on what every American consumer pays for some of the most basic commodities needed to sustain life.

Consider the millions of tons of raw materials like grain and other agricultural products, petroleum, limestone, lumber and coal that travel on the inland and coastal waterways of the nation. The price of everyday commodities like cereal and electricity are directly affected by the cost of transporting them—and it is the barge industry's efficiency that holds down the price for the American people.

Pork barrel?

Our waterways are also a matchless source of recreation for fishing, pleasure boating, and sightseeing—and millions of acres along the waterways are designated wildlife refuges. It is also little understood that we play a vital role in national defense, currently supplying the remote Distant Early Warning radar site in Alaska and defense installations throughout our land.

Pork?

Barges haul about one-half of all United States export grain, and the low cost and high efficiency of water transportation keeps oil and coal producers, farmers and other shippers competitive in the world market—expanding our overseas trade and improving the U.S. balance of payments. Finally, it is significant to note that over 100,000 direct jobs for our citizens derive from the waterways industry. Indirect employment is in the millions.

If it *is* pork, then it's "Grade A" bacon—cured for the benefit of every American.

Yet, despite these contributions to the nation, and much more, we in the inland and coastal barge and towing industry continue to find ourselves in the curious and frustrating position of having to suffer the negative political reputation of being the "pork barrel" industry.

No one benefits from this name calling except the pundits and other critics who delight in its use. Every American has a direct, compelling and personal stake in the success or failure of this vital national industry. So the next time you hea an expert rattling around in an empty "pork barrel," give him, or her, the word. The next time you read a newspaper account, or hear a radio or television reporter blabbing about the "pork barrel" waterways industry, get involved. Write them a letter. Call them up. Educate them with the facts. Complain.

By all means let your Congressmen and Senators know how you feel. They too have an important stake in this. When a politician who likes to dramatically throw the term "pork barrel" around begins to hear the murmuring voices of constituent complaint, the rumbling harmony of grievance, and the full symphonic roar of voter discontent, he'll listen. He has to.

Give him the facts.

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# Marine coatings & corrosion control

Manufacturers of marine coatings and other corrosion-fighting systems continue to improve their products and services, with much emphasis on reducing costs, both of the products and their application, and by extending drydocking times.

The fuel-saving, self-polishing copolymer antifoulants continue to gain in market share. In 1984 they passed conventional antifoulants, with 53 percent of the total gallonage sold worldwide.

The editors of MR/EN asked the suppliers of marine coatings and other corrosion-control products and services to tell us about their latest and most important products and capabilities. The review that follows is based upon the replies that we had received as we went to press.

### FOR MORE INFORMATION

If you wish to receive additional information on any of the products and services described in this article, circle the appropriate reader service number(s) on one of the postage-paid cards near the back of this issue.

## AMERICAN ABRASIVE

American Abrasive Metals of Irvington, N.J., manufactures Epoxo, a safety coating that provides surefooted, non-slip, long-lasting traction. Originally developed for use by the U.S. Navy, Epoxo has been used on the flight decks of all aircraft carriers since 1962. It provides vital, non-skid safety for helicopter landing pads on offshore rigs. The safety coating is also suitable for use on ramps, passageways, engine rooms, equipment storage rooms, and shop areas—wherever slippery surfaces exist.

Epoxo's tough epoxy binder resists gouging, impact, and chipping. It locks in the coating's near diamond-hard abrasive granules, preventing them from being loosened or kicked out. Epoxo is said to maintain its highy effective non-slip properties five times longer than sand and paint.

It is unaffected by seawater, oil, gasoline, grease, and chemicals, and can be rolled, troweled, or sprayed on. A two-man team can roll up to 1,000 square feet per hour. Epoxo is available in a variety of colors and in 1- and 5-gallon containers.

**Circle 62 on Reader Service Card**

## AMERON

Ameron Inc. of Monterey Park, Calif., recently announced a new dimension in abrasion protection named Amerthane. The Amerthane barrier on steel, aluminum, or concrete provides outstanding protection against sliding and impact abrasion. The new product's elastomeric polyurethanes possess the mechanical properties that deliver long-term abrasion protection over a wide range of temperatures and service conditions. Flexible to temperatures as low as −80 F, it provides the surface to resist most severe solids—handling environments such as mineral ores, coal, grain, salt, sulfur, or plastic pellets.

Other marine uses where Amerthane is likely to offer alternative solutions are decks and hull exteriors subject to severe abrasion and impact. Areas around the stern including the propeller where cavitation, pitting, and erosion are prevalent is another application where Amerthane is being considered as a cost-effective alternative.

Ameron's success in high-technology coatings for all types of uses aboard ship includes silicate technology to achieve anticorrosive and antifouling properties in one product. A durable, controlled-release type antifouling, Amercoat 602 is a coating that can provide protection for up to 48 months. Being both an anticorrosive and antifouling coating, repair of the surface requires minimum material and labor, offering a significant cost-effective approach to underwater hull maintenance.

Ameron's portfolio of antifoulings also includes the latest state-of-the-art ablative self-polishing product, Amercoat 698HS, which has solids by volume of 55 percent and offers protection under both water and dynamic conditions and is compatible with most anticorrosive systems.

**Circle 86 on Reader Service Card**

## ARNESSEN

The Arnessen Corporation's Corrosion Dynamics Division of Roselle, N.J., provides a complete line of heavy-duty descaling and high-pressure air/water cleaning devices for removal of rust, scale, and old paint from ships, barges, offshore rigs, storage tanks, and other structures.

Among the quality tools and equipment offered by Arnessen are chipping hammers, deck scaling machines, needle scalers, and water/air cleaning machines.

The company's SSS high-pressure water cleaning system solves the problem of cleaning the holds of both large and small bulk carriers and similar vessels, as well as the insides of land-based steel storage tanks and other interiors. The system is based on the use of compressed air to increase the speed and throw of a water jet. It is simply connected to a ship's water-on-deck line and the service air line. A new nozzle design feeds the compressed air so as not to split and spread the water column.

The Model SSS-100 Mini-Gun is small, light, and specially designed for deck, superstructure, and hold cleaning in ships and other enclosures where headroom does not exceed 35 feet. The Model SSS-200 Combi-Gun is primarily intended for the hose cleaning of high holds, tall superstructures, ships' sides, etc., but is equally effective for other cleaning. Its powerful jet and high washing efficiency make prior sweeping unnecessary. Hot water can be used to speed removal of greasy deposits and stubborn dirt.

**Circle 63 on Reader Service Card**

## AURAND

An improved, low-cost method for removing corrosion, paint, scale, rust, and other accumulated coatings from steel or any other hard surface in a marine environment is offered by Aurand Centrifi-Clean Tools, of Cincinnati, Ohio.

The exclusive Centrifi-Clean system combines the Aurand technique, proven over more than 35 years, with a new modern design. The cleaning and chipping power is delivered by a patented bundle of multi-toothed circular cutting wheels, loose-pinioned around a rotating head. The head revolves at high speed, using centrifugal force to throw the cutters' specially designed teeth against the surface to be cleaned.

The cutters are of high grade tool steel, specially heat treated and hardened. They feature a new design with increased cutting surface that means greater capacity and longer wear. In addition, Aurand cutter bundles are easily replaced and are interchangeable between different Aurand cleaning tools. The thoroughness of the Centrifi-Clean method also usually means less frequent cleaning.

All Aurand tools feature an adjustable depth shoe set by the operator to limit the impact of the cutters. This feature protects the surface being cleaned and insures uniform cleaning action, preventing excessive cutter wear. The tools are lightweight, easy to handle, and have durable cast aluminum housings.

The Aurand Centrifi-Clean equipment is available in both electric and pneumatic models. Electric tools are available in 115 and 230-volt models, with ⅛ or ½-hp AC or DC universal motors, and 15 feet of three-conductor cable.

The pneumatic tools feature rotary type air motors, in ½ or 2½ hp sizes, free from toggles, pistons, or reciprocating parts to eliminate vibration. Units operate on 70 to 100 pounds air pressure.

Models are available with cleaning areas 5-inches, 8-inches, or 13-inches wide.

**Circle 64 on Reader Service Card**

## BUTTERWORTH

Butterworth, Inc. of Houston, an Exxon affiliate, has been a leader in high-pressure, water-jetting technology for more than 20 years. With equipment offering pressures from 5,000 to 20,000 psi and a variety of flow rates, the applications are unlimited.

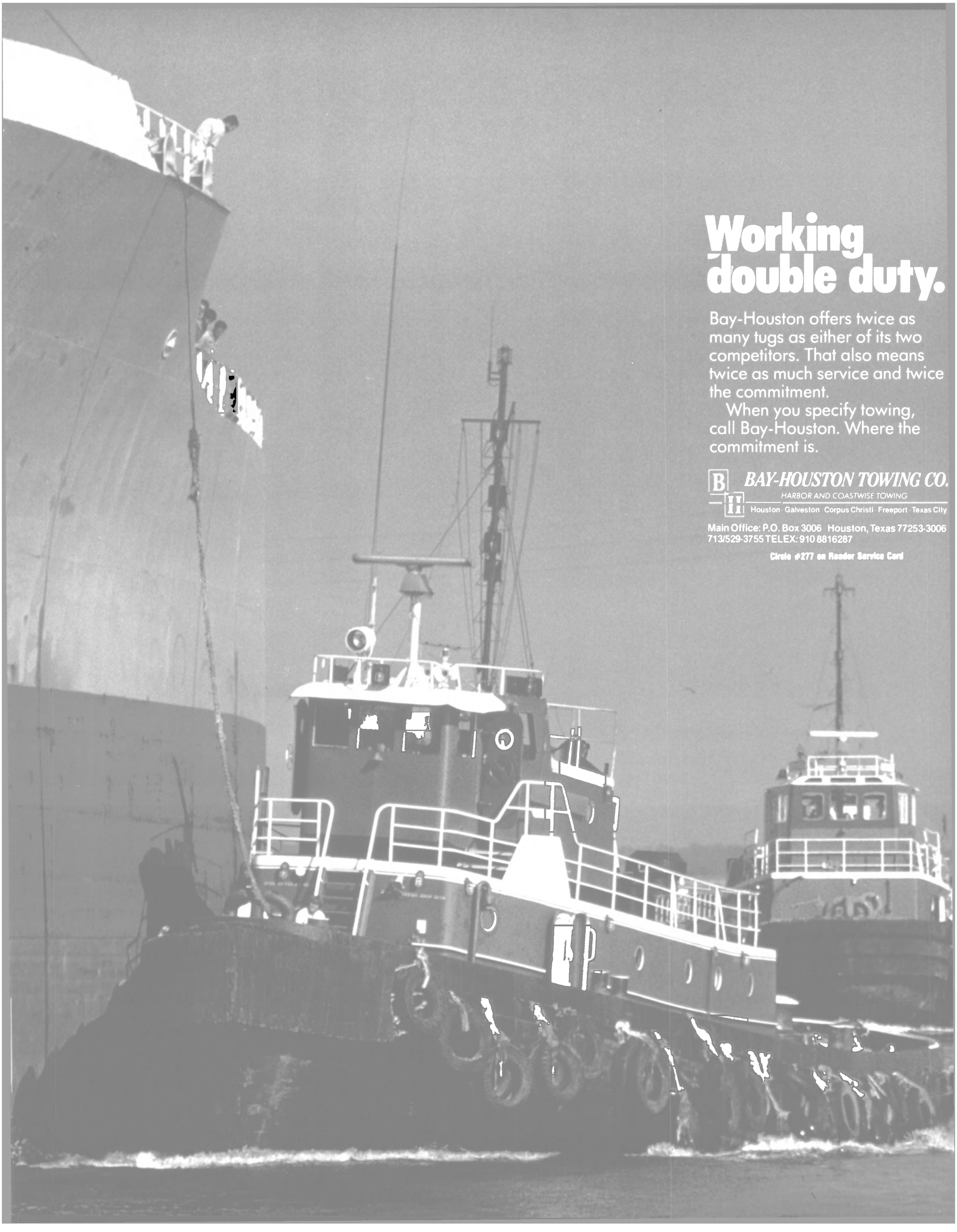
The company recently demonstrated the performance of its 20,000-psi Liqua-Blaster system on a barge that was heavily encrusted with rust and barnacles. The effect of the 20,000-bhp water blasting on the layered corrosion could be seen clearly, with one sweep of the gun removing both barnacles and scale deposits that could not be removed at all with lower pressure water jets or sandblasting.

Independent field tests showed that 20,000 psi not only got to "white" metal but also removed the contaminants that were below the surface. This included corrosion pockets formed when metal folds over the surface, pits that cannot be reached by the surface attack of abrasives and chemical salts.

Abrasive blasting reworked the surface but did not remove these contaminants, and the result is almost always paint failure. The average production rate was 60 square feet per hour, which is comparable to the rate achieved with dry abrasive cleaning.

Butterworth is offering free copies of an in-depth study by

(continued on page 39)



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(Butterworth continued)
Coastal Science & Associates entitled "Evaluation of 20,000 psi Waterjetting for Surface Preparation of Steel Prior to Coating or Recoating."

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## BYWATER COATINGS

Bywater Coatings Company of Belle Chasse, La., is a member of the Brink/Molyn Group of the Netherlands and its subsidiary, MCS Marine Coatings and Services. This came about through the acquisition of Bywater by Brink/Molyn Beheer N.V.

The Byco-MCS marine line will continue as before with the addition of MCS products, along with the availability of the combination on a worldwide basis.

Two new products of interest to the marine user are 316 epoxy mastic and 950 urethane/aluminum primer. Both products exhibited excellent adhesion to marginally cleaned steel surfaces (ST-3) along with a low moisture vapor transmission rate.

Byco—MCS 316 epoxy mastic is manufactured in two colors, red oxide and aluminum. It can be applied in a single coat to 16 mils dry, and does not need a primer. Its high solids (84 percent) make it economical to apply. The 316 can be used in both ballast and cargo tanks.

Byco-MCS 950 is a single-package urethane/aluminum primer. Topcoats of epoxies and urethanes make it a superior barrier coat system.

Byco-MCS Moluspeed 593 is the latest addition to the company's antifouling line. It was developed with the latest technology in copolymers and toxicants. The 950 is based upon the combination of slight paint-film solubility and leaching.

**Circle 66 on Reader Service Card**

## CARBOLINE

Carboline Company of St. Louis has a long and enviable record of service to the marine industry. Its protective coating systems have been used on hundreds of vessels to halt the destructive forces of corrosion. In addition, the company's tank linings are recognized industry-wide as having superior capabilities.

Carbo Zinc ll and Carbo Weld ll are two of Carboline's most important products for the marine industry. Carbo Zinc ll was the first self-curing, alkyl silicate inorganic zinc coating ever developed. Following its introduction in the late 1950s, it became the most widely used zinc primer in the world due to its many advantages. Over the years the marine industry has become aware that the use of a Carbo Zinc protective coating system, applied over a properly prepared surface, far outperforms any other type of coating system.

Since then, Carboline has expanded its inorganic zinc line to meet changing requirements. In this logical growth, the Carbo Zinc series added: Carbo Weld ll, a fully weldable preconstruction primer; Carbo Zinc 12, a more economical version of the original Carbo Zinc ll; Carbo Zinc 11 FD, a fast-drying primer for fabricating shop use; and a series of single-package products.

Carbo Weld 11 dries to the touch allowing steel to be handled in 3-5 minutes. It is ideally suited for automatic welding, and weld spatter will not adhere to nor damage the coating.

**Circle 67 on Reader Service Card**

## CHESTERTON

The Industrial & Marine Products Division of A.W. Chesterton Company of Stoneham, Mass., has developed, over a seven-year period, the antifouling coating OMP, which effectively retards growth of marine organisms and algae on ship hulls.

Three different coatings have been formulated: #210 OMP, which has the slowest extraction rate. It is designed for strong currents and/or when a vessel is in continuous ser-

(continued on page 40)

## Coatings Review

(Chesterton continued)

vice. A thickness of 150 microns should be applied.

#220 OMP is designed for use in moderate currents and for vessels at sea half the time. A thickness of 245 microns is recommended. #230 OMP has the fastest extracton rate, and should be used where there is little or no current, and on vessels that are anchored most of the time. A thickness of 295 microns should be applied.

OMP coatings can be applied by brush, roller, or spray. Its effectiveness is traced to a controlled release of an organometallic antifoulant that is part of the product's binder system, and, unlike conventional coatings, is not mixed into the product.

**Circle 68 on Reader Service Card**

### CHUGOKU MARINE

Chugoku Marine Paints, Ltd. of Japan recently introduced a new family of self-polishing, antifouling hull coatings. These new products are based on the formulation technology of the company's AF-SEAFLO Z-100 paint that was developed five years ago and is now in service on more than 500 ships worldwide.

In AF-SEAFLO Z-100 HS, volume of solids has been increased substantially and dry film thickness up to 50 percent, showing the same antifouling performance and self-polishing action as the original formulation. Up to 150 microns per coat can be applied, and coverage is decreased by 10 percent. A two-coat system is said to offer up to 36 months protection.

AF-SEAFLO Z-100 LE and AF-SEAFLO Z-100 LE HS have a low eroding/polishing rate that insures good antifouling activity for a longer period. They can be applied without extensive hull blasting, in some cases over existing conventional paints.

**Circle 69 on Reader Service Card**

### CLEMCO

Clemco Industries of Burlingame, Calif., recently announced an addition to its abrasive blast equipment line, a Wetblast Injector System that eliminates dusty blasting environments without detracting from abrasive cleaning speed.

A water-jetting design combined with precise metering improves abrasive velocity rather than causing abrasive flow interference. The result is a hard-hitting, high-velocity blast force that will clean to white metal quickly.

A versatile function of the system is its ability to remove aged top layers of paint while retaining solid, tightly adhered base coats. This cost-effective feature eliminates the necessity to apply new primer when existing primer is intact.

Another new addition to the Clemco line, after two years of research and development and field testing, is the PVR-400 pinch valve remote control for abrasive blast cleaning. With this control, one operator can stop blasting without depressurizing the blast machine; other operators can continue to work off the same machine without interruption.

The PVR-400 features a normally closed grit valve and an air valve. Air pressure opens both to blast and a powerful spring closes them instantly when pressure is removed. Pilot valves or air pressure are unnecessary to close the valves. The danger of accidental blasting is said to be nonexistent.

The remote control systems are available in either pneumatic or electrical versions.

**Circle 70 on Reader Service Card**

## DAMPNEY

Dampney Company, Inc. of Everett, Mass., has been supplying its Apexior® line of protective coatings to the maritime industry for more than 70 years. Two grades of the Apexior coating offer long-lasting corrosion protection for metal exposed to fresh or salt water over a wide range of temperatures.

Apexior Number 1® is a heat-resistant coating for metal surfaces immersed in boiling water at temperatures to 700 F. Typical applications include the water-side surfaces of such marine equipment as steam generator boilers and drums, economizers, water heaters, evaporators, and steam turbine rotors. It is applied by brush and dries tack-free in 16 hours.

Apexior Number 3® offers low-cost basic corrosion protection for difficult-to-prepare metal surfaces that are frequently wet or immersed in water at temperatures up to 140 F. It is recommended for service conditions where the use of expensive high-performance coatings cannot be justified.

Typical applications include condensers, air receiver tanks, brine tanks, rudders and rudder posts, propeller blades and cones, and chain lockers. Apexior Number 3 can be applied by spraying or brushing; drying time between coats is 12 hours.

**Circle 71 on Reader Service Card**

## DEVOE MARINE

In answer to the marine and offshore industry's need to provide long-term protection to substrates economically without sandblasting, Devoe Marine Coatings Company of Louisville, Ky., a division of Grow Group, Inc., developed Bar-Rust 235. Specifically designed for application over tight rust, this coating requires a surface preparation of Swedish Standard D St 2 for non-immersion service and D St 3 for immersion service. Traditional epoxies cease cure at 40 F. Devoe Marine has broken through this barrier with Bar-Rust, a new-technology epoxy that can be applied and will cure at temperatures below freezing.

As Bar-Rust is an epoxy, the cured paint film results in a permanent, hard lining with excellent seawater resistance; the safety problems associated with "soft" coatings are eliminated. Bar-Rust 235 can be used in nearly every marine and offshore application where abrasive blasting is impractical or too costly, such as ballast tanks, voids, and vessel exterior areas both above and below the waterline.

In the area of ablative coatings, Devoe developed the ABC-AF system of ablative anti-fouling coatings. With its unique ablative mechanisms, ABC is compatible with a variety of quality anti-corrosive systems. The high ablative action creates a smoothing effect, decreasing the vessel's drag resistance and thereby reducing fuel costs.

Full fouling protection is provided by ABC in both the dynamic and static conditions. When utilized in conjunction with Devoe's AC system, a 12-year bottom paint system results, requiring only anti-fouling renewal at drydocking after high-pressure water washing of the intact underwater areas. Devoe's anti-corrosive system does not include tar-based coatings, thereby eliminating the health hazards and performance problems associated with coal tar epoxies and their derivatives.

In response to increasing environmental concerns regarding the possible toxic effects of organo tin compounds, Devoe developed its ABC-AF organo tin free ablative coating with the same performance characteristics as the existing ABC. Besides addressing the environmental concerns, savings may accrue to the owner in the form of reduced application costs by eliminating the costs that may be associated with the application/removal of organo tin anti-foulings.

Grow Group's Devoe Prufcoat industrial maintenance division in Baton Rouge, La., continues to penetrate the tank lining market, reporting increased sales of its Chemline 548 and Chemfast 547 epoxy coatings. Chemline 548, the division's newest product, is said to offer better chemical resistance than is typically available in epoxies. The Chemfast 547 system is a coating that adheres to rusty steel surfaces, and has application in a broad number of markets.

**Circle 72 on Reader Service Card**

## DREW AMEROID

Drew Ameroid Marine in Booton, N.J., is a major supplier of products and services to the maritime industry worldwide. Products include maintenance chemicals, water and fuel treatment programs, packings, jointings, mechanical seals, and a complete line of welding and refrigerant gasses and products.

Drew's BTP-101 ballast tank preservative contains a rust inhibitor, wetting agents, and oils formulated specifically for protecting ballast tanks and other marine equipment from the corrosive effect of the marine salt water environment. BTP-101 forms a non-drying, self-healing film that electrochemically binds itself to tank surfaces. It penetrates through existing rust on the tank surfaces and displaces water, thus eliminating costly surface preparation by sandblasting and the need for humidity control when applying.

BTP-101 ballast tank preservative is specifically designed to low-cost application by the flotation method of coating ballast tanks. Where this method is not possible, the preservative may be sprayed or brushed on the surface to be treated.

**Circle 73 on Reader Service Card**

## DUPONT

DuPont of Wilmington, Del., markets Starblast® abrasive, a blend of coarse and fine grains of staurolite that permits virtually dust-free blasting. Airborne dust and respirable free silica levels are some 25 to 30 times below applicable OSHA air contamination standards.

Blasting areas and adjacent work sites will be well below OSHA maximum respiratory exposure limits, with unobscured visibility. Operators can see their work clearly, and can therefore work faster with fewer interruptions.

Compared with silica sand, Starblast will greatly lessen the need for special ventilation and worker protection, and will reduce concerns

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(Dupont continued)

about the proximity of other workers to the blasting area.

Because of its uniformly sized, dense rounded grains, Starblast cleans faster—two-thirds the time needed when blasting with coal slag or silica sand—so labor costs are lowered. It also handles the same amount of blasting with less abrasive, reducing both cleanup and handling costs.

Circle 74 on Reader Service Card

## DUPONT MPS

Drawing on its long experience in protecting industrial facilities from the ravages of corrosion in harsh environments, Du Pont has launched an armada of services to combat the problem at offshore locations.

In addition to providing continuously monitored painting services, featuring proven offshore painters and the most technologically advanced coating systems—such as those topped with Du Pont "Imron" polyurethane enamel with special aliphatic urethanes—to fight marine conditions, the company has integrated its Maintenance Painting Services (MPS) with cathodic protection.

Offered to Offshore Maintenance Painting Service (OMPS) clients, Du Pont's cathodic protection services are designed for total structure corrosion protection. The service includes a survey and analysis of existing protection systems, development of a planned retrofitting program to ensure optimum continuous protection, design and engineering of all anodes for retrofitting, total anode installation services and continuous monitoring and inspection.

The service is the result of years of MPS service based on Du Pont's own internal protection program for

its multibillion-dollar worldwide facilities. Through acquisitions, Du Pont has well over 15 years experience in cathodic protection, especially in installation and retrofitting. Offshore operators can find cost-effective total corrosion protection through the integration of Du Pont's know how.

To meet cool moist conditions, such as those in the North Sea, Du Pont is using a "cold cure" technology in addition to "Imron" urethane. Chloride rubbers have been used in such applications because of their faster drying times, but they do not have the durability of aliphatic urethanes.

As with its OMPS program, Du Pont specialists combine tight management controls with flexible scheduling to cover contingencies such as weather and platform operating emergencies and make sure work is done on schedule and within budget.

**Circle 96 on Reader Service Card**

## ENGELHARD

Engelhard Corporation's Capac™ impressed-current cathodic protection systems have proven effective in the prevention of corrosion and pitting in well over 2,000 ocean-going vessels of all sizes and types—tankers, containerships, workboats, mobile offshore drilling rigs, fishing trawlers, tugboats, and many types of naval vessels.

Manufactured by Engelhard's Systems Department, the automatically controlled Capac systems have operated successfully for 20 years and more, the life of most marine vessels. Thousands of dollars can be saved by avoiding the need for replacing sacrificial anodes at each drydocking and by extending the time between each drydocking.

Designed to operate unattended in the automatic mode, Capac systems constantly adjust the impressed current emitted by the platinum-clad niobium anodes to account for changes in hull speed, water temperature, salinity, and loss of the protective coating. Hull conditions can be estimated by monitoring current output—a major increase in current demand at sea probably means that serious deterioration of paint on the hull has occurred, and allows corrective action to be planned in an economical way.

Capac systems are simple to operate. No special training is required for the routine maintenance that leads to years of trouble-free corrosion control.

Engelhard Corporation, headquartered in Edison, N.J., is an international leader in the technological development and manufacturing of high-performance specialty chemicals and catalysts, industrial minerals, and precious metals products.

**Circle 75 on Reader Service Card**

## ESGARD

Esgard, Inc. of Lafayette, La., has been active in the corrosion-prevention field for 16 years. Ongoing research and development has led to the introduction products in such diverse groups as ballast coatings, inventory protection coatings, self-priming paints, and heavy-duty wire rope and gear lubricants.

Of particular interest to the shipowner/operator is the choice of products available for protection of ballast tanks, voids, cofferdams, hatch covers, and chain lockers. Time-proven Interfilm Type I is a modified petroleum oil containing active corrosion inhibitors. Type I may be applied after minimal surface preparation by either spraying or flotation, and 6 mils will cover 266 square feet per gallon.

Bio-Float, with a vegetable oil base, is offered for customers who want the effectiveness, ease of application, and economy of a "floatcoat" type product but with a lesser environmental hazard. Application is by spraying or floating over minimally prepared surfaces. Coverage is 266 square feet per gallon at 6-mil thickness.

The need for a non-solvent-based coating that dried was met when Esgard introduced Bio-Gel. Applied during new construction or maintenance, this vegetable coating "skins through" to form a tough, resilent film. Waterblasting or hand scraping to firm metal is sufficient for airless spray application. Coverage is 80 square feet per gallon at 20 mils.

For years, Esgard's Interfilm

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(Esgard continued)

Type II has provided protection for the marine industry. Utilized in either new construction or maintenance, Type II is applied over firm metal and cures through solvent evaporation to a strong, flexible coating. A 12-mil wet application will cover 133 square feet per gallon.

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## EUREKA CHEMICAL

Eureka Chemical Company of South San Francisco has been a leader in supplying quality soft coatings for the marine and offshore industries. Fluid Film™, Gel BW, for years has been used in ballast tanks to provide long-term protection at the lowest practical cost per year. Fluid Film Liquid AR, a new product, can be used where spray application of Gel BW is not practical. This new product can be hosed onto metal surfaces in ballast tanks or void areas with an absolute minimum of surface preparation, both for corrosion control and to soften heavy scale prior to descaling operations.

Following company policy of developing corrosion control for an expanding number of areas aboard ship, other new Eureka products continue to supplement ballast tank protection.

Fluid Film WRN-EP may be applied to standing or running rigging for both corrosion protection and lubrication. EP properties enhance its lubricating quality. For users of pressurized wire rope lubrication equipment such as Dyna-Lube, Fluid Film WRL penetrates to the core of the wire rope without dripping as the rope emerges from the applicator.

Fluid Film aerosols, which contain no solvent and do not dry out, are convenient for small applications where penetration and lubrication are desired.

Eureka's Perma Film™ family of epoxies supplement the Fluid Film coatings. Perma Film WT-100 has been in use in potable water tanks for almost 20 years. Perma Film BT-200, for ballast tanks, does not require sandblasting but may be used over a surface conforming to SSPC-SP3. Perma Film PT-100 is the latest addition to the family, and is formulated for cargo tanks, particularly in tankers and bulk carriers.

Circle 77 on Reader Service Card

## GLIDDEN

Glidden Marine Coatings of Harahan, La., has some 20 years of experience with a steel hull bottom system combining a thin-film barrier coat with an ablative, self-cleaning vinyl antifoulant. Normal performance of this system when properly applied is 4—6 years before spot blasting and coating repairs are required. Shipyards have complained that 6- and 8-year-old Glidden bottoms were difficult to blast to white metal as the old coating was still adhering tightly.

The Glidden bottom system has proven especially effective on vessels working overseas. An owner can confidently schedule two-, four-, and even six-year drydockings without bottom paint repairs being necessary except for major collision or catastrophic grounding damage. Of course, no matter where a vessel works there is significant savings in knowing that no blasting or painting needs to be done on the bottom until its sixth or eighth year of service.

Glidden's vinyl antifoulant allows little or no tightly adhering growth, even in badly polluted waters, and the system is resistant to delamination and to abrasion from repeated groundings on shallow bottoms. When repairs are required, turnabout is very quick. Under normal conditions, *total* drying time for a four-coat system is eight hours. The vessel may then be launched immediately or left dry indefinitely with no reduction of antifouling protection.

Circle 78 on Reader Service Card

## HEMPEL'S

A major increase in customer specification choice in self-polishing antifoulings was announced recently by Hempel's Marine Paints Limited, the worldwide manufacturer and supplier of marine coatings.

The company has added three new modules to its tailor-making range of self-polishing antifoulings—Hempel's Nautic Modules—and at the same time applied to the whole range the concept of variable film thicknesses, first introduced last year in its Classic line of non-polishing antifoulings.

With the introduction of Nautic-Hi modules, the specification choice the shipowner has open to him rises from 12 to as many as 282. It also enables the customer to reduce the number of coats required, thereby cutting the quantity needed and shipyard application costs.

The three new modules are Hempel's Nautic-Hi 7690, 7695, and 7697, and they can be specified in variable film thicknesses.

The increase in specification choice made possible by the introduction of the three new modules and the application of the concept of variable film thicknesses is important because Hempel's tailor-making Nautic Modules were developed specifically to enable customers to choose the optimum self-polishing coating to suit their individual ships.

The increased solid volume ratio now offered, plus the variable film thicknesses concept, allow even greater flexibility in the total dry film thicknesses to be specified, thereby enhancing the tailor-making ability of the modules.

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## HENKEL

Henkel Corporation of Minneapolis provides Versamid® 280B75 polyamide resin and Genamid® 2000 amidoamine resin, the curing agents used by formulators to produce unique epoxy coating that meets the U.S. Navy's P-24441 (SHIPS) Specification and offers good adhesion to poorly prepared surfaces, low-temperature cure, and corrosion resistance without rust-inhibitive pigments.

Laboratory tests conducted by Henkel reveal that coatings based on these resins "creep" into small cracks to displace water and foreign materials. There is also chemical absorption on metal surfaces to prevent corrosion, and no zinc pigments to inhibit welding.

Circle 79 on Reader Service Card

## INTERNATIONAL PAINT

Marketed under the "K" Series, International Paint Company, Inc. of Union, N.J., is introducing three new anti-corrosive products to the U.S. market. These products do not contain coal tar epoxy, and will be available in standard cure, a low-temperature cure, and surface-tolerant version. These products are said to offer extremely attractive operational flexibility to both owners and shipyards.

The KT Series is a surface-tolerant anti-corrosive that can be applied over marginally prepared surfaces, complex structures, or where operational/safety regulations restrict blasting. KT Series cures down to 32 F, will not bleed through when overcoated, and is currently available in four colors.

In addition to curing down to 20 F, the KL Series cures faster at all temperatures, allowing for shorter overcoat intervals and faster drydockings. This product is also furnished in four colors, and exhibits no bleed when overcoated.

The KH Series is the standard cure product that is available in five colors and has the lowest price in the new K line. This product complements the other two in offering a complete line of anti-corrosives for all standard operational conditions.

International Paint's Intersmooth Hisol and Interswift copolymer antifoulings continue to displace conventional products, confirming worldwide customer acceptance of copolymer's superior performance and economic benefits. Of all antifoulants sold in 1984, 53 percent were copolymers, compared with only eight percent in 1979.

These copolymer antifoulants are now being specified for drydocking intervals of four to five years, and are showing every indication of superb long-term fouling protection.

Circle 88 on Reader Service Card

## JAEGLE

Jaegle Paint Company, headquartered in Havertown, Pa., began manufacturing heavy-duty marine coatings in 1935, and quickly grew to produce its products at three separate locations for customers worldwide.

A complete line of marine coatings is available for both surface ships and underwater craft. Jaegle's capability in the latter category is documented by its participation in the U.S. Navy's submarine building program. Coatings are offered for surface vessel maintenance as well as for new construction.

Jaegle is well known in the marine industry for 24-hour inspection services as well as systems analysis and recommendation. The company's coatings experts travel worldwide to assist in writing specifications and in performing hull and tank surveys.

Providing technical expertise is part of an ongoing program by Jaegle to provide shipowners with the most effective coating systems for their vessels, and insuring that the systems are applied properly.

**Circle 89 on Reader Service Card**

## JOTUN

Jotun Marine Coatings, Inc. of Baltimore, a subsidiary of Jotun of Norway, is an industry leader in self-polishing copolymer antifouling. Its first was Takata LLL, followed some six years later by a second generation—Seaflex, Seamate HB33, and Seamate HB66.

Seaflex offers the flexibility of being applied in one coat over any previous traditional long-life or self-polishing antifouling, giving 24 months of protection. Seaflex contains a Jotun-developed copolymer as binder. When drydocking time is limited, it offers an economical alternative.

Seamate HB (high build) is based on a specially formulated organotin copolymer as binder, which dissolves slowly in seawater so that fresh antifouling is continuously exposed. It can be applied as one coat up to a dry film thickness of 150 microns. Seamate is available in two qualities, HB33 and HB66; the former polishes at a slower rate than HB66. Greater economy is achieved through the high-build nature of these coatings, as greater film thicknesses can be obtained with lower costs.

Jotun recently announced that due to a breakthrough in copolymer technology, it has developed a new self-polishing paint to replace the older, long-life antifoulings, at no extra investment. Called Seaconomy, it is based on pioneering copolymer technology, protected by worldwide technology.

To date, self-polishing action would only be achieved if the content of the tributyltin (meth)acrylate monomer in the organotine copolymer was more than 50 percent by weight. Jotun's new and original approach breaks that barrier, offering the capability to use organotin copolymers with a lower content of tributyltin (meth)acrylate.

Seaconomy is said to offer just as good antifouling protection as the best long-life coatings, but it is more predictable and of longer duration due to the linear biocide release rate.

The copolymer technology breakthrough provided Jotun with a raw material cost structure similar to that of long-life antifoulings. Therefore, no extra investment is necessary, while having extra advantages with respect to the older, long-life antifoulings.

These Seaconomy advantages include: no sealer coat, no "sandwich coatings", lifetime proportional to the dry film thickness (DFT), and minimized cracking risks. Due to its high solids content (50 percent by volume) and minimum surface preparation required, Seaconomy offers lower application costs and lower drydocking charges.

Seaconomy can be applied in DFTs ranging from 75 to 150 microns per coat. A single coat of 150 microns DFT provides antifouling protection for 24 months.

**Circle 90 on Reader Service Card**

## KAISER CHEMICALS

Kaiser Aluminum & Chemical Corporation of Oakland, Calif., is now manufacturing and marketing, in Asia and Oceania, aluminum anodes for cathotic protection in marine environments. The anodes are being produced in Taiwan by the Metal Products Division of Kaiser Chemicals, a division of Kaiser Aluminum. Kaiser Chemicals has been a major supplier of sacrificial anodes for the protection of steel in corrosive environments for 30 years.

Primary product for marine applications is KA95, a highly efficient, mercury-type aluminum alloy anode, with maximum current output. The company's Far East converter, Formosa Shinn Yaun at Kaoshiung, Taiwan, will produce flush-mount hull anodes, ballast tank anodes, platform, and multipurpose anodes. Kaiser Chemicals maintains the same manufacturing techniques and stringent quality-control measures at its new facility as it established at its modern, 12-

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(Kaiser continued)

million-pound-capacity manufacturing facility in Tulsa, Okla.

Since its start-up in the fall of 1983, the new Taiwan operation has already received large orders from Daewoo Shipbuilding in Korea and Nippon Steel in Japan.

**Circle 80 on Reader Service Card**

## MAGNUS MARITEC

Magnus Maritec International Inc. of Palisades Park, N.J., manufactures Magnakote®, a rust-retarding compound for ballast tank protection, intended to economically and effectively control corrosion. It can be described as an inorganic-organic complex that has a platelet, crystalline structure similar to fish scale. These platelets, being polar in nature, function by being attracted to the metal to form a thin but dense, tight coating that provides an effective barrier to corrosion by allowing an extremely low rate of vapor transmission.

The active corrosion-preventive materials in Magnakote are carried in a matrix that includes a "gelling" oil, making the final coating even more effective. Because there are no solvents to evaporate, the coating is 100-percent active. It is thermally stable, has no offensive odors, is non-toxic in use, and has a high flash point for safety in application. It is not required that Magnakote be completely removed to make mechanical repairs; only the area where the work is to be done will require local cleaning.

Magnus also markets Protecsol-100, a liquid blend of organic and inorganic corrosion inhibitors specifically developed for the protection of ballast tanks filled during lay-up with seawater. It forms an inherent passivating film on ballast tank surfaces that protects the steel from corrosion. This film remains present even when the ballast is discharged.

The rust-retarding qualities of Protecsol-100 were found to be outstanding when tested by a leading independent laboratory specializing in marine corrosion studies. Exposure of steel to a Protecsol-100 solution provides protection that remains even after the inhibited solution is replaced by uninhibited water. The solution contains no chromates, nitrites, nor organo-nitrogen compounds that could be harmful to the environment. It is safe and easy to use, as it has no fire nor flash point.

**Circle 91 on Reader Service Card**

## MARK TOOL

For more than 20 years, Lafayette, La.-based Mark Tool Company's Splashtron has protected metal surfaces offshore from corrosion in an area where cathodic protection does not function and conventional paints and coatings will not last—the "splash zone." This is an area immediately above and below the mean water level.

The splash zone is difficult to protect because it is constantly attacked by salt- and sand-laden waves, has a high concentration of oxygen near the surface, and is exposed to physical damage from boats and floating debris.

Splashtron is applied to platform structural members (legs and braces), pipeline risers of all types, and as a permanent liner for riser clamps. The largest member coated to date was a 96-inch OD caisson for the mud slide area in the Gulf of Mexico.

The tough yellow elastomer is bonded tenaciously to the metal surface. Risers can be "cold bent" after the material is applied—testimony to its elasticity and strong bond.

A popular application for Splashtron in recent years has been coating the pipelines to be pulled through the J-tubes (pull tubes) on platforms in relatively deep waters. Mark Tool coated some 50 "pulls" for the Gulf alone in 1984, and is acknowledged to be the industry leader for that application.

Most recent use of Splashtron to solve severe offshore problems is in combination with copper-nickel cladding to prevent both marine biofouling and corrosion for the life of offshore facilities. This new protective sheathing is called Bio-Shield, and is of special interest in areas where marine growth is excessive.

**Circle 92 on Reader Service Card**

## MUHLHAN

The Muhlhan Group of companies in Hamburg, West Germany, a worldwide corrosion-protection organization for shipping and industry, is represented in the U.S. by Field, Wigham & Company of Great Neck, N.Y.

Muhlhan specializes in steel and concrete protection work, such as high-performance tank, hull, and repair coating at shipyards, and shoreside coating work for oil refineries, conventional and nuclear power stations, and chemical plants. The company also provides under way coating work, as well as the application of highly sophisticated coating materials. The Group is presently active in 22 countries throughout the world.

Apart from the flexibility and mobility of its work force, Muhlhan operates the shot-blasting vessel Strahl-O-Matic, which is capable of performing work directly alongside a vessel at any location. Muhlhan is presently recycling abrasive material in compliance with the new and stringent environmental protection regulations being enacted throughout the world. All work accomplished by the company is fully guaranteed, and can be insured by international underwriters on a long-term basis.

In addition to recent projects in the Middle East and Latin America, Muhlhan is able to execute international work through its subsidiaries in countries in which orders are received regularly by its long-term cooperation with shipyards and industry.

**Circle 93 on Reader Service Card**

## PACIFIC MARINE SERVICES

Pacific Marine Services (PMS) of Long Beach, Calif., is an underwater service company offering innovative cost-reduction technology and commercial diving services in West Coast harbors.

PMS recently completed a series of underwater propeller polishings that have significantly improved propeller surfaces. The result has been sharply increased propeller efficiency, leading to substantially reduced bunker costs. This underwater polishing is performed by PMS diver technicians using hydraulic polishers. Special marine disks remove fouling and polish the propeller surfaces to a satin-smooth finish. A detailed report, complete with before-and-after color photographs, is provided with each job.

Propeller efficiency is receiving increased attention by cost-conscious shipowners and marine researchers. Analytical studies by the British Ship Research Association have shown that power penalties ranging from three to six percent can be expected from propellers having Rubert Roughness Grades from D to F. BSRA concludes that because of the small surface areas involved, the return on capital invested in regular propeller maintenance is of a magnitude several times greater than the costs involved.

Recent propeller polishing tests by tankers in actual sea trials have repeatedly increased operating efficiency and allowed horse-power reductions of more than 10 percent—far exceeding the analytical studies. Significant fuel consumption reductions have been documented as well. Under carefully controlled testing, a ULCC showed real fuel consumption decreases of more than 10 percent due to propeller polishing.

PMS also offers pre-drydock hull scrubbing—underwater cleaning for hulls that reduces sand sweeping and water blasting at periodic drydockings. For vessels with conventional coatings, the pre-drydock scrubbing results in a smooth hull surface, clean of all fouling and loose debris, that is ready for coating with antifouling layers.

A full range of 24-hour professional diving services are provided by PMS, including underwater inspection, photo-video surveys, emergency damage reports, and underwater repairs and maintenance.

**Circle 81 on Reader Service Card**

## PALMER INTERNATIONAL

Palmer International of Worcester, Pa., long known for its epoxy products, has developed a new polyurethane deck coating and leveling system. Designated Polydeck, this four-component system was developed specifically to meet the demanding needs of the marine and offshore industries. Approved by the U.S. Navy, the system is resistant to oil, water, and fuel, and has high resistance to wear, abrasion, and impact.

The components of the system are primer, underlayment, non-skid, and top coat. The PM-249 primer is a corrosion-resistant coating that creates an excellent adhesive bond between the deck and the PM-249 underlayment. PM-249 is an ambient-curing, self-leveling polyurethane that produces a continuous elastomeric polymer. It is applied at a minimum of 70 mils. (PM-2490 is specifically formulated for cambered decks or other sloping areas.)

After proper curing of the PM-249, PM-1665 polyurethane non-skid is applied. This is a high-performance coating that was developed for use in areas where flexibility and toughness are required. The non-skid is available in roll or spray versions.

PM-1315U is a two-part polyurethant sealer and dress coat designed for use with the PM-1665 non-skid. The dress coat can also be used to apply lines or other markings on the deck.

Palmer International also manufactures Chocktite Green, a pourable chocking compound that is approved by the American Bureau of Shipping, Lloyd's Register of Shipping, Nippon Kaiji Kyokai, and Det norske Veritas.

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## PETROCHEMICAL

Petrochemical Services, Inc. of New Orleans specializes in marine and industrial cleaning. The company is a distributor of two semi-automatic cleaning systems that have the capability to remove rust, scale, algae, and paint (if desired) to a Swedish Standard 3 cleanliness solely with the use of high-pressure water.

The Hammelmann Aquablast surface cleaning machine offers the following capabilities when cleaning ship hulls: high capacity, low weight, optimum cleaning efficiency, minimum water consumption, and easy fitting to available dock equipment. No additional drive power is required.

The second system is the Hammelmann Dockknight, a self-contained, hydraulically driven unit mounted on the dock wall. Its variable travel gear and luffing and slewing arms, with a total extension of about 130 feet, are capable of reaching almost any part of a ship's hull.

Applications for the Dockknight system include: pressure water washing, high-pressure cleaning, derusting and descaling, shot blasting, paint spraying; cutting, welding, or burning; repairs and inspections of all kinds; and ship aligning during docking and undocking.

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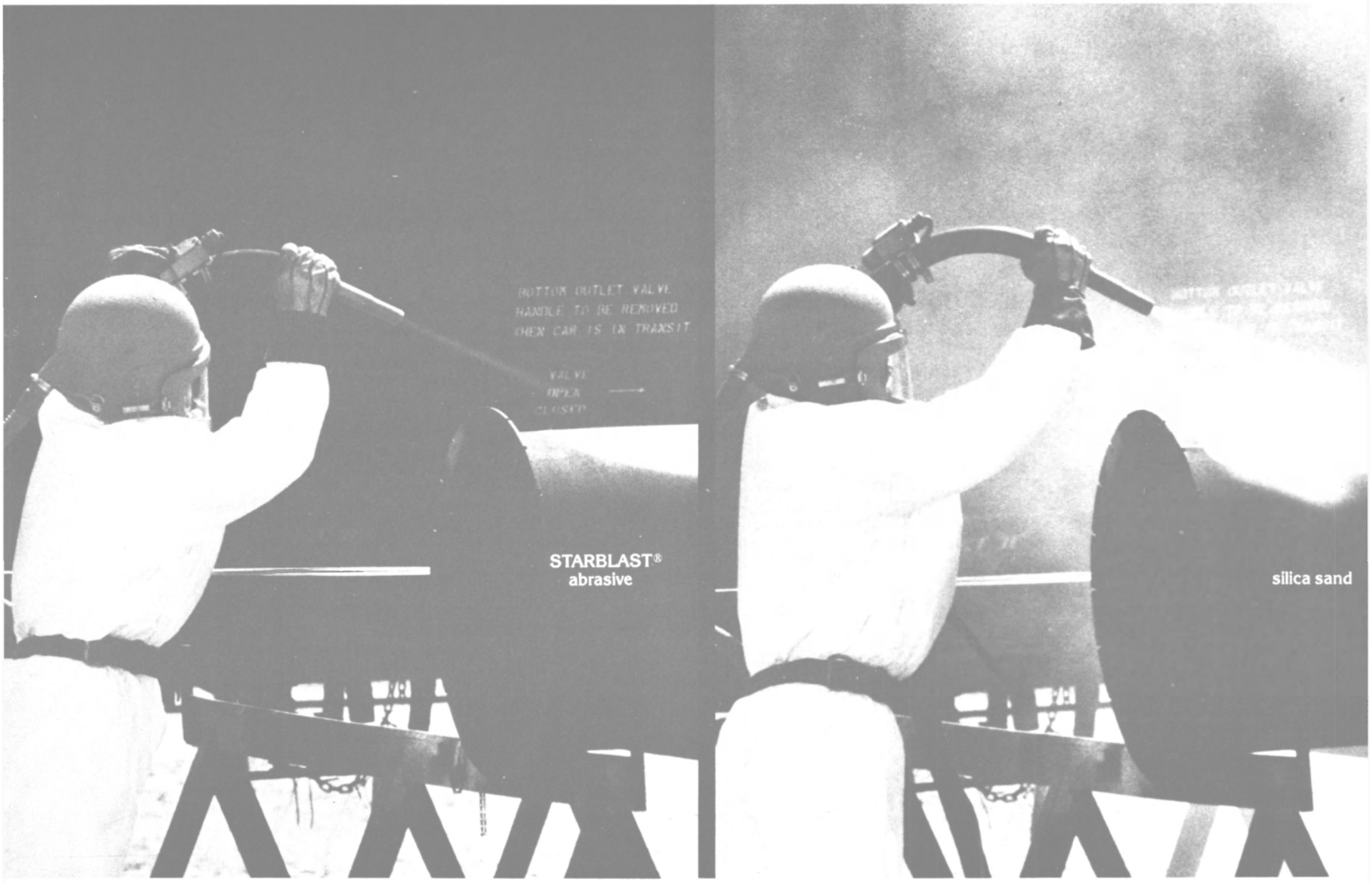
# STARBLAST®- up to 30 times less dust than OSHA standards permit!




## Du Pont STARBLAST cleans faster, safer, more efficiently than silica sand—won't cloud work area.

Du Pont STARBLAST® abrasive permits virtually dust-free blasting. Airborne respirable dust and respirable free silica levels are up to a remarkable 25 to 30 times below applicable OSHA air contaminant standards.

Your blasting areas and adjacent work sites will be well below OSHA maximum respiratory exposure limits, with unobscured visibility. Operators can see their work clearly and can work faster with fewer interruptions.

Compared with silica sand, STARBLAST will greatly lessen the need for special ventilation and personal protection and will reduce concerns about the proximity of other workers to the blasting area.

### STARBLAST cleans faster, cuts costs.

You'll quickly notice that STARBLAST cleans faster, because of its uniformly sized, dense, rounded grains—so labor costs are lowered. It also handles the same amount of cleaning with less abrasive, reducing both cleanup and handling costs.

### Call 800-341-4004 for more information.

Du Pont STARBLAST offers low dusting and fast cleaning with safety, efficiency and cost savings. If you would like to learn more about STARBLAST, call us toll free for our literature package: 800-341-4004.

DU PONT
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## PHILADELPHIA RESINS

Philadelphia Resins Corporation of Montgomeryville, Pa., manufactures the Phillyclad® 1000 Series, a two-component, catalyzed epoxy protective coating designed for demanding marine and industrial requirements. It can be used on interior and exterior surfaces of steel, concrete, masonry, wood, etc., where there is a need for resistance to chemicals, moisture, abrasion, and impact.

Phillyclad 1000 Series offers long-term durability in the painting and protection of steel, concrete, and wood decks; steel fuel storage tanks, pipelines, and other steel structures. It is non-toxic when cured (3-4 days at 72 F) and meets USDA standards for maintenance protective coatings not in direct contact with food, etc.

The 1000 Series is also available as an anti-slip deck coating where safety and durability are prime requirements.

When coating steel, blast cleaning to near white metal is recommended. If that is not possible, water blast or mechanical preparation is an alternative if done carefully.

Prime coats are recommended to seal porous surfaces such as concrete and wood. When a prime coat is required, the first coat of the 1000 Series is reduced 30 percent with PRT-59 solvent; this improves first-coat penetration resulting in excellent adhesion.

Phillyclad 1000 Series epoxy coating without aggregate is easily sprayed, rolled, or brushed. For the final coat with anti-slip aggregate in the coating, a low-pile, mohair type roller is recommended.

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## PHOSMARINE

Phosmarine Equipment S.A. of Marseille, France, provides the BRUSH-KART® underwater hull cleaning service. Diver-driven for greater efficiency and flexibility, the unit removes marine growth that eats up expensive fuel oil. It can do it in a matter of hours instead of days, while the ship is loading, unloading, or at anchor, causing no delays in ship scheduling. With regular hull cleanings that can be performed between drydock cycles, BRUSH-KART more than pays for itself with impressive savings in fuel operating costs.

Because it is hydraulically operated, the device is said to be safer, faster, and more efficient than any other hull cleaning units available. As it travels underwater along the hull of a ship, it cleans with a thoroughness not attainable with hand-held brushes and scrubbers. It can also operate under sea conditions that are normally impossible for other methods.

BRUSH-KART's hydraulic power is supplied to the three brushing units by a single, 328-foot-long, coaxial floating hose. Power source is a 52-bhp diesel engine. The unit is fitted with safety gear that not only meets government and Lloyd's of London requirements, but also allows the unit to be used in the vicinity of unloading tankers.

When in use, the BRUSH-KART is positively buoyant in the water. It clings to the hull surface with a clamping force of 1,390 pounds of suction. This holds the brushes tightly to the hull and provides grip for the driving wheels.

**Circle 84 on Reader Service Card**

## PRC

More than one million square feet of Products Research & Chemical Corporation's Proreco® deck coating systems have been applied to exterior decks of small boats, large commercial ships, towboats, offshore rigs, and military vessels. These interior and exterior coating systems are fire-retardant, and resistant to acids, caustic chemicals, and petroleum products.

Proreco III exterior coating systems are used to virtually eliminate costly maintenance and downtime for working ships. These systems are specified by many naval architects, and specified by the military due to their known track record for corrosion control, dependability, and long wear.

Proreco III coatings have an inherent flexibility to withstand normal stress caused by deck movement. These fire-retardant systems provide the ultimate in corrosion control, and are resistant to the heaviest abrasion and impact. Their advantages over rigid coatings is the Proreco elastomeric base, which is not brittle and not subject to cracking, chipping, nor spralling.

The Proreco I coating system is specified for habitability areas such as heads, galleys, and mess decks; it has proven itself as a low-cost, minimal-maintenance system for living spaces. The polyurethane coating provides an attractive high-gloss appearance coupled with the long-wearing capability and flexibility to withstand structural movement, impact, and abrasion, with extended corrosion control.

Products Research & Chemical, headquartered in Glendale, Calif., developed the first one-part polysulfide marine caulk many years ago. Through high-technology research and development facilities, PRC continues to develop superior coatings and sealants to meet most high-performance requirements for such products above and below the waterline.

**Circle 95 on Reader Service Card**

## SEAGUARD

Seaguard Corporation of Portsmouth, Va., continues to manufacture a complete line of high-quality, high-performance marine paints for both commercial and government applications.

Some of Seaguard's more recent products include the following:

Balcoat 2000 is an all-purpose, single-component, rust-inhibitive compound that can be applied to marginally prepared surfaces. Intended for use in dry voids and ballast tanks, it should not be used in tanks containing petroleum products.

No Rust 1000 HS is a high-solids, single-component, rust-inhibitive compound formulated to dry hard. It is said to be excellent for exterior/interior application over marginally prepared surfaces for extended protection.

Fire-retardant latex is a non-emissive, fire-retardant, general purpose paint that is both protective and decorative. It is intended for application as a fire-protective coating for steel, aluminum, and nonmetallic substrates. Wherever possible, this coating should be applied over a surface that has been degreased, and primed to promote adhesion.

Silcoguard 600 Series is a high-performance, silicone alkyd gloss enamel that gives excellent weather resistance, gloss and color retention over long periods, and easily cleaned surfaces.

Seaguard also carries Seawash®, a water-based, biodegradable, nonflammable non-toxic cleaner for petroleum-based products. It takes on the toughest marine cleaning jobs, and is available in 55-gallon drums and a handy 5-gallon pail.

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## FOR MORE INFORMATION

If you wish to receive additional information on any of the products and services described in this article, circle the appropriate reader service number(s) on one of the postage-paid cards near the back of this issue.

## OSG And P&O Agree To Form Joint Venture For LPG Transportation

The Peninsular and Oriental Steam Navigation Company (P&O) of London, and Overseas Shipholding Group, Inc. (OSG) of New York, recently announced that they have reached agreement to form a joint venture involving the acquisition by OSG of a 50-percent interest in P&O's liquefied petroleum gas and chemical gas ocean transportation business for approximatly $35 million. The transaction is subject to the execution of definitive agreements.

P&O's LPG and chemical gas ocean transportation business comprises the nine LPG carriers owned by P&O, supplemented by chartered tonnage. The two companies will pursue opportunities through the joint venture to further develop the established international gas transportation business.

This joint venture will bring together two of the world's major shipowning companies. OSG is one of the world's leading bulk shipping operators. It owns a fleet of 63 vessels aggregating more than six million dwt, and operates in both the U.S. and international bulk shipping markets. P&O has major interests in cruise ships, bulk carriers, and container shipping.

## New Products From Dahl Help Solve Diesel Fuel Problems In Cold Weather

The problem of handling diesel fuel in cold weather conditions often require several different solutions, depending on climatic conditions.

Dahl, the Ceres, Calif., fuel filter/water separator manufacturer, has developed both a new heavy-duty in-line diesel fuel heater and an internal electric heater for its filter/separators. With these two products, used either separately or in combination, Dahl engineers state they can attack the problems of keeping diesel fuel flowing freely in cold weather conditions.

The 75-AK In-Line Heater boasts of rugged stainless steel construction with excellent heat exchange properties. The heater can be mounted either in a horizontal or vertical position. Engine coolant is used as the heating medium. Generally, the engine coolant will be connected directly from the engine block to the heater for maximum efficiency. A shut-off valve is included to stop the flow of hot radiator fluid during warm weather. The heater is capable of handling engines up to 500 hp.

The 85-EK In-Filter Electric Heating Element is now available with the standard line of DAHL model 200 and 300 Filter/Separators. It is a wafer type resistance controlled electric heating element that is installed between the filter cartridge and the bottom of the collection bowl. This allows for heating of the cartridge and the fuel around it, and is designed to eliminate fuel blockage due to waxing and icing. The heating element has a printed circuit design and has the interesting characteristic of requiring less electric heating power automatically as the temperature increases, thus acting like a thermostat.

Dahl engineers state that at −40°F the heating element takes about six amps and this reduces to about four amps at +10°F. In measurement tests, Dahl has found that it takes about five minutes to heat fuel from 0°F to +65°F. An illuminated switch is included for operation from the operator's cab.

Dahl engineers calculate that the electric heating element in the filter/separator will take care of most cold weather operating conditions down to −5°F for engine startup and operation. The inline fuel heater is needed where temperatures below this level are experienced during engine operation. The combination of both units will protect the fuel system in many cold weather operating conditions. The company recommends installation of both systems where a variety of cold weather operating conditions are found.

Dahl Manufacturing, Inc., has several hundred dealers and distributors throughout the United States. Dahl is also represented in South America, Western Europe, Australia, and the Far East.

**Circle 56 on Reader Service Card**

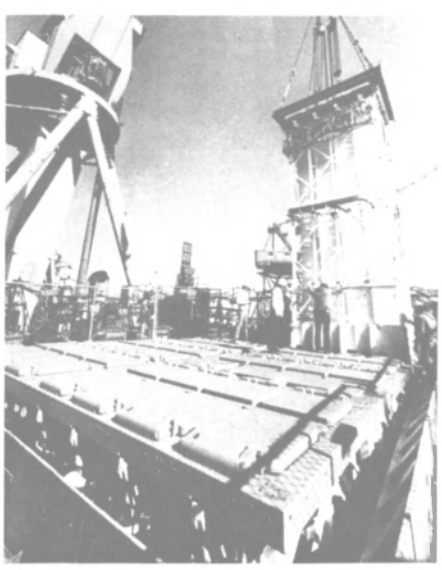
Aegis cruiser Bunker Hill in the water following launching from floating dock at Ingalls Shipbuilding division of Litton Industries in Pascagoula, Miss.

# Ingalls Yard Christens First Ship With Vertical Missile Launchers

The first U.S. Navy surface warship ever to be equipped with a vertical-launching missile system was christened recently at Ingalls Shipbuilding division of Litton in Pascagoula, Miss. The ship, the Bunker Hill (CG-52), is the fifth of 12 Aegis guided-missile cruisers under contract to Ingalls by the Navy. Principal speaker at the christening ceremony was **Walter T. Skallerup Jr.,** the Navy's general counsel. **Mrs. Skallerup** was the ship's sponsor.

Other participants in the christening program included: Vice Adm. **Earl B. Fowler,** USN, commander Naval Sea Systems Command; Rear Adm. **Donald P. Roane,** USN, Aegis shipbuilding program manager; Rear Adm. **John W. Nyquist,** prospective commander, Cruiser-Destroyer Group Five, U.S. Pacific Fleet; **Jerry St. Pé,** vice president of Litton and Ingalls Shipbuilding division president; and Capt. **George W. Dowell III,** USN, Supervisor of Shipbuilding, Pascagoula.

The Bunker Hill is equipped with the MK 41 Vertical Launching System (VLS) produced by Martin Marietta, a multiwarfare missile launching system capable of firing a mix of missiles against airborne, surface, and underwater threats. It is modular in design, with modules grouped symetrically to form launcher magazines, located both fore and aft on the cruiser's deck. Each module contains all the necessary components for launching functions when interfaced with Bunker Hill's weapons system.



Bunker Hill is first U.S. Navy surface combatant ship to be equipped with the new vertical launch system for missiles produced by Martin Marietta.

Aegis ships comprise the most important shipbuilding program in America today. The Bunker Hill and other ships of the Ticonderoga Class will provide the primary protection for the Navy's battle forces well into the next century. Aegis ships are designed to counter all present and projected missile threats to the Navy's battle forces.

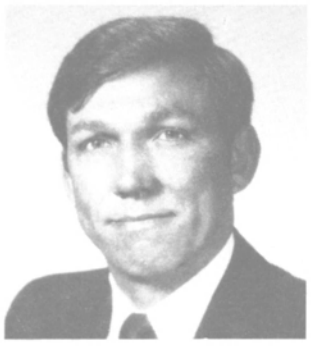
Bunker Hill's Aegis weapons system, the heart of her fighting capability, is a significant advance in fleet air defense. Four fixed-array radar antennae, mounted on the four sides of the ships superstructure, replace conventional rotating radars, enabling the vessel and her crew to "see" in all directions simultaneously. The Aegis system can simultaneously fire and direct more missiles at more targets, with greater accuracy, than any other weapons control system.

Aegis cruisers are 567 feet long with a beam of 55 feet. Four General Electric gas turbine engines power the 9,250-ton ships at speeds in excess of 30 knots.

The Navy's third Aegis cruiser, Vincennes (CG-49), will be commissioned into the Pacific Fleet on July 6 this year. The fourth ship, Valley Forge (CG-50), will join the Fleet in January 1986.

In addition to the Bunker Hill, Ingalls has seven other cruisers in various stages of production. The Pascagoula yard is also building the lead ship of the Navy's new class of multipurpose amphibious assault ships, the Wasp (LHD-1).

## Young Appointed Marine Operations Vice Presient For American President



H. Peter Young

**H. Peter Young** has been appointed vice president of marine operations for American President Lines (APL), according to **H.B. Hubbard**, senior vice president-operations. Mr. **Young** will have overall responsibility for the intermodal transportation company's fleet of 16 containerships and five multi-purpose vessels that are deployed in the Pacific and Indian Oceans and the Arabian Gulf region.

He has served as APL's managing director, Taiwan, since 1983. Since joining the company in 1978, he has also served as managing director for breakbulk services, responsible for operations and marketing for the company's multi-purpose ships; director of vessel maintenance and repair for the APL fleet; and as a marine and staff engineer. He has some 16 years of experience in steamship operations and marine project engineering, and holds a master's degree in management from Rensselaer Polytechnic Institute.

APL transports containerized and other cargoes between Asia and points throughout North America, where its ships call at ports on the West Coast. The Oakland-based firm provides extensive intermodal (rail and truck) services to inland cities in the U.S. and Canada.

# New York SNAME Meeting Hears Paper On Preventive Maintenance

A recent meeting of the New York Metropolitan Section of The Society of Naval Architects and Marine Engineers held at the ABS Building in New York City heard a paper titled, "Preventative Maintenance Programs for Machinery." The author was **Richard Rothamel** of the American Bureau of Shipping.

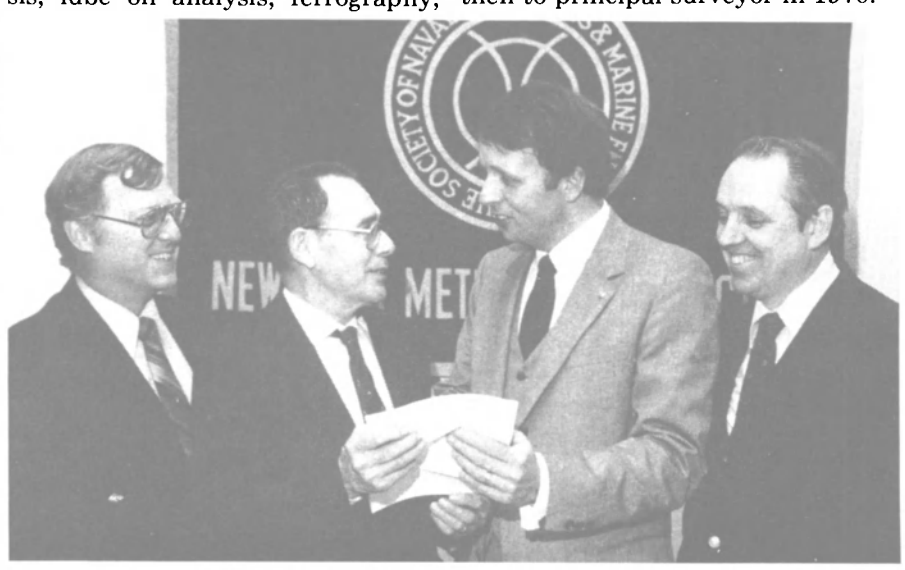
Planned maintenance and condition-based maintenance are the two techniques most often used on machinery. These techniques are frequently used in combination.

Planned maintenance involves the setting of formal schedules for maintenance and overhaul of machinery. Such schedules are generally established by the machinery manufacturer and include lubrication servicing; filter, bearing, and seal replacements; as well as major overhaul.

Condition-based maintenance plans employ condition-monitoring techniques such as vibration analysis, lube oil analysis, ferrography, shock pulse analysis, and thermography, to determine if maintenance of a particular machine is necessary. Measurements are taken at periodic intervals.

The American Bureau of Shipping has since 1978 cooperated with vessel owners on developing preventative maintenance techniques as alternatives to traditional maintenance and survey of machinery. This paper draws from the experience of ABS with vessels involved in these programs, and discusses techniques and key elements used in developing a preventative maintenance program.

The honored guest at this meeting was **Helmut (John) Eccarius,** who retired from ABS in 1980 as a principal surveyor. He joined the Bureau in 1947 after going to sea and serving as an engineering instructor at the U.S. Merchant Marine Academy. He advanced from surveyor to senior surveyor in 1968, then to principal surveyor in 1970.



Principals at recent SNAME New York Section meeting included (L to R): **John H. Higginbotham**, vice chairman; **Helmut (John) Eccarius**, honored guest; **Richard Rothamel,** author; and **William H. Garzke Jr.**, chairman.

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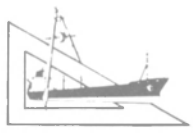

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## Furness Withy Offers Folder On Group's Structure And Services

Furness Withy, the British group of companies based and managed in the United Kingdom, is offering a free color folder that describes the group's structure and services and gives a glimpse into its wide-ranging interests.

Since 1980, these companies have been part of the Tung Group of Hong Kong. Furness Withy & Co. is the holding company, and there are four principal operating subsidiaries, representing the four main business sectors in which group companies are engaged: (1) Furness Withy (Shipping); (2) Houlder Offshore; (3) Furness Withy (Terminals); and (4) Furness-Houlder (Insurance).

The activities of each of the four business sectors are outlined in the folder, along with attractive illustrations of vessels, drilling rigs, container terminals, buildings, etc., associated with the group. Serving to point up the varied participation of the companies is an underwater photo of one of the several hundred divers employed in North Sea operations by Comex Houlder Diving Ltd., a leading British diving contractor in which Houlder Offshore has a 50 percent interest.

For more information and a copy of the folder on the Furness Withy Group,

**Circle 50 on Reader Service Card**

## 32-Page Bulletin From Falk Details Their Crowned Tooth Gear Couplings

The Falk Corporation, Milwaukee, Wisc., is offering their 32-page bulletin which provides comprehensive information on the firm's extensive line of crowned tooth gear couplings. More than a dozen different types in the 1000G Series are presented for evaluation complete with illustrations, detailed drawings and photos of typical applications.

To aid in proper coupling selection, the Bulletin 451-110 contains complete specifications, quick and formula selection methods and engineering tables. Construction and design features, including an improved lubrication system known as Falk Long Term Grease (LTG), are also covered.

The Falk Corporation is a subsidiary of Sundstrand Corporation, a major manufacturer of industrial power machinery, including gear drives, couplings and backstops.

For a copy of Bulletin 451-110 on Falk Series 1000G Crowned Tooth Gear Couplings,

**Circle 47 on Reader Service Card**

## 1985 Product Catalog Available From Furuno

Furuno U.S.A., Inc., S. San Francisco, Calif., has published a 28-page catalog of their complete 1985 product line. It covers a broad range of marine electronics for commercial fishermen, work boat operators and yachtsmen.

The catalog is arranged by product category, covering radars, echosounders, sonars, radiotelephones, and nav-aids. Each product is illustrated and briefly described with a full specification section to enable purchasers to choose among the many models available.

A number of new products have been added this year, including the FR-800D series of daylight-bright digital radars, new 12- and 16-inch heavy commercial radars, a supercompact yacht radar, a low-cost/high-performance color video sounder, new net recorder equipment and a completely revised section showing how Furuno products can be interconnected into a virtually unlimited range of integrated vessel systems.

For a free copy of the new Furuno catalog,

**Circle 41 on Reader Service Card**

## Pumps & Power Ltd. Of Vancouver Signed To Represent Omnithruster

**Charles M. Aker**, president of Omnithruster Inc. of Santa Fe Springs, Calif., designer and manufacturer of marine maneuvering and propulsion systems, has announced the signing of a representative's agreement with Pumps & Power Ltd. of Vancouver, B.C., a major supplier of pumps and compressors in Western Canada.

Pumps & Power is headed by president **Robert Hardman** who states, "We are manufacturers as well as distributors, and have approximately 30,000 square feet of office, manufacturing, and warehouse space. These facilities enable us to assemble, repair, service, and test equipment that we market for the marine industry. Our testing procedures meet requirements of the classification societies, including the American Bureau of Shipping and Lloyd's Register of Shipping.

"Having an excellent rapport with the major shipyards and naval architects in Canada, our sales engineers are well trained both academically and from a practical point of view, and average more than 15 years per man of direct involvement in engineering and technical sales."

Omnithruster manufactures a complete line of hydrojet maneuvering and propulsion equipment, sized from 50 hp up to single-thrust modules of 1,500 hp and multi-module thrust levels of any size. The company also offers electronic control equipment.

Omnithruster-Canada manufactures products in Canada, and is a supplier to the Canadian Coast Guard, Department of Fisheries and Oceans, and Canadian companies that operate equipment in ice conditions in the Great Lakes, Maritime Provinces, and Beaufort Sea. Other Omnithruster-Canada representatives are **Alan MacKinnon** located in Beaconsfield, Quebec, and **John W. Shelley** in Sarnia, Ontario.

For further information on Omnithruster products,

**Circle 59 on Reader Service Card**

# BUYERS DIRECTORY

**This directory section is an editorial feature published in every issue tor the convenience of the readers of MARITIME REPORTER/Engineering News. A quick-reference readers' guide, it includes the names and addresses of the world's leading manufacturers and suppliers of all types of marine machinery, equipment, supplies and services.** A listing is provided, at no cost for one year in all 24 issues, only to companies with continuing advertising programs in this publication, whether an advertisement appears in every issue or not. Because it is an editorial service, unpaid and not part of the advertisers contract, MR/EN assumes no responsibility for errors. **If you are interested in having your company listed in this Buyers Directory Section, contact John C. O'Malley at (212) 477-6700.**

**AIR COMPRESSORS**
Hamworthy Engineering Ltd., 10555 Lake Forest Blvd., Suite 5F, New Orleans, LA 70127
Squire-Cogswell Company, 3411 Commercial Ave., Northbrook, IL 60062

**AIR CONDITIONING AND REFRIGERATION—REPAIR & INSTALLATION**
Bailey Refrigeration Co., Inc., 74 Sullivan St., Brooklyn, NY 11231
Flakt AB, Box 8862, S-40272, Gothenburg, Sweden
Marlo Coil/Nuclear Cooling, Inc., P.O. Box 171, High Ridge, MO 63049
Stal Refrigeration AB, Butangsgatan 16, S 601 87 Norrkoping, Sweden

**ANCHORS AND CHAIN**
Baldt Incorporated, P.O. Box 350, Chester, PA 19016
G.J. Wortelboer Jr. B.V., Eemhavenstraat 4, P.O. Box 5003, 3008 AA Rotterdam, Netherlands

**ANODES—Cathodic Protection**
American United Marine Corp., 5 Broadway, Rte. 1, Saugus, MA 01906
Engelhard Industries Division, 2655 U.S. Route 22, Union, NJ 07083
Federal Harco, P.O. Box 40310, Houston, TX 77240

**BALLASTS**
Genstar Stone Products Co., Executive Plaza IV Hunt Valley, MD 21031

**BASKET STRAINERS**
Riley-Beaird, P.O. Box 31115, Shreveport, LA 71130

**BEARINGS—Rubber, Metallic, Non-Metallic**
Grant Manufacturing & Alloying, Inc., 600 Schoolhouse Rd., Souderton, PA 18964
Johnson Rubber Co., Duramax Marine Div., 16025 Johnson St., Middlefield, OH 44062
Lucian Q. Moffitt, Inc., P.O. Box 1415, Akron, OH 44309
Norton Chemplast, 309-150 Dey Rd., Wayne, NJ 07470
Thomson-Gordon Limited, 3225 Mainway, Burlington, Ontario, Canada L7M 1A6
Waukesha Bearings Corp., P.O. Box 798, Waukesha, WI 53186

**BLASTING—Cleaning—Equipment**
Butterworth Inc. (USA), 3721 Lapas Dr., P.O. Box 18312, Houston, TX 77223-9989
Butterworth Systems (UK), 123 Beddington Lane, Croydon CR9 4NX, England
CLEMCO, P.O. Box 7680, San Francisco, CA 94120
E.I. DuPont De Nemours & Co., Inc., Starblast Division, Room X39186, Wilmington, DE 19898
Key Houston Division of Jacksonville Shipyards, 13911 Atlantic Blvd., Jacksonville, FL 32225

**BOILERS**
Combustion Engineering, Inc., Windsor, CT 06095

**BOILER CLEANING**
Asea Stal, 50 Chestnut Ridge Rd., Montvail N.J. 07645

**BROKERS**
Capt. Astad Company, Inc., P.O. Box 53434, New Orleans, LA 70153
ECO Inc., 1036 Cape St. Claire Center, Annapolis, MD 21401
Mowbray's Tug & Barge, 21 West St., New York, NY 10006
Western Maritime, 701 B Street, San Diego, CA 92101

**BRONZES—COMMEMORATIVE**
Duramax Metals, Inc., 2401 Wesley Street, Portsmouth, VA 23707

**BUNKERING SERVICE**
Belcher Company, Inc., 8700 West Flagler, P.O. Box 525500, Miami, FL 33152
Gulf Oil Trading Co., 535 Madison Ave., New York, NY 10022
National Marine Service Inc. (Transport Div.), 1750 Brentwood Blvd., St. Louis, MO 63144

**CARGO HANDLING EQUIPMENT**
MacGregor-Navire International, Box 8991, S-402 74 Goteborg, Sweden
MacGregor Navire U.S.A. Inc., 135 Dermody St., Cranford, NJ 07016

**CASTINGS/FORGINGS**
NKS Industria Pesada, Grupo Industrial, Reforma 404, 140 Piso, Mexico, D.F. 06600 U.S. REP.—Lexington Transport (New York) Inc., 551 Fifth Ave., Room 910, New York N.Y. 10017

**CHOCKING SYSTEMS**
Philadelphia Resins Corp., 20 Commerce Drive, Montgomeryville, PA 18936

**CLOSURES—Marine**
Cornell-Carr Co. Inc., 63 Main St., Monroe, CT 06468
Mock Manufacturing Inc., 777 Rutland Rd., Brooklyn, NY 11203

**COMPUTERIZED INFORMATION SYSTEMS**
Marine Management Systems, Inc., 102 Hamilton Ave., Stamford, CT 06902
Maritime Data Network, Ltd., 102 Hamilton Ave., Stamford, CT 06902
Military Contract Information Service, Inc. Dist. by Maritime Reporter/Engineering News, 118 East 25 St. N.Y. N.Y. 10010
TIMSCO, 622 Azalea Rd., Mobile, AL 36609
Veson Systems, 29 Broadway, Suite 1002, New York, NY 10006

**CONDENSERS**
Riley-Beaird, P.O. Box 31115, Shreveport, LA 71130

**CONTROL SYSTEMS—Monitoring**
American United Marine Corp., 5 Broadway, Rte. 1, Saugus, MA 01906
ASEA, Inc., 4 New King St., White Plains, NY 10604
Autronica Marine USA, 280 Industrial Pkwy., Northvale, NJ 07647
Barringer Research, 304 Carlingview Dr., Rexdale, Ontario, Canada M9W 5G2
Biospherics Inc., 4928 Wyaconda Rd., Rockville, MD 20852
Bowmar/ALI, Inc., 531 Main St., Acton, MA 01720
Cooper Energy Services, Mount Vernon, OH 43050
Ergon, Inc., P.O. Drawer 1639, Jackson, MS 39205
Failsafe Motor/Generator Protector, Marine Safe Electronics Ltd., 101 Jardin Dr., Unit 24/25, Concord, Ontario, Canada L4K 186
Grumman Aerospace, 111 Stewart Ave., Bethpage, NY 11714.
Indikon Corp., 26 New St., Cambridge, MA 02138
Kongsberg North America Inc., 400 Oser Ave., Hauppauge, NY 11738
Leslie Co., 401 Jefferson Rd., Parsippany, NJ 07054
Marine Moisture Control Co., 60 Inip Dr., Inwood, NY 11696
Marine Safe Electronics, 37 Staffern Drive, Concord, Ontario, Canada, L4K 2X2
Megasystems, Inc., 1075 N.W. 58th Street, Boca Raton, FL 33431
Offshore Technology Corp., 578 Enterprise St., Escondido, CA 92025
Pandel Instruments Inc., 2100 N. Hwy. 360, Grand Praire, TX 75050
Propulsion Systems, Inc., 21213 76 Ave., Kent, WA 98032
Teleflex Inc., 771 First Ave., King of Prussia, PA 19406
Thomas Products, 987 West St., Southington, CT 06489-1023
Transamerica Delaval, Inc., Gems Sensors Division, Cowles Road, Plainville, CT 06062
Valmet Automation A.S., P.O. Box 130, N-3430, Spikkestad, Norway

**COUPLINGS**
CamLock Flange Sales Corp./Marine Moisture Control Co., 60 Inip Dr., Inwood, N.Y 11696
SKF Steel, 201 Tower Lane, P.O. Box 745, Avon, CT 06001

**CRANE BUMBERS**
Kastalon Inc., 4101 West 123rd St., Alsip, IL 60658

**CRANES—HOISTS—DERRICKS—WHIRLEYS**
Appleton Marine, P.O. Box 2339, Appleton, WI 54913
ASEA Hagglunds Inc., P.O. Box 7949, The Woodlands TX 77380
HIAB Cranes & Loaders Inc., 258 Quigley Boulevard, New Castle, DE 19720
Machinoexport, 35 Mosfilmovskaya Ul., 117330 Moscow, U.S.S.R.
Marine Travelift, Inc., 49 E. Yew St., Sturgeon Bay, WI 54235
J.D. Neuhaus, Hebezeuge, D5810, Witten Heven, West Germany
CMH Heleshaw, Inc., 201 Harrison St. Hoboken N.J. 07030
Cunningham Marine Hydraulics Co. Inc., 2030 E. Adams St. Jacksonville, FL 32202

**DECK MACHINERY—Cargo Handling Equipment**
Morkey Machinery Co., Inc., 79 S. Horton St., Seattle, WA 98134
Murdock Engineering Company, P.O. Box 2278, Irving, TX 75061
Schoellhorn Albrecht, Div. of St. Louis Ship, 3460 So. Broadway, St. Louis, MO 63118

**DECKING—GRATING**
Alligned Fiber Composites, Highway 52, South Chatfield, MN 55923
International Grating, 7625 Parkhurst, Houston, TX 77028
Selby, Battersby & Company, 5220 Whiby Ave., Philadelphia, PA 19143

**DIESEL ACCESSORIES—CYLINDER LINERS**
Colt Industries Inc. Fairbanks Morse Engine Div. 701 Lawton Ave., Beloit, WI 53511
General Thermodynamics Corporation, 210 South Meadow Road, P.O. Box 1105, Plymouth, MA 02360
Haynes Corporation, P.O. Box 179, Jackson, MI 49204
Illman Jones, 1111 Green Island Rd., American Canyon, CA 94589
Stewart & Stevenson Services, Inc.—MWM, P.O. Box 1637, Houston, TX 77251-1637
Transamerica Delaval Engine & Comp. Div., 550 85th, Oakland, CA

**DIESEL ENGINE—Spare Parts & Repair**
Alban Engine Power, Inc., 6455 Washington Blvd., Baltimore, MD 21227
Alco Power Inc., 100 Orchard St., Auburn, N.Y. 13021
Colt Industries Inc. Fairbanks Morse Engine Div. 701 Lawton Ave., Beloit, WI 53511
Cummins Engine Co., Inc., Mail Code 40642, Box 3005 Columbus, IN 47202-3005
Granges Repair Service GMBH, Gutenbergring, 64 D-2000 Hamburg-Norderstedt TX:0215553
Schoonmaker Service Parts Co., Inc., P.O. Box 757, Foot of Spring St., Sausalito, CA 94966
Stewart & Stevenson Services, Inc.—MWM, P.O. Box 1637, Houston, TX 77251-1637
Sulzer Brothers Inc., 200 Park Ave., New York, N.Y. 10166
Transamerica Delaval Engine & Comp. Div., 550 85th, Oakland, CA

**ELECTRICAL EQUIPMENT**
Newmar, P.O. Box 1306, Newport Beach, CA 92663
Stewart & Stevenson Services, Inc.—MWM, P.O. Box 1637, Houston, TX 77251-1637
Valad Electric Heating Corporation, 162 Wildey St., Tarrytown, NY 10591
Ward Leonard Electric Co., 31 South St., Mt. Vernon, NY 10550
Zidell Explorations, Inc., 3121 S.W. Moody St., Portland, OR 97201

**ELECTRONIC SYSTEMS**
Marine Electric RPD, Inc., 666 Pacific St., Brooklyn, NY 11217 TX: 125327

**EMULSIFICATION SYSTEMS**
Cleanodan A/S, N. American Agents, American United Marine Corp., 5 Broadway, Route 1, Saugus, MA 01906
S/S Research & Development Inc., 1050 State St., Perth Amboy, NJ 08862

**ENGINE TEST EQUIPMENT**
General Thermodynamics Corp., P.O. Box 1105, 210 S. Meadow Road, Plymouth, MA 02360

**ENTERPRISE**
Transamerica Delaval Engine & comp. Div., 550 85th, Oakland, CA

**EQUIPMENT—Marine**
American General/Levin Corp., 445 Littlefield Ave., So. San Francisco, CA 94080
ASEA Hagglunds Inc., P.O. Box 7949, The Woodlands TX 77380
Band-It Division, Houdaille Industries, Inc., P.O. Box 16307, Denver, CO 80216
Boston Metals Co., 313 E. Baltimore St., Baltimore, MD 21202
Thomas Coudon Associates, 6655 Amberton Dr., Baltimore, MD 21227
Fitz-Wright Suits Ltd., 17919 Roan Pl., Surrey, B.C., Canada V3S 5K1
Hamworthy Engineering Ltd., 10555 Lake Forest Blvd., Suite 5F, New Orleans, LA 70127
Kearfott Marine Products, 550 South Fulton Ave., Mount Vernon, NY 10550
Maritime Power Corp., 200 Henderson Street, Jersey City, NJ 07302
Raytheon Service Co., 100 Roesler Rd., Suite 103, Glen Burnie, MD
Republic-Lagun Machine Tool Co., 1000 E. Corson St., Carson, CA 90749 TX: 181098

**EVAPORATORS**
Alfa-Laval, Inc., Dept. MR-2, 2115 Linwood Ave., Fort Lee, NJ 07024
Aqua-Chem Inc., P.O. Box 421, Milwaukee, WI 53201
Riley-Beaird, P.O. Box 31115, Shreveport, LA 71130

**FANS—VENTILATORS—BLOWERS**
American United Marine Corp., 5 Broadway, Rte. 1, Saugus, MA 01906
Joy Manufacturing Company, 338 So. Broadway, New Philadelphia, OH 44663
Zidell Explorations, 3121 S.W. Moody St., Portland, OR 97201

**FASTENERS**
Sales Systems Limited,7006, 700 Florida Ave., Portsmouth, VA 23707

**FENDERING SYSTEMS—Dock & Vessel**
InterTrade Industries, 15301 Transistor Lane, Huntington Beach, CA 92649
Johnson Rubber Co., Duramax Marine Div., 16025 Johnson St., Middlefield, OH 44062
Samson Ocean Systems, Inc., 99 High St., Boston, MA 02110
Seaward International, Inc., 6269 Leesburg Ave., Falls Church, VA 22044

**FILTERS**
Dahl Manufacturing, Inc., 2521 Railroad Ave., Ceres, CA 95307

**FINANCING—Leasing**
Gulf Western Leasing Corp., 1500 City West Blvd., Suite 300, Houston, TX 77047
JMJ Marine Investors, P.O. Box 51509, New Orleans, LA 70151

**FIRE PROTECTION, DETECTION & ALARM SYSTEMS**
Walter Kidde, Walter Kidde Dr., Wake Forest, NC 27586

**FUEL OIL/ADDITIVES—Analysis & Combustion Testing**
Ferrous Corporation, 910 108th N.E., P.O. Box 1764, Bellevue, WA 98009
Hamworthy Engineering Ltd., 10555 Lake Forest Blvd., Suite 5F, New Orleans, LA 70127
McTigue Industries Inc., 1615 9th Ave., Bohemia, NY 11716
U.S. Borax, 3075 Wilshire Blvd., Los Angeles, CA 90010

**FURNITURE**
Bailey Carpenter & Insulation Co., 74 Sullivan Street, Brooklyn, NY 11231
Comfort-Mate, Inc., 7988 NW 56th Street, Miami, FL 33166

**GALLEY EQUIPMENT**
Insinger Machine Co., 6245 State Rd., Philadelphia, PA 19135

**GANGWAYS**
Rampmaster Inc., 9825 Osceola Blvd., Vero Beach, FL 32960

**HATCH & DECK COVERS—Chain Pipe**
CamLock Flange Sales Corp./Marine Moisture Control Co., 60 Inip Dr., Inwood, NY 11696
Marine Moisture Control Co., 60 Inip Dr., Inwood, NY 11696
MacGregor-Navire Internatinal, Box 8991, S-402 74 Goteborg, Sweden
MacGregor Navire U.S.A. Inc., 135 Dermody St., Cranford, NJ 07016
Mock Manufacturing Inc., 777 Rutland Rd., Brooklyn, NY 11203

**HEAT EXCHANGERS**
Alfa-Laval, Inc., Dept. MR-2, 2115 Linwood Ave., Fort Lee, NJ 07024
Riley-Beaird, P.O. Box 31115, Shreveport, LA 71130

**HOLD LINERS**
Himont U.S.A., Inc., 1313 N. Market St., Wilmington, DE 19894

**HULL CLEANING**
Butterworth Inc. (USA), 3721 Lapas Dr., P.O. Box 18312, Houston, TX 77223-9989
Butterworth Systems (UK), 123 Beddington Lane, Croydon CR9 4NX, England
Gulf International Divers, P.O. Box 1342, Gretna (New Orleans), LA 70052
Petroferm Marine, Route 2, Box 280, Amelia Island, FL 32034
Phosmarine Equipment, 21 Bd. de Paris, 13002, Marseille, France
Seaward Marine Services, Inc., 6269 Leesburg Pike, Falls Church, VA 22044
Seaward International, 5409 Beamon Rd., Norfolk, VA 23513 TX: 710-881-1182
Taylor Diving & Salvage Co. Inc., 701 Engineers Rd., Belle Chasse, LA 70037

**HYDRAULICS**
Aeroquip Corp., 1130 Maynard Road, Jackson, MI 49202
Bardex Hydranautics, 6338 Lindmar Dr., P.O. Box 1068, Goleta, CA. 93116
Cunningham Marine Hydraulics Co., Inc., 201 Harrison St., Hoboken, NJ 07030; 2030 E. Adams St., Jacksonville, FL 32204, TX: 710-730-5224
CMH Heleshaw, Inc., 201 Harrison St. Hoboken N.J. 07030
Del Gavio Marine Hydraulics Inc., 207 W. Central Ave., Maywood, NJ 07607
Hydra-Dynamics, Inc., 2141 Greenwood Ave., Wilmette, IL 60091
Washington Chain & Supply, Inc., P.O. Box 3646, Seattle, WA 98124

**INERT GAS—Generators—Systems**
Maritime Protection A/S, N. American Agents, American United Marine Corp., 5 Broadway, Rte. 1, Saugus, MA 01906

**INSULATION—Cloth, Fiberglass**
Bailey, Carpenter & Insulation Co., Inc., 74 Sullivan St., Brooklyn, NY 11231
Duracote Corp., 350 North Diamond St., Ravenna, Ohio 44266
Superior Energies, Inc. P.O. Drawer 386, Groves, TX 72619

**INSURANCE**
Adams & Porter, 510 Bering Dr., Houston, TX 77057-1408
Adams & Porter, 1 World Trade Center, Suite 8433, New York, NY 10048
Wm. Keith Hargrove, Inc., 1300 Post Oak Blvd., Suite 2050, Houston, TX 77056
United States P&I Agency, Inc., 80 Maiden Lane, New York, NY 10038

**JOINER—Watertight Doors—Paneling**
Advanced Structures Corp., 235 W. Industry Ct., Deer Park, NY 11729
Astech, 3030 S. Red Hill Ave., Santa Ana, CA 92711
Bailey Distributors, Inc., 74 Sullivan St., Brooklyn, NY 11231
Masonite Commercial Division, Dover, OH 44622
Megadoor Inc., 441 Lexington Ave., Suite 903, New York, NY 10017
Walz & Krenzer, Inc., 400 Trabold Road, Rochester, NY 14624

**KEEL COOLERS**
R.W. Fernstrum & Co., 1716 Eleventh Ave., Menominee, MI 49858
Johnson Rubber Co., Duramax Marine Div., 16025 Johnson St., Middlefield, OH 44062

**LIGHTING EQUIPMENT—Lamps, Fixtures, Searchlights**
Midland-Ross Corp., Russellstoll Division, 530 W. Mt. Pleasant Ave., Livingston, NJ 07039
Perko Inc., P.O. Box 6400D, Miami, FL 33164
Phoenix Products Company, Inc., 4769 North 27th Street, Milwaukee, WI 53209

**LINE BLINDS**
Stacey/Fetterolf Corp., P.O. Box 103, Skippack, PA 19474

**MACHINERY MAINTENANCE, REPAIR, OVERHAUL, AND TESTING**
A-C Brake Co., 308 E. College St., Louisville, KY
CMH Heleshaw, Inc., 201 Harrison St. Hoboken N.J. 07030
Cunningham Marine Hydraulics Co. Inc., 2030 E. Adams St. Jacksonville, FL 32202
Jered Brown Brothers Inc., 1300 Coolidge, P.O. Box 2006, Troy, MI 48007
American General/Levin Corp., 445 Littlefield Ave., So. San Francisco, CA 94080
Goltens, 160 Van Brunt St., Brooklyn, NY 11231
Rosan, Inc., 2901 West Coast Hwy., Newport Beach, CA 92663

**METALS**
Bayou Steel Corp., P.O. Box 5000, Laplace, LA 70068

**MINING**
Rocky Mountain Energy, 10 Longspeake Dr., Box 2000, Broomfield, CO 80020

**MOORING SYSTEMS**
Samson Ocean Systems, Inc., 99 High Street, Boston, MA 02110

**NAME PLATES—BRONZE—ALUMINUM**
Duramax Metals, Inc., 2401 Wesley Street, Portsmouth, VA 23707

**NAVAL ARCHITECTS, MARINE ENGINEERS, SURVEYORS**
Advanced Marine Enterprises, Inc., 1725 Jefferson Davis Highway (Suite 1300), Arlington, VA 22202
Aero Nav Laboratories, Inc., 14-29 112 St., College Point, NY 11356
American Systems Engineering Corp., P.O. Box 4265, Virginia Beach, VA 23454
Amirikian Engineering Co., Chevy Chase Center Bldg., Suite 505, 35 Wisconsin Circle, Chevy Chase, MD 20015
Art Anderson Associates, 148 First St., Bremerton, WA 98310

B.C. Research, 3650 Wesbrook Mall, Vancouver, B.C. Canada V6S 2L2
Del Breit inc., 326 Picayune Place (Suite 201), New Orleans, LA 70130
C.A.C.I., Inc., 1815 No. Fort Myer Dr., Arlington, VA 22209
C.D.I. Marine Co., 5520 Los Santos Way, Suite 600, Jacksonville, FL 32211
C.T. Marine, 18 Church Street, Georgetown, CT 06829
Phillips Cartner & Co., Inc., 203 So. Union St., Alexandria, VA 22314
Century Engineering, inc., 32 West Rd., Towson, MD 21204
Childs Engineering Corp., Box 333, Medfield, MA 02052
Crandall Dry Dock Engrs., Inc., 21 Pottery Lane, Dedham, MA 02026
Crane Consultants Inc., 15301 1st Ave., So. Seattle, WA 98148
C.R. Cushing, 18 Vesey St., New York, NY 10007
Design Associates Inc., 14360 Chef Menteur Highway, New Orleans, LA 70129
Designers & Planners, Inc., 1725 Jefferson Davis Highway, Suite 700, Arlington, VA 22202
ECO Inc., 1036 Cape St. Claire Center, Annapolis, MD 21401
Encon Management & Engineering Consultant Services, P.O. Box 7760, Beaumont, TX 77706
Christopher J. Foster, Inc., 16 Sintsink Drive East, Port Washington, NY 11050
Gibbs & Cox, Inc., 119 West 31st Street, New York, NY 10001
John W. Gilbert Associates, Inc., 66 Long Wharf, Boston, MA 02110
The Glosten Associates, Inc., 610 Colman Bldg., 811 First Ave., Seattle, WA 98104
Phillip Gresser Associates, Ltd., 3250 South Ocean Blvd., Palm Beach, FL 33480
Morris Guralnick Associates, Inc., 620 Folsom Street, Suite 300, San Francisco, CA 94107
Hamilton Cornell Associates, Box 188, Snug Harbor Station, Duxbury, MA 02331
J.J. Henry Co., Inc., 40 Exchange Place, New York, NY 10005
Hi-Test Laboratories, Inc., P.O. Box 226, Buckingham C.H., VA 23921
HydroComp, Inc., 10 Cutts Road, P.O. Box 865, Durham, NH 03824
Intramarine, Inc., P.O. Box 53043, Jacksonville, FL 32201
R.D. Jacobs & Associates, 11405 Main St., Roscoe, IL 61073
Jantzen Engineering Co., 6655-H Amberton Drive, Baltimore, MD 21227
J.L. Konopasek & Associates, 3523 Scrimshaw Dr., Jacksonville, FL 32217
James S. Krogen & Co., Inc., 3333 Rice St., Miami, FL 33133
Rodney E. Lay & Associates, 13891 Atlantic Blvd., Jacksonville, FL 32225
Alan C. McClure Associates, Inc., 2600 South Gessner, Houston, TX 77063
John J. McMullen Associates, Inc., 1 World Trade Center, New York, NY 10048
McLear & Harris, Inc., 28 West 44 Street, New York, NY 10036
Fendall Marbury, 1933 Lincoln Drive, Annapolis, MD 21401
Marine Consultants & Designers, Inc., 308 Investment Insurance Bldg., Corner E. 6th St. & Rockwell Ave., Cleveland, OH 44114
Marine Design Inc., 401 Broad Hollow Road, Rte. 110, Melville, NY 11746
Marine Power Associates, 4475 Mission Blvd., Suite 235, San Diego, CA 92109
Marine Technical Associates, Inc., 95 River Rd., Hoboken, NJ 07030
George E. Meese, 194 Acton Rd., Annapolis, MD 21403
R. Carter Morrell, 715 S. Cherokee, Bartlesville, OK 74003
NKF Engineering Assoc., Inc., 8150 Leesburg Pile, Vienna, VA 22202
Nelson & Associates, Inc., 610 Northwest 183rd St., Miami, FL 33169
New England Engineering & Marine Services, Rt. 2, Box 50, York, ME 03909
Nickum & Spaulding Associates, Inc., 2701 First Ave., Seattle, WA 98121
Northern Marine, P.O. Box 1169, Traverse City, MI 49685
Ocean-Oil Internatinal Engineering Corporation, 3019 Mercedes Blvd., New Orleans, LA 70114
PRC Guralnick, 5252 Balboa Ave., San Diego, CA 92117
Pearlson Engineering Co., Inc., 8970 S.W. 87th Ct., Miami, FL 33156
S.L. Petchul, Inc., 1380 S.W. 57th Avenue, Fort Lauderdale, FL 33317
Q.E.D. Systems Inc., 4646 Witchduck Rd., Virginia Beach, VA 23455
M. Rosenblatt & Son, Inc., 350 Broadway, New York, NY 10013 and 667 Mission St., San Francisco, CA 94105
Sargent & Herkes Inc., 611 Gravier St., New Orleans, LA 70130
Schmahl and Schmahl, Inc., 1209 S.E. Third Ave., Fort Lauderdale, FL 33316
SEACOR Systems Engineering Associates Corp., 19 Perina Blvd., Cherry Hill, NJ 08003 (Publications Division at Cherry Hill location)
STV/Sanders & Thomas, Inc., 1745 Jefferson Davis Hwy., Arlington, VA 22202
Seaworthy Systems, Inc., 28 Main St., Essex Ct. 06426; 17 Battery Place, N.Y. N.Y. 10004, P.O. Box 205, Solomons, MD 20688
Seaworthy Electrical Systems, 17 Battery Pl. N.Y. N.Y. 10004
George G. Sharp, Inc., 100 Church St., New York, NY 10007
Simmons Associates, P.O. Box 760, Sarasota, FL 33578
R.A. Stearn, Inc., 253 N. 1st Ave., Sturgeon Bay, WI 54235
J.F. Stroschein Associates, 666 Old Country Rd., Garden City, NY 11530
Richard R. Taubler, Inc., 610 Carriage La., Dover, DE 19901
Timsco, 622 Azalea Road, Mobile, AL 36609
Tracor Hydronautics, Inc., 7210 Pindell School Rd., Laurel, MD 20707
Thomas B. Wilson, Associates, 1258 North Avalon Blvd., Wilmington, CA 90744

**NAVIGATION & COMMUNICATIONS EQUIPMENT**

Atkinson Dynamics, Section 6, 10 West Orange Ave., South San Francisco, CA 94080
British Telecom International, The Holborn Centre, 120 Holborn, London EC1N 2TE
CMC Communications Inc., 5479 Jetport Industrial Blvd., Tampa, FL 33614
COMSAT World Systems, 950 L'Enfant Plaza, S.W., Suite 6151 Washington, DC 20024
A/S Elektrisk Bureau, P.O. Box 98, N-1360 Nesbru, Norway
Furuno U.S.A., 271 Harbor Way, S. San Francisco, CA 94080
General Electric Company, Mobile Communications Division, Lynchburg, VA 24502
Harris Communications (RF Communications), 1680 University Avenue, Rochester, NY 14610
Henschel Corp., 9 Hoyt Drive, Newburyport, MA 01950
Hose McCann Telephone Company, Inc., 9 Smith Street, Englewood, NJ 07631
ITT Mackay, 441 U.S. Highway #1, Elizabeth, NJ 07202
Japan Radio Co., Ltd., Akasaka Twin Tower, 17-22, Akasaka 2-chome, Minato-ku, Tokyo 107, Japan U.S. Rep: 405 Park Ave., New York, NY 10022
Kongsberg North America Inc., 400 Oser Ave., Hauppauge, NY 11738
Kongsberg Vopenfabrikk, Norcontrol Division, P.O. Box 145, Horten 3191, Norway
Krupp Atlas-Elektronik, 1453 Pinewood St., Rahway, NJ 07065
Micrologic, 20801 Dearborn, Chatsworth, CA 91311
Nav-Com, Inc., 9 Brandywine Drive, Deer Park, NY 11729
Navigation Sciences Inc., 6900 Wisconsin Ave., Bethesda, MD 20815 TX: 705999
Perko Inc. (Lights), P.O. Box 6400D, Miami, FL 33164
Racal Marine Inc., 1 Commerce Blvd., Palm Coast, FL 32037-0029
Radio-Holland USA, Inc., 6033 South Loop East, Houston, TX 77033
Raytheon Marine Co., 676 Island Pond Road, Manchester, NH 03103
Raytheon Ocean Systems Company, Westminster Park, Risho Avenue, East Providence, RI 02914
Raytheon Service Co., 103 Roesler Rd., Glen Burnie, MD 21061
Robertson Autopilot, 400 Oser Ave., Happauge, NY 11738
Simrad, Inc., 2208 N.W. Market St., Suite 600, Seattle, WA 98107
Sperry Corporation, Great Neck, NY 11020
Standard Communications, P.O. Box 92151, Los Angeles, CA 90009
Telesystems, 2700 Prosperity Ave., Fairfax, VA 22031 USA
Texas Instruments, Inc., P.O. Box 405, 3438, Lewisville, TX 75067

**OILS—Marine—Additives**

Exxon Company, U.S.A., Room 2323 AH, P.O. Box 2180, Houston, TX 77701
Gulf Oil Company—U.S. (Domestic Oils), 909 Fannin Street, Houston, TX 77001
Gulf Oil, New York District Sales Office (Domestic), 433 Hackensack Avenue, Hackensack, NJ 07601
Gulf Oil Trading Co., 535 Madison Ave., New York, NY 10022
Mobil Oil Corp., 150 East 42 Street, New York, NY 10017
Texaco, Inc. (International Marine), 135 East 42nd St., New York, NY 10017

**OIL/WATER SEPARATORS**

Alfa Laval, Inc., Dept. MR-2, 2115 Linwood Ave., Fort Lee, NJ 07024
Biospherics Incorporated, 5001 Forbes Blvd., Lanham, MD 20801
Butterworth Inc. (USA), 3721 Lapas Dr., P.O. Box 18312, Houston, TX 77223-9989
Butterworth Systems (UK), 123 Beddington Lane, Croydan CR9 4NX, England
Centrico, Inc. (Westfalia Separators), 100 Fairway Court, Northvale, NJ 07647
Dahl Manufacturing, Inc., 2521 Railroad Ave., Ceres, CA 95307
Hamworthy Engineering Ltd., 10555 Lake Forest Blvd., Suite 5F, New Orleans, LA 70127
Hyde Products, Inc., 810 Sharon Dr., Westlake, OH 44148
Microphor, Inc., P.O. Box 490, Willits, CA 95490
Marine Moisture Control Co., 60 Inip Dr., Inwood, NY 11696
Peck Purifier Sales Co., 3724 Cook Blvd., Chesapeake, VA 23323

**PAINTS—COATINGS—CORROSION CONTROL**

American Abrasive Metals, 460 Coit Street, Irvington, NJ 07111
Ameron, 4700 Ramona Blvd., Monterey Park, CA 91754
CLEMCO, P.O. Box 7680, San Francisco, CA 94120
Dampney Company, Inc., 85 Paris St., Everett, MA 02149
Devoe Marine Coatings Co., P.O. Box 7600, Louisville, KY 40207
Drew Ameroid Marine, One Drew Chemical Plaza, Boonton, NJ 07005
E.I. DuPont De Nemours & Co., Inc. Nemours Bldg., Rm. N-2504-2, Wilmington, DE 19898
DuPont Co. MPS , Room X40750, Wilmington, DE 19898
Esgard, Box 2698, Lafayette, LA 70502
Farboil Company, 8200 Fischer Rd., Baltimore, MD 21222
Hempel Marine Paints, Inc., Foot of Currie Ave., Wallington, NJ 07057; 6868 NorthLoop East, Suite 304, Houston, TX 77028; P.O. Box 10265, New Orleans, LA 70181
International Paint Company, Inc., 2270 Morris Avenue, Union, NJ 07083
Jotun Marine Coatings Inc., 175 Penrod Court N&O, Glen Burnie, MD 21061
Magnus Maritec International Inc., 150 Roosevelt Pl., P.O. Box 150, Palisades Park, NJ 07650
Palmer Products Inc., P.O. Box 8, Worcester, PA 19490
Products Research & Chemical Corp., 5454 San Fernando Rd., Glendale, CA 91203

**PIPE-HOSE—Cargo Transfer Clamps, Couplings, Coatings**

Amermarine International, P.O. Box 9205, Dundalk, MD 21222
Deutsch Metal Components, 14800 S. Figueroa St., Gardena, CA 90248
Hydro-Craft Inc., 1821 Rochester Industrial Dr., Rochester, MI 48063
Selkirk Metalbestos, Box 19000, Greensboro, NC 27419
Tioga Pipe Supply Co. Inc., 2450 Wheatsheaf La., P.O. Box 5997, Philadelphia, PA 19137

**PLASTICS—Marine Applications**

Hubeva Marine Plastic, Inc., 390 Hamilton Ave., Brooklyn, NY 11231
Norton Chemplast, 309-150 Dey Rd. Wayne NJ 07470

**PLYWOOD**

Simpson Timber Co., Third and Franklin, Sheton, WA 98584

**PROPULSION EQUIPMENT—Bowthrusters, Diesel Engines, Gears, Propellers, Shafts, Turbines**

Amarillo Gear Co., P.O. Box 1789, Amarillo, Texas 79105
Aquamaster Inc., 4125, 9th Avenue N.W. Seattle, WA 98107
Armco Steel/Advanced Materials Div., 703 Curtis St., Middletown, OH 45043
Avondale Shipyards, Inc., P.O. Box 52080, New Orleans, LA 70150
Bergen Diesel Inc., 2110-10 Service Rd., Kenner, LA 70062
Bird-Johnson Company, 110 Norfolk St., Walpole, MA 02081
Boston Metals Co., 313 E. Baltimore St., Baltimore, MD 21202
Burmeister & Wain Alpha Diesel AS, DK-1400 Copenhagen K, Denmark
Capitol Gears, 349 N. Hamline Ave., St. Paul, MN 55104
Caterpillar Engine Division, 100 N.E. Adams, Peoria, IL 61629
Cincinnati Gear Co., 5657 Wooster Pike, Cincinnati, OH 45227
Colt Industries Inc. (Fairbanks Morse Engine Div.), 701 Lawton Avenue, Beloit, WI 53511
Columbian Bronze Corporation, 216 No. Main Street, Freeport, NY 11520
Combustion Engineering, Inc., Windsor, CT 06095
Coolidge-Stone Vickers, Inc., 56 Squirrel Rd., Auburn Hills, MI 48057
Daihatsu Diesel (USA) Inc., 180 Adams Ave., Hauppauge, NY 11788
Deutz Corp., 7585 Ponce de Leon Circle, Atlanta, GA 30340
Elliott Company, 1809 Sheridan Ave., Springfield, OH 45505
George Engine Company, Inc., Lafayette, LA
General Motors, Electro-Motive Division, LaGrange, IL 60525
Golten Marine Co., Inc., 160 Van Brunt St., Brooklyn, NY 11231
Isotta Fraschini S.p.A., c/o Italian Aerospace Industries (U.S.A.), Inc., 1235 Jefferson Davis Hwy., Suite 500, Arlington, VA 22202
KHD Canada Inc., 180 Rue de Normandie, Boucherville, Quebec J4B 5S7, Canada
Lips Propellers, 3617 Koppens Way, Chesapeake, VA 23323
M.A.N.-B&W Diesel, 2 Ostervej, DK-4960 Holeby, Denmark
MTU of North America, One E. Putnam Ave., Greenwich, CT 06830; 10450 Corporate Dr., Sugarland, TX 77478; 2945 Railroad Ave., Morgan City, LA 70203; 180 Nickerson St., Seattle, WA 98109; 1730 Lynn St., Arlington, VA 22209
MWM-Murphy Diesel, 12 Greenway Plaza, Suite 1100, Houston, TX 77046
Mapeco Products, Inc., 20 Vesey St., New York, NY 10007
Michigan Wheel, 1501 Buchanan Ave., S.W., Grand Rapids, MI 49507
National Marine Service Louisiana, Inc., 222 Bayou Rd., Belle Chasse, LA 70037
North American Marine Jet P.O Box 1232 Benton, AR 72015
Omnithruster Inc., 9515 Sorensen Ave., Santa Fe Springs, CA 90670
Penske GM Power, Inc., 600 Parsippany Road, Parsippany, NJ 07054
Penske GM Power, Lodi N.J., 180 Rt. 17 South, Lodi, NJ 07644
Inland Water Propulsion Systems, Inc., 580 Walnut St., Cincinnati, OH 45201
Propulsion Systems, Inc., 21213 76 Ave. So., Kent, WA 98032
SACM (Societe Alsacienne De Constructions Mechaniques De Mulhouse) 1, Rue De La Fonderie, Boite Postale 1210, 68054 Mulhouse Cedex, France
Schottel of America, Inc., 8375 N.W. 56 St., Miami, FL 33166
Stewart & Stevenson Services, Inc., P.O. Box 1637, Houston, TX 77251-1637
Sulzer Brothers, Dept. Diesel Engines, CH-8401 Winterthur, Switzerland
Tech Development Inc., 6800 Poe Ave., P.O. Box 14557, Dayton, OH 45414
Transamerica DeLaval Inc., Engine & Compressor Div., 550 85th Ave., Oakland, CA 94621
Transamerica Delaval, Inc., Turbine & Compressor Div., P.O. Box 8788, Trenton, NJ 08650
Ulstein Maritime Ltd., 6307 Laurel St., Burnaby, B.C. Canada V5B 3B3
Ulstein Trading Ltd. A/S, N-6-65, Ulsteinvik, Norway
Voith Schneider America, 159 Great Neck Rd., Ste. 200, Great Neck, NY 11021
Volvo Penta of America, P.O. Box 927, Rockleigh, NJ 07647
WABCO Fluid Power, an American-Standard Company, 1953 Mercer Rd., Lexington, KY 40505
Wartsila Power Inc., 5132 Taravella Rd., P.O. Box 868, Marrero, LA 70072
Waukesha Engine Division, Waukesha, WI 53187

**PUMPS—Repairs—Drives**

Allweiler Pump Inc., 5410 Newport Dr., Rolling Meadows, IL 60008 TX: 270-0444
Cunningham Marine Hydraulics Co., Inc., 201 Harrison St., Hoboken, NJ 07030; 2030 E. Adams St., Jacksonville, FL 32204, TX: 710-730-5224
CMH Heleshaw, Inc., 201 Harrison St. Hoboken N.J. 07030
Goltens, 160 Van Brunt St., Brooklyn, NY 11231
Hamworthy Engineering Ltd., 10555 Lake Forest Blvd., Suite 5F, New Orleans, LA 70127
Ingersoll—Rand Pump Group, Dept. B—346, Washington, N.J. 07882
Jim's Pump Repair, 48-55 36th St., Long Island City, NY 11101
Megator Corporation, 562 Alpha Drive, Pittsburgh, PA 15238
Sims Pump Valve Co., Inc., 1314 Park Ave., Hoboken, NJ 07030
Transamerica Delaval, Pyramid Pump Div., P.O. Box 447, Monroe, NC 28110
Vita Motivator Company, 200 West 20th St., New York, NY 10011
Warren Pumps Division, Bridges Avenue, Warren, MA 01083
Wilden Pump & Engineering Co., 22060 Van Buren St., P.O. Box 845, Colton, CA 92324

**REFRIGERATION—Refrigerant Valves**

Bailey Refrigeration Co., Inc., 74 Sullivan St., Brooklyn, NY 11231
United Technologies Carrier Transicold Div., Carrier Corp., P.O. Box 4805, Syracuse, NY 13221

**ROPE—Manila—Nylon—Hawsers—Fibers**

A.L. Don Co., Foot of Dock St., Matawan, NJ 07747
Allied Fibers, 1411 Broadway, New York, NY 10018
American Mfg. Co., Inc., Willow Avenue, Honesdale, PA 18431
Atlantic Cordage Corp., 60 Grant Avenue, Carteret, NJ 07008
DuPont Co., KEVLAR Aramid Fiber, Room G-15465, Wilmington, DE 19898
Samson Ocean Systems, Inc., 99 High Street, Boston, MA 02110
Tubbs Cordage Company, P.O. Box 709, Orange, CA 92666
Tubbs Cordage Co., P.O. Box 7986, San Francisco, CA 94120-7986
Vermeire N.V. Industripark Zwaarveld, B-9160 Hamme, Belgium TX: 21687
Wall Industries, Inc., P.O. Box 560, Elkin, NC 28621

**SANITATION DEVICES—Pollution Control**

Davit Sales Inc., P.O. Box 232, Jefferson Valley, NY 10535
Envirovac Inc., 1260 Turret Dr., Rockford, IL 61111
FAST Sewage Systems, Div. of St. Louis Ship, 611 East Marceau St., St. Louis, MO 63111
Golor Metal A/S, P.O. Box 70, 4901 Tvedestrand, Norway
Hamworthy Engineering Ltd., 10555 Lake Forest Blvd., Suite 5F, New Orleans, LA 70127
Marine Moisture Control Co., Inc., 60 Inip Dr., Inwood, L.I., NY 11696
Marland Environmental Systems, P.O. Box 501, Great Falls, VA 22066
National Sanitation Foundation, P.O. Box 1468, Ann Arbor, MI 48105

**SCAFFOLDING EQUIPMENT—Work Platforms**

McCausey Lumber Co., 7751 Lyndon, Detroit, MI 48238
Trus-Joist Corp., P.O. Box 60, Boise, ID 83704

**SCUTTLES/MANHOLES**

Mock Manufacturing Inc., 777 Rutland Rd., Brooklyn, NY 11203

**SHAFT SEALS, REVOLUTION INDICATOR EQUIPMENT**

Bird-Johnson Co., 100 Norfolk St., Walpole, MA 02081
Crone Packing Company, 435 Regina Dr., Clarksberg, MD 20734
Norton Chemplast, 309-150 Dey Rd., Wayne, NJ 07470

**SHIPBREAKING—Salvage**

Fred Devine Diving & Salvage, Inc., 6211 N. Ensign, Swan Island, Portland, OR 97217
Zidell Explorations, Inc., 3121 S.W. Moody St., Portland, OR 97201

**SHIPBUILDING EQUIPMENT**

Bardex Hydranautics, 6338 Lindmar Dr., P.O. Box 1068, Goleta, CA 93116
Cockatoo Dockyard Pty. Ltd., P.O. Box 1139, North Sydney, NSW 2060, Australia TX: 72086
Pearlson Engineering Co., P.O. Box 8, Kendall Branch, Miami, FL 33156
Total Transportation System Inc., 813 Forest Dr., Newport News, VA 23606
Total Transportation Systems (International) A/S, Bjornegarden, P.O. Box 248, N 5201, Os, Norway

**SHIPBUILDING STEEL**

Armco Steel Corp., 703 Curtis St., Middletown, OH 45042
Bethlehem Steel Corp., Martin Tower, Bethlehem, PA 18018
United States Steel Corp., Christy Park Plant, 2214 Walnut St., McKeesport, PA 15132
Welded Beam Company, P.O. Box 280, Perry, OH 44081

**SHIPBUILDING—Repairs, Maintenance, Drydocking**

Amsterdam Drydock Company, Post Box 3006, 1003 AA, Amsterdam, Holland
Arsenale Triestino-San Marco Shipyard, Trieste, Italy, U.S. Rep: Marine Technologies & Brokerage, 33 Rector St., New York, NY 10066
Asmar Shipyards Co., Astilleros y Maestranzs de la Armada, Prat 856, Piso 14, Casilla 150-V, Valpariso, Chile, S.A.
Avondale Shipyards, Inc., P.O. Box 52080, New Orleans, LA 70150
Bardex Hydronautics, 6338 Lindmar Dr., P.O. Box 1068, Goleta, CA 93116
Bath Iron Works Corp., 700 Washington St., Bath, ME 04530
Bender Shipbuilding & Repair Co., Inc., P.O. Box 42, Mobile, AL 36601
Bethlehem Steel Corp., Martin Tower, Bethlehem, PA 18018
Blohm & Voss AG, P.O. Box 100720, D-2000 Hamburg 1 (In US)-Blohm & Voss CO, Springfield, N.J.
Boston Whaler Commercial Div., 1149 Hingham St., Rockland MA 02370
Burrard Yarrows Corporation, P.O. Box 86099, North Vancouver, B.C., Canada
Cantieri Navali Riuniti, Via Cipro, 11, 16100 Geneva, Italy
Chesapeake Shipbuilding Inc., 710 Fitzwater St., Salisbury, MD 21801
Conrad Industries, P.O. Box 790, Morgan City, LA 70380
Curacao Drydock Company Inc., 26 Broadway, Suite 741, New York, NY 10040
Dorbyl Ltd., Military Road, 1 Industrial Sites, West Bank, 5201 East London, Republic of South Africa
Dubai Drydocks, P.O. Box 8988, Dubai, United Arab Emirates—U.S.A. Agents: Keppel Marine Agencies, Inc., 26 Broadway, New York, NY 10040, 6240 Richmond Ave., Houston, TX 77057
Eastern Marine, Inc., P.O. Box 1009, Panama City, FL 32401
FMC Corp., Marine & Rail Equipment Div., 4700 N.W. Front Ave., Portland, OR 97208
Genstar Marine, 10 Pemberton Ave., No. Vancouver, B.C., Canada V7P 2R1
Gladding-Hearn Shipbuilding Corp., 1 Riverside Ave., Somerset, MA 02725
Golten Marine Co., Inc., 60 Van Brunt St., Brooklyn, NY 11231
Halter Marine, Inc., P.O. Box 29266, New Orleans, LA 70189
Hitachi Zosen Corp., 1-1-1 Hitotsubashi, Chiyoda-ku, Tokyo 100, Japan
Hong Kong United Dockyards Ltd., P.O. Box 534, Kowloon Central Post Office, Kowloon, Hong Kong
Hyundi Mipo Dockyard Ltd., 456 Cheonha-Dong, Ulsan, Korea
Jakobson Shipyard Inc., P.O. Box 329, Oyster Bay, NY 11771

# BUYERS DIRECTORY

**This directory section is an editorial feature published in every issue for the convenience of the readers of MARITIME REPORTER/Engineering News. A quick-reference readers' guide, it includes the names and addresses of the world's leading manufacturers and suppliers of all types of marine machinery, equipment, supplies and services.** A listing is provided, at no cost for one year in all 24 issues, only to companies with continuing advertising programs in this publication, whether an advertisement appears in every issue or not. Because it is an editorial service, unpaid and not part of the advertisers contract, MR/EN assumes no responsibility for errors. **If you are interested in having your company listed in this Buyers Directory Section, contact John C. O'Malley at (212) 477-6700.**

**AIR COMPRESSORS**
Hamworthy Engineering Ltd., 10555 Lake Forest Blvd., Suite 5F, New Orleans, LA 70127
Squire-Cogswell Company, 3411 Commercial Ave., Northbrook, IL 60062
**AIR CONDITIONING AND REFRIGERATION—REPAIR & INSTALLATION**
Bailey Refrigeration Co., Inc., 74 Sullivan St., Brooklyn, NY 11231
Flakt AB, Box 8862, S-40272, Gothenburg, Sweden
Marlo Coil/Nuclear Cooling, Inc., P.O. Box 171, High Ridge, MO 63049
Stal Refrigeration AB, Butangsgatan 16, S 601 87 Norrkoping, Sweden
**ANCHORS AND CHAIN**
Baldt Incorporated, P.O. Box 350, Chester, PA 19016
G.J. Wortelboer Jr. B.V., Eemhavenstraat 4, P.O. Box 5003, 3008 AA Rotterdam, Netherlands
**ANODES—Cathodic Protection**
American United Marine Corp., 5 Broadway, Rte. 1, Saugus, MA 01906
Engelhard Industries Division, 2655 U.S. Route 22, Union, NJ 07083
Federal Harco, P.O. Box 40310, Houston, TX 77240
**BALLASTS**
Genstar Stone Products Co., Executive Plaza IV Hunt Valley, MD 21031
**BASKET STRAINERS**
Riley-Beaird, P.O. Box 31115, Shreveport, LA 71130
**BEARINGS—Rubber, Metallic, Non-Metallic**
Grant Manufacturing & Alloying, Inc., 600 Schoolhouse Rd., Souderton, PA 18964
Johnson Rubber Co., Duramax Marine Div., 16025 Johnson St., Middlefield, OH 44062
Lucian O. Moffitt, Inc., P.O. Box 1415, Akron, OH 44309
Norton Chemplast, 309-150 Dey Rd., Wayne, NJ 07470
Thomson-Gordon Limited, 3225 Mainway, Burlington, Ontario, Canada L7M 1A6
Waukesha Bearings Corp., P.O. Box 798, Waukesha, WI 53186
**BLASTING—Cleaning—Equipment**
Butterworth Inc. (USA), 3721 Lapas Dr., P.O. Box 18312, Houston, TX 77223-9989
Butterworth Systems (UK), 123 Beddington Lane, Croydon CR9 4NX, England
CLEMCO, P.O. Box 7680, San Francisco, CA 94120
E.I. DuPont De Nemours & Co., Inc., Starblast Division, Room X39186, Wilmington, DE 19898
Key Houston Division of Jacksonville Shipyards, 13911 Atlantic Blvd., Jacksonville, FL 32225
**BOILERS**
Combustion Engineering, Inc., Windsor, CT 06095
**BOILER CLEANING**
Asea Stal, 50 Chestnut Ridge Rd., Montvail N.J. 07645
**BROKERS**
Capt. Astad Company, Inc., P.O. Box 53434, New Orleans, LA 70153
ECO Inc., 1036 Cape St. Claire Center, Annapolis, MD 21401
Mowbray's Tug & Barge, 21 West St., New York, NY 10006
Western Maritime, 701 B Street, San Diego, CA 92101
**BRONZES—COMMEMORATIVE**
Duramax Metals, Inc., 2401 Wesley Street, Portsmouth, VA 23707
**BUNKERING SERVICE**
Belcher Company, Inc., 8700 West Flagler, P.O. Box 525500, Miami, FL 33152
Gulf Oil Trading Co., 535 Madison Ave., New York, NY 10022
National Marine Service Inc. (Transport Div.), 1750 Brentwood Blvd., St. Louis, MO 63144
**CARGO HANDLING EQUIPMENT**
MacGregor-Navire International, Box 8991, S-402 74 Goteborg, Sweden
MacGregor Navire U.S.A. Inc., 135 Dermody St., Cranford, NJ 07016
**CASTINGS/FORGINGS**
NKS Industria Pesada, Grupo Industrial, Reforma 404, 140 Piso, Mexico, D.F. 06600 U.S. REP.—Lexington Transport (New York) Inc., 551 Fifth Ave., Room 910, New York N.Y. 10017
**CHOCKING SYSTEMS**
Philadelphia Resins Corp., 20 Commerce Drive, Montgomeryville, PA 18936
**CLOSURES—Marine**
Cornell-Carr Co. Inc., 63 Main St., Monroe, CT 06468
Mock Manufacturing Inc., 777 Rutland Rd., Brooklyn, NY 11203
**COMPUTERIZED INFORMATION SYSTEMS**
Marine Management Systems, Inc., 102 Hamilton Ave., Stamford, CT 06902
Maritime Data Network, Ltd., 102 Hamilton Ave., Stamford, CT 06902
Military Contract Information Service, Inc. Dist. by Maritime Reporter/Engineering News, 118 East 25 St. N.Y. N.Y. 10010
TIMSCO, 622 Azalea Rd., Mobile, AL 36609
Veson Systems, 29 Broadway, Suite 1002, New York, NY 10006
**CONDENSERS**
Riley-Beaird, P.O. Box 31115, Shreveport, LA 71130
**CONTROL SYSTEMS—Monitoring**
American United Marine Corp., 5 Broadway, Rte. 1, Saugus, MA 01906
ASEA, Inc., 4 New King St., White Plains, NY 10604
Autronica Marine USA, 280 Industrial Pkwy., Northvale, NJ 07647
Barringer Research, 304 Carlingview Dr., Rexdale, Ontario, Canada M9W 5G2
Biospherics Inc., 4928 Wyaconda Rd., Rockville, MD 20852
Bowmar/ALI, Inc., 531 Main St., Acton, MA 01720
Cooper Energy Services, Mount Vernon, OH 43050
Ergon, Inc., P.O. Drawer 1639, Jackson, MS 39205
Failsafe Motor/Generator Protector, Marine Safe Electronics Ltd., 101 Jardin Dr., Unit 24/25, Concord, Ontario, Canada L4K 1B6
Grumman Aerospace, 111 Stewart Ave., Bethpage, NY 11714.
Indikon Corp., 26 New St., Cambridge, MA 02138
Kongsberg North America Inc., 400 Oser Ave., Hauppauge, NY 11738
Leslie Co., 401 Jefferson Rd., Parsippany, NJ 07054
Marine Moisture Control Co., 60 Inip Dr., Inwood, NY 11696
Marine Safe Electronics, 37 Staffern Drive, Concord, Ontario, Canada, L4K 2X2
Megasystems, Inc., 1075 N.W. 58th Street, Boca Raton, FL 33431
Offshore Technology Corp., 578 Enterprise St., Escondido, CA 92025
Pandel Instruments Inc., 2100 N. Hwy. 360, Grand Praire, TX 75050
Propulsion Systems, Inc., 21213 76 Ave., Kent, WA 98032
Teleflex Inc., 771 First Ave., King of Prussia, PA 19406
Thomas Products, 987 West St., Southington, CT 06489-1023
Transamerica Delaval, Inc., Gems Sensors Division, Cowles Road, Plainville, CT 06062
Valmet Automation A.S., P.O. Box 130, N-3430, Spikkestad, Norway
**COUPLINGS**
CamLock Flange Sales Corp./Marine Moisture Control Co., 60 Inip Dr., Inwood, N.Y 11696
SKF Steel, 201 Tower Lane, P.O. Box 745, Avon, CT 06001
**CRANE BUMBERS**
Kastalon Inc., 4101 West 123rd St., Alsip, IL 60658
**CRANES—HOISTS—DERRICKS—WHIRLEYS**
Appleton Marine, P.O. Box 2339, Appleton, WI 54913
ASEA Hagglunds Inc., P.O. Box 7949, The Woodlands TX 77380
HIAB Cranes & Loaders Inc., 258 Quigley Boulevard, New Castle, DE 19720
Machinoexport, 35 Mosfilmovskaya Ul., 117330 Moscow, U.S.S.R.
Marine Travelift, Inc., 49 E. Yew St., Sturgeon Bay, WI 54235
J.D. Neuhaus, Hebezeuge, D5810, Witten Heven, West Germany
CMH Heleshaw, Inc., 201 Harrison St. Hoboken N.J. 07030
Cunningham Marine Hydraulics Co. Inc., 2030 E. Adams St. Jacksonville, FL 32202
**DECK MACHINERY—Cargo Handling Equipment**
Markey Machinery Co., Inc., 79 S. Horton St., Seattle, WA 98134
Murdock Engineering Company, P.O. Box 2278, Irving, TX 75061
Schoellhorn Albrecht, Div. of St. Louis Ship, 3460 So. Broadway, St. Louis, MO 63118
**DECKING—GRATING**
Alligned Fiber Composites, Highway 52, South Chatfield, MN 55923
International Grating, 7625 Parkhurst, Houston, TX 77028
Selby, Battersby & Company, 5220 Whiby Ave., Philadelphia, PA 19143
**DIESEL ACCESSORIES—CYLINDER LINERS**
Colt Industries Inc. Fairbanks Morse Engine Div. 701 Lawton Ave., Beloit, WI 53511
General Thermodynamics Corporation, 210 South Meadow Road, P.O. Box 1105, Plymouth, MA 02360
Haynes Corporation, P.O. Box 179, Jackson, MI 49204
Illman Jones, 1111 Green Island Rd., American Canyon, CA 94589
Stewart & Stevenson Services, Inc.—MWM, P.O. Box 1637, Houston, TX 77251-1637
Transamerica Delaval Engine & Comp. Div., 550 85th, Oakland, CA
**DIESEL ENGINE—Spare Parts & Repair**
Alban Engine Power, Inc., 6455 Washington Blvd., Baltimore, MD 21227
Alco Power Inc., 100 Orchard St., Auburn, N.Y. 13021
Colt Industries Inc. Fairbanks Morse Engine Div. 701 Lawton Ave., Beloit, WI 53511
Cummins Engine Co., Inc., Mail Code 40642, Box 3005 Columbus, IN 47202-3005
Granges Repair Service GMBH, Gutenbergring, 64 D-2000 Hamburg-Norderstedt TX:0215553
Schoonmaker Service Parts Co., Inc., P.O. Box 757, Foot of Spring St., Sausalito, CA 94966
Stewart & Stevenson Services, Inc.—MWM, P.O. Box 1637, Houston, TX 77251-1637
Sulzer Brothers Inc., 200 Park Ave., New York, N.Y. 10166
Transamerica Delaval Engine & Comp. Div., 550 85th, Oakland, CA
**ELECTRICAL EQUIPMENT**
Newmar, P.O. Box 1306, Newport Beach, CA 92663
Stewart & Stevenson Services, Inc.—MWM, P.O. Box 1637, Houston, TX 77251-1637
Valad Electric Heating Corporation, 162 Wildey St., Tarrytown, NY 10591
Ward Leonard Electric Co., 31 South St., Mt. Vernon, NY 10550
Zidell Explorations, Inc., 3121 S.W. Moody St., Portland, OR 97201
**ELECTRONIC SYSTEMS**
Marine Electric RPD, Inc., 666 Pacific St., Brooklyn, NY 11217 TX: 125327
**EMULSIFICATION SYSTEMS**
Cleanodan A/S, N. American Agents, American United Marine Corp., 5 Broadway, Route 1, Saugus, MA 01906
S/S Research & Development Inc., 1050 State St., Perth Amboy, NJ 08862
**ENGINE TEST EQUIPMENT**
General Thermodynamics Corp., P.O. Box 1105, 210 S. Meadow Road, Plymouth, MA 02360
**ENTERPRISE**
Transamerica Delaval Engine & comp. Div., 550 85th, Oakland, CA
**EQUIPMENT—Marine**
American General/Levin Corp., 445 Littlefield Ave., So. San Francisco, CA 94080
ASEA Hagglunds Inc., P.O. Box 7949, The Woodlands TX 77380
Band-It Division, Houdaille Industries, Inc., P.O. Box 16307, Denver, CO 80216
Boston Metals Co., 313 E. Baltimore St., Baltimore, MD 21202
Thomas Coudon Associates, 6655 Amberton Dr., Baltimore, MD 21227
Fitz-Wright Suits Ltd., 17919 Roan Pl., Surrey, B.C., Canada V3S 5K1
Hamworthy Engineering Ltd., 10555 Lake Forest Blvd., Suite 5F, New Orleans, LA 70127
Kearfott Marine Products, 550 South Fulton Ave., Mount Vernon, NY 10550
Maritime Power Corp., 200 Henderson Street, Jersey City, NJ 07302
Raytheon Service Co., 100 Roesler Rd., Suite 103, Glen Burnie, MD
Republic-Lagun Machine Tool Co., 1000 E. Carson St., Carson, CA 90749 TX: 181098
**EVAPORATORS**
Alfa-Laval, Inc., Dept. MR-2, 2115 Linwood Ave., Fort Lee, NJ 07024
Aqua-Chem Inc., P.O. Box 421, Milwaukee, WI 53201
Riley-Beaird, P.O. Box 31115, Shreveport, LA 71130
**FANS—VENTILATORS—BLOWERS**
American United Marine Corp., 5 Broadway, Rte. 1, Saugus, MA 01906
Joy Manufacturing Company, 338 So. Broadway, New Philadelphia, OH 44663
Zidell Explorations, 3121 S.W. Moody St., Portland, OR 97201
**FASTENERS**
Sales Systems Limited,7006, 700 Florida Ave., Portsmouth, VA 23707
**FENDERING SYSTEMS—Dock & Vessel**
InterTrade Industries, 15301 Transistor Lane, Huntington Beach, CA 92649
Johnson Rubber Co., Duramax Marine Div., 16025 Johnson St., Middlefield, OH 44062
Samson Ocean Systems, Inc., 99 High St., Boston, MA 02110
Seaward International, Inc., 6269 Leesburg Ave., Falls Church, VA 22044
**FILTERS**
Dahl Manufacturing, Inc., 2521 Railroad Ave., Ceres, CA 95307
**FINANCING—Leasing**
Gulf Western Leasing Corp., 1500 City West Blvd., Suite 300, Houston, TX 77047
JMJ Marine Investors, P.O. Box 51509, New Orleans, LA 70151
**FIRE PROTECTION, DETECTION & ALARM SYSTEMS**
Walter Kidde, Walter Kidde Dr., Wake Forest, NC 27586
**FUEL OIL/ADDITIVES—Analysis & Combustion Testing**
Ferrous Corporation, 910-108th N.E., P.O. Box 1764, Bellevue, WA 98009
Hamworthy Engineering Ltd., 10555 Lake Forest Blvd., Suite 5F, New Orleans, LA 70127
McTigue Industries Inc., 1615 9th Ave., Bohemia, NY 11716
U.S. Borax, 3075 Wilshire Blvd., Los Angeles, CA 90010
**FURNITURE**
Bailey Carpenter & Insulation Co., 74 Sullivan Street, Brooklyn, NY 11231
Comfort-Mate, Inc., 7988 NW 56th Street, Miami, FL 33166
**GALLEY EQUIPMENT**
Insinger Machine Co., 6245 State Rd., Philadelphia, PA 19135
**GANGWAYS**
Rampmaster Inc., 9825 Osceola Blvd., Vero Beach, FL 32960
**HATCH & DECK COVERS—Chain Pipe**
CamLock Flange Sales Corp./Marine Moisture Control Co., 60 Inip Dr., Inwood, NY 11696
Marine Moisture Control Co., 60 Inip Dr., Inwood, NY 11696
MacGregor-Navire Internatinal, Box 8991, S-402 74 Goteborg, Sweden
MacGregor Navire U.S.A. Inc., 135 Dermody St., Cranford, NJ 07016
Mock Manufacturing Inc., 777 Rutland Rd., Brooklyn, NY 11203
**HEAT EXCHANGERS**
Alfa-Laval, Inc., Dept. MR-2, 2115 Linwood Ave., Fort Lee, NJ 07024
Riley-Beaird, P.O. Box 31115, Shreveport, LA 71130
**HOLD LINERS**
Himont U.S.A., Inc., 1313 N. Market St., Wilmington, DE 19894
**HULL CLEANING**
Butterworth Inc. (USA), 3721 Lapas Dr., P.O. Box 18312, Houston, TX 77223-9989
Butterworth Systems (UK), 123 Beddington Lane, Croydon CR9 4NX, England
Gulf International Divers, P.O. Box 1342, Gretna (New Orleans), LA 70052
Petroferm Marine, Route 2, Box 280, Amelia Island, FL 32034
Phosmarine Equipment, 21 Bd. de Paris, 13002, Marseille, France
Seaward Marine Services, Inc., 6269 Leesburg Pike, Falls Church, VA 22044
Seaward International, 5409 Beamon Rd., Norfolk, VA 23513 TX: 710-881-1182
Taylor Diving & Salvage Co. Inc., 701 Engineers Rd., Belle Chasse, LA 70037
**HYDRAULICS**
Aeroquip Corp., 1130 Maynard Road, Jackson, MI 49202
Bardex Hydranautics, 6338 Lindmar Dr., P.O. Box 1068, Goleta, CA. 93116
Cunningham Marine Hydraulics Co., Inc., 201 Harrison St., Hoboken, NJ 07030; 2030 E. Adams St., Jacksonville, FL 32204, TX: 710-730-5224
CMH Heleshaw, Inc., 201 Harrison St. Hoboken N.J. 07030
Del Gavio Marine Hydraulics Inc., 207 W. Central Ave., Maywood, NJ 07607
Hydra-Dynamics, Inc., 2141 Greenwood Ave., Wilmette, IL 60091
Washington Chain & Supply, Inc., P.O. Box 3646, Seattle, WA 98124
**INERT GAS—Generators—Systems**
Maritime Protection A/S, N. American Agents, American United Marine Corp., 5 Broadway, Rte. 1, Saugus, MA 01906
**INSULATION—Cloth, Fiberglass**
Bailey, Carpenter & Insulation Co., Inc., 74 Sullivan St., Brooklyn, NY 11231
Duracote Corp., 350 North Diamond St., Ravenna, Ohio 44266
Superior Energies, Inc. P.O. Drawer 386, Groves, TX 72619
**INSURANCE**
Adams & Porter, 510 Bering Dr., Houston, TX 77057-1408
Adams & Porter, 1 World Trade Center, Suite 8433, New York, NY 10048
Wm. Keith Hargrove, Inc., 1300 Post Oak Blvd., Suite 2050, Houston, TX 77056
United States P&I Agency, Inc., 80 Maiden Lane, New York, NY 10038
**JOINER—Watertight Doors—Paneling**
Advanced Structures Corp., 235 W. Industry Ct., Deer Park, NY 11729
Astech, 3030 S. Red Hill Ave., Santa Ana, CA 92711
Bailey Distributors, Inc., 74 Sullivan St., Brooklyn, NY 11231
Masonite Commercial Division, Dover, OH 44622
Megadoor Inc., 441 Lexington Ave., Suite 903, New York, NY 10017
Walz & Krenzer, Inc., 400 Trabold Road, Rochester, NY 14624
**KEEL COOLERS**
R.W. Fernstrum & Co., 1716 Eleventh Ave., Menominee, MI 49858
Johnson Rubber Co., Duramax Marine Div., 16025 Johnson St., Middlefield, OH 44062
**LIGHTING EQUIPMENT—Lamps, Fixtures, Searchlights**
Midland-Ross Corp., Russellstoll Division, 530 W. Mt. Pleasant Ave., Livingston, NJ 07039
Perko Inc., P.O. Box 6400D, Miami, FL 33164
Phoenix Products Company, Inc., 4769 North 27th Street, Milwaukee, WI 53209
**LINE BLINDS**
Stacey/Fetterolf Corp., P.O. Box 103, Skippack, PA 19474
**MACHINERY MAINTENANCE, REPAIR, OVERHAUL, AND TESTING**
A-C Brake Co., 308 E. College St., Louisville, KY
CMH Heleshaw, Inc., 201 Harrison St. Hoboken N.J. 07030
Cunningham Marine Hydraulics Co. Inc., 2030 E. Adams St. Jacksonville, FL 32202
Jered Brown Brothers Inc., 1300 Coolidge, P.O. Box 2006, Troy, MI 48007
American General/Levin Corp., 445 Littlefield Ave., So. San Francisco, CA 94080
Goltens, 160 Van Brunt St., Brooklyn, NY 11231
Rosan, Inc., 2901 West Coast Hwy., Newport Beach, CA 92663
**METALS**
Bayou Steel Corp., P.O. Box 5000, Laplace, LA 70068
**MINING**
Rocky Mountain Energy, 10 Longspeake Dr., Box 2000, Broomfield, CO 80020
**MOORING SYSTEMS**
Samson Ocean Systems, Inc., 99 High Street, Boston, MA 02110
**NAME PLATES—BRONZE—ALUMINUM**
Duramax Metals, Inc., 2401 Wesley Street, Portsmouth, VA 23707
**NAVAL ARCHITECTS, MARINE ENGINEERS, SURVEYORS**
Advanced Marine Enterprises, Inc., 1725 Jefferson Davis Highway (Suite 1300), Arlington, VA 22202
Aero Nav Laboratories, Inc., 14-29 112 St., College Point, NY 11356
American Systems Engineering Corp., P.O. Box 4265, Virginia Beach, VA 23454
Amirikian Engineering Co., Chevy Chase Center Bldg., Suite 505, 35 Wisconsin Circle, Chevy Chase, MD 20015
Art Anderson Associates, 148 First St., Bremerton, WA 98310

B.C. Research, 3650 Wesbrook Mall, Vancouver, B.C. Canada V6S 2L2
Del Breit inc., 326 Picayune Place (Suite 201), New Orleans, LA 70130
C.A.C.I., Inc., 1815 No. Fort Myer Dr., Arlington, VA 22209
C.D.I. Marine Co., 5520 Los Santos Way, Suite 600, Jacksonville, FL 32211
C.T. Marine, 18 Church Street, Georgetown, CT 06829
Phillips Cartner & Co., Inc., 203 So. Union St., Alexandria, VA 22314
Century Engineering, inc., 32 West Rd., Towson, MD 21204
Childs Engineering Corp., Box 333, Medfield, MA 02052
Crandall Dry Dock Engrs., Inc., 21 Pottery Lane, Dedham, MA 02026
Crane Consultants Inc., 15301 1st Ave., So. Seattle, WA 98148
C.R. Cushing, 18 Vesey St., New York, NY 10007
Design Associates Inc., 14360 Chef Menteur Highway, New Orleans, LA 70129
Designers & Planners, Inc., 1725 Jefferson Davis Highway, Suite 700, Arlington, VA 22202
ECO Inc., 1036 Cape St. Claire Center, Annapolis, MD 21401
Encon Management & Engineering Consultant Services, P.O. Box 7760, Beaumont, TX 77706
Christopher J. Foster, Inc., 16 Sintsink Drive East, Port Washington, NY 11050
Gibbs & Cox, Inc., 119 West 31st Street, New York, NY 10001
John W. Gilbert Associates, Inc., 66 Long Wharf, Boston, MA 02110
The Glosten Associates, Inc., 610 Colman Bldg., 811 First Ave., Seattle, WA 98104
Phillip Gresser Associates, Ltd., 3250 South Ocean Blvd., Palm Beach, FL 33480
Morris Guralnick Associates, Inc., 620 Folsom Street, Suite 300, San Francisco, CA 94107
Hamilton Cornell Associates, Box 188, Snug Harbor Station, Duxbury, MA 02331
J.J. Henry Co., Inc., 40 Exchange Place, New York, NY 10005
Hi-Test Laboratories, Inc., P.O. Box 226, Buckingham C.H., VA 23921
HydroComp, Inc., 10 Cutts Road, P.O. Box 865, Durham, NH 03824
Intramarine, Inc., P.O. Box 53043, Jacksonville, FL 32201
R.D. Jacobs & Associates, 11405 Main St., Roscoe, IL 61073
Jantzen Engineering Co., 6655-H Amberton Drive, Baltimore, MD 21227
J.L. Konopasek & Associates, 3523 Scrimshaw Dr., Jacksonville, FL 32217
James S. Krogen & Co., Inc., 3333 Rice St., Miami, FL 33133
Rodney E. Lay & Associates, 13891 Atlantic Blvd., Jacksonville, FL 32225
Alan C. McClure Associates, Inc., 2600 South Gessner, Houston, TX 77063
John J. McMullen Associates, Inc., 1 World Trade Center, New York, NY 10048
McLear & Harris, Inc., 28 West 44 Street, New York, NY 10036
Fendall Marbury, 1933 Lincoln Drive, Annapolis, MD 21401
Marine Consultants & Designers, Inc., 308 Investment Insurance Bldg., Corner E. 6th St. & Rockwell Ave., Cleveland, OH 44114
Marine Design Inc., 401 Brood Hollow Road, Rte. 110, Melville, NY 11746
Marine Power Associates, 4475 Mission Blvd., Suite 235, San Diego, CA 92109
Marine Technical Associates, Inc., 95 River Rd., Hoboken, NJ 07030
George E. Meese, 194 Acton Rd., Annapolis, MD 21403
R. Carter Morrell, 715 S. Cherokee, Bartlesville, OK 74003
NKF Engineering Assoc., Inc., 8150 Leesburg Pile, Vienna, VA 22202
Nelson & Associates, Inc., 610 Northwest 183rd St., Miami, FL 33169
New England Engineering & Marine Services, Rt. 2, Box 50, York, ME 03909
Nickum & Spaulding Associates, Inc., 2701 First Ave., Seattle, WA 98121
Northern Marine, P.O. Box 1169, Traverse City, MI 49685
Ocean-Oil Internatinal Engineering Corporation, 3019 Mercedes Blvd., New Orleans, LA 70114
PRC Guralnick, 5252 Balboa Ave., San Diego, CA 92117
Pearlson Engineering Co., Inc., 8970 S.W. 87th Ct., Miami, FL 33156
S.L. Petchul, Inc., 1380 S.W. 57th Avenue, Fort Lauderdale, FL 33317
Q.E.D. Systems Inc., 4646 Witchduck Rd., Virginia Beach, VA 23455
M. Rosenblatt & Son, Inc., 350 Broadway, New York, NY 10013 and 667 Mission St., San Francisco, CA 94105
Sargent & Herkes Inc., 611 Gravier St., New Orleans, LA 70130
Schmahl and Schmahl, Inc., 1209 S.E. Third Ave., Fort Lauderdale, FL 33316
SEACOR Systems Engineering Associates Corp., 19 Perina Blvd., Cherry Hill, NJ 08003 (Publications Division at Cherry Hill location)
STV/Sanders & Thomas, Inc., 1745 Jefferson Davis Hwy., Arlington, VA 22202
Seaworthy Systems, Inc., 28 Main St., Essex Ct. 06426; 17 Battery Place, N.Y. N.Y. 10004, P.O. Box 205, Solomons, MD 20688
Seaworthy Electrical Systems, 17 Battery Pl. N.Y. N.Y. 10004
George G. Sharp, Inc., 100 Church St., New York, NY 10007
Simmons Associates, P.O. Box 760, Sarasota, FL 33578
R.A. Stearn, Inc., 253 N. 1st Ave., Sturgeon Bay, WI 54235
J.F. Stroschein Associates, 666 Old Country Rd., Garden City, NY 11530
Richard R. Taubler, Inc., 610 Carriage La., Dover, DE 19901
Timsco, 622 Azalea Road, Mobile, AL 36609
Tracor Hydronautics, Inc., 7210 Pindell School Rd., Laurel, MD 20707
Thomas B. Wilson, Associates, 1258 North Avalon Blvd., Wilmington, CA 90744

**NAVIGATION & COMMUNICATIONS EQUIPMENT**

Atkinson Dynamics, Section 6, 10 West Orange Ave., South San Francisco, CA 94080
British Telecom International, The Holborn Centre, 120 Holborn, London EC1N 2TE
CMC Communications Inc., 5479 Jetport Industrial Blvd., Tampa, FL 33614
COMSAT World Systems, 950 L'Enfant Plaza, S.W., Suite 6151 Washington, DC 20024
A/S Elektrisk Bureau, P.O. Box 98, N-1360 Nesbru, Norway
Furuno U.S.A., 271 Harbor Way, S. Son Francisco, CA 94080
General Electric Company, Mobile Communications Division, Lynchburg, VA 24502
Harris Communications (RF Communications), 1680 University Avenue, Rochester, NY 14610
Henschel Corp., 9 Hoyt Drive, Newburyport, MA 01950
Hose McCann Telephone Company, Inc., 9 Smith Street, Englewood, NJ 07631
ITT Mackay, 441 U.S. Highway #1, Elizabeth, NJ 07202
Japan Radio Co., Ltd., Akasaka Twin Tower, 17-22, Akasaka 2-chome, Minato-ku, Tokyo 107, Japan U.S. Rep: 405 Park Ave., New York, NY 10022
Kongsberg North America Inc., 400 Oser Ave., Hauppauge, NY 11738
Kongsberg Vopenfabrikk, Norcontrol Division, P.O. Box 145, Horten 3191, Norway
Krupp Atlas-Elektronik, 1453 Pinewood St., Rahway, NJ 07065
Micrologic, 20801 Dearborn, Chatsworth, CA 91311
Nav-Com, Inc., 9 Brandywine Drive, Deer Park, NY 11729
Navigation Sciences Inc., 6900 Wisconsin Ave., Bethesda, MD 20815 TX: 705999
Perko Inc. (Lights), P.O. Box 6400D, Miami, FL 33164
Racal Marine Inc., 1 Commerce Blvd., Palm Coast, FL 32037-0029
Radio-Holland USA, Inc., 6033 South Loop East, Houston, TX 77033
Raytheon Marine Co., 676 Island Pond Road, Manchester, NH 03103
Raytheon Ocean Systems Company, Westminster Park, Risho Avenue, East Providence, RI 02914
Raytheon Service Co., 103 Roesler Rd., Glen Burnie, MD 21061
Robertson Autopilot, 400 Oser Ave., Happauge, NY 11738
Simrad, Inc., 2208 N.W. Market St., Suite 600, Seattle, WA 98107
Sperry Corporation, Great Neck, NY 11020
Standard Communications, P.O. Box 92151, Los Angeles, CA 90009
Telesystems, 2700 Prosperity Ave., Fairfax, VA 22031 USA
Texas Instruments, Inc., P.O. Box 405, 3438, Lewisville, TX 75067

**OILS—Marine—Additives**

Exxon Company, U.S.A., Room 2323 AH, P.O. Box 2180, Houston, TX 77701
Gulf Oil Company—U.S. (Domestic Oils), 909 Fannin Street, Houston, TX 77001
Gulf Oil, New York District Sales Office (Domestic), 433 Hackensack Avenue, Hackensack, NJ 07601
Gulf Oil Trading Co., 535 Madison Ave., New York, NY 10022
Mobil Oil Corp., 150 East 42 Street, New York, NY 10017
Texaco, Inc. (International Marine), 135 East 42nd St., New York, NY 10017

**OIL/WATER SEPARATORS**

Alfa Laval, Inc., Dept. MR-2, 2115 Linwood Ave., Fort Lee, NJ 07024
Biospherics Incorporated, 5001 Forbes Blvd., Lanham, MD 20801
Butterworth Inc. (USA), 3721 Lapas Dr., P.O. Box 18312, Houston, TX 77223-9989
Butterworth Systems (UK), 123 Beddington Lane, Croydon CR9 4NX, England
Centrico, Inc. (Westfalia Separators), 100 Fairway Court, Northvale, NJ 07647
Dahl Manufacturing, Inc., 2521 Railroad Ave., Ceres, CA 95307
Hamworthy Engineering Ltd., 10555 Lake Forest Blvd., Suite 5F, New Orleans, LA 70127
Hyde Products, Inc., 810 Sharon Dr., Westlake, OH 44148
Microphor, Inc., P.O. Box 490, Willits, CA 95490
Marine Moisture Control Co., 60 Inip Dr., Inwood, NY 11696
Peck Purifier Sales Co., 3724 Cook Blvd., Chesapeake, VA 23323

**PAINTS—COATINGS—CORROSION CONTROL**

American Abrasive Metals, 460 Coit Street, Irvington, NJ 07111
Ameron, 4700 Ramona Blvd., Monterey Park, CA 91754
CLEMCO, P.O. Box 7680, San Francisco, CA 94120
Dampney Company, Inc., 85 Paris St., Everett, MA 02149
Devoe Marine Coatings Co., P.O. Box 7600, Louisville, KY 40207
Drew Ameroid Marine, One Drew Chemical Plaza, Boonton, NJ 07005
E.I. DuPont De Nemours & Co., Inc. Nemours Bldg., Rm. N-2504-2, Wilmington, DE 19898
DuPont Co. MPS , Room X40750, Wilmington, DE 19898
Esgard, Box 2698, Lafayette, LA 70502
Farboil Company, 8200 Fischer Rd., Baltimore, MD 21222
Hempel Marine Paints, Inc., Foot of Currie Ave., Wallington, NJ 07057; 6868 NorthLoop East, Suite 304, Houston, TX 77028; P.O. Box 10265, New Orleans, LA 70181
International Paint Company, Inc., 2270 Morris Avenue, Union, NJ 07083
Jotun Marine Coatings Inc., 175 Penrod Court N&O, Glen Burnie, MD 21061
Magnus Maritec International Inc., 150 Roosevelt Pl., P.O. Box 150, Palisades Park, NJ 07650
Palmer Products Inc., P.O. Box 8, Worcester, PA 19490
Products Research & Chemical Corp., 5454 San Fernando Rd., Glendale, CA 91203

**PIPE-HOSE—Cargo Transfer Clamps, Couplings, Coatings**

Amermarine International, P.O. Box 9205, Dundalk, MD 21222
Deutsch Metal Components, 14800 S. Figueroa St., Gardena, CA 90248
Hydro-Craft Inc., 1821 Rochester Industrial Dr., Rochester, MI 48063
Selkirk Metalbestos, Box 19000, Greensboro, NC 27419
Tioga Pipe Supply Co. Inc., 2450 Wheatsheaf La., P.O. Box 5997, Philadelphia, PA 19137

**PLASTICS—Marine Applications**

Hubeva Marine Plastic, Inc., 390 Hamilton Ave., Brooklyn, NY 11231
Norton Chemplast, 309-150 Dey Rd. Wayne NJ 07470

**PLYWOOD**

Simpson Timber Co., Third and Franklin, Sheton, WA 98584

**PROPULSION EQUIPMENT—Bowthrusters, Diesel Engines, Gears, Propellers, Shafts, Turbines**

Amarillo Gear Co., P.O. Box 1789, Amarillo, Texas 79105
Aquamaster Inc., 4125, 9th Avenue N.W. Seattle, WA 98107
Armco Steel/Advanced Materials Div., 703 Curtis St., Middletown, OH 45043
Avondale Shipyards, Inc., P.O. Box 52080, New Orleans, LA 70150
Bergen Diesel Inc., 2110-10 Service Rd., Kenner, LA 70062
Bird-Johnson Company, 110 Norfolk St., Walpole, MA 02081
Boston Metals Co., 313 E. Baltimore St., Baltimore, MD 21202
Burmeister & Wain Alpha Diesel AS, DK-1400 Copenhagen K, Denmark
Capitol Gears, 349 N. Hamline Ave., St. Paul, MN 55104
Caterpillar Engine Division, 100 N.E. Adams, Peoria, IL 61629
Cincinnati Gear Co., 5657 Wooster Pike, Cincinnati, OH 45227
Colt Industries Inc. (Fairbanks Morse Engine Div.), 701 Lawton Avenue, Beloit, WI 53511
Columbian Bronze Corporation, 216 No. Main Street, Freeport, NY 11520
Combustion Engineering, Inc., Windsor, CT 06095
Coolidge-Stone Vickers, Inc., 56 Squirrel Rd., Auburn Hills, MI 48057
Daihatsu Diesel (USA) Inc., 180 Adams Ave., Hauppauge, NY 11788
Deutz Corp., 7585 Ponce de Leon Circle, Atlanta, GA 30340
Elliott Company, 1809 Sheridan Ave., Springfield, OH 45505
George Engine Company, Inc., Lafayette, LA
General Motors, Electro-Motive Division, LaGrange, IL 60525
Golten Marine Co., Inc., 160 Van Brunt St., Brooklyn, NY 11231
Isotta Fraschini S.p.A., c/o Italian Aerospace Industries (U.S.A.), Inc., 1235 Jefferson Davis Hwy., Suite 500, Arlington, VA 22202
KHD Canada Inc., 180 Rue de Normandie, Boucherville, Quebec J4B 5S7, Canada
Lips Propellers, 3617 Koppens Way, Chesapeake, VA 23323
M.A.N.-B&W Diesel, 2 Ostervej, DK-4960 Holeby, Denmark
MTU of North America, One E. Putnam Ave., Greenwich, CT 06830; 10450 Corporate Dr., Sugarland, TX 77478; 2945 Railroad Ave., Morgan City, LA 70203; 180 Nickerson St., Seattle, WA 98109; 1730 Lynn St., Arlington, VA 22209
MWM-Murphy Diesel, 12 Greenway Plaza, Suite 1100, Houston, TX 77046
Mapeco Products, Inc., 20 Vesey St., New York, NY 10007
Michigan Wheel, 1501 Buchanan Ave., S.W., Grand Rapids, MI 49507
National Marine Service Louisiana, Inc., 222 Bayou Rd., Belle Chasse, LA 70037
North American Marine Jet P.O Box 1232 Benton, AR 72015
Omnithruster Inc., 9515 Sorensen Ave., Santa Fe Springs, CA 90670
Penske GM Power, Inc., 600 Parsippany Road, Parsippany, NJ 07054
Penske GM Power, Lodi N.J., 180 Rt. 17 South, Lodi, NJ 07644
Inland Water Propulsion Systems, Inc., 580 Walnut St., Cincinnati, OH 45201
Propulsion Systems, Inc., 21213 76 Ave. So., Kent, WA 98032
SACM (Societe Alsacienne De Constructions Mechaniques De Mulhouse) 1, Rue De La Fonderie, Boite Postale 1210, 68054 Mulhouse Cedex, France
Schottel of America, Inc., 8375 N.W. 56 St., Miami, FL 33166
Stewart & Stevenson Services, Inc., P.O. Box 1637, Houston, TX 77251-1637
Sulzer Brothers, Dept. Diesel Engines, CH-8401 Winterthur, Switzerland
Tech Development Inc., 6800 Poe Ave., P.O. Box 14557, Dayton, OH 45414
Transamerica DeLaval Inc., Engine & Compressor Div., 550 85th Ave., Oakland, CA 94621
Transamerica Delaval, Inc., Turbine & Compressor Div., P.O. Box 8788, Trenton, NJ 08650
Ulstein Maritime Ltd., 6307 Laurel St., Burnaby, B.C. Canada V5B 3B3
Ulstein Trading Ltd. A/S, N-6-65, Ulsteinvik, Norway
Voith Schneider America, 159 Great Neck Rd., Ste. 200, Great Neck, NY 11021
Volvo Penta of America, P.O. Box 927, Rockleigh, NJ 07647
WABCO Fluid Power, an American-Standard Company, 1953 Mercer Rd., Lexington, KY 40505
Wartsila Power Inc., 5132 Taravella Rd., P.O. Box 868, Marrero, LA 70072
Waukesha Engine Division, Waukesha, WI 53187

**PUMPS—Repairs—Drives**

Allweiler Pump Inc., 5410 Newport Dr., Rolling Meadows, IL 60008 TX: 270-0444
Cunningham Marine Hydraulics Co., Inc., 201 Harrison St., Hoboken, NJ 07030; 2030 E. Adams St., Jacksonville, FL 32204, TX: 710-730-5224
CMH Heleshaw, Inc., 201 Harrison St. Hoboken N.J. 07030
Goltens, 160 Van Brunt St., Brooklyn, NY 11231
Hamworthy Engineering Ltd., 10555 Lake Forest Blvd., Suite 5F, New Orleans, LA 70127
Ingersoll—Rand Pump Group, Dept. B—346, Washington, N.J. 07882
Jim's Pump Repair, 48-55 36th St., Long Island City, NY 11101
Megator Corporation, 562 Alpha Drive, Pittsburgh, PA 15238
Sims Pump Valve Co., Inc., 1314 Park Ave., Hoboken, NJ 07030
Transamerica Delaval, Pyramid Pump Div., P.O. Box 447, Monroe, NC 28110
Vita Motivator Company, 200 West 20th St., New York, NY 10011
Warren Pumps Division, Bridges Avenue, Warren, MA 01083
Wilden Pump & Engineering Co., 22060 Van Buren St., P.O. Box 845, Colton, CA 92324

**REFRIGERATION—Refrigerant Valves**

Bailey Refrigeration Co., Inc., 74 Sullivan St., Brooklyn, NY 11231
United Technologies Carrier Transicold Div., Carrier Corp., P.O. Box 4805, Syracuse, NY 13221

**ROPE—Manila—Nylon—Hawsers—Fibers**

A.L. Don Co., Foot of Dock St., Matawan, NJ 07747
Allied Fibers, 1411 Broadway, New York, NY 10018
American Mfg. Co., Inc., Willow Avenue, Honesdale, PA 18431
Atlantic Cordage Corp., 60 Grant Avenue, Carteret, NJ 07008
DuPont Co., KEVLAR Aramid Fiber, Room G-15465, Wilmington, DE 19898
Samson Ocean Systems, Inc., 99 High Street, Boston, MA 02110
Tubbs Cordage Company, P.O. Box 709, Orange, CA 92666
Tubbs Cordage Co., P.O. Box 7986, San Francisco, CA 94120-7986
Vermeire N.V. Industripark Zwaarveld, B-9160 Hamme, Belgium TX: 21687
Wall Industries, Inc., P.O. Box 560, Elkin, NC 28621

**SANITATION DEVICES—Pollution Control**

Davit Sales Inc., P.O. Box 232, Jefferson Valley, NY 10535
Envirovac Inc., 1260 Turret Dr., Rockford, IL 61111
FAST Sewage Systems, Div. of St. Louis Ship, 611 East Marceou St., St. Louis, MO 63111
Golor Metal A/S, P.O. Box 70, 4901 Tvedestrand, Norway
Hamworthy Engineering Ltd., 10555 Lake Forest Blvd., Suite 5F, New Orleans, LA 70127
Marine Moisture Control Co., Inc., 60 Inip Dr., Inwood, L.I., NY 11696
Marland Environmental Systems, P.O. Box 501, Great Falls, VA 22066
National Sanitation Foundation, P.O. Box 1468, Ann Arbor, MI 48105

**SCAFFOLDING EQUIPMENT—Work Platforms**

McCausey Lumber Co., 7751 Lyndon, Detroit, MI 48238
Trus-Joist Corp., P.O. Box 60, Boise, ID 83704

**SCUTTLES/MANHOLES**

Mock Manufacturing Inc., 777 Rutland Rd., Brooklyn, NY 11203

**SHAFT SEALS, REVOLUTION INDICATOR EQUIPMENT**

Bird-Johnson Co., 100 Norfolk St., Walpole, MA 02081
Crane Packing Company, 435 Regina Dr., Clarksberg, MD 20734
Norton Chemplast, 309-150 Dey Rd., Wayne, NJ 07470

**SHIPBREAKING—Salvage**

Fred Devine Diving & Salvage, Inc., 6211 N. Ensign, Swan Island, Portland, OR 97217
Zidell Explorations, Inc., 3121 S.W. Moody St., Portland, OR 97201

**SHIPBUILDING EQUIPMENT**

Bardex Hydranautics, 6338 Lindmar Dr., P.O. Box 1068, Goleta, CA. 93116
Cockatoo Dockyard Pty. Ltd., P.O. Box 1139, North Sydney, NSW 2060, Australia TX: 72086
Pearlson Engineering Co., P.O. Box 8, Kendall Branch, Miami, FL 33156
Total Transportation System Inc., 813 Forest Dr., Newport News, VA 23606
Total Transportation Systems (International) A/S, Bjornegarden, P.O. Box 248, N 5201, Os, Norway

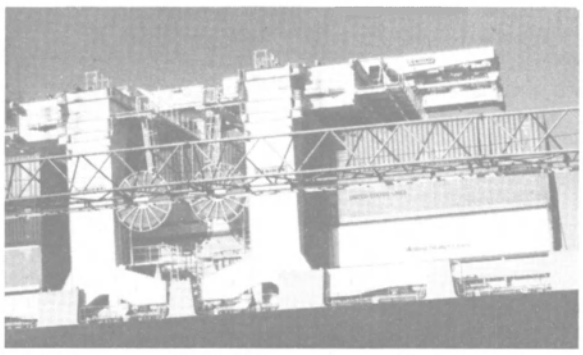
**SHIPBUILDING STEEL**

Armco Steel Corp., 703 Curtis St., Middletown, OH 45042
Bethlehem Steel Corp., Martin Tower, Bethlehem, PA 18018
United States Steel Corp., Christy Park Plant, 2214 Walnut St., McKeesport, PA 15132
Welded Beam Company, P.O. Box 280, Perry, OH 44081

**SHIPBUILDING—Repairs, Maintenance, Drydocking**

Amsterdam Drydock Company, Post Box 3006, 1003 AA, Amsterdam, Holland
Arsenale Triestino-San Marco Shipyard, Trieste, Italy, U.S. Rep: Marine Technologies & Brokerage, 33 Rector St., New York, NY 10066
Asmar Shipyards Co., Astilleros y Maestranzs de la Armada, Prat 856, Piso 14, Casilla 150-V, Valpariso, Chile, S.A.
Avondale Shipyards, Inc., P.O. Box 52080, New Orleans, LA 70150
Bardex Hydranautics, 6338 Lindmar Dr., P.O. Box 1068, Goleta, CA 93116
Bath Iron Works Corp., 700 Washington St., Bath, ME 04530
Bender Shipbuilding & Repair Co., Inc., P.O. Box 42, Mobile, AL 36601
Bethlehem Steel Corp., Martin Tower, Bethlehem, PA 18018
Blohm & Voss AG, P.O. Box 100720, D-2000 Hamburg 1 (In US)-Blohm & Voss CO, Springfield, N.J.
Boston Whaler Commercial Div., 1149 Hingham St., Rockland MA 02370
Burrard Yarrows Corporation, P.O. Box 86099, North Vancouver, B.C., Canada
Cantieri Navali Riuniti, Via Cipro, 11, 16100 Geneva, Italy
Chesapeake Shipbuilding Inc., 710 Fitzwater St., Salisbury, MD 21801
Conrad Industries, P.O. Box 790, Morgan City, LA 70380
Curacao Drydock Company Inc., 26 Broadway, Suite 741, New York, NY 10040
Dorbyl Ltd., Military Road, 1 Industrial Sites, West Bank, 5201 East London, Republic of South Africa
Dubai Drydocks, P.O. Box 8988, Dubai, United Arab Emirates—U.S.A. Agents: Keppel Marine Agencies, Inc., 26 Broadway, New York, NY 10040, 6240 Richmond Ave., Houston, TX 77057
Eastern Marine, Inc., P.O. Box 1009, Panama City, FL 32401
FMC Corp., Marine & Rail Equipment Div., 4700 N.W. Front Ave., Portland, OR 97208
Genstar Marine, 10 Pemberton Ave., No. Vancouver, B.C., Canada V7P 2R1
Gladding-Hearn Shipbuilding Corp., 1 Riverside Ave., Somerset, MA 02725
Golten Marine Co., Inc., 60 Van Brunt St., Brooklyn, NY 11231
Halter Marine, Inc., P.O. Box 29266, New Orleans, LA 70189
Hitachi Zosen Corp., 1-1-1 Hitotsubashi, Chiyoda-ku, Tokyo 100, Japan
Hong Kong United Dockyards Ltd., P.O. Box 534, Kowloon Central Post Office, Kowloon, Hong Kong
Hyundi Mipo Dockyard Ltd., 456 Cheonha-Dong, Ulsan, Korea
Jakobson Shipyard Inc., P.O. Box 329, Oyster Bay, NY 11771

## Odense-Built Containership Sea Wolf Equipped With Bromma Telescopic Spreaders



Bromma, Inc. of Greensboro, N.C., a subsidiary of the Swedish Bromma-Smides company of The Axel Johnson Group, has secured a valuable share of the U.S. spreader market for shipboard applications. The new RO/RO-containership Sea Wolf, ordered by Crowley Maritime's Delta Line in 1983 and now under charter to United States Lines, is the first in a series of four sister ships being constructed by the Odense Steel Shipyard in Lindo, Denmark.

Each of the 1,936-TEU vessels is equipped with two Liebherr gantry cranes that are fitted with Bromma telescopic 20/35/40-foot spreaders with a lifting capacity of 40 long tons. The estimated average container handling is 25 units per hour per crane. The spreader on the aft crane is provided with heavy-duty lifting lugs to load and discharge odd-sized equipment with a weight of up to 45 long tons from the lower RO/RO deck.

All Bromma spreaders supplied for shipboard applications are protected to operate trouble-free in tropical climates and in very humid environments. Bromma is also a big supplier of pier-side container-handling spreaders. Bromma's specialty spreader know-how, combined with the latest state-of-the-art design and testing programs, insures reliability, durability, and cost savings for the spreader user.

For additional information on Bromma spreaders,

**Circle 15 on Reader Service Card**

## Ward Leonard Offers Catalog Listing Quality Controls For Defense-Maritime Applications

Ward Leonard Electric Co., Inc., of Mount Vernon, N.Y., is offering a new 66-page catalog that contains useful information on the company's full compliment of quality electrical control products for both maritime and defense-oriented applications.

Entitled "Defense-Maritime Controls," the booklet also includes the latest "state-of-the-art" solid-state circuitry in the company's new uninterrupted power supplies, battery chargers and inverters. These modern designs are said to offer high efficiency, smaller and lighter enclosures and lower cost.

Both the defense and maritime sections of the catalog are generously illustrated with photos and charts, and contain general descriptions, specifications, dimensions and weights, ordering information, etc.

The defense section details products designed specifically for Navy service aboard surface and below-surface vessels, as well as land-based installations. All products listed are designed to meet existing MIL specifications, and Ward Leonard is QPL listed for many of the products offered. Included are A.C. magnetic starters; thermal overload relays; magnetic overload relays; A.C. magnetic contractors; A.C. and D.C. magnetic relays; pushbutton stations; A.C. automatic bus transfers; limit switches; control circuit transformers; field rheostats; power resistors; and load banks. When the shipboard application calls for custom-designed control equipment or systems to specification and/or requirements, Ward Leonard makes available a broad range of special products from miniature components to room size control panels. A listing of these specialized products is included in the defense section, along with services and software.

The maritime section contains data on electrical controls and components for non-military shipboard applications. These products are designed to meet IEEE No. 45, USCG and ABS specifications. Listed are A.C. magnetic starters; A.C. multi-speed starters; A.C. autotransformer starters; thermal overload relays; A.C. solid state starters; A.C. magnetic contractors; D.C. magnetic contractors; A.C. and D.C. magnetic relays; field rheostats; power resistors—high current; power resistors—wire wound; and specialized products. For application aboard maritime vessels or for shipyard use Ward Leonard offers a multiplicity of customized products such as power supplies, battery chargers, uninterrupted power systems, lighting control systems, load banks, etc.

For more information and a copy of the catalog from Ward Leonard,

**Circle 12 on Reader Service Card**

Jeffboat Inc., Jeffersonville, Ind. 47130
Jered Brown Brothers, Inc., 56 S. Squirrel Rd., Auburn Hills, MI 48057
Keppel Shipyard Limited, 325 Telok Blangah Road, P.O. Box 2169, Singapore 0409
Koch Ellis Barge & Ship Service, P.O. Box 9130, Westwego, LA 70094
Kone Corp. P.O. Box 6 SF-05801 Hyvinkaa, Finland
Paul Lindenau GmbH, & Co., Schiffswerft u. Maschinenfabrik, D-2300 Kiel Friedrichsort, West Germany
Lockheed Shipbuilding and Construction Co., 2929 16th Avenue, S.W., Seattle, WA 98134
M.A.N. GHH Sterkrade, P.O.B. 110240, D-4200 Oberhausen 11, West Germany
Main Iron Works, Inc., P.O. box 1918, Houma, LA 70361
Marinette Maine Corporation, Marinette, WI 54143
Mitsubishi Heavy Industries, Ltd., 5-1, Marunochi 2-chome, Chiyoda-ku, Toyko, 100 Japan
MonArk Boat Co., P.O. Box 210, Monticello, AR 71655
Moran Shipping Agencies, 602 Sawyer, Suite 200, Houston, TX 77077
Moss Point Marine Inc., P.O. Box 1310, Escotawpa, MS 39552
Nashville Bridge Company, P.O. Box 239, Nashville, TN 37202
National Marine Service (Shipyard Division), P.O. Box 38, Hartford, IL 62048
National Steel & Shipbuilding Corp., San Diego, CA 92112
Nautilus Surveys Inc., 10822 Sageleaf Lane, Houston, TX 77089
Neorion Shipyards Syros Ltd., Syros, Greece–U.S.A. Agents: Keppel Marine Agencies Inc., 26 Broadway, New York, NY 10004, 6420 Richmond Ave., Houston, TX 77057
Newport News Shipbuilding, 4101 Washington Ave., Newport News, VA 23607
Nichols Brothers Boat Builders Inc., P.O. Box 580, 5400 S. Cameron Rd., Freeland, WA 98249
Pennsylvania Shipbuilding, P.O. Box 442, Chester, PA 19016
Promet (PTE) Ltd., 27 Pandam Rd., Jurong Industrial Estate, Singapore 22
Promet Marine Services Corp., 242 Allens Ave., Providence, RI 02905
Rauma-Repola, 26100 Rauma 10, Finland
Samsung Shipbuilding & Heavy Industries Co., Ltd., Samsung Main Bldg. 250, 2Ka, Taepyong-ro, Chung-ku, Seoul, Korea
St. Louis Ship, 611 East Marceau St., St. Louis, MO 63111
Southwest Marine, Inc., P.O. Box 13308, San Diego, CA 92113
Tampa Shipyards Inc., P.O. Box 1277, Tampa, FL 33601
Thomas Marine, 37 Bransford St., Patchogue, NY 11772
Todd Shipyards Corp., 1 State St. Plaza, New York, NY 10004
Tracor Marine, P.O. Box 13107, Port Everglades, FL 33316
Vanguard Services, P.O. Drawer A, New Johnsonville, TN 37134
Verolme Estaleiros Reunidos Do Brasil S.A., Rua Buenos Aires, 68, Rio de Janeiro—RJ—Brazil
Verreault Navigation Inc., Les Mechins, Quebec, G0J 1T0
Zidell Explorations, Inc., 3121 S.W. Moody Street, Portland, OR 97201

**SHIPPING—PACKING**
Pilotage Consultants, Inc., P.O. Box 2046, New Hyde Park, NY 11040

**SILENCERS**
Riley-Beaird, P.O. Box 31115, Shreveport, LA 71130

**SMOKE INDICATORS**
Robert H. Wager Co., Inc., Passaic Avenue, Chatham, NJ 07928

**STUFFING BOXES**
Johnson Rubber Co., Duramax Marine Div., 16025 Johnson St., Middlefield, OH 44062
Smith-Meeker Engineering Co., 157 Chambers St., New York, N.Y. 10007

**SURVEYORS AND CONSULTANTS**
Advanced Technologies Dept. PZ-01, 7926 Jones Branch Dr., McLean, VA 22102
Booz Allen & Hamilton Inc., Crystal Square 2, Suite 1100, 1725 Jefferson Davis Highway, Arlington, VA
Francis B. Crocco, Inc., P.O. Box 1411, San Juan, Puerto Rico 00903
Frank Jeffrey & Assoc., 5201 Westbank Exp., Suite 206, Marrero, LA 70073
M.A. Stream Associates, Inc., 400 Second Ave. W., Seattle, WA 98119

**TANK CLEANING**
Butterworth Inc. (USA), 3721 Lapas Dr., P.O. Box 18312, Houston, TX 77223-9989
Butterworth Systems (UK), 123 Beddington Lane, Croydon CR9 4NX, England
Gamlen Marine Division, 375 Allwood Rd., Clifton, NY 07013
Gamajet Equipment Div., Sybron Chemicals Inc., 121 S. Maple Ave., So. San Francisco, CA 94080
Petrochemical Services, Inc., 3820 Dauphine St., New Orleans, LA 70117

**TANK LEVELING INDICATORS**
American United Marine Corp., 5 Broadway, Route 1, Sagas, MA 01906
Kongsberg North America Inc., 400 Oser Ave., Hauppauge, NY 11738
Marine Moisture Control Co., 60 Inip Dr., Inwood, NY 11696
Transamerica Delaval, Inc., Gems Sensors Division, Cowles Road, Plainville, CT 06062

**TORSIONAL VIBRATION SPECIALISTS**
T.W. Spaetgens, 156 W. 8th Ave., Vancouver, Canada, V5Y 1N2

**TOWING—Barges, Vessel Chartering, Lighterage, Salvage, etc.**
Bay Houston Towing Co., 2243 Milford, P.O. Box 3006, Houston, TX 77253
Curtis Bay Towing Co., Mercantile Bldg., Baltimore, MD 21202
Jan Erik Dyvi A/S, P.O. box 454, Sentrum, Norway
McAllister Bros., Inc., 17 Battery Pl., New York, NY 10004
McDonough Marine Service, P.O. Box 26206, New Orleans, LA
Midland Affiliated Co., 580 Walnut St., Cincinnati, OH 45201
Moran Towing & Transportation Co., Inc., One World Trade Center, Suite 5335, New York, NY 10048
National Marine Service, Transport Div., 1750 Brentwood Blvd., St. Louis, MO 63144
Port Allen Marine Service, Inc., P.O. Box 108, Port Allen, LA 70767; Walker Boat Yard, P.O. Box 729, Port Allen, LA
Suderman & Young Co., Inc., 918 World Trade Bldg., Houston, TX 77002
Turecamo Coastal & Harbor Corp. 1 Edgewater Plaza Staten Island, N.Y. 10305

**VALVES AND FITTINGS**
Crawford Fitting Company, 29500 Solon Road, Solon, OH 44139
Baily, Division of CMB Industries, P.O. Box 8070, Fresno, CA 93747
Boston Metals Co., 313 E. Baltimore St., Baltimore, MD 21202
Cajon Co., 9760 Shepard Rd., Macedonia, OH 44056
Dover Corporation, Norris Division, P.O. Box 1739, Tulsa, OK 74101
Elliott Manufacturing Co., Inc. (Remote Valve Operating Equipment), P.O. Box 773, Binghamton, NY 13902
Hayward Marine Products, 900 Fairmount Avenue, Elizabeth, NJ 07207
Jamesbury Corp. 640 Lincoln St., Worcester, MA 01605
Marine Moisture Control Co., 60 Inip Dr., Inwood, NY 11696
Nupro Co., 4800 E. 345th St., Willoughby, OH 44094
Parker Hannifin Corp. Rotary Actuator Div., 9948 Rittman Rd., Wadsworth, OH 44281
Pittsburgh Brass Manufacturing, Sandy Hill Rd., R.D. 6 Box 387-A, Irwin, PA 15642
Sno-Trik Co., 9760 Shepard Rd., Macedonia, OH 44056
Stacey/Fetterolf Corporation, P.O. Box 103, Skippack, PA 19474
Stockham Valves & Fittings, Box 10326, Birmingham, AL 35202
Swagelok Company, 5171 Hudson Dr., Hudson, OH 44236
Tate Temco, Inc. 1941 Lansdowne Road, Baltimore, MD 21227
Union Flonetics, P.O. Box 459, Clinton, PA 15026
Robert H. Wager Co., Inc., Passaic Avenue, Chatham, NJ 07928
Waukesha Bearings Corp., 405 Commerce St., P.O. Box 798, Waukesha, WI 53186
S.S. White Industrial Products, 151 Old New Brunswick Rd., Piscataway, NJ 08854
Whitey Co., 318 Bishop Road, Highland Heights, OH 44143
William E. Williams Valve Corporation, 38-52 Review Avenue, Long Island City, NY 11101
Zidell Explorations, Inc., (Valve Division), 3121 S.W. Moody Avenue, Portland, OR 97201

**VESSEL OWNER/OPERATOR**
Wallenius Lines, P.O. Box 17086, S–10432 Stockholm, Sweden

**VIBRATION ANALYSIS**
DLI Engineering Corp., 253 Winslow Way West, Bainbridge Island, WA 98110

**VIDEO TRAINING FILMS**
Gulf Publishing Company Video, P.O. Box 2608, Houston, TX 77001

**WATER PURIFIERS**
Alfa Laval, Inc., Dept. MR-2, 2115 Linwood Ave., Fort Lee, NJ 07024
Atlas-Danmark Marine & Offshore Baltorpej, 154 DK-2750 Ballerup, Copenhagen, Denmark, TX 35177 Atlas DK
Drew Chemical Corporation, One Drew Chemical Plaza, Boonton, NJ 07005
Everpure, Inc., 660 N. Blackhawk Dr., Westmont, IL 60559
Marine Moisture Control, 60 Inip Dr., Inwood, NY 11696
Marland Environmental Systems, P.O. Box 501, Great Falls, VA 22066
MECO (Mechanical Equipment Company, Inc.), 861 Carondelet St., New Orleans, LA 70130
Riley-Beaird, P.O. Box 31115, Shreveport, LA 71130

**WEATHER CHART RECORDERS**
Alden Electronics, 1145 Washington St., Westborough, MA 10581

**WELDING**
KSM Fastening Systems Inc., 301 New Albany Rd., Moorestown, NJ 08057
Metallizing Co. of America, Inc., 321 So. Hamilton, Sullivan, IL 61951
Miller Electric Mfg. Co., P.O. Box 1079, Appleton, WI 54912

**WELDING EQUIPMENT**
Enerjee Ltd., 32 S. Lafayette Ave., Morrisville, PA 19067

**WINCHES AND FAIRLEADS**
Braden Winch Co., 800 East Dallas, Broken Arrow, OK 74012
Fritz Culver, Inc., P.O. Box 569, Covington, LA 70434
Markey Machinery Co., 79 South Horton St., Seattle, W. shington 98134
McElroy Machine & Mfg. Co., Inc., P.O. Box 4454, W. Biloxi, MS 39531
Nashville Bridge Co., P.O. Box 239 Nashville TN 37202
Schoellhorn Albrecht, Div. of St. Louis Ship, 3460 So. Broadway, St. Louis, MO 63118
Smith Berger Marine Inc., 516 S. Chicago St., Seattle, WA 98108

**WINDOWS**
Kearfott Marine Products, A Singer Co., 550 South Fulton Avenue, Mt. Vernon, NY 10550

**WIRE AND CABLE**
AMP Special Industries, P.O. Box 1776, Southeastern, PA 19399
Anixter Bros., Inc., 4711 Golf Road, One Concourse Plaza, Skokie, IL 60076
Atlantic Cordage Corp., 60 Grant Ave., Carteret, NJ 07008
Delco Wire & Cable, Inc., 257 Rittenhouse Circle, Keystone Industrial Park, Bristol, PA 19007
Seacoast Electric Supply Corp., 225 Passaic St., Passaic, NJ 07055
Seacoast Electric Supply Corp., 1505 Oliver St., Houston, TX 77007

**WIRE/CABLE LUBRICANT**
Atlantis Services, Inc., 1057 Kings Ave., Jacksonville, FL 32207

**WIRE ROPE—Slings**
Atlantic Cordage Corp., 60 Grant Ave., Carteret, NJ 07008
Bethlehem Steel Corp., Martin Tower, Bethlehem, PA 18018
A.L. Don Company, Foot of Dock Street, Matawan, NJ 07747
I & I Sling Company, 2626 Market Street, Dept. D, Aston, PA 19014

**ZINC**
The Platt Bros. & Co., Box 1030, Waterbury, CT 06721
Smith & McCroken, 153 Franklin St., New York, NY 10013

M/V Star Florida, the first of three identical vessels for A/S Billabong from Hyundai.

# Hyundai Delivers First Of Three Bulk Carriers For Norwegian Owner

The first of three 40,790-dwt open-hatch bulk carriers, the Star Florida, was delivered recently by Hyundai Heavy Industries Company, Ltd. of South Korea to her managing owner, A/S Billabong of Bergen, Norway. The delivery took place one month earlier than initially scheduled at the owner's request. Star Florida was named, together with sister ships Star Fugi and Star Fraser, in a simultaneous christening ceremony held at Hyundai's Ulsan Shipyard.

The three bulkers were contracted in May 1983 through Joachim Grieg & Company of Bergen, who also arranged for the ownership with Nichimen Group and the bareboat arrangement between Nichimen and A/S Billabong. The latter company has chartered the three vessels for a 12-year period.

Designed to carry forest products, containers, and packaged lumber, in addition to bulk cargoes including ore and grain, the Star Florida has an overall length of 614 feet 6 inches, beam of 96 feet 5¼ inches, and depth of 53 feet 3¾ inches. Propulsion is provided by the latest design Hyundai/B&W 7L60MCE slow-speed diesel with an output (test bed) of 11,720 bhp at 103.7 rpm. Normal continuous rating of 10,030 bhp will provide a service speed of 15.1 knots.

Nine cargo holds provide grain loading of 42,198 cubic meters. The vessel can load at total of 1,064 TEUs of containers, 604 TEUs in holds and 460 on deck. Cell guides installed inside the cargo holds 2, 4, 6, and 8 can accommodate a six-tier container stack, while the other holds are designed for two tiers. Two 37-ton Mitsui/Paceco gantry cranes insure speedy and efficient container handling.

**STAR FLORIDA**
**Major Suppliers**

| | |
|---|---|
| Main engine | Hyundai/B&W |
| Turbochargers | Mitsui/M.A.N. |
| Engine controls | Norcontrol |
| Steering gear | Kawasaki |
| Propeller | Lips B.V. |
| Stern tube seals | Kobe Steel/Simplex |
| Bow thruster | Nakashima |
| Turning gear | HEMCO/Nishishiba |
| Boiler | Osaka Boiler |
| Generators (3) | Daihatsu/HEECO |
| Emergency generator | M.A.N./Stamford |
| Air compressors | Tanabe/Nishishiba |
| Distiller | Sasakura Engineering |
| Purifiers | Nagase/Alfa |
| Separators | Nippon SRS |
| Reefer plant | Sabroe/Asea |
| Air conditioning system | Nordisk Ventilator |
| Windlasses & mooring winches | Pusnes |
| Gantry cranes | Mitsui/Paceco |
| Hatch covers | Kvaerner Brug |
| Fire-fighting systems | John Kerr |
| Radars (2), gyrocompass, autopilot | Tokyo Keiki |
| Collision-avoidance system | Tokyo Keiki/Sperry |
| Navstar navigator | Decca |
| Satnav system | Navidyne |
| Facsimile recorder | Koden |
| Echo sounder | Simrad |
| Satcom system, radio station, VHF radiotelephone, RDF, P-A system, Sound-powered telephones | JRC |

# Los Angeles SNAME Meeting Discusses Shipboard Fiber Optics

A recent meeting of the Los Angeles Metropolitan Section of The Society of Naval Architects, held aboard the Princess Louise I, heard a paper entitled, "Fiber Optics for Shipboard Applications," by **Donald Chambers**, senior project engineer at Hughes Aircraft Company in Anaheim, Calif.

Members and guests listened attentively to the future of on-board electronics control of ships at sea. The language and resistance to change barriers seem to hold somewhat against this new technology, but applications where only a simple addition of more powerful multiplexers to expand monitoring and control capabilities may hold the key to the fiber optics field. Mr. **Chambers** also showed inherent advantages of lower cost, durability, and longer life of these new fiber optics systems.

The presentation was followed by a lively question and answer session, where specific applications were discussed.

Principals at Los Angeles SNAME meeting included (L to R): **Paul Cromer**, Papers Committee chairman; **E.J. Penewell**, Public Relations Committee chairman; **Donald Chambers**, author, and **Mrs. Chambers; Gary Cash**, Section chairman; and **Robert Levine**, secretary-treasurer.

# Blount Marine Yard Delivers Dinner Cruise Vessel 'Bay Queen'

Capable of seating more than 450 at dinner, the Bay Queen is certified by the U.S. Coast Guard to carry 600 passengers. With an overall length of 145 feet, beam of 32 feet 4 inches, and depth of 9 feet 4 inches, the vessel offers two fully enclosed, carpeted decks, and a third deck that provides unlimited viewing. The bridge deck, which offers exterior seating, also affords passengers a panoramic view.

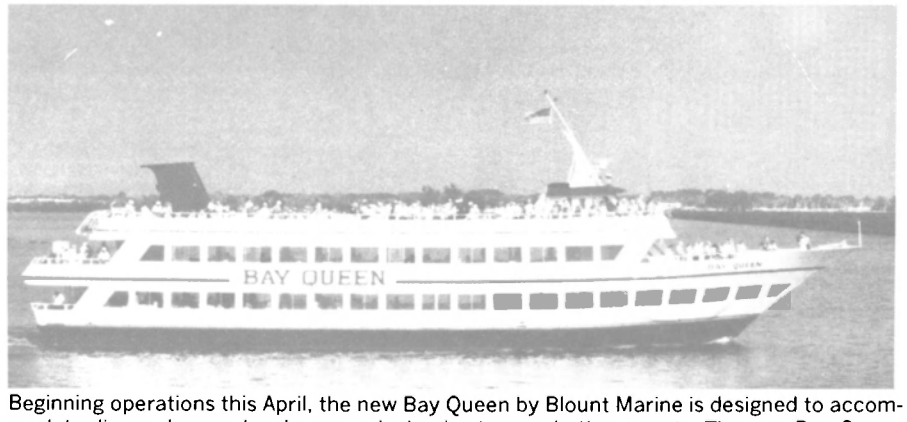
The new vessel is powered by two 8V92 Detroit Diesel engines, and has two 99-kw 8.2T Detroit Diesel generators. Admeasuring slightly less than 100 tons, the boat attains a speed of 11 knots.

Owned by Blount Leasing Corporation, the new Bay Queen will be operated by Rentacruise, Inc., also of Warren. This new vessel replaces last year's Bay Queen, which has been recently sold to interests in Toledo, Ohio, and is to be renamed Arawana Queen.

The new vessel can accommodate two separate charter groups simultaneously, and has been designed with a second deck embarkation point, made possible by a Blount-designed bow landing system. For passenger entertainment, a stage for bands and a dance floor have been installed on the second deck.

For cruising comfort, the Bay Queen is fully air conditioned and heated, with full-service bars available on both the upper and lower decks.

Blount Marine Corporation of Warren, R.I., recently completed the dinner boat Bay Queen, designed to accommodate dinner dances, luncheons, private charters, Bay Island cruises, and other day and evening tours of Narrangansett Bay.




Beginning operations this April, the new Bay Queen by Blount Marine is designed to accommodate dinner dances, luncheons, private charters and other events. The new Bay Queen replaces last year's vessel of the same name.

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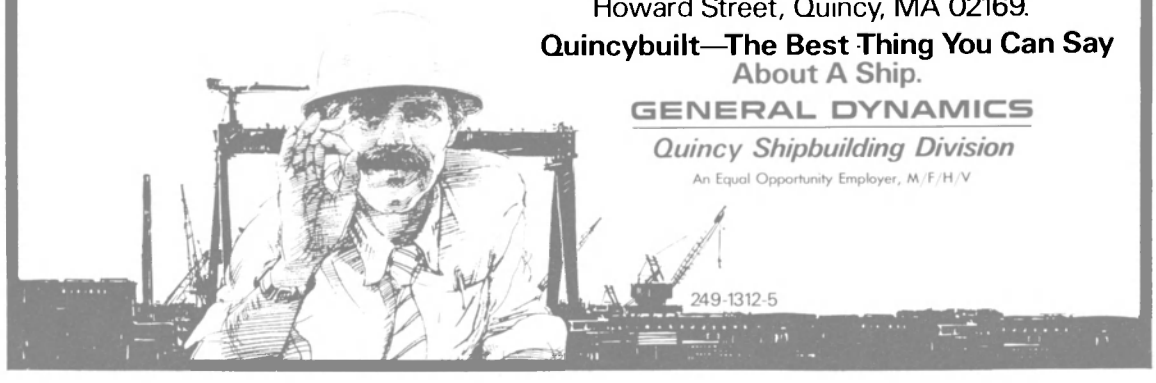

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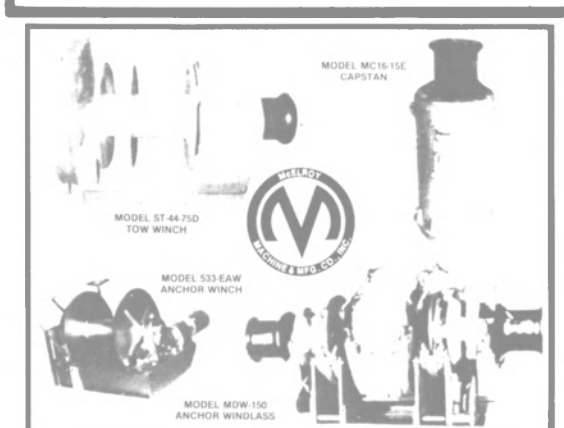


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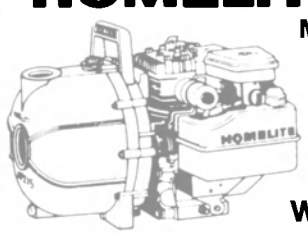

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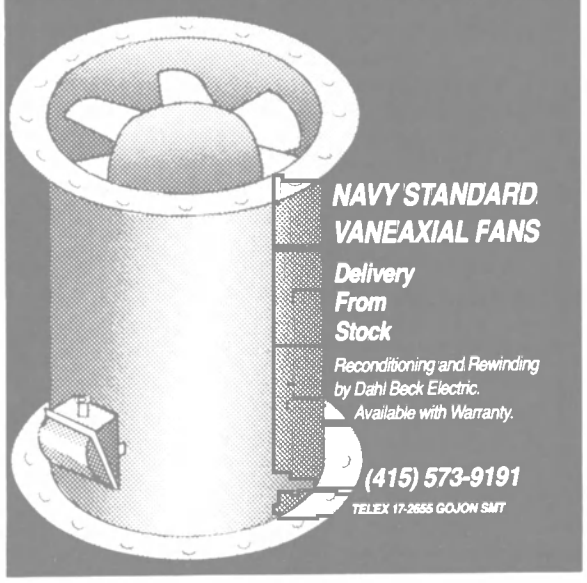

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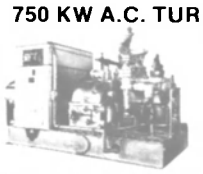

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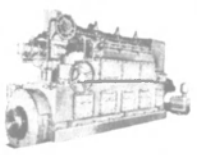

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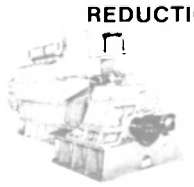

ENGINE GM 12-567A 8" x 10" 2-cycle V-type – 747 RPM – electric starting GEAR Falk Airflex reverse & reduction – 2.48:1 forward – 2.52:1 reverse From USN LST

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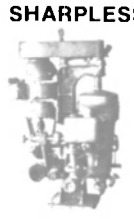

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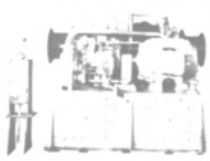

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Drum will stow 1500' of 1" wire in 9 layers Steam inlet 3" – 4" exhaust – 171 PSI working pressure BASE DIMENSIONS 6' X 6'3" – overall 8'4" wide X 9' long Mfg by Friedrich Kocks – Bremen Germany Remover from ARCO "Challenger" ALSO IN STOCK – 12" X 14" Double gypsy unit Can be demonstrated running

## UNUSED STEAM WINCH FOR MOORING & CARGO SERVICES

Lidgerwood 10X12 – with Morse controls 10,000 lb line pull – declutchable gypsy hand compression brake

## SMALL 4 X 6 WINCH

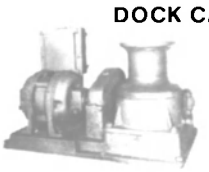
STEAM OR AIR

DRUM 20" Diameter X 23" width – 8" flange Rated 2000# 90 FPM on 3rd layer of rope 125# Steam or 3500 @ 90 FPM 150 PSI steam 13,000 lb static load Fitted with ratchet & pawl so drum can be locked in off and on position

## HEAVY DUTY 2-SPEED DOCK CAPSTANS

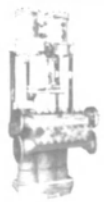
For tugs, docks, etc. Suitable for manila or wire rope because barrel is ridged. 40/40 HP – 1200/600 – 24,000# @ 30 FPM – 12,000# @ 60 FPM Barrel size 22" diameter by 24" high – with controls

## DOCK CAPSTANS



Spool 10" diam. X 4" 15 HP – 220/440/3/60 10,000 lbs @ 40 FPM 48" Long – 32" wide – 28" high

## DEAN BROS. ALL-BRONZE STRIPPING PUMP BILGE & BALLAST 12 X 10 X 18



Max. pressure 730 GPM @ 200 lbs – steam end 250 lbs Serial 67735 OA Dimensions: 43" wide – 39" deep – 104" high Complete with spare unused bronze valve deck & spare liquid lines piston, steam end spares, rods, etc. This pump ready for immediate use equal to new – little if any use

## WORTHINGTON 16" X 14" X 18" VERTICAL DUPLEX STRIPPING PUMP

1400 GPM @ 110PSI – suction lift 11.5 ft – steam back pressure 15 lbs 14" Suction – 10" discharge – 2" – steam – 4" exhaust Overall width 6'8" – overall height 9'1" – depth 3'9" Wt approx 10,000 Reconditioned 1980 ABS – ready to go

## HIGH PRESSURE HULL CLEANING PUMP

Mfg by Hypro – type L – 25 HP – 220/440.3/60 – Frame 284T Pump capacity 25 GPM @ 500 PSI – 600 RPM

## DEMING MOTOR DRIVEN RECIPROCATING PUMP

For sanitary and potable water use 30 GPM @ 90 lbs 190 RPM – 2" suction – 1½" discharge GE motor – 2 HP – 440.3/60.1735 RPM

## U.S. NAVY FANS

25000 CFM – A25A4W6 – 42" – ID – 52" high – 25.14 HP – 440.3/60 – 1200/900 RPM – 36.24 amps 4 Available

3000 CFM – A3A4W6 – 21" – ID – 29" high – 3 HP – 1150.1750 RPM Mfg by Joy 4 Available

5000 CFM – A5A4W6 – 23" – ID – 29" high – 4 HP – 1150.1750 RPM Mfg by Joy 1 Available

12000 CFM A12AX6 Explosion-proof – 29" – ID – 37" high – 10.3 HP – 1800.1200 RPM – Frame 254U – group D Reliance motor

## ALSO MARAD FANS

40665 CFM – size 43 AF – 60 HP

## TANK TOP COVERS

STYLE A STYLE B

Steel – with 12mm (½") cover and 19mm (¾") flange Gasket between top cover and flange Mounting bolts are stainless steel

Style A has flush deck mounting flange with 24¼" diameter bolts Style B has extended deck mounting flange with 20" diameter bolts

## 21" & 24" I.D. MAN-WAY 3-DOG HATCHES

18" Coaming Available with T socket-wrench or removable handwheel (can be welded in place) for top opening Spring-loaded lid w inside handwheel Coaming 12mm thick – top 11mm Bosmet drawing #67.56

## QUICK OPENING HATCH

Handwheel top & bottom. 4-Dogs 16"X24" with 5" coaming. Drawing #60-40

## 4-DOG GENERAL PURPOSE 15"X23"X5" HATCH

## QUICK-ACTING 4-DOG HATCHES

Heavily constructed. Handwheel operated. Handwheels top & bottom. Size A: 27" X 21" w/12" coaming. SIZE B: 31"X31" w/12" coaming. For ocean-going barges, etc

## TANKER EXPANSION TRUNK

36" Diameter – 26" coaming – 7-dog drop-bolts. Drawing 36/26

## 20" ROUND HATCH

18" Coaming – 3 brass dog drop bolts. Coaming 12mm thick – top 11mm. Bosmet #68

## 36" X 48" — 24" X 36" DECK HATCHES

Has 10 brass dogs – 18" coaming. Coaming is 12mm – top is 11mm.

## FLUSH HATCHES 24" X 30" 30" X 30"

4-Dogs bottom – T-key top opener. 4" Maximum coaming. Coaming 8mm thick top 7mm

## NEW 18" & 24" HATCH COVERS

Flush mounting watertight hatch with machined steel mounting ring. T-Handle is recessed and hand tightens against a strongback across mounting ring. 18" (60 lbs) – 24" (100 lbs)

## NEW 3-DOG WEATHERTIGHT DOORS 26" X 78"

## NEW QUICK-ACTING WHEEL OPERATED WATERTIGHT DOORS

6-DOG 5/16" Steel frame – ¼" panel – 26" X 48" – 30" X 60" – 30" X 69" – 30" X 54"

## QUICK-ACTING LEVER-OPERATED 8-DOG WATERTIGHT DOOR

## EXTRA LARGE EXTRA HEAVY DUTY PANAMA CHOCKS

Clear opening 16" X 20" – 10" radius – 36½" high – 40½" long. For extra large tankers or heavy dredges where 1½" wire or eye-spliced loop must pass through chock VLCC type from 250,000 ton tankers

## INQUIRE ABOUT ITEMS NOT SHOWN HERE

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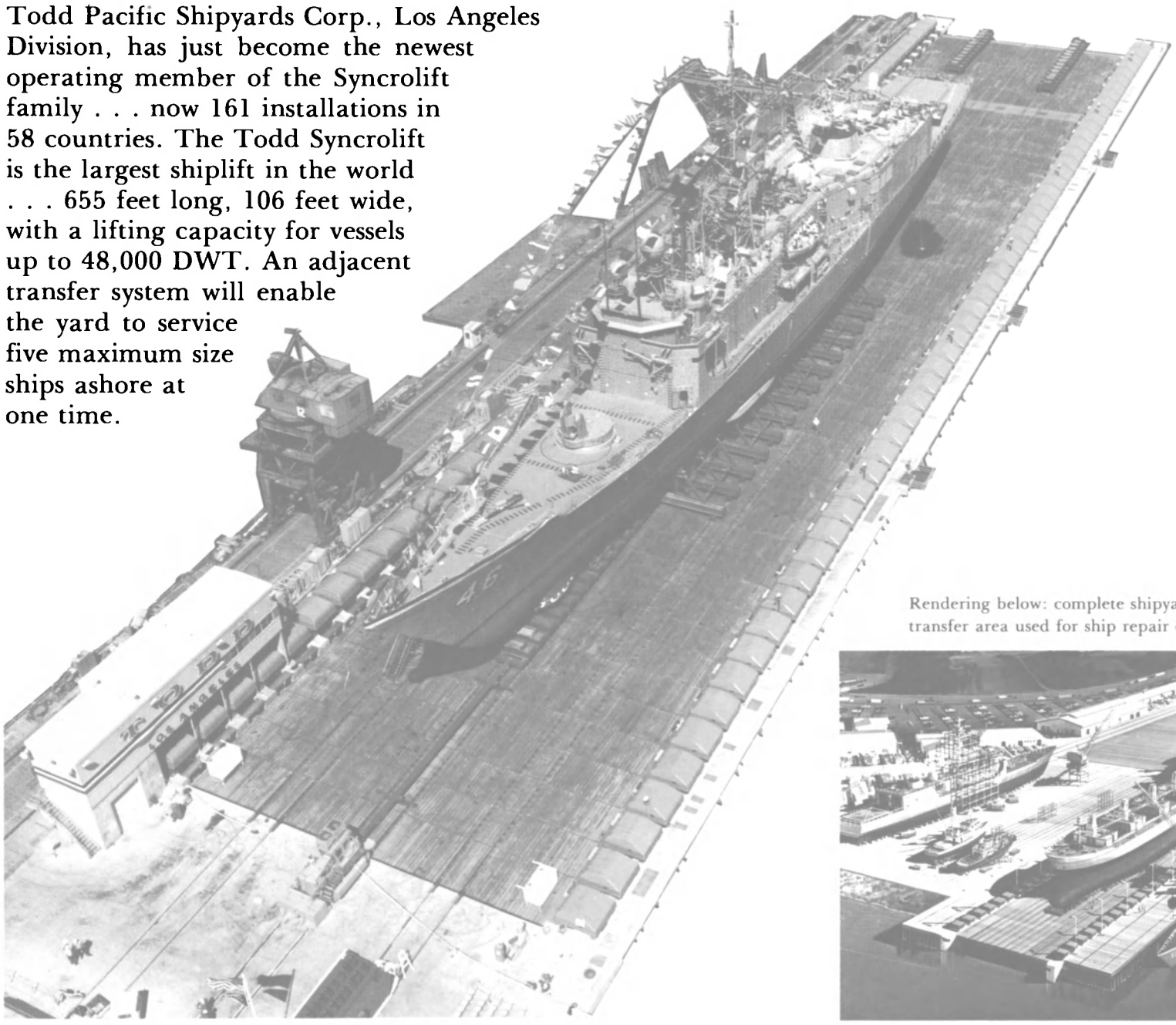
# Todd Inaugurates Largest Shiplift In The World A 48,000 DWT SYNCROLIFT®

Todd Pacific Shipyards Corp., Los Angeles Division, has just become the newest operating member of the Syncrolift family . . . now 161 installations in 58 countries. The Todd Syncrolift is the largest shiplift in the world . . . 655 feet long, 106 feet wide, with a lifting capacity for vessels up to 48,000 DWT. An adjacent transfer system will enable the yard to service five maximum size ships ashore at one time.



Photograph above taken March 27, 1984, at Inauguration Ceremony.
Photo by Joseph Ernest, Todd Pacific Shipyard.

Rendering below: complete shipyard project including transfer area used for ship repair or new construction.



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