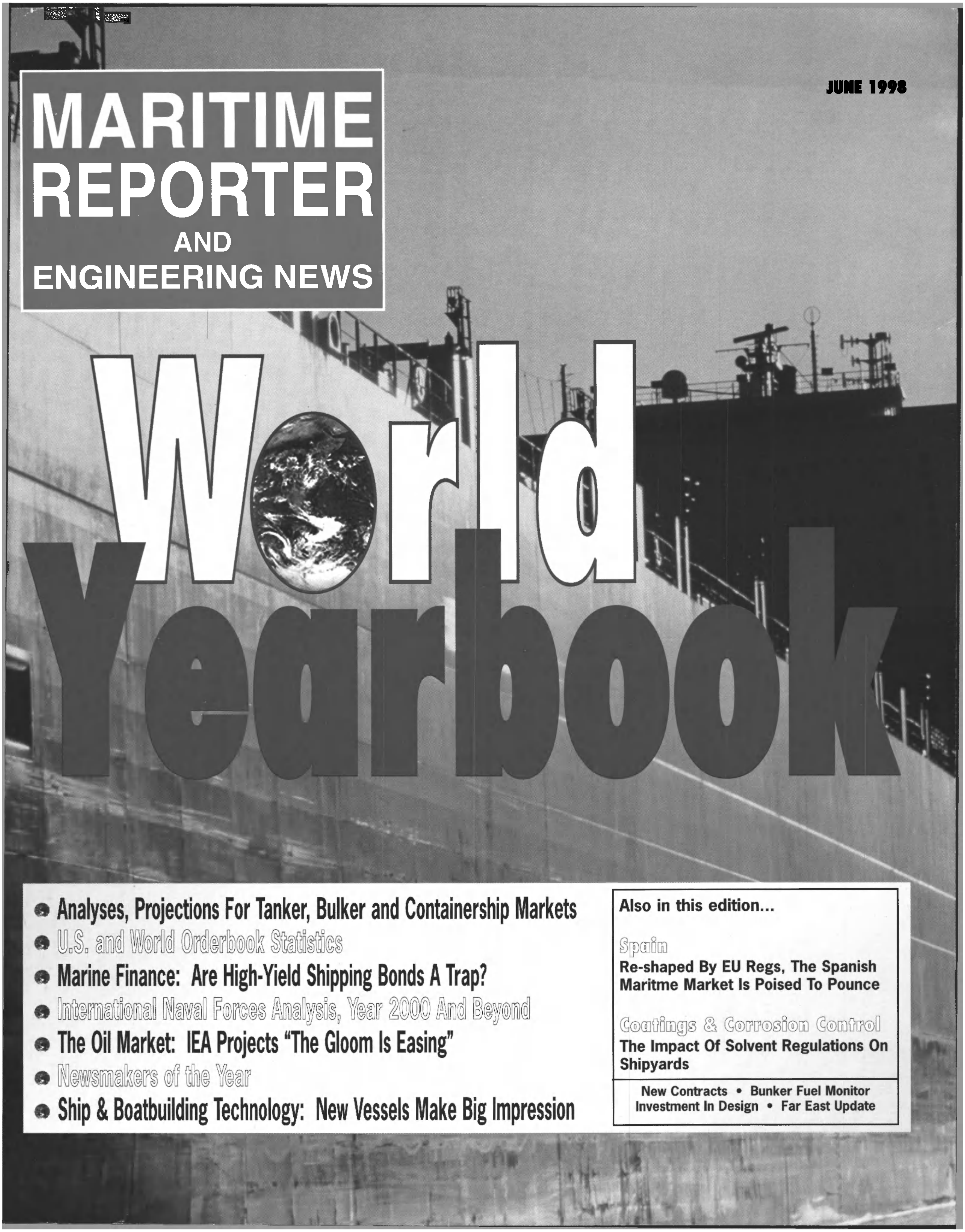

JUNE 1998

MARITIME REPORTER AND ENGINEERING NEWS

World Yearbook

- Analyses, Projections For Tanker, Bulker and Containership Markets
- U.S. and World Orderbook Statistics
- Marine Finance: Are High-Yield Shipping Bonds A Trap?
- International Naval Forces Analysis, Year 2000 And Beyond
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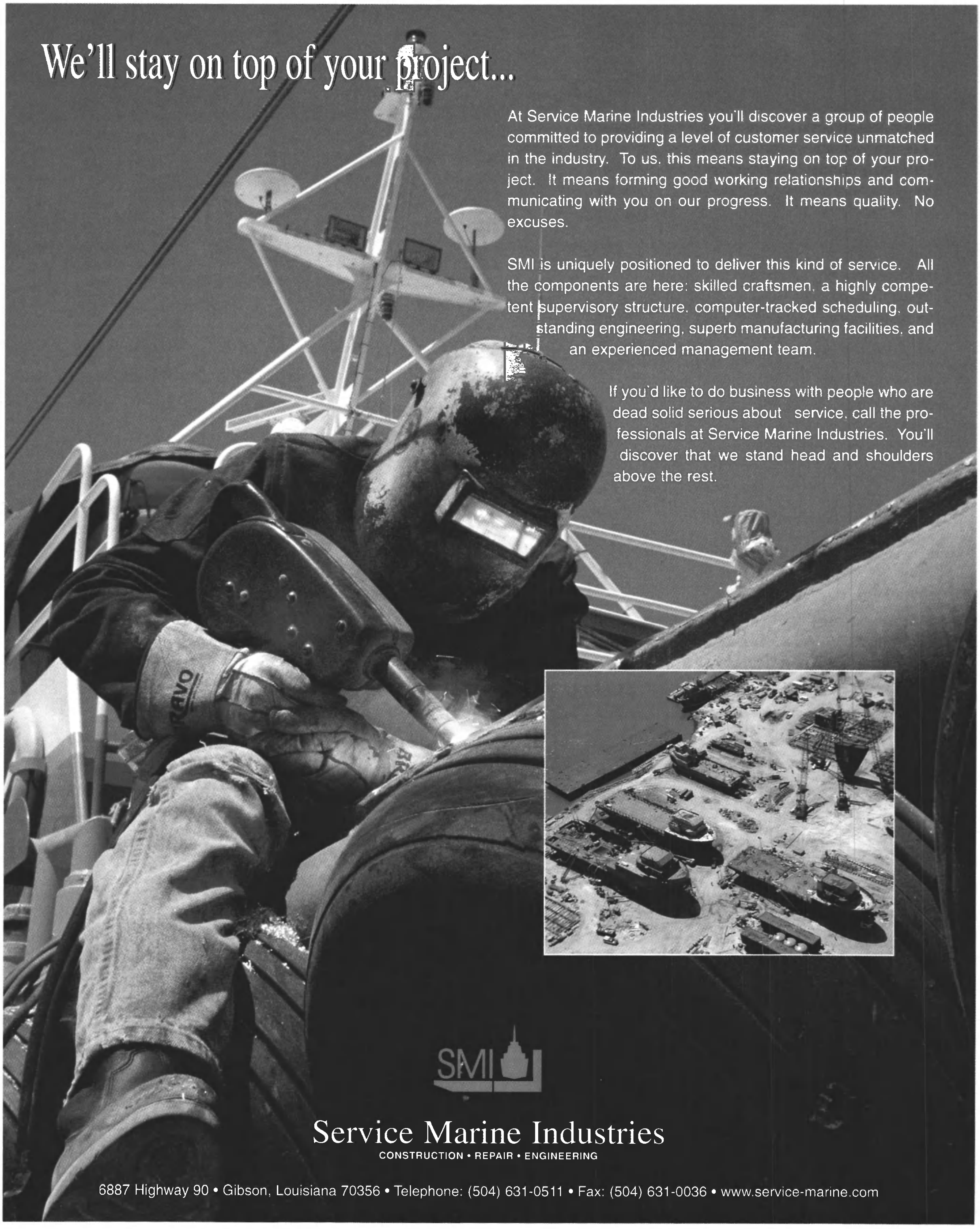
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Editorial & Executive Offices
118 E. 25th St., NY, NY 10010
Tel: (212) 477-6700; Fax: (212) 254-6271
e-mail: mren@marinelink.com

PUBLISHERS
Charles P. O'Malley
John E. O'Malley
John C. O'Malley

Vice President/Editorial Director
Gregory R. Trauthwein

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Telephone: (504) 893-5099; Fax: (504) 893-5024

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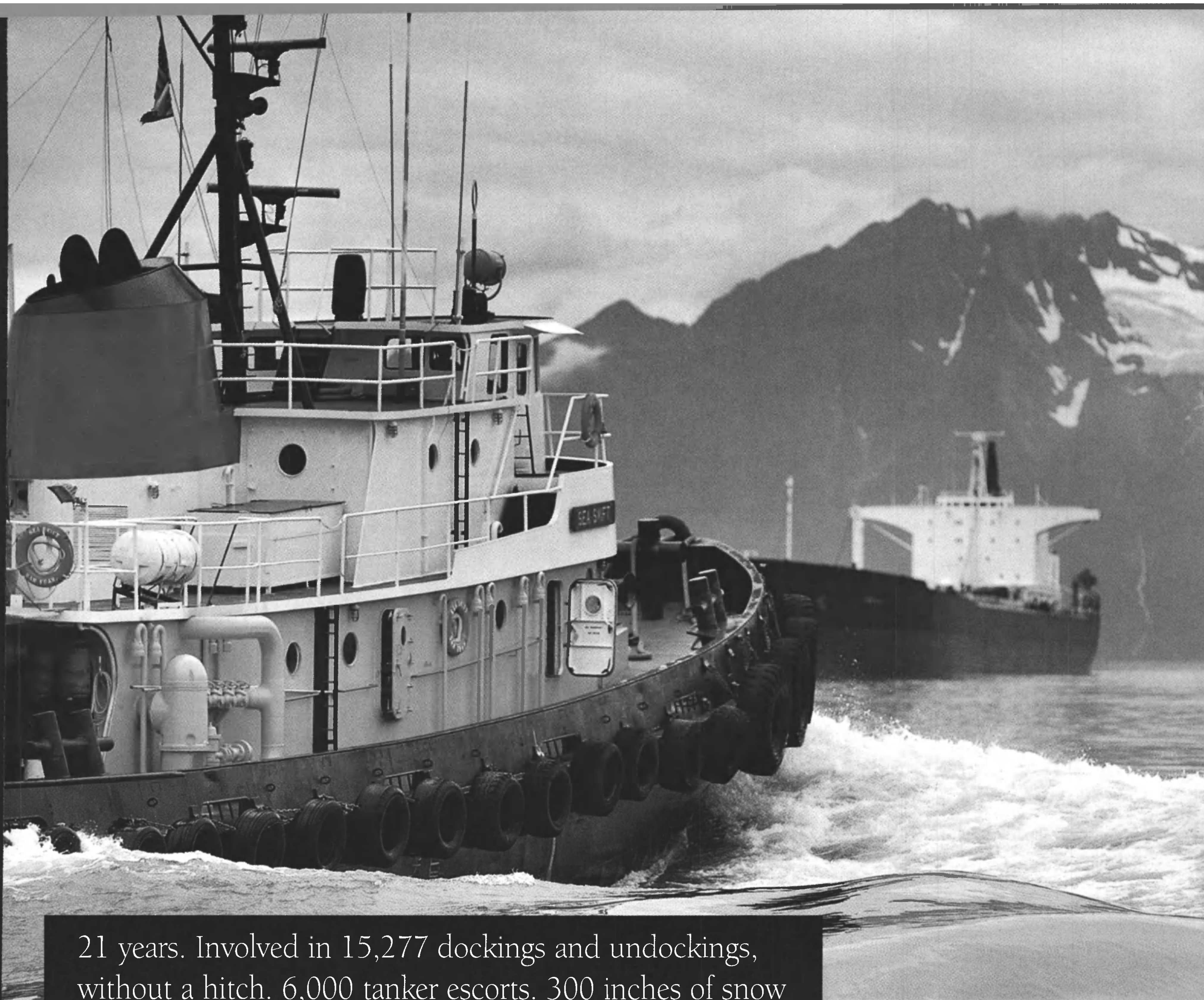


EDITOR'S NOTE

Embracing Change

Summing up the maritime industry's year's events in one edition is a near Herculean task, given the complexity and breadth of the market. But given today's thirst for analysis, data and statistics, the editors of *Maritime Reporter & Engineering News* have responded in-kind with the latest World Yearbook.

It may be cliche to say that the only constant is change, but change is truly the only word worthy to describe the year's events.

The rapid pace or severe market swings may be disconcerting to some in the industry, but in the global perspective, the level of change is at or below that which is sweeping industry around the world.

But as much as things change, they seem to — particularly in the maritime world — stay blissfully the same.

International, national, regional and even local laws, rules and regulations continue to change the way ships are designed, built, outfitted, crewed and managed. As of this writing, the impending deadline for the implementation of ISM Code draws ever nearer, and in the not too distant future, ISM Code and all of the accompanying controversy and cost will be but a faint memory.

Where, then, will our industry's focus be trained for the coming year? Count on matters of safety of vessels, environment and crew, as well as the rapid evolution of onboard equipment and information technology, to take and keep center stage for many years to come.

To put it simply, there are still far too many maritime accidents, whether it is runaway barges smashing into passenger vessels on the Mississippi River, commercial ships slamming into each other in one of the world's most congested ship channels or a bulk carrier breaking up and sinking in the middle of the ocean.

Efforts to ensure the safety of all of the world's waterways will be doubled and re-doubled in years to come, as industry and political leaders, as well as the public at large, become increasingly intolerant of maritime mishaps.

This should not, however, be taken as a blanket condemnation, as quality owners which run clean operations should continue to prosper. However, it should serve as a warning to the "not-so-quality-conscious" owners and managers who enjoy playing Russian Roulette with old ships.

A key character in this evolving drama will be the world fleet itself. It has been reported, analyzed and discussed for years, but the bottom line is that the world's fleet is getting old. In a recent report released by the American Bureau of Shipping (ABS) entitled *World Fleet Profile 2000*, statistics show that by the year 2000, nearly 40 percent of ships more than 10,000 dwt will be 20 years of age or older.

While the world shipyard orderbook is at an all-time high, it is clear that as older ships increasingly lose favor and head for the scrapyard, new tonnage ordering activity will pick up to fill the void. (This simple scenario, while seemingly logical, is in turn affected by a myriad other factors, namely freight rates. For full analysis of the tanker, bulker and containership markets from the directors of Drewry Consultants, please turn to page 34).

Thus change is the constant, and it should be welcomed as a challenge instead of a roadblock. For it is the individuals and companies that seize the opportunities of the future who emerge as market leaders.

Gregory R. Trauthwein

Oceaneering Completes Offshore Heavy Lift Program

Oceaneering International, Inc. has successfully completed a major offshore heavy lift program aboard floating production, storage and offloading (FPSO) vessel *Safiro Producer*. The heavy lifts were performed with the FFOSI on station and operating offshore Equatorial Guinea, West Africa, with minimal interruption to production as part of the Phase 2 development of Zafiro Field for operator Mobile Equatorial Guinea Inc. (MEGI).

Serving as project manager for the Phase 2 modifications to the FPSO within an integrated Mobile-led team, Oceaneering managed the fabrication and offshore installation of 10 modules with an overall total weight of 3,000 tons. Five main lifts, ranging in weight from 300 to 830 tons, set modules for seawater treatment, water injection, turbine generators, turbine fuel gas compression and a three-story quarters with accommodations for 58 people were also installed . Lifts were performed by heavy lift derrick barge Pearl Marine, operated by SaiBOS.

Austal Wins Contract From Turkish Interest

Austal Ships has won a contract to supply two 282-ft. (86-m) Auto Express high-speed vehicle/passenger catamarans to leading Turkish fast ferry operator Istanbul Deniz Otobusleri. The vessels are the first of their design in the Auto Express range. The first vessel, **Adnan Menderes**, was launched in April and the second is scheduled for delivery in December.

Circle 47 on Reader Service Card

Bardex Scores Another Deepwater System Contract

Bardex Industries has been chosen by R&B Falcon to provide a riser centralizer system and central hydraulic power units for an ultra-deepwater drillship. Bardex recently won contracts for the supply of the same type of equipment for *Deepwater Pathfinder* and *Deepwater Frontier*, each owned by separate joint ventures between Conoco and R&B Falcon. All three drillships are designed for operations in water depths up to 10,000 ft. (3,048 m).

Shipment of the equipment under this latest contract will be ABS certified and delivered later this year.

YVC To Take Over Wilton-Fijenoord Shipyard

Yssel-Vliet Combinatic (YVC) has undergone negotiations with RDM Technology Holding and Wilton-Fijenoord Holding concerning the takeover of the repair yard Wilton-Fijenoord at Schiedam. Once this transaction occurs, YVC will conduct the ship repair, conversion and silencer fabrication at the Schiedam yard.

Defining The Many Faces Of Hi-Tech

by David Tinsley, technical editor

That Golden Touch

Compared to the four bulk carriers and three VLCCs under its control as of March this year, the Golden Ocean Group-managed fleet is set to grow to 12 bulkers and 18 VLCCs by the year 2001. Such is the scale of its investment in the two million barrel-capacity category, that 15 of the 35 VLCCs on order or under construction in Japan on March 1 were for Golden Ocean ownership or operation.

Taking a crude carrier fleet from three to 18 in the space of just three years, based wholly on newbuilds, must surely rank as one of the industry's most audacious, albeit well-considered schemes. It befits the reputation of Golden Ocean as being a truly dynamic ship operating company. The age profile of the global VLCC fleet is one of the driving factors for Vancouver-based group head **Fred Cheng**.

In an interview given to the Bureau Veritas house magazine, Mr. **Cheng** said "Trading VLCCs over 25 years of age is simply not economic. It is the shipping industry's responsibility to renew and replace old ships with new and improved designs with the interests of safety and pollution prevention in mind.

"Carrying crude oil in the quantities that VLCCs do can be a serious risk to the environment, and it is the industry's responsibility to minimize all risks insofar as it is possible. This is simply not a theater for Russian roulette," he pointedly observed. An important stage has recently been attained in the enormous program, with the delivery of the first of the nine double-hulled VLCCs entrusted to Hitachi Zosen. *New Vanguard*, leading a new generation for Golden Ocean, incorporates a dual-purpose design lending itself equally well to operation in the draft-restricted Japanese import traffic, or as a worldwide trader in shipment sizes of 2.1 million barrels. In fact, she has been commissioned into the traffic from the Persian Gulf to the U.S.

> ***It is the shipping industry's responsibility to renew and replace old ships with new and improved designs with the interests of safety and pollution prevention in mind.***
>
> ***— Fred Cheng, Golden Ocean Group***

Icebreaker Evolution

Finland's capacity for innovative maritime design has found new expression in a hybrid vessel suited equally well to the extremely demanding tasks of ice-breaking and offshore industry support.

While drawing on the concept employed in her larger, diesel-electric forebears *Fennica* and *Nordica*, the 10-MW *Botnica* takes the design technology a stage forward through the incorporation of a home-grown, azimuthing podded (Azipod) drive system, sophisticated genset installation and adoption of a moonpool. (note: Botnica is the subject of a "Vessel Focus" this month, and additional details of the vessel are available starting on page 92).

Examining a model of the Schiehallion FPSO in the BMT Wind Tunnels at Teddington, U.K: BMT Group chairman **David Goodrich** (left), chief executive **John Gallagher** (center), and director of research **Fernando Caldeira-Saraiva.** (See complete story under sub-head "Pragmatic Research," on page 10.

Officially named at the Rauma premises of Aker Finnyards towards the end of April, the 318-ft. (97-m) *Botnica* combines the features of an icebreaker charged with keeping Finnish harbors and fairways open on a year-round basis, with those of a vessel offering the open-water stability and precise positioning needed for exploration drilling and other offshore tasks. In fact, she has been engineered to triple redundancy (DP3) standard in an offshore guise.

All-year usability is now a tenet of fleet investment by the Finnish Maritime Administration (FMA), which has to lay-up its conventional icebreakers typically for eight months of each year due to the inherent unsuitability of classic designs in open-water operations. The Finnish authority's Swedish counterpart has recently taken a leaf out of the Finns' book by making seasonal charter commitments to three multi-purpose newbuildings in Poland.

Botnica will be used in the winter period in the Bothnian Gulf, Bothnian Sea and Gulf of Finland in keeping with the FMA's commitment to industry and shipping to maintain access to 23 of the country's approximately 60 commercial harbors during the ice-bound months. For the rest of each year under a long-term agreement, it will be leased to DSND Oceantech for subsea intervention work in the North Sea. The Swedish Maritime Administration, meanwhile, will have recourse from the turn of the century to a new breed of combined icebreaker-supply vessels. Ordered from Naval Shipyard Gdynia by a joint venture of Sweden's B&N Bylock & Nordsjofrakt and Norway's Viking Supply Ships, the 18,000-bhp trio is the subject of a 15-year, winter charter agreement with the Swedish authorities. For the rest of the year, the class will rank among the most powerful anchor-handlers in the North Sea.


When
it comes
to maritime
communications
we've got serious pull.

Pragmatic Research

Against a backcloth of contraction in the indigenous shipbuilding and shipowning sectors, the U.K.'s leading maritime research organization has raised its game by adopting an outward looking and pragmatic business approach that transcends national bounds. The fact that some 45 percent of British Maritime Technology's record turnover last fiscal year was generated by projects outside the U.K., and this, along with its implementation of an acquisition strategy covering both sides of the Atlantic, testify to a policy of growth that combines a commercial-mindedness with technical capabilities in depth.

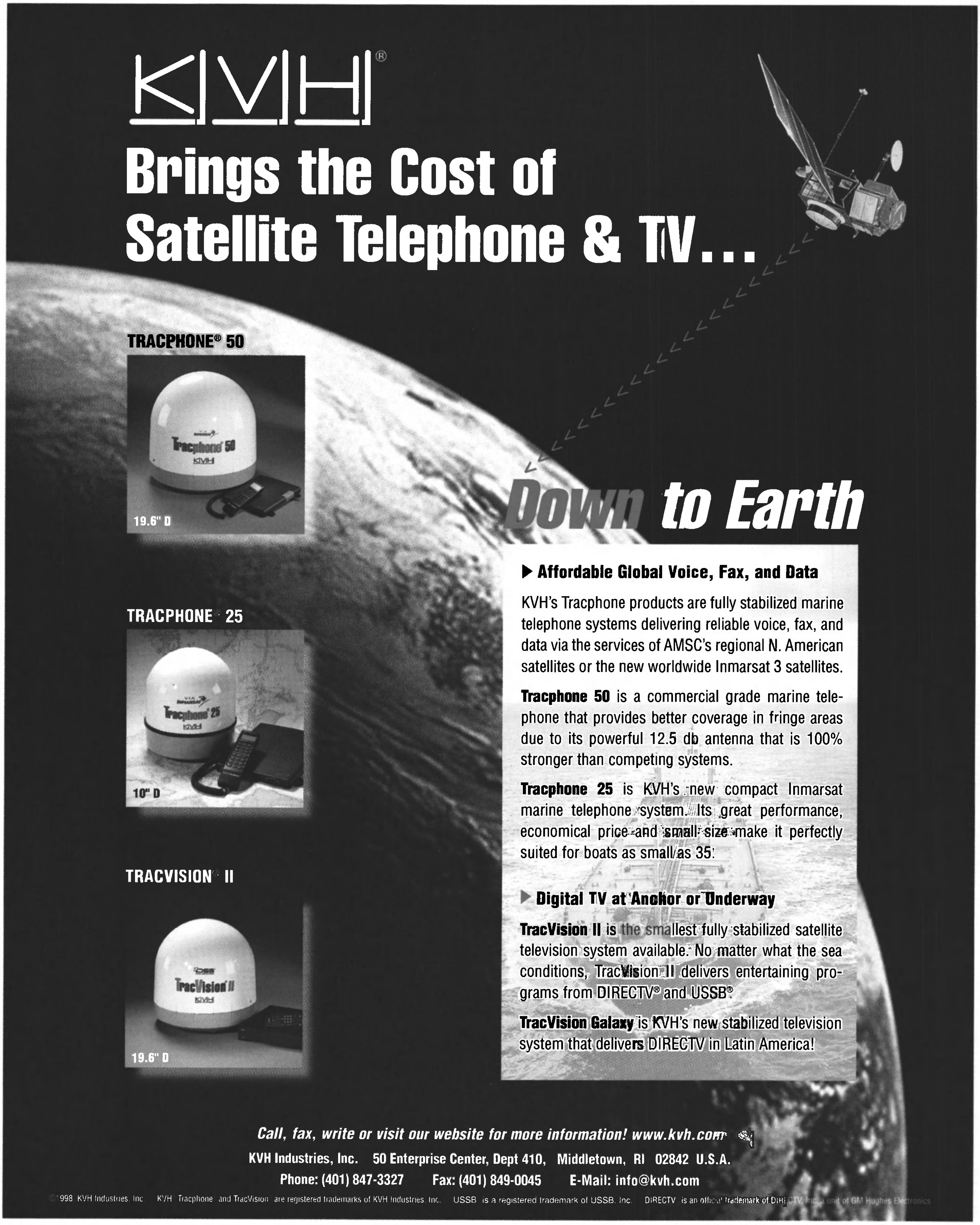
With 500 people employed worldwide, it has developed an impressive pool of know-how over a period which has seen a parallel, considerable diminution in European resources of qualified and skilled professionals in the downsized and increasingly rationalized shipping and shipbuilding industries. But in the competitive international world of technical consultancy and technology transfer, since government does not underwrite those resources, commercial maxims have to be applied to achieve optimum utilization of that strong knowledge base. A perspicacious approach to European Union-sponsored research programs also bears on the viability of the undertaking.

The net result is an organization which marries commercial awareness in identifying and defining market requirements with continuous investment in a research and development framework to design and implement solutions. In the view of Chairman **David Goodrich**, "Successful exploitation and transfer of the resultant technology can only take place when the provider is a wholly profit-motivated company, as are all BMT's subsidiaries."

Established in 1985, when turnover was around $18.3 million, the group's influence has steadily grown. The past few years have seen a pronounced rate of business increase, from $33 million in 1994 to the all-time high of $54.4 million achieved in the 1997 year, on which $4.9 million profit was made. Last year, $2.5 million was invested back from own resources into research, swelled by $1.7 million from EU coffers under joint European programs.

A bolstered international network of subsidiaries promises not only a greater yield and reinvestment in the technological and design base, but also a broader platform for providing solutions to the industrial and commercial shipping as well as defense markets. Having grown its South East Asian interests, where there is no lessening of commitment despite the region's current problems, BMT plans further company acquisitions not only in the U.K. but also in the U.S., which accounted for about 23 percent of group income last year.

Group Chief Executive **John Gallagher** is also intent on increasing BMT's involvement in the mercantile and offshore fields, without diluting the activities in the defense and non-maritime civil sectors. His aim is a fairly even spread of work across the generic fields, whereby commercial shipping and offshore would collectively come to represent about one-third of an increased turnover.



Circle [illegible] on Reader Service Card

High-Yield Shipping Bonds: A Better Mouse-Trap, Or Just A Better Trap?

By Sydney P. Levine, Shipping Intelligence

Until fairly recently, most ship financing was done through conventional bank lending. Putting considerations of scale aside, buying a ship was not too different from buying a house — the ship is collateral for the loan, the bank lends a conservative percentage of the ship's current value and the ship owner pays back the loan over a fixed period of time.

A very important part of this process is the close relationship between the lending bank and the borrowing ship owner; it must exist before the loan is made and contiue for the life of the loan. This close relationship is both a safety net for the ship owner and an early warning system for the lender. With mutual cooperation and occasional midcourse adjustments, most ship loans are completed successfully.

A new form of ship financing, high yield bonds — "junk" bonds as they are generically known — has seized the interest of ship owners and underwriters and billions of dollars have been and will be raised from the international investment community.

Ocean shipping as an investment vehicle has been practically non-existent, at least in the U.S., for decades.

If the high yield issues are successful — and only time will tell — then investor interest in shipping will be stimulated and the availability of funds for new ventures and the expansion of existing companies will grow. If the bond issues are not successful, then shipping as an investment could return to the deep-freeze for a very long time.

Unfortunately, the signs are not encouraging.

The ratings agencies, primarily Standard & Poor and Moody's, have rated nearly all of the high yield shipping bond issues as below investment grade.

In the past, about 20 percent of issues so rated have defaulted within five years.

Further, the absence of the three factors that characterize traditional ship lending — sufficient collateral, declining loan balance over time and close relationship between borrower and lender — increases the probability of eventual investor unhappiness. Specifically:

Absence of sufficient collateral:

The value of a ship is a volatile number that fluctuates, widely and wildly, but eventually declines as a ship ages. In many cases, the value of the high yield shipping bonds issued far exceeds the present value of the ships involved. And this disparity will increase as the ships age, unless, of course, there is a program of

High-Yield Shipping Bonds: A Better Mouse-Trap, Or Just A Better Trap?

fleet renewal. If the bond issuing company is profitable, then this gap between the fleet value and the value of the bonds is not serious. If, however, the company is not profitable, then the investor may be at risk because there will not be sufficient collateral to rely on in case of default. This was certainly the case in the Adriatic Tankers fiasco. And this situation would be magnified by the:

Absence of declining loan balance over time:

In traditional ship financing, the loan was paid back over time. The declining value of the collateral was matched by the declining loan balance, so that the lender's exposure was controlled at all times. Under the structure of many of the shipping bond issues, the lender's exposure increases over time. The bonds are issued for a period during which only interest is paid, so that as the fleet ages and declines in value, the amount of the indebtedness remains constant and increasingly unsecured. Will the bonds be redeemed at maturity? Possibly, but it is more likely that the bonds will be rolled over into new issues to be redeemed at some point further in the future. These bonds are really a form of preferred equity, perhaps never to be retired. And if the financial status of the bond issuing company should deteriorate, the bond holders have little that they can do about it, because of the:

Absence of a close relationship between the borrower and lender:

Simplifying radically, some of these bond issues are equivalent to a traditional bank loan with a balloon payment of 100 percent at maturity. But with one very important difference. Under traditional bank lending, the bank officer responsible for monitoring the loan can judge the financial health of the borrower on a daily basis if necessary and help to avert trouble. Most bank ship lending officers know the subtleties of the shipping business and can be of immense help to the borrower at times of impending distress. But who can fill this role with high-yield shipping bonds? There is probably no one. The underwriters who helped to bring the bond issue public will have collected their commissions and fees and are neither privy to the ongoing business of the borrower nor financially at risk if the borrower's fortunes decline. And the bond holders, who certainly are financially at risk, are a fragmented group who can only influence the behavior of the borrower if they act in a group — and that usually happens only after the worst has happened and bankruptcy court is the only option left.

High-Yield Shipping Bonds: A Better Mouse-Trap, Or Just A Better Trap?

But perhaps a more basic question to ask is, should these bond issues be brought to market in the first place? Who determines the credit worthiness and future viability of these shipping companies? While the ratings agencies play a role in this regard, and they have been conservative and even discouraging in their assessments, the major influence has been the underwriters. And the underwriters have certainly brought public the bonds of some very strong companies — strong financially, operationally and managerially. But they have also brought public bonds of some companies that are weak candidates indeed when measured against the ongoing dynamics of the shipping business. How can this happen? I believe that the underwriters simply do not understand how the shipping business works.

The shipping business has been neglected by the securities markets for years and as a result the level of understanding of shipping within the securities community is low.

But, now that shipping has become, at least for the moment, a fashionable investment, underwriters reason that shipping is a business like any other and can be treated like any other. But shipping has many aspects, particularly its strongly cyclical nature, that make it different from other businesses. Because underwriters are not aware of these aspects they cannot differentiate between a current rosy financial picture that is unlikely to be sustained and a situation of strength that will be maintained into the future.

Underwriters reject this criticism out of hand, but there is evidence that they are wrong. For example, a few underwriters stirred up a great deal of controversy recently about the possibility of inflated ship valuations and their effect on investment analysis. While inflated valuations may occasionally mask fraud, ship valuations really play a minor role in investment evaluation, where the emphasis is rightly placed on cash flow and earning power. Sadly, underwriters often don't get the answers that they need because they don't know the right questions to ask.

At a recent shipping meeting, the head of shipping of a major bank thanked an underwriter's representative for taking on risks that he would not want to assume. Metaphorically, it may be time to batten down the hatches.

Sydney P. Levine is the president of Shipping Intelligence, Inc., a maritime economic consulting firm located in New York. He may be reached at 25 West 43 Street. New York, NY 10036; tel: (212) 997-0966; fax: (212) 997-1105; e-mail: SPL@PANIX.COM; WWW.PANIX.COM/~SPL.

GFR Starts Marine Debt Recovery Division


Raymond Clarke


Jonathan Clegg

Global Financial Recoveries Ltd. (GFR) started a new marine debt recovery division. The new company, Global Financial Recoveries (Marine) Limited, will recover debts for suppliers, banks and insurance companies exposed to the international shipping industry. It will be managed by **Raymond Clarke**, a former partner at City law firm Elborne Mitchell. Group managing director, **Jonathan Clegg**, said, "We are delighted to bring this new service to the market providing no cure–no pay collections, including world wide ship arrest, when necessary. Contingent collections are nothing new, but the addition of the legal element is a first. We are all very excited at the scope for the operation and believe that Ray is the ideal person to head up the operation."

New director, **Raymond Clarke**, said, "The shipping industry as a whole is extremely depressed at the moment. All sectors are suffering, but particularly the suppliers. This service is intended to re-dress the balance."

GFR (Marine) Ltd. is part of Global Financial Recoveries Ltd. which has offices in the U.K., Switzerland and Australia. It operates to maximize the collection of commercial debt, personal loans, residual mortgages, asset finance and credit card debts.

Oslo Exchange To Add Havila Supply

Havila Supply ASA has been approved for listing on the Oslo Stock Exchange (OSE). The company is set for a listing on the SMB list, the OSE's special alternative for small-and medium-sized companies. Havila Supply ASA was established in March 1998 by **Per Savik** and his associates. Including three newbuildings currently on order, the company owns and operates seven anchor handling, tug and supply vessels (AHTS), five platform supply vessels (PSVs) and three multifunctional stand-by vessels. The vessels are chartered out on a combination of short- and long-term contracts. The company has recently raised $65 million on the Norwegian stock market. Based on a share price of $2 per share, the market value of the company is estimated to be about $84.2 million. With the addition of Havila Supply, 18 shipping or offshore companies are listed on the OSE's SMB list for small and medium sized companies.

Circle 62 on Reader Service Card

HZ Receives Order For Enhanced Aframax Hull

Hitachi Zosen Corp. received an order for an Enhanced Aframax Size Hull for FPSO from Bluewater N.V. Netherland Antilles. The hull ordered is similar to the Aframax Size hull of *Bleo Holm*, which was delivered by Hitachi Zosen last year. The hull will be constructed at the Ariake Works and towed to Europe for the installation of turret, topside facil-

STN Atlas Wins $4.5M VTS Contract

STN Atlas Elektronik has been awarded a $4.5 million contract by the Polish National Coast & Harbor Authority for the design and installation of an advanced VTS system for monitoring and control of traffic in the Pomeranian Bay region and its approaches. Due for commissioning in February 1999, the system will comprise two interlinked main control centers at the inland port of Szczecin and at Swinoujscie on the Baltic coast, serving traffic to and from Denmark, Germany and Sweden. Each is to be equipped with a series of Atlas VTS work-stations for automatic tracking of all vessels, as well as support of channel pilotage operations between the two centers. The purpose-designed units will also facilitate overlay of all radar-derived targets on electronic charts.

Circle 48 on Reader Service Card

Stolt Comex Renews LKMN Agreement

Stolt Comex Seaway SA will extend its cooperation agreement with Russian fleet owner/operator Lukoil-KaliningradMorNeft (LKMN), under which heavy lift ship *Stanislav Yudin* is chartered to Seaway Heavy Lifting Ltd., the joint venture company established between Stolt Comex and LKMN.

Kvaerner Selects Shipyard Design Team

Pennsylvania Shipyard Engineering (PSV), a joint venture of STV Inc., Urban Engineers, Inc. and Ewing Cole Cherry Brott, in association with Synterra Ltd., has entered into a Letter of Intent with Kvaerner Philadelphia Shipyard Inc. for the design of Kvaerner's new shipyard facility at the former Navy Yard in Philadelphia. This $100 million project will commence in summer 1999.

IBM Wins $100M Hapag-Lloyd Contract

Hapag-Lloyd Container Line GmbH and IBM have signed a major five-year service agreement whereby IBM will manage Hapag-Lloyd's information technology infrastructure around the world.

"Hapag-Lloyd is represented in almost 40 countries and has a complex data processing infrastructure that has comprehensive operational and user support demands. With the service agreement, we obtain a high measure of standardization of our PC/LAN-environment and a clear-cut and reliable service level in terms of availability and response times, said **Dieter Schmidtsdorff**, managing director of Hapag-Lloyd Container Line GmbH.

IBM Global will run Hapag-Lloyd worldwide dedicated systems network, central data center and bilingual (German/English) help desk. To efficiently manage the company's IT infrastructure, IBM will develop a standard hardware and software platform for the LAN/PC environment. Also under the agreement, 48 Hapag-Lloyd employees will convert to IBM's payroll.

Circle 49 on Reader Service Card

Leica Wins Contract From Chinese Organization

Leica GPS has been awarded a contract by the Chinese Maritime Safety Administration for four marine differential GPS (DGPS) beacon systems. Each system will include dual Leica MX 9310 Beacon DGPS reference stations, on-site integrity monitoring and an industrial control PC with Leica broadcast station software running in a WindowsNT environment. The new DGPS beacon sites will augment the five existing stations already provided by Leica.

Circle 50 on Reader Service Card

Crowley Chooses Jamestown Metal For Barge Conversion Project

Jamestown Metal Marine Sales, Inc. has been selected by Crowley Marine Services, Inc. to design, supply and install a complete joiner package as part of a camp barge conversion project. Joiner materials to be installed include INEXA TNF softcore joiner panels, LAVTEC modular fiberglass toilet and shower units and JMMS C-70 ceilings, in addition to deck covering and furnishings throughout the accommodation module.

Circle 51 on Reader Service Card

Oceanfast Completes $3M Conversion/Upgrade

Oceanfast has completed a $3 million conversion and upgrade of its 1995-built SES catamaran *Atlantica*. Having served in the Caribbean, the vessel will now operate for Brazilian Fast Ferries in the Amazon River region between Belem and Macapa. The 126 ft. (38.5 m) vessel will carry 346 passengers, is fitted with Ulstein Speed-Z drives and is capable of speeds of 44 knots.

Circle 52 on Reader Service Card

GE Provides New Cruise Ship Technology

A technological shift aimed at resulting in 80 to 98 percent reduction in exhaust emissions and lower noise and vibration levels is scheduled for the engine room of new Royal Caribbean International (RCI) and Celebrity Cruises vessels.

"We have designed these to be the most environmentally sensitive cruise ships in the world. This technology introduces a new era in cruise ship design, and marks the first partnership between a major American technology company and foreign-flagged cruise lines," said RCI Chairman and CEO **Richard D. Fain**.

Each of the 85,000-ton ships, being constructed in France and Germany, will be equipped with a pair of GE Marine Engines LM2500+ aeroderivative gas turbines and a single steam turbine. The turbines are adapted from the same family of commercial aircraft engines that power DC-10s, MD-11s, and Boeing 747s and 767s. On the cruise ships, the gas turbines will drive generators which, in turn, will provide electricity to propeller motors. A steam turbine will then recover heat from the exhaust, providing energy for heating water and other electrical needs.

The first two ships for Celebrity Cruises will be part of the cruise line's Millennium class and are scheduled for delivery in June 2000 and January 2001. The first ship for RCI, of the Voyager class, is due in February 2001.

Circle 40 on Reader Service Card

COSCO Places $200M Order

China Ocean Shipping (Group) Co. (COSCO) has ordered nine ships worth a total of $200 million from two domestic shipbuilders. The Shanghai Shipbuilding Plant will build four ships for COSCO and the rest would be built by the Dalian Shipbuilding Plant. The nine ships would have a total carrying capacity of 25,800 tons and would be put into operation by 2000.

Four OMI Directors Resign

Four members of OMI Corp.'s board of directors have resigned as part of the company's previously announced acquisition of Marine Transport Lines. **Marianne Smythe**, **Emanuel Rouvelas**, **Steven Jellinek** and **Livio Borghese** are resigning from the board. In addition to the transaction with Marine Transport, OMI will be spinning off to OMI's shareholders its foreign operations. The spun off company, which is regarded as the "New OMI," will have a slate of directors which does not include the four resigning directors.

OMI and the directors agreed that it would be in the best interest of the company and the directors if they resigned rather than wait for consummation of the deal.

Gdansk Shipyard To Be Sold By End Of June

Poland's Gdansk Shipyard is expected to have a new owner by the end of this month. In recent weeks, Szczecin Shipyard and the Repair Yard in Gdansk made a joint bid for Gdansk. Gdynia Shipyard and a ship building group which works in the failed Gdansk yard had also placed bids for the yard. Gdansk's reported book value is $26 million.

Clarkson Foresees Tanker Order Pick-Up

In its semi-annual report, Clarkson Research Studies said orders for new tankers may pick up this year, due to a strong tanker market and falling new ship prices. Clarkson noted tanker newbuilding totaled 32.4 million

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130 foot Tambor

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120 foot Flamingo

116 foot Canima

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In Mobile Alabama:

Alabama Shipyard, Inc.
New Construction
Atlantic Marine Inc.
Repair & Conversion
Tel: 334-690-7100
Fax: 334-690-7016

Circle 113 on Reader Service Card

dwt in 1997, the largest level since 1974. With a low volume of deliveries, 8.4 million dwt, the tanker orderbook grew to 46.7 million, up 102 percent on the end of 1996. Clarkson said containership orders, which came to an abrupt halt after the first quarter of 1997, are starting to show signs of re-emerging and may pick up in the latter part of this year.

Austal Ships Wins $37.2M Patrol Boat Contract

Austal Ships Pty Ltd. won a $37.2 million government contract to build and maintain a new fleet of Customs patrol boats.

The eight, 115-ft. (35-m) Bay class boats will be supplied to the Australian government over two and a half years, with the first delivery due in March 1999. The remaining seven patrol boats will be delivered periodically through February 2001.

Circle 53 on Reader Service Card

Damen Wins Order From Irish Interest

Damen Shipyards has signed a contract with The Commissioners of Irish Lights (CIL) for the contruction of a new Aids to Navigation Service Vessel. The tender design has been prepared by naval architectural firm Hart, Fenton & Co. Ltd.

The new vessel is scheduled for delivery in late 1999, and will measure 261.5 x 52.4 x 14.7 ft. (79.7 x 16 x 4.5 m), with a bollard pull of 40 tons. Main propulsion will be provided by five diesel alternators driving two azimuthing nozzle propeller to provide speeds of 13.1 knots.

Offshore Systems Launches New Generation ECPINS

Offshore Systems International Ltd. announced its new ECPINS-NG product line. The line consists of three new models: the ECPINS-NG Nav, NG Pro and NG Pro+; each designed to provide ECPINS capabilities on a PC platform. With a successful beta-test program complete, there are pre-release orders from the Canadian Navy, U.S. Coast Guard and several commercial customers. The NG line is aimed at extending Offshore Systems' customer base to smaller coastal patrol boats and commercial vessels, pilots, tug-barge operators and small ferries.

Circle 23 on Reader Service Card

ResidenSea A Reality

Cruise firm ResidenSea Ltd. signed a $545 million contract with HDW to build a sea-going luxury resort. ResidenSea said the deal for construction of 86,000 gt The World of ResidenSea, on which clients will own apartments rather than rent cabins, was signed on April 30 with shipyard in Kiel.

Apartments aboard the vessel, which will cruise the oceans permanently, cost from $1.5 million to $6.6 million. The vessel, which innovates by allowing home ownership, will be 958 ft. (292 m) long. The vessel is scheduled to be delivered on April 30, 2001.

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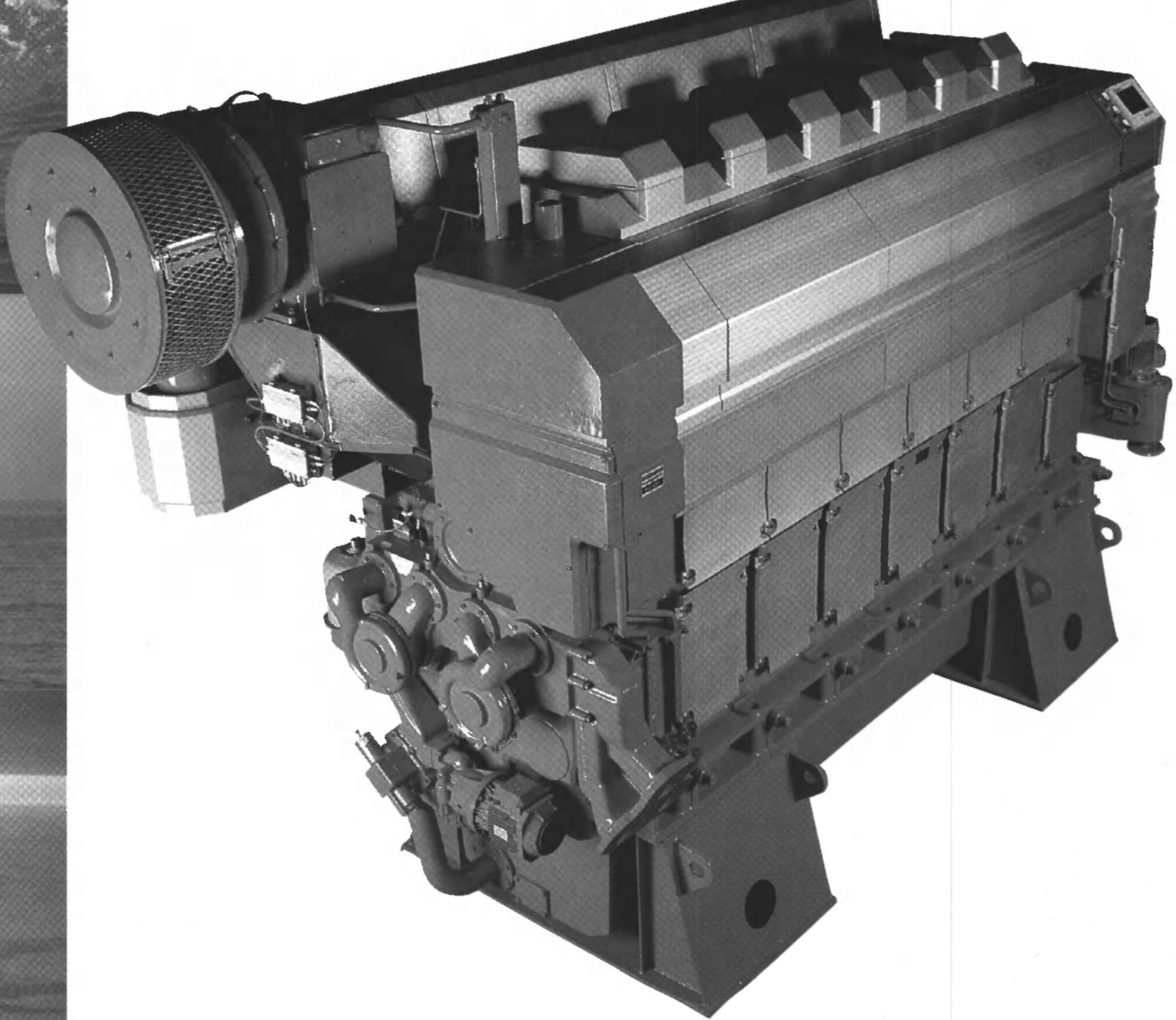
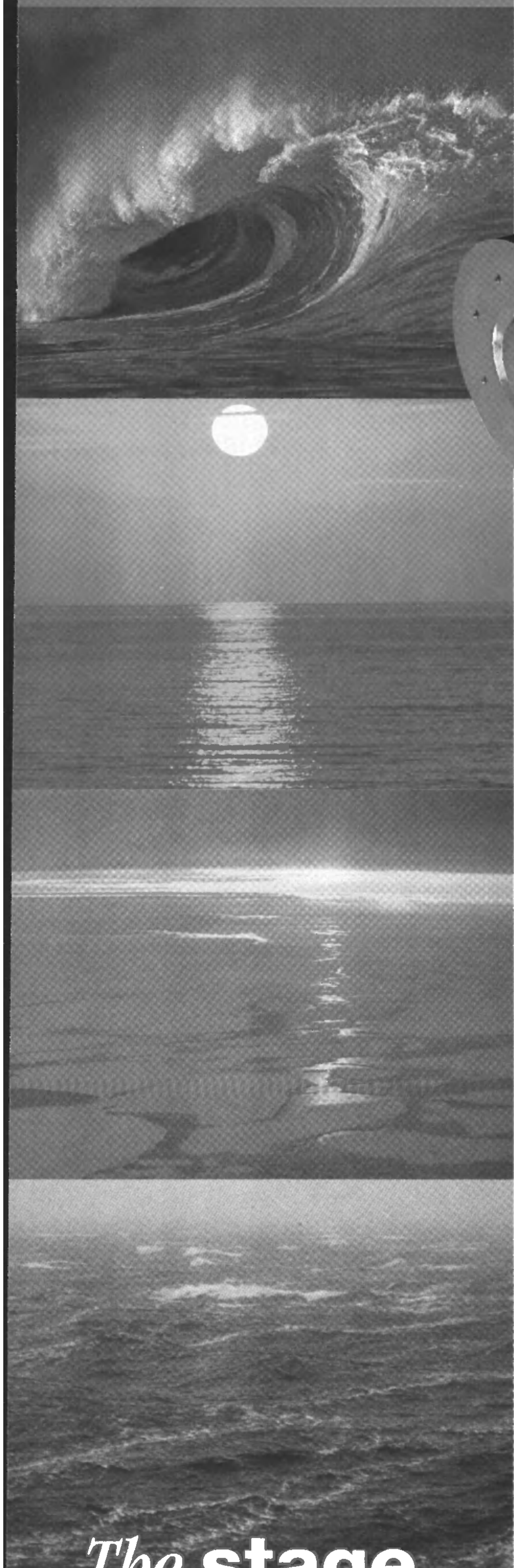
The Performer





The **stage**

Wärtsilä NSD introduces Wärtsilä 32 – the Performer. A whole new engine concept in the 2700 to 8280 kW output range. The new medium-speed engine integrates reliability, economy and ecology in a way that meets even the toughest requirements.

The engine's reliability is based on a modular design with integrated functions. Such as the engine block's integrated channels for oil and water and the engine-integrated monitoring and control system.

Its durability is based on using the most wear-resistant materials and innovative technical solutions in all engine parts to extend their lifetime to the maximum.

Thanks to the engine design which enables high firing pressures and effective turbocharging, the engine's fuel efficiency is excellent.

Coupled with built-in low NOx combustion as standard, the Wärtsilä 32 gives a performance that lives up to all standards. Wherever the stage might be.

WÄRTSILÄ NSD
CORPORATION

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GKN Provides Canadian Coast Guard With Innovative Hovercraft

GKN Westland Aerospace recently delivered the first of a new type of hovercraft to the Canadian Coast Guard. *Dash 400* is the first in a series of two vessels based on the AP1-88 design. The new vessel measures 93.5 ft. (28.5 m) in length and is capable of carrying a payload in excess of 20 tons. *Dash 400* is powered by four Caterpillar 3412 TTW water-cooled diesel engines, each developing 671 kW. Two of the engines are used for lift and two for propulsion.

GKN Westland is responsible for the design and project management of the two-craft contract. Construction was sub-contracted to Hike Metal Products. The first vessel will join the existing AP1-88 well deck craft on the St. Lawrence Seaway. The second, due for delivery this month, will join the exsiting SRN6 hovercraft servicing the Vancouver area. GKN hovercraft are currently in service in Alaska, South America, the U.K., Russia and the Middle East.

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Cable and Wireless Adventure Main Particulars

Length, o.a.	115 ft. (35 m)
Beam	113.2 ft. (34.5 m)
Draft	4.4 ft. (1.3 m)
Displacement	41 tons
Engines	(2) Cummins Marine turbo-diesels
Range	> 3,500 nm
Service life	20 years
Port of Registry	London, U.K.
Fuel	12-ton max.
Crew	16

Cable & Wireless Takes Worldwide Adventure

Cable and Wireless Adventure, a unique, 115-ft. (35-m) stabilized mono-hulled powerboat, will attempt to complete the 26,000 mile circumnavigation of the globe in less than 75 days.

Having set sail from Girbraltar on April 19, the vessel will follow a mainly equatorial route with ports of call in Monte Carlo, Port Said, The Maldives, Singapore, Hong Kong, Yokohama, Honolulu, San Diego, Panama, Jamaica, Miami, New York and returning to Gibraltar.

The vessel is made from the latest composite glass reinforced polymer/foam sandwich construction and equipped with state-of-the-art navigation and communications equipment. *Cable and Wireless Adventure* was built in Southampton by Vosper Thorneycroft, and is a development of a smaller prototype vessel, *Llan Voyager*, which broke the "Round Britain" power boat record in 1989. Both vessels were designed by **Nigel Irens**.

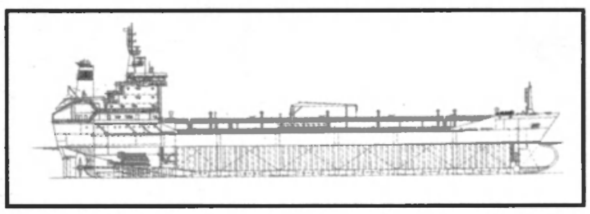
The challenge placed upon builder and designer was to produce a vessel capable of beating the existing record of circumnavigation (83 days by USS *Triton* in 1960), while capable of achieving a range in excess of 4,000 miles. The new vessel is also leading in its potential for fuel efficiency. The narrow hull design cuts through waves and decreases drag, allowing the vessel to use proportionately less fuel than a traditionally designed vessel achieving a similar speed and range.

BP Marine will be a major technical sponsor of *Cable and Wireless Adventure*'s circumnavigational attempt by providing a complete range of lubricants and technical support for the vessel, as well as coordinating the delivery of fuel required for the vessel during its journey. BP will supply products from its Energol, Vanellus and Bartran series including products ranging from lubricants in the main engine to the oil for the ouboard motor on the boat's dinghy.

Circle 45 on Reader Service Card

Alabama Shipyard Makes Monumental Delivery

The first of two chemical tankers built for Dannebrog Rederi AS has been delivered by Atlantic Marine subsidiary Alabama Shipyard, representing the completion of the first self-propelled, ocean-going vessel built for export by an American shipyard in more than 40 years. Built under a Title XI loan guarantee, the new vessel, dubbed *Amalienborg*, is a 16,000 DWT IMO chemical carrier and is built in accordance with OPA 90 regulations. Designed by its owner, the single screw vessel features a single deck and a double hull, and contains 12 epoxy-coated cargo tanks.



Main and auxiliary power plants were provided by Wartsila. The populsion system consists of a 4,800 kW diesel engine driving a four-blade Kamewa controllable pitch propeller through a Valmet reduction gear. A single 588 kW hydraulically driven Kamewa bowthruster enhances maneuverability. The vessel is classed to LR +100A1 specifications, and will be manned by a crew of 18, with accommodations for 20 persons.

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(Continued on page 28)

North Carolina Shipyard Completes Revamping

M/V *Carteret*, orginally constructed in 1989 by Halter Marine, has completed rennovation at North Carolina Shipyard. The project involved stripping the vessel of all wiring, electronics, passenger lounges and pilot house, leaving only an empty shell. *Carteret* was then cut in half, and a newly fabricated mid-body was welded into place. The vessel was originally 161 ft. (49 m) long, powered by Caterpillar 3412 engines reaching 642 hp and carried 30 vehicles and 200 passengers. *Carteret* now measures 220 ft. (67 m) long with a gross tonnage of 771. It can carry 50 vehicles and 300 passengers and is powered by twin CAT 3508 engines each developing 805 hp. *Carteret* was scheduled to be delivered to the State of North Carolina Ferry Division on May 22.

Sub-suppliers such as Marine Accommodations played a major role in the ultimate success of the project.

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Carteret Main Particulars	
Shipbuilder	North Carolina State Shipyard
Vessel Type	Ferry
Owner/Operator	State of North Carolina — Ferry Division
Designer	R.S. Dossett
Flag	U.S.
Contract date	June 1996
Delivery date	May 22, 1998
Length, o.a.	220 ft. (67 m)
Length, b.p.	209 ft. (63 m)
Gross tonnage	770
Draft, design	6 ft. (1.8 m)
Service speed	12 knots
Complement	six crew, 300 passengers
Cargo capacity	50 vehicles
Bunker	4,500 gallons
Fuel consumption	65 gph
Maine engine	Caterpillar 3508
Auxiliary engines	Caterpillar
Propellers	Bird Johnson
Thrusters	Michigan/Jostram
Reduction gears	Twin Disc
Engine Controls	Marine Engine Controls, Inc.
Steering Controls	Matthews Marine
Bearings	Johnson
Radar	Furuno
Compass	Richie
GPS	Northstar
Autopilot	Navcom
A/C	Marine Development Corp.

(Continued from page 26)

Amalienborg Main Particulars	
Length, o.a.	472.5 ft. (144 m)
Length, bp	439 ft. (134 m)
Breath, molded	75.4 ft. (23 m)
Depth, molded	40.7 ft. (12.4 m)
Draft, design	28 ft. (8.4 m)
Draft, scantling	29 ft. (8.7 m)
Main engine	Wartsila
Propeller	Kamewa
Reduction gear	Volmet
Bow thruster	Kamewa
Rudder	Ulstein
Steering gear	Ulstein
Hydraulic cargo pump	FRAMO
Cargo/slop tank coating	Sigma
Tnk level gauging system	Autronica
Cargo control system	Autronica
Valve remote control system	Danfoss
Tank cleaning machines	Toftjorg
Auxiliary diesel engines	Alfa Laval
Emergency generating sets	Cummins
Paint	Hempel
Rescue boat	Norsafe
Satellite navigator	Sperry
Deck machinery	Aquamaster Rama

Circle 166 on Reader Service Card

Flender Werft Launches *Santa Federica*

Flender Werft recently celebrated the launching of containership *Santa Federica*. The ship, owned by Claus-Peter Offen, is of the FW 2100 type series, and features a DWT of 30,200 with a service speed of 20 knots.

Santa Federica is equipped with four cranes carrying 2,169 containers in six tiers. Propulsion is accomplished with a crosshead MAN B&W 6S 60 MC engine developing 12,240 kW at 105 rpm. Electrical energy is supplied from four auxiliary diesel generators with a total output of 3,670 kW.

The new containership is scheduled to be delivered in July, at which time it will enter service under a three-year charter for P&O Nedlloyd Lines.

Circle 44 on Reader Service Card

Daewoo Gets Order For Car Carriers

Ugland International Holding Plc and Leif Hoegh & Co. have ordered two new car vehicle carriers from Daewoo Heavy Industries Ltd. for around $56.9 million each. Ugland and Leif Hoegh — whose jointly owned company, Norwegian car transport specialist HUAL AS, already owns five vessels — placed the order through another joint company Joint Vessels Ltd.

NNS Awarded $1.2 Billion USS *Nimitz* Contract

Newport News Shipbuilding (NNS) has been awarded a contract by the U.S. Navy to perform refueling and overhaul work on the nuclear-powered aircraft carrier USS *Nimitz* (CVN 68). The contract, valued at approximately $1.2 billion, was signed by Navy and NNS officials on April 30, 1998.

In addition to the refueling of both of the ship's reactors, there will be significant modernization work including a major upgrade of the island house and the integration of a new radar tower.

Maintenance and repair work will be performed below the ship's waterline to include the application of new paint. In addition, the shipyard will be replacing nearly 3,000 valves and overhauling another 600 in various ship systems.

Pictured is Fincantieri-built LNG *SNAM Lerici*.

Main Particulars

Length, o.a.	705.4 ft. (215 m)
Length, b.p.	673 ft. (205 m)
Breadth	111.2 (33.9 m)
Depth to upper deck	70 ft. (21.3 m)
Draft, design	31.2 ft. (9.5 m)
DWT	32,000
Fresh water capacity	300-cu.-m.

Circle 19 on Reader Service Card

Halter Extends Influence Abroad

Halter Marine Inc., a subsidiary of Halter Marine Group, Inc., along with Yantai Raffles Shipyard Co., Ltd., and Yantai Taisun Shipbuilding Co. Ltd., — collectively Yantai Shipyards — have formed Halter-Yantai Raffles International, a joint venture to market and build marine vessels in Yantai Shipyards in Yantai, China. Halter-Yantai Raffles will market offshore drilling rigs, platform supply vessels, anchor handling tug/supply vessels, utility vessels, tug boats, production units, multi-service vessels and pipelaying/derrick barges for delivery worldwide.

John Dane III, chairman, president and CEO of Halter Marine Group, Inc. who said, "Halter is committed to achieving global leadership in the construction of marine equipment, and this joint venture is integral to our strategy for accomplishing that goal.


John Dane III

Our customers have global operations and they will be building a portion of their fleets of vessels and rigs in yards outside of the U.S. We are positioning ourselves to service these worldwide requirements."

Yantai Shipyard is located on the island of Zhifu, part of the city of Yantai, Sandong in northeast China. The yard covers 555,000 sq.-m. and occupies 1,100 m. of coastline.

It is equipped with eight 1,000-ton capacity shipways connected to a single shipway and a 672-ft. (205-m) long, 148-ft. (45-m) wide and 26.2-ft. (8-m) deep graving dock.

The shipyard's existing facilities give it the capacity to build an equivalent of 20 tug/supply vessels per year or four rigs per year.

A significant capital improvement program is underway now, and when completed, Yantai will be one of the most modern shipyards in the world with one of the world's largest graving docks. With the availability of labor in the Yantai area and the support of Halter, Yantai's world class facilities will be able to produce multiple boat, drilling rig, and production unit projects simultaneously.

Mr. **Dane** emphasized that Halter-Yantai Raffles venture will not take away business that might otherwise go to Halter's U. S. shipyards saying, "Our new China joint venture will capture some of the business that was going overseas anyway, and additionally, we will be able to complete the outfitting in our U.S. yards of drilling rig hulls built in the Yantai Shipyards."

Robert Fogal, senior vice-president of marketing and business development of TDI-Halter L.P. will be the senior marketing officer of the joint venture.

Frontline Buys Cambridge Tankers

Frontline Ltd. reached a deal with Cambridge Fund Management to acquire six VLCCs and four Suezmax tankers. Under the deal, Frontline will gain control of three shipowning structures — Golden State Holdings, Windsor Holdings Ltd. and California Petroleum Tankers Holding Ltd.

Peterson Named Ceanic's CEO

American Oilfield Divers Inc. (AOD) d/b/a Ceanic, announced that it named **Kevin C. Peterson** as its president and CEO. Mr. **Peterson** has been with Ceanic for approximately one year, currently serving as its COO and a director. Prior to joining Ceanic, Mr. **Peterson** was president and CEO of Coflexip Stena Offshore Inc. and Perry Tritech Inc., a Coflexip subsidiary. Mr. **Peterson** replaces **Rod Stanley** who resigned as an executive officer and director for personal reasons. Ceanic is a provider of diving services, intervention technologies, subsea products, field development, general contracting and marine construction services to offshore, governmental and industrial customers in the U.S. and internationally.

LR Signs Emissions Trading Agreement With U.N.

Lloyd's Register (LR) signed a Memorandum of Understanding with the United Nations Conference on Trade and Development (UNCTAD) agreeing to cooperate in promoting the timely development and implementation of an international greenhouse gas emissions trading system, in accordance with the Kyoto Protocol signed in December 1997.

The Protocol requires industrialized countries to limit emissions, mainly carbon dioxide, through a variety of measures including emissions trading, which should be supplemental to domestic actions.

The role of a certification authority would be to validate the permits which would be traded internationally by either governments or the private sector and verify actual emissions from participating bodies.

Digital Camera Technology Updated

IMC Engineering Inc. has upgraded it's DICAMOS System (Digital Camera Monitoring System) to run under WindowsNT 4.0 and has been awarded contracts covering the installation and delivery of several Digital Camera

Monitoring Systems to Exxtor Group Shipping Service Limited, Sea-Ro Terminal in Zeebrugge and HRS (Hoogewerf de Rijke Seaport bv) in Rotterdam .

Cobelfret Ferries, who is sailing to all these terminals, will be the first shipping line in the world to have all incoming and outgoing cargo monitored on damage by a Digital Camera Monitoring System. All claims will be centralized in the claim department of Cobelfret in Zeebrugge in a jukebox with 150 CD ROM's which can be accessed very easy to handle the claims.

Circle 22 on Reader Service Card

Grupo Libra Expands Sales Team

Grupo Libra appointed **Thomas L. Sadowski** as Regional Sales Manager of its Mid-Atlantic territory in the U.S., responsible for sales efforts for the carrier's South America Service. He will oversee Libra's activities in Pennsylvania, Delaware, Maryland, Virginia, West Virginia, and the District of Columbia. Formerly known in North America as Companhia Maritima Nacional — or Nacional Line — Grupo Libra provides weekly service between the U.S. and South America, calling Atlantic and Gulf coast ports.

P&O Nedlloyd Arica Enters Service

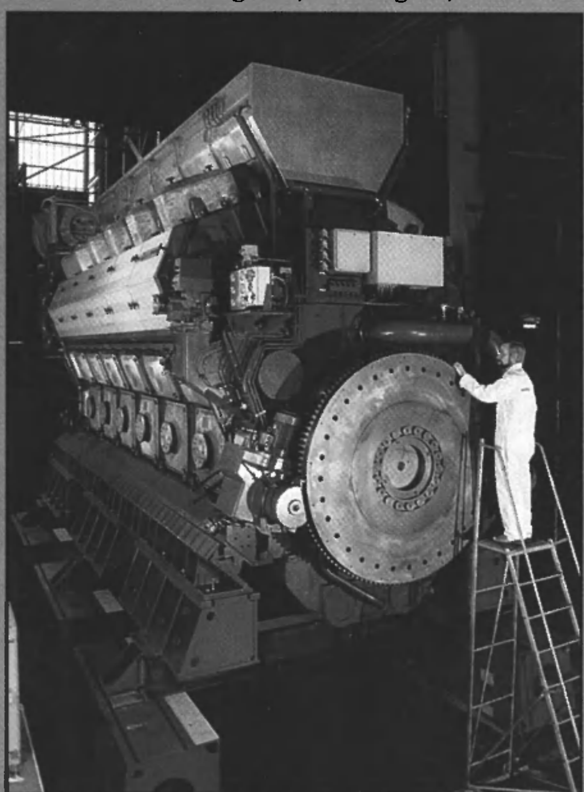
P&O Nedlloyd's new 2,160 TEU container vessel *Arica* has officially entered service and has been assigned to the company's Lamcon services sailing between the Far East and South America. The new vessel will replace an existing charter ship on the same route, and is the sixth from the Flender yard charterd by P&O Nedlloyd from Reederei Claus Peter Offen.

Arica is classed to GL 100 A5 E standards and meets SOLAS 11-2 regulation 54. At 600 x 95 ft. (183 x 29 m), the vessel is powered by MAN B&W 6 S 60 engines with a service speed of 20 knots, and is fitted with plugs for refrigerated containers.

Circle 43 on Reader Service Card

Wärtsilä 46 Is In Demand

Wartsila NSD Finland OY has received orders from Kvaerner Masa-Yards for the installtion of Wartsila 46 engines in the shipyard's new series of cruise ships to be built for Costa Crosiere, Carnival Cruise Line (CCL) and Royal Caribbean Cruise Line (RCCL). The new ships being constructed for Costa Crosiere and CCL will each be equipped with six Wartsila 9L46 engines, providing a total output of 62,370 kW. Kvaerner is constructing the Eagle class vessels, to be the largest cruise ships in the world, for RCCL, and will equip each vessel with six Wartsila 12V46 engines, totaling 75,600 kW.



Pictured is the Wartsila 46 12-cylinder engine.

Tanker Markets Endure Political, Economical, Cyclical Turmoil

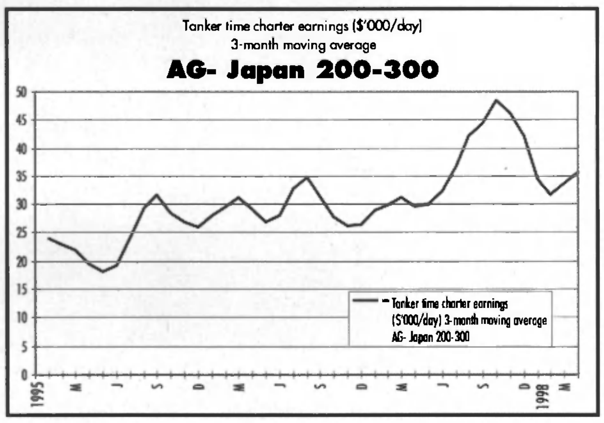
by John C. Harris, director
Drewry Shipping Consultants Ltd.

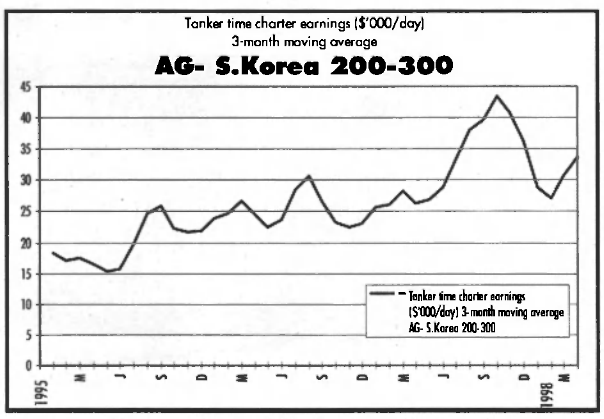
The tanker market provides a transportation service to rectify imbalances between the main oil producing and consuming nations. More than 80 percent of crude oil production is moved on a seaborne basis, with trades from the Middle East dominating. In contrast a much smaller proportion of refined products are traded, some representing export orientated refineries, but many being intra-regional balancing movements. The larger the tanker the greater the economies of scale — but there are two important limitations. Firstly, ports provide physical restrictions to trade — generally in terms of draft, and secondly, oil is traded in varying parcel sizes which will influence the optimum vessel size.

The largest crude oil tankers (a mere handful) when laden are in excess of 500,000 dwt, but generally the principal traders are VLCCs (here defined as vessels of 200-320,000 dwt). VLCCs find most of their employment trading from the Middle East to Asia, Europe and the U.S. Gulf/Caribbean. Only one U.S. terminal can handle fully laden VLCCs — the Louisiana Offshore Oil Port (LOOP) — and many vessels are lightered off the U.S. Gulf Coast into smaller vessels. Suezmax tankers (defined as 110-200,000 dwt) are engaged in a range of trades, most usually from West Africa to the U.S. Gulf/Caribbean or Europe, within the Mediterranean, or within Asia. Aframax tankers (70-110,000 dwt) are employed in shorter regional trades — mainly in North West Europe, the Caribbean, Mediterranean and Asia. Finally, Panamax tankers (50-70,000 dwt) represent a more specialized niche and take advantage of draft restrictions in South and North America, and are heavily employed on these trades.

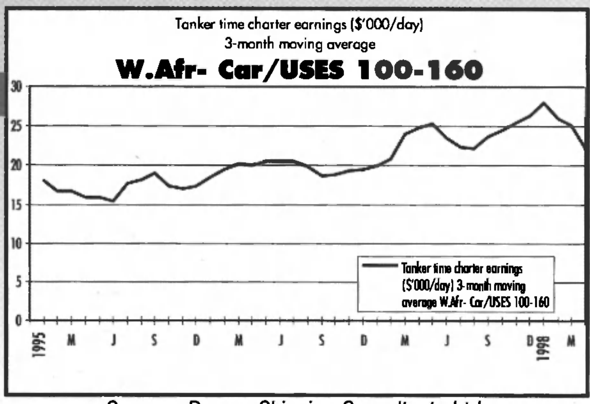
A number of oil tankers have the capability to carry crude oil or refined products, but it is usual for a vessel to trade refined products. The majority of product tankers lie in a size

A buoyant tanker market has kept many ships on the waters. Here, the 1974-built VLCC *Monrovia* is shown undergoing its fourth special survey.





Source: Drewry Shipping Consultants Ltd.



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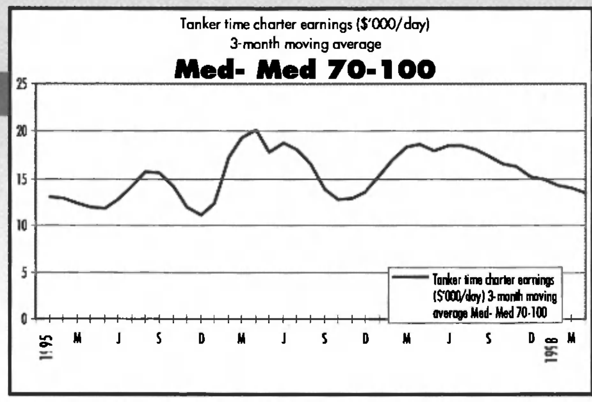

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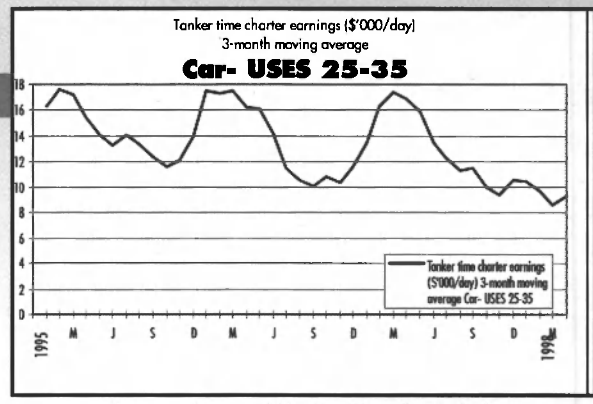

Source: Drewry Shipping Consultants Ltd.

range from 10-50,000 dwt, with more than 90 percent of vessels in this size range falling into this category. A smaller number of vessels ranging up to 110,000 dwt are also able to carry refined products, usually finding employment from the Middle East to Asia. And there are literally a couple of vessels above 110,000 dwt with products carrying capability, but these are geared for oil companies' specific trades.

The level and direction of crude and refined product trades determines the demand for oil tankers. Changes in trade patterns can have a significant impact on demand. The supply of tankers is derived from the balance between vessels delivered to the fleet (usually from a lead time of around 24 months) and those deleted when they are technically obsolete (currently around 25 years of age, with smaller vessels having a longer life).

The tanker market was characterized by a serious recession through the mid-1980s as a result of high oil prices which curbed oil demand. But in the latter part of the 1980s the scrapping of vessels, combined with renewed oil demand growth, brought the market steadily back into balance. The market peaked in 1990/91 as a result of the Gulf crisis, and this prompted a surge in speculative orders (i.e. vessels without cargo guarantees).

As a consequence, faltering economic growth combined with an expansion of the fleet in the early 1990s, has resulted in rates once again being depressed. An increase in demolition levels and a slump in orders kept tanker supply in check, and with strong economic growth, the result in the period 1996/97 has been for rates to strengthen appreciably once again.

For several years there has been a perception that, as the tanker fleet ages, a number of vessels will inevitably have to be scrapped. As a consequence it has been anticipated that a strong level of new-









buildings will be required to maintain the market balance. But the strength in freight rates has merely served to choke off scrapping — as higher incomes allow owners to spend proportionately more on maintaining their vessels, hence extending their trading lives.

The start of 1998 has left the market somewhat delicately poised, as a combination of surging oil production and limited additions to the fleet have maintained a reasonable balance in the face of economic uncertainty in Asia and a bulging orderbook. The prospects for the main individual sectors are discussed below.

Product Tankers

The product tanker market has effectively peaked across a three year period running from 1995 to 1997. Illustrative of the collapse in the market is the fact that time charter equivalent assessments showed earnings of $8,400/day in 1Q98, down from $17,400/day in 1Q97.

While the 1Q98 figure has been aggravated by mild weather and reduced demand in Asia, the fundamentals have also clearly deteriorated. A total of 998,000 dwt was recorded in additions to the 10-50,000 dwt sector in 1997, while the deletions amounted to just 380,000 dwt. In addition, the commissioning of a number of refineries in the Asian region has sharply cut the need for refined product imports.

In the first three months of 1998 another 391,000 dwt in deliveries was recorded, and a total of just 87,000 dwt was deleted. And scheduled deliveries for the remaining nine months of 1998 amounted to 2.1 millioin dwt. The implications for the fleet are clear: by the end of 1998, the fleet expansion can be expected to register between five and 10 percent. Early indications are that the demand for these vessels will not rise by more than one percent in 1998. Consequently, freight rates are projected to remain under considerable pressure. In the first six months of 1999, another one million dwt in additions is scheduled for the fleet and demand is thus almost certain to lag behind supply once again.

Longer term there are two possible scenarios: optimistically a sharp and prolonged downturn in freight rates will promote vessel scrapping which, combined with delayed refining projects in Asia, may redress the current weakness and allow rates to begin to firm again by the end of the decade: pessimistically, weak economic growth, import restrictions in Asia and reluctance to sell vessels for demolition could herald three to four years of depressed freight rates.

Aframax

The Panamax/Aframax tanker market recorded a very strong performance in 1996 and 1997, illustrated by the strength in secondhand values and the number of vessels transacted. Increased crude production in Latin

America, the North Sea and latterly resumed exports from Iraq have all supported demand in this sector of the market.

Demand (including Panamax tankers) was assessed to have risen by 2.4 percent in 1997 following on from a 3.4 percent gain in 1996. The impact on freight rates on the main trades was for spot market earnings growth of around 30-50 percent between 1995 and 1997. However, in 1Q98 there has been a perceptible weakening in the market prompted by a combination of mild weather and increasing deliveries to the fleet.

The Aframax fleet absorbed deliveries of 561,000 dwt in 1996 and 1.8 million dwt in 1997, with deletions of just 280,000 dwt in 1996 and none recorded in 1997. With the aforementioned increase in demand it is not surprising that freight rates rose. But as we enter 1998, a total of 3.1 million dwt is due to be added to the 198,000 dwt total from the first three months of the year. And with 78 orders placed in 1997, totalling 7.6 million dwt the 62.1 million dwt fleet is likely to remain under pressure for some time to come.

Admittedly, in 1997 increases in long haul supplies from the OPEC producers were underestimated, as the IEA had anticipated a near two million bpd increase in non-OPEC production whereas the 1997 outturn was just 700,000 bpd. But there is no reason to suppose that there will be any meaningful reduction in OPEC output in 1998. And if there is, then this is likely to be in the context of a wider cut in production that would have implications for all sectors of the tanker market anyway.

As noted, some of the 20-25 percent decline in first quarter 1998 spot market earnings is due to seasonal anomalies. However, the fact is that rates are likely to remain under pressure over the remainder of 1998. Given the relative strength in freight rates in this sector in the last couple of years and fact that the age profile of the fleet is relatively youthful, a sharp run up in demolition levels is not likely to turn the market's fortunes. Instead the emphasis will be very much on the demand side.

Provided the U.S. continues to import increasing volumes of Latin and South American crude, that additional North Sea output is closer to the more optimistic expectations, and that Iraqi exports into the Mediterranean are sustained, rates may be cushioned.

But there are also downside risks, with 18 orders placed for tonnage in the first three months of 1998. Also, low crude oil prices will affect Venezuelan crude production and may delay some North Sea projects. This sector on balance must look for a reduction in rate levels in the near term, but with the likelihood that they will settle some way between the 1993/94 lows and 1996/97 highs.

Suezmax

The principal employment for Suezmax tonnage is from West Africa, with the Mediterranean and NW Europe also important secondary sources. However, competition to this tonnage can come in the form of VLCCs on the former

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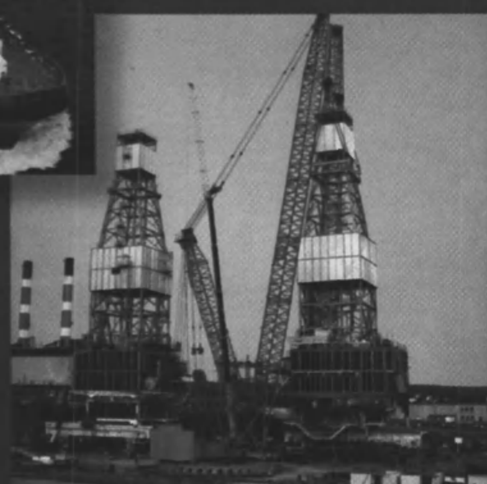

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and Aframax on the latter. The vessels can also benefit from strong Aframax rates which may encourage owners to "double up" cargoes. In recent years, West African crudes have started to move into Asia meeting refiners' requirements there, although this trade is also often occupied by VLCCs. The resumption of Iraqi exports has also been beneficial to this market. In the last two years demand growth has been impressive — 3.4 percent in 1997 and 4.6 percent in 1996.

With a very modest level of Suezmax deliveries being made through 1995-97 (16 vessels in all) and deletions running ahead (22 vessels), the market has clearly tightened. However although rates doubled in 1996 from 1994 levels, in 1997 they generally underwent a period of consolidation, perhaps reflecting the nascent surplus of tonnage.

Delivery levels in 1998 and 1999 are scheduled at twice the demolition rates of recent years. Consequently, much will rely on the employment patterns of these vessels. Given modest increases in crude output from Africa, the North Sea, and sustained Iraqi movements into the Mediterranean, demand should remain steady. And in the long term, the forecast increase in crude exports into the Black Sea could provide an additional boost to demand.

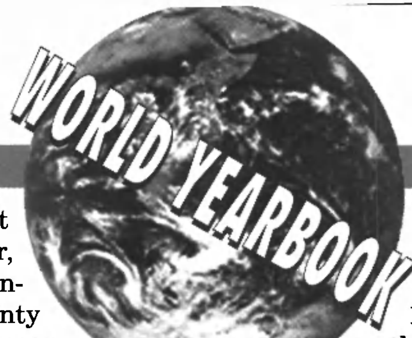
Rates in 1998 and 1999 could well be influenced by the fortunes of the Aframax and VLCC sectors, and as a consequence we would take the middle ground and look optimistically for consolidation around 1997 levels.

VLCC

The apparent high profile of the VLCC sector may reflect the

Figure 2
Tanker time charter earnings ($'000/day)
3-month moving average

		AG-Japan 200-300	AG-S.Korea 200-300	W.Afr-Car/USES 100-160	Med-Med 70-100	Car-USES 25-35
1995	J	24.1	18.4	18.1	13.1	16.3
	F	22.8	17.15	16.8	12.85	17.65
	M	21.87	17.47	16.8	12.3	17.2
	A	19.6	16.47	15.83	11.93	15.43
	M	18.2	15.43	15.93	11.8	14.13
	J	19.3	15.77	15.47	12.83	13.33
	J	24.3	19.8	17.67	14.33	14.13
	A	29.47	24.67	18.3	15.8	13.37
	S	31.7	25.8	19.13	15.63	12.43
	O	28.37	22.3	17.43	14.13	11.6
	N	27	21.77	17.07	11.93	12.13
	D	26.03	21.93	17.43	11.13	14.03
1996	J	28	23.93	18.63	12.33	17.47
	F	29.57	24.67	19.63	17.37	17.27
	M	31.27	26.67	20.2	19.33	17.47
	A	29.1	24.47	20.07	20.23	16.27
	M	26.8	22.5	20.47	17.83	16.17
	J	28.13	23.6	20.47	18.77	14.17
	J	32.63	28.57	20.5	18.07	11.53
	A	34.83	30.63	19.97	16.6	10.6
	S	31.5	26.73	18.8	13.9	10.1
	O	27.77	23.2	18.87	12.77	10.83
	N	26.2	22.43	19.33	12.93	10.33
	D	26.47	23.07	19.53	13.6	11.6
1997	J	28.9	25.67	20.03	15.33	13.5
	F	29.83	26.17	20.83	17	16.33
	M	31.07	28.27	24	18.4	17.4
	A	29.57	26.33	24.87	18.63	16.93
	M	30.03	26.97	25.3	18.03	15.9
	J	32.2	28.8	23.6	18.6	13.47
	J	36.77	33.27	22.43	18.53	12.33
	A	42.07	38	22.23	18.2	11.33
	S	44.43	39.57	23.67	17.4	11.53
	O	48.43	43.33	24.6	16.67	9.93
	N	46.17	40.8	25.47	16.37	9.43
	D	42.17	36.27	26.33	15.23	10.53
1998	J	34.23	28.83	28.07	14.97	10.5
	F	31.6	27.07	26.07	14.33	9.67
	M	33.63	30.67	25.23	14.07	8.57
	A	35.63	33.57	22.17	13.4	9.3



volatile nature of freight rates in this sector, coupled with a number of listed companies that have heavy exposure to the market.

At the time of the Gulf Crisis VLCC rates were providing returns in excess of $50,000/day for some voyages and optimism was considerable, principally given the aging nature of the fleet with its mid-1970s built vessels.

As regulations were also being tightened and double hulls introduced under OPA90 a further impetus was added to the concept that ageing vessels would have to be scrapped. The reality proved otherwise — as a heavy weight of tonnage was added to the fleet from the orderbook, freight rates began to reduce. And it soon became clear that many vessels would have no trouble passing their supposedly difficult fourth special surveys around 20 years of age. Thus in the early 1990s freight rates were returning averages on a spot basis of perhaps $10-15,000/day.

A number of factors then came into play — principally a surge in oil demand in Asia prompted by the commissioning of new refineries.

Consequently, while demand increased by just one percent in 1996, it then rose by 4.7 percent in 1997. With just five vessels added to the fleet in 1996 and eight in 1997 it was clear that the market surplus was beginning to contract. And illustrative of this improvement was the fact that VLCC demolition resulted in just seven removals in 1997, down from 23 in 1996 and 28 from 1995. The speed with which rates can improve was shown by the fact that in 1997 spot rates AG-Japan had tripled from their 1994 levels.

Going into the early part of 1998, booming OPEC output once again resulted in an upside surprise on the demand side, prompting rates to recover strongly from an uncertain end year position prompted by the Asian slowdown. With just two VLCCs delivered to the fleet in the first three months of 1998 and only 10 scheduled for the remainder of the year, demand will again prove important. Even with cutbacks announced by OPEC, it is difficult to see VLCC demand falling below 1997 levels implying a reasonably tight market for the remainder of 1998.

Unfortunately, fundamentals will not always win the day. It has already been noted that the outlook for product tankers is poor, while there is considerable uncertainty over the Aframax market, and even Suezmax rates are unlikely to strengthen. Thus, attention and sentiment is likely to focus heavily on the VLCC orderbook which stood at 72 vessels at the end of March 1998. This shows that the market will have to absorb a considerable weight of tonnage through 1999 and 2000.

The key to freight rates will thus be the extent to which vessels are removed from the fleet.

There is little reason to anticipate a surge in demand in 1998 and consequently the probability is that VLCC rates will have peaked by the end of 1998 and, if not, 1999 will almost certainly mark the next cyclical peak.

Host Of Factors Conspire To Facilitate Bulk Market Stagnation

by Malcolm Jupe, director
Drewry Shipping Consultants Ltd.

Drewry

The opening months of 1998 have been traumatizing for dry bulk ship owners. Freight rates have collapsed, there has been talk of applications for lay-up berths and, to cap it all, the progressive draft limit cuts imposed by the Panama Canal authorities in the light of the El Nino phenomenon have put the Panamax sector in particular in a quandary.

Yet, six months or so previously the outlook had appeared so much rosier. In terms of cargo volumes, 1997 had been a phenomenal year. Iron ore trade surged through the 400 million tons mark — a figure that many had regarded as an unbreachable ceiling, especially as scrap-charged mini mills rather than huge blast furnaces and integrated mills appeared to be the way forward.

A key factor was Chinese import demand, this being borne out further by the much smaller traffic improvement for coking coal, the other major steelmaking raw material. In addition, steam coal trade maintained its seemingly inexorable upward path Furthermore, on the supply side the order backlog for new ships was falling. At long last, restraint by ship owners looked to be about to pay dividends — 1997 was going to be the start of the good times, the upcycle was here.

Then, suddenly, the bubble burst as the Asian "powerhouse economies" on which most near and medium term optimism was built, started to unravel badly. Economists began slashing growth rate expectations and the market, which is heavily influenced by sentiment, got nervous. South East Asia started the jitters but their overall trade volume is not that great. Nevertheless, they were behind a significant number of independent power projects (IPPs) - which were going to require millions of tons of coal. Some supply contracts were in place and, crucially, ships were on order. Probably, if the problems had been limited to this region, the dry bulk market could have ridden out the storm. However, the vital Japanese market — already sluggish — could not (and still does not seem able to) shake off its lethargy. Worse still, however, the crisis impacted in a major way in South Korea. When a country responsible for perhaps seven to eight percent of dry bulk demand catches a cold, everybody is likely to be sneezing.

With hindsight, as ever, some claimed to have seen the crisis coming. There were signs — extended periods before bills were paid, for example — but such market intelligence was not widely available. Most, if they are honest, will have been taken by surprise.

How serious is the calamitous market of early 1998?

For charterers, rates are very low — which, naturally, suits them. This said, however, very narrow freight differentials do not necessarily enhance the competitive advantage of end-users of dry bulk commodities. Charterers also know that the advantage they hold is of little value if owners would rather lay up their ships than take loss making rates.

For owners, rates are very low — which, naturally, does not suit them. There have been claims that rates — as typified by the Baltic Freight Index (BFI) falling below the 1,000 points mark — are in reality as bad as during the disastrous market of 1986, when the catalog of dry bulk ship owners going to the wall still remains too painful for many to contemplate. If one allows for inflationary factors between 1986 and 1987, there may be some truth in this. There are, however, other points to consider.

The 1986 nadir followed a market decline that had seen rates hemorrhaging for at least five years. In 1988, troubled owners — if prudent — ought to have some reserves to fall back on.

With the summer months inevitably seeing a slacker market and El Niño continuing to bite, there is near term pain for dry bulk ship owners.

But beyond then?

The camps divide into optimists and pessimists. The former see the problems in Asia as a short term correction. Things will stabilize in, say, 12-18 months and then the growth path will resume but at a less frenetic pace. The latter fear the Asia contagion will spread and undermine other markets. A close watch on economic performance in the EU and U.S. will be crucial.

As Table 1 has indicated (see next page), with economic growth still predicted (albeit more modestly) it is still possible to envisage demand being maintained. Nearly two billion tons remains a prospect.

However, for 1998 and 1999, the orderbook averages out at over one new Handymax and Panamax bulk carrier a week. For Capesizes, the figure might be nearer to one every two weeks, and 1998 also has a notable backlog of Handysize ships scheduled for delivery.

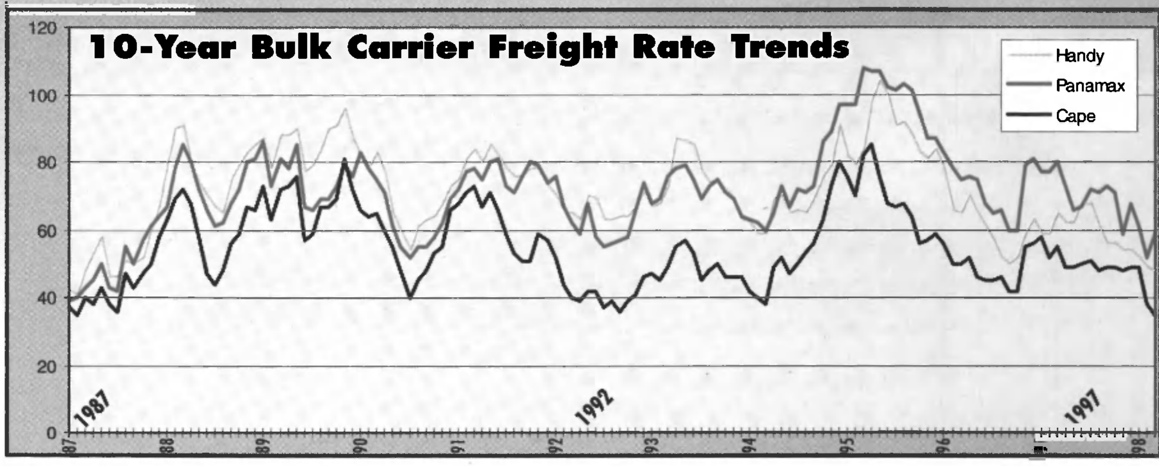
Pictured above is Daewoo-built bulk carrier SG *Prosperity*. Despite its moniker, the bulk carrier market has been anything but prosperous for owners who have helplessly watched a good market turn bad in a mere six months.

Table I

Estimated Seaborne Dry Bulk Trade: 1996-98
(Million tons)

	1996	1997*	1998**
Iron Ore	390.0	419.5	420.5
Coking coal	171.8	174.0	170.5
Steam coal	261.2	277.0	290.0
Grain	190.0	185.0	191.0
Major Bulks	1,013.0	1,055.5	1,072.0
Agribulks	88.3	88.3	91.1
Fertilizers/raw mats.	108.8	109.7	110.7
Forest Products	171.7	172.3	174.5
Iron & Steel Products	109.5	113.3	113.5
Cement	48.5	50.0	49.0
Bauxite/alumina	56.0	52.5	50.5
Scrap	28.0	29.0	30.0
Metal ores & conc.	20.1	20.1	20.4
Non-metallic minerals	32.8	33.6	33.5
Other minor bulks	86.0	88.6	87.7
Minor Bulks	749.7	757.4	760.9
Total	**1,762.7**	**1,812.9**	**1,832.9**

* Provisional.
** First estimates, prepared 1Q98.
Source: Drewry Shipping Consultants Ltd. — The Dry Bulk Quarterly
Source: Drewry Shipping Consultants Ltd.



Doubtless, some will question whether some of these are firm orders or "berth space bookings," to what extent the "refund guarantee" problems facing South Korean builders will impact and whether owners will look to cancel orders and/or defer deliveries. Sentiment sees continuing inexorable fleet growth — especially given the difficulties shipbreakers appear to be having over merely staying in business — and this may well develop a negative market momentum.

Could a major slowdown in further bulk carrier ordering change the picture? The answer is yes but is it achievable?

Ship owners and those that finance them tend to view deals individualistically. As a result, the outcome can be — to outside observers at least — a lack of market discipline. If newbuilding prices remain low, will the "buy now while stocks last" mentality prevail?

A further factor in the equation is the current stampede of ship owners to raise very large sums of money through junk bond issues. Is this going to further stoke up new ship demand?

The year 1998 is set to be a memorable year for the dry bulk market, though the memories may well be unpleasant ones. It is likely to be memorable because the dry bulk sector faces a situation against which it has no real benchmark. Certainly it is used to cyclical behavior — sometimes extreme — but not dislocation. Indeed, some in the industry have suggested that there has been nothing to match the discontinuity factor of the Asian collapse since the Suez crisis. Each new release of statistics on Japanese and South Korean steel production, Chinese ore imports, new ship orders, sales to breakers, etc. is likely to be scrutinized more deeply in the search for comfort.

Freight Rate Trends

YEAR	Handy	Panamax	Cape
1979			
	46	42	45
	42	44	46
	53	55	50
	57	54	49
	72	66	67
	82	75	83
	79	79	86
	75	74	74
	77	79	82
	80	79	80
	86	88	93
	79	83	78
1980			
	74	76	73
	82	86	73
	86	86	86
	94	101	97
	99	102	90
	91	96	9
	80	81	75
	90	88	73
	94	93	74
	86	90	78
	105	94	87
	105	101	97
1981			
	100	100	100
	95	94	90
	88	89	82
	86	87	77
	79	77	66
	85	74	66
	74	72	56
	59	63	49
	57	61	52
	60	61	54
	60	62	56
	56	59	49
1982			
	51	58	49
	49	54	41
	63	59	52
	69	61	52
	64	57	52
	50	50	40
	40	40	31
	41	38	30
	51	40	35
	52	42	34
	51	42	36
	52	44	39
1983			
	57	48	40
	51	49	41
	53	49	41
	55	57	40
	55	56	40
	50	47	41
	46	44	36
	46	44	36
	45	46	36
	48	46	38
	50	47	45
	49	46	43
1984			
	50	46	41
	49	49	44
	53	51	55
	52	54	57
	56	52	54
	53	46	46
	47	45	39
	51	47	41
	50	50	41
	51	49	42
	53	51	45
	51	49	43
1985			
	48	46	42
	45	47	42
	48	49	45
	48	50	47
	45	46	47
	43	44	39
	40	38	31
	37	34	27
	40	37	30
	44	42	38
	46	43	39
	43	42	42
1986			
	41	42	38
	36	39	34
	35	38	32
	33	36	31
	30	32	28
	28	30	27
	25	27	24
	26	29	26
	41	39	36
	39	38	33
	41	37	34
	38	37	34
1987			
	42	39	37
	41	40	35
	48	43	40
	53	45	38
	58	50	43
	46	43	38
	46	42	36
	51	55	47
	50	50	43
	52	57	47
	60	61	50
	67	64	58
198[illegible]			
	79	67	63
	90	78	69
	91	85	72
	80	80	68
	74	72	58
	70	66	47
	67	61	44
	65	62	48
	75	68	56
	79	72	59

YEAR	Handy	Panamax	Cape
	83	80	67
	85	81	66
1989			
	87	86	73
	78	73	63
	88	81	72
	88	78	73
	90	85	76
	77	67	57
	79	66	59
	84	69	67
	90	69	67
	91	73	69
	96	79	81
	87	76	72
1990			
	82	83	66
	78	78	64
	83	75	65
	77	71	60
	65	61	55
	60	55	48
	54	52	40
	61	55	45
	63	55	48
	64	58	53
	68	62	55
	73	69	66
1991			
	75	72	68
	81	77	71
	84	78	73
	80	75	67
	85	80	71
	82	81	66
	78	73	59
	76	71	53
	76	76	51
	78	80	51
	78	79	59
	73	74	57
1992			
	70	76	52
	66	67	44
	65	62	40
	63	59	39
	70	68	42
	69	58	42
	63	55	37
	63	56	39
	64	57	36
	64	58	39
	67	66	41
	71	74	46
1993			
	67	68	47
	68	69	45
	73	76	49
	87	78	55
	86	79	57
	85	75	53
	77	693	45
	74	73	48
	75	75	50
	72	71	46
	69	69	46
	63	64	46
1994			
	62	63	42
	59	62	40
	59	60	38
	69	65	49
	70	73	52
	65	67	47
	66	72	50
	65	71	53
	69	73	56
	76	86	63
	79	89	73
	91	97	80
1995			
	82	97	76
	79	97	70
	84	108	82
	98	107	85
	104	107	76
	100	102	68
	91	101	67
	92	103	68
	88	101	64
	83	94	56
	81	87	57
	84	87	59
1996			
	78	83	56
	66	78	50
	65	75	50
	70	76	52
	65	75	46
	61	68	45
	57	65	45
	52	66	46
	50	60	42
	52	60	42
	59	79	55
	63	81	56
1997			
	59	77	58
	59	77	52
	65	80	55
	62	73	49
	62	66	49
	68	67	50
	68	72	51
	61	71	48
	56	73	49
	56	71	49
	54	59	48
	54	68	49
1998			
	52	61	49
	49	52	38
	48	59	35

Source: Drewry Shipping Consultants Ltd.

Crisis And Opportunity: Carrier Prospects After The Asian Turmoil

by Mark Page, director
Drewry Shipping Consultants Ltd.

Drewry

The fallout from the Asian currency crisis has cast a giant shadow over an already depressed container market, and threatens the 20+ year record of uninterrupted global growth, which has always given consolation to carriers for poor profitability and declining freight rates. However, there may be some considerable longer term benefits from the market dislocation currently taking place.

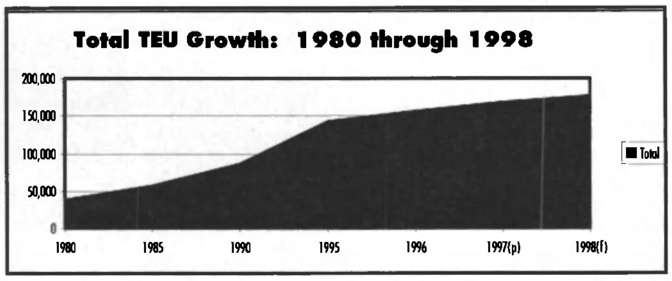
The general collapse of Asian imports (down at least 10 percent) in the wake of the massive currency devaluations in Korea (50 percent), Indonesia (80 percent), Thailand (55 percent) and elsewhere has worsened already costly container imbalance problems in both the transpacific and Europe-Far East trades, but Asian exports have risen equally dramatically (estimated at around 12 percent), prompting both equipment and space shortages on outbound trades.

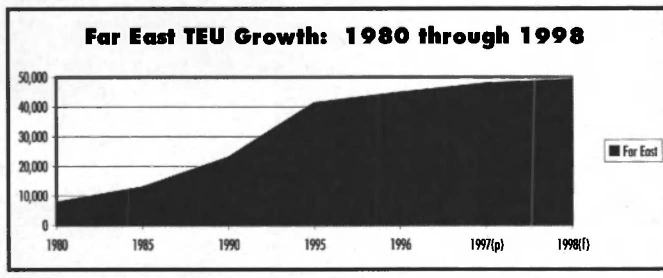
Given that eastbound t/pac and westbound E-FE rates are substantially higher than rates on the trades' weaker legs, carriers have received an infusion of higher paying traffic and a loss of marginally priced cargo — albeit at the cost of much greater container repositioning expenses. Asian exporters have found themselves in the unaccustomed position of being on the wrong side of the supply/demand equation, giving carriers a strong hand in contract negotiations. Moreover, carrier cohesion has, forcibly, been strengthened by the severe financial impact of the crisis on Asian lines who are no longer in a position to be so aggressive on price.

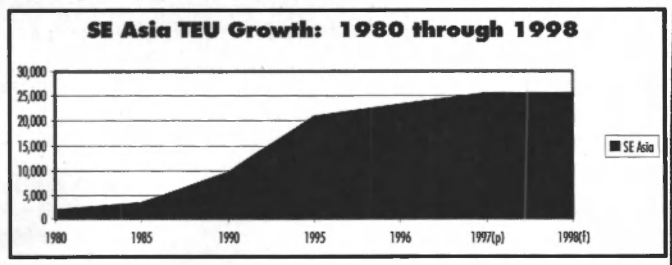
What should be the response of carriers to this shift in the balance of power?

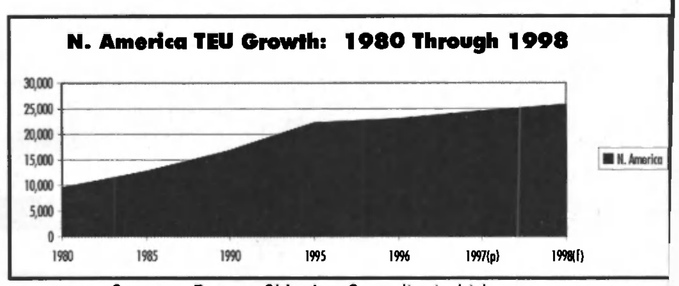
Perhaps most importantly, they need to finally accept that the past approach of operating a liner service with a one way (i.e. downward) pricing policy to fill marginal vacant space has been ruinous, and use the opportunity which the Asian export boom has created to change the direction of freight rates — if not permanently then certainly in the short term.

Historically, liner shipping offered stable rates for a known level of service, but somewhere in the containerization process this relationship got separated. The level of service remained — in fact it got much better — but rate stability disappeared, and in the process so did the linkage between rates and volume. When volume/utilization fell so did rates, but when volume/utilization rose, rates did not. Carriers must re-establish the mechanism whereby pressure on space triggers an upward move in freight rates — while shippers must appreciate that in a fluid market rates can go up as well as down — and that securing a fixed, contract rate may entail paying above the open market rate for the slack-season periods of that









Source: Drewry Shipping Consultants Ltd.

The containership market has been swept by company and service consolidations.

World Container Port Traffic By Region

('000 TEU full, loaded and empty)

	1980	1985	1990	1995	1996	1997(p)	1998(f)
N. America	9,531	12,772	16,659	22,155	22,957	24,485	25,763
L. America	2,349	3,510	4,948	9,382	10,358	11,512	12,605
W. Europe	11,728	16,292	22,419	31,711	34,659	38,575	41,501
E. Europe	373	548	605	733	807	933	1,070
Far East	7,662	13,057	22,959	41,287	44,571	47,839	49,239
SE Asia	1,860	3,434	9,611	20,814	23,258	25,460	25,560
S. Asia	249	892	1,768	3,206	3,805	4,311	4,725
Mid East	1,943	2,849	3,548	6,772	7,392	8,004	8,758
Oceania	1,610	1,990	2,333	3,397	3,592	3,794	3,974
Africa	1,454	1,954	2,668	4,666	5,075	5,109	5,320
Total	**38,758**	**57,299**	**87,518**	**144,122**	**156,474**	**170,023**	**178,515**

p = preliminary; f = forecast

Source: Drewry Shipping Consultants Ltd.

contract. The reefer shipping industry knows this basic fact above all others.

When demand is high and ships are full, rates must go up to compensate for both the costs of operating that capacity in slack periods and the rate dilution which inevitably occurs at that period. A much greater degree of seasonal pricing is clearly indicated in trades with major fluctuations in cargo volumes, and already the transpacific carriers have announced the introduction of a "temporary peak season surcharge." Other trades will need to follow suit.

Such a strategy will be reinforced by the current space shortages, which emphasize the message of opportunism and flexibility in rate making. Contracts made to secure cargo at low rates do not look so smart when demand rises - and when what was already effectively a discount for stable, guaranteed service becomes even further below the prevailing market rate.

And carriers do seem to be reacting positively to the opportunities presented by the surge in Asian exports. Far East-Europe rates rose by $200 per FEU in January (and stuck) and are scheduled to go up by a further $300/FEU in July. If the Asian export boom continues, carriers might well contemplate a third price increase within the year.

Transpacific eastbound rates rose by $300/FEU in May and unlike many other such increases these appear to have been widely accepted.

With container freight rates in clear long term decline, such opportunities to secure much needed windfall gains need to be exploited to the maximum that the market will allow - because the supply/demand balance is not going to stay in carriers' favor permanently.

Despite the major problems which emerged in the Far East during 1997, both regional and global container traffic growth remained surprisingly firm, with

Special Advertising Section

Mackay's World Service Department: Local service on a global scale

Since John Mackay and his partner, James Bennett, constructed two transatlantic cables in 1884, Mackay Marine has evolved with the maritime and communications industry. When technology breakthroughs during World War I unveiled radio as a viable means to communication with ships, Mackay was making air waves. And when the world was introduced to communication via satellite, Mackay was at the forefront of this bold wireless revolution. Consistently, Mackay has proven its leadership – defining, honing, and improving communication system reliability at sea.

Today Mackay is at the forefront in serving the growing marine equipment and communication business. With its World Service Centre in Houston, Texas, Mackay is charting new courses in customer service at sea. The World Service Centre was created to meet the growing need for quality managed service on a global scale. The center represents the newest commitment and extension to the company's extensive world-wide service network to provide equipment, equipment repair, installation, and airtime to its customers. According to Francis Neary, Mackay President, the goal of the World Service organization is to, "provide quality service for both overseas and domestic clients through one central coordination location. We have a strong edge in achieving our objectives because we have an existing network of foreign and domestic service depots that deliver reliable work. In fact, I'd say Mackay Marine does it better than anyone operating a maritime service business today." Mackay augments its global service effort with its unique TEAM approach. TEAM stands for the Technical Electronic Administrative Management program, pioneered by Mackay service experts and their worldwide customers. TEAM removes the burden of scheduling and coordinating repairs of ship's electronics equipment from the ship owner or manager. Mackay TEAM members take on the repair responsibilities for the complete maritime electronics package including engine room equipment. "It's a value-add service that surpasses anything out there today," Mackay's Gulf Regional Service Manager, Steven Colburn, stated.

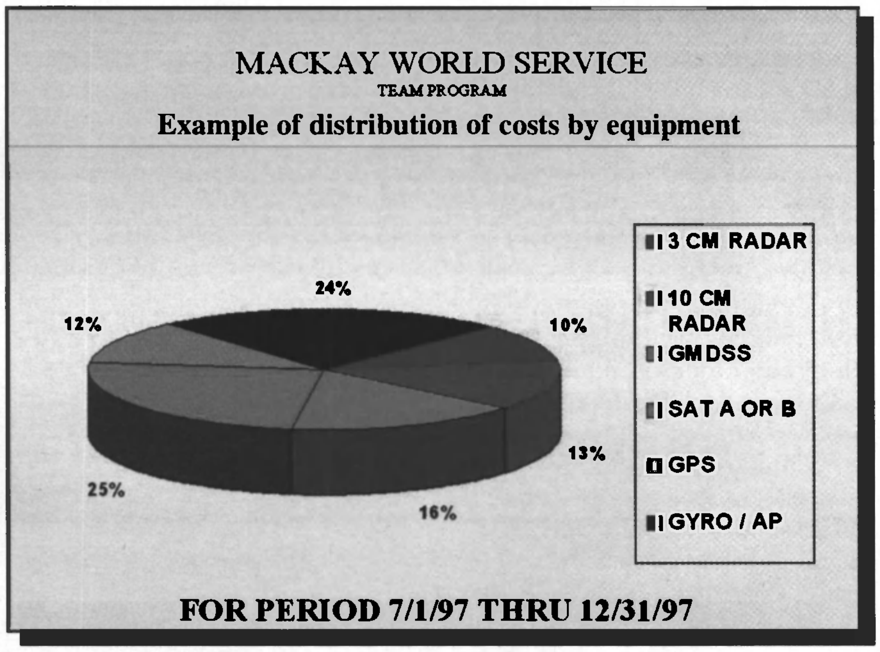
When Mackay claims extensive, comprehensive service features, they mean it. Some of the features available include:

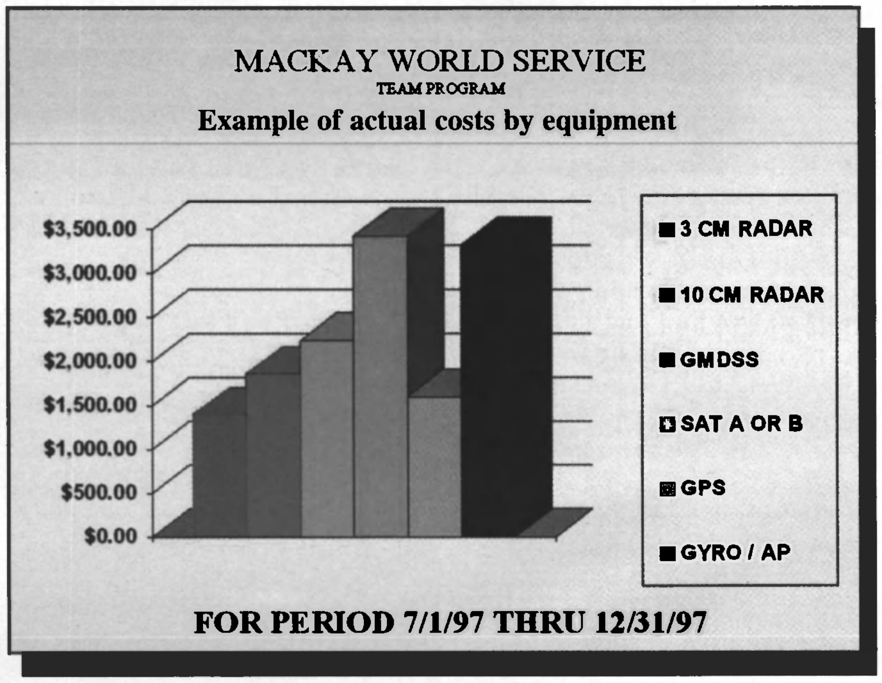
- Single point of contact for world-wide service coordination
- Experienced technical support staff available on a round-the-clock basis
- 24-hour per day availability, 7-days per week via phone, fax, telex and e-mail
- Confirmation of attendance and notification when repairs are satisfactorily completed
- Notification of trouble prone equipment and advice on repair or replacement options
- All invoices reviewed by technical staff for accuracy and correctness prior to payment
- Complete database of repair history maintained by vessel, fleet, and type of equipment
- Vessel equipment condition surveys and reports
- Annual survey and renewal of SOLAS and GMDSS certificates
- Regulatory compliance advice and updates
- Complete communications and navigation packages
- Representation by major marine electronics manufacturers
- Extensive inventory of spare parts stocked for immediate dispatch
- The latest diagnostic equipment to solve customer problems
- A computer information system specifically designed to provide the necessary data to make informed replacement decisions and reduce repair time

One of the cornerstones of the Mackay service offering is its state-of-the-art, continually updated, cost tracking system. Gulf Regional Manager, Steven Colburn, stresses that, "Mackay will analyze and track associated costs whether it's for equipment under warranty sold by Mackay or equipment purchased from another provider. In terms of cost, our customers will know the who, what, when, and where of every single service job."

Mackay's World Service department, of which the Service Centre is a part, is staffed with experienced marine service engineers who have years of field service experience. Not only that, these marine experts have completed the company's rigorous factory training seminars on products ranging from GMDSS to Inmarsat B satcom. All Mackay service is conducted under the supervision and direction of these engineers to ensure quality work, responsive turn-around, and competitive pricing. World Service Centre customers would all agree that competitive advantage is the greatest benefit of having Mackay on board. One customer, a large European ship management company, has been with World Service for more than a year and is so thrilled with the benefits that they are contracting for more of their ships to be included in the program. This level of customer satisfaction is a result of Mackay's comprehensive service program and seasoned support team which offer far more advantages and resources than were possible from a single crew member. Global capability that makes the customer think it's local. That's the underlying rule for Mackay Marine's World Service Centre.

Mackay is a world leader in the installation of marine and offshore electronic equipment and offers a comprehensive line of innovative products and services. For more information, contact Mackay inside the U.S. at 1-888-361-8532, outside the U.S. at 1-713-644-3788, by telex at 4612018MACKAY, or by e-mail at service@mackaymarine.com





the preliminary Drewry assessment pointing to an 8.7 percent rise in port handling activity and an 8.3 percent growth in underlying cargo volume.

Expectations for 1998 are highly uncertain, but there is some confidence that even Asia will be able to sustain marginal positive growth, despite the particularly acute problems on the intra-Asian trades — which have hitherto been the fastest growing routes in the world. Other regions will need to take up the shortfall to maintain the expansionary momentum to which the industry has been accustomed. In this respect it is vital that Latin America does not catch the Asian economic malaise; that Japan avoids the slide into deflation; that China remains above the worst of the regional fall-out; and that the Western European and U.S. economies remain resilient and receptive to Asian imports.

The Drewry forecast for 1998 points towards a global rise in container port handling of just five percent, which would be the lowest rate of growth for over a decade — but in the circumstances something of a triumph, and vindication of those who believe in the inherent strength of global liner trade.

Certainly if the after-shock from Asia is contained and this market starts to stabilize in 1999, longer term prospects still point toward continued growth of container trade worldwide — so that at the very worst 1998 should constitute a pause and not a full stop. General cargo trade should continue its expansion, fueled by the decentralization of production and the globalization of the world economy.

Trade liberalization has reduced tariff barriers in many regions during the 1990s, and there is still scope for further cargo growth from this source. Container operators have the capability to capture more general cargo traffic — the current rate of penetration being only around 50 percent, still some way short of any physical or economic ceiling.

In response to depressed profitability — which intensified in 1997 and which can hardly be expected to improve in 1998 — the pace of industry consolidation has quickened, with several medium size liner companies being acquired by larger groups.

The latest of these developments has been P&O Nedlloyd's purchase of Blue Star Line, while previously CP Ships had swept up Lykes and Contship during 1997 (and subsequently Ivaran). The privatization of Italia Line and Lloyd Triestino will produce further rationalization amongst this vulnerable group of carriers who lack the size to compete effectively against the global lines. Only those with a defendable niche are likely to escape the squeeze from the mega-carriers above and the more nimble specialists below.

Moreover, further consolidation within the major carriers might also be expected, and recent restructuring has confirmed that current partnership arrangements will be no guide, and equally no barrier, to future developments. Financial imperatives do not respect vessel sharing agreements or alliances.

Metro Plans Demerger Into Three Listed Companies

Metra Corp. has begun preparations to divide itself into three separate groups, whose Finnish parent companies will be quoted on the Helsinki Stock Exchange. The plan is to divide the Metra Group by splitting the parent company, including its assets and liabilities, into three new publicly listed companies and at the same time to dissolve Metra corporation.

Metra's current three industrial divisions would form three new groups in the demerger: Wartsila NSD and Metra Finance would form a diesel and gas engine company; Sanitec would form a bathroom products company; and Imatra Steel, together with Metra Group's holding in Assa Abloy, Metra Real Estate and Metra's other investments, would form a new investment company. The new diesel and gas engine group will comprise Wartsila NSD and Metra Finance.

Wartsila NSD is a global engineering company offering its customers complete solutions for power generation and marine propulsion. The core activities are design, manufacturing, licensing, sales and service of Wartsila and Sulzer engines with output per unit ranging from 500 to 66,000 kW. In 1997 Wartsila NSD had net sales totaling FIM 11.3 billion and 7,300 employees. Metra currently owns 87.8 percent of the Wartsila NSD Group, with the remaining 12.2 percent held by Fincantieri. Metra Finance, a wholly owned Metra subsidiary, acts as the group's internal bank.

Circle 61 on Reader Service Card

Harrington Retires As Head Of Ship Finance

Rex Harrington is to retire as head of the Royal Bank of Scotland's ship finance unit in November. He will be succeeded as director of shipping by **Lambros Varnavides**, who has helped establish the bank's Shipping Business Center which has become the largest provider of corporate and private financial services to the Greek shipping industry.

Ship Repair Shake-Out To Continue

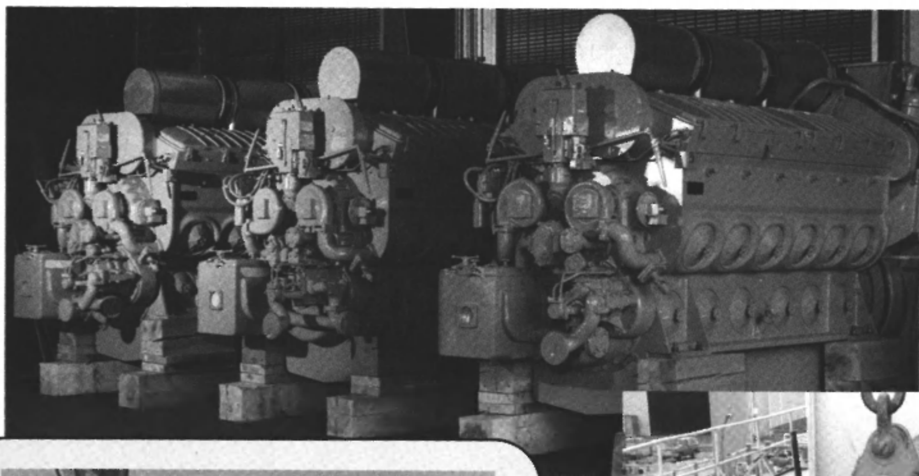
The global shiprepair industry faces further consolidation as revenues fall due to competition and the prospect of weaker demand, a study from Drewry Shipping Consultants Ltd. predicts. Shiprepair revenues are likely to fall by 1.5 percent between 1998 and 2003 placing increased pressure on repair yards to cut costs through mergers. Singapore's big four market-leading shiprepair yards have already merged into two, with lthe merger between Keppel Shipyard and Hitachi Zosen Singapore Corp. following last year's takeover of Jurong Shipyard by Sembawang Shipyard Ltd. Extreme competition between yards is set to persist.

SARS Secures Ben Line Agencies Representation

Shipping Agency Representation Services (SARS), the ship agency arm of the London Maritime Partnership (LMP), has been appointed the U.K. representative of Ben Line Agencies of the Far East.

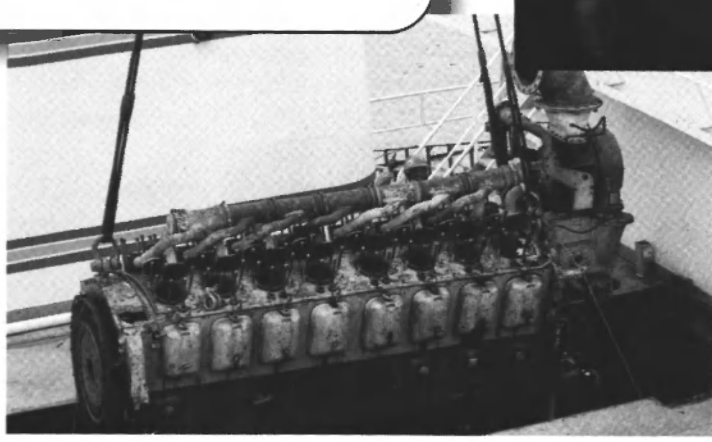
3 Big Reasons

To Repower Your Workboa



"Harriet Ann"

- 198' long x 50' beam x 11'6" depth
- Nashville Bridge Co.
- Built 1966
- Owner: Riverway Co
- Power: Three Model 12-710 G7B marine diesel engines @ 3,000 BHP/ 900 RPM from Electro-Motive Diesel Division, General Motors Corporation
- Gearing: Three Lufkin Model RS 3626 Reverse Reduction Gears, 4.34:1



ing in an elite group with its so-called multi-purpose concept. One order is under construction, intended for Norway's Statoil. The company has also led the way in the field of chemical tankers, with great success in concentrating on coated and/or stainless steel tanks. Most of these ships are built at the Juliana yard in Gijon, but recently some vessels have been placed at the Sestao yard. The group anticipates much future success in this market niche, as its naval architects are well on their way to completing advanced, next-generation designs.

Guy Morel
MC Shipping

Guy Morel

Although certainly not the largest shipping company, Monaco-based MC Shipping is a prime example of how shipping finance has changed dramatically. Company President **Guy Morel** cannot be considered wholly pioneering, in conventional terms, but he has utilized a plethora of creative financing measures, most notably raising $100 million on the high yield bond market, to effectively infuse life into this small niche player.

Following the bond issuance, MC Shipping went on an acquisition spree, and recently completed the buyout of joint venture partner ShipNav, acquiring two 3,200-cu.-m. gas carriers, *Spica Gas* and *Taurus Gas*. The vessels were purchased in a joint venture in the third quarter of 1997, and began MC Shipping's venture into LPG carriers. Another acquisition made possible by the bond issue was the purchase of five LPG ships from the Vlasov Group. Part of the purchase price was paid in shares of the company, with the result being that the Vlasov Group now holds approximately 48 percent of MC Shipping's outstanding stock. Once the smoke cleared, the acquisitions had taken MC Shipping's fleet from eight vessels to 19 vessels.

In another financial move designed to ensure the company's long-term success, MC Shipping changed its accounting method for drydocking from accrual to capitalization and amortization. The amortization method allows for a true reflection of actual drydock costs.

In announcing his company's 1997 year-end results, Mr. **Morel** said: "The company ended the year well-positioned for the future. While 1997 was a difficult year for the dry cargo and container shipping industry, we were well-protected by having most of our fleet covered by long-term charters. Simultaneously, we have begun implementation of a long-term growth and diversification strategy."

Antonio Mendozo, chairman Astilleros Españoles

Astilleros Espanoles' chairman **Antonio Mendoza** has been the steady force guiding the Spanish shipbuilding and repair empire through the beginning of EU and the end of shipbuilding subsidies. *(For further details on the Spanish Maritime Market, turn to page 132.)*

Antonio Mendoza

Coming to the shipbuilding, repair and conversion group with little shipbuilding experience (having a background in the construction and civil engineering industry) Mr. **Mendoza** has quickly developed as one of the industry's respected leaders and voices.

Astilleros Espanoles is a group of eight yards and one diesel engine factory, with headquarters in Madrid. The group accounts for 75 percent of the Spanish shipbuilding capacity, and is one of Europe's leading and largest shipbuilders. Activities at Astilleros Espanoles cover nearly every kind of construction, but the group is focusing now into specialized tankers (shuttle tankers, stainless steel chemical carriers, multipurpose shuttle/oil tankers), RoPax ferries, and offshore units (including FPSOs, drillships and complex conversions.

Mr. **Mendoza** has led the group through an intricate restructuring process, following European Commission directions. The three-year plan started the first of January 1996 and will end on Dec. 31, 1998, a plan which includes capacity reductions and early retirement of nearly 4,200 employees.

Operational results have dramatically improved as the restructuring plan has been implemented, and the goal is to break even in 1999. The organization seems well on track, as sales for 1997 were up nearly 10 percent over 1996, and there is a secured workload of 95 percent occupancy in 1998, and 90 percent in 1999. The current orderbook totals 30 vessels and 684,000 cgt, up from 430,000 cgt in 1997.

As has been the shipbuilder's tenant, Mr. **Mendoza** has ensured that the group invested in R&D. Of particular note are inquiries into the group over a large, full-displacement RoRo ferry with speeds up to 28 knots.

The group's central technical unit, working with the three ferry-oriented yards (Puerto Real, Sevilla and Barreras), the Madrid University of Naval Architecture and the El Pardo test tank, recently presented a 557-ft. (170-m) design, capable of the 28 knot speeds, for consideration.

Perhaps though, the organization has made its biggest moves and news in the area of specialized tanker development.

Specifically, in the past year Astilleros Espanoles secured foot-

From its ultra-modern facilities in Helsinki and Turku, Finland, which arguably produce some of the world's finest cruise ships, to its new project in the form of redeveloping the old Philadelphia Naval Shipyard into a modern, state-of-the-art and profitable commercial player, Kvaerner has always relied upon the internal development and marketability of its own advanced technology and systems. As Mr. **Saarikangas** noted in one of the company's house publications, "cutting edge is not just a slogan at Kvaerner, it is a way of life."

Mr. **Saarikangas** took up his new position of president of Kvaerner Shipbuilding on January 1, 1998, but his reputation as a strong leader was formed during his years as CEO of Kvaerner Masa-Yards in Finland. On announcing the appointment, **Erik Tønseth**, president and CEO of Kvaerner said "I'm very happy that one of the world's most respected shipbuilding characters will be joining us in London. **Martin Saarikangas** will be a vibrant head of Kvaerner's Shipbuilding activities and a substantial contributor to our group management team."

Mr. **Saarikangas**, who evidently couldn't wait to dig into the responsibilities of the new post, was involved in one of the company's biggest headline making events, the announcement of the initiative for Kvaerner's Philadelphia Shipyard project. Mr. **Saarikangas** was at the center of events on December 5, 1997, when he was joined by Vice President **Al Gore**, along with local and state officials to announce the revival of the Philadelphia naval yard.

As any strong leader is likely to do, Mr. **Saarikangas** and Kvaerner have stirred controversy, particularly with the Philadelphia naval shipyard deal, as some label the additional tonnage "unnecessary." Undaunted by critics and with a firm grasp of the "big plan," however, the company and its leader proceed undaunted, with promises of more jobs and more ships. Mr. **Saarikangas** and other Kvaerner executives assembled in New York this spring to unveil the company's maritime innovation and technology initiatives to the U.S. market, a step which was viewed as key to establishing the company in the U.S.

Profiles Of The Year's Tep Newsmakers

Maritime Reporter's Newsmakers of the Year are dynamic leaders attempting to navigate their respective companies through a time a tremendous changes in the business world. This feature — which focuses on companies and their leaders — was prepared specially for the June yearbook edition, but is not meant to be inclusive. It is a profile of a few maritime industry executives who have helped generate a volume of headlines during the past 12 months.

John Dane III
Chairman, President and CEO
Halter Marine Group


John Dane III

John Dane III is the chairman, president and CEO of Halter Marine Group. The company, as most maritime industry executives know, has been quite busy for the past 12 months, primarily with a slew of acquisitions which has expanded its business both domestically and internationally. Halter Marine Group is an acknowledged leader in the Gulf of Mexico maritime business, and has made great strides to ensure that its presence is felt worldwide. Recently, for example, Halter Marine Inc. and Yantai Raffles Shipyard of China formed a joint venture — Halter-Yantai Raffles International — to market and build vessels in China.

Mr. **Dane** was also recently selected as the Propeller Club-Port of New Orleans "Maritime Man of the Year" for 1998.

In August, 1987 Mr. **Dane** sold his Moss Point Marine, Inc. to Trinity Industries, Inc. and became president of the newly formed Trinity Marine Group. He was given executive authority over his former shipyard and the three operating Trinity shipyards — Halter Marine, Inc., in Moss Point, Miss., Equitable Shipyards, Inc., in New Orleans, and Gretna Machine & Iron Works, Inc., in Harvey, La. He also had custodial authority over two inactive shipyards, Halter's facility in Lockport, La., and Equitable's shipyard in Madisonville, La.

Despite the "oil bust" of the time, he quickly re-opened the two inactive shipyards and began a growth path that took the Trinity Marine Group from those four original operating shipyards to 21, and from approximately 850 employees to 3,200 and annual revenues of $40 million to $400 million in 1996.

In September 1996, under the name Halter Marine Group, Inc., Mr. **Dane** began a spin off on the American Stock Exchange of the 10 Trinity shipyards that build and repair powered vessel and double hull ocean-going barges. On March 31, 1997 Trinity made a distribution to its shareholders of its remaining interest in Halter. Halter Marine Group, Inc. was now a separate entity and Mr. **Dane** quickly initiated an aggressive acquisition plan that has taken Halter Marine Group, Inc. from 10 shipyards in late 1996, to 21 in early 1998. Those shipyards in Texas, Louisiana, Mississippi and Florida now employ more than 6,000, while shipbuilding joint ventures in the Philippines and Venezuela employ hundreds more. Under Mr. **Dane**'s dynamic leadership, Halter has become the nation's seventh largest shipbuilder, with revenues for fiscal year 1998 are expected to exceed $800 million.

Shipyards, however, are not the focus of all the company's recent acquisitions. As part of Halter's stated goal of vertical integration, Halter acquired three companies in Minneapolis, Slidell, and Covington that design and build equipment used on vessels and drilling rigs. Known as the Halter Engineered Products Group, these companies make Halter a single source, seamless provider of rigs and vessels for a wide variety of uses.

In November, Mr. **Dane** met another of his goals with the ground breaking for the construction of a training facility in Moss Point to train people in the shipbuilding crafts the skills to work in Halter's five Mississippi shipyards. The training school is just one part of a massive "re-engineering" of the entire company initiated by Mr. **Dane** to make Halter even more efficient while increasing shareholder value.

Mr. **Dane** has more than 25 years of experience in marine industry management. He began his career with Halter Marine, Inc. in New Orleans where he served as facilities manager in charge of designing and supervising construction of three shipyard expansion projects. At the time of his resignation in 1980, he held the title of assistant to the vice president of production.

Mr. **Dane** is a graduate of Tulane University in New Orleans; receiving a B.S. degree in Civil Engineering in 1972 and a Doctorate in Civil Engineering from Tulane University in 1975.

Martin Saarikangas
President
Kvaerner Shipbuilding


Martin Saarikangas

Kvaerner ASA has become one of the world's largest engineering and construction groups, with few peers able to match its scope of products and services on the international level. A key plank in this emerging empire is Kvaerner Shipbuilding — which with 14 shipyards around the world has forged itself quite a reputation by creating modern shipyards from moth-balled facilities and enjoying subsequent commercial success. The new president of Kvaerner Shipbuilding, **Martin Saarikangas**, embodies the entrepreneurial and workmanlike attitude of the entire Kvaerner Shipbuilding structure, and has become one of the company's more recognizable characters.

deserving of the best and most timely response in the event of a spill.

To eliminate this disturbing trend and ensure that the objectives of OPA 90 are met, AWO advocates that OPA 90 be reaffirmed as the exclusive statute for criminal prosecution for oil pollution.

This would ensure the increased cooperation and responsiveness essential to a timely and effective spill response, while not diluting the deterrent effect and stringent criminal penalties imposed by OPA 90 itself.

State Activism

Another troubling trend affecting the barge and towing industry is the increasing willingness of state governments, from Washington to Wisconsin to Rhode Island, to go beyond their traditional jurisdictional boundaries and attempt to regulate the design and operation of vessels in interstate commerce. Clearly, minimizing the incentive for states to regulate the industry is the place to start — by giving state legislators and agency officials confidence that the combination of an effective federal regulatory floor, with industry standards that supplement that floor, protect their waters, their shorelines, and their citizens' livelihoods. Usually, states enter into maritime regulation on the heels of a marine accident. The industry recognizes that minimizing, or preferably eliminating, accidents and spills is by far the best way to minimize state efforts to regulate the industry's operations.

But invariably, when something does go wrong, and sometimes even when it doesn't, politics dictate that state officials will look to do for themselves what they don't see industry and the federal government doing for them. When that happens, both the USCG and the maritime industry need to take a strong stand in defense of federal jurisdiction.

AWO believes strongly that neither the marine industry's interests nor the nation's are served by a patchwork of differing laws and regulations imposed by states that do not have the means to enforce them and often lack a basic understanding of the industry's operations. AWO will continue to work to provide assurance to would-be state regulators that when they have identified a legitimate safety issue, the industry will work to solve the problem, either through federal regulation, industry self-regulation, or a combination of the two.

Increasing safety and environmental protection in the maritime industry is of paramount importance to AWO and its members. However, not every governmental attempt to promote improvement has proven helpful to that objective. The trend toward strict criminal prosecution of companies and their employees and regulation on a state-by-state basis produce serious side-effects that jeopardize the positive results we all seek to achieve. AWO believes an adequate federal regulatory floor, supplemented by industry-specific standards, will result in safe, high quality, reliable service for everyone dependent on this important mode of transportation.

The preceding was provided compliments of the AWO.

This trend toward industry standard-setting offers real opportunities both for the maritime industry and for the U.S. Coast Guard (USCG), the industry's primary regulatory agency. It allows the USCG to effectively focus its regulatory efforts and enforcement resources where those scarce resources are most needed, while at the same time encouraging responsible operators to go beyond simple compliance with the regulatory floor. Given the shared goals of continually enhancing marine safety and environmental protection, industry standard-setting initiatives like the AWO Responsible Carrier Program, and its external counterpart, the USCG-AWO Safety Partnership, offer a meaningful way to leverage USCG and industry resources in support of these critical objectives. By working together in developing a regimen of best safety practices, the industry and the Coast Guard are achieving a higher level of marine safety and environmental protection than would be possible through government regulation alone.

Criminal Enforcement

Another less positive trend impacting the barge and towing industry is the increased use of strict criminal liability statutes to prosecute oil spills. As a result of this trend, responsible operators who transport oil are unavoidably exposed to potentially immeasurable criminal fines and, in the worst case scenario, jail time. Instead of defining a crime as the occurrence of a knowing, intentional act or conduct so egregious that "negligence" has occurred, as did the landmark Oil Pollution Act of 1990 (OPA 90), strict liability statutes impose criminal sanctions without the requirement of proving criminal knowledge, intent or even negligence. In other words, a company can take every prudent step possible to avoid a spill, but just the occurrence of the spill itself can result in criminal prosecution. This trend has created an atmosphere of extreme uncertainty for companies engaged in the transport of petroleum products. Moreover, this atmosphere is undermining the very objectives which OPA 90 sought to achieve, namely to enhance the prevention of and response to oil spills. It leaves operators with only one course of action in eliminating the risk of criminal liability — to leave the business of transporting oil products completely. If this were to happen, the least experienced mariners or the least responsible operators could become the only available carriers for the nation's most hazardous cargoes.

Certainly, AWO completely supports the vigorous pursuit and prosecution of operators who violate laws. What is a cause for real concern, however, is the prospect of responsible companies being advised by counsel not to cooperate with a USCG investigator or boarding officer because anything they say could end up being used against them in a criminal proceeding. That scenario does not serve the best interests of the industry, the USCG, or a public

SHALLOW DRAFT REPORT

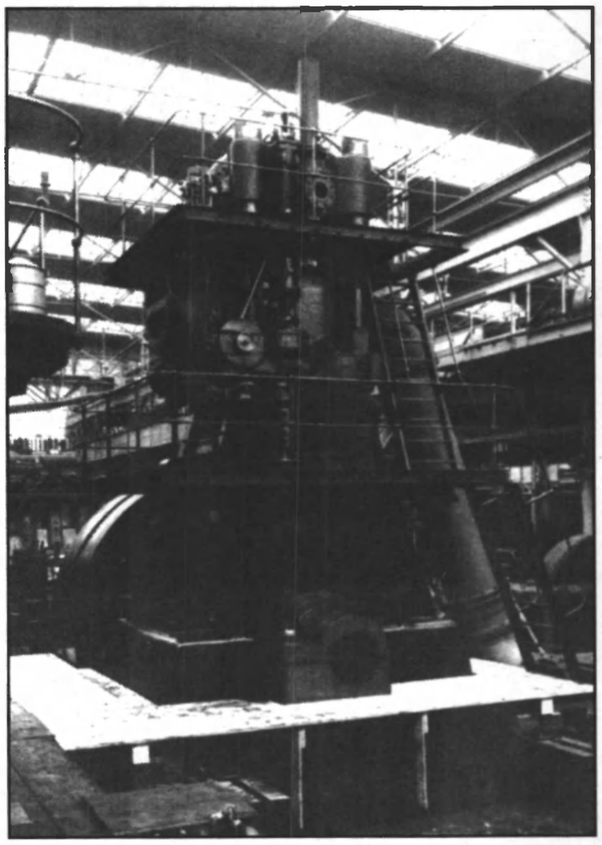
AWO: Trends, Challenges and Opportunities

The tugboat, towboat, and barge industry is operationally and geographically diverse. From inland river barging on the Mississippi, Ohio, and Columbia rivers to ocean towing along the Atlantic, Pacific and Gulf Coasts, to shipdocking and bunkering in ports and harbors throughout the country, the American Waterways Operators (AWO) represents more than 350 member companies. One of AWO's challenges as a trade association is harnessing that diversity and focusing its strength on the common issues affecting movement of the nation's commerce.

While AWO works on a full portfolio of issues, three important and related trends are significantly impacting the industry's operations today. Chief among them is the industry-driven effort to develop safety standards. As a natural next step in a process started almost four years ago, AWO's membership very recently voted to require participation in AWO's Responsible Carrier Program (RCP) as a condition of association membership, thus fundamentally changing the character of the organization. AWO's members have now said that it is no longer enough to operate vessels and pay dues to belong to AWO. Members now must demonstrate to a third-party auditor that they are participating in a rigorous safety program that exceeds the existing regulatory floor and spans the breadth of their operations. This successful effort to strengthen self-regulation comes at a time when federal prosecutors are pursuing tougher penalties and states are initiating legislative responses to maritime incidents.

Industry Standards

The Responsible Carrier Program is the preeminent example of an overall trend within the maritime industry to step up to the plate and take responsibility for setting its own operational standards to meet marine safety and environmental protection goals. The tug and barge industry started down this path in 1994, when AWO's Board of Directors adopted the Responsible Carrier Program as a voluntary code of practice for AWO member companies. Since that time, AWO members have embraced a continuing willingness to take the next step on the road to self-regulation and industry standard-setting. Last October, AWO's Board approved the design of a third-party audit for the Responsible Carrier Program. An AWO member Accreditation Board has just approved the first class of third-party auditors for the RCP, with the expectation of having the program on line and operational in the third quarter of this year. Last month, AWO's membership took its most significant step yet and voted overwhelmingly to amend the AWO Constitution and Bylaws to make a commitment to achieving full compliance with the Responsible Carrier Program a condition of membership in AWO. From now on, any company that joins AWO will sign a statement pledging its commitment to implementing the Responsible Carrier Program and to undergoing a third-party audit within two years. Existing AWO members have also committed to achieving full compliance and to undergoing an audit by January 2000.



1912: The Sulzer 1S100 engine.

which complement the low-speed, direct-drive engines by catering for ship installations with low headroom or high power concentrations, as in ferries, cruise ships, RoRo vessels and ice-breakers.

In parallel, there was also the continuous development of a line of four-stroke engines of lower output for diverse applications in stationary electricity generation, marine propulsion and marine auxiliary duties such as today's S20 type. These also included a long series of four-stroke engines that were built for rail traction up to 1977; many of which are still in service today.

An important factor in the history of the Sulzer diesel engine has been the partnership between the designers in Winterthur and the licensees. Licensing has been practiced by Sulzer since 1909 in Europe and 1917 in eastern Asia. It has allowed the manufacture of Sulzer diesel engines to be localized near the shipbuilding yards while research, development and design could be concentrated in Winterthur. Whereas the production of large two-stroke diesel engines was predominantly in Europe during the first half of this century, it has since followed the shift of shipbuilding from Europe to eastern Asia. Sulzer RTA two-stroke diesel engines are now built by many of the 21 Sulzer diesel licensees, mainly in Japan, Korea, China, Poland and Germany, and by the associated company Grandi Motori Trieste SpA.

Today, Sulzer diesel engines are products of Wartsila NSD Corporation, which was formed last year when New Sulzer Diesel and Wartsila Diesel joined forces. The merger created a global engineering group with the widest range of engines and power systems in the industry.

The design, development and service of Sulzer diesel engines remain in Winterthur, Switzerland, while the group is present with 52 local companies world-wide.

The story is brought up to date with the recent delivery of the 6,674 TEU containership *P&O Nedlloyd Southampton* which is powered by the first 12-cylinder Sulzer RTA96C engine. With an output of 89,640 bhp, the 12RTA96C is the world's most powerful diesel engine currently in production. It symbolizes the vitality of the Sulzer diesel engine as it approaches the new century.

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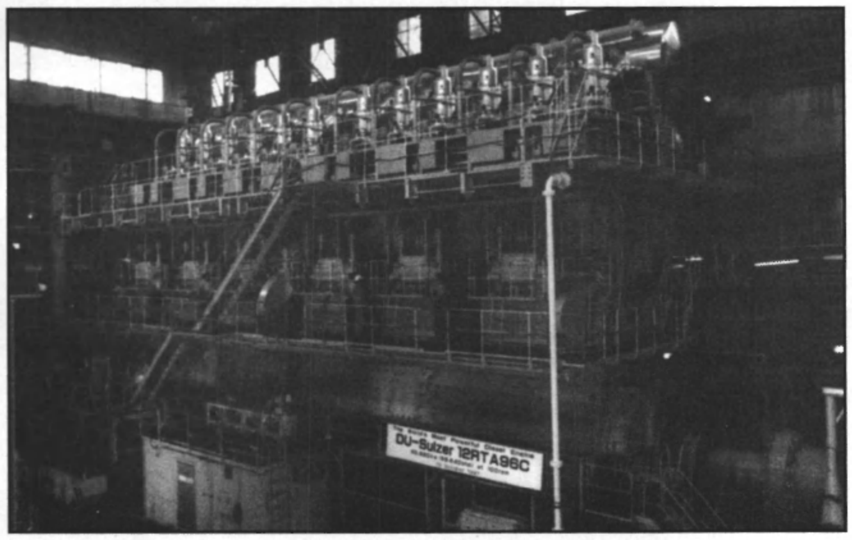

1997: The Sulzer 12RTA96C engine.

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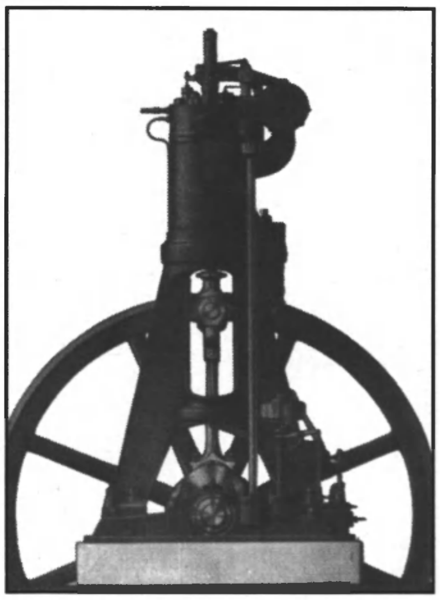


1898: Sulzer diesel engine.

steam engines and was justifiably reluctant to launch out on unproven technology.

The principle advocate of the diesel engine in Winterthur, **Johann Jakob Sulzer-Imhoof**, had the vision that the diesel engine would be developed to large powers and particularly for ship propulsion and established Sulzer Brothers as a major designer and manufacturer of diesel engines.

Even those in favor of **Diesel**'s engine were not prepared to venture beyond a purely scientific interest. The firm thus chose to bide its time while closely watching developments. Accordingly, on May 16, 1893, Sulzer Brothers signed an agreement with Rudolf Diesel to secure the exclusive use of his patents in Switzerland together with an option to take up engine manufacture later. The agreement gave Sulzer the right to receive all test results and design improvements arising from the engine research in Augsburg.

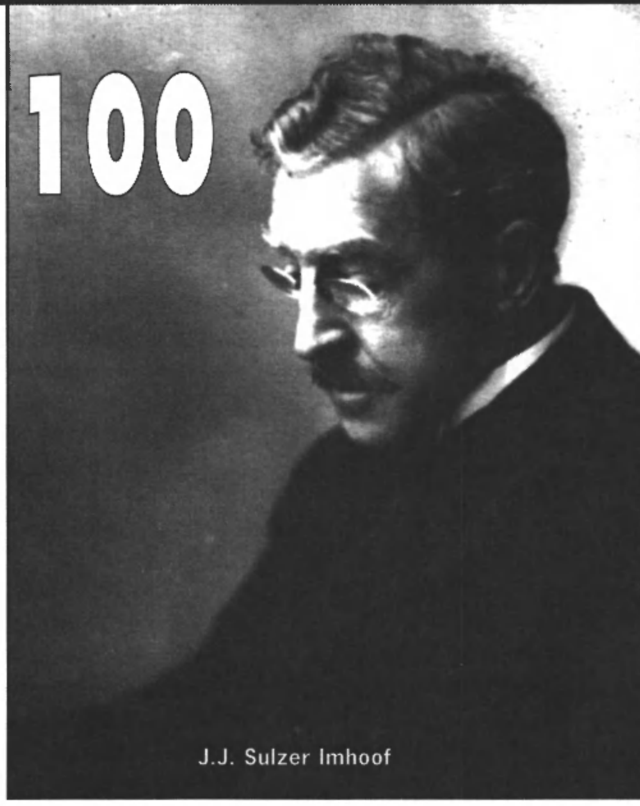
Sulzer-Imhoof visited Augsburg to see Diesel's engine at least twice before the definitive tests in February 1897. The test results encouraged Sulzer Brothers to build its own engine and it was started on June 10, 1898. It was a single-cylinder four-stroke engine of 260 mm cylinder bore and 410 mm piston stroke, developing 20 bhp at 160 rpm.

Diesel engine manufacture was begun in Winterthur in 1903. The license agreement signed in that year gave Sulzer Brothers the right to export engines to any country worldwide. Within three years or so, Sulzer was offering a range of 12 engine sizes covering outputs of 15 to 600 bhp. These first production engines in Winterthur were all four-stroke types and were only used for stationary applications.

The adoption of the two-stroke cycle by Sulzer in 1905 constituted a decisive advance — increasing output and allowing a simpler engine. Port scavenging introduced in 1910 eliminated the gas exchange valves in the cylinder cover to create the simple valveless engine concept that was characteristic of the Sulzer two-stroke engine for 70 years. The change to uniflow scavenging only came in the RTA-series engines of 1982 because their very long stroke, which was required for the lower speeds necessary for high propeller efficiency, was unsuitable for valveless port scavenging.

The first two-stroke engine was a 90 bhp four-cylinder unit that was

Sulzer Diesel Engine Turns 100


J.J. Sulzer Imhoof

This year is the centenary of the Sulzer diesel engine. On June 10, 1898, the first diesel engine built by Sulzer Brothers began running on the test bed in Winterthur, Switzerland.

Since then, the Sulzer diesel engine has become a household name in the marine industry, and has passed through an amazing range of development, starting from the first engines — derived from the 1898 experimental four-stroke engine of 20 bhp — to the 90,000 bhp 12-cylinder RTA96C ship propulsion engine that recently entered service.

A total of some 37,000 Sulzer diesel engines, aggregating 158.3 million bhp, had been built or were on order by the end of 1997.

Formation Of Early Diesel Roots

The remarkable association of the Swiss firm Sulzer Brothers with the diesel engine stemmed from 1879 when at the age of 21, **Rudolf Diesel** came to the firm's Winterthur works for workshop experience after studying in Munich. In 1893, when he was seeking backing to develop his new engine concept, he sent a copy of his book *Theory And Design of An Efficient Heat Engine As The Replacement For Steam Engines and Today's Known Combustion Engines* to Sulzer Brothers. He also corresponded with **Wilhelm Zublin**, chief engineer at Sulzer Brothers, to promote his engine but with no success. At that time, the firm was enjoying tremendous success with its world-renowned orders to the U.S. Sixth Fleet aircraft carriers. During the Russian Okean 70 exercise, the Soviet Fleet found that their shore-based command links were inflexible and unresponsive. The exercise showed that the command loops were so long that their fleet could not react fast enough to developing situations to avoid destruction at the hands of the more agile Western navies. The result in this case was a crash program to develop at-sea flagships and the testing of those links in the subsequent Okean 75 exercise.

A number of navies are now attempting to move beyond the confines of their proximate littorals and project naval power significantly further from home. In so doing, they will incur the added expense of providing for organic naval aviation and at-sea command facilities. However, to most of those who live on the sea, the most visible attribute of naval power will remain the maritime patrol craft and offshore patrol vessels used to maintain law and order on the high seas. While nobody now takes claims that effective surface combatants can be built on anything less than a 203 to 230 ft. (62 to 70 m) hull seriously, 184 and 203 ft. (56 and 62 m) offshore patrol craft carry most of the burden of preventing marine crime. These patrol craft are properly thought of as police craft. They are responsible for preventing piracy, controlling smuggling and all the other aspects of maintaining the rule of law at sea. To the crew of a yacht or pleasure craft in difficulties, there is no more welcome site of a coastguard cutter offering assistance.

Marine policing also requires dedicated command facilities which add to the cost burden of maintaining a naval presence. The operations of coastal patrol craft are best controlled from inshore, coordinating the actions of the OPCs and OPVs with radio monitoring, maritime patrol aircraft, shore-based observers and citizens who become aware of a situation that requires professional assistance. Shore-based radar networks are necessary to control shipping movements through restricted waters and to alert emergency services when an accident does occur. It is interesting to note that in some areas, most notably the Malacca Straits and English Channel, the data load generated by controlling shipping movements approximates to that required for air traffic control. The techniques used by the operators are similar, the only difference being that the maritime situation develops much more slowly than that involved with aircraft movement. Overall, maintaining a naval presence in littoral waters, whether for military operations or for maritime policing revolves around obtaining the information needed to plot the situations in question, then analyzing the key factors of those situations in order to determine the correct course of actions. Forecast International's detailed studies have shown that modern computer command control technology is providing the necessary answers to these problems but also indicate the high level of cost that can be incurred. This, problem too, is being addressed by modern technology. Computers designed for the civilian market are being exploited for military use, dramatically reducing costs while, apparently, not involving any great loss of military capability. This approach, knows as COTS (Civilian off-the-shelf) may well provide answers to the littoral warfare C4I crisis within reach of regional and local navies.

(Continued from page 58)

exploited by using databuses to link workstations into a net. Each workstation maintains a copy of the overall tactical picture, updates it from its own sensors and draws on whatever information it needs from that database. This means that the tactical picture is continuously being updated and the individual combat stations benefit from much more complete and accurate data.

The great flexibility of fully distributed systems really comes into its own when the tactical situation becomes heated. The flexibility of the system and its workstations can be reconfigured very quickly to match the tactical scenario. Resources can be shifted from one combat area to another as the situation develops. If the ship is hit and takes damage, destroyed workstations can be replaced by reconfiguring identical stations elsewhere in the ship — frequently this takes as little as inserting the correct authorization card in a slot.

Bringing fully distributed command systems into service took longer and was more difficult than anticipated. The computers and databuses both revealed quirks that took some time to understand and then eliminate. However, once this had been done, the systems quickly proved of immense value. They also allowed something new but equally important to their combat management roles. Ships' functions such as damage control, engine room operation, internal and external communications and even fuel, supplies, personnel records and maintenance logs could be added into the system. Combat systems evolved into command management systems, allowing ships to be automated with consequent reductions in crew strength. Smaller crews reduced costs and the capital expenditure required to provide habitability onboard ship.

As part of a detailed examination of warship cost structures and fits carried out by Forecast International in Littoral Warfare, it became apparent that the cost of command systems was accounting for between 15 and 45 percent of the total cost of the ship — with the proportion increasing in new construction. In one specific case, sea-based flagships dedicated to commanding large-scale naval operations, the cost of C4I facilities rises to almost 80 percent of the cost of the ship.

Naval C4I expenditure need not be concentrated on the fleet at sea. The provision of adequate shore-based command control facilities also adds to the burden of expenditure in this category. The development of modern communication networks has meant that real-time contact can be maintained with fleets on a worldwide basis. It is very tempting to assume that these facilities can substitute for at-sea flagships. Where operations are taking place in proximate littorals — that is littoral waters adjacent to home territory — this is indeed the case. Such operations can be better controlled from land than from sea-based flagships.

However, once force is being projected into more remote littorals, the situation is far from clear. Such communications links can be abused — most notoriously in one Mediterranean crisis when U.S. Presidential Aides were attempting use such links to give helm

582 Rigs Under Contract

Worldwide offshore rig utilization is 95.6 percent. As of May 13, 582 of the world's 609 mobile offshore drilling units were under contract, according to data compiled by Offshore Data Services. In addition to the 609 existing mobile offshore drilling rigs in the world fleet, another 62 are under construction. Most of these new rigs will work on very deep water drilling programs. The U.S. Gulf of Mexico and European offshore rig counts are unchanged from last week. On May 13, 165 of the 173 mobile offshore drilling units in the U.S. Gulf are under contract. U.S. Gulf offshore rig utilization is 95.4 percent. In European waters, 109 of 114 mobile offshore drilling units are under contract. European offshore rig utilization is 95.6 percent.

U.S. Gulf of Mexico

Category/ Date	May 13, 1998	Month Ago	Year Ago	5 years Ago
Total rigs in fleet	173	176	180	147
Rigs under contract	165	169	170	115
Rigs w/o contract	8	6	10	32
Fleet utilization rate	95.4%	96.6%	94.4%	78.2%

Northwest Europe/Mediterranean Sea

Category/ Date	May 13 1998	Month Ago	Year Ago	5 years Ago
Total rigs in fleet	114	110	106	127
Rigs under contract	109	106	105	98
Rigs w/o contract	5	4	1	29
Fleet utilization rate	95.6%	96.4%	99.1%	77.2%

Worldwide

Category/ Date	May 13 1998	Month Ago	Year Ago	5 years Ago
Total rigs in fleet	609	609	603	632
Rigs under contract	582	584	576	521
Rigs w/o contract	27	25	27	111
Fleet utilization rate	95.6%	95.9%	95.5%	82.4%

Offshore Platform Rigs

In addition to mobile drilling units, 308 platform rigs are marketed worldwide for offshore drilling operations:

Area	Platform Rig Fleet Tota	Rigs Under Contract	Fleet Utiliz. Rate
U.S. Gulf of Mexico	81	62	76.8%
Europe/Mediterranean*	99	95	95.9%
Worldwide*	308	267	86.7%

*as of March 6, 1998 (Updated Quarterly)
Source: Offshore Data Services

Marine Drilling Picks Up Rig

Marine Drilling Cos. Inc. reportedly signed a memorandum of agreement to acquire the Maersk Explorer, a jack-up drilling rig capable of operating in 205 ft. of water that is currently being used as an accommodation unit in the Danish sector of the North Sea.

Baker Hughes And Western Atlas To Merge

Baker Hughes and Western Atlas announced a mega-merger agreement that will effectively create a company projected to have 1998 revenues of approximately $6.5 billion and 36,000 employees worldwide, and which will surely emerge as a leading oilfield technology and services company with the capability to offer fully integrated reservoir management from exploration through production.

The combined company will reportedly retain the Baker Hughes name and be based in Houston, Texas.

Mobil Debuts New Liquefied Natural Gas Technology

Two Mobil Corp. subsidiaries introduced technology for the regasification of liquefied natural gas onboard ships, opening the way for the purchase of small quantities of LNG. The Mobil Shipboard Regasification Terminal is low-capital-cost technology that accelerates deliveries of LNG to customers within 24 months, versus four years or longer for a conventional, land-based LNG receiving terminal.

"Mobil considers this technology as a breakthrough solution that will greatly facilitate the development of new LNG markets," said Michael P. Ramage, Mobil Technology Co.'s president.

With the new offshore technology, LNG carriers will be retrofitted to have the entire regasification facilities located onboard the carrier. Upon arrival at the discharge location with full LNG tanks, the ship will be moored to a single-point mooring system. "This allows the LNG carrier to weathervane around the mooring point, minimizing forces on the installation and maximizing availability," Mr. Ramage said.

The LNG on the carrier will be pumped to delivery pressure, regasified on the ship and discharged as ambient temperature gas via a high-pressure flexible hose. The gas then flows through a high-pressure swivel on the SPM and into a pipeline that delivers the gas to shore. Once the ship has completed regasifying its cargo, it disconnects from the mooring system and returns to the supply port for its next cargo.

The shipboard technology allows customers to purchase small quantities of LNG, Mobil said. Should demand grow to levels that make a full-scale terminal more economically attractive, the technology can supply LNG to a buyer while its conventional terminal is being constructed, providing more flexibility in the development of downstream infrastructure.

According to Mobil, earlier sales of smaller quantities of LNG can have a positive impact on financing as well, by providing new buyers with a means to demonstrate LNG offtake capability and sound cash flows while constructing downstream facilities. By retrofitting two LNG carriers, a system can be developed that allows one to complete a round-trip voyage to the supply port and back while the other is unloading.

In contrast to other offshore terminal concepts, the Mobil technology involves no offshore transfer of cryogenic fluids, and employs only proven technology that has been integrated in a unique manner that is the subject of a U.S. patent application.

British-Borneo Exploration, Inc. for work on the Allegheny field development in the Gulf of Mexico. Under the contract, J. Ray McDermott will transport and install the hull, deck, pilings and tendons for the SeaStar mini-tension leg platform (TLP) in 3,300 ft. of water at Green Canyon Block 254. Through its subsidiary Mentor Subsea Technology, the company will also design steel catenary risers (SCR) and design, procure and commission five subsea completions and two riser-end manifolds. The DB-50 will install the TLP pilings, tendons, hull and deck and the two risers and manifolds. Using J. Ray McDermott's J-lay system, the DB-50 will also install two 12-in. export pipeline SCRs and six miles of interfield flowlines and associated SCRs. The work is expected to be complete in the summer of 1999.

The Shaw Group To Acquire Bagwell Brothers

The Shaw Group Inc. has signed a letter of intent to acquire all of the outstanding shares of common stock of Bagwell Brothers, Inc., a Louisiana-based fabrication and construction company serving the offshore energy industry. Shaw will fund the acquisition through a combination of 675,000 shares of its common stock and $1.6 million in cash.

Transocean Offshore Gets Contract For Semisubmersible

Transocean Offshore Inc.'s second-generation semisubmersible Transocean 97 has received a new contract from a subsidiary of Conoco for a second work program offshore Trinidad. The two-well contract will commence in January 1999, immediately upon the completion of current work in progress for Texaco Exploration and Production, Inc. offshore Trinidad. Revenues to be generated over the estimated six-month contract period are approximately $25.6 million.

Kvaerner Unveils New Oil "Floater" Technology

Kvaerner ASA unveiled two new offshore "floater" concepts for the oil and gas industry.

The deep draft floater (DDF) is a multi-leg deep draft floater is based on existing technology assembled in a new configuration. The DDF is suitable for water depths from 425 ft. (130 m) to over 6,561 ft. (2,000 m) and could be a viable solution for a wide range of field development solutions including the Gulf of Mexico, West Africa, Brazil and the Caspian Sea.

The floating production, drilling, storage and offloading (FPDSO) vessel is a deep-water, single stand-alone unit with production, drilling and storage capabilities.

Kvaerner said the FPDSO is the first free weathervaning turret-moored FPSO with fully rated drilling through a turret facility.

WORLD YEARBOOK

Oil Market Uncertainties...So What Else Is New?

While it is said that love makes the world go 'round, it can be persuasively argued that oil is the axis upon which it rotates. Few, if any other resources, have the sweeping effect that oil does on everyday business, particularly maritime business.

While the supply and demand of oil and related products has always been delicate by nature, today perhaps more so than in recent memory, have the varieties of world events conspired to make the market more nervous than usual. For companies whose livelihoods are directly tied to the direction of the oil market — namely the oil majors, tanker owner/operators, offshore service and supply companies, as well as vessel builders, owners and suppliers — the power of information is paramount to making business decisions today which will prove profitable in the near and long-term. The following includes excerpts from the latest Monthly Oil Market Report from the International Energy Agency (IEA), the acknowledged source of oil market data, information and projections.

Clearing on the horizon?

IEA reports that the gloom that has hung over oil producers during the last six months "seems to be easing as cautiously upbeat sentiment" is starting to infiltrate the market. At the center of this optimism is the real world cutting of oil stocks caused by OPEC production cuts, which have worked to eliminate some of the second quarter 1998 oil surplus. In fact, the worldwide stockbuild which nearly all experts anticipated for the first quarter has not materialized. While complete first quarter data was not available at press time, it was expected that there would be only slight revisions upward, and perhaps a small first quarter build of less than .5 m/bd in OECD industry stocks.

While IEA found that oil prices were virtually stuck between the $13 and $14 level between April and May, it noted that producer's mood had brightened, due in large to positive signs from Asia and a U.S. gasoline market that is "charging ahead."

In evaluating year-to-year stock builds, OECD industry stocks ended the quarter at 2,505 million barrels, only 65 million barrels above March 1997 levels, but more than 200 million barrels higher than two years earlier.

Although oil prices have edged up about $2 per barrel since earlier in the year, the market remains in a "wait-and-see" mode, assessing the relative impacts on crude balances of expanding Iraqi exports and announced production cuts by both OPEC and non-OPEC producers.

Demand remains strong

While the Asian oil crisis, the sudden increase (and since decrease) of new OPEC oil and the warm winter in the Northeast have all conspired to slice oil consumption numbers for the year, it is worthy to note that global oil usage is still projected to rise a healthy 1.5 million barrels per day.

But while the demand remains strong, considering all of the detrimental factors the market has endured, IEA did note that the "oil markets are drifting without clear direction, while key questions on inventory changes, production cuts and Iraqi export potential remain unanswered."

Global oil demand, hence, is still projected to rise two percent over 1997 levels, from 73.6 million bpd to 75.1 million bpd. Demand would have been even stronger if it had not been for the large decline in Japanese demand in March.

IEA noted that one area of uncertainty in projection of global demand in 1998 is U.S. gasoline. Although it was assumed that the U.S. economy would slow in 1998, the most recent indicators show continued strong growth without the usual inflationary pressure. Hence, low gasoline prices and high levels of disposable income could contribute to stronger than expected demand.

While the U.S. solidly leads demand projections, at 21.01 million bpd (versus a demand of 14.63 million bpd for all of Europe, there are some significant areas to consider when discussing up and coming energy consumers. For example, China is anticipated to demand 4.26 million bpd, a big 7.7 percent increase over the previous year. This comes on top of 7.9 percent and 10.1 percent demand increases for China in 1996 and 1997, respectively.

Similarly, Latin America's demand is anticipated to top out at 6.83 million bpd in 1998, a 3.6 percent increase over the previous year. Demand in Latin America jumped 4.6 from 1995 to 1996, and another 4.3 percent from 1996 to 1997.

By contrast, demand in "other Asian" countries is anticipated to grow just 1.6 percent in 1998 to 9.14 million bpd.

Cal Dive First Quarter Earnings Increase 178%

Houston-based Cal Dive International, Inc. announced first quarter net income of $5.2 million, an increase of 178 percent over the $1.9 million earned a year ago. Revenues of $33.2 million increased $14.7 million or 80 percent as the fleet of CDI dynamically positioned vessels generated more utilization days than in any quarter of the prior two years.

J. Ray McDermott Awarded $70 Million Contract

J. Ray McDermott was awarded a $70 million contract from

HODDER TUGBOAT CO. LTD. specifies ZF GEARS, a pair of BW191s on 3412TAs from FINNING POWER SYSTEMS

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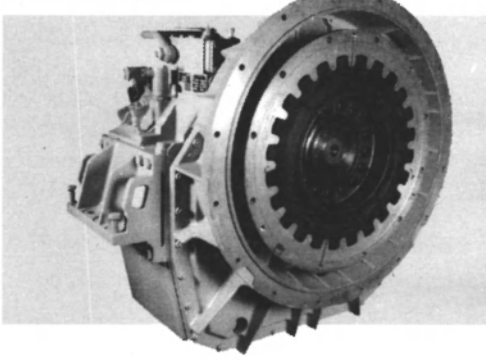

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Marinette Supports USCG Deepwater Program

Marinette Marine's President and CEO **Dan Gulling** testified last month before the House Coast Guard and Maritime Transportation Subcommittee in support of the Coast Guard's Deepwater Program. The Deepwater Program has been developed to modernize the U.S. Coast Guard's (USCG) aging fleet of ships and aircraft. Marinette Marine Corporation is teamed with SAIC (Science Applications International Corporation); Sikorsky; Bath Iron Works Corp. (A General Dynamics Company); and others. As the prime contractor, SAIC will be responsible for leading the team, performance systems modeling and electronic integration. Marinette Marine Corp. will lead the surface system effort and be responsible for all ship assets. Sikorsky will lead the aviation effort and be responsible for those assets. Bath Iron Works has responsibility for the engineering support, and will support and likely share in ship modernization and large ship procurement, as part of the surface systems effort. SOZA will be responsible for the logistics implementation. The size and complexity of the Deepwater Program — to replace 41 High and Medium Endurance Cutters; 49 Patrol Boats; Helicopters; Fixed Wing Aircraft and implementing a new command, control and surveillance system requires a multifaceted team. The USCG will award three study contracts, which will last 18 months. Upon completion of Phase I of the study contract the USCG will pick one, two or three of the best solutions, to participate in Phase II, which will define the system and its costs in more detail. Phase III would involve selection of one team for procurement. It is anticipated that the first ship construction contracts will be awarded to the winner of Phase III in Fiscal Year 2002.

Circle 56 on Reader Service Card

Ambar Names Chief Financial Officer

Ambar, Inc. — an integrated, total fluids management company — has named Robert M. Flavin as Chief Financial Officer. Mr. Flavin goes to Ambar after a 13-year career with Basis Petroleum, Inc., where he served as Senior Vice President and CFO. During his tenure, Basis Petroleum was the fifth largest independent oil refining and marketing company in the U.S.

3.MAJ Awarded Tanker Contracts

Croatian Shipyard 3.MAJ Brodogradiliste, d.d., recently received orders to deliver an 81,500 dwt oil tanker to Ferens Shipping Co. and a 63,000 dwt oil tanker to Lerici Shipping Co. Delivery of the oil tankers to their respective owners is scheduled for 2001.

TDI-Halter To Acquire Trinity Shipyard

TDI-Halter, L.P., a subsidiary of Halter Marine Group, Inc., has entered into an agreement with Trinity Industries, Inc. to acquire Trinity's shipyard in Orange, Texas. The sale of the yard was expected to close on May 29. The shipyard, which will be re-named, TDI-Halter-Orange, will become the eighth TDI-Halter facility and the 22nd shipyard of Halter Marine Group, Inc. TDI-Halter intends to use the 77-acre facility to build mobile offshore drilling and production units as well as components for other rigs under construction at other TDI-Halter and Halter Marine shipyards throughout the Gulf South. Halter Marine Group, Inc. announced its backlog was a record $817 million at March 31, an 11 percent increase from the fourth quarter of FY97. The $817 million year-end backlog can be broken down into the following business segments: vessels, $529 million or 65 percent; rigs, $229 million or 28 percent; and engineering products, $60 million or seven percent.

adequate to meet the new EPA limits. In addition, the entire industry (especially the U.S. Navy and the NSRP) has demonstrated highly proactive attitudes in testing and field evaluation of these products and in cooperating with the manufacturers and the regulators. As a result, the U.S. shipyards are, for the most part, well positioned to fully conform to the new VOC regulations with little disruption to production or quality.

The need to control solvent emission has had several major impacts on shipyards operation.

•**Equipment Retrofit:** Equipment changes have not been dramatic, but mainly incremental (such as improvements in nozzles, tips, pressure regulators and monitors). Better use and control of existing equipment is often the most important factor for successful use of the new material. Several yards have tried higher pressure airless, HVLP, twin gun spray, and powder coating lines. Equipment has also been developed for bulk handling of coatings and for heating materials prior to application.

•**Inventory and Recordkeeping:** Most of the coating formulations have been changed in the last five years. So, all the manuals, procedures, practices, standards and specifications for materials, application and inspection have needed to be updated (especially for Navy work, which generally requires more documentation). All departments and groups involved with coatings (e.g., design, engineering, maintenance, procurement, environmental, hygiene/medical) have needed guidance on how to deal with the changes.

One of the most costly impacts is the need for inventory control and recordkeeping. This has required substantial manpower investment in developing systems to document coatings and thinners purchased and used, and to compute VOC and HAPs emissions.

Additional regulations on solvent emissions are expected as EPA and states strive to further reduce the production of ozone and the emission of HAPs. In July 1997, EPA proposed a reduction in the standard for ozone, signaling an intent to tighten up on ozone producing materials, such as VOCs. New restrictions are already being discussed in California and other high pollution areas.

Most manufacturers are convinced that the technology is now available to further reduce VOC and for some applications to achieve zero VOC. The main limitations are the acquisition and retrofitting of the equipment, the training of personnel, and the verification of long-term service performance.

SSPC is a U.S.-based technical and educational society representing users, applicators and suppliers of coating systems for shipbuilding and other major industries worldwide. Updates and additional information on solvent and other regulations, new technologies and cost and impact are available. Visit SSPC Online at www.sspc.org or contact the author by e-mail at appleman@sspc.org, fax 412-281-9992 or mail 40 24th, 6th floor, Pittsburgh, PA 15222-4656.

ity could be adjusted by thinning; now the applicators must learn to use the correct nozzle tip and pressure. The new HAPs regulations require that the quantities of thinner emitted be monitored, as well as the solvent in the can. Applicators and supervisors must also be trained on the procedures for recordkeeping and inventory control.

Recordkeeping and Quality Control

One of the major effects of the new regulations has been the requirement for the yard to keep detailed records of the quantity and type of VOC emitted.

Newport News Shipbuilding (Newport News, Va.) uses a computer program which enables the yard to track, on a daily basis, the amount of paint applied at each of the several dock area where paint is applied.

Electric Boat also tracks the paints and thinners from when they are received through final application. As major sources, both of these yards are limited in total emissions per year as noted above. The state of Connecticut also mandates additional emission limitations and reporting requirements on Electric Boat for adhesives that contain VOCs.

Scott Devinney of Bath Iron Works has pointed out that the shipyards are still liable for any penalty from environmental violations. He advises the yards to periodically spot check the VOCs and HAPs levels reported by manufacturers. As part of the yard's quality control, Bath Iron Works identified several chlorinated alkyds whose VOCs exceeded the EPA limits, as well as the manufacturers own product data sheets.

The Navy relies on its procurement agent (GSA) to check the conformance of the coating to the Navy specification requirements, including the VOC. GSA also relies primarily on the data from the manufacturers.

EPA Estimates of Impact

EPA estimated the annual cost of the national HAPs regulation from the 35 major source shipyards at approximately $2 million. The agency also expected virtually no capital costs associated with this regulation. For the VOC rule imposed by state and local regulatory agencies, EPA estimates nationwide costs of approximately $1.1 million per year. The total estimated cost is, therefore, $3.1 million per year. These numbers are very hard to quantify; they depend on the methodology, the base year, and other factors.

The HAPs rule is expected to reduce emissions of air toxics, including xylene and toluene, by 318 tons (350 tons) per year, representing about a 24 percent reduction from current levels. The VOC rule is expected to affect about 100 facilities, and reduce the emissions of VOCs by approximately 1,250 tons (1,380 tons) per year, so the total reductions are estimated at 1,570 tons (1,730 tons) per year.

Technology Adequate

Because of major R&D and testing initiatives by the coating manufacturers over the last 20 years, coatings technology is more than

Hempel Coatings Offers Hempadur 17630

Hempadur 1763 from Hempel Coatings is a high-build, light-colored modified epoxy paint for the application of cost-effective systems in new ships. It does not contain tar or isocynate, and has a low content VOC. Hempadur 17630 is specified as a two-coat system in accordance with widely accepted guidelines for ballast tank coating systems. It cures down to 0°C/32°F, making it a all-year-round product in most locations. The light color makes inspections easier.

Hempel Coatings (USA) is part of the worldwide Hempel Organization, which was founded in 1915 in Denmark. The Hempel Group is owned by the J.C. Hempel Foundation, and Hempel is reportedly the largest independent paint and coatings company in the world. The company is a leader in the field of marine coatings, providing products for both new construction and repair jobs. Its product line is complete with ballast tank coatings designed to comply with 1998 SOLAS regulations, cargo holding coatings that are made for strength and economy, and Combic and Olympic antifouling systems.

Circle 26 on Reader Service Card

ciency (more paint gets to the substrate instead of being wasted). This may also reduce overall solvent emission, as well as the quantity of paint required. This technique is typically used on more complex parts or in areas where overspray could be detrimental to machinery or other operations. HVLP also reduces the amount of masking of adjacent surfaces. It generally has a lower production rate than conventional air or airless spraying.

Shipyards in northerly climates such as Bath Iron Works (Bath, Maine) often have a need to apply low VOC coatings in cold weather.

One new piece of equipment is a portable heated and insulated storage cabinet. These maintain the coating at temperatures near 72°F (20°C) at location immediate adjacent to where the coating is applied. Bath Iron Works recently purchased 15 such cabinets at $8,000 a piece.

In warmer climates where freezing is not common, water-borne coatings are another alternative for reducing VOCs and HAPs. Avondale Shipyards converted its two pre-construction primer lines from inorganic zinc (zinc silicate) to a waterborne epoxy acrylic. The epoxy acrylic has reduced VOC (less than 240 g/l [2 lbs/gal]).

Volatile coalescing aids are still needed in the formulation to ensure adequate film forming properties. Water-borne coatings also have simplified cleanup and no regulatory restrictions on thinning. The two-part system used at Avondale requires a 9:1 ratio of resin to curing agent. The resin is supplied in 1,000 liter containers.

Powder Coatings

One approach adopted by Bath Iron Works, Electric Boat (Groton, Conn.) and others, is the use of powder coatings, which have zero VOCs and HAPs. The powder is electrostatically sprayed to a heated metallic substrate. The heat causes the powder to melt or fuse. The most commonly used are thermosetting epoxies (two components reacting together). There is some use of single component thermoplastic (e.g., polyester). The U.S. Navy has developed specifications for powder epoxy (MIL-C-24712). Also some commercial products are permitted by the Navy. Presently, powders are used almost primarily for small parts because of the need for ovens. Parts coated include hangers, brackets and casings. A submarine may contain several thousand hangers according to **Mark Panosky** of Electric Boat, which is conducive to an automated powder coating process. In addition to eliminating VOCs, powder also reduces production time because of the rapid cure and the ability to apply 200 micrometers (8 mils) or more in one coat. Automated powder coating facilities require a substantial capital investment (typically $300,000 to $500,000). However, the payback is often achieved in five years or less due to reduced labor costs and the improved efficiency of the automated powder coating process.

Training

As with any new technology, the applicators must be trained and become experienced with these different materials and their application properties.

At Electric Boat, the yard had established a regular training program for applicators, so the transition was not difficult. However, the applicators must learn to not rely on thinners to adjust viscosity. Bath Iron Works has emphasized the need for training painters on proper use of the new materials as they are introduced. For the U.S. Navy yards, less funding has been available for training of painters. This has required greater attention by the supervisors and inspectors to ensure proper application

One important difference with the new coatings is that thinning is severely restricted, as thinning may cause the coating to become non-compliant. Applicators must understand the reason for this limitation and be better skilled in selecting and adjusting the spray equipment. In the past, the viscosand curing agents. This provision was challenged by the industry as being excessive and prohibitively expensive. A coalition among the National Shipbuilding Research Program Panel SP-3, the U.S. Shipbuilders Council, paint manufacturers and the National Paint and Coatings Association met with EPA. After some discussion, the EPA relaxed that particular requirement. Other aspects of the recordkeeping requirements imposed on the shipyards are discussed below.

Impact of VOCs and HAPs on Shipyards

Several shipyards were contacted regarding the impact of VOC/HAP rules. The yards have been anticipating, and preparing for, the new regulations for several years. The conversion to new, lower VOC formulations has affected the application properties of shipboard coatings.

To reduce the VOC of epoxies, coating manufacturers use lower molecular weight resins in order to achieve the same degree of cross linking as the conventional (high solvent) epoxy. Pot life may need to be reduced. In some instances, a different mixing ratio may also be required (e.g., from 1:1 to 4:1).

In order to achieve a VOC of 340 g/l (2.8 lbs/gal), coating manufacturers have used longer oil alkyds. This has generally resulted in longer dry times, hence, increased times to recoat and to put the unit into service. This puts additional pressure on already tight drydock and construction schedule and represents a hidden cost of VOC compliance.

Application Methods

Conventional airless equipment is considered capable of applying the current generation of VOC/HAP compliant coatings (e.g., VOC of 340 g/l [2.8 lbs/gal]). However, if the VOC is reduced to significantly lower levels there may be a need for more specialized equipment. One example is plural component spray.

Avondale Shipyards (New Orleans) has successfully utilized twin gun airless spray equipment. One limitation, however, is the need to maintain the pressure over long lengths of hose (100 ft. [30 m]). The yard found it necessary to transport the pump to the vicinity of the work pieces in situations where pressure losses were excessive. Twin gun airless also allows the applicator to preheat the material because the curing reaction does not begin until the material has been sprayed. This heating can significantly improve the application viscosity. None of the yards contacted has yet employed this technique in full production conditions.

One shipyard experienced major problems in spraying new low VOC epoxy with conventional 40:1 ratio airless pumps. The manufacturer was forced to change the formulation several times until the applicators could successfully apply the product with the existing equipment. Problems included sagging and fingering.

Several yards have, however, used High Volume Low Pressure (HVLP) spraying. This technique provides a greater transfer efficode, two separate regulations have been issued.

HAPs Rule

On November 15, 1995, EPA issued the Final Air Toxics Regulation for the Shipbuilding and Ship Repair Industry. In December 1996, EPA began enforcing this rule, which limits the total amount of HAPs that could be emitted by a major source (such as a large shipyard).

EPA's regulation is modeled after the State of California's regulation for VOC emissions from coating operations at shipyards. It includes a table listing, various types of coatings, and the maximum amount of VOC permitted.

A portion is given in Table 1. The full provision became effective in December 1997.

Table 1:

VOC and HAPs Limits for Shipbuilding Coatings*

Coating Description	Max. VOC** (g/l)	Max VOC (lbs./gal.)
Antifoulant	400	3.33
Heat resistant	420	3.5
High gloss	420	3.5
High temperature	500	4.17
Inorganic zinc high-build	340	2.8
Organic zinc	360	3.0
Pretreatment wash primer	780	6.5
Repair and maintenance of thermoplastics	550	4.58
Sealant for thermal spray aluminum	610	5.08
Weld-through precon. primer	650	5.42

*partial list
**higher levels are permitted for cold weather applications (<4.5°C [40°F])

Limits on HAPs content in the container applies only to yards that emit 9.1 tons (10 tons) per year for any single HAP or 22.8 tons (25 tons) per year for more than one HAP. An estimated 35 shipbuilding and ship repair facilities nationwide were expected to be affected by the final regulation.

An important component of the rule was the requirement for detailed recordkeeping to verify that the yard was conforming with the emission rules.

VOC Rule

The EPA may regulate VOC emissions primarily in areas with high ozone levels. However, EPA's rule for VOCs in shipbuilding is a national rule, by virtue of the fact that EPA equated VOCs with HAPs in the rule. EPA could have controlled VOCs by the use of a control technique guideline (CTG). A CTG differs from a national rule in several important ways:

A CTG only regulates in areas that are designated as non-attainment for ozone (i.e., areas that exceed the EPA ozone standard).

A CTG is developed by the state regulatory agencies based on EPA guidelines. Under a CTG, a rule in one state need not be identical to the rules in other states.

Results of Recent Negotiations With EPA

The shipyard and the coating manufacturers have generally accepted the HAP and VOC limits as being achievable. However, the rule included a requirement to measure the VOC for every batch, including all combinations of base

Impact Of Solvent Regulations On Ship Coating Users

by Dr. Bernard R. Appleman, Executive Director, SSPC: The Society for Protective Coatings

This article describes some recent regulations affecting use of volatile solvents in coatings for ships. The operational, economic and other impacts are discussed for U.S. Navy and private ships and structure owners.

Ship owners and operators are increasingly recognizing the significance of coating systems for the effective construction, operation and maintenance of oceangoing vessels. Proper design, selection, and application of coatings can reduce the overall cost to owners and operators by minimizing downtime for maintenance and repair and by reducing fuel consumption and increasing vessel speed. In the drive to produce ships both quickly and competitively, however, owners have sought to reduce both construction and maintenance costs, with coatings often being a major area for reductions.

Another important trend is the development of environmental regulations regarding the manufacture, application and disposal of shipboard coatings. An important area of regulation is air quality, which is significantly affected by the emission of volatiles during the application and curing of coatings.

The following is a review of the recent round of U.S. EPA regulations on the emission of volatile components of coatings and the impact these rules are having on shipyards doing both commercial and US Navy shipbuilding and repair.

Recent Regulations on VOCs and HAPs for Shipbuilding

In the last three years, the U.S. EPA has proposed and enacted significant new regulations affecting the solvents in organic and inorganic coatings used in shipyards. In the past, regulations have been concerned with volatile organic compounds (VOCs). VOCs are precursors to ozone, an air pollutant, which adversely affects the human respiratory system and damages crops and forests. It has been the target of regulations in the US since 1966 in California (Rule 66) and since 1970 nationwide (Clean Air Act).

Under the 1990 CAA EPA identified an additional 189 compounds for substances that were considered hazardous when airborne. These are designated as Hazardous Air Pollutants or HAPs. HAPs include most (but not all) commonly used coating solvents (toluene, MEK, xylene, MIBK). Mineral spirits is a VOC, but not a HAP. In 1994, EPA determined that for the shipbuilding regulation, VOCs would serve as a surrogate for HAPs. Reducing VOC emission would automatically reduce volatile HAPs emissions as well. However, because these two classes of compounds fall under different portions of the regulatory

WORLD YEARBOOK

This is where it all gets put together — the combat direction center of the AEGIS cruiser USS *Hue City*. These demonstration plots look deceptively calm and uncluttered but in a combat situation they will be a mass of ambiguous and conflicting data. Helping the crew to perform the appropriate actions under these circumstances is the key to commanding naval operations in the littoral regions.

Aegean region. In each of these cases, the absolute necessity of having organic air power available while operating in littoral regions has been a primary driver behind this expansion of naval capability.

The virtues of aircraft carriers and their smaller cousins involved in littoral operations far from home extend beyond routine flight operations such as contact verification. As national sovereign territory, they are free to execute national policy as their governments see fit. Land-based aircraft are subject to such irritations as overflight rights and, if using bases on allied territory, to the political restrictions imposed by that ally. This factor recently proved to be the key argument in favor of the Royal Navy being authorized to build a new generation of aircraft carriers to replace its three existing Invincible class ships. Just before the decision was finalized, Saudi Arabia and Bahrain had refused to allow their airfields as bases for United Nations air attacks on Iraq and only those aircraft on nearby carriers could be considered available without restriction. This demonstration of political realities effectively discredited arguments that land-based air power could substitute for fleet-based naval aviation.

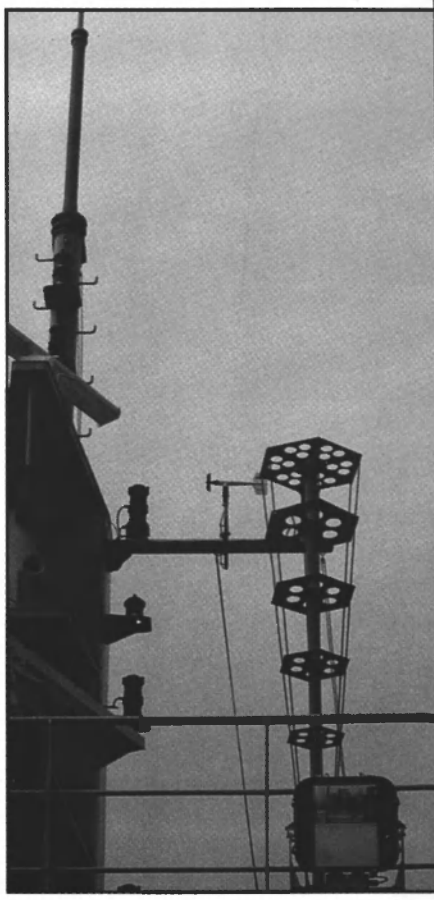
The new generation of computerized warship command systems has arrived at a fortuitous time for naval forces operating in the littoral regions. The characteristic, confused tactical air picture described above is accentuated by the presence of a wide variety of friendly air assets. In addition to the aircraft operating off carriers, many of the screening frigates and destroyers will have their helicopters airborne for a wide variety of roles. These could range from mine detection and clearance to delivering the mail and administrative paperwork. With an attack impending, it is easy to envisage a fleet commander ordering "all friendly helicopters down on the nearest deck — NOW." Computerization of tactical plots has provided the key to solving this problem.

The earliest computer combat systems used a single central computer to maintain the tactical plot. All sensor and IFF information was fed into this computer and the contacts held as separate files. Each of the combat stations then drew on this tactical picture for the information needed to fulfill its own specific purposes. The tactical data held in the central computer was refreshed at periodic intervals. This system was a great advance over earlier, manual systems and even today has its advocates. They point out that using a single central computer is inherently efficient in terms of resource exploitation. This, they claim, enables tactical data to be exploited more quickly and reliably

However, the modern trend is toward using a fully distributed system. Here, the immense processing power of modern desktop computers is

(Continued on page 72)

Fleet broadcast HF radio is still the primary means of communicating tactical data but, as computer datalinking becomes more common, voice HF may be de-emphasized. The problem is whether or not nets of interacting computers will be excessively vulnerable to attack by virus or other forms of information warfare.



Naval Forces: 2000 and Beyond

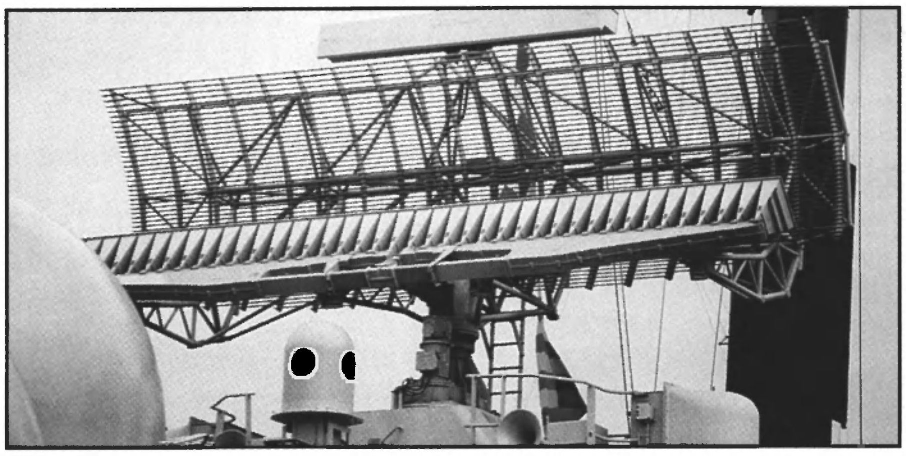
Where the brunt of the $161 billion international naval budget will be spent

Moving naval operations into littoral waters will fundamentally change the environment in which naval forces will be expected to fight.

Over the next decade, warships and their supporting arms will face a complex, pan-dimensional threat theater in which the participants can expect to be brought under concentrated attack by a variety of different modes with little or no warning. They will face these threats in scenarios that also include a wide variety of friendly forces, neutrals, civilians and/or unknown elements. Even this categorization may be inadequate since the boundaries separating hostile and neutral or combatant and non-combatant may be blurred to invisibility.

In view of this confused, hazardous scene of operations, it is not surprising that, of the $161 billion Forecast International projects for investment in littoral warfare capability over the next decade, more than 25 percent will be spent on command control capabilities. Forecast International's study *Littoral Warfare: From the Sea to the Land* clearly shows that the essential nature of littoral warfare is a command control crisis. Being able to decide what represents a threat, identifying those elements and then targeting them without accidentally destroying uninvolved bystanders, all within a severely restricted time-frame, is a major challenge.

Unfortunately, the IFF transponders fitted to civilian aircraft cannot be relied on to identify aircraft with an adequate level of accuracy. Their failure rate is high enough to lead to many incidents of unidentified aircraft appearing on air traffic control screens. The most notorious example was a P-3 Orion with a non-functional IFF system that crossed New York airspace during the TWA 800 disaster. This aircraft showed on the radar screens as a skin paint rather than a transponder response, an unfamiliar sight to a generation of air traffic controllers brought up to handle transponder data. This lead to much ill-informed speculation that was only resolved when air traffic control veterans saw the tapes. Until non-cooperative target recognition (NCTR) systems can be perfected, positive identification will have to rely upon visual checks.

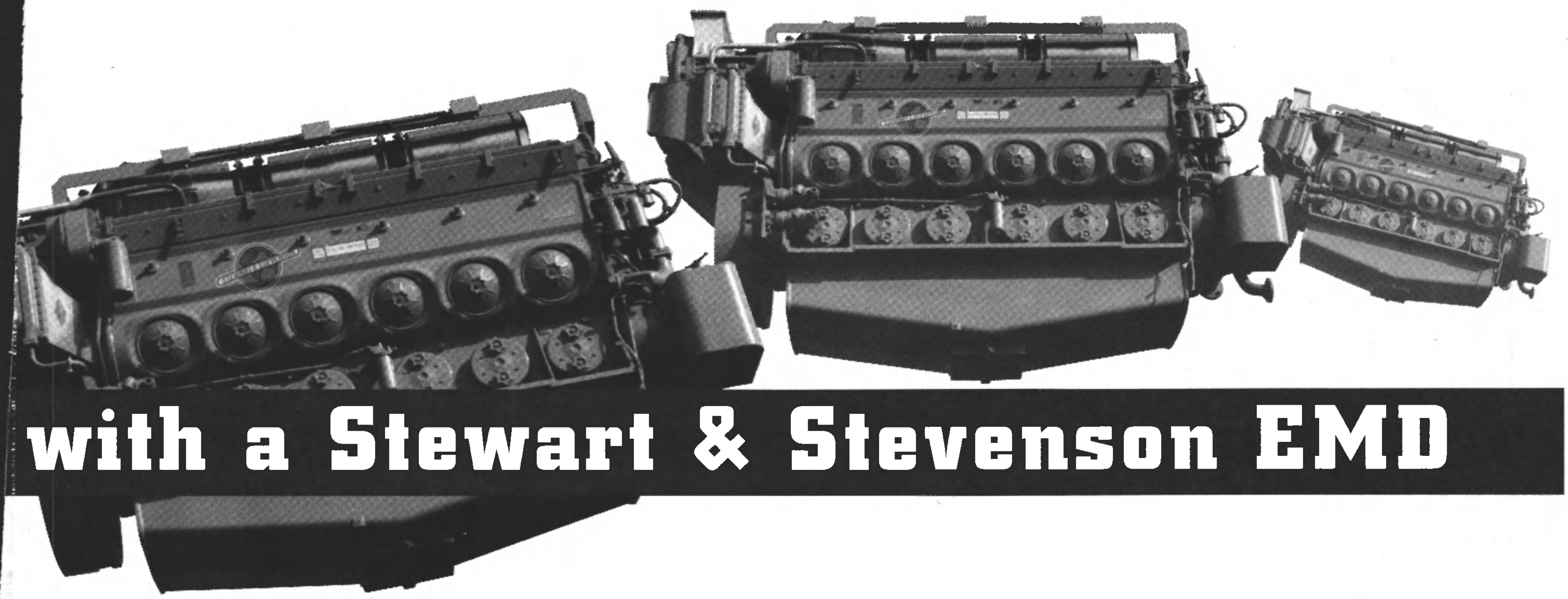


The Mark 11 IFF unit on top of this British Type 1022 radar is an essential part of the ship's equipment fit. Far less prominent is the small cylindrical radome underneath it (with circular black ports in its faces). This is a directional datalink, allowing tactical information to be shared between ships, reducing the chance of another Iranian Airbus incident.

In the absence of aircraft to investigate ambiguous contacts, the point defense Sea Sparrow missiles on this Italian destroyer may be the first line of defense rather than the last.

This has thrown greater emphasis on the value of naval aviation. The inclusion of Sea Harriers as part of the airgroup on the British Invincible class air-capable ships was originally envisaged as a response to the need to visually identify ambiguous contacts while they were too far from the fleet to present a serious threat. This mission is now becoming an important part of the daily routine of most carrier aircraft. Without the ability to fly out, intercept and inspect an inbound contact, the target will remain unidentified until it crosses the radar and/or visual horizon of the fleet. By this time, it may be too late to mount a defensive action.

Eight years ago, Forecast International suggested that the ability of air-capable ships to allow a degree of organic air power to navies lacking the resources to acquire full-size aircraft carriers would make them of growing importance. This trend is now well under way with Thailand having recently taken delivery of its first air-capable ship and with India and China reportedly having well-advanced construction plans of their own. Turkey recently revealed an intention to acquire air-capable ships to add to her fleet, an action obviously undertaken with an eye to threats in the



with a Stewart & Stevenson EMD

STEWART & STEVENSON SERVICES, INC. is proud to have supplied three Electro-Motive Diesel Division of General Motors Corporation, Model 12-710 G7B marine diesel engines, 3000 BHP each at 900 RPM, and three Lufkin Model RS 3626 reverse reduction gears, in ratio of 4.34 to one, for the repower of the M/V HARRIET ANN. The HARRIET ANN has joined the ranks of hundreds of towboats with EMD power.

The series 710 EMD offers such a low specific fuel consumption that repowering a workboat with 710's will, in most cases, pay for itself in a very short time. The 710, like all EMD's, is easy to maintain or overhaul. The 710 turbocharger has a tougher clutch that is separately replaceable. 710 parts are available through the EMD unit exchange (UTEX) program.

EMD's have been running for 30,000 hours or more between overhauls in tough towboat service, which is mostly full power running. Overhauls are quick, easy, and relatively inexpensive. The EMD premium power packs with hardened upper bore liners (HUB liners) and hardened upper ring groove pistons have mostly rebuildable components.

The engines, like all EMD's, are smooth running and accelerate quickly to full load RPM.

We are pleased that Riverway Co chose EMD power for the HARRIET ANN.

Let us demonstrate for you how EMD 710 engines can pay for themselves in your boat.

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J. Erik Hvide
Hvide Marine

Most anyone privy to the maritime industry would be hard pressed to leave **J. Erik Hvide** off of any "Newsmakers" list. Mr. **Hvide** has led his namesake company, Hvide Marine Inc., on an acquisition binge which has seen the company grow to a vessel owning behemoth with vast new avenues of business potential.

J. Erik Hvide

Hvide Marine is one of the world's leading providers of marine support and transportation services with a growing fleet of 271 vessels in two core businesses:

— **Marine Support Services**: Featuring 237 vessels, primarily in the offshore energy industry. Hvide's Seabulk Offshore subsidiary is the world's third largest operator of oilfield support vessels; and offshore and harbor towing, which includes harbor tug operations in Tampa Bay, Port Everglades and Port Canaveral, Fla.; Mobile Bay, Ala.; Lake Charles, La.; and Port Arthur, Texas.

— **Marine Transportation Services**: Featuring 34 vessels, in which Hvide is a leader in the domestic chemical transportation trade and has a significant position in petroleum product transportation.

With its large (and sure to grow larger) fleet, Hvide has assumed a unique and powerful role in the maritime market, as Fort Lauderdale, Fla. has suddenly become the hub for a large concentration of product and service purchasing. But the scope of Hvide Marine spans far beyond the shorelines of the U.S., and Mr. **Hvide** has led the charge to develop and maintain a unique vessel owning/operating empire around the world.

In announcing its first quarter earnings, Mr. **Hvide** noted that "Last year at this time our international business did not exist. Today, it is the fastest growing part of our operations, representing about one-third of revenues and nearly 40 percent of profits. We look for continued strong growth in this sector of our business as we complete the integration of newly acquired vessels and benefit from improving day rates in all major international markets."

As proof of its resolve to expand its influence, the company opened its first office in Singapore, where it is currently operating 19 vessels in the Southeast Asia region.

(Note: 1Q98 revenue more than doubled to $86.5 million on the strength of its global expansion, increased fleet size and higher day rates in the company's biggest business - offshore energy support services.)

The most recent news from the company was the addition of 37 oilfield support vessels formerly operated by Care Offshore, making Hvide's Seabulk Offshore subsidiary the number three operator in the world with 197 vessels. Revenues from offshore activities more than tripled from a year ago to $56.4 million as a result of acquisitions and higher day rates in all major markets. In the Gulf of Mexico, for example, where the company has 73 vessels, supply boat day rates averaged $8,475 versus $6,478 last year, while crewboat day rates were $2,419 versus $1,777 a year ago.

In offshore and harbor towing, where Hvide has become the leading domestic consolidator, revenues grew two-and-a-half times to $9.5 million as a result of acquisitions, higher offshore day rates and increased port traffic.

In chemical transportation, where the company has a leading position in the Jones Act trade, revenues grew seven percent to $15.3 million. In petroleum product transportation, which includes the recently completed acquisition of two product carriers from Kirby Corporation, revenues grew 26 percent to $5.4 million.

Mr. **Hvide** was also recently named as a finalist for the Ernst & Young LLP Florida Entrepreneur Of The Year Award. He was one of 27 executives selected by a 10-member independent panel of business and academic leaders representing diverse industries throughout the state.

Grupo Libra Expands Sales Team

Grupo Libra appointed **Thomas L. Sadowski** regional sales manager of its U.S. mid-Atlantic territory. In this position, he will be responsible for sales efforts for the carrier's South America service and will represent the company at trade shows throughout the area.

In addition, Mr. **Sadowski** will oversee Libra's activities in Pennsylvania, Delaware, Maryland, Virginia, West Virginia, and Washington, D.C. Mr. **Sadowski** brings more than 13 years of experience in the maritime industry to Grupo Libra. Before joining the company he served as an account executive for Maersk Line and also held positions at K-Line, Southern Pacific Railroad, Union Pacific, and Cast North America.

NKF Elects New Board Of Directors

The shareholders of NKF Engineering, Inc. (NKF) recently elected a new Board of Directors consisting of five members: William Bierlin, chairman of Hamburg Industries, Inc.; John Claman, vice president of American Management Systems, Inc.; Jay Leader, NKF ESOP trustee; Jack Nicholas, Jr., Co-founder and chief engineer of Maintenance Quality Systems, LLC; and David O'Neil, president of Seaworthy Systems, Inc. and president of SNAME. NKF is a small business supporting U.S. Navy and commercial customers within the disciplines of noise, shock, vibration and condition, and has recently broadened its scope of expertise to include joint force level architecture.

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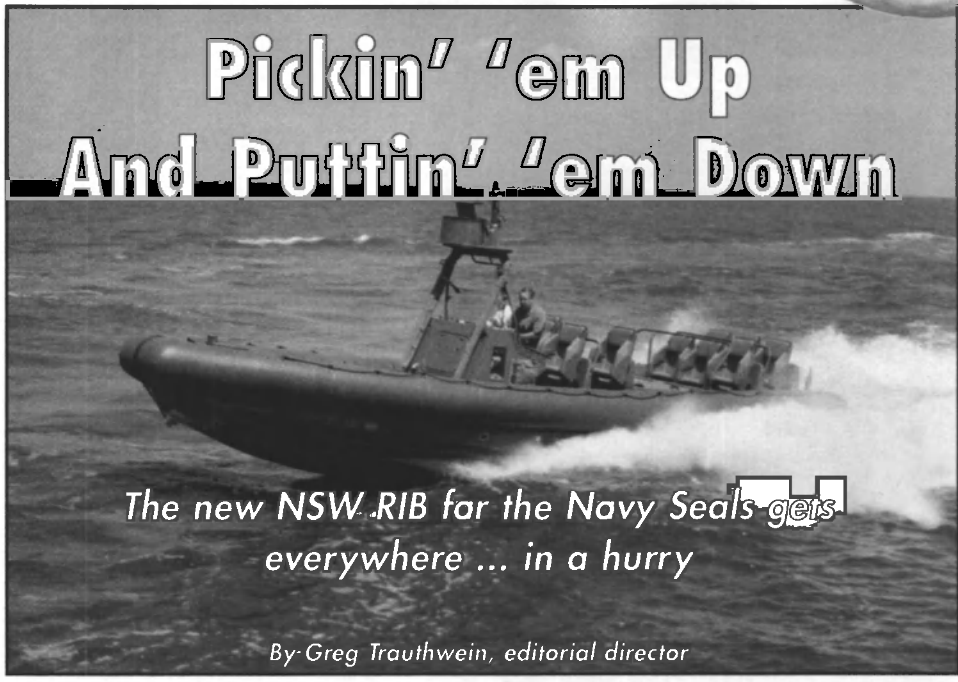


Fast, in a word, describes the new Naval Special Warfare Rigid Inflatable Boat (NSW RIB) built for the Navy SEALs. But while speed is an overriding characteristic, these truly amazing new boats incorporate a host of design and outfitting advances which provide them with outstanding overall performance.

Maritime Reporter & Engineering News was recently invited to ride along on the 12th (of a total order of 72) new NSW RIB built by United States Marine Inc. (New Orleans). The 36 x 10.5 ft. (11 x 3.2 m) vessels are designed to transport a fully equipped team of eight Navy SEALs and three crew on short-range insertion and extraction missions, in a low to medium-threat environment. The boats replace a variety of 24 to 33-ft. (7.3 to 10-m) vessels used by Special Boat Units since 1987

From The Hull Up

While the NSW RIBs feature the latest in outfitting and equipment technology, the basis for the vessel's performance is a proven hull design from United States Marine. The hull is a deep V composite fiberglass design constructed of vinylester resin reinforced with Kevlar aramid fibers. The rigid hull gains added buoyancy and tendering from an inflatable sponson manufactured by Demaree Inflatable Boats (Friendsville, Md.).

The hull and inflatable sponsons provide for an incredibly smooth ride, particularly on rough waters. As **Chris Bukosky**, the deputy program manager (and our "captain" for the day) explained, the hulls can absorb a 30G shock, with only 4G felt on the occupant's feet.

United States Marine specializes in custom mixed vinylester

and epoxy resins used with Kevlar, carbon fiber and other advanced materials. It takes United States Marine 70 days to produce one boat (at any one time there are five to six boats being built simultaneously), and much of that time is consumed with ensuring the hull is coated correctly.

The 72-vessel order for United States Marine is actually a unique one, not only because of its size, but because it allows the manufacturer to take advantage of the benefits of series production. Mr. **Bukosky** said one of the lessons learned thus far along on the project is to "take as much of the manufacturing as possible off of the hull, until the last moment."

This means the facility utilizes the full benefits of modular construction.

But as **Tom Dreyfus** from United States Marine pointed out, the yard has built its business and reputation on its ability to take an idea and produce a cost-effective product in a relatively short time. "Our forte is special projects. On one project, we took an initial thought to a final product in one year," he said.

Military work accounts for 90 percent of United States Marine's business, and surprisingly, in the era of slashed military budgets and commercial diversification, the yard is very pleased to keep this ratio.

"We're geared to the military business, and that gives us advantage over others," said Mr. **Dreyfus**.

The company's clout is evident in its new development projects. To bid on new projects cost effectively, United States Marine enlists the help of its key suppliers, particularly on the propulsion side, to donate equipment for the prototype with the possibility of garnering the benefits of a big, long-term contracts, such as the NSW RIB project.

Dressed For Success

The NSW RIB series is powered

by a pair of Caterpillar 3126 turbocharged diesel engines. The engines each provide 470 hp, for a combined 940 hp per vessel. The tremendous amount of power for this size of boat may seem excessive, but in view of its mission — to carry 11 people and 3,200 lbs. of cargo at a top speed of more than 45 knots — the outfitting is understandable.

The engines are coupled to Kamewa FF280 water jets through ZF reduction gears. The boat's navigation suite consists of Furuno radar, GPS and depthfinder, ICOM VHF and a Ritchie compass.

Using the Cat 3126 to start, there were a series of fuel systems and timing adjustments to meet the performance specifications in terms of speed, acceleration range and reliability requirements. This was all accomplished using Caterpillar off-the-shelf parts, a key factor in ensuring that the engines could be supported by Caterpillar's worldwide dealer network.

One of the key suppliers which helped garner United States Marine the contract to build the NSW RIB project was the hull's tubes, supplied by Demaree Inflatable Boats (DIB).

DIB was founded by owner **Dave Demaree** more than 15 years ago, and including related work, Demaree has been in the inflatables business since 1973. DIB is supplying 11 sets of tubes for every six boats, which includes spares. DIB's unique tube attachment system allows the tubes to be changed out from the front and back, in just 20 minutes.

Prior to this contract, DIB had earned some military work, but the brunt of its business in the production of whitewater business.

The NSW RIB boats have not simply caught the eye of United States Special Operation Command (USSOCOM) and industry trade publications. United States Marine and all sub-suppliers in the project were recently honored at the Pentagon for work on the NSW RIB, as it was the recipient of the 1998 David Packard Excellence in Acquisition Award in the category of Test and Evaluation.

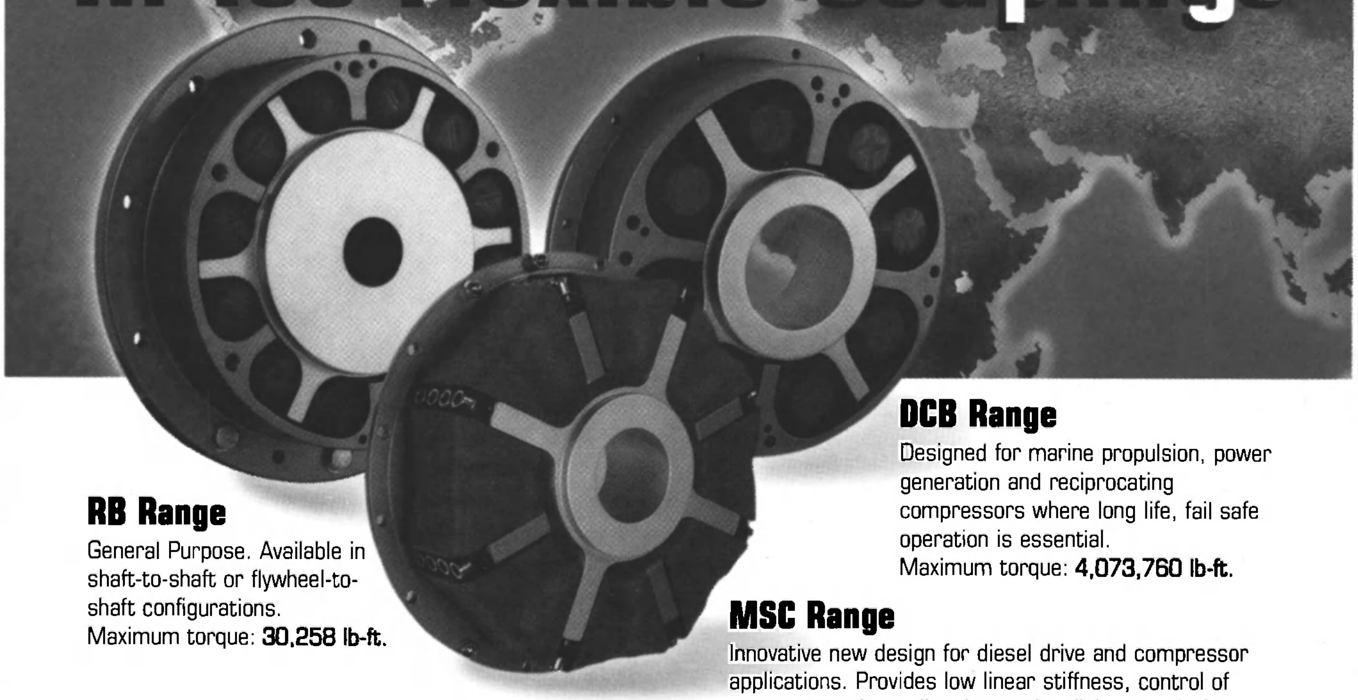
"It is an honor to share with the NSW RIB Program Office being chosen to receive the Packard Award," said **Larry Ellis**, president of United States Marine Inc. The ceremony took place in early May in the Pentagon Courtyard.

The award was named in honor of the late **David Packard**, a former deputy secretary of defense during the Nixon administration. Packard was the founder and chairman of Hewlett-Packard Co., and chairman of the Presidential Commission on Defense Management.

The NSW RIB program encompasses an order for 72 boats, 12 of which have been delivered. The entire program — as currently procured — is slated for completion in 2001.

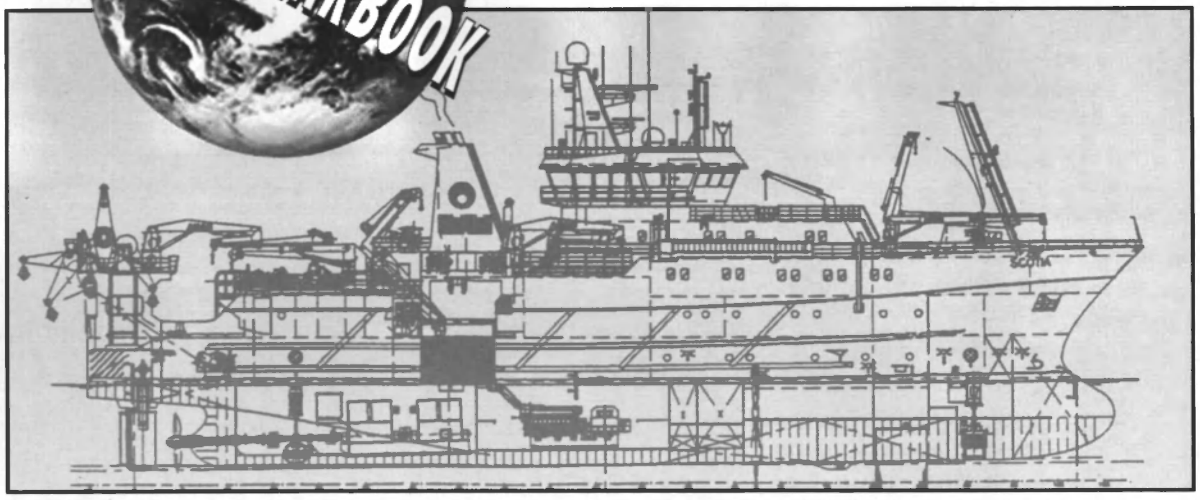
For more information from the following companies referenced in this story, please circle the appropriate number on the Reader Service Card in this edition:

Caterpillar 27
Demaree Inflatable Boats 28
Kamewa 29
United States Marine 30



WORLD YEARBOOK

Ferguson Wins Order For Fishery Research Vessel



The Scottish Office of Agriculture, Environment and Fisheries Department has ordered a single screw diesel electric fishery research vessel from Ferguson Schipbuilders, Ltd. Dubbed *Scotia*, the vessel was designed by Skipsteknisk AS for worldwide service and combines the essential features of modern hydrographic research ships with those of a sophisticated marine trawler.

The vessel's navigation outfit includes one Furuno FAR2835 radar and one Furuno FR2110/6/5 radar, one Decca Navigator and Loran C Receiver system, two differential GPS satellite receiver, two video/radar plotters, two Robertson RGC11 gyro compasses and one Lilley & Gillie Setreline Mk X magnetic compass. *Scotia* is fitted with five electro-hydraulic Aukra deck cranes, complete with remote control faciltities for the handling of deck and research equipment. In addition, a large and complex, low pressure hydraulic system is fitted, comprising eight Allweiler screw type pumps ranging from 30 to 150 kW and powering 16 winches of four to 34-ton-pull.

The vessel's sonar outfit includes two deepwater echosounders with four transducers, a retractable long-range sonar, a retractable short-range sonar, a multi-beam echo sounder system, four net monitoring systems, two acoustic doppler current provilers and a navigation echo sounder. *Scotia* is powered by a diesel electric system comprised of three Wartsila 9L20 alternator sets, each producing 1,485 kW at 1,000 rpm. Aft of the engine room are two 1,500 kW DC propulsion motors driving a LIPS five-bladed fixed pitch propeller, designed for silent running at 11 knots.

Circle 39 on Reader Service Card

Scotia Main Particulars	
Length, o.a.	225 ft. (68.6 m)
Length, b.p.	200 ft. (61.2 m)
Breadth, molded	49.2 ft. (15 m)
Depth, molded	28.2 ft. (8.6 m)
Draft, loaded	18 ft. (5.5 m)
DWT	850 tons
Gross tonnage	2,619
Service speed	13 knots
Diesel engines	Wartsila NSD
Stern thruster	Brunvoll AS
Pipework installation	BRM Engineering
Bow thrust unit	Elliot Turbomachinery
Radars/Sonar	Furuno
Stablizing system	Intering
Paint materials	International Paint
Classification	Lloyd's Register
Fixed pitch propeller	Lips
Nautical instruments	Lilley & Gillie
Windows/sideshoots	Wingerden B.V.
Deck machinery	Ulstein Brattvaag
Firefighting systems	Wormald
Rescue boat/liferaft davits	Welin Lambie

DnV Reports On FastShip Technology

FastShip, Inc. took a big step toward the establishment of its high-speed transatlantic ocean shipping service. Det Norske Veritas (DnV), the Oslo-based ship classification society, issued its initial report on FastShip's plans to construct a fleet of ships based on the merging of a unique hull design with a gas turbine propulsion system that will allow transatlantic crossings in less than four days at average speeds between 35 and 40 knots.

The DNV report — Structural Design Review (SDR) — concluded that new high-speed ships, using the patented FastShip technology, are feasible.

The ships will be capable of operating at the high-speeds under severe ocean conditions.

The company plans to offer seven-day, door-to-door, ocean-based shipping services between Philadelphia and Europe.

This approval of the FastShip design team's four-year effort is critical to the future of the emerging Philadelphia-based company. From a technical standpoint, it will allow FastShip, Inc. to proceed with negotiations with shipbuilders, enter into negotiations for financing for ship construction and operations, and establish the basis for ship warranties and insurance for the new ship design and construction.

DNV evaluated the FastShip design calculations under more than 6,000 different loading scenarios. DNV examined the speed of the ship and the effect of a variety of ocean conditions on the hull, bulkheads, cargo decks, pillars, doors, spray rails and transom areas.

Final approval will come after the construction of the ship and successful sea trials.

DNV concluded that a FastShip would be able to maintain speeds up to 40 knots even in extreme ocean conditions where it would often be required to confront waves up to an average of 7.5 meters. David Giles, FastShip's technical director and chief designer, patented the FastShip design in 1989.

Botnica

A multi-purpose ice-breaker from Aker Finnyards

The third in a series of multi-purpose icebreakers, the 2,850-dwt *Botnica*, has been delivered by Finland's Aker Finnyards, Rauma to the Finnish Maritime Administration (FMA), after being built in a record time of just 13 months.

The main difference between Botnica and its two predecessors, Fennica and Nordica, is its propulsion method.

Both the previous ships used Wartsila medium speed diesels as the main propulsion plant. The FMA decided on a diesel electric plant for the *Botnica,* which comprises six packages of twin Caterpillar 3512B units, giving a total output for the 12 engines of 15 MW, connected to six ABB generators driving two 5 MW Azipod thrusters.

The vessel will be utilized by Norway's NSND Offshore for the summer months under a seven-year charter, which has options for extensions. This year it will operate under a contract with Saga Petroleum on well-intervention duties on the Vigdis Field in the Norwegian sector of the North Sea and a 10 day research contract in the Voring Sea, which was recently opened in the 15th round of Norwegian licenses.

For the winter season *Botnica* will operate as an icebreaker in the southern Finnish area, replacing Hansa, which had been chartered in from Germany for the past few years. The FMA operate a fleet of nine icebreakers, with the expectation that the two oldest vessels in the fleet, *Voima,* which was built in 1954 and modernized in 1979, and Apu (1970), will be replaced during the early part of the next century. Up to 80 percent of the Finnish export/import trade uses sea ports and 50 percent of this total is during the winter months. Trade has increased over the past few years, 23,000 ship calls were registered in 1997 compared with 19,000 during 1986.

Main propulsion

The six Caterpillar 'engine-generator-engine' packages that are providing diesel electric power for the *Botnica*, are a key feature of the new concept vessel. Six packages of twin Caterpillar V12, four stroke, 51.8 liter 3512B electronic engines connected to each end of an ABB generator that powers a Megastar Controlled Azipod Drive system, provide a 12 engine (six generator) diesel electric package that gives the new concept vessel some 10MW of usable power for propulsion and an all year round deployment potential in what is the first marine application in the world for this kind of engine generator system.

The power package is part of a revolutionary concept designed by senior engineers and naval architects at the FMA. The classic icebreaker action of riding up on the ice before slamming down in a dynamic side to side motion, is well proven but is a hull induced action that tends to make the vessel extremely uncomfortable and relatively unstable in open water, which is why most icebreakers are laid up for eight months of the year.

The excellent sea keeping and stability required from a satellite controlled, dynamic positioned exploration drilling vessel would therefore seem to be at the diametrically opposite end of the scale as far as hull design is concerned.

Yet the revolutionary new package developed and patented by the FMA has achieved vessel performance that improves on the best icebreakers currently in service and delivers the outstanding stability and triple redundancy (DP3) required of an exploration drilling vessel.

The highly flexible power package produced by the Caterpillar engines and ABB generator system means that the vessel can use the maximum 10MW power needed for a front line icebreaker without the economic and environmental downside of running a massive slow speed engine at virtually idle power for offshore standby or positioning duties.

Arjo Harjula, Chief Naval Architect at the FMA explains the principals behind the new concept vessel: "The classic icebreaker generates its performance from the fore section of the hull while the offshore vessel is exceptionally stable because of the aft characteristics of its hull. We have combined these elements and added some new features in the new hull design as well as installing stability tanks. The result is outstanding.

"The propulsion package is also a key element. This multi-function vessel would not be efficient with any other type of power system and I am delighted that Caterpillar, its Finnish dealer Wihuri Oy Power Products and ABB have worked together to produce a package that ideally meets our needs in what is the first marine application of this type in the world. The azipod drive system also brings additional benefits to the icebreaking operation because the thrusters can be used to create a propeller wave that pushes the broken ice away from the vessel, creating a wider channel for the following convoy to navigate.

"We now have the design of a vessel that will be an excellent icebreaker but will not have to be laid up for eight or nine months a year because of poor open sea characteristics. This vessel is widely considered by experts in the shipping industry as being way ahead of its time and in my opinion, the future for this sector is in the use of good hull design combined with the flexibility of multiple high speed diesel

(Continued on page 100)

Caterpillar Launches New CM Series Of Engines

Marking the first release of a new engine product since its acquisition of Germany's MaK, Caterpillar has launched its all new CM Series of engines, with the introduction of the CM32 and the CM43. The engines are designed for use in a broad range of petroleum applications, including semi-submersible drill rigs, power barges, drillships, FPSOs and other equipment used for mobile offshore drilling and oil extraction. Available in both in-line (6, 8, and 9-cyl.) and V (12 and 16-cyl.) configurations, the CM32 is a long-stroke medium speed engine rated at 2,880 to 7,680 kW. The engines are capable of running cleanly on distillate or low-quality residual fuel or crude oil. The CM32 is manufactured according to ISO 9001 standards, and are designed for high reliability, low installation costs, environmental soundness, low oil consumption and top fuel economy. The in-line version of the CM32 is rated to deliver form 2,880 to 4,320 kW at 600 rpm. It features a stroke/bore ratio of 1.5. Intervals between overhauls, according to Steve Birdsall, typically range from two years (16,000 hours) to five years (40,000 hours). V versions of the CM32 engine delivers 5,530 to 7,680 kW at 720 rpm, with a stroke/bore ratio of 1.31. Mr. Birdsall said that the engine possesses excellent thermodynamic characteristics. The CM43 was released for drillship applications worldwide. Available in in-line (6, 7, 8, and 9-cyl.) and V (12, 14, 16 and 18-cyl.) configurations, the CM43 is an all-new long-stroke medium speed engine with a 430mm bore. The CM43 will be manufactured in Kiel, and production is slated to begin in 1999. The in-line version of the CM43 are rated to deliver power in a range form 5,400 to 8,100 kW at 500 rpm. V version are designed to deliver 10,800 to 16,200 kW at 500 rpm. The engines have a stroke/bore ratio of 1.48 and are designed to possess excellent thermodynamic characteristics required for crude and residual low-grade fuels.

Circle 38 on Reader Service Card

CM32 In-Line Engine Data

Number of Cylinders	6,8,9
Bore	320mm
Stroke	480mm
Cylinder rating	480kW
Speed	600 rpm
Mean piston speed	9.6 m/s
BMEP	24.9 bar
Pmax	190 bar
Engine rating	
6-cyl.	2,880 kW
8-cyl.	3,840 kW
9-cyl.	4,320 kW

The Caterpillar CM43 engine was designed for drillship applications.

GL Sponsors Double Hull Crash Test

The value of double hull construction, mandated following two high-profile shipping accidents, was under study recently by the German ship classification society Germanischer Lloyd (GL). A collision test was orchestrated between two inland waterway tankers, vessels which were originally intended for scrapping but were instead spared and prepared for these unique trials.

The test section was modeled on a 40,000 dwt tanker, scaled down to 1:3. The ramming bow, also reduced to the 1:3 scale, corresponds to the bulbous bow of a 40,000 ton vessel. It was set to hit the test model at a speed of about six knots at the middle transverse, and to penetrate the outer and inner skin if possible.

Detailed results of the crash, held in late April, were still not available at press time. The conclusions will be covered in the earliest possible edition of MR/EN.

Circle 37 on Reader Service Card

HDW Buys MaK Engines For Novel Ships

Germany's HDW placed an order with MaK for genset engines to be installed on a pair of reefer-container ships. The ship class is a new development for the Dole Food Company, and will have a capacity of approximately 1,000 40-ft. refrigerated containers, making them the largest reefers in the world in terms of refrigerated hold. To cover the electric power requirement for the refrigerated containers, each ship will have five M32 diesel generator sets, which will offer a total power output of 17.3 MW.

Circle 33 on Reader Service Card

Guido Perla Provides Design For Crowley Tugs

Guido Perla and Assoc. (GPA) has completed the design and complete detail modular construction engineering for Crowley Maritime Corp.'s series of Voith Schneider Harbor Class tractor tugs. The vessels will measure 105 ft. (32 m) and are powered by a pair of Caterpillar 3516B diesel engines, each rated at 2,400 bhp at 1,785 rpm. The powerplants drive Voith Schneider 28GII/210 propulsion units coupled with Falk 1.828:1 reduction gearboxes. GPA's overall responsibilities included initial vessel design in conjunction with Crowley subsidiary Vessel Management Services and Voith Schneider engineers. Included in the complete engineering package were the structural, mechanical and electrical systems, together with modular construction engineering and detail design drawings.

Circle 31 on Reader Service Card

Litton Offers Wireless Remote Display For VTS

Litton Marine Systems introduced Tele-Master, a new wireless remote display system for the transmission of real-time radar images from vessel traffic monitoring stations to ships underway. The Tele-Master portable VTS display was developed by Litton Marine's INA division in Rotterdam as an option available with the VTS-Master vessel traffic system.

The Tele-Master system transmits the radar images and other navigation information from the shoreside VTS-Master station to the remote PC using an open data protocol. The data transmission can be via GSM phone, VHF radio or other wireless media.

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Botnica

(Continued from page 97)

engines which are lighter and much more flexible than alternative solutions."

By employing a 92 percent efficient diesel electric system and housing the propulsion motors in the azipod units themselves, the significant weight, space and maintenance penalties associated with larger, slower speed engines, gearboxes and drive shaft systems are eliminated. This multi-pack approach also means that the vessel has two, fully watertight and fully capable engine rooms which is a much safer and a much more balanced approach as well. Caterpillar won the contract against tough competition from a number of other engine manufacturers, none of whom however were recommending a multi-engine diesel electric system. According to Mr. Harjula, price was a significant factor, as well the fact that the FMA has had good experience in using Caterpillar engines on other pilot, passenger, cargo and safety vessels around Finland. The FMA has also received outstanding support service from Wihuri Oy Power Products, which is vital in a country which depends so heavily on its maritime industries.

Circle 21 on Reader Service Card

Botnica Main Particulars

Length	317 ft. (96.7 m)
Breadth, molded	78.7 ft. (24 m)
Draft (icebreaker)	23.6 ft. (7.2 m)
Draft (offshore)	27.8 ft. (8.5 m)
DWT (icebreaker)	1,000 tons
DWT (offshore)	2,850 tons
Main engines	Caterpillar 3512
Engine output	15MW
Propulsion	(2) 5 MW Azipod
Speed	
open water	15 knots
.6 m ice	8 knots
1.2 m ice	4 knots
Bollard pull	105 tons
Free deck area	1,000 sq. m.
Deck crane	120 tons
Classification	DNV
Steel plate	Rautaruukki
Compound plates	Creusot-Loire
Paints	International
Cathodic protection	Savcor
Deck and Service cranes	Hydromega
Anchor and Mooring winches, capstans	Aquamaster Rauma
Towing winch	Aquamaster Rauma
Life and Rescue boats	Fassmer
Davits/Life and Rescue boats & rafts	Davit International
Life rafts	Viking
Watertight bulkhead doors	Tebul
Sliding fire doors	Saajos
Person lift	MacGregor
Proviant lift	Norent
Helideck	Marine Aluminum
Central vacuum cleaner system	Protekno-Puzair
AC/Ventilation	Kojo
Refrigeration machinery	Bitzer
Kitchen	Fonsen
WC Units	Parma Metals
Laundry equipment	Miele
Windows (general spaces)	Dalmas
Windows (bridges)	THT Rokenne
A60 windows	Teamtec
Main generators	ABB
Azimuth thrusters	Azipod
Electric propulsion system	ABB
Emergency genset	Caterpillar
Purifier Units	Alfa Laval
Hot water boiler	Aalborg Industri
Centrifugal pump	Iron
Screw pumps	Allweiler
Plate heat exchangers	APV
Starting air compressors	Sperre
Working air compressors	Atlas Copco
CO2 fire extinguishing system	Heien-Larsen
Sewage plant	Format
Vacuum WC system	Evac
Fresh water generator	Alfa Laval
Incinerator	Teamtec
Tunnel thrusters	Brunvoll
Stabilizer/anti-heeling	Intering
Electric switchboards	ABB Palko
SPS	Kongsberg Simrad
Frequency converters	Hitzinger
Uninterruptable power systems	Exide Electronics
Lightning transformers	Muuntolaite
Lighting fittings	Glamox
Navigation system	Kongsberg Norcontrol
Searchlights	Norselight
Navigation lights	Aqua Signal
Automatic telephone system	Hedengren/Matra
UHF Basestation system	Motorola/Hedengren
Wireless telephone system	Ascom Tateco
Central antenna system	Naval
Fire and Gas detection	Salwico
Radar	Kelvin Hughes/Norcontrol
Compass	Anschutz
Speed log	Consilium Marine
Echo sounder	Skipper
DGPS	Trimble
Loran-C	Furuno
Whistles	Kockum Sonics
Radio communication system	SP Radio
Sat/Com system	Nera/Thrane & Throne

VESSEL FOCUS: CONTAINERSHIPS

Sea-Land: Dancing To The Beat Of Its Own Drummer

Leading containershipping company completes technologically challenging "shortening" of ships

Sea-Land Service, Inc. has a reputation for innovation, a reputation which was recently proven in the quest to meet a competitive challenge through the ingenious modification of existing ships, coupled with a recently-completed newbuilding program.

In the maritime industry, it is fairly commonplace to make a ship bigger so that it may better serve a growing market. It is highly unusual to make one smaller for that same purpose. And it is even more unusual to do so at a time when the competition is addressing that same purpose by building ever bigger ships of ever-greater capacities.

Nonetheless, one of the world's largest container carriers, Sea-Land Service, has done just that. It has met a competitive challenge by taking three large ships and shrinking them.

The large ships were part of Sea-Land's 12-vessel Atlantic class. These were 4,354-TEU "Jumbo Econships" (known popularly as "Econships," shorthand for "economical operation"), originally built for U.S. Lines by Daewoo, and delivered in the mid-eighties. With a top service speed of just 18 knots, they proved uncompetitive in the eastbound around-the-world service for which they were built. USL went out of business in 1986. The ships were purchased by Sea-Land two years later and assigned to the North Atlantic trade.

From the start, the ships were part of unusual strategies. "We did something opposite to what you would normally do: we designed a service to suit the ships," says **Rod Vulovic**, vice president, Ocean Transportation Services for Sea-Land. The ships became part of a vessel sharing agreement with P&O Nedlloyd. "We needed 19-knot ships, so we decided to operate the ships at a nine-meter draft to gain the extra knot," he recalls. This strategy worked well in all but one route. So Sea-Land began to consider alternate use for the three vessels in that service. At first, the ships were considered for a Pacific service involving a line-haul vessel of 3,000 TEU and smaller feeder ships. This changed in 1993, when the need for two classes of ships for distinct services developed. The company determined that one vessel class would have a capacity of 3,600 TEU and a speed of 24 knots, the other a capacity of 2800 TEU and a speed of 21 knots.

The company sought alternatives to two newbuilding programs. Here was an opportunity to employ the Atlantic class vessels, provided the power could be boosted. More than 30 different proposals were considered. The one chosen was known as "cut and paste."

Table 1

Comparing Atlantic-class with SL-31-class

	Atlantic class	SL-31
Length (o.a.)	949 ft. (289.5 m)	856 ft. (261 m)
Length (b.p.)	915 ft. (279 m)	814.6 ft. (248.5 m)
Beam	105.6 ft. (32.2)	105.6 ft. (32.2 m)
Depth	70.5 ft. (21.5 m)	70.5 ft. (21.5 m)
Draft, design	35 ft. (10.7 m) (as Econships)	32.8 ft. (10 m)
Draft, load line	38.4 ft. (11.7 m)	38.4 ft. (11.6 m)
Speed, design draft, kt.	19.1 (18 as Econships)	21
Speed, load line draft, kt	18	20.4
Power, kW	20,588	25,388
DWT	56,480	46,987
GT	57,075	47,667
Total container capacity	4,354	3,918
Deck containers	1,890	1,934
Hold containers	2,464	1,984
Reefer	146	146

Boosting the power of the ships would require building a new engine room and stern, with the result that three perfectly good stern sections less than 10 years old, whose only fault was that they were underpowered, would be wasted. So the idea came up to build new forebodies for the old sterns, and create six new ships from the three old ones.

"We contacted many shipyards, and received many proposals regarding the costs of forebodies, aftbodies, and re-joining. We excited many yards to think creatively," says Mr. **Vulovic**.

One yard so inspired was the Blohm + Voss shipyard of Hamburg, Germany, which appeared with a striking alternative. The builder proposed to cut three hatches from the large ships, subcontract the building of a series of smaller, new ships, and insert the excised sections into the new vessels. The newbuilding part of the plan was determined to be commercially impractical, but the reconstruction remained attractive, especially as its delivery timetable was shorter than that of a newbuilding.

"Along the way we determined that the big fast ship built from the Atlantic class would be too expensive to operate, because to reach 24 knots using the fairly blunt forebody of the ECON design would require a 12-cylinder engine."

The story took another turn when newbuilding prices hit a momentary trough, and IHI appeared with an attractive newbuilding proposal. "After speaking with IHI we realized that we could reach 24 knots using a new ship with only a nine-cylinder engine, because its hull lines would be designed to minimize power requirements," adds Mr. **Vulovic**. "The newbuild price was competitive with the cut-and-paste costs. That is how the ideas developed to modify the existing ships into 21-knot, 2,800-TEU vessels, and to build the Champion class.

So the simultaneous challenge was met by shrinking three of the larger Atlantic class ships to create the new SL-31 class of 3,918-TEU vessels for the European service, and contracting for a series of newbuildings, designated the Champion class, for the Pacific route.

"Because the Econships were so huge to start with, even after removing the midbody, the SL-31s ended up as 3,900 — instead of 2,800-TEU ships, giving lots of spare capacity," says Mr. **Vulovic**. Even so, market opportunities changed once more during the construction projects, requiring SeaLand to shift strategy yet again.

The challenge came in the form of obligations to a new joint venture with the Danish shipping giant, Maersk, for a new pendulum service the long way round from the U.S. west coast to the U.S. east coast, to be called the Suez Express. The service involved 14-week trips, demanding 14 ships in all, seven from each partner. Being involved in an ongoing newbuilding project enabled Sea-Land to supply ships to meet these needs.

So, over the years, Sea-Land exercised and augmented contract options and grew the Champion class from an initial four ship series into a nine-vessel family. In the end, the decision to "downsize" the larger ships, which proved to be the catalyst in committing to the design and construction of the Champion ships, proved a sound one. The conversion was a long process of design, testing, experimentation and redesign. It also demonstrated the power of cooperation between shipowner, shipyard, design agents, the classification society (ABS), equipment suppliers, and regulatory bodies. And in that, is a valuable example for the entire industry.

Table 2

Champion class at-a-glance

Length (o.a.)	958.6 ft. (292.2 m)
Length (b.p.)	895.6 ft. (273 m)
Beam	105.6 ft. (32.2 m)
Depth	70 ft. (21.2 m)
Draft, design	38 ft. (11.5 m)
Draft, load line	42.6 ft. (13 m)
Speed, design draft, kt.	24.4
Speed, load line draft, kt.	—
Power, kW	36,470
DWT	48,260
GT	49,985
Total container capacity	4,062
Deck containers	2,121
Hold containers	1,941
Reefer	350

Cooperation a key to success

Blohm + Voss began by addressing the problem of redesigning the ships' lines. The builder set about proving it could achieve an increase in speed without requiring a whole new forebody. In the end, modifications resulted in what is nearly a three-knot boost in speed, when the new and old ships are compared at the same draft. The yard undertook a series of model tests at the HSVA model basin in Hamburg, confirming the results with hydrodynamic and computational aerodynamic calculations. These showed that modifications to the bow of the vessel could lead to a significant improvement in speed. Close contact between Sea-Land, the engine supplier (Sulzer), the propeller supplier (KaMeWa) and ABS resolved propulsion and vibration questions quickly. Likewise, cooperation between these suppliers and B+V began to yield results in the continuing speed-increase studies. Ultimately, the power savings achieved through a redesign of the lines, removal of the midbody, and the incorporation of a more efficient propeller fell just short of the required goals, so a small booster engine was added. Reversing the common idea of power take-off, to create a power booster, was yet another of this project's inventive solutions.

It was determined that, by using a complex electronic control system and an electric motor driven by a diesel engine, sufficient power could be delivered to the shaft. Fortunately, the stern tube could accommodate a stronger shaft. But even more fortunately, there was a vast open space just above the engine room where the booster power plant could be installed. Three decks high, the space was designed for special cargo, and indeed once had been used to carry the animals for a traveling circus. It became the supplementary engine room.

The last step in the conversion project would be securing plan approval in time, which, considering the complexity and uniqueness of the project, was a source of concern at Sea-Land. The time-line was considerably shortened by cooperation between the U.S. Coast Guard Marine Safety Center, B+V, ABS and Sea-Land, using what they called the "Tiger Team" approach.

Representatives of these groups, along with the major equipment suppliers, met at ABS headquarters in Houston. With ABS carrying out most of the approvals on behalf of the USCG, and Sea-Land making design changes on a CAD system it had installed on ABS premises, the bulk of the initial plan approvals were completed within a week.

Comparison shopping for ships

Long before the SL-31 project, Sea-Land was known for its innovative ships. The SL-7 series, history's fastest containerships, is the high point in the company's design tradition. When R.J. Reynolds purchased Sea-Land in the early 1970s, the nine-ship program to build the SL-7s had just begun. As it was full of technical advances, the realization of this advanced vessel design was an immensely expensive endeavor. So Reynolds representatives naturally wanted to examine the technical and financial studies that determined the need for the ships. As the story goes, they requested to see capital authorization for the project and were handed the following: a single 8-½ x 11-inch piece of paper bearing a sketch of the SL-7, a list of primary characteristics, and the signature of company founder Malcom McLean accompanied by the words "Buy nine."

Things have changed a great deal since then. In September 1997 Sea-Land completed another nine-ship building program, known as the Champion class, when it took delivery of the last ship from Japan's IHI.

This series took a different route to existence. From Sea-Land's various revenue divisions came a set of requirements matched with projections for expanding service. The division planners determined the number and type of boxes to be carried, the average weight per box, and the desired speed of the vessels. The technical division's job was to put the figures into physical reality.

The increase in the number of ships to nine vessels illustrates the changing nature of the containership industry, from individual competition to competition amidst alliances. Originally, Sea-Land's planners determined a need for four ships in a two-stop trans-Pacific service. As market opportunities emerged, the company added two ports to that service and, in order to maintain weekly sailings — timeliness being the cornerstone of success in the container shipping industry — added a fifth ship to the plan.

The last twist in the planning story came when Sea-Land and the Danish operator Maersk formed an alliance, and together initiated what almost amounts to an around-the-world service — from the west coast of the U.S. to the east coast, via the Suez Canal. A 14-week trip, it requires the participants to each supply seven vessels. Surveying all its complex options, Sea-Land upped its newbuilding commitments to nine ships.

These changing business strategies, in their translation to actual ships, had to be backed up by technical strategies at each step of their evolution. Much of that job fell to **Hans Nilsen**, Manager, New Construction and Conversions.

"Essentially, it's our job to consider anything. It all comes down to the best balance of price and expected quality," said Mr. **Nilsen**. Even when Sea-Land was considering adding four ships to its original five-ship program at IHI, it looked around at bids from other yards. "Even though we went back to IHI, the fact that we were happy with the ships did not make it a done deal, you still have to do your comparison shopping."

One container industry observer is former ABS Chairman **Richard Soper**, who had been Executive Vice-President of Sea-Land until joining ABS in 1986. Still active as an industry consultant, he notes that decision-making processes have not changed much since his time at Sea-Land. "Normally when someone says 'we want a bigger ship,' which is what most people say, he is just looking at economies of scale, whereas for many reasons it may not be the wisest thing to have a bigger ship. You have to look at the application of the ship to its trade and the potential in that trade. Sea-Land's got good people. They analyze this to the last lamb chop and bag of soap. Good people who really know how to analyze it all are very, very valuable to a company."

Also valuable to a company is the ability to remain responsive to changing market conditions, a necessary flexibility which grows increasingly difficult as a company accumulates layers of management. The ability to forecast beyond the lag time required by the internal decision process is, then, even more valuable.

No one at Sea-Land could have foretold, back in 1990, that they would end up with a single-class building program greater in scope than the two separate programs they were initially considering. The successes of the SL-31 and Champion programs demonstrate perseverance.

But, more than anything, they demonstrate some of the techniques necessary for survival in the changing world of container shipping.

The preceding was excerpted, with permission, from ABS' house magazine* Surveyor. *For additional information on the American Bureau of Shipping,

Circle 20 on Reader Service Card

Leica Initiates International Strategy

Leica GPS has announced three appointments to its marine GPS sales force, in a move to provide better support to its international dealer network and customers. **Stuart Tolman** has been named Marine Sales manger for the U.S. market, and has established a new sales office in Fort Lauderdale, Fla. Mr. **Tolman** was previously Sales manager of Leica's Torrance, Calif., office.

Peter Devantier has been appointed Marine Sales manager for the European market. He will operate out of Copenhagen. Mr. **Devantier** was previously a Sales manager for Litton Marine Systems.

Matthew Smith will handle marine GPS sales for Southeast Asia from Leica's office in Singapore, in addition to his existing responsibility for survey products in the same territory. He previously worked in Leica's Australia and Malaysia offices. The objective of this restructuring is to enable the company to provide direct sales support within key regional time zones.

International Registries Appoints New President


Charles H. Baumann

Brigadier General (Ret.) **Charles H. Baumann** has been appointed president and COO of International Registries, Inc., the administrator of the maritime and corporate programs of the Republic of Liberia and the Republic of the Marshall Islands. Mr. **Baumann** was previously the executive vice president and general manager of the International Trust Company of Liberia.

BMT Acquires SMS

Scientific Marine Services, Inc. (SMS) has been acquired by international research and technology organization British Maritime Technology Ltd. (BMT), as announced at the recent Offshore Technology Conference (OTC) in Houston, Texas. According to SMS Chairman **Frank DeBord**, no changes have been planned of yet in regard to SMS management or operations, and the company will continue to operate out of its offices in Escondido, Calif. and Houston, Texas.

Frontline And OMI Form Chartering Company

Frontline Ltd. and OMI Corp. have formed Alliance Chartering LLC, which will handle the chartering of both companies' Suezmax fleets. "The charting of the fleets, including three vessels being delivered to each company this summer, presents opportunities to reduce overhead costs for both companies and to offer a more efficient and flexible service to our customers," said **John Frederiksen**, Frontline CEO. The new chartering company will initially commercially manage a fleet of 26 Suezmax tankers and OBOs. In addition, the companies have 10 newbuildings on order.

American Marine Coatings Teams Up With Blair-Pacific

Anti-fouling barrier coating manufacturer American Marine Coatings, Inc. has aligned with Blair-Pacigic Marine Co., a national representative of "green" marine products.

RINA Awards V.Ships ISM And SMC Certification

V. Ships Marine, Ltd., a full-service international marine transportation management and operations organization, has received ISM DOC and SMC certification from RINA. "We are ahead of both our internal schedule for receiving safety management certificates and the mandatory July 1, 1998 deadline for tanker, bulk carrier and passenger vessel compliance," said V. Ships Vice President of Safety and Quality **David Walton**.

Global Marine Announces Key Management Changes

Robert E. Rose has been elected President and CEO of Global Marine Inc. by the company's Board of Directors, as **John G. Ryan** has resigned as the company's president and COO. In addition, **Jon A. Marshall** has been named vice president and COO, **Marion M. Woolie** will become president of Global Marine Drilling Co., and **Gary L. Kott** will become president of Global Marine's international drilling subsidiary.

Boots & Coots To Acquire Baylor Co.

Boots & Coots International Well Control Inc., provider of global prevention and emergency response well control services to the oil and gas industry, has reached an agreement to acquire Baylor Co., a manufacturer of products for industrial, commercial oil and gas services. Prudential Securities Inc. has been retained by Booots & Coots as investment banking advisor for the transaction. This acquisition is the latest in a series that in total boost Boots & Coots revenues by approximately $90 million, according to company CEO **Larry Ramming**.

JMS Elects New President

The Board of Directors of Jamestown Marine Services (JMS) has elected Capt. **Jack Ringleberg** as president. **Bruce Banks**, JMS founder and former president, will now serve as chairman. Capt. **Ringleberg** has more than 30 years of experience in the marine industry as a naval architect and marine engineer.

Hornblower Welcomes Decorated USCG Officer

Hornblower Marine Services has announced that Capt. **Stephan A. Mort** has joined the firm as a Special Projects manager, after recently retiring from the U.S. Coast Guard (USCG). In his new position, Capt. **Mort** will specialize in developing unique training programs, emergency shipboard procedures and plans and station bills required by the USCG. Upon joining Hornblower, he drafted the Nation's first high-speed ferry Safety and Training Manual, Route Operations Manual, Vessel Operating Manual and Station Bill, required by the IMO and USCG for Hornblower-operated *Sassacus*.

During his 20-year career with the USCG, Capt. **Mort** was awarded a Congressional Achievement Award and three USCG Achievement Medals for past superlative performance of duties. He provided guiding oversight and direction to the Ninth District's Waterways and Management Branch Federal Projects team, supervised the review of several hundred critical waterways on the Great Lakes and implemented changes to many of the aids of navigation relied upon by deep draft, ocean-going and lake-bound cargo and passenger vessels.

Southern Vectis Carries Out Growth Strategy

Isle of Wight-based Southern Vectis plc has appointed **Albert Brown** as Corporate Development director with special responsibility for strategic developments including mergers and acquisitions. Mr. **Brown** has served on the company's main board and also as managing director of the company's environmental technology business Vikom International. Succeeding Mr. **Brown** at Vikoma International is **Glyn Humphries**.

MMS Names Holl COO

Randall Holl

Marine Management Systems, Inc. (MMS) has appointed **Randall Holl** as COO. In addition to his appointment, Mr. **Holl** will also serve as manager of the company's Fleet Manager Enterprise line of business, a newly created profit center at MMS. Mr. **Holl** previously held the position of vice president of Development at MMS.

James Marine Names Calloni New Agent

James Marine Services Ltd. has appointed Marine Industrial Representative and Consultant **Niclo Calloni** as its Italian agent. Mr. **Calloni** has more than 30 years experience in the shipping industry, including work for Alfa Laval and Soteco. As James Marine's agent, his primary role will be to strengthen and expand the company's client base throughout Italy by marketing the company's products and services, specifically marine spare parts and equipment.

National Navigation Receives ISM Certificates

Patrick O'Ferral, chairman of Lloyd's Register (LR) recently presented ISM Code compliance certificates to the National Navigation Company of Egypt. The certificates included 12 Safety Management Certificates (SMCs) for its fleet of 11 ships, and a Document of Compliance (DOC) for its shore-based office. All ships in the fleet are Egyptian-flagged and classed by LR.

Inmarsat Members Agree To Reorganization

Inmarsat's Assembly of member governments recently agreed to amend the Convention and Operating Agreement which governs the organization. The Assembly of Parties approved the amendments as proposed by the Inmarsat Council and the Intersessional Working Group, formed to develop the privatization model and which comprises member governments, Council members and Directorate staff. The new Inmarsat structure will comprise two entities: a public limited company that will seek and initial public offering (IPO) within approximately two years of formation; and an intergovernmental structure to ensure that Inmarsat meets its public service obligations, including the Global Maritime Distress and Safety System (GMDSS) The new company will be governed by a 15-member fiduciary Board of Directors including the CEO and 14 non-executive directors, three of which will represent developing countries.

GL Names New Manager


Herman Jacobs

Herman Jacobs has been appointed as Germanishcer Lloyd's (GL) Long Beach Station manager and Area manager, West Coast.

Metra Makes Executive Moves

Ole Johansson has been appointed president of Metra Group subsidiary Wartsila NSD, effective June 1. Mr. **Johansson** formerly served as executive vice president of Metra Corp. Metra has announced plans for the demerger of the Metra Group into three new companies. This project will mean the separation of Metra's diesel engine operations into a new company, to be headed by **Pentti-Juhani Hintikka**, currently a member of Wartsila NSD's board of directors.

BV Trains Baltic Shipping Companies In ISM

Bureau Veritas (BV.) has recently extended its successful training courses in ISM Code implementation to the Baltic states. Two Baltic shipowners, the Estonia Shipping Company and the Latvian Shipping Company, were the first companies to undertake the course. **Phil Robson**, U.K. QMS manager and lead auditor for BV, said "I have had very positive feedback. Both companies appeared quite impressed with the course. They showed a real commitment to the principles of the ISM Code, and the future, which I found very encouraging."

Scurlock And Stone Join MESI

Moe Scurlock has been appointed Sales manager of

PEOPLE & COMPANY NEWS

Marine Electric Service Inc. (MESI), which has recently been acquired by CKC Electronics Corp. In addition, **Terry Stone** will become the company's new Service manager.

Ulstein Nabs Swire Design And Supply Business

Ulstein is to supply designs and equipment packages for four UT719 anchor-handling supply vessels which are to be built at Imamura Shipbuilding Co. Ltd. in Japan.

The order has been placed by Swire Pacific Offshore (SPO), a major operator of offshore vessels based in Singapore.

The first is to be handed over by Imamura in March 1999, with the others following at approximately three-month intervals.

The UT719, a new design, is a relatively small vessel which brings experience from the leading edge of offshore support technology into an established market. There has long been a general market requirement for a small combined platform supply vessel and anchor-handler, and many of these currently in operation are either nearing the end of their economic lives or are technically outdated. The UT719 has a length of about 58m, a deadweight of around 1,400 tons, and a design bollard pull of 60 tons.

Ulstein In Joint Venture To Develop New Diesel Engine

Ulstein's diesel engine division has completed agreements with Hyundai Heavy Industries to cover the manufacture of Ulstein Bergen engines in South Korea and the joint development of a new engine.

The two companies will jointly develop a new generation of diesel engines, and in the interim Hyundai will build Ulstein Bergen's existing range of 'K' and 'B' series engines under license in South Korea for both marine applications and land-based power production.

Circle 34 on Reader Service Card

LR Seeks To Boost Communications Links

Radically improving its communications with both clients and surveyors is a key objective for Lloyd's Register (LR), **Chris Wade**, managing director of LR's Marine Division, said recently.

In detailing the organizations efforts, Mr. **Wade** said "We have launched a new Ship Survey Reporting System (SSRS). The new software system will improve consistency in surveys and survey reporting, reduce reporting time, and provide the capability for fast, electronic updating, storage and retrieval of information. ClassDirect will soon provide client with direct access to survey status information via the LR Web site."

In noting the plethora of product advances, Mr. **Wade** did however say that "LR's central mission remained the same: that of constantly striving to improve ship safety."

He added that the safety of bulk carriers remained a top priority

The LR-classed fleet rose again during 1997 to 104.8 mgt (compared with 103.2 mgt in 1996) and LR maintained the largest share, 20.1 percent, of the existing fleet.

LR Updates Bulk Carrier Safety Publication

Lloyd's Register (LR) published a completely revised edition of *Bulk Carriers — An Update*, to take account of the latest international developments and requirements to enhance bulk carrier safety. The document was originally published in July 1995, followed by an updated version in January 1996.

The new version incorporates a number of additional features, including an important section on areas at risk. This describes the likely flooding scenarios resulting from failure of a bulk carrier's primary and secondary barriers, and identifies the structural areas at risk from damage that could contribute to failure of each barrier. Such damage includes cracking at hatch corners, buckling of cross-deck strips, corrosion and cracking of side shell frame end brackets, corrosion and buckling of watertight bulkheads, and grab and bulldozer damage to the inner bottom.

Circle 25 on Reader Service Card

IT In Shipping: Evolution or Revolution?

IT — information technology — is the industry "buzzword" of the late 1990s. IT is widely perceived as being at the leading edge of commercial progress and, as with many such developments, has evolved its own jargon and mystique and may become influential in intracorporate politics.

Many would argue that, in all its guises, shipping is the world's biggest industry, with, perhaps, only banking or insurance challenging this claim. Yet, in an area where leading edge technology could be vital to its progress, many shipping sectors appear to be antiquated regarding IT. More curiously, perhaps, much of the IT industry does not seem to regard the shipping industry as the important business field that it is. This, concludes Drewry in its latest briefing report, *IT in Shipping — Evolution or Revolution?* would imply that the shipping industry is unclear about what the IT sector can offer — and vice versa.

The shipping industry is in the main noted, even notorious, for its conservative approach and consequently IT engenders some reticence. Nevertheless, according to Drewry, there is a significant cross-section of experienced shipping industry interests looking to "have the situation" explained.

IT is about communication, information transmission and analysis — at high speed, in considerable volume if needed, and to a wide range of destinations simultaneously. Operationally (e.g. ship-to-shore) and commercially (e.g. owner-broker-charterer or seller-broker-buyer), communication is a more vital element of shipping business than many others. However, where IT provides advancement is its ability to allow this communication process to be interactive.

Drewry's research suggests, however, that the shipping industry may face risks if it adopts an introverted stance. The effect of doing so could well be to delight those who exploit shipping. Clearly, merely embracing IT is not the solution but, rather, Drewry suggests that the shipping industry should be looking to answer the question: Does IT offer a route by which the shipping industry can enhance its efficiency, competitive advantage, selling position, public image, attractiveness to investors, attractiveness to an educated, quality workforce and, of course, bottom line? It is a question that individual decision makers within the shipping industry have to answer — and the answer may not be straightforward.

Drewry's findings suggest that, currently, the shipping industry appears most comfortable with IT applications that surface in the operational or ship management context — satellite communications, the ability to download the contents of a shipboard computer at head office, weather routing, systems developed by classification societies, systems developed by port authorities, etc.

Where it takes a less certain position is in the commercial spheres. Drewry's conclusions are that the advantages are there but the industry may not yet be ready to grasp them.

This is a concern, as IT offers a route whereby emerging players have the vehicle that could enable them to leapfrog traditional ways.

For owners and charterers, the benefits might not seem immediately tangible — for the former, it could be information itself in a market driven by sentiment; for the latter, the possibility to develop marginal business or create new business.

IT may turn out to be the most difficult issue for shipbrokers. At one extreme, get IT right and brokers are indispensable. At the other, get it wrong and they could become extinct.

Drewry does not suggest either extreme is likely, but it does point out that the deciding factor will be quality of service — and providing a principle with a competitive advantage.

Kvaerner Unveils New FPDSO At OTC

At the recent Offshore Technology Conference (OTC) in Houston, Kvaerner Oil & Gas, together with Single Buoy Moorings (SBM), is offering a new Floating Production, Drilling, Storage and Offloading (FPDSO) concept for harsh weather environments. Kvaerner has reportedly solved one of the problems which has vexed the development of such a vessel, saying that it found a solution to problems associated with drillpipe stack-up heights on the drillfloor and the use of a derrick on top of the turret. The solution is through collaboration with SBM and in cooperation with Statoil.

The vessel has been designed as a monohull, which supports a combination of drilling, production, storage and offloading functions.

Circle 35 on Reader Service Card

Combination Traction Winch Unveiled

CE marine Products developed a "mega" combination standard drum/traction drum winch, an 825,000-lb. unit. The SMATCO 140E/750TW-3200 was ordered by Halter Marine for two vessels owned by Seacor Marine.

The combination traction winch combines the advantages of both a drum winch and a traction winch for maximum line pull in deepwater anchor handling operations. The drum winch is capable of maintaining one million pounds of line pull on the first wrap of the drum, and the traction winch can maintain up to 750,000 pounds of pull continuously along the full length of 15,000 ft. of 3.5-in. wire.

Circle 36 on Reader Service Card

Classic Basile Designed Tugs for Chabert

Port Captain **Wade Bruce** reports that Scotty Chabert's new 84 x 27 x 11.6-ft. (25.6 x 8.2 x 3.5-m) tugs will feature forward house and towing winches. Designed by naval architect **Frank Basile** of Houma, La., the boats are being built at R&S Fabricators in Lockport.

Powered by a pair of KTA38M2 engines rated at 1,200-hp driving at 1,800 rpm prop through Twin Disc model MG5301 6:1 reduction gears.

The tugs will be involved in rig towing and anchor handling.

Frank Basile has a long history in workboat design, beginning his career with Avondale Shipyard in 1947.

The Chabert tug design has its origins in a pair of 80 x 25 ft. (24.3 x 8 m) boats designed by Mr. **Basile** in the 1970s for Allied Towing out of Norfolk.(

Since then he has designed an 84 x 25-ft. (25.6 x 8-m) version, and in 1980 he designed and built at his Modern Mariner Power Inc. yard, an 84 x 27-ft. (25.6 x 8.2-m) version for St. Phillips Towing. He then built two more of the popular tugs for a paper company in Chesapeake Bay.

When **Scotty Chabert** came looking for a tug of that general size, he brought out the original pre CAD drawings and input the numbers to his computer.

Accordiong to Mr. **Chabert**, a scan won't work, so the actual design work has to be put into the CAD program. Some modifications were required to meet regulatory changes over the years, but the tug had been well designed in the first place and the new boat will have the same general appearance.

But, said Mr. **Basile**, marine engines have come a long way, and the Cummins KTA38-M2 engines going in this 2,400-hp boat are about 20 percent lighter for their hp than the engines that he was putting in the original boats of this design. This allows for increased tankage and more fuel.

At the same time the modern engine gains another 20 percent in fuel efficiency.

This means that with the 50,000 gallons of fuel that this boat can carry it will be suitable for towing to any of the Caribbean Islands although its intended work will be in the Gulf of Mexico oil patch.

The engines will turn 79-in. propellers in 80-in. kort nozzles.

Circle 63 on Reader Service Card

Millennium Bug Website Demonstrated At IMO

A new site on the World Wide Web aimed at encouraging the shipping industry to tackle its Year 2000 problem has been demonstrated at the International Maritime Organization (IMO).

The Ship2000 Web site, a joint project between Lloyd's Register (LR) and the U.K. P&I Club and supported by the TT Club, International Chamber of Shipping and BIMCO, has been designed to help increase the marine community's awareness that shipboard computer systems may malfunction because their integral clocks cannot cope with the onset of the year 2000. Visitors to the Web site can access a database of manufacturers of equipment based on the list of equipment type approved by LR and, using the contact details or e-mail hyperlinks, seek advice appropriately.

For additional, in-depth information on the project, please see *MR/EN*'s July 1998 Information technology section.

Circle 59 on Reader Service Card

Dataworks Offers New Tanker Fixtures Program

Dataworks (U.K.) Ltd. has launched a new Tanker Fixtures program. Tanker Fixtures enables owners, brokers and charterers to keep track of fixtures made under time or voyage charters. It allows the user to store permanent vessel information, and only alters data which is relevant to each individual fixture. This facility is unique to Dataworks.

"The strength of the preliminary orders shows once again that Dataworks is meeting the market's needs. We are confident that Tanker Fixtures will be as popular as Message Manager," said **Lawrence Royston**, marketing director of Dataworks.

The system, which is aimed primarily at shipbroking companies, can be incorporated into a company's existing Dataworks shipbroking system, or it can work in the Message Manager information handling system.

Special features of the system include its ability to work in any currency desired, and the use of shortcut keys to cut typing time. It automatically cross-references against previous fixtures, saving the time-consuming searches previously needed.

Circle 60 on Reader Service Card

Greece's Pateras Seeks Funds To Build Ships

In a continuing trend of utilizing high-yield bond issues to finance fleet start-ups and expansions, a dry bulk and container shipping company owned by the long-standing Greek shipowning Pateras family is seeking to make a $126 million junk bond issue to finance debt and purchase six new ships. Pacific & Atlantic Holdings Inc., which operates a fleet of Handysize bulk carriers, multipurpose and container feeder vessels, wants to use the proceeds to refinance $84 million of existing debt and use $34 million to acquire up to six additional ships.

MTIS Emerges As GMDSS Force

Marine Technical and Industrial Services Limited

(MTIS) is a new force in marine electronics to meet the shipping industry's key requirements for the manufacture, supply and service GMDSS equipment.

MTIS is a brand-new firm established by former employees of Marine Technology International Limited, following that company's abrupt closure earlier this year. According to Managing Director **James Green**, "MTIS is born out of a personal commitment to see that customers receive continuity of support and service."

Now operating from its factory site in Chatham, Kent, MTIS is providing a wide range of GMDSS equipment, ranging from individual elements, through "off the shelf" integrated consoles, to customized communications console solutions. MTIS is able to provide a wide range of experienced technical advice and support for a vessel's electrical and electronic outfit, together with the required support for the GMDSS communications systems.

"Our real objective," said Mr. **Green**, "is to be considered an integral part of the ship manager's team, rather than merely another supplier." The new company has been set up in the vital run-up period to the GMDSS fittings' deadline of Feb. 1, 1999.

Japan April Overseas Ship Orders Stable

Foreign shipbuilding orders received by Japanese shipyards in April totaled 15 vessels, or 754,151 grt, up one percent from a year earlier, the Japan Ship Exporters' Association said.

Recovery of last year's sales level marked a rebound as the first quarter of 1998 saw overseas contracts won by Japanese shipbuilders decline 45 percent from same quarter a year earlier due partly to the Asian financial crisis. Foreign orders returned to the normal level in April but business inquiries were down. April orders comprise six freighters, six bulk carriers, two crude tankers and one LPG vessel.

OMI Corp. Sells CEO Shares In Error

A trustee of the OMI Corp. 401(k) plan recently sold shares belonging to the company's CEO **Craig Stevenson**, without his knowledge. Deeming the sale misleading, the company said in a statement the sale was an error, and that the trustee was acquiring an equal number of shares to place back in Mr. **Stevenson**'s account. The company filed a form 4 statement with the U.S. Securities and Exchange Commission which reported the sale and its erroneous nature.

P&O Nedlloyd CEO To Retire

P&O Nedlloyd announced that its North American chief executive — **Christopher Rankin** — is retiring as of June 1, after 11 years in the job. Mr. **Rankin** will hand over to **Mike Seymour**, currently director Europe-Asia trades.

Mr. **Seymour** has 27 years experience with the company and has been responsible for the south Asian and Far Eastern trade regions.

Mr. **Rankin** set up P&O Containers' North American operations in 1987, and oversaw the company's entry into the Pacific market in 1996.

Turbulence Continues To Rule Asian Markets

South Korean shipbuilders reported a 45 percent fall in new contracts in the first quarter of this year

by Alan Thorpe, international editor

South Korea

According to South Korea's Korea Shipbuilding Association, shipbuilders reported a 45 percent fall in new contracts in the first quarter of this year as the country's financial crisis took hold. Orders fell to 923,150 grt from 1.69 million grt in the same period during 1997. However, in terms of numbers of vessels the decline was significantly smaller, from 25 vessels to 21.

Samsung Heavy Industries (SHI) appears to have been the most successful South Korean yard in the newbuilding market during the first quarter of 1998. The company booked orders for 12 vessels with a value of $500 million in the period. SHI is expecting second quarter contracts to reach a similar level.

One of SHI's largest recent orders is from Conoco Shipping which has ordered two Aframax tankers.

The pair of 105,000-dwt crude carriers, which are due for delivery between the third quarter of 1999 and the opening quarter of 2000, will be the fifth and sixth vessels in the Aframax category to have been ordered from the Koje Island shipyard by the U.S. oil giant.

Other recent orders won by SHI include Greece's Angelicoussis, which has ordered three Panamax bulk carriers. Ordered through the group's Alpha Tankers affiliate, the gearless 73,000 bulkers are scheduled for delivery in late 1999 and in 2000. The hull of the Laminaria, the world's largest floating production, storage and offloading (FPSO) vessel has been floated out 12 days ahead of schedule from SHI. Owner, Norway's Kvaerner, said that the FPSO, which faced delays and increasing costs during 1997, was now back on schedule. The hull is now ready for the installation of production and process facilities in Singapore and Perth, Australia.

Meanwhile, Daiichi Chuo Kisen and BHP Transport have jointly ordered a 185,000 dwt bulk carrier from SHI. The new vessel, in which both companies will have a 50 percent share, is intended to carry iron ore and coal and is scheduled for delivery in early 2000.

Daewoo Heavy Industries (DHI) has added a number of orders to the impressive business already booked this year, despite caution surrounding South Korean yards.

Swiss-based Geogas has come to the yard for the first time to sign a letter of intent for a 78,000-cu.-m LPG carrier, while OMI Corp. has committed itself to a Suezmax

Samsung Heavy Industries (SHI) appears to have been the most successful South Korean yard in the newbuilding market during the first quarter of 1998. The company booked orders for 12 vessels with a value of $500 million in the period.

tanker, both for early 2000 delivery. Norway's Wilhelmsen Lines has chosen DHI for its much heralded series of three new generation RoRo vessels, capable of combining large volumes of RoRo and car cargoes. The letter of intent was for a reported $240 million for consecutive deliveries in the first three-quarters of 2000, and included an option for three additional ships. South Korea's bankrupt Halla Group will be restructured around three core subsidiaries specializing in car part manufacturing, cement and construction, according to chairman Chung Mong-won. Halla's shipbuilding subsidiary was not referred to in the context of a core operation because it is in court receiver ship. Mr. Chung said: "We will complete the merger and sell off of nonessential subsidiaries to be reborn around Mando Machinery, Halla Cement and Halla Engineering & Construction within a year."

Hyundai Heavy Industries (HHI) plans to open new offices in Europe and South America to help attract orders for its huge shipbuilding operations. New offices in Germany and Venezuela will supplement HHI's existing eight overseas offices which are dedicated to supporting the world's largest shipbuilding group. The Caracas office will be the company's first in South America.

Japan

Three leading Japanese shipbuilders are examining the potential for growth in orders of oil rigs amid the continuing depression in the shipbuilding sector. Given the EC ban on the disposal of oil and gas platforms at sea and that some 450 steel rigs, 85 percent of those operating in the North Sea, are likely to be disposed of within the next 20 to 30 years, they believe demand will increase. The three, Ishikawajima-Harima Heavy Industries (IHI), Hitachi Zosen and Mitsui Engineering & Shipbuilding (MES), expect annual demand to reach 15-20 rigs with orders totaling at least 50 in the next five to six years.

Mitsubishi Heavy Industries (MHI) will stop consigning production of ship blocks to Chinese subcontractors that fail to meet quality standards and delivery requirements. The company will instead boost in-house production of ship blocks, the large-scale components of a vessel, as well as increase outsourcing to Japanese subcontractors. Japan's Mitsui OSK Lines (MOL) has ordered three double-hull 260,000 dwt VLCCs from MES' Chiba Shipyard. The first of the vessels will be delivered in December next year, with the second and third due in September and December 2000.

Singapore

Singapore's Keppel Shipyard has won a contract worth more than $100 million to build a semi-submersible drilling tender for Smedvig Asia, one of the largest offshore drilling contractors in the region. The order comes as a surprise as the shipyard's sister facility, Keppel Fels, which is in arbitration with Smedvig over alleged deficiencies found in the Balder FPSO. When completed in April, 1999, the self-erecting drilling tender ship will be named West Menang and will be working long-term for Brunei Shell Petroleum. AP Moller has ordered an additional pair of 18,600-bhp anchor handling tug/supply (AHTS) vessels from Keppel Singmarine, in a contract estimated to be worth $12.9 million. The two ships will be similar to four AHTS vessels already under construction for the Danish shipowner at Keppel Singmarine, which is part of Keppel Marine Industries.

Philippines

Philippines' Kepphil Shipyard Inc. is to be renamed Keppel Philippines Marine Inc. and its sister company Cebu Shipyard and Engineering Works is to become Keppel Philippines Properties Inc.

"Streamlining our operations will enable us to focus and grow our core business here," said Keppel Philippines Holdings chairman and Singapore-based Keppel Corp Ltd. managing director Loh Wing Siew. The major restructuring exercise is intended by Keppel to maximize the shareholder value of its three listed companies: Keppel Holdings; Kepphil Shipyard; and Cebu Shipyard. "We want to give investors here a wide choice of investment portfolio under the Keppel flag," Mr. Loh said.

Cebu's largest shipbuilder, Tsuneishi Shipbuilding (Cebu) Philippines, is planning to build an additional slipway in 1999. The slipway will have a capacity of 70,000 dwt, making it the first shipyard in the country capable of building Panamax-sized bulk carriers, the Aboitiz Group reported. Tsuneishi Shipbuilding is a joint venture between Hiroshima-based builder Tsuneishi Heavy Industries and local transportation conglomerate Aboitiz Group.

U.S. Shipyard Orderbook Information

Vessel Owner	Vessel Name	Vessel Type	Hull	Dimensions	Engines	Delivery Date
AMFELS, Inc., Brownsville, TX						
Chiles Offshore	N/A	Jack-Up rig	P178	N/A	N/A	4/15/99
Atlantic Marine, Inc., Jacksonville, FL						
Hornbeck Offshore Services	N/A	OSV	4236	190 x 54	CAT 3516B	9/30/98
Hornbeck Offshore Services	N/A	OSV	4237	190 x 54	CAT 3516B	11/30/98
Alabama Shipyard, Inc., Mobile, Ala.						
Dannebrog Rederi A/S	Aggershorg	Chemical tanker	N/A	472.5 x 75.4	Wartsila	1998
Avondale Industries, Inc., New Orleans, LA						
USCG	Healy	Polar Icebreaker	2372	420 x 82 x 29.3	(4) Sulzer Diesels	2/26/99
U.S. Navy	Fisher	Fast Sealift	2374	950 x 105.8 x 34.5	(4) Medium Speed Diesel	9/24/98
U.S. Navy	Seay	Fast Sealift	2375	950 x 105.8 x 34.5	(4) Medium Speed Diesel	4/12/99
U.S. Navy	N/A	Fast Sealift	2376	950 x 105.8 x 34.5	(4) Medium Speed Diesel	10/8/99
U.S. Navy	N/A	Fast Sealift	2377	950 x 105.8 x 34.5	(4) Medium Speed Diesel	4/30/00
U.S. Navy	N/A	Fast Sealift	2378	950 x 105.8 x 34.5	(4) Medium Speed Diesel	10/6/00
U.S. Navy	San Antonio	LPD-17 Class	2484	684 x 105 x 23	(4) Med. Speed Turbo-	7/1/02
Arco Marine Inc.	N/A	DH Crude Carrier	2497	894 x 151 x 83	(2) Slow Speed Diesel	2/1/00
Arco Marine inc.	N/A	OH Crude Carrier	2498	894 x 151 x 83	(2) Slow Speed Diesel	9/1/00
Bath Iron Works Corp., Bath, ME						
U.S. Navy	Donald D. Cook	Arleigh Burke Class Aegis Destroyer	DDG-75	505 x 66 x 42	(4) geared gas turbines	8/21/98
U.S. Navy	Higgins	"	DDG-76	505 x 66 x 42	(4) geared gas turbines	1/14/99
U.S. Navy	O'Kane	"	DDG-77	505 x 66 x 42	(4) geared gas turbines	5/19/99
U.S. Navy	Oscar Austin	Arleigh Burke Class Aegis Destroyer (Flight 11A)	DDG-79	510 x 66 x 42	(4) geared gas turbines	2/16/00
U.S. Navy	Winston Churchill	"	DDG-81	510 x 66 x 42	(4) geared gas turbines	8/11/00
U.S. Navy	Howard	"	DDG-83	510 x 66 x 42	(4) geared gas turbines	2/9/01
U.S. Navy	N/A	"	DDG-85	510 x 66 x 42	(4) geared gas turbines	8/3/01
U.S. Navy	N/A	"	DDG-87	510 x 66 x 42	(4) geared gas turbines	3/1/02
U.S. Navy	N/A	Arleigh Burke Class Aegis Destroyer	N/A	510 x 66 x 42	(4) geared gas turbines	2003-2006
U.S. Navy	N/A	Arleigh Burke Class Aegis Destroyer	N/A	510 x 66 x 42	(4) geared gas turbines	2003-2006
U.S. Navy	N/A	Arleigh Burke Class Aegis Destroyer	N/A	510 x 66 x 42	(4) geared gas turbines	2003-2006
U.S. Navy	N/A	Arleigh Burke Class Aegis Destroyer	N/A	510 x 66 x 42	(4) geared gas turbines	2003-2006
U.S. Navy	N/A	Arleigh Burke Class Aegis Destroyer	N/A	510 x 66 x 42	(4) geared gas turbines	2003-2006
U.S. Navy	N/A	Arleigh Burke Class Aegis Destroyer	N/A	510 x 66 x 42	(4) geared gas turbines	2003-2006
Bender Shipbuilding & Repair Co., Mobile, AL						
Otto Candies Inc.	N/A	OSV	6670	218 x 54 x 20	EMD 16-645E6	6/19/98
Otto Candies Inc.	N/A	OSV	6680	218 x 54 x 20	EMD 16-645E6	12/28/98
Otto Candies Inc.	N/A	OSV	6690	218 x 54 x 20	EMD 16-645E6	6/16/99
Otto Candies Inc.	N/A	OSV	6700	218 x 54 x 20	EMD 16-645E6	9/10/99
Gulfmark Offshore	N/A	OSV	6750	218 x 54 x 20	CAT 3606TA	1/5/99
Gulfmark Offshore	N/A	OSV	6760	218 x 54 x 20	CAT 3606TA	6/28/99
Gulfmark Offshore	N/A	OSV	N/A	N/A	N/A	1/15/99
Gulfmark Offshore	N/A	OSV	N/A	N/A	N/A	7/15/99
Blount Marine Corporation, Warren, RI						
ACCL	Heron	Rescue Vessel	292	21.3 x 8.8 x 2.5	Mercury O/B	6/98
ACCL	N/A	Glass Bottom Boat	297	22.5 x 10.3 x 3.2	Mercury O/B	6/98
ACCL	M/V Grande Mariner	Overnight Cruise Ship	298	182.6 x 40 x 9.8	(2) Man D2842LE	8/15/98
N/A	R&D	High-Speed Composite Catamaran	299	40 x 11.5 x 3.5	(2) Mercury 250 hp	1998
Tallmadge Brothers	N/A	Oyster Dredge	301	105 x 34 x 9	3408 CAT	1999
N/A	N/A	700 Passenger Ferry	N/A	130 x 40 x 9.5	1,200 hp	N/A
Bollinger Shipyards, Inc., Lockport, LA						
Mersea Ships	N/A	Ferry	281	N/A	N/A	3/15/99
Mersea Ships	N/A	Ferry	282	N/A	N/A	6/15/99

(Continued on page 120)

Vessel Owner	Vessel Name	Vessel Type	Hull	Dimensions	Engines	Delivery
U.S. Army	N/A	Derrick Barge	310	200 x 78 x 14.3	N/A	5/98
U.S. Army	N/A	Derrick Barge	323	200 x 78 x 14.3	N/A	3/99
USCG	Hammerhead	Patrol Boat	324	87 x 17.3 x 10	(2) MTU 8V396	5/98
USCG	N/A	Patrol Boat	325	87 x 17.3 x 10	(2) MTU 8V396	6/98
USCG	N/A	Patrol Boat	326	87 x 17.3 x 10	(2) MTU 8V396	8/98
USCG	N/A	Patrol Boat	327	87 x 17.3 x 10	(2) MTU 8V396	9/98
USCG	N/A	Patrol Boat	328	87 x 17.3 x 10	(2) MTU 8V396	10/98
USCG	N/A	Patrol Boat	329	87 x 17.3 x 10	(2) MTU 8V396	12/98
PC-14	N/A	Patrol Coastal	330	170 x 30 x 13.5	(4) Paxman Valenta 16RPZ00	2/00
Egypt	N/A	Fast Patrol Boat	331	31 x 10	MTU-B MTB300MD	5/99
Plaisance Marine	Seahorse IV	Utility Vessel	332	145.5x 36 x 11.5	(2) Cummins KTZ-38MO	10/98
U.S. Army	Army barge	Derrick Barge	333	200 x 78 x 14.3	Cummins 300 kW	12/99
Plaisance Marine	Seahorse V	Utility Vessel	334	145.5 x 36 x 11.5	(2) Cummins KTZ-38MO	8/21/98
USCG	CPB#8	Patrol Boat	335	87 x 17.3 x 10	(2) MTU 8V396	4/99
USCG	CPB#9	Patrol Boat	336	87 x 17.3 x 10	(2) MTU 8V396	5/99

Breaux Brothers Enterprises, Inc., Loreauville, LA

Edison Chouest	N/A	OSV	1246	N/A	N/A	6/15/98
Edison Chouest	N/A	OSV	1247	N/A	N/A	8/15/98

Chesapeake Shipbuilding Corp., Salisbury, MD

N/A	N/A	Cruise Ship	76	N/A	N/A	6/15/98

Conrad Industries, Morgan City, LA

N/A	N/A	Deck Barge	C-662	270 x 80 x 18	N/A	6/30/98
Dynamic Marine	Ram X	Lift Boat	C-663	102 x 64 x 13	500 hp	9/30/98
N/A	N/A	Lift Boat	C-664	102 x 64 x 13	500 hp	1/31/99
N/A	N/A	Lift Boat	C-665	98 x 40 x 9	500 hp	4Q-98
N/A	N/A	Liquid Mud Barge	C-667	130 x 34 x 7	N/A	3Q-98
N/A	N/A	Liquid Mud Barge	C-668	130 x 34 x 7	N/A	4Q-98

Corn Island Shipyard, Lamar, IN

Cashman Equipment	N/A	Ocean Barge	N/A	N/A	N/A	6/15/98
Cashman Equipment	N/A	Ocean Barge	N/A	N/A	N/A	7/15/98
Cashman Equipment	N/A	Ocean Barge	N/A	N/A	N/A	8/15/98

Dakota Creek Industries, Anacortes, WA

Crowley Marine Services	N/A	Tractor Tug	N/A	N/A	N/A	12/15/98
Crowley Marine Services	N/A	Tractor Tug	N/A	N/A	N/A	4/15/99

Derecktor Shipyards, Mamaroneck, NY

Buquebus	Buquebus	HS Catamaran Ferry	99	147 x 39 x 5	Detroit Diesel TE80	Fall 1999

Eastern Shipbuilding Group, Panama City, FL

Trico Marine Operators	Stillwater River	250 Passenger SWATH Crewboat	575	120 x 43.9 x 19	Allison 501-KF Gas Turbines	5/98
Trico Marine Operators	Spirit River	OSV	592	230 x 48 x 16	EMD 16-645E7	8/98
Trico Marine Operators	N/A	OSV	593	230 x 48 x 16	EMD 16-645E7	10/98
White Stack Maritime	Elizabeth Turecamo	Z-Drive Tug	608	110 x 40 x 20	EMD 16-645	5/98
N/A	N/A	N/A	629	190 x 44 x 16	CAT 3516	12/98
N/A	N/A	N/A	634	190 x 44 x 16	CAT 3516	1/99

Freeport Shipbuilding, Freeport, FL

Certified Marine Expeditions	Rapture	Overnight/Excursion	151	145 x 36	Lugger L6170A	6/98
Harbor Tours	California Princess	Dinner/Excursion	152	115 x 27 x 9	Detroit Diesel Series 60	7/98

Gladding-Hearn Shipbuilding Somerset MA

City of NY Police Dept.	N/A	Police Patrol Launch	P-315	55 x 15 x 8	(2) Detroit 12V7ITA DDEC	3/99
City of NY Police Dept.	N/A	Police Patrol Launch	P-316	55 x 15 x 8	(2) Detroit 12V7ITA DDEC	4/99
Boston Harbor Cruises	Millenium	Commuter Ferry/ Whalewatcher	P-317	120 x 33 x 10	(4) Cummins KTZ 38M-2	7/98
Boston Harbor Cruises	N/A	Commuter Ferry/ Whalewatcher	P-318	120 x 33 x 10	(4) Cummins KTZ 38M-2	10/98
Yankee Fleet	Yankee Freedom II	Whalewatcher/ Excursible	P-319	92 x 28 x 8	Cat 3412	2/99
New England Aquarium	N/A	Whalewatcher	P-320	111 x 30 x 10	N/A	6/99

Gulf Coast Fabrication	Pearlington	MS				
N/A	N/A	Asphalt Barge	293	N/A	N/A	8/19/98
Trailer Bridge	N/A	Deck Barge	294	N/A	N/A	7/2/98
Trailer Bridge	N/A	Deck Barge	295	N/A	N/A	9/10/98
Trailer Bridge	N/A	Deck Barge	296	N/A	N/A	11/19/98

Gulf Craft, Inc., Patterson, LA

N/A	N/A	Aluminum Crewboat	418	N/A	N/A	10/15/99
Seacor Marine	N/A	Aluminum Crewboat	419	165 x 34	N/A	6/15/99
Seacor Marine	N/A	Aluminum Crewboat	421	180 x 35	N/A	10/15/98
Hyannis Whale Watch, Inc.	N/A	Aluminum Whale Watch	424	120 x 28	N/A	3/99

Canadian Pacific Completes Acquisition Of Ivaran Lines

Canadian Pacific Limited completed the acquisition of Ivaran Lines business from Ivarans Rederi ASA of Oslo, Norway, which includes Ivaran's container shipping services linking North America with South America and the Caribbean.

The acquisition will increase CP Ships $2 billion annual sales revenue and one million TEU annual container volume by about 10 percent. Ivaran Lines is now part of the CP Ships group of companies, which includes Canada Maritime, Cast, Lykes Lines, Contship Containerlines and Montreal Terminals. It will maintain its own distinct identity and be run as a separate business.

The transaction includes Ivaran Lines brand name, services, organization, container fleet and nine chartered container ships, three of which remain owned by Ivarans Rederi. The transaction includes nine chartered containerships, three of which remain owned by Ivarans Rederi (x).

Ship	TEU Capacity	Year
(x)Americana	1,120	1988
(x)San Antonio	1,512	1994
(x)Santa Rosa	1,742	1992
Ivaran Sexto	585	1994
Ivaran Cuarto	563	1983
San Fernando	1,512	1996
San Felipe	1,512	1996
San Francisco	1,512	1996
San Isidro	1,512	1993

Canadians Demonstrate Marine Technology on European Tour

The Canadian ice breaker *Louis St. Laurent* will be demonstrating a wide range of Canadian Marine technologies at European ports during the month of June 1998. Traveling as deck cargo on board the ship will be a 45 x 16.8-ft. (13.7 x 5.1-m) fiberglass fishing boat, which was built to the tradition and quality of the great wooden hulled Nova Scotian schooners that traded into Europe in the 19th Century.

The boat is a forward house design with the large open cockpit. Marketed by DDS Export Limited, a joint project of two well know Acadian boat builders, Camille Deon Boat Builders Ltd. and Dixon Shipyards Ltd., the boat includes compact accommodation for four crew.

With weight kept to a minimum through such techniques as Nida-Core decks, the hull is built to rugged commercial structural specifications.

Power is from a Cummins new 525-hp N-14 engine equipped with the optional pre-lube system rating. Speeds will be in excess of 20-knots.

Norwegian Cruise Commences $1B Ship Deal

Norwegian Cruise Line (NCVL) has begun a $1 billion shipbuilding campaign by committing to build a 76,000-ton luxury liner. NCL has signed a letter-of-intent with the Lloyd Werft shipyard to build a 76,000-ton ship which will be a sister ship to NCL's 11th vessel, M/S *Norwegian Sky*. The ship is designed to carry 2,000 passengers and is scheduled for delivery in the summer of 2000.

Bergesen Orders Two LPGs From Gdynia Shipyard

Bergesen D.Y. ASA ordered two LPG vessels from Poland's Gdynia Shipyard and had an option for up to four more. The contract price per vessel was reportedly $63 million, of which 40 percent would be paid during the building period and the remaining upon delivery. The two vessels were expected to be delivered in June and December in the year 2000. The loading capacity of each was 78,500 cbm. Bergesen has 18 gas carriers already in the VLGC segment, which meant above 70,000 cbm.

OT Africa Line Appoints East Med/Black Sea Agent

OT Africa Line (Otal) has extended its agency network to encompass the Black Sea, Balkans and Eastern Mediterranean regions. The company said it has taken on Piraeus-based forwarding agency, Economou, which has offices in Greece, Turkey, Bulgaria, Romania, Russia and the Ukraine, as well as a network of representatives located in key ports and cities.

Ulstein Buys Half Of Poland's FAMA

Ulstein Holding ASA's Brattvaag AS division is buying 50.08 percent of Polish shipping equipment company FAMA for $1 million. The Gniew, Poland-based company had turnover totaling $5.4 million in 1997 and has about 400 employees. The seller was Stocznia Szczecinska SA, or the Stettin shipyard, according to Ulstein.

Hess Tower Sinks During Float Out

Amerada Hess Corp. has reportedly recovered the tower section of an oil rig for its estimated 100 million barrel Baldpate field in the Gulf of Mexico, and "initial indications are it has not suffered any damage." The tower, owned by Hess and Oryx Energy Co., its 50 percent partner in the project, sank in late May, about 100 miles off the Louisiana coast while being towed to the field. The 20,200-ton, 1,320 ft. (420 m) tall structure had sunk in an upright position and was 100 ft. below the surface of the water.

Litton Wins $138.6M Contract

Litton Industries Inc. won a $138.6 million contract to design and make engineering control systems equipment and integrated bridge systems for the U.S. Navy's Ticonderoga class of AEGIS cruisers.

The contract, awarded by the U.S. Navy Sea Systems Command, includes a firm requirement for four systems, options for 22 additional systems, and pricing agreements for the bridge systems to be used in DDG 51 class of destroyers. Work is expected to be completed by December 2003.

U.S. SHIPYARD ORDERBOOK

(Continued from page 116)

Vessel Owner	Vessel Name	Vessel Type	Hull	Dimensions	Engines	Delivery Date
Gunderson Marine Inc.	Portland	OR				
Greenbrier Companies	N/A	Flat deck cargo barge	49	300 x 84 x 19	N/A	3Q-98

Houma Fabricators, Inc., Houma, LA

Vessel Owner	Vessel Name	Vessel Type	Hull	Dimensions	Engines	Delivery Date
U.D.I.	C/Centurion	OSV	114	190 x 42 x 15	CAT 3512	7/31/98
U.D.I.	N/A	OSV	115	220 x 46 x 16	CAT 3606	N/A

Ingalls Shipbuilding, Pascagoula, MS

Vessel Owner	Vessel Name	Vessel Type	Hull	Dimensions	Engines	Delivery Date
Edison Chouest	N/A	OSV	6814	240 x 56	Diesel	6/98
Edison Chouest	N/A	OSV	6815	240 x 56	Diesel	7/98
Edison Chouest	N/A	OSV	6816	240 x 56	Diesel	8/98
Edison Chouest	N/A	OSV	6817	240 x 56	Diesel	9/98
Edison Chouest	N/A	OSV	6818	240 x 56	Diesel	10/98
Edison Chouest	N/A	OSV	6819	240 x 56	Diesel	11/98
Edison Chouest	N/A	OSV	6820	240 x 56	Diesel	12/98
Edison Chouest	N/A	OSV	6821	240 x 56	Diesel	1/99
Edison Chouest	N/A	OSV	6822	240 x 56	Diesel	2/99
Edison Chouest	N/A	OSV	6823	240 x 56	Diesel	3/99
Edison Chouest	N/A	OSV	6827	240 x 56	Diesel	11/98
Edison Chouest	N/A	OSV	6828	240 x 56	Diesel	2/99
Edison Chouest	N/A	OSV	6829	240 x 56	Diesel	4/99
Edison Chouest	N/A	OSV	6830	190 x 44	Diesel	8/98
Edison Chouest	N/A	OSV	6831	190 x 44	Diesel	9/98
Edison Chouest	N/A	OSV	6832	190 x 44	Diesel	10/98
Edison Chouest	N/A	OSV	6833	190 x 44	Diesel	11/98
Edison Chouest	N/A	OSV	6834	190 x 44	Diesel	12/98
Edison Chouest	N/A	OSV	6835	190 x 44	Diesel	1/99
Edison Chouest	N/A	OSV	6836	190 x 44	Diesel	2/99
N/A	N/A	Offshore Jackup Vessel	6870	165 x 140 x 15	N/A	2/99
N/A	N/A	Offshore Jackup Vessel	6871	165 x 140 x 15	N/A	4/99
N/A	N/A	Offshore Jackup Vessel	6872	165 x 140 x 15	N/A	7/99
N/A	N/A	Offshore Jackup Vessel	6873	165 x 140 x 15	N/A	10/99
U.S. Navy	Porter	Aegis destroyer	N/A	505 x 55	Gas Turbine	12/98
U.S. Navy	Roosevelt	Aegis destroyer	N/A	510 x 505	Gas Turbine	3/00
U.S. Navy	DDG 82	Aegis destroyer	N/A	510 x 505	Gas Turbine	10/00
U.S. Navy	DDG 84	Aegis destroyer	N/A	510 x 505	Gas Turbine	5/01
U.S. Navy	DDG 86	Aegis destroyer	N/A	510 x 505	Gas Turbine	12/01
U.S. Navy	DDG 88	Aegis destroyer	N/A	510 x 505	Gas Turbine	8/02
U.S. Navy	DDG 89	Aegis destroyer	N/A	510 x 505	Gas Turbine	4/03
U.S. Navy	DDG 91	Aegis destroyer	N/A	510 x 505	Gas Turbine	10/03
U.S. Navy	DDG 93	Aegis destroyer	N/A	510 x 505	Gas Turbine	4/04
U.S. Navy	DDG 95	Aegis destroyer	N/A	510 x 505	Gas Turbine	10/04
U.S. Navy	DDG 97	Aegis destroyer	N/A	510 x 505	Gas Turbine	4/05
U.S. Navy	DDG 98	Aegis destroyer	N/A	510 x 505	Gas Turbine	10/05
U.S. Navy	DDG 100	Aegis destroyer	N/A	510 x 505	Gas Turbine	4/06
U.S. Navy	DDG 102	Aegis destroyer	N/A	510 x 505	Gas Turbine	10/06
U.S Navy	Iwo Jima	Multipurpose Assault	N/A	844 x 106	N/A	12/00

Intermarine USA, Savannah, GA

Vessel Owner	Vessel Name	Vessel Type	Hull	Dimensions	Engines	Delivery Date
N/A	N/A	Motor Yacht	2301	N/A	N/A	6/15/98
N/A	N/A	Motor Yacht	2302	N/A	N/A	9/15/98
N/A	N/A	Motor Yacht	2303	N/A	N/A	2/15/99

Vessel Owner	Vessel Name	Vessel Type	Hull	Dimensions	Engines	Delivery Date
N/A	N/A	Motor Yacht	2304	N/A	N/A	4/15/99
N/A	N/A	Motor Yacht	2305	N/A	N/A	8/15/99

Intracoastal City Dry Dock & Shipbuilding, Abbeville, LA

Vessel Owner	Vessel Name	Vessel Type	Hull	Dimensions	Engines	Delivery Date
ICCD	N/A	Drydock (Air)	N/A	185 x 65 x 7	N/A	11-9-98
ICCD	N/A	Drydock (Pump)	N/A	30 x 110 x 7.6	N/A	5-9-98

Jeffboat, Jeffersonville, IN

Vessel Owner	Vessel Name	Vessel Type	Hull	Dimensions	Engines	Delivery Date
N/A	N/A	Barges (multiple)	N/A	N/A	N/A	through 12/15/98

Leevac Shipyards Inc., JenningsLA,

Vessel Owner	Vessel Name	Vessel Type	Hull	Dimensions	Engines	Delivery Date
North American Shipbuilding		N/A	OSV	175	N/A	7/15/98
N/A	N/A	OSV	176	N/A	N/A	5/1/99
N/A	N/A	Barge	319	N/A	N/A	6/30/98
N/A	N/A	Barge	320	N/A	N/A	6/30/98
Naviera Tampaulipaspbuilding	N/A	OSV	340	N/A	N/A	8/30/98
HOS	N/A	OSV	495	N/A	N/A	10/31/98
HOS	N/A	OSV	496	N/A	N/A	12/31/98

Main Iron Works, Inc., Houma, LA

Vessel Owner	Vessel Name	Vessel Type	Hull	Dimensions	Engines	Delivery Date
Colle Towing	Kimberly Colle	Harbor Tug	403	N/A	N/A	6/30/98

Main Iron Works, Inc., Houma, LA

Vessel Owner	Vessel Name	Vessel Type	Hull	Dimensions	Engines	Delivery Date
Bisso Towboat Co.	N/A	Tug	404	N/A	N/A	9/30/98
& Young	N/A	Tug	405	N/A	N/A	2/15/99
N/A	N/A	Harbor Tug	406	N/A	N/A	12/15/98

MARCO Seattle Inc., Seattle, WA

Vessel Owner	Vessel Name	Vessel Type	Hull	Dimensions	Engines	Delivery Date
Tugz International	N/A	Z Tractor Tug	479	94 x 32 x 11.5	CAT 3516B 4,000 hp	3/1/99
Tugz International	N/A	Z Tractor Tug	480	94 x 32 x 11.5	CAT 3516B 4,000 hp	3/1/99
Tugz International	N/A	Z Tractor Tug	481	94 x 32 x 11.5	CAT 3516B 4,000 hp	3/1/99

Marine Builders Inc., Utica, IN

Vessel Owner	Vessel Name	Vessel Type	Hull	Dimensions	Engines	Delivery Date
N/A	N/A	Passenger Vessel	209	N/A	N/A	5/1/99
Tennessee Valley Authority	N/A	Workboat	210	N/A	N/A	12/1/98
Winston Knauss	N/A	Passenger Vessel	211	N/A	N/A	5/1/99
N/A	N/A	Workboat	213	N/A	N/A	5/1/99
N/A	N/A	Workboat	214	N/A	N/A	8/1/99

Marinette Marine Corporation, Marinette, WI

Vessel Owner	Vessel Name	Vessel Type	Hull	Dimensions	Engines	Delivery Date
USCG	Elm	Seagoing Buoy Tender	WLB-Hull 204	225 x 46 x 13	N/A	10/25/98
USCG	Walnut	Seagoing Buoy Tender	WLB-Hull 205	225x 46 x 13	N/A	2/22/99
USCG	James Rankin	Coastal Buoy Tender	WLB-Hull 555	175 x 36 x 7.9	N/A	9/9/98
USCG	Joshua Appleby	Coastal Buoy Tender	WLB-Hull 556	175 x 36 x 7.9	N/A	7/1/99
USCG	Frank Drew	Coastal Buoy Tender	WLB-Hull 557	175 x 36 x 7.9	N/A	10/6/99
USCG	Anthony Pettit	Coastal Buoy Tender	WLB-Hull 558	175 x 36 x 7.9	N/A	3/1/00
USCG	Barbara Mabrity	Coastal Buoy Tender	WLB-Hull 559	175 x 36 x 7.9	N/A	7/3/00
USCG	William Tate	Coastal Buoy Tender	WLB-Hull 560	175 x 36 x 7.9	N/A	10/2/00
USCG	Harry Claiborne	Coastal Buoy Tender	WLB-Hull 561	175 x 36 x 7.9	N/A	3/1/01
USCG	Maria Bray	Coastal Buoy Tender	WLB-Hull 562	175 x 36 x 7.9	N/A	7/2/01

Vessel Owner	Vessel Name	Vessel Type	Hull	Dimensions	Engines	Delivery Date
USCG	Henry Blake	Coastal Buoy Tender	WLB-Hull 563	175 x 36 x 7.9	N/A	10/1/01
USCG	George Cobb	Coastal Buoy Tender	WLB-Hull 564	175 x 36 x 7.9	N/A	3/1/02

Master Boat Builders, Inc., Bayou La Batre, AL

Bristol Leader Fisheries LLC	Bristol Leader	Longline Freezer	248	167 x 34 x 16	CAT 3508B	6/98
Abdon Callais Boat Rentals	C. Michael Callais	145' Mini-Supply Vessel	249	145 x 36 x 12	CAT 3508	5/98
Abdon Callais Boat Rentals	Corey Callais	145' Mini-Supply Vessel	250	145 x 36 x 12	CAT 3508	7/98
Abdon Callais Boat Rentals	Peter Callais	145' Mini-Supply Vessel	251	145 x 36 x 12	CAT 3508	9/98
Hadi H. Al-Hammam	Hadi V	120' Mini-Supply Vessel	253	120 x 30 x 11.5	CAT 3412	5/98
Hadi H. Al-Hammam	Hadi VI	120' Mini-Supply Vessel	254	120 x 30 x 11.5	CAT 3412	6/98
Hadi H. Al-Hammam	Hadi VII	120' Mini-Supply Vessel	255	120 x 30 x 11.5	CAT 3412	7/98
Abdon Callais Boat Rentals	N/A	145' Mini-Supply Vessel	256	145 x 36 x 12	CAT 3508	10/98
Abdon Callais Boat Rentals	N/A	145' Mini-Supply Vessel	257	145 x 36 x 12	CAT 3508	12/98
Abdon Callais Boat Rentals	N/A	145' Mini-Supply Vessel	258	145 x 36 x 12	CAT 3508	1/99

McDermott Shipyards - Morgan City, Amelia, LA

N/A	N/A	Barges	350 (total)	N/A	N/A	3/31/99

NASSCO, San Diego, CA

U.S.Navy	Watson	Sealift	451	N/A	N/A	10/28/98
U.S.Navy	Sisler	Sealift	452	N/A	N/A	5/28/99
U.S.Navy	Dahl	Sealift	453	N/A	N/A	10/28/99
U.S.Navy	N/A	Sealift	454	N/A	N/A	4/28/00
U.S.Navy	N/A	Sealift	455	N/A	N/A	10/27/00
U.S.Navy	N/A	Sealift	456	N/A	N/A	4/27/01
U.S.Navy	N/A	Sealift	457	N/A	N/A	9/28/01

Neuville Boat Works, Inc., New Iberia, LA

N/A	N/A	Crew/Supply	145-4	N/A	N/A	11/1/98

Newport News Shipbuilding, Newport News, VA

Eletson Holdings	Agathonissos	Product Tanker	N/A	N/A	N/A	1998
Hvide Marine	Cape Lookout Shoals	Product Tanker	N/A	N/A	N/A	1998
Hvide Marine	Diamond Shoals	Product Tanker	N/A	N/A	N/A	1998
Hvide Marine	Ambrose Channel		N/A	N/A	N/A	1999
Hvide Marine	Brenton Reel		N/A	N/A	N/A	1999
U.S. Navy	Harry S. Truman	Aircraft Carrier (CVN-75)	N/A	N/A	N/A	1998
U.S. Navy	Ronald Reagan	Aircraft Carrier (CVN-76)	N/A	N/A	N/A	2002

Nichols Brothers Boat Builders, Freeland, WA

Catalina Cruises Inc.	N/A	Ferry Catamaran	5133	N/A	N/A	6/30/98
Crowley Marine	N/A	Tractor Tug	S-127	N/A	N/A	11/15/98
Crowley Marine	N/A	Tractor Tug	S-128	N/A	N/A	7/15/98
Crowley Marine	N/A	Tractor Tug	S-129	N/A	N/A	1/15/99
Crowley Marine	N/A	Tractor Tug	S-130	N/A	N/A	3/15/99
Crowley Marine	N/A	Tractor Tug	S-131	N/A	N/A	9/15/99
Crowley Marine	N/A	Tractor Tug	S-132	N/A	N/A	5/15/99

Ocean Technical Services, Inc., Harvey, LA

Semco	N/A	Rigid Hull Inflatable	N/A	N/A	Outboard	4/98

Orange Shipbuilding Co., Inc., Orange, TX

U.S. Army	N/A	Tugboat	304	59 x 22 x 8	(2) Cummins KTA19M3	7/30/98
U.S. Army	N/A	Tugboat	305	59 x 22 x 8	(2) Cummins KTA19M3	10/15/98
U.S. Army	N/A	Tugboat	306	59 x 22 x 8	(2) Cummins KTA19M3	12/15/98
U.S. Army	N/A	Tugboat	307	59 x 22 x 8	(2) Cummins KTA19M3	12/14/98
USACE	N/A	Work/Layout Barge	308	230 x 68 x 12	N/A	6/99
U.S. Army	N/A	Tugboat	309	59 x 22 x 8	(2) Cummins KTA19M3	8/15/99
U.S. Army	N/A	Tugboat	310	59 x 22 x 8	(2) Cummins KTA19M3	12/15/99
Broussard Barges	8812	Deck Barge	311	120 x 30 x 7	N/A	6/98
U.S. Army	N/A	Tugboat	312	59 x 22 x 8	(2) Cummins KTA19M3	8/15/00
U.S. Army	N/A	Tugboat	313	59 x 22 x 8	(2) Cummins KTA19M3	12/15/00
U.S. Army	N/A	Tugboat	314	59 x 22 x 8	(2) Cummins KTA19M3	4/1/01

Palmer Johnson Inc., Sturgeon Bay, WI

N/A	N/A	N/A	220	88 x 23	2 DDC/MTU 12V2000	N/A
N/A	N/A	Turbine Yacht	223	82 x 22 x 4	2 DDC/MTU 16V2000, Turbine TF40	1998
N/A	Constellation	Yacht	224	95 x 23 x 5	2 DDC/MTU 12V2000	Fall 1998
N/A	N/A	Yacht	225	110 x 23 x 6	2 MTU 12V396TE94	N/A
N/A	La Baronessa	Yacht	228	195 x 35 x 7	2 CAT 3512	Fall 1998

Patti Shipyard Inc., Pensacola, FL

N/A	N/A	Towboat	476	N/A	N/A	5/15/99

(Continued on page 124)

Carnival Corp. Completes $500M Acquisition Of Cunard Line

Carnival Corp. has completed the acquisition of Cunard Line for $500 million from Kvaerner ASA and simultaneously completed the merger of Cunard with Seabourn Cruise Line, which was 50 percent owned by Carnival and 50 percent owned by Norwegian entrepreneur **Atle Brynestad**.

Carnival owns a 68 percent stake in the newly merged company, named Cunard Line Limited, with Mr. **Brynestad** and a group of Norwegian investors holding 32 percent.

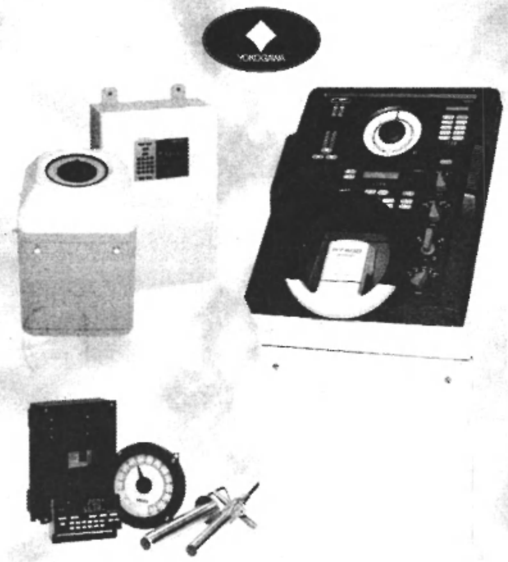
The new company is headed by recently appointed President and CEO **Larry Pimentel** who was formerly president of Seabourn. Its combined fleet includes eight ships — five from Cunard and three from Seabourn.

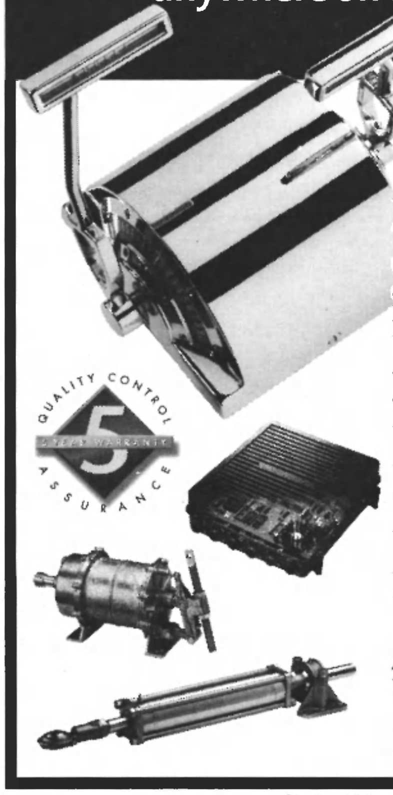
"This deal, which has enabled us to combine the brand strength inherent in the Cunard name with the successful high-end product that is Seabourn, positions us extremely well for operating in the luxury segment of the cruise industry," said **Micky Arison**, Carnival Corp. chairman and CEO.

Along with the new Cunard Line Limited, Carnival Corp. is comprised of Carnival Cruise Lines, Holland America Line, Windstar Cruises and equity interests in Costa Cruises and Airtours plc, which combined operate 42 ships in the Caribbean, Alaska, Europe and other worldwide destinations. Collectively, Carnival Cruise Lines, Holland America Line and Costa Cruises have eight new ships slated for delivery over the next three years. Carnival Cruise Lines' new 70,000-ton SuperLiner, *Paradise*, the world's first smoke-free cruise ship, is expected to debut in November. Also on order are two 101,000-ton vessels, *Carnival Triumph* and *Carnival Victory*, scheduled to enter service in 1999 and 2000, respectively.

In addition, Carnival Cruise Lines is expected to introduce an 82,000-ton ship at the end of 2000 which will begin a new class of vessel for the line. Holland America Line also has two new 65,000- ton cruise ships, *Volendam* and *Zaandam*, expected to enter service in 1999, as well as a 61,000-ton vessel scheduled to debut in 2000. Additionally, Costa Cruises has a new 82,000-ton cruise ship slated for delivery in 2000.

Circle 84 on Reader Service Card





U.S. SHIPYARD ORDERBOOK

Vessel Owner	Vessel Name	Vessel Type	Hull	Dimensions	Engines	Delivery Date
N/A	N/A	Towboat	514	N/A	N/A	7/15/98
USACE	Ted Cook	Towboat	N/A	N/A	N/A	6/15/98

Pequot River Shipworks, New London, CT

Vessel Owner	Vessel Name	Vessel Type	Hull	Dimensions	Engines	Delivery Date
Mashantucket Pequot Tribe	N/A	Ferry Catamaran	PRS-2	N/A	N/A	6/1/98

Quality Shipyards Inc., Houma, LA

Vessel Owner	Vessel Name	Vessel Type	Hull	Dimensions	Engines	Delivery Date
Memco	Patricia Gail	River Towboat	1217	180 x 48 x 11.5	EMD 16-710	4/24/98
Memco	N/A	River Towboat	1219	180 x 48 x 11.5	EMD 16-710	9/98
Memco	N/A	River Towboat	1220	180 x 48 x 11.5	EMD 16-710	4/99

Rockland Marine, Rockland, NH

Vessel Owner	Vessel Name	Vessel Type	Hull	Dimensions	Engines	Delivery Date
Tisbury Towing and Transportation		N/A	Deck Barge	2	160 x 40 x 10	N/A
5/98						

Rodriguez Boat Builders, Inc., Bayou La Batre, AL

Vessel Owner	Vessel Name	Vessel Type	Hull	Dimensions	Engines	Delivery Date
Dvard Eymard	Jane	Tug	172	65 x 22 x 8.5	(2) G.M 12V	5/98
Persistant Fishing	Valerie	Tuna Jig Boat	173	88 x 25 x 12.5	CAT 3408	6/98
Jim Richardson	N/A	Charter Boat	174	71 x 21 x 8	(2) Cat 3208	6/98
C&D Towing	N/A	Tug	175	66 x 24 x 8.5	(2) Cummins	7/98

SeaArk Marine, Monticello, AR

Vessel Owner	Vessel Name	Vessel Type	Hull	Dimensions	Engines	Delivery Date
Corps of Engineers	River Runner	Modified Vee	A0912	22 x 7	N/A	5/98
Corps of Engineers	River Runner	Modified Vee	A0913	22 x 7	N/A	5/98
Intl. Commercial	Dauntless	Vee Hull	A0914	42 x 14	N/A	TBD
Commercial	Dauntless	Vee Hull	A0916	40 x 13	N/A	6/98
Commercial	Dauntless	Vee Hull	A0917	40 x 13	N/A	6/98
State Agency	Dauntless	Vee Hull	A0919	48 x 16	N/A	8/98
Commercial	Explorer	Excursion Boat	A0921	54 x 145	N/A	5/98
Municipality	Commander	Vee Hull	A0923	21 x 8.5	N/A	5/98
Municipality	Commander	Vee Hull	A0924	21 x 8.5	N/A	5/98

Service Marine Industries Inc., Morgan City, LA

Vessel Owner	Vessel Name	Vessel Type	Hull	Dimensions	Engines	Delivery Date
Oceaneering International	Ocean Intervention II	OSV	190	N/A	N/A	6/11/98
Western Geophysical	N/A	Survey Vessel	192	N/A	N/A	11/25/98
N/A	N/A	Survey Vessel	193	N/A	N/A	2/12/99
N/A	N/A	Survey Vessel	194	N/A	N/A	12/15/98

SkipperLiner Industries Inc., LaCrosse, WI

Vessel Owner	Vessel Name	Vessel Type	Hull	Dimensions	Engines	Delivery Date
CedarPoint	Harbor Belle	Yacht	N/A	64	N/A	4/1/98
St. Croix Custom Cruises	Song of the Croix	Yacht	N/A	80	N/A	4/15/98
Island Girl River Cruises	Island Girl XI	Yacht	N/A	91	N/A	5/5/98
Paradise Yacht Cruises	Summer Wind	Yacht	N/A	73	N/A	5/25/98
S&S Management	N/A	Yacht	N/A	91	N/A	7/1/98

Steiner Shipyard, Inc., Bayou La Batre, AL

Vessel Owner	Vessel Name	Vessel Type	Hull	Dimensions	Engines	Delivery Date
N/A	N/A	Shrimp Trawler	380	75 x 22 x 11	Cummins KT-19M	11/15/98
N/A	N/A	Shrimp Trawler	381	75 x 22 x 11	Cummins KT-19M	11/15/98
N/A	N/A	Shrimp Trawler	382	75 x 22 x 11	Cummins KT-19M	2/15/99

Sun State Marine Services, Inc., Green Cove Springs, FL

Vessel Owner	Vessel Name	Vessel Type	Hull	Dimensions	Engines	Delivery Date
Hvide Marine	Sunstate 1103	Double Hull Barge	10	200 x 36 x 12	N/A	7/98

Swiftships Inc., Morgan City, LA

Vessel Owner	Vessel Name	Vessel Type	Hull	Dimensions	Engines	Delivery Date
Candy Fleet Corp.	Candy Maker	Aluminum Crew/Supply	475	145 x 27	Cummins	4/98
Candy Fleet Corp.	N/A	Aluminum Crew/Supply	476	145 x 27	Cummins	6/98
Seachase, Inc.	N/A	Aluminum Motor Yacht	477	150	MTU	6/98
Candy Fleet Corp.	Candy Voyager	Steel Supply Vessel	480	220 x 46	EMD	4/98
Rangk Limited	Seamark	Aluminum Crew/Supply	492	145 x 27	Caterpillar	4/98
Candy Fleet Corp.	N/A	Steel Supply Vessel	493	220 x 46	EMD	7/98
Candy Fleet Corp.	N/A	Steel Supply Vessel	494	220 x 46	EMD	10/98
Candy Fleet Corp.	N/A	Steel Supply Vessel	495	220 x 46	EMD	1/99
Candy Fleet Corp.	N/A	Steel Supply Vessel	496	220 x 46	EMD	3/99
NAVSEA	N/A	Aluminum Diving Tender	497	131	Caterpillar	12/98
NAVSEA	N/A	Aluminum Diving Tender	498	131	Caterpillar	3/99
Diamond Services Corp.	N/A	Aluminum Crew/Supply	507	185 x 30	Caterpillar	11/98

Textron Marine & Land Systems, New Orleans, LA

Vessel Owner	Vessel Name	Vessel Type	Hull	Dimensions	Engines	Delivery Date
USCG	N/A	Lifeboat/Motorboat	231	N/A	N/A	6/8/98
USCG	N/A	Lifeboat/Motorboat	232	N/A	N/A	6/25/98
USCG	N/A	Lifeboat/Motorboat	233	N/A	N/A	7/12/98
USCG	N/A	Lifeboat/Motorboat	234	N/A	N/A	7/29/98
USCG	N/A	Lifeboat/Motorboat	235	N/A	N/A	8/15/98
USCG	N/A	Lifeboat/Motorboat	236	N/A	N/A	9/1/98
USCG	N/A	Lifeboat/Motorboat	237	N/A	N/A	10/5/98
USCG	N/A	Lifeboat/Motorboat	238	N/A	N/A	10/22/98
USCG	N/A	Lifeboat/Motorboat	239	N/A	N/A	11/8/98
USCG	N/A	Lifeboat/Motorboat	240	N/A	N/A	11/25/98
USCG	N/A	Lifeboat/Motorboat	241	N/A	N/A	12/12/98
USCG	N/A	Lifeboat/Motorboat	242	N/A	N/A	12/29/98
USCG	N/A	Lifeboat/Motorboat	243	N/A	N/A	1/15/99
USCG	N/A	Lifeboat/Motorboat	244	N/A	N/A	2/1/99
USCG	N/A	Lifeboat/Motorboat	245	N/A	N/A	2/14/99
USCG	N/A	Lifeboat/Motorboat	246	N/A	N/A	2/25/99
USCG	N/A	Lifeboat/Motorboat	247	N/A	N/A	2/28/99

Tidewater Equipment Corp., Norfolk, VA

Vessel Owner	Vessel Name	Vessel Type	Hull	Dimensions	Engines	Delivery Date
Crane Barge	233	120 x 55 x 8	N/A	9/98		
Hughes Brothers	N/A	ABS Offshore Deck Barge		234	180 x 54 x 12	N/A
9/98						

Todd Pacific Shipyards, Seattle, WA

Vessel Owner	Vessel Name	Vessel Type	Hull	Dimensions	Engines	Delivery Date
Washington State Ferries	Puyallup	Ferry	93	N/A	N/A	N/A

Trinity Marine, Caruthersville, MO

Vessel Owner	Vessel Name	Vessel Type	Hull	Dimensions	Engines	Delivery Date
N/A	N/A	Yacht	009	N/A	N/A	1/27/99
N/A	N/A	Yacht	010	N/A	N/A	11/15/98
N/A	N/A	Yacht	011	N/A	N/A	6/30/99
N/A	N/A	Rake Hopper Barge (Madisonville)	(1)	N/A	N/A	12/31/98
N/A	N/A	Box Hopper Barge (Madisonville)	(110 total)	N/A	N/A	6/30/98
N/A	N/A	Open Tank Hopper Barge (Port Allen)	(12 total)	N/A	N/A	6/30/98
N/A	N/A	Double Rake Deck Barge (Ashland City)	(2 total)	N/A	N/A	6/30/98
N/A	N/A	Crounse Type Hopper Barge (Caruthersville)	(20 total)	N/A	N/A	10/31/98
N/A	N/A	Rake Hopper Barge (Caruthersville)	(3 total)	N/A	N/A	9/30/98
N/A	N/A	Deck Barge (Orange)	(3 total)	N/A	N/A	9/30/98
N/A	N/A	Rake Hopper Barge (Caruthersville)	(30 total)	N/A	N/A	6/30/98
Magnolia Marine	N/A	Oil Tank Barge (Ashland City)	32323	N/A	N/A	6/30/98
Magnolia Marine	N/A	Oil Tank Barge (Ashland City)	32324	N/A	N/A	6/30/98
N/A	N/A	Box Hopper Barge (Orange)	(50 total)	N/A	N/A	6/30/98
N/A	N/A	Rake Hopper Barge (Orange)	(52 total)	N/A	N/A	6/30/98
N/A	N/A	Box Hopper Barge	(53 total)	N/A	N/A	9/30/98
N/A	N/A	Barges (Ashland City)	(6 total)	N/A	N/A	12/31/98
N/A	N/A	Box Hopper Barge (Madisonville)	(7 total)	N/A	N/A	9/30/98
N/A	N/A	Box Hopper Barge	(70 total)	N/A	N/A	6/30/98

Washburn & Doughty Associates Inc., East Boothbay, ME

Vessel Owner	Vessel Name	Vessel Type	Hull	Dimensions	Engines	Delivery Date
University of Connecticut	N/A	Research vessel	61	76 x 26 x 10	(2) CAT 3412	Summer 98
LARA Cruises	N/A	Dinner/Casino Boat	62	155 x 36 x 10.8	(2) CAT 3412	Summer 98
N/A	N/A	Z-Drive Tugboat	64	91.3 x 32 x 13.8	(2) CAT 35168	Fall 1998

Western Towboat Terminal Inc., Seattle, WA

Vessel Owner	Vessel Name	Vessel Type	Hull	Dimensions	Engines	Delivery Date
Western Towboat	Hull 12	Z-Drive Tractor Tug	12	106 x 37 x 18	3516-8 CAT	6/99

Westport Shipyard, Inc., Westport, WA

Vessel Owner	Vessel Name	Vessel Type	Hull	Dimensions	Engines	Delivery Date
Westport Shipyard	N/A	Yacht Tri-Deck FRP	1501	126 x 26	MTU/Det Diesel 16v2000	9/99
Westship, Inc.	N/A	Yacht FRP	7621	107 x 22.7	MTU 8V396	8/98
Westport Shipyard	N/A	Yacht FRP	7629	112 x 23.8	MTU/Det Diesel 16V2000	9/98
Westport Shipyard	N/A	Yacht FRP	7632	112 x 23.8	MTU/Det Diesel 16V2000	3/99
Westport Shipyard	N/A	Yacht FRP	7633	112 x 23.8	MTU/Det Diesel 16V2000	6/99
Guardian Marine Intl.	N/A	Patrol FRP	8506	85	Detroit Diesel 16V149	7/98
Alaska Heritage Tours	Coastal Explorer	Passenger Ferry FRP	8507	95 x 22 x 8	CAT 3512B	5/98
TMT Corporation	N/A	Passenger Ferry FRP	8508	100 x 22.7	CAT 3512B	11/98

Yager Marine, Inc., Owensboro, KY

Vessel Owner	Vessel Name	Vessel Type	Hull	Dimensions	Engines	Delivery Date
Yager Materials	N/A	Sand & Gravel Dredge	N/A	170 x 46 x 7.3	N/A	9/98

Zidell Marine Group, Portland, OR

Vessel Owner	Vessel Name	Vessel Type	Hull	Dimensions	Engines	Delivery Date
Zidell Marine Corp.	ZB240	Deck Cargo Barge	660	240 x 55 x 15	N/A	4/15/98
Zidell Marine Corp.	N/A	Deck Cargo Barge	661	285 x 78 x 18	N/A	9/15/98

BMI Starts Unique Conversion

Baltimore Marine Industries, Inc. (BMI) of Baltimore, Md. is currently working on a contract awarded by Cabot LNG Carriers, Inc. of Boston, Mass. for the reactivation and upgrading of LNGC *Matthew* — built by Newport News Shipbuilding Co., as a 125,000-cu.-m. carrier intended for global operations. *Matthew* was constructed to work as a steam turbine-driven, single screw LNG carrier featuring six cargo tanks.

Involved in the project will be the prepping and coating of the vessel's hull, decks, superstructure, deck machinery and piping.

In order to met bridge clearance limitations, the stack height will be reduced and an aerodynamic stack deflector spanning 56 ft. (17 m) will be fitted.

In addition, the radar/navigation light masts will be modified to pivot downward. The repair/reactivation work also includes a broad range of activities requiring coordination of BMI work items with owner-performed "specialist" work items. These services include functions such as installing emergency tow packages, relocating and upgrading the ship's service air and control air compressor, as well as refurbishing the cargo piping supports.

Matthew's propulsion machinery consists of high and low pressure steam turbines, along with a reduction gear coupled to a fixed pitch propellers. Steam is generated by two main boilers using both cargo gas and fuel oil. Electrical power is generated by two 2,150 kW steam turbine-driven alternators and one 400 kW diesel driven emergency alternator. *Matthew* was originally delivered in 1979 and was in operation until 1981 when it was laid-up.

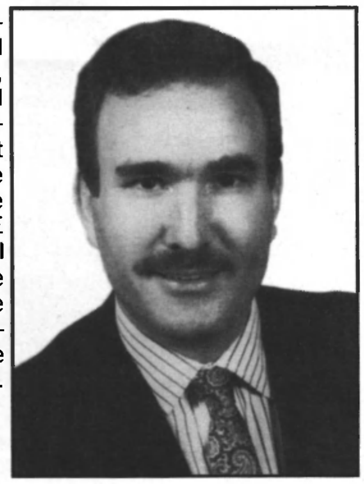
The vessel's status recently changed when it was towed to BMI on March 2, 1998 for repairs. Upon completion of the revitalization project, expected to last approximately seven months, *Matthew* will be classed to ABS standards and registered in the Commonwealth of the Bahamas.

Circle 83 on Reader Service Card

LNGC *Matthew* Main Particulars

Length, o.a.	948.6 ft. (289 m)
Length, b.p.	906 ft. (276.1 m)
Beam, molded	135 ft. (41.2 m)
Depth, molded	85 ft. (26 m)
Draft, design	36 ft. (11 m)
DWT	63,934 LT (64,991 MT)
Gross tonnage	69,472

RCI Is Taking The Plunge



Richard D. Fain, chairman and CEO of Royal Caribbean Cruises, Ltd, has continually positioned his company at the leading edge. The most recent example is the announcement that the company will feaute GE gas turbines on several new vessels. "We have designed these to be the most environmentally-sensitive cruise ships in the world," he said.

While it has often been discussed, Royal Caribbean International (RCI) has become the first cruise ship operator to incorporate gas turbine propulsion on a large cruise ship. Until now, the use of gas turbine propulsion has been limited to naval vessels and smaller fast craft. However, the ever pioneering Royal Caribbean believes the GE units will give its ship many decided advantages. A technological shift resulting in 80 to 98 percent reductions in exhaust emissions and much lower levels of noise and vibration will take place in engine rooms of new cruise ships for Royal Caribbean International and Celebrity Cruises. Up to six of their Voyager and Millennium-class vessels will be the first cruise ships ever powered by General Electric's gas and steam turbines instead of diesel engines.

"We have designed these to be the most environmentally-sensitive cruise ships in the world," said **Richard D. Fain**, chairman and CEO of Royal Caribbean Cruises, Ltd. "This technology introduces a new era in cruise ship design and marks the first partnership between a major American technology company and foreign-flagged cruise lines."

Each of the 85,000-ton ships, being constructed in France and Germany, will be equipped with a pair of GE Marine Engines' LM2500+ aeroderivative gas turbines and a single steam turbine instead of the four or five diesel engines used on modern cruise ships. On each cruise ship, gas turbines will drive generators which, in turn, provide electricity to propeller motors. Then a steam turbine recovers heat from the exhaust, providing energy for heating water and other electrical needs such as lighting. The first two Millennium ships for Celebrity Cruises are due in June 2000 and January 2001, and the first Voyager ship for Royal Caribbean International is due in February 2001. The company has options to build an additional three ships by 2003.

Royal Caribbean, actively looking at turbine technology for several years, has worked alongside General Electric to develop a cruise ship application. GE Marine Engines' LM 2500 has performed successfully on a variety of cruisers, frigates, destroyers and patrol boats for more than two dozen international navies. The U.S. Navy has used gas-turbine technology for propulsion since the 1970s. Gas turbines use a more expensive fuel than diesel, but the environmental benefits of gas turbines outweigh the added fuel costs to a cruise line. GE Power Systems will install the power plants and will provide service under a 10-year agreement.

"Turbine technology minimizes a ship's environmental impact by drastically reducing air emissions, sludge and oil waste," said **William K. Reilly**, former Environmental Protection Agency administrator who serves on Royal Caribbean's Board of Directors and advises the company on its environmental operations.

"Emissions of nitrous oxide are lowered 80 percent and sulfur oxide 98 percent, resulting in much lower emissions than from typical diesel engines," Mr. **Reilly** added.

Harri Kulovaara, Royal Caribbean's senior vice president of Marine Operations, said the technology has several other advantages for cruise ships. "By utilizing the waste heat from the turbine's exhaust, we're able to produce a major portion of the electricity for ship services, from heating water to air-conditioning, and it eliminates the need for additional energy-depleting machinery."

Mr. **Kulovaara** described the turbine technology "more reliable than diesel," and added, "Another benefit for the cruise line is that it reduces the size of the maintenance crew along with reduced parts inventory." Passenger benefits include reduction of noise and vibration. Since the machinery is very compact, much less space is required to house and maintain the turbines and related equipment.

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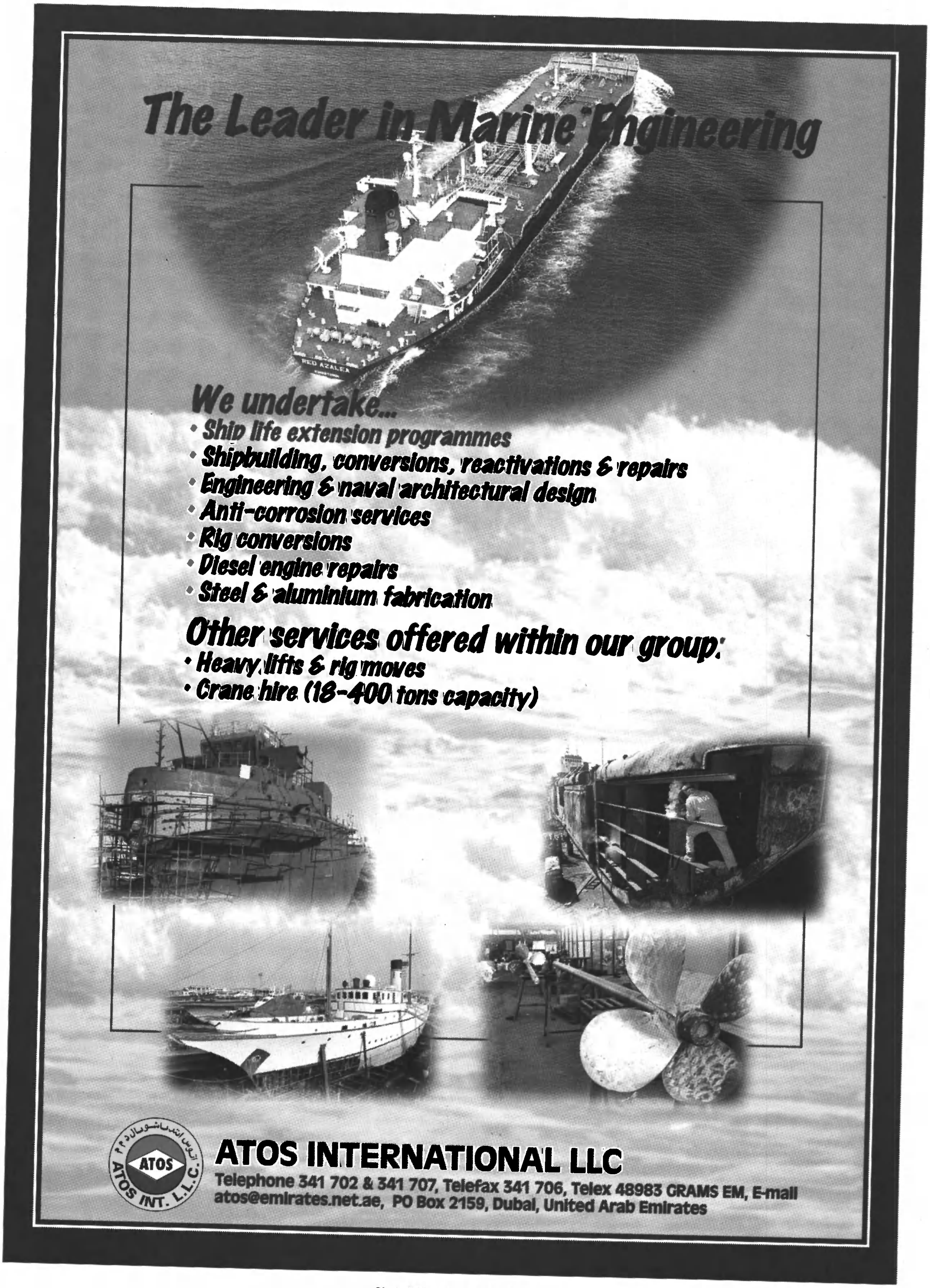

Circle 32[illegible] on Reader Service Card

Lintec Offers Unique Marine Fuel Testing Service

U.K. and Netherlands-based fuel testing and analysis company Lintec has established a unique sample testing service that can reportedly identify problematic polypropylene contamination in bunker oil. "We have invested in the very latest analysis hardware to identify the presence of polypropylene," said **John Dixon**, Lintec's managing director.

Lintec first alerted the maritime industry to the polypropylene problem last summer after a batch of polypropylene contaminated oil found its way into bunker markets worldwide. Polypropylene is an oil-based polymer used in the manufacture of plastic wrappings. Due to its physical properties, it is very difficult to isolate using standard centrifuges onboard ships and ends up blocking the ships' fuel filters. At present, the only solution is to debunker the vessel and filter the fuel on land, which can cost up to $300,000.

Already one shipowner has a pre-bunkering test program in place using Lintec, while another has agreed on an on-going sampling program.

Circle 66 on Reader Service Card

Luber-finer

Luber-finer offers a complete line of filters for marine applications worldwide, including oil, air, coolant and hydraulic filters. Every filter is factory-tested to ensure the highest performance in rough waters and engine protection in harsh marine conditions. Luber-finer products are manufactuered and distributed by Champion Laboratories, Inc.

Circle 67 on Reader Service Card

Elf Offers Analysis System

Elf Lub Marine offers ISO-certified lubricant products at more than 650 ports worldwide. The company's Diagomar analysis system provides spectro-analysis for wear metals featuring fully automated lab equipment and a computerized data bank. The system allows for prompt results of analysis to be obtained for the main characteristics of lubricants.

Circle 68 on Reader Service Card

New Catalog From Jet-Lube

Jet-Lube offers a 32-page catalog featuring performance and application recommendations on its complete line of specialty products, anti-seize compounds, thread sealants, EP greases, penetrants and coatings, cleaners and degreasers, anaerobics and aerosols. Product listings and application guides are categorized for general industry, marine, water well, oilfield, valve and specialty products. Primary based product contents, container sizes and product numbers are also included.

Circle 70 on Reader Service Card

Flowdata

FuelCom net fuel monitoring system from Flowdata is designed to provide temperature compensated fuel monitoring for diesel engines used in marine propulsion and onboard power generation. For recirculating fuel systems. FuelCom uses displacement flowmeters to prevent engine fuel-oil starvation and non-intrusive sensors to monitor the flow rate of both the supply and return sides, with the temperature-compensated difference providing a net burn measurement. For non-recirculating systems, a positive displacement flowmeter and sensor monitors the supply side only.

Circle 69 on Reader Service Card

Mobil Offers Internet-Based Global Analysis Program

PFA Inter-Link from Mobil is reportedly the first global analysis program to use the Internet to deliver anlaysis results to a customer's land-based computer. With the new software program, international shipping companies can receive, review and respond to time-critical PFA information in record time. Mobil has enhanced the program to allow users to view, print and store their entire fleets' most current lubrication charts and print out PFA sample bottle labels at their own offices.

Also available from Mobil is Mobilgard 450 NC, a non-chlorine, non-zinc marine lubricant for heavily loaded EMD engines operating under severe load conditions. Mobilgard 570 is a high-performance cylinder oil for modern crosshead diesel engines operating under the most severe conditions and using high sulfer content fuels.

Circle 71 on Reader Service Card

Reducing Bunker Price Uncertainty

Closer ties between BP Marine and its international trading function are designed to help ship owners reduce the exposure and price uncertainty they face in the bunker market. Voltaile oil prices lead to large fluctuation in bunker prices, resulting in difficuties for ship owners in regard to cost control. As a global supplier of marine fuels and a global trader of risk managment instruments, BP can provide its customers with physical fuel at a fixed price.

"From conversations with our customers we recognized that some wanted to exert greater control over bunker prices without having to participate directly in the 'paper' markets. With two distinct parts of BP working in unison, we can provide a much broader offer ... Risk management is about finding and securing the appropriate level of risk for each individual business," said Robert Lawson of BP's Risk Management group.

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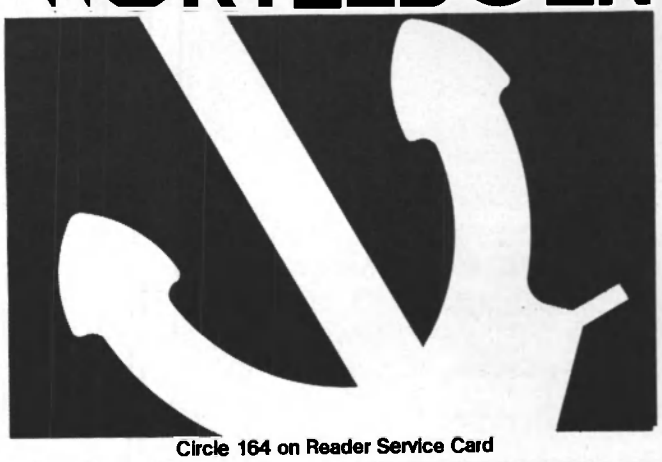

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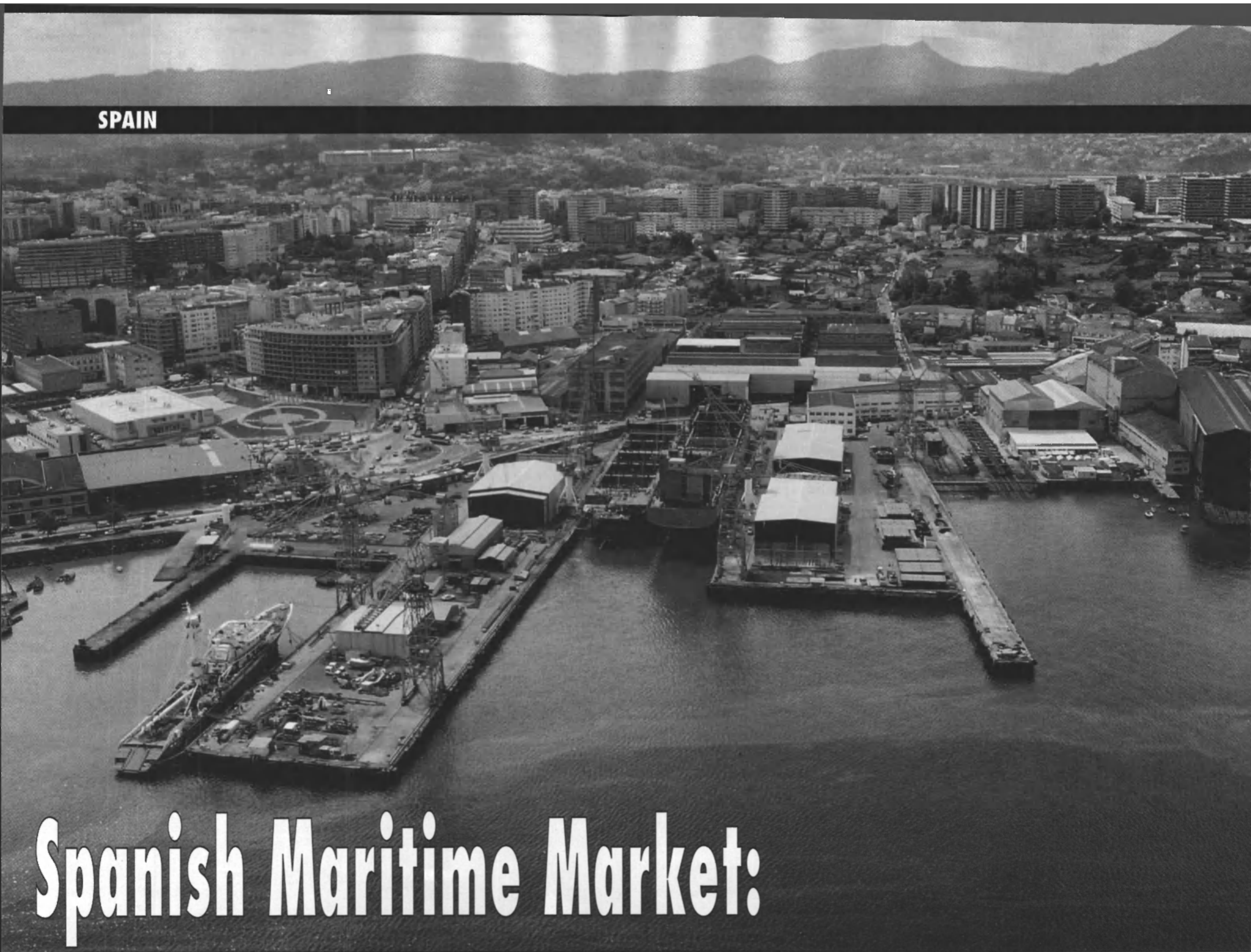

Spanish Maritime Market: The End And The Beginning

The impending ownership change for the Barreras yard at Vigo signals the start of privatization of AESA-controlled shipbuilding capacity.

by David Tinsley, technical editor

While continuing to gain ground in terms of financial performance and market credibility, state-owned Astilleros Españoles (AESA) will face considerable new challenges as well as responsibilities over the coming years, given a government commitment to the privatization process.

The corporation has tenaciously adhered to a policy of concentrating on more specialized sectors of the newbuilding market, even in the case of those larger yards where volume steel throughput with the more populous classes of vessel had initially been fundamental to the economics of the operation. That key element of strategy has undoubtedly contributed to an improved financial picture, while strengthening a reputation in niche areas of business and otherwise technically-demanding fields, as in stainless steel tanker, shuttle tanker, ferry and offshore vessel construction. One of the most significant aspects of the pattern of commercial development has been the cultivation of contractual links with influential groups in Scandinavia, the U.S. and elsewhere, in keeping with a very high export orientation. In fact, only limited opportunities have presented themselves on the home front over a period of weak demand from the Spanish shipping industry.

for two 125,000 dwt shuttle tankers to AESA and the Sestao yard is particularly salient, as AESA-built tonnage has been central not only to the development of the Haugesund company's fleet through the 1990s, but also to technological progress in the shuttle tanker field.

As significant has been the further reinforcement of contractual links with the Norwegian energy group Statoil, which has underwritten a further shuttle newbuild of 126,650-dwt, to be delivered from the Puerto Real facilities in Andalucia, the country's largest shipbuilding establishment.

Go-ahead U.K. shipowner Cenargo International, having extended its driver-accompanied, RoRo freight ship program at the Sevilla yard to four vessels, is about to phase first-of-class *Dawn Merchant* into service on the central corridor of the Irish Sea. The 6,300-dwt drive-through design has been developed to provide a 2,000 lane-meter freight capacity and accommodation for at least 214 passengers within main dimensions of 590.5 x 82 ft. (180 x 25-m).

While getting started on a new tranche of shuttle tanker and MST contracts, Puerto Real has turned its hand to the construction of sophisticated new types of high-capacity ferry for Scandinavian principals

The class offers an exceptionally fast transit speed of 25-knots at a representative freight-carrying draft, by virtue of a four-engine propulsion plant developing 23,000-kW in total.

A high degree of maneuverability is promised by the adoption of two powerful bowthrusters and twin, high-lift rudders.

The series can be expected to have a significant impact on Irish Sea traffic because of its unusual combination of high speed, trailer capacity and quality of driver accommodation. *Dawn Merchant*, assigned to the Liverpool/Dublin run, testifies to the versatility of the Sevilla yard, distinguished by its long tradition in shipbuilding and by its location 50 miles inland on the River Guadalquivir. Its preceding deliveries were Gorthon Lines' sophisticated, cassette-carrying forestry products carriers chartered to Swedish exporter SCA Transforest.

Unconstrained by space, and with its one million dwt capacity building dock a living testament to the industry's abounding confidence prior to the 1973 oil crisis, the Puerto Real yard retains a latent scope for volume production of steel-intensive tonnage. That capability was demonstrated to particular effect through the early 1990s with a run of Suezmax tankers, although hopes of a revival in long-haul crude carrier construction on the back of pan-European E3 technology never materialized.

But Puerto Real continues to

play a major role in AESA's successful and ongoing development of business in the niche market of purpose-designed, offshore-loading crude carriers and a new breed of multi-purpose shuttle tanker (MST). With the Andalucian yard complementing the activities in the sector of the Sestao establishment at Bilbao, the group can thereby offer the requisite skills and performance on a greater scale, to satisfy lead time requirements on larger or series newbuild projects, than many of its competitors.

For a country in which regional considerations are extremely important, the arrangements also mean a fair distribution of know-how between northern and southern premises.

While getting started on a new tranche of shuttle tanker and MST contracts, Puerto Real has turned its hand to the construction of sophisticated new types of high-capacity ferry for Scandinavian principals.

SweFerry's 42,800-gt *Skane* is a landmark design for the southern Baltic, conveying trains, commercial vehicles, cars and up to 600-passengers on the Trelleborg-Rostock connection between Sweden and Germany.

Puerto Real is also the birthplace for a new series of Sea Pacer-class RoPax ferries, conceived by Gothenburg-based Stena.

The class is distinguished by a remarkably high concentration of freight-carrying capacity, equating to 3,000-lane-meters. Following its conclusion of a deal with Finnlines whereby the Swedish firm will transfer ownership of the first two ferries to the Finnish operator on completion, Stena ordered two further vessels to its own account.

The San Fernando yard in Cadiz has consecutively produced a trio of Maestral-class, 40-knot monohulled passenger/car ferries and the very much larger Alhambra-type, followed last fall by a B60-designated catamaran vehicle ferry for Buquebus.

While currently the world's major point of concentration for the construction of dedicated, offshore-loading tankers, the Sestao yard at Bilbao is also a participant in the far-reaching, parcel tanker fleet renewal and development program fostered by Greenwich, Conn.-headquartered Stolt-Nielsen.

With AESA having to date sealed contracts from the Norwegian-American group for a total of six 22,460-dwt newbuildings, resources at Sestao as well as at the group's Juliana yard at Gijon are being directed into a project demanding especially high levels of skill and specialization.

The technical complexity of the subject design is implicit in the compartmentalization of the cargo section into 36 integral tanks and four deck tanks, incorporating individual pumps and fabricated from duplex stainless steel to cater for the full range of specialty chemical and related bulk liquids. In addition, and in line with the policy employed by Stolt for the various series of ships currently under production at European yards, the AESA sextet has been specified with a diesel-electric propulsion and power system.

The contract thereby reinforces AESA's position in the vanguard of world builders of cargo-carrying vessels applying the concept of a diesel-electric power station-type plant serving all shipboard energy needs.

While Sestao has been assigned two of the newbuilds, four have been placed with the Juliana yard, which has an impressive track record in building specialized tankers for Scandinavia. At the time of the firming-up of orders last year for the fifth and sixth vessels, options were placed on two further ships of the class.

Empresa Nacional Bazan has in recent years complemented its broad-based naval construction, shiprepair and engineering activities with the development of fast commercial vessel technology.

In the space of four years, its San Fernando yard in Cadiz has consecutively produced a trio of Maestral-class, 40-knot monohulled passenger/car ferries and the very much larger Alhambra-type, followed last fall by a B60-designated catamaran vehicle ferry for the Uruguayan-Argentine company Buquebus. The 252.6-ft. (77-m) *Luciano Federico L*, offering capacity for 446-passengers and 52-cars, became the world's fastest ferry at 57-knots. A second, similar vessel is under construction at San Fernando for the progressive South American owner.

AESA again proved a thorn in the side of Far East shipbuilders this year when it landed a deal from Transocean Offshore for the construction of two 54,000-gt drillships, to be undertaken by Astano at El Ferrol, the showcase offshore yard located on Spain's northwest tip.

While the potential buyers, at the time of writing, were exercising the accepted 'due diligence' prior to formal purchase, the group's sale of the well-regarded Barreras facility at Vigo to a private consortium is expected to be a highlight of structural changes in the industry during 1998.

AESA again proved a thorn in the side of Far East shipbuilders this year when it landed a deal from Transocean Offshore for the construction of two 54,000-gt drillships, to be undertaken by Astano at El Ferrol

Barreras has a reputation for quality and delivery performance with projects in technically-challenging areas, including ferries and RoRo ships, chemtankers and the largest types of deepwater tuna fishing vessels. Indicative of the diversity of production, output this year will feature a 973-TEU cellular containership for Naviera del Odiel of Madrid, an 8,300-dwt chemical carrier for a French owner, and a diesel-electric train/RoRo ferry for New Zealand.

The successful bidding group comprises two clients of the yard in the shape of Naviera del Odiel and one of the world's biggest operators of deepwater tuna freezer fishing vessels, Naviera Albacora, along with the locally-based Garofa Costas industrial group and a yard management team.

The new venture has an evidently sound platform on which to build in the shape of a profitable business, good production facilities and motivated personnel, and an orderbook extending through 1999. Leading on from this year's boxship, chemtanker and ferry deliveries, the Vigo yard's commitments include a tuna purse seiner in excess of 100 m for Albacora and two 1,250-unit capacity vehicle carriers ordered by Vapores Suardiaz.

Tuna catchers in the 344.4 to 354.3-ft. (105 to 108-m) range delivered in recent years by Barreras to Albacora and French-owned Saupiquet rate as the largest ships of their type worldwide, giving new dimension to Spanish prowess in the design, construction and equipping of the gamut of fishing vessel types.

The scale of activity generated by the fisheries industry remains substantial, but the impact of quota regulations and other factors has depressed overall demand for new fishing vessels, necessitating changes in business emphasis for large parts of the supplier industries.

A number of privately-owned yards in Spain have proved very effective in developing new lines of specialization, a case in point being the Astilleros Zamakona enterprise, which has emerged in the 1990s as one of Europe's most prominent tug builders after many years of concentrating on fishing vessels.

Located in the north-east at Santurce, in the

Bilbao area, the Zamakona yard has generated and maintained a substantial tug construction workload, currently including a seven-vessel series for Spanish towage contractor Grupo Boluda. The Boluda program consists of three tractor tugs, one of which has been delivered, plus four stern drive tugs, with identical main engines and Aquamaster azimuthing propulsion units.

The Spanish yard has also this year given new depth to its international market standing by building a Schottel tractor tug of 45-tons bollard-pull for a German operator.

Zamakona's production versatility, and the export competitiveness of Spain's private sector, were again demonstrated at the beginning of the year by the commissioning of a double-ended fjord ferry for operation in the west Norwegian county from which owner More og Romsdal Fylkesbaatar (MRF) takes its name.

Arranged to carry 400-passengers and 75-cars, or a mix of 59-ft. (18-m) trailers and cars, the 285.4-ft. (87-m) *Ivar Aasen* rates as a rare example of foreign construction among a fleet designed to maintain short crossings on the Norwegian fjord service network, an essential part of the transportation infrastructure. The remarkable propulsion system comprises two Schottel azimuthing units, one at each end of the hull, and in each case incorporating contra-rotating, twin-propellers.

The intact skills at Santurce in building competitive, rugged vessels for the fisheries sector were given higher profile by the delivery to Shetland owners last year of the 144.3 ft. (44-m) state-of-the-art *Sunbeam*.

The intact skills at Santurce in building competitive, rugged vessels for the fisheries sector were given higher profile by the delivery to Shetland owners last year of the 144.3 ft. (44-m) state-of-the-art *Sunbeam*

It has been conceived for stern trawling and twin rigging on the established grounds around the U.K. and north of Norway, together with the developing deepwater fishing in the Atlantic. Its design reflects the special considerations arising from operations in hostile environments, with an emphasis on the ease of handling the extensive gear carried by such a multi-function vessel.

Zamakona is one of the nine, independent shipbuilding companies which owns the Madrid-headquartered commercial organization Construnaves.

With more than 30 years' experience in the international market, its role can potentially embrace all financial aspects of newbuilding agreements. The resilient private sector as largely represented by the nine firms is involved in a diverse range of small and medium-sized vessels, up to the 554.4-ft. (169-m) maximum length offered by Union Naval de Levante (UNL) and the 541.3-ft. (165-m) at Naval Gijon.

In totality, the shareholders in Construnaves offer one of the most comprehensive newbuilding possibilities worldwide for fishing vessels, the generic type that provides the ties that bind within the industry.

Strategically located at the entrance to the Mediterranean on the Strait of Gibraltar, and in an area of increasing transhipment activity, a new repair yard is about to start operations under the Cernaval banner.

Founded on a 70,000-sq.-m. site at Algeciras Bay previously used by the former Crinavis shipyard, the new enterprise will be able to drydock vessels within the limits of a 9,000-ton lift-capacity floating dock of 525 x 78.7-ft. (160 x 24-m) main dimensions, and carry out repairs afloat to ships of any size.

The yard's huge integral dry dock of 1,312.3 x 164-ft. (400 x 50-m) will initially be used as an open, unlocked facility, providing alongside berthing for vessels under repair, refit or conversion.

Created 11 years ago by a broad spread of shareholders, comprising both companies and individuals involved in the marine business, technical consultancy firm Sistemar has achieved sustained success with its innovative, CLT (contracted and loaded tip) propeller concept.

In fact, a record volume of business was generated for the design over the course of the past year in the newbuild and retrofit markets.

Depending on the type of ship and nature of the propulsion plant, fuel savings of 10 to 15 percent have been claimed for propellers employing CLT blades, together with enhanced maneuverability and low vibration levels. While the actual gains and perceived advantages vary in accordance with the precise nature of the ship design, engineering installation and field of operations, the increased rate of recourse to the concept in 1997 testifies to demonstrable, overall performance benefits.

Central to the higher efficiency engendered by the CLT propeller is the design of blade geometry relative to radial circulation distribution, coupled with the adoption of the distinguishing end plates at the blade tips. Also described as barrier elements, the plates contribute to the creation of a high pressure differential between the forward and after areas of the screw.

The entire series of B577-designated bulk/container carriers under construction in Poland at Stocznia Szczecinska for Compania Chilena de Navegacion Interoceanica (CCNI) is being equipped with CLT monoblock propellers manufactured in Spain by Navalips. Several newbuildings booked with the Szczecin yard by local shipowning group Polish Steamship Company (PZM) will also feature the concept, and it was anticipated the overall propeller production would be assigned to the Polish company ABB Zamech.

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Halter Joins South American Shipyard In Joint Venture

Halter Marine Group, Inc. and Sanym, S.A. of Argentina have entered into a joint venture for the construction of two 112-ft. (34 m), 3,000 hp, raised-pilot house towboats for Vessel Management Services, Inc., a subsidiary of Crowley Maritime Corporation which will own and operate the boats.

Construction under American Bureau of Shipping (ABS) rules, has begun at Sanym and delivery of both vessels will occur within the next year.

John Dane III, chairman, president and CEO of Halter Marine Group, Inc. said, "We are particularly pleased that Crowley chose Halter designed towboats as their first vessels to be built in Argentina to take advantage of the privatization of transportation activities resulting from the Mercosur Free Trade Agreement."

The Halter design, which has been supplied to Sanym, is an adaptation of two proven tow boats, *Asunceno* and *Capt. Bilbo*, specifically designed for South American waterways.

Each vessel will be powered by two Caterpillar 3512B diesel engines, each developing 1,500 hp and driving 87-in., four-blade stainless steel propellers through Reintjes reverse/reduction gears. Electrical power will be provided by two 105 kW generators driven by two Caterpillar 3304 diesel engines.

The boats' two steering rudders and four flanking rudders will be moved by an EMI electric/hydraulic system and Fernstrum grid coolers will cool the engines.

Two Nabrico deck winches capable of exerting 60 tons of pull will be installed on each. A partial list of navigation and communications equipment includes two Furuno radars and three Sephen radios.

Each boat will be able to carry approximately 56,000 gallons of fuel oil, 500 gallons of oil and 10,400 gallons of fresh water and each will have air-conditioned accommodations for 13.

Circle 85 on Reader Service Card

Kamewa Selects Louisiana As Home For Global Hub

Kamewa America, a world leader in marine propulsion products and services, recently announced its plan to relocate its corporate administrative office to Covington, La. The office, one of its four global hubs for parts and inventory, will include Corporate, Service, Design, Sales, Parts and Inventory departments.

The organization was scheduled to open in Covington early this month, as a hemispheric hub of its parent company, Kamewa AB of Sweden.

In addition, the international business division of the corporation is relocating from Fort Lauderdale, Fla. to better serve markets in North America, South America, Canada and the Caribbean. Kamewa officials characterized the move to South Louisiana as customer driven, reflecting a corporate decision by the parent company to enhance customer initiatives in Service, Design, Parts and Sales. The change is intended to strengthen service to customers through the parent company's four global anchors.

During the current reorganization phase, Kamewa America employs 20 people in Administrative, Sales, Design and Service. The company plans to expand its workforce to 30 before the end of the year. The new office in the North Park Business Complex occupies approximately 8,000-sq.-ft., including space for administrative offices, parts/inventory storage and additional warehousing.

Circle 86 on Reader Service Card

As changes continue to sweep the marine electronics market, so too do they alter the way in which these products are manufactured and sold. Offshore Systems International, Inc. (OSI) of Fife, Wash., is a prime example of a young, agile company poised to expand its business while fulfilling the industry's electronics product needs. A subsidiary of Offshore Systems, Ltd., OSI is the sole distributor for a full line of gyrocompasses, autopilots and speed logs manufactured by Yokogawa Denshikiki Company (YDK) Ltd. of Japan in North, South and Central America. OSI's $1.1 million in annual sales comes from the marketing of four products in navigational equipment: the CMZ50 Series Gyrocompass; the CMZ500 Gyrocompass System; EML50 Series Electromagnetic Speed Log and the EML500 Series Electromagnetic Speed Log.

The CMZ50 Series Gyrocompass features a single, compact, lightweight and low power consuming design. Applications include coastal fishing and supply and transportation vessels which require high accuracy.

According to OSI, the CMZ500 Gyrocompass System is designed to be a highly reliable and accurate system featuring a compact, low-power and lightweight design. Utilization of the equipment includes offshore shipping transportation and supply vessels.

The versatility, reliability and accuracy of the EML50 Series Electromagnetic Speed Log reportedly satisfies a wide range of applications from workboats to research vessels and ferries.

The EML500 Series Electromagnetic Speed Log is suited for craft from research vessels to VLCCs.

OSI claims both EML50 and EML500 are adaptable, capable and precise in measurement. They are also largely unaffected by salinity or silt content, OSI affirms. In addition, the electromagnetic logs are not effected by losing track of the ocean floor as they operate strictly with the flow of water across the face of the sensor.

OSI recently added a new product to its trade, the PT500. It is the fourth in YDK's series of computer controlled Autopilots. Adaptable to commercial applications, the PT500 can reportedly handle any vessel with high course accuracy and increased fuel savings. OSI credits its success to certain marketing strategies. The company focuses its resources on the retrofit and newbuild markets, comprising the U.S.-Foreign Flag workboat, supply, RoRo, bulker, container and tanker fleets. Over the last 10 years, OSI has witnessed an expansion from one main supplier in the U.S. to three companies that control commercial navigation trade in the Americas, creating a large gain in OSI's market share. OSI provides 24-hr. factory-trained support and parts shipment to all of its clients in the Americas. The company also assists YDK by supporting its European distributors on an emergency parts basis.

OSI predicts a wave of changes in the South American market. The company foresees the South American yards as a new business that has been either unreachable or dormant to most U.S. firms. OSI believes the South American market will flourish in the years to come as governments stabilize and new trade treaties are signed.

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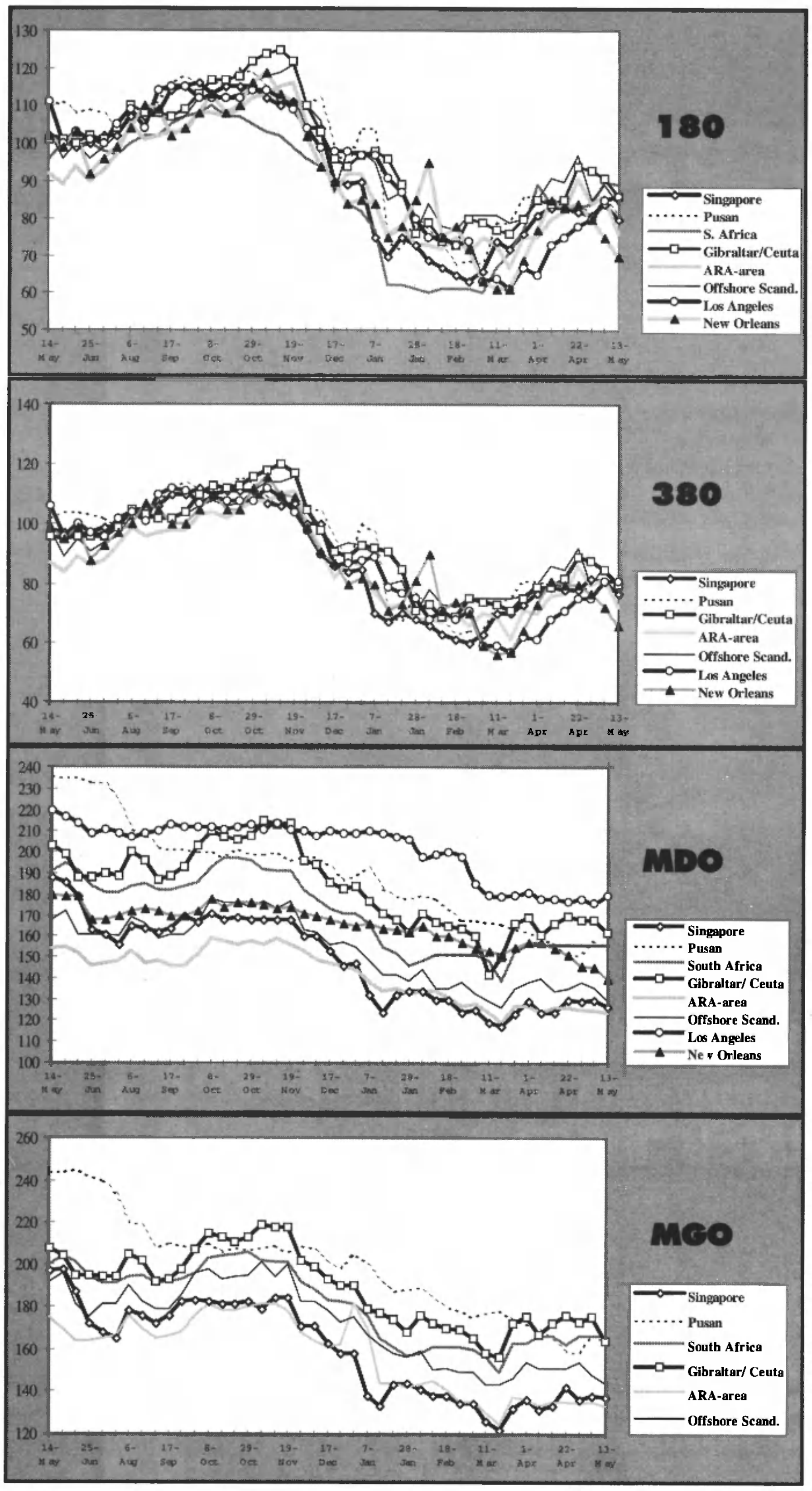
Bunker Fuel Monitor

A/S DAN-BUNKERING Ltd.



* ARA-area = Amsterdam/Rotterdam/Antwerp

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MGO = Marine Gas Oil - MDO = Marine Diesel Oil

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E-mail middelfart@dan-bunkering.dk	E-mail copenhagen@dan-bunkering.dk

http://www.dan-bunkering.dk

World Shipyard Orderbook

The following is a breakdown of the world shipbuilding orderbook, as of March 26, 1998, by SHIPYARD. For breakdown by vessel type, please see pages 146 and 158. Source: Lloyd's Register

Ship Name	GT	Ship Type	Year
61 Kommunar Shipyard — Ukraine			
0061 KOMMUNAR 1149	12 000	REF. CARGO SHIP	1998
0061 KOMMUNAR 1150	12 000	REF. CARGO SHIP	1998
0061 KOMMUNAR 1151	7 000	REF. CARGO SHIP	1998
0061 KOMMUNAR 1152	7 000	REF. CARGO SHIP	1998
FRIO HELLENIC	12 000	REF. CARGO SHIP	1998
0061 KOMMUNAR 1148	12 000	REF. CARGO SHIP	1998
A/O Baltiyskiy Sudomekhaniches — Russia			
BALTIC ST. PETERSBURG 452	28 000	BULK CARRIER	1998
BALTIC ST. PETERSBURG 451	28 000	BULK CARRIER	1998
BALTIC ST. PETERSBURG 453	28 000	BULK CARRIER	1999
BALTIYSKIY 705	13 000	ICE-BREAKER	1999
BALTIC ST. PETERSBURG 454	28 000	BULK CARRIER	2000
BALTIC ST. PETERSBURG 455	28 000	BULK CARRIER	2000
BALTIC ST. PETERSBURG 456	28 000	BULK CARRIER	2000
A/S Nordsovaerftet — Denmark			
ISOLA MORA	2 000	CHEM. TANKER	1998
NORDSOVAERFTET 231	2 000	CHEM. TANKER	1998
NORDSOVAERFTET 232	2 000	CHEM. TANKER	1998
NORDSOVAERFTET 233	2 000	CHEM. TANKER	1998
NORDSOVAERFTET 234	4 000	CHEM. TANKER	1999
Aarhus Flydedok A/S — Denmark			
ISOLA AMBRA	5 000	CHEM. TANKER	1998
AARHUS FLYDEDOK 228	5 000	CHEM. TANKER	1998
AARHUS FLYDEDOK 225	6 285	GENERAL CARGO	1998
AARHUS FLYDEDOK 226	6 285	GENERAL CARGO	1998
PERSEY	3 817	REF. CARGO SHIP	1998
CENTAUR	3 817	REF. CARGO SHIP	1998
Aas Mek. Verksted A/S — Norway			
OYTIND	319	FISH CARRIER	1998
AAS 150	350	FISH CARRIER	1998
INGER HILDUR	1 200	FISHING VESSEL	1999
AAS 153	325	LIVE-FISH CARRIER	1999
ABG Shipyard Ltd. — India			
PRANIK PRAGATI	1 874	BULK CARRIER	1998
LYSVIK	5 570	GENERAL CARGO	1998
ABG 154	5 570	GENERAL CARGO	1998
ORIENT PATRIARCH	8 200	CONTAINERSHIP	1998
ESSAR TUG IX	293	PUSHER TUG	1998
ESSAR TUG XII	293	PUSHER TUG	1998
ACH-Soc. Nouvelle des At. & Ch — France			
STOLT ACHIEVEMENT	25 000	CHEM. TANKER	1998
STOLT PERSEVERANCE	25 000	CHEM. TANKER	1999
STOLT ENDEAVOUR	25 000	CHEM. TANKER	1999
Admiralteiskiy Shipyard — Russia			
CAPE BENAT	21 142	CHEM./OIL PROD. TANKER	1998
ADMIRALTEISKIY 2715	21 142	OIL PROD. TANKER	1998
ADMIRALTEISKIY 2730	12 000	CHEM./OIL PROD. TANKER	1999
ADMIRALTEISKIY 2731	12 000	CHEM./OIL PROD. TANKER	1999
BLUE SEA	25 000	PASS. (CRUISE) SHIP	1999
ADMIRALTEISKIY 2732	12 000	CHEM./OIL PROD. TANKER	2000
Ailsa Troon Ltd. — Great Britain			
AILSA-TROON 575	527	TRAWLER	1998
AILSA-TROON 576	717	TRAWLER	1998
AILSA-TROON 577	717	TRAWLER	1998
AILSA-TROON	150	PATROL VESSEL	1998
Aker MTW Werft GmbH — Germany (United)			
MERKUR TIDE	15 929	CONTAINERSHIP	1998
AKER MTW 305	15 929	CONTAINERSHIP	1998
BORKUM TRADER	25 361	CONTAINERSHIP	1998
ANIKA OLTMANN	25 361	CONTAINERSHIP	1998
JUIST TRADER	25 361	CONTAINERSHIP	1998
HELGOLAND TRADER	25 361	CONTAINERSHIP	1998
AKER MTW 133	14 050	CHEM. TANKER	1999
AKER MTW 134	14 050	CHEM. TANKER	1999
AKER MTW 135	14 050	CHEM. TANKER	1999
AKER MTW 275	10 298	CHEM./OIL PROD. TANKER	1999
AKER MTW 276	10 298	CHEM./OIL PROD. TANKER	1999
AKER MTW 277	10 298	CHEM./OIL PROD. TANKER	1999
AKER MTW 435	25 361	CONTAINERSHIP	1999
AKER MTW 136	14 050	CHEM. TANKER	2000
Alabama Shipyard Inc., — U.S.A.			
AMALIENBORG	11 000	CHEM. TANKER	1998
AGGERSBORG	11 000	CHEM. TANKER	1998
ALABAMA 54	16 800	CONTAINERSHIP	1999
ALABAMA 55	16 800	CONTAINERSHIP	1999
ALABAMA 56	16 800	CONTAINERSHIP	1999
ALABAMA 57	16 800	CONTAINERSHIP	1999
Alcock, Ashdown Ltd. — India			
ALCOCK ASHDOWN 220	2 495	OIL PROD. TANKER	1999
Alexandria Shipyard — Egypt			
N.26	4 500	GENERAL CARGO	1998
N.25	4 500	GENERAL CARGO	1998
Aluminium Fast Ferries Austral — Australia			
ALUMINIUM FAST FERRIES 03	180	PASS./RoRo CARGO SHIP	1998
Amur Shipyard — Russia			
AMUR	3 600	CRUDE OIL TANKER	1998
USSURI	4 690	GENERAL CARGO	1998
Ananda Builders Ltd. —Bangladesh			
ANANDA 226/15	135	TUG	1998
Appledore Shipbuilders Ltd. — Great Britain			
APPLEDORE 174	5 000	PASS./RoRo CARGO SHIP	1998
APPLEDORE 176	2 100	OFFSHORE SUPPLY SHIP	1999
APPLEDORE 175	2 100	OFFSHORE SUPPLY SHIP	1999
Arkhangelsk Shipyard "Krasnyy — Russia			
KRASNYY KUZNITSA 001	700	GENERAL CARGO	1998
KRASNYY KUZNITSA 003	700	GENERAL CARGO	1998
KRASNYY KUZNITSA 005	700	GENERAL CARGO	1998
KRASNYY KUZNITSA 006	700	GENERAL CARGO	1998
KRASNYY KUZNITSA 007	700	GENERAL CARGO	1998
Arvandan Shipbuilding Co. — Iran			
ARVANDAN	500	PASS./RoRo CARGO SHIP	1998
ARVANDAN	500	PASS./RoRo CARGO SHIP	1998
ARVANDAN 73/106	300	PASS.SHIP	1999
Asakawa Zosen K.K. — Japan			
PANAM LINDA	5 999	CHEM. TANKER	1998
ORIENTAL ORCHID	5 999	CHEM. TANKER	1998
ORIENTAL JASMIN	5 999	CHEM. TANKER	1998
Ast. Construcciones S.A. — Spain			
AEGEAN SEA	1 352	PASS.SHIP	1998
Ast. de Huelva S.A. — Spain			
LEMBITU	7 8?0	RoRo CARGO SHIP	1998
VARBOLA	7 8?0	RoRo CARGO SHIP	1998
JULIAN BESTEIRO	8 851	PASS./RoRo CARGO SHIP	1998
HUELVA 571	193	TRAWLER	1998
HUELVA 604	242	TRAWLER	1998
HUELVA 405	305	FISHING VESSEL	1998
HUELVA 459	305	FISHING VESSEL	1998
LEILI	7 800	RoRo CARGO SHIP	1999
MURUETA 199	1 700	TRAWLER	1998
AURORA B	2 453	TRAWLER	1998
Ast. Naval Federico Contessi y — Spain			

Ship Name	GT	Ship Type	Year
CONTESSI 081	143	TRAWLER	1998
SASOR	125	TRAWLER	1998
Ast. Zamacona S.A. — Spain			
IVAR AASEN	4 000	PASS./RoRo CARGO SHIP	1998
TOKI ALAI BERRIA	312	FISHING VESSEL	1998
PAU CASALS	253	TUG	1998
MONTSACOPA	262	TUG	1998
V.B. MEDITERRANEO	345	TUG	1998
V.B. BALEAR	345	TUG	1998
V.B. ALBORAN	345	TUG	1998
MICHEL	339	TUG	1998
ZAMACONA 433	300	TUG	1998
ZAMACONA 434	300	TUG	1998
ZAMACONA 435	300	TUG	1998
ZAMACONA 436	300	TUG	1998
ZAMACONA 376	316	TUG	1998
ZAMACONA 377	316	TUG	1998
JEDDAH 30	305	BUOY/LIGHTHOUSE VESSEL	1998
SUNBEAM	922	FISHING VESSEL	1999
ASTAFERSA, Ast. y Tall. — Spain			
MESSINA	202	TRAWLER	1998
ASTAFERSA 336	202	TRAWLER	1998
ASTAFERSA 337	202	TRAWLER	1998
ASTAFERSA 338	202	TRAWLER	1998
ASTAFERSA 347	202	TRAWLER	1998
ASTANO, Astilleros y Tallere — Spain			
DISCOVERER ENTERPRISE	54 744	DRILLING SHIP	1998
Astillero Anibal Vanoli y Cia.			
ICHTHYS	212	FISHING VESSEL	1998
Astilleros Arica S.A. — Chile			
ARICA 023	328	FISHING VESSEL	1998
Astilleros Armada S.A. — Spain			
NUEVO MARIA LOURDES	241	TRAWLER	1998
Astilleros Armon Burela S.A. — Spain			
XUDEMIL	219	TRAWLER	1998
PLAYA DAS DUNAS	251	TRAWLER	1998
ROSINA	206	TRAWLER	1998
SABINO SEGUNDO	208	TRAWLER	1998
MARINA SEGUNDA	208	TRAWLER	1998
RIO XUNCO	239	TRAWLER	1998
Astilleros Armon S.A. — Spain			
NUEVO HERMANOS REYES	158	TRAWLER	1998
VICTORY	507	TRAWLER	1998
ARMON NAVIA 464	341	TRAWLER	1998
PLAYA LA CALETA	257	TRAWLER	1998
ARMON NAVIA 410	110	FISHING VESSEL	1998
ARMON NAVIA 445	126	FISHING VESSEL	1998
BELMA	221	FISHING VESSEL	1998
ARMON NAVIA 479	245	FISHING VESSEL	1998
ARMON NAVIA 474	358	TUG	1998
ARMON NAVIA 425	359	TUG	1998
ARMON NAVIA 427	359	TUG	1998
ARMON NAVIA 491	770	TRAWLER	1999
ARMON NAVIA 492	770	TRAWLER	1999
Astilleros Corrientes S.A. — Argentina			
UROS Z	3 167	CHEM./OIL PROD. TANKER	1998
Astilleros de Pasaia S.A. — Spain			
SANTA LUZIA	194	FISHING VESSEL	1998
SAN PRUDENZIO BERRIA	224	FISHING VESSEL	1998
Astilleros Espanoles S.A. (AES) — Spain			
STOLT SEA	14 916	CHEM. TANKER	1998
ESPANOLES SESTAO 314	72 097	CRUDE OIL TANKER	1998
NAVION BRITANNIA	72 097	CRUDE OIL TANKER	1998
ESPANOLES PUERTO REAL 83	71 370	CRUDE OIL TANKER	1998
DAWN MERCHANT	19 800	PASS./RoRo CARGO SHIP	1998
ESPANOLES SEVILLA 288	19 800	PASS./RoRo CARGO SHIP	1998
FINNCLIPPER	30 500	PASS./RoRo CARGO SHIP	1998
FINNEAGLE	30 500	PASS./RoRo CARGO SHIP	1998
SKANE	42 500	PASS./RoRo CARGO SHIP	1998
STOLT SUN	14 916	CHEM. TANKER	1999
ESPANOLES SESTAO 315	72 097	CRUDE OIL TANKER	1999
ESPANOLES SESTAO 317	71 850	CRUDE OIL TANKER	1999
ESPANOLES SEVILLA 289	19 800	PASS./RoRo CARGO SHIP	1999
ESPANOLES SEVILLA 290	19 800	PASS./RoRo CARGO SHIP	1999
ESPANOLES PUERTO REAL 80	30 500	PASS./RoRo CARGO SHIP	1999
ESPANOLES PUERTO REAL 84	102 000	DRILLING SHIP	1999
ESPANOLES PUERTO REAL 81	30 500	PASS./RoRo CARGO SHIP	2000
Astilleros Gondan S.A. — Spain			
GONDAN 406	448	TRAWLER	1998
GONDAN 400	690	TRAWLER	1998
GONDAN 403	2 500	GENERAL CARGO	1999
GONDAN 404	2 500	GENERAL CARGO	1999
GONDAN 405	5 000	PASS. (CRUISE) SHIP	1999
GONDAN 388	1 200	TRAWLER	1999
GONDAN 409	1 200	TRAWLER	1999
GONDAN 408	1 200	TRAWLER	1999
Astilleros Marco Chilena Ltda. — Chile			
MARCO CHILENA IQUIQUE 216	2 000	FISHING VESSEL	1998
Astilleros Naves Industriales — Peru			
RODGA III	600	FISHING VESSEL	1998
RODA IV	600	FISHING VESSEL	1998
RODGA II	600	FISHING VESSEL	1998
GUILLERMO	350	FISHING VESSEL	1998
Astilleros y Servicios Navales			
ASENAV 121	1 900	FISHING VESSEL	1998
EL CAZADOR II	2 000	FISHING VESSEL	1998
Aukra Industrier A/S — Norway			
DORIS	16 150	CHEM./OIL PROD. TANKER	1998
FINNSTRAUM	9 950	CHEM./OIL PROD. TANKER	1999
AUKRA 101	9 800	CHEM./OIL PROD. TANKER	2000
Austal Ships Pty. Ltd. — Australia			
JADE EXPRESS	550	PASS./RoRo CARGO SHIP	1998
AUSTAL 63	6 000	PASS./RoRo CARGO SHIP	1998
GEKKA 2000	550	PASS.SHIP	1998
AUSTAL 67	200	PASS.SHIP	1998
AUSTAL 65	200	PASS.SHIP	1998
AUSTAL 66	200	PASS.SHIP	1998
AUSTAL 64	600	PASS.SHIP	1998
Aveco (Teesside) Ltd. — Great Britain			
MACDUFF 589	200	FISHING VESSEL	1998
MACDUFF 593	200	FISHING VESSEL	1998
MACDUFF 596	200	FISHING VESSEL	1999
Avondale Industries, Inc. — U.S.A.			
MICHAEL A. HEALY	15 150	ICE-BREAKER	1998

Ship Name	GT	Ship Type	Year
Aykin Denizcilik San. ve Tic. —Turkey			
H. KEMAL KAPTAN	1 250	GENERAL CARGO	1998
B.V. Scheepswerf "Ferus Smit" — Netherlands			
NAMAI	4 100	GENERAL CARGO	1998
KASTEELBORG	5 999	GENERAL CARGO	1998
SMIT FERUS 317	3 750	GENERAL CARGO	1998
SMIT FERUS 318	3 750	GENERAL CARGO	1998
FLINTEREEMS	4 360	GENERAL CARGO	1999
FLINTERMAAS	4 360	GENERAL CARGO	1999
B.V. Scheepswerf "Waterhuizen" — Netherlands			
IJSSELDIEP	3 600	GENERAL CARGO	1998
PATTJE 403	2 835	GENERAL CARGO	1998
MERWEDIEP	3 620	GENERAL CARGO	1998
MARNEDIEP	3 300	GENERAL CARGO	1999
B.V. Scheepswerf Damen Hoogeza — Netherlands			
DAMEN HOOGEZAND 741	2 715	GENERAL CARGO	1998
JANEI C	2 740	GENERAL CARGO	1998
DAMEN HOOGEZAND 718	2 740	GENERAL CARGO	1998
DAMEN HOOGEZAND 801	5 680	GENERAL CARGO	1998
DAMEN HOOGEZAND 802	5 680	GENERAL CARGO	1998
B.V. Scheepswerf K. Damen — Netherlands			
DAMEN HARDINXVELD 709	2 100	CHEM. TANKER	1998
DAMEN HARDINXVELD 710	2 100	CHEM. TANKER	1998
DAMEN HARDINXVELD 712	2 100	CHEM. TANKER	1998
DAMEN HARDINXVELD 5951	120	TUG	1998
DAMEN HARDINXVELD 719	2 100	CHEM. TANKER	1999
DAMEN HARDINXVELD 720	2 100	CHEM. TANKER	1999
DAMEN HARDINXVELD 713	2 100	CHEM. TANKER	1999
B.V. v/h Schps. Gebr. van Diep — Netherlands			
DINTELBORG	6 000	GENERAL CARGO	1998
VAN DIEPEN 1043	4 848	LIVESTOCK CARRIER	1998
DONGEBORG	6 000	GENERAL CARGO	1999
Baatbygg AS — Norway			
FROYANES JUNIOR	890	FISHING VESSEL	1998
LYNGHOLM	890	FISHING VESSEL	1998
Baatservice Verft A/S — Norway			
BAATSERVICE MANDAL 17	499	PASS.SHIP	1998
BAATSERVICE MANDAL 18	550	PASS.SHIP	1998
BAATSERVICE MANDAL 19	351	PASS.SHIP	1998
Banguhjin Shipbuilding — Korea (South)			
BANGUHJIN 104	2 667	OFFSHORE PROCESSING SHIP	1998
Bharati Shipyard Pvt. Ltd. — India			
BHARATI 259	1 600	GENERAL CARGO	1998
BHARATI 260	1 600	GENERAL CARGO	1998
BHARATI 239	400	TUG	1998
BHARATI 266	490	TUG	1998
BHARATI 267	490	TUG	1998
BHARATI 263	288	TUG	1998
SUDHIRMULJI	288	TUG	1998
BHARATI 265	490	TUG	1999
Binjiang Shipyard — China, People's Republic			
BINJIANG JY96122	18 037	CONTAINERSHIP	1998
BINJIANG JY96121	18 037	CONTAINERSHIP	1998
BINJIANG JY96123	18 037	CONTAINERSHIP	1999
BINJIANG JY96124	18 037	CONTAINERSHIP	1999
Blohm + Voss AG — Germany			
BLOHM & VOSS 961	25 000	PASS. (CRUISE) SHIP	2000
BLOHM & VOSS 962	25 000	PASS. (CRUISE) SHIP	2001
Bodewes Scheepswerven B.V. — Netherlands			
TRANSMAR	2 800	GENERAL CARGO	1998
PARAGON	2 800	GENERAL CARGO	1998
BODEWES HOOGEZAND 584	2 850	GENERAL CARGO	1998
BODEWES HOOGEZAND 587	4 800	GENERAL CARGO	1999
BODEWES HOOGEZAND 589	4 800	GENERAL CARGO	2000
BODEWES HOOGEZAND 588	4 800	GENERAL CARGO	2000
Bodewes Schpsw. "Volharding" — Netherlands			
VOLHARDING 337	2 800	GENERAL CARGO	1998
VOLHARDING 345	6 170	GENERAL CARGO	1998
SCHOUWENBANK	2 800	GENERAL CARGO	1998
NEMUNA	2 835	GENERAL CARGO	1998
VECHTBORG	6 170	GENERAL CARGO	1999
VOLHARDING 344	6 170	GENERAL CARGO	1998
VLISTBORG	6 170	GENERAL CARGO	1999
VLIEBORG	6 170	GENERAL CARGO	1999
Bohai Shipyard — China, People's Republic			
PACTIMBER	18 000	BULK CARRIER	1998
ALGARVE	23 253	GENERAL CARGO	1998
NORMANDIE	23 253	GENERAL CARGO	1998
BOHAI BH408-1	23 253	BULK CARRIER	1999
BOHAI BH408-2	23 253	BULK CARRIER	1999
Bollinger Machine Shop & Shpyd — U.S.A.			
SEAHORSE II	120	OFFSHORE SUPPLY SHIP	1998
DAMEN GORINCHEM 2657	165	PATROL VESSEL	1998
BOLLINGER 318	120	UTILITY VESSEL	1998
SEAHORSE IV	120	UTILITY VESSEL	1998
SEAHORSE III	120	UTILITY VESSEL	1999
Borneo Shipping & Timber — Malaysia			
MARATHA CRYSTAL	1 700	BULK CARRIER	1998
Brattvag Skipsverft A/S — Norway			
MERCURY BAY	1 850	OFFSHORE SUPPLY SHIP	1998
MONARCH BAY	1 850	OFFSHORE SUPPLY SHIP	1998
MAMMOTH BAY	1 969	OFFSHORE SUPPLY SHIP	1998
BRATTVAG 90	4 000	OFFSHORE SUPPLY SHIP	1999
BRATTVAG 91	3 200	OFFSHORE SUPPLY SHIP	2000
Breaux Brothers Enterprises — U.S.A.			
BREAUX BROTHERS 1655	250	CREWBOAT	1998
Bremer Vulkan Werft und Masch. — Germany			
NORWEGIAN SKY	78 200	PASS. (CRUISE) SHIP	1999
Brevik Construction AS — Norway			
STOUT TRUCK	1 969	OFFSHORE SUPPLY SHIP	1998
BREVIK 12	1 850	OFFSHORE SUPPLY SHIP	1998
Brodogradiliste "3 Maj" — Croatia			
0003 MAJ 662	39 000	OIL PROD. TANKER	1998
YONGXING	18 200	GENERAL CARGO	1998
NORWID	18 200	GENERAL CARGO	1998
0003 MAJ 617	15 000	CRANE SHIP	1998
0003 MAJ 663	39 000	OIL PROD. TANKER	1999
0003 MAJ 673	39 000	OIL PROD. TANKER	2000
0003 MAJ 674	39 000	OIL PROD. TANKER	2000
Brodogradiliste "Begej" — Yugoslavia			
MARBLE SEA	3 500	GENERAL CARGO	1998
MARBLE BAY	3 500	GENERAL CARGO	1998
MARBLE FJORD	3 500	GENERAL CARGO	1998
NORDEN	280	BUOY/LIGHTHOUSE VESSEL	1998

Ship Name	GT	Ship Type	Year
Brodogradiliste "Sava" — Yugoslavia			
SAVA 319	2 997	GENERAL CARGO	1998
SAVA 320	2 997	GENERAL CARGO	1998
SAVA 325	2 997	GENERAL CARGO	1998
PLUS	3 500	GENERAL CARGO	1998
PERU	3 500	GENERAL CARGO	1998
PROMPT	3 500	GENERAL CARGO	1998
SAVA 326	2 997	GENERAL CARGO	1999
Brodogradiliste "Uljanik" d.d. — Croatia			
KARA SEA	27 150	CHEM./OIL PROD. TANKER	1998
ULJANIK 424	27 150	CHEM./OIL PROD. TANKER	1998
NAUTILUS	26 750	CHEM./OIL PROD. TANKER	1998
ULJANIK 427	27 150	CHEM./OIL PROD. TANKER	1998
ULJANIK 429	11 000	CHEM./OIL PROD. TANKER	1998
ULJANIK 430	11 000	CHEM./OIL PROD. TANKER	1999
ULJANIK 431	11 000	CHEM./OIL PROD. TANKER	1999
ULJANIK 432	11 000	CHEM./OIL PROD. TANKER	1999
ULJANIK 419	45 000	PASS./LANDING CRAFT	1999
ULJANIK 420	45 000	PASS /LANDING CRAFT	1999
ULJANIK 421	45 000	PASS /LANDING CRAFT	2000
ULJANIK 422	45 000	PASS./LANDING CRAFT	2000
Brodogradiliste Apatin — Yugoslavia			
APATIN 1107	4 500	BULK CARRIER	1998
BOREALNES	4 500	BULK CARRIER	1998
APATIN 1105	4 500	BULK CARRIER	1998
APATIN 1106	4 500	BULK CARRIER	1998
Brodogradiliste Split — Croatia			
PODRAVINA	30 000	CHEM./OIL PROD. TANKER	1998
POSAVINA	30 000	CHEM./OIL PROD. TANKER	1998
BERING SEA	27 526	CHEM./OIL PROD. TANKER	1998
SPLIT	23 900	BULK CARRIER	1998
RUSSIAN SEA	27 150	CHEM./OIL PROD. TANKER	1999
SPLIT 407	26 400	OIL PROD. TANKER	1999
SPLIT 406	26 400	OIL PROD. TANKER	1999
SPLIT 403	11 100	REF. CARGO SHIP	1999
SPLIT 404	14 000	REE CARGO SHIP	1999
Brodogradiliste Trogir — Croatia			
AZOV SEA	27 526	CHEM./OIL PROD. TANKER	1998
MOSCOW SEA	27 150	CHEM./OIL PROD. TANKER	1998
MOSOR SAILOR	22 607	CHEM./OIL PROD. TANKER	1998
OKHOTSK SEA	27 150	CHEM./OIL PROD. TANKER	1999
TROGIR 242	5 600	GENERAL CARGO	1999
TROGIR 241	5 600	GENERAL CARGO	1999
TROGIR 243	5 600	GENERAL CARGO	2000
TROGIR 244	5 600	GENERAL CARGO	2000
TROGIR 245	5 600	GENERAL CARGO	2001
Brooke Dockyard & Eng. Works — Malaysia			
BROOKE H146	650	BUOY/LIGHTHOUSE VESSEL	1998
Bruces Shipyard AB — Sweden			
PASIPHAE	31 000	PASS./RoRo CARGO SHIP	1998
FOSEN 68	9 500	PASS./RoRo CARGO SHIP	1999
Burgas Shipyards Co. Ltd.			
NORTHERN RIVER	3 000	OFFSHORE SUPPLY SHIP	1998
C.N. "Visentini" di Visentini — Italy			
VISENTINI 184	15 500	PASS./RoRo CARGO SHIP	1998
VISENTINI 183	15 500	PASS./RoRo CARGO SHIP	1998
VISENTINI 185	21 000	PASS./RoRo CARGO SHIP	1999
C.N. de Fibras Lda. (CONAFI) — Portugal			
CONAFI 42	154	FISHING VESSEL	1998
Cant. Nav. A. Stabile — Italy			
STABILE RNC01/93	110	FISHING VESSEL	1998
STABILE RNC02/93	110	FISHING VESSEL	1998
STABILE RNC03/93	110	FISHING VESSEL	1998
Cant. Nav. de Poli S.p A. — Italy			
VENEZIA D	6 742	CHEM. TANKER	1998
SVEVA	8 000	CHEM. TANKER	1998
POLI 168	1 500	PASS./RoRo CARGO SHIP	1998
Cant. Nav. di Pesaro — Italy			
PESARO 83	3 800	LPG TANKER	1998
PESARO 82	3 000	LPG TANKER	1998
Cant. Nav. Fratelli Orlando — Italy			
MIMMO IEVOLI	6 000	CHEM. TANKER	1998
ORLANDO 165	6 000	CHEM./OIL PROD. TANKER	1998
GIOVANNI FAGIOLI	6 000	CHEM./OIL PROD. TANKER	1998
ORLANDO 270	24 000	CHEM. TANKER	1999
ORLANDO 271	24 000	CHEM. TANKER	1999
ORLANDO 166	9 700	CHEM. TANKER	1999
ORLANDO 168	9 800	CHEM./OIL PROD. TANKER	1999
ORLANDO 169	9 800	CHEM./OIL PROD. TANKER	1999
ORLANDO 164	6 000	CHEM./OIL PROD. TANKER	1999
Cant. Nav. Ind. Nav. Mecc. — Italy			
I.N.M.A. 4260	3 500	CHEM. TANKER	1998
I.N.M.A. 4261	3 500	CHEM. TANKER	1998
I.N.M.A. 4263	3 500	CHEM. TANKER	1998
I.N.M.A. 4262	3 500	CHEM. TANKER	1999
I.N.M.A. 4264	3 500	CHEM. TANKER	1999
I.N.M.A. 4265	3 500	CHEM. TANKER	1999
Cant. Nav. Mario Morini S.p.A. — Italy			
SMERALDO	4 896	CHEM. TANKER	1998
MORINI 259	7 200	OIL PROD. TANKER	1998
MORINI 260	6 000	OIL PROD. TANKER	1998
MORINI 265	9 000	OIL PROD. TANKER	1999
Cant. Nav. Rodriquez S.p.A. — Italy			
RODRIQUEZ 271	470	PASS.SHIP	1998
RODRIQUEZ 273	470	PASS.SHIP	1998
RODRIQUEZ 272	470	PASS.SHIP	1998
PRINCESS OF DUBROVNIK	320	PASS.SHIP	1998
RODRIQUEZ 267	2 000	PASS.SHIP	1998
RODRIQUEZ 268	2 000	PASS.SHIP	1998
RODRIQUEZ 269	2 000	PASS.SHIP	1998
RODRIQUEZ 270	2 000	PASS.SHIP	1998
Cant. Nav. Rosetti — Italy			
ROSETTI 30	350	TUG	1998
Cant. Nav. S.M.E.B. S.p.A. — Italy			
GI-AL	1 800	PASS. (CRUISE) SHIP	1998
Cant. Navale "Ferrari" S.p.A. — Italy			
FERRARI 225	33 000	PASS./LANDING CRAFT	1998
FERRARI 226	33 000	PASS./LANDING CRAFT	1998
FERRARI 229	670	PASS.SHIP	1998
CONSTANTE NERI	198	TUG	1998
Cant. Navali L. Rodriquez — Italy			
RODRIQUEZ 265	340	PASS.SHIP	1998
Cant. Navalmeccanico di — Italy			
NAVALMECCANICO 64	180	TRAWLER	1998

Ships On Order

(as of March 26, 1998)

SHIPTYPE	NO.
AGGREGATES CARRIER	1
BULK CARRIER	330
BULK/ORE CARRIER	4
BUOY/LIGHTHOUSE VESSEL	21
CABLE LAYER	4
CEMENT CARRIER	3
CHEMICAL TANKER	119
CHEMICAL/OIL PRODUCTS TANKER	87
CONTAINER SHIP	309
CRANE SHIP	1
CREWBOAT	5
CRUDE OIL TANKER	186
DECK CARGO SHIP	5
DREDGER	2
DRILLING SHIP	7
FIRE-FIGHTING VESSEL	2
FISH CARRIER	2
FISH FACTORY SHIP	1
FISHING SUPPORT VESSEL	2
FISHING VESSEL	98
GENERAL CARGO	326
HEAVY LOAD CARRIER	9
HOPPER DREDGER	14
ICE-BREAKER	3
LANDING CRAFT	5
LIMESTONE CARRIER	3
LIVE-FISH CARRIER	1
LIVESTOCK CARRIER	2
LNG TANKER	22
LPG TANKER	49
MOTOR HOPPER	4
OFFSHORE PROCESSING SHIP	8
OFFSHORE SUPPLY SHIP	46
OFFSHORE TUG/SUPPLY SHIP	22
OIL PRODUCTS TANKER	152
OTHER LIQUIDS	3
PALLETIzED CARGO SHIP	1
PASSENGER (CRUISE) SHIP	37
PASSENGER/GENERAL CARGO	3
PASSENGER/LANDING CRAFT	60
PASSENGER/RO-RO CARGO SHIP	82
PASSENGERSHIP	78
PATROL VESSEL	15
PILOT VESSEL	3
POLLUTION CONTROL VESSEL	4
PUSHER TUG	7
REFRIGERATED CARGO SHIP	39
RESEARCH VESSEL	24
RO-RO CARGO SHIP	41
SALVAGE VESSEL	1
SELF DISCHARGING BULK DRY	1
TANK CLEANING VESSEL	2
TENDER (UNSPECIFIED)	5
TRAINING SHIP	4
TRAWLER	140
TUG	215
UTILITY VESSEL	11
WELL-STIMULATION VESSEL	1
WOOD CHIPS CARRIER	7
WORK/REPAIR VESSEL	1

source: Lloyd's Register

World Shipyard Orderbook

Ship Name	GT	Ship Type	Year
NAVALMECCANICO 61	180	TRAWLER	1998
NAVALMECCANICO 62	180	TRAWLER	1998
NAVALMECCANICO 63	180	TRAWLER	1998
Cantiere Navale A.R.L. Coop. — Italy			
TOMMASI 85	150	TUG	1998
MARINA MC	150	TUG	1998
LOURDES MC	150	TUG	1998
TOMMASI 82	350	TUG	1999
TOMMASI 89	350	TUG	1999
Catamaran Ferries Internationa — Canada			
CFI 001	5 000	PASS./RoRo CARGO SHIP	1998
CFI 002	5 000	PASS./RoRo CARGO SHIP	1999
CFI 003	5 000	PASS./RoRo CARGO SHIP	1999
Celiktekne Sanayii ve Ticaret — Turkey			
AORASAN C	3 000	CHEM. TANKER	1998
RIDVAN OZERLER	8 000	CONTAINERSHIP	1998
YUKSEL GULER	8 000	CONTAINERSHIP	1998
ZEHRA KIRAN	8 000	CONTAINERSHIP	1998
Cenal Shipyard Ltd. — Poland			
TRONDHEIM 3	1 175	PASS./RoRo CARGO SHIP	1998
Central Inland Water Transport — India			
DHARMAPAL	1 200	POLLUTION CONTROL VESSEL	1998
Ceskoslovenska Plavba			
PODEBRADY	1 550	GENERAL CARGO	1998
LOVOSICE	1 550	GENERAL CARGO	1998
HANSA KAMPEN	1 999	GENERAL CARGO	1998
HANSA LUBECK	1 999	GENERAL CARGO	1998
DECIN	1 550	GENERAL CARGO	1998
HANSA BREMEN	1 999	GENERAL CARGO	1999
Ch. Breheret Leroux & Lotz — France			
BREHERET LEROUX & LOTZ 822	5 580	PASS./RoRo CARGO SHIP	1998
Ch. Nav. O.C.E.A. — France			
CLOE	241	FISHING VESSEL	1998
MAKAI-RA II	280	FISHING VESSEL	1998
MAKAI-RA III	241	FISHING VESSEL	1998
Chantier Piriou Freres — France			
PIRIOU C198	250	TRAWLER	1998
PIRIOU C197	2 600	OFFSHORE TUG/SUPPLY SHIP	1998
Chantiers de l'Atlantique — France			

ATOS Active On Unique Repair And Conversion Jobs

ATOS International, a major player in the Dubai ship repair and maintenance market, has been very active of late with a number of interesting conversion and major refits to a series of small craft. The company is now increasingly involved in large turnkey projects, and has the ability to provide all facets of major afloat marine construction contracts from detail design to steel fabrication to testing and evaluation trials.

An example of the company's capabilities is its contract with Etisalat to upgrade and expand the accommodations onboard the cableship Umm Al Auber. Simultaneously, the owner contracted to install special computer controlled hydraulic actuated equipment for the laying of submarine cables at sea.

ATOS also contracted with Delta Marine Services for major modification and upgrade of the jack-up barge Donau into a process production platform to be named Delta Explorer.

This work involves construction and installation of 400 tons of steel; designing and building of new machinery compartments; new accommodation for up to 66 people; and installation of a crude oil process plant which is to be supply by Schlumberger.

Circle 57 on Reader Service Card

Bow whiskers and hydraulic A-Frame installation.

Ship Name	GT	Ship Type	Year
VISION OF THE SEAS	76 000	PASS. (CRUISE) SHIP	1998
RENAISSANCE ONE	30 200	PASS. (CRUISE) SHIP	1998
RENAISSANCE TWO	30 200	PASS. (CRUISE) SHIP	1998
L'ATLANTIQUE J31	47 900	PASS. (CRUISE) SHIP	1999
RENAISSANCE THREE	30 200	PASS. (CRUISE) SHIP	1999
RENAISSANCE FOUR	30 200	PASS. (CRUISE) SHIP	1999
L'ATLANTIQUE M31	12 500	RESEARCH VESSEL	1999
Chernomorskiy Shipyard	**— Ukraine**		
DIAMOND	31 214	CRUDE OIL TANKER	1998
CHERNOMORSKIY 206	31 214	CRUDE OIL TANKER	1998
CHERNOMORSKIY 207	31 214	CRUDE OIL TANKER	1998
CHERNOMORSKIY 612	4 407	TRAWLER	1998
CHERNOMORSKIY 613	4 407	TRAWLER	1998
CHERNOMORSKIY 614	4 407	TRAWLER	1998
CHERNOMORSKIY 615	4 407	TRAWLER	1998
CHERNOMORSKIY 616	4 407	TRAWLER	1998
CHERNOMORSKIY 617	4 407	TRAWLER	1998
CHERNOMORSKIY 618	4 407	TRAWLER	1998
CHERNOMORSKIY 619	4 407	TRAWLER	1998
CHERNOMORSKIY 208	31 214	CRUDE OIL TANKER	1999
CHERNOMORSKIY 209	31 214	CRUDE OIL TANKER	1999
CHERNOMORSKIY 210	31 214	CRUDE OIL TANKER	2000
China SB. Corp.	**— China (Taiwan**		
CHINA SB KAOHSIUNG 688	82 110	BULK CARRIER	1998
CHINA SB KAOHSIUNG 685	15 200	CONTAINERSHIP	1998
CHINA SB KAOHSIUNG 686	15 200	CONTAINERSHIP	1998
ANDRE RICKMERS	25 200	CONTAINERSHIP	1998
CHINA SB KAOHSIUNG 662	25 200	CONTAINERSHIP	1998
ANDREAS RICKMERS	25 200	CONTAINERSHIP	1998
CHINA SB KAOHSIUNG 665	25 200	CONTAINERSHIP	1998
CHINA SB KAOHSIUNG 666	25 200	CONTAINERSHIP	1998
CHINA SB KAOHSIUNG 667	25 200	CONTAINERSHIP	1998
CHINA SB KAOHSIUNG 668	25 200	CONTAINERSHIP	1998
CHINA SB KAOHSIUNG 669	25 200	CONTAINERSHIP	1998
CHINA SB KAOHSIUNG 704	38 500	BULK CARRIER	1999
CHINA SB KAOHSIUNG 705	38 500	BULK CARRIER	1999
CHINA SB KAOHSIUNG 702	38 500	BULK CARRIER	1999
CHINA SB KAOHSIUNG 703	38 500	BULK CARRIER	1999
CHINA SB KAOHSIUNG 717	45 000	BULK CARRIER	1999

Westfalia Nabs Big P&O Cruise Contract

Westfalia Separator Mineraloil Systems recently announced a contract to supply P&O Cruises with nine C-Generation separators and one B-Generation purifier for Project Capricorn. The 76,000-ton ship is to be built in Germany at Meyer Werft Shipyard, and is scheduled for delivery in the first half of 2000.

The new C-Generation includes four models, and is designed to be ecologically sound. Since the line's introduction in late 1997, the company reports that more than 160 have been sold. "The market's rapid acceptance of our purifiers since their introduction tells us that our goal of combining high performance, low life-cycle cost and environmentally advanced equipment is on target," said **Dierk Homborg**, managing director, Westfalia Separator Mineraloil System.

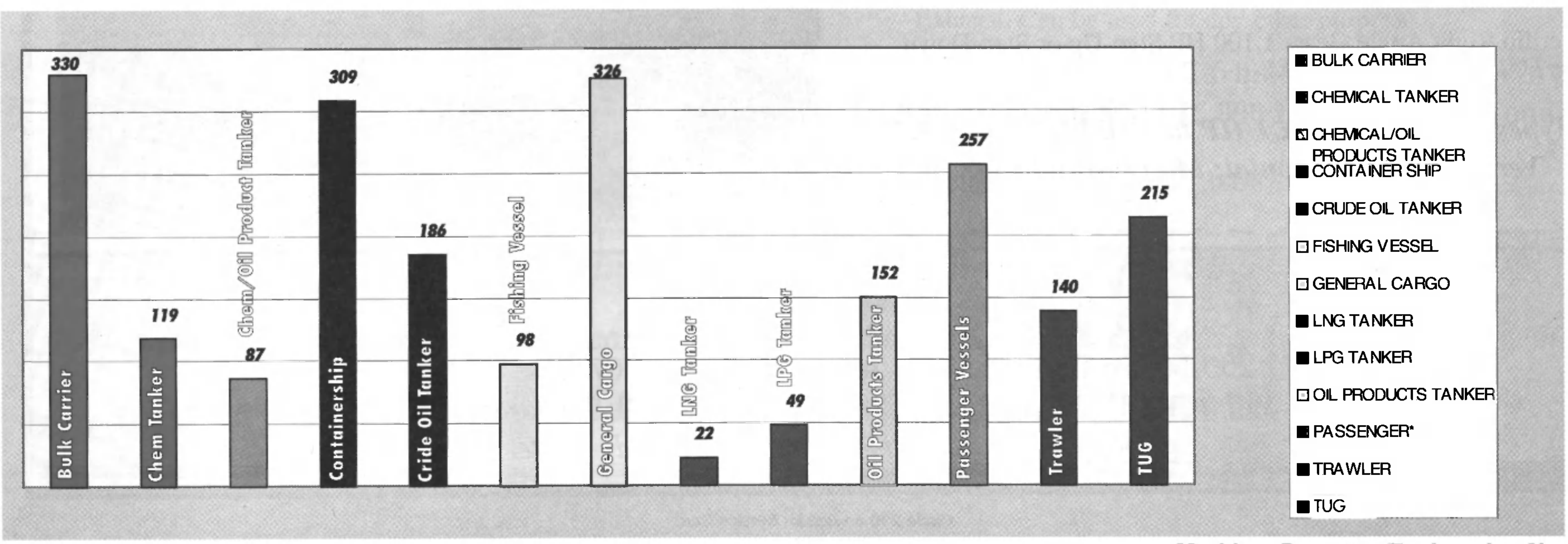
Circle 58 on Reader Service Card

World Shipyard Orderbook

Ship Name	GT	Ship Type	Year
KWANGYANG 141	8 650	RoRo CARGO SHIP	1998
GAE YA FERRY	104	PASS.SHIP	1998
JIN GANG LUN 14 HAO	413	TUG	1998
LONG GANG TUO 21	299	TUG	1998
Kyoei Zosen K.K. — Japan			
ROYAL PHOENIX	1 914	CHEM. TANKER	1998
Kyokuyo Zosen K.K. — Japan			
SAN H BHUM	5 990	CONTAINERSHIP	1998
KYOKUYO 418	9 400	CONTAINERSHIP	1998
KYOKUYO 420	9 400	CONTAINERSHIP	1998
KYOKUYO 425	7 350	REF. CARGO SHIP	1998
KYOKUYO 421	9 000	CONTAINERSHIP	1999
KYOKUYO 422	9 000	CONTAINERSHIP	1999
KYOKUYO 423	9 000	CONTAINERSHIP	1999
KYOKUYO 426	7 350	REF CARGO SHIP	1999
Kyong In Engineering — Korea (South)			
SUN JIN No. 909	259	TUG	1998
Langsten Slip & Batbyggeri A/S — Norway			
FAR SENIOR	3 100	OFFSHORE SUPPLY SHIP	1998
RAMFORM VICTORY	9 470	RESEARCH VESSEL	1998
RAMFORM VANGUARD	9 570	RESEARCH VESSEL	1998
LANGSTEN 179	3 300	OFFSHORE TUG/SUPPLY SHIP	1999
Lindenau GmbH Schiffswerft — Germany (United)			
HORNISSE	8 100	CHEM./OIL PROD. TANKER	1998
MARIELLA AMORETTI	10 500	CHEM./OIL PROD. TANKER	1998
LINDENAU 248	8 100	CHEM./OIL PROD. TANKER	1999
LINDENAU 250	8 100	CHEM./OIL PROD. TANKER	1999
LINDENAU 247	8 100	CHEM./OIL PROD. TANKER	1999
Lindstols Skips & Baatbyggeri — Norway			
LINDSTOLS 310	101	PASS.SHIP	1998
Maaskant B.V. Scheepswerf — Netherlands			
CORNELIA	310	TRAWLER	1998
Macduff Shipyards Ltd. — Great Britain			
MACDUFF 591	200	FISHING VESSEL	1998
Madenci Gemi Sanayii Ltd. Sti. — Turkey			
CELTIC KING	4 250	GENERAL CARGO	1999
MADENCI 017	4 900	HEAVY LOAD CARRIER	1999
MADENCI 018	4 900	HEAVY LOAD CARRIER	1999
MADENCI 13	3 840	CONTAINERSHIP	2000
MADENCI 14	3 840	CONTAINERSHIP	2000
MADENCI 15	3 840	CONTAINERSHIP	2000
Maebata Zosen Tekko K.K. — Japan			
MAEBATA 235	749	CRUDE OIL TANKER	1998
MAEBATA 237	214	CRUDE OIL TANKER	1998
Main Iron Works Inc. — U.S.A.			
ERVIN S. COOPER	160	TUG	1998
Malaysia Shipyard & Eng. Sdn. — Malaysia			
MALAYSIA 076	4 990	OIL PROD. TANKER	1998
MALAYSIA 077	4 990	OIL PROD. TANKER	1998
MALAYSIA 078	4 990	OIL PROD. TANKER	1998
MALAYSIA 079	4 990	OIL PROD. TANKER	1999
Malta SB. Co. Ltd. — Malta			
MEKHANIK KONCHAYEV	6 395	GENERAL CARGO	1998
MALTA SB 183	1 800	FISHING VESSEL	1998
MALTA SB 184	1 800	FISHING VESSEL	1998
MALTA SB 181	1 800	FISHING VESSEL	1998
MALTA SB 182	1 800	FISHING VESSEL	1998
MALTA SB 178	8 500	PASS./RoRo CARGO SHIP	1999
MALTA SB 179	8 500	PASS./RoRo CARGO SHIP	1999
MALTA SB 180	8 500	PASS./RoRo CARGO SHIP	2000
Marine Projects Ltd. Sp. z o.o — Poland			
BARTEN	3 300	GENERAL CARGO	1998
Marinteknik Shipbuilders Pte. — Singapore			
JETSON	1 150	PASS./RoRo CARGO SHIP	1998
AUTO JET	200	PASS.SHIP	1998
MARINTEKNIK 141	800	PASS.SHIP	1998
TAI KONG 217	299	TUG	1999
TAI KONG 318	299	TUG	1999
Marmara Tersanesi — Turkey			
PHILIPSBURG	8 600	CONTAINERSHIP	1998
Marystown Shipyard Ltd. — Canada			
MARYSTOWN 55	642	TUG	1998
MARYSTOWN 56	642	TUG	1998
Massachusetts Heavy Industries — U.S.A.			
QUINCY MARE	28 000	OIL PROD. TANKER	1998
MASSACHUSETTS 652	28 000	OIL PROD. TANKER	1998
MASSACHUSETTS 653	28 000	OIL PROD. TANKER	1999
MASSACHUSETTS 654	28 000	OIL PROD. TANKER	1999
MASSACHUSETTS 655	28 000	OIL PROD. TANKER	2000

Ship Name	GT	Ship Type	Year
MASSACHUSETTS 656	28 000	OIL PROD. TANKER	2000
Matsuura Tekko Zosen K.K. — Japan			
SHANTOU	290	TUG	1998
Mawei Shipyard — China, P.R.			
CAPE CLEVELAND	8 986	CONTAINERSHIP	1998
CAPE CAMPBELL	6 000	CONTAINERSHIP	1998
CAPE CANAVERAL	8 986	CONTAINERSHIP	1998
CAPE CAPRICORN	8 986	CONTAINERSHIP	1999
MC Fabrications — Great Britain			
MC 1029A	150	TRAWLER	1998
McTay Marine — Great Britain			
MCTAY 119	264	TUG	1998
Merwede Shipyard B.V. — Netherlands			
SAND FULLMAR	6 000	HOPPER DREDGER	1998
SAND FALCON	5 400	HOPPER DREDGER	1998
MERWEDE 676	14 000	HOPPER DREDGER	1999
Minami Nippon Zosen K.K. — Japan			
SHOKO MARU	20 600	OIL PROD. TANKER	1998
MINAMI-NIPPON 649	20 600	OIL PROD. TANKER	1998
MINAMI-NIPPON 656	20 600	OIL PROD. TANKER	1998
MINAMI-NIPPON 653	25 600	CONTAINERSHIP	1998
EURO SPIRIT	46 400	PASS./LANDING CRAFT	1998
COSMOS ACE	46 400	PASS./LANDING CRAFT	1998
MINAMI-NIPPON 654	25 600	CONTAINERSHIP	1999
MINAMI-NIPPON 655	25 600	CONTAINERSHIP	1999
Mitsubishi Heavy Industries — Japan			
CARLY BAY	18 100	LPG TANKER	1998
ABU DHABI	48 154	CONTAINERSHIP	1998
FOWAIRET	48 200	CONTAINERSHIP	1998
AL-MUTANABBI	48 200	CONTAINERSHIP	1998
EVER DEVELOP	52 090	CONTAINERSHIP	1998
EVER DIAMOND	52 090	CONTAINERSHIP	1998
EVER DYNAMIC	52 090	CONTAINERSHIP	1998
EVER DEVOTE	52 090	CONTAINERSHIP	1998
EVER DIADEM	52 090	CONTAINERSHIP	1998
EVER DIVINE	52 090	CONTAINERSHIP	1998
NYK CANOPUS	76 800	CONTAINERSHIP	1998
MITSUBISHI SHIM 1035	12 500	PASS./RoRo CARGO SHIP	1998
MITSUBISHI SHIM 1056	13 700	PASS./RoRo CARGO SHIP	1998
MITSUBISHI SHIM 1052	15 950	PASS./RoRo CARGO SHIP	1998
SUN FLOWER COBALT	9 000	PASS./RoRo CARGO SHIP	1998
MITSUBISHI SHIM 1041	6 400	PASS./RoRo CARGO SHIP	1998
MITSUBISHI SHIM 1053	310	PASS.SHIP	1998
MITSUBISHI SHIM 1054	145	PASS.SHIP	1998
ONIYOUZU	260	PASS.SHIP	1998
KAMO	8 145	HEAVY LOAD CARRIER	1998
MITSUBISHI SHIM 1055	381	FISHING VESSEL	1998
MITSUBISHI SHIM 1033	2 300	OFFSHORE TUG/SUPPLY SHIP	1998
MITSUBISHI SHIM 1050	250	PATROL VESSEL	1998
MITSUBISHI SHIM 1051	250	PATROL VESSEL	1998
MITSUBISHI SHIM 1048	120	PATROL VESSEL	1998
DOHA	112 200	LNG TANKER	1999
MITSUBISHI NAGASAKI 2148	110 000	LNG TANKER	1999
MITSUBISHI NAGASAKI 2149	44 400	LPG TANKER	1999
MITSUBISHI NAGASAKI 2153	49 500	LPG TANKER	1999
MITSUBISHI NAGASAKI 2147	24 400	LPG TANKER	1999
MITSUBISHI NAGASAKI 2138	165 000	CRUDE OIL TANKER	1999
MITSUBISHI NAGASAKI 2139	165 000	CRUDE OIL TANKER	1999
MITSUBISHI NAGASAKI 2144	154 000	CRUDE OIL TANKER	1999
MITSUBISHI NAGASAKI 2151	154 000	CRUDE OIL TANKER	1999
MITSUBISHI NAGASAKI 2137	84 500	BULK CARRIER	1999
MITSUBISHI SHIM 1047	9 500	GENERAL CARGO	1999
MITSUBISHI NAGASAKI 2141	69 200	CONTAINERSHIP	1999
MITSUBISHI NAGASAKI 2142	69 200	CONTAINERSHIP	1999
MITSUBISHI NAGASAKI 2143	69 200	CONTAINERSHIP	1999
MITSUBISHI KOBE 1231	69 200	CONTAINERSHIP	1999
MITSUBISHI KOBE 1232	69 200	CONTAINERSHIP	1999
MITSUBISHI KOBE 1233	69 200	CONTAINERSHIP	1999
MITSUBISHI KOBE 1234	69 200	CONTAINERSHIP	1999
MITSUBISHI KOBE 1235	69 200	CONTAINERSHIP	1999
MITSUBISHI SHIM 1045	3 300	FISHING VESSEL	1999
MITSUBISHI SHIMONOSEKI 1057	9 700	CABLE LAYER	1999
AL JASRA	112 200	LNG TANKER	2000
MITSUBISHI NAGASAKI 2152	154 000	CRUDE OIL TANKER	2000
MITSUBISHI NAGASAKI 2154	154 000	CRUDE OIL TANKER	2000
MITSUBISHI NAGASAKI 2156	84 500	BULK CARRIER	2000
MITSUBISHI KOBE 1236	69 200	CONTAINERSHIP	2000
Mitsui Eng. & SB. Co. Ltd. — Japan			
MITSUI TAMANO 1459	43 600	BULK CARRIER	1998
MITSUI TAMANO 1460	43 600	BULK CARRIER	1998

Ship Name	GT	Ship Type	Year
SOLAR ACE	27 011	BULK CARRIER	1998
MITSUI TAMANO 1457	43 600	BULK CARRIER	1998
MITSUI TAMANO 1455	43 600	BULK CARRIER	1998
MITSUI TAMANO 1452	27 000	BULK CARRIER	1998
MITSUI TAMANO 1439	43 600	BULK CARRIER	1998
MITSUI TAMANO 1479	27 000	BULK CARRIER	1999
MITSUI TAMANO 1476	27 000	BULK CARRIER	1999
MITSUI TAMANO 1478	27 000	BULK CARRIER	1999
MITSUI TAMANO	32 000	BULK CARRIER	1999
MITSUI TAMANO	32 000	BULK CARRIER	2000
MITSUI TAMANO	32 000	BULK CARRIER	2000
ZEKREET	112 200	LNG TANKER	1998
MITSUI CHIBA 1412	112 000	LNG TANKER	1998
MITSUI CHIBA 1451	18 500	LPG TANKER	1998
MITSUI CHIBA 1472	160 300	CRUDE OIL TANKER	1998
MITSUI CHIBA F601	53 552	OIL PROD. TANKER	1998
MITSUI CHIBA 1475	27 000	BULK CARRIER	1998
MITSUI CHIBA 1445	76 800	CONTAINERSHIP	1998
AL-SABAHIA	48 200	CONTAINERSHIP	1998
ASIR	48 200	CONTAINERSHIP	1998
AL ABDALI	48 200	CONTAINERSHIP	1998
MITSUI CHIBA 1453	18 500	LPG TANKER	1999
MITSUI CHIBA 1466	21 500	BULK CARRIER	1999
MITSUI CHIBA 1467	21 500	BULK CARRIER	1999
MITSUI CHIBA 1468	21 500	BULK CARRIER	1999
MITSUI CHIBA 1469	21 500	BULK CARRIER	1999
MITSUI CHIBA 1458	115 000	BULK CARRIER	1999
MITSUI CHIBA 1464	40 000	BULK CARRIER	1999
MITSUI CHIBA 1465	40 000	BULK CARRIER	1999
MITSUI CHIBA 1484	40 500	BULK CARRIER	2000
MITSUI CHIBA 1470	21 500	BULK CARRIER	2000
MITSUI CHIBA 1477	40 000	BULK CARRIER	2000
Miyoshi Zosen K.K. — Japan			
MIYOSHI 342	4 200	CHEM. TANKER	1998
Mjellem & Karlsen A/S — Norway			
BARUNA JAYA VII	1 200	FISHING VESSEL	1998
MJELLEM & KARLSEN 153	10 500	RESEARCH VESSEL	1999
Montajes Cies S.L. — Spain			
PICAMILLO	179	TRAWLER	1998
NUEVO CORDERO DE DIOS	202	TRAWLER	1998
HEPERMAR	149	TRAWLER	1998
Murakami Hide Zosen K.K. — Japan			
MURAKAMI HIDE 397	5 200	CHEM. TANKER	1998
MURAKAMI HIDE 396	5 200	CHEM. TANKER	1998
SUN CHALLENGER	3 866	CHEM./OIL PROD. TANKER	1998
MURAKAMI HIDE 500	6 543	CONTAINERSHIP	1998
MURAKAMI HIDE 398	5 200	CHEM. TANKER	1999
Naikai Zosen Corp. — Japan			
FORTUNE EXPRESS	18 600	BULK CARRIER	1998
NAIKAI 634	15 200	CONTAINERSHIP	1998
NAIKAI 635	15 200	CONTAINERSHIP	1998
NAIKAI 636	15 200	CONTAINERSHIP	1998
TRANS FUTURU	18 100	PASS./LANDING CRAFT	1998
YAESHIMA No. 12	345	PASS.SHIP	1998
NAIKAI SETODA 645	17 900	BULK CARRIER	2000
Namura Shipbuilding Co. Ltd. — Japan			
NEW AMITY	57 000	CRUDE OIL TANKER	1998
NEW ALLIANCE	57 000	CRUDE OIL TANKER	1998
PAOLA I	57 000	CRUDE OIL TANKER	1998
GREAT LUCK	37 663	BULK CARRIER	1998
Narasaki Zosen K.K. — Japan			
NARASAKI 1166	160	FISHING VESSEL	1998
Nashville Bridge Co. — U.S.A.			
NASHVILLE BRIDGE	194	TUG	1998
NASHVILLE BRIDGE	194	TUG	1998
NASHVILLE BRIDGE	194	TUG	1998
NASHVILLE BRIDGE	194	TUG	1998
Naval Dockyard Sdn. Bhd. —Malaysia			
NURSHAH KOTA TINGGI	450	PASS.SHIP	1998
NURSHAH MUAR	450	PASS.SHIP	1998
Naval Gijon S.A. (NAGISA) — Spain			
KRISTIN KNUTSEN	12 184	CHEM. TANKER	1998
CAMBRIDGESHIRE	12 136	CHEM. TANKER	1998
GIJON NAVAL 554	23 000	CHEM. TANKER	1999
GIJON NAVAL	12 140	CHEM. TANKER	1999
GIJON NAVAL 553	15 000	CHEM./OIL PROD. TANKER	1999
GIJON NAVAL 555	23 000	CHEM. TANKER	2000
GIJON NAVAL 552	15 000	CHEM./OIL PROD. TANKER	2000
Naval Shipyard — Iran			
ATLAS	124	FISHING VESSEL	1998



Ship Name	GT	Ship Type	Year
Network Marine Inc. — U.S.A.			
ABEER THIRTY THREE	169	CREWBOAT	1998
ABEER THIRTY FOUR	169	CREWBOAT	1998
Nevskiy Shipyard — Russia			
SOKOL	150	PASS.SHIP	1998
Newport News SB. & D.D. Co. — U.S.A.			
AGATHONISSOS	30 415	CRUDE OIL TANKER	1998
DHOKOS	30 415	OIL PROD. TANKER	1998
MAKRONISSOS	30 415	OIL PROD. TANKER	1998
AMBROSE CHANNEL	26 000	OIL PROD. TANKER	1998
BRENTON REEF	26 000	OIL PROD. TANKER	1998
Niestern Sander B.V. — Netherlands			
CAP FERRET	4 700	CHEM. TANKER	1998
IJSSELDIJK	2 560	CONTAINERSHIP	1998
SCHELDEDIJK	2 560	CONTAINERSHIP	1998
Niigata Eng. Co. Ltd. — Japan			
NIIGATA 2338	610	PASS./RoRo CARGO SHIP	1998
MATSUEI MARU No. 28	439	FISHING VESSEL	1998
CORREGIDOR	830	BUOY/LIGHTHOUSE VESSEL	1998
Nippon Kokan K.K. — Japan			
SHOYO MARU	2 096	TRAWLER	1998
Nishi Zosen K.K. — Japan			
BRAVE HEART	6 178	GENERAL CARGO	1998
NISHI 409	6 100	GENERAL CARGO	1998
NISHI 410	6 100	GENERAL CARGO	1998
NISHI 411	4 450	GENERAL CARGO	1998
NISHI 412	6 100	GENERAL CARGO	1998
NKK Corporation — Japan			
NKK TSU 153	16 400	LNG TANKER	1998
NKK TSU 174	79 200	CRUDE OIL TANKER	1998
NKK TSU 175	79 200	CRUDE OIL TANKER	1998
NKK TSU 173	58 500	CRUDE OIL TANKER	1998
NKK TSU 183	56 300	CRUDE OIL TANKER	1998
NKK TSU 182	56 300	CRUDE OIL TANKER	1998
HANG TA	39 000	BULK CARRIER	1998
FORTUNE LADY	39 000	BULK CARRIER	1998
NKK TSU 181	77 000	BULK CARRIER	1998
NKK TSU 185	56 300	CRUDE OIL TANKER	1999
NKK TSU 184	56 300	CRUDE OIL TANKER	1999
NKK TSU 186	88 500	BULK CARRIER	1999
NKK TSU 176	88 500	BULK CARRIER	1999
NKK TSU 177	88 500	BULK CARRIER	1999
NKK TSU 192	18 000	LNG TANKER	2000
NKK TSU 190	56 300	CRUDE OIL TANKER	2000
NKK TSU 191	56 300	CRUDE OIL TANKER	2000
NKK TSU	85 000	BULK CARRIER	2000
NKK TSU 188	88 500	BULK CARRIER	2000
Nuovi Cantieri Apuania S.p.A. — Italy			
ISOLA GIALLA	20 000	CHEM./OIL PROD. TANKER	1998
MARTINA	6 500	CHEM./OIL PROD. TANKER	1998
EXCELLENT	33 000	PASS./RoRo CARGO SHIP	1998
APUANIA 1207	20 000	CHEM./OIL PROD. TANKER	1999
APUANIA 1209	40 000	PASS./RoRo CARGO SHIP	1999
LIGURI	1 250	FISHING VESSEL	1998
OAO Kvaerner Vyborg Verf — Russia			
KAPITAN KUROPTEV	4 576	GENERAL CARGO	1998
Oceanfast Marine Pty. Ltd. — Australia			
TAMAHINE MOOREA VIII H	3 493	PASS./RoRo CARGO SHIP	1998
KODIAK T	350	TRAWLER	1998
OCEANFAST MARINE 23	350	TUG	1999
OCEANFAST MARINE 24	350	TUG	1999
OCEANFAST MARINE 25	350	TUG	1999
OCEANFAST MARINE 26	350	TUG	1999
OCEANFAST MARINE 27	350	TUG	2000
OCEANFAST MARINE 28	350	TUG	2000
Odense Staalskibsvaerft A/S — Denmark			
ODENSE 163	91 560	CONTAINERSHIP	1998
ODENSE 164	91 560	CONTAINERSHIP	1998
ODENSE 165	91 560	CONTAINERSHIP	1998
ODENSE 168	91 560	CONTAINERSHIP	1999
ODENSE 166	91 560	CONTAINERSHIP	1999
ODENSE 167	91 560	CONTAINERSHIP	1999
Oderwerft GmbH — Germany (United)			
VILM	650	POLLUTION CONTROL VESSEL	1999
Okean Shipyard — Ukraine			
MINERVA	38 000	BULK CARRIER	1998
OKEAN 502	38 000	BULK CARRIER	1998
KIEV	38 000	BULK CARRIER	1998
OKEAN 504	38 000	BULK CARRIER	1998
OKEAN 505	38 000	BULK CARRIER	1998
OKEAN 506	38 000	BULK CARRIER	1998
Onomichi Zosen K.K. — Japan			
ONOMICHI 433	43 300	CRUDE OIL TANKER	1998
ONOMICHI 429	28 400	OIL PROD. TANKER	1998
GANSU	28 400	OIL PROD. TANKER	1998
GANTU	28 400	OIL PROD. TANKER	1998
ALAM BELIA	28 400	OIL PROD. TANKER	1998
ONOMICHI 434	43 300	CRUDE OIL TANKER	1999
ONOMICHI 447	28 600	CRUDE OIL TANKER	1999
ONOMICHI 437	28 600	OIL PROD. TANKER	1999
ONOMICHI 438	28 600	OIL PROD. TANKER	1999
ONOMICHI 439	28 600	OIL PROD. TANKER	1999
ONOMICHI 436	28 600	OIL PROD. TANKER	1999
ONOMICHI 446	28 600	OIL PROD. TANKER	1999
Orskov Christensens — Denmark			
ORSKOV 205	2 700	PASS./RoRo CARGO SHIP	1998
SEVRYBA-2	1 998	TRAWLER	1998
SEVRYBA III	1 650	TRAWLER	1998
SEVRYBA IV	1 650	TRAWLER	1998
SEVRYBA V	1 650	TRAWLER	1998
ASSO 21	2 600	OFFSHORE SUPPLY SHIP	1998
ORSKOV 210	2 900	OFFSHORE TUG/SUPPLY SHIP	1999
Oshima Shipbuilding Co. Ltd. — Japan			
PACIFIC PROSPERITY	25 965	BULK CARRIER	1998
MERMAID DREAM	25 969	BULK CARRIER	1998
GOLDEN DAISY	26 000	BULK CARRIER	1998
GOLDEN ROSE	26 000	BULK CARRIER	1998
JIN QIANG	26 200	BULK CARRIER	1998
TU QIANG	26 200	BULK CARRIER	1998
JIA QIANG	26 200	BULK CARRIER	1998
OSHIMA 10226	25 600	BULK CARRIER	1998
OSHIMA 10227	25 600	BULK CARRIER	1998
OSHIMA 10228	25 600	BULK CARRIER	1998
OSHIMA 10229	25 600	BULK CARRIER	1998

Ship Name	GT	Ship Type	Year
WESTERN ONYX	29 300	BULK CARRIER	1998
WESTERN OPAL	29 300	BULK CARRIER	1998
WESTERN OLIVIN	29 300	BULK CARRIER	1998
OSHIMA 10237	26 000	BULK CARRIER	1999
WESTERN OBELISK	29 300	BULK CARRIER	1999
OSHIMA 10252	26 600	BULK CARRIER	1999
OSHIMA 10253	26 600	BULK CARRIER	1999
OSHIMA 10254	22 300	BULK CARRIER	1999
OSHIMA 10243	27 000	BULK CARRIER	2000
P.T. Batamas Jala			
SAMANALA DEVI	105	MOTOR HOPPER	1998
SAMANALA KURAMI	105	MOTOR HOPPER	1998
P.T. Dok Dan Perkapalan			
KETALING	5 266	OIL PROD. TANKER	1998
SURABAYA DOK 570	3 800	OIL PROD. TANKER	1999
SURABAYA DOK 571	3 800	OIL PROD. TANKER	1999
P.T. Noahtu Shipyard			
NOAHTU 028	200	TUG	1998
P.T. PAL Indonesia			
PAL INDONESIA M000132	13 000	CRUDE OIL TANKER	1998
PAL INDONESIA M000150	11 080	BULK CARRIER	1998
PAL INDONESIA M000140	26 000	GENERAL CARGO	1998
PAL INDONESIA M000122	800	PASS.SHIP	1998
PAL INDONESIA M000141	26 000	GENERAL CARGO	1999
PAL INDONESIA M000142	26 000	GENERAL CARGO	1999
PAL INDONESIA M000143	26 000	GENERAL CARGO	1999
PAL INDONESIA M000157	4 700	CONTAINERSHIP	1999
PAL INDONESIA M000159	4 700	CONTAINERSHIP	1999
PAL INDONESIA M000158	4 700	CONTAINERSHIP	1999
PAL INDONESIA M000156	18 000	CONTAINERSHIP	1999
PAL INDONESIA M000155	18 000	CONTAINERSHIP	1999
PAL INDONESIA M000126	800	PASS.SHIP	1999
p/f Torshavnar Skipasm dja			
SISAK II	139	PATROL VESSEL	1998
Pan United Shipyard Pte. Ltd. — Singapore			
ETERNAL OIL I	14 474	CRUDE OIL TANKER	1998
SHARON	14 474	CRUDE OIL TANKER	1998
Pandan Shipyard Pte. Ltd. — Singapore			
ENA EMPEROR	499	TUG	1998
Pao Hing Shipyard Sdn. Bhd. — Malaysia			
AYM TAURUS	170	TUG	1998
Parnica Stocznia Remontowa — Poland			
PARNICA 07/97	140	FISHING VESSEL	1998
PARNICA 08/97	140	FISHING VESSEL	1998
PARNICA 06/97	140	FISHING VESSEL	1998
PARNICA 05/97	140	FISHING VESSEL	1998
Peene Werft GmbH — Germany (United)			
PEENE-WERFT 485	9 500	GENERAL CARGO	1998
LAURIN	11 000	CONTAINERSHIP	1998
SCAN ARCTIC	8 000	RoRo CARGO SHIP	1998
SCAN BOTHNIA	8 000	RoRo CARGO SHIP	1998
PEENE-WERFT 486	9 000	GENERAL CARGO	1999
Pequot River Shipworks — U.S.A.			
PEQUOT RIVER	364	PASS.SHIP	1998
Persian Gulf Shipbuilding Corp. — Iran			
NAYBAND	445	CREWBOAT	1998
Peters Ysselmeer B.V. — Netherlands			
LUMARE	2 625	GENERAL CARGO	1998
THALASSA	2 625	GENERAL CARGO	1998
VERITAS	2 625	GENERAL CARGO	1999
MICHEL	2 625	GENERAL CARGO	1999
Peterswerft — Germany (United)			
HEIKE BRAREN	4 230	GENERAL CARGO	1998
STOR TRADER	6 750	CONTAINERSHIP	1998
Port Said Engineering Works — Egypt			
PORT SAID 668	275	TUG	1998
PORT SAID 661	120	POLLUTION CONTROL VESSEL	1998
President Marine Pte. Ltd. — Singapore			
SEABULK KATIE	408	OFFSHORE TUG/SUPPLY SHIP	1998
SEABULK CAROLYN	408	OFFSHORE TUG/SUPPLY SHIP	1998
PM243	411	TUG	1998
PRESIDENT MARINE 244	399	TUG	1998
PT. Dok & Perkapalan Kodja			
MOSELGAS	5 870	LPG TANKER	1998
KODJA BAHARI IV 1154	10 000	CHEM./OIL PROD. TANKER	1998
KODJA BAHARI IV 1155	10 000	CHEM./OIL PROD. TANKER	1998
WESERGAS	4 950	LPG TANKER	1999
Qingshan Shipyard — China, P.R.			
NING HUA 410	4 391	CHEM./OIL PROD. TANKER	1998
QINGSHAN KS960301	4 450	CONTAINERSHIP	1998
QINGSHAN KS960302	4 450	CONTAINERSHIP	1998
NICOLA	9 068	CONTAINERSHIP	1998
Qiuxin Shipyard — China, P.R.			
DICKSI	5 100	CHEM./OIL PROD. TANKER	1998
QIUXIN 1254	5 100	CHEM./OIL PROD. TANKER	1998
QIUXIN 1255	7 500	OIL PROD. TANKER	1998
MILFORD FISHER	3 368	OIL PROD. TANKER	1998
QIUXIN 1256	7 500	OIL PROD. TANKER	1999
QIUXIN 1257	7 500	OIL PROD. TANKER	1999
R.O. Brodogradiliste Novi Sad — Yugoslavia			
NOVI SAD	2 000	GENERAL CARGO	1998
NOVI SAD	2 000	GENERAL CARGO	1998
HELGOLAND	4 453	GENERAL CARGO	1998
Remesa Astilleros S.A. — Peru			
REMESA 096	327	FISHING VESSEL	1998
REMESA 107	519	FISHING VESSEL	1998
CRETA	442	FISHING VESSEL	1998
REMESA 097	327	FISHING VESSEL	1998
REMESA 098	327	FISHING VESSEL	1998
REMESA 099	327	FISHING VESSEL	1998
REMESA 100	327	FISHING VESSEL	1998
Rodman Polyships S.A. — Spain			
ALASKAN STAR	2 000	TRAWLER	1998
RODMAN POLYSHIPS 83005	132	FISHING VESSEL	1998
Ruse Shipyard Ltd.			
ROUSSE 390	2 999	GENERAL CARGO	1998
ROUSSE 391	2 999	GENERAL CARGO	1998
ROUSSE 392	2 999	GENERAL CARGO	1998
S. Ordzhonikidze Works			
ORDZHONIKIDZE POTI	344	PASS.SHIP	1998
S.A. Balenciaga — Spain			
ERLAXI	149	TRAWLER	1998
WIRON III	1 059	TRAWLER	1998

Ship Name	GT	Ship Type	Year
WIRON 4	1 059	TRAWLER	1998
S.A. Juliana Constructora — Spain			
JO EIK	12 317	CHEM. TANKER	1998
STOLT SPAN	14 775	CHEM. TANKER	1998
STOLT SPRAY	14 775	OIL PROD. TANKER	1999
STOLT STREAM	14 775	OIL PROD. TANKER	1999
STOLT SURF	14 775	OIL PROD. TANKER	2000
Sadra International — Iran			
SADRA INTERNATIONAL	18 000	GENERAL CARGO	1998
SADRA INTERNATIONAL	18 000	GENERAL CARGO	1998
SADRA INTERNATIONAL	18 000	GENERAL CARGO	1998
SADRA INTERNATIONAL	18 000	GENERAL CARGO	1998
SADRA INTERNATIONAL	18 000	GENERAL CARGO	1998
SADRA INTERNATIONAL	18 000	GENERAL CARGO	1998
Sahin Celik Sanayi A.S. — Turkey			
DOGANCAY	150	TUG	1998
Saiki Jukogyo K.K. — Japan			
SAIKI 1077	14 800	BULK CARRIER	1998
SAIKI 1078	14 800	BULK CARRIER	1998
SAIKI 1080	14 800	BULK CARRIER	1998
SAIKI 1081	15 000	BULK CARRIER	1998
ONOMICHI 421	19 900	BULK CARRIER	1998
Saint John Shipbuilding Ltd. — Canada			
SAINT JOHN 1142	13 020	CONTAINERSHIP	1998
SAINT JOHN 1143	13 020	CONTAINERSHIP	1998
Saint Malo Navale — France			
LE LEVANT	1 600	PASS. (CRUISE) SHIP	1998
COTE DE BRETAGNE	550	DREDGER	1998
Saltdalsverftet — Norway			
SKAGET	100	PASS.SHIP	1998
Samsung Heavy Industries Co. — Korea (South)			
CAP ROMAULD	160 000	CRUDE OIL TANKER	1998
ODIN	64 700	CRUDE OIL TANKER	1998
SAMSUNG 1221	82 000	CRUDE OIL TANKER	1998
CAP ROMIALD	80 570	CRUDE OIL TANKER	1998
SAMSUNG 1226	55 000	CRUDE OIL TANKER	1998
SAMSUNG 1217	55 000	CRUDE OIL TANKER	1998
CAP JEAN	80 570	CRUDE OIL TANKER	1998
CAP LAURENT	80 570	CRUDE OIL TANKER	1998
SAMSUNG 1245	57 000	CRUDE OIL TANKER	1998
SAMSUNG 1234	60 000	CRUDE OIL TANKER	1998
SAMSUNG 1215	55 000	OIL PROD. TANKER	1998
SAMSUNG 1218	55 000	OIL PROD. TANKER	1998
SG CREATION	90 000	BULK CARRIER	1998
KMTC KEELUNG	16 731	CONTAINERSHIP	1998
SAMSUNG 1214	16 500	CONTAINERSHIP	1998
SAMSUNG 1224	36 500	CONTAINERSHIP	1998
LUOBAHE	36 772	CONTAINERSHIP	1998
DUSSELDORF EXPRESS	54 000	CONTAINERSHIP	1998
LONDON EXPRESS	54 000	CONTAINERSHIP	1998
SAMSUNG 1206	65 475	CONTAINERSHIP	1998
SAMSUNG 1220	108 000	DRILLING SHIP	1998
SAMSUNG 1207	103 000	LNG TANKER	1999
SAMSUNG 1229	160 000	CRUDE OIL TANKER	1999
SAMSUNG 1230	55 000	CRUDE OIL TANKER	1999
SAMSUNG 1222	82 000	CRUDE OIL TANKER	1999
SAMSUNG 1227	57 000	CRUDE OIL TANKER	1999
SAMSUNG 1241	150 000	CRUDE OIL TANKER	1999
SAMSUNG 1254	55 000	CRUDE OIL TANKER	1999
SAMSUNG 1239	160 000	CRUDE OIL TANKER	1999
SAMSUNG 1232	55 000	CRUDE OIL TANKER	1999
SAMSUNG 1233	55 000	CRUDE OIL TANKER	1999
SAMSUNG 1235	60 000	CRUDE OIL TANKER	1999
SAMSUNG 1236	60 000	CRUDE OIL TANKER	1999
SAMSUNG 1216	55 000	OIL PROD. TANKER	1999
SAMSUNG 1253	37 500	BULK CARRIER	1999
SAMSUNG 1251	35 500	BULK CARRIER	1999
SAMSUNG 1237	37 500	BULK CARRIER	1999
SAMSUNG 1260	55 000	CONTAINERSHIP	1999
SAMSUNG 1261	55 000	CONTAINERSHIP	1999
SAMSUNG 1249	8 500	RoRo CARGO SHIP	1999
SAMSUNG 1250	8 500	RoRo CARGO SHIP	1999
SAMSUNG 1255	108 000	DRILLING SHIP	1999
SAMSUNG 1231	108 000	DRILLING SHIP	1999
LAMINARIA	96 000	OFFSHORE PROCESSING SHIP	1999
SAMSUNG 1258	120 000	LNG TANKER	2000
SAMSUNG 1259	120 000	LNG TANKER	2000
SAMSUNG 1242	150 000	CRUDE OIL TANKER	2000
SAMSUNG 1243	150 000	CRUDE OIL TANKER	2000
SAMSUNG 1244	150 000	CRUDE OIL TANKER	2000
SAMSUNG 1246	57 000	CRUDE OIL TANKER	2000
SAMSUNG 1240	160 000	CRUDE OIL TANKER	2000
SAMSUNG 1252	35 500	BULK CARRIER	2000
SAMSUNG 1262	55 000	CONTAINERSHIP	2000
SAMSUNG 1257	30 000	DRILLING SHIP	2000
SAMSUNG 1256	30 000	DRILLING SHIP	2000
Sanoyas Hishino Meisho Corp. — Japan			
STELLAR LIGHT	27 000	BULK CARRIER	1998
STELLAR MIGHT	27 000	BULK CARRIER	1998
LUHAI	26 000	BULK CARRIER	1998
LIHAI	26 000	BULK CARRIER	1998
SANOYAS 1165	30 000	BULK CARRIER	1998
GREAT PESCADORES	36 600	BULK CARRIER	1998
BANDAI	36 600	BULK CARRIER	1998
SANOYAS 1166	36 600	BULK CARRIER	1998
SANOYAS 1171	38 900	BULK CARRIER	1999
SANOYAS 1167	27 000	BULK CARRIER	1999
SANOYAS 1168	27 000	BULK CARRIER	1999
SANOYAS 1163	27 000	BULK CARRIER	1999
SANOYAS 1164	27 000	BULK CARRIER	1999
SANOYAS 1170	30 000	WOOD CHIPS CARRIER	1999
SANOYAS 1175	28 000	CHEM./OIL PROD. TANKER	2000
SANOYAS 1176	28 000	CHEM./OIL PROD. TANKER	2000
Santan Engineering Pte. Ltd. — Japan			
PRIOR 082	1 120	OFFSHORE SUPPLY SHIP	1998
Santierul Naval Braila			
BIRNOVA	6 036	GENERAL CARGO	1998
GAIESTI	6 036	GENERAL CARGO	1998
GURA ARIESULUI	6 305	GENERAL CARGO	1998
GURA HUMORULUI	6 305	GENERAL CARGO	1998
GURA OCNITEI	6 305	GENERAL CARGO	1998
ODOBESTI	4 254	GENERAL CARGO	1998
ORSOVA	4 254	GENERAL CARGO	1998
ORASTIE	4 254	GENERAL CARGO	1998
ONESTI	4 254	GENERAL CARGO	1998

Ship Name	GT	Ship Type	Year
OSTRA	4 254	GENERAL CARGO	1998
OCNA MURES	4 254	GENERAL CARGO	1998
OCNA SIBIULIU	4 254	GENERAL CARGO	1998
BRAILA 1325	4 254	GENERAL CARGO	1998
BRAILA 1326	4 254	GENERAL CARGO	1998
BRAILA 1327	4 254	GENERAL CARGO	1998
BRAILA 1328	4 254	GENERAL CARGO	1998
BRAILA 1329	4 254	GENERAL CARGO	1998
BRAILA 1381	1 655	CONTAINERSHIP	1998
BRAILA 1382	1 655	CONTAINERSHIP	1998
XIANG ZHU	7 864	CONTAINERSHIP	1998
BRAILA 1387	1 000	TRAWLER	1998
BRAILA 1388	1 000	TRAWLER	1998
Santierul Naval Giurgiu			
BROA	1 120	GENERAL CARGO	1998
Santierul Naval Mangalia			
PEARL SALONICA	39 800	BULK CARRIER	1998
PEARL CONSTANTA	39 800	BULK CARRIER	1998
PEARL ATHENS	58 520	BULK CARRIER	1998
BLUETANK CRUSADER	16 145	BULK CARRIER	1998
PEARL MANGALIA	58 520	BULK CARRIER	1998
NICK	2 435	GENERAL CARGO	1998
RIEJANNE	2 435	GENERAL CARGO	1998
Santierul Naval S.A. Galatz			
SAEIR	24 248	OIL PROD. TANKER	1998
ONIX	24 248	OIL PROD. TANKER	1998
TOPAZ	24 248	OIL PROD. TANKER	1998
DIAMANT	24 248	OIL PROD. TANKER	1998
KOPENHAGEN	2 805	GENERAL CARGO	1998
GALATZ 917	2 805	GENERAL CARGO	1998
GALATZ 918	2 805	GENERAL CARGO	1998
MIRONYCH	4 061	GENERAL CARGO	1998
PROKOPIY GALUSHIN	4 061	GENERAL CARGO	1998
ROZNOV	6 263	GENERAL CARGO	1998
RUCAR	6 263	GENERAL CARGO	1998
GALATZ 863	6 263	GENERAL CARGO	1998
GALATZ 864	6 263	GENERAL CARGO	1998
CAMANDA	12 220	GENERAL CARGO	1998
GALATZ 813	12 220	GENERAL CARGO	1998
FOSEN 63	12 050	RoRo CARGO SHIP	1998
KONOSHA	1 528	RoRo CARGO SHIP	1998
VISSER 157	195	LANDING CRAFT	1998
VISSER 154	195	LANDING CRAFT	1998
VISSER 155	195	LANDING CRAFT	1998
VISSER 156	195	LANDING CRAFT	1998
GALATZ 908	12 050	PASS./RoRo CARGO SHIP	1998
FOSEN 64	12 050	PASS./RoRo CARGO SHIP	1999
Santierul Naval Tulcea			
BLUETANK ARCHITECT	10 976	CHEM. TANKER	1998
BLUETANK ENGINEER	10 976	CHEM. TANKER	1998
TULCEA 294	7 500	CHEM. TANKER	1998
ARION	1 599	GENERAL CARGO	1998
TULCEA 293	1 500	TRAWLER	1998
BRATTVAG 53	1 500	TRAWLER	1998
BRATTVAG 57	1 500	TRAWLER	1998
CHEFALU 18	107	FISHING VESSEL	1998
CHEFALU 19	107	FISHING VESSEL	1998
CHEFALU 20	107	FISHING VESSEL	1998
TULCEA 295	2 600	OFFSHORE SUPPLY SHIP	1998
TULCEA 296	1 200	OFFSHORE SUPPLY SHIP	1998
TULCEA 297	1 200	OFFSHORE SUPPLY SHIP	1998
ADJUD 2	560	TUG	1998
SIRIUS 1	400	TANK CLEANING VESSEL	1998
SIRIUS 2	400	TANK CLEANING VESSEL	1998
ZEUS	1 599	GENERAL CARGO	1999
HESTIA	1 599	GENERAL CARGO	1999
THEBE	1 599	GENERAL CARGO	1999
BRATTVAG 75	3 200	OFFSHORE SUPPLY SHIP	1999
Sanuki Zosen Tekkosho K.K. — Japan			
SANUKI 1275	2 100	REF. CARGO SHIP	1998
SANUKI 1281	449	FISHING VESSEL	1998
SANUKI 1276	2 100	REF. CARGO SHIP	1999
SANYM S.A. — Argentina			
S.A.N.Y.M. 106	100	TRAWLER	1998
S.A.N.Y.M. 100	110	FISHING VESSEL	1998
Sasaki Zosen K.K. — Japan			
SANYO 1083	4 700	GENERAL CARGO	1998
SASAKI 616	3 534	CRUDE OIL TANKER	1998
SASAKI 617	3 400	CRUDE OIL TANKER	1998
Sasebo Heavy Industries Co. — Japan			
FORMOSA TEN	19 600	CHEM. TANKER	1998
FORMOSA ELEVEN	19 600	CHEM. TANKER	1998
SASEBO 439	14 600	CRUDE OIL TANKER	1998
ORIENTAL SUN	37 773	BULK CARRIER	1998
SASEBO 441	43 400	BULK CARRIER	1998
SASEBO 440	38 200	BULK CARRIER	1998
SASEBO 444	37 900	BULK CARRIER	1998
SASEBO 449	38 200	BULK CARRIER	1998
WORLD RIBBON	38 864	BULK CARRIER	1998
SASEBO 438	39 300	BULK CARRIER	1998
SASEBO 421	43 500	GENERAL CARGO	1998
BALSA 63	4 355	GENERAL CARGO	1998
SASEBO 445	38 200	BULK CARRIER	1999
SASEBO 446	43 400	BULK CARRIER	1999
SASEBO 447	39 300	BULK CARRIER	1999
SASEBO 447	39 300	BULK CARRIER	1999
SBF Shipbuilders — Australia			
SBF 972	222	PASS.SHIP	1998
RISHI AUROBINDO	200	PASS.SHIP	1998
Scheepsw. "De Hoop" B.V. — Netherlands			
DE HOOP HARDINXVELD 800	130	FISHING VESSEL	1998
Scheepswerf Bijlsma B.V. — Netherlands			
BIJLSMA 682	6 540	GENERAL CARGO	1998
MAASBORG	6 510	GENERAL CARGO	1998
BIJLSMA 683	6 540	GENERAL CARGO	1999
Scheepswerf Damen B.V. — Netherlands			
JORISTON	1 638	GENERAL CARGO	1998
EMMASINGEL	2 000	GENERAL CARGO	1998
DAMEN GORINCHEM 6787	400	PASS./RoRo CARGO SHIP	1998
DAMEN GORINCHEM 5939	120	TUG	1998
DAMEN GORINCHEM 7915	300	TUG	1998
WALVIS 9	350	TUG	1998
WALVIS 10	350	TUG	1998
DAMEN GORINCHEM 7922	330	TUG	1998
DAMEN GORINCHEM 7929	330	TUG	1998
DAMEN GORINCHEM 7930	330	TUG	1998
DAMEN GORINCHEM 7931	330	TUG	1998
DAMEN GORINCHEM 7932	330	TUG	1998
WALVIS 11	350	TUG	1998
DAMEN GORINCHEM 3194	250	TUG	1998
DAMEN GORINCHEM 3195	250	TUG	1998
LAMNALCO PELICAN	210	TUG	1998
LAMNALCO PUFFIN	210	TUG	1998
DAMEN GORINCHEM 6542	140	TUG	1998
DAMEN GORINCHEM 6549	155	TUG	1998
DAMEN GORINCHEM 7921	300	TUG	1998
PERO DE TEIVE	360	TUG	1998
SMR MANZANILLO	212	TUG	1998
WADI SAFAD	395	TUG	1998
CHINGUITTY	200	TUG	1998
DAMEN GORINCHEM 2162	250	DREDGER	1998
P 23	100	PATROL VESSEL	1998
DAMEN GORINCHEM 5103	290	PATROL VESSEL	1998
DAMEN GORINCHEM 5104	290	PATROL VESSEL	1998
DAMEN GORINCHEM 5105	290	PATROL VESSEL	1998
LEOPARDESS	100	PATROL VESSEL	1998
SIDI BOUSAID	499	UTILITY VESSEL	1998
DAMEN GORINCHEM 2853	100	PILOT VESSEL	1998
DAMEN GORINCHEM 2854	100	PILOT VESSEL	1998
DAMEN GORINCHEM 2852	100	PILOT VESSEL	1998
DAMEN GORINCHEM 6901	400	TENDER (UNSPECIFIED)	1998
DAMEN GORINCHEM 6902	400	TENDER (UNSPECIFIED)	1998
DAMEN GORINCHEM 6903	400	TENDER (UNSPECIFIED)	1998
DAMEN GORINCHEM 6904	400	TENDER (UNSPECIFIED)	1998
DAMEN GORINCHEM 6905	400	TENDER (UNSPECIFIED)	1998
DAMEN GORINCHEM 7933	360	TUG	1999
DAMEN GORINCHEM 7934	360	TUG	1999
DAMEN GORINCHEM 7935	360	TUG	1999
DAMEN GORINCHEM 7936	360	TUG	1999
DAMEN GORINCHEM 6129	120	BUOY/LIGHTHOUSE VESSEL	1999
DAMEN GORINCHEM 6130	120	BUOY/LIGHTHOUSE VESSEL	1999
Scheepswerf Made B.V. — Netherlands			
ZEEMEEUW	270	TUG	1998
Scheepswerf Metz — Netherlands			
METZ 108	500	TRAWLER	1998
METZ 109	500	TRAWLER	1998
METZ 111	300	FISHING VESSEL	1998
METZ 110	250	FISHING VESSEL	1998
Scheepswerf Slob B.V. — Netherlands			
DAMEN GORINCHEM 6797	1 700	RESEARCH VESSEL	1998
IHC HOLLAND C01219	1 975	HOPPER DREDGER	1999
Schiffswerft u. Maschinenfabri — Germany (United)			
BALTIC SAILOR	2 280	GENERAL CARGO	1998
ARMINIUS WERKE 10551	2 280	GENERAL CARGO	1998
CASSENS 217	7 270	GENERAL CARGO	1998
GRAN RICH	7 300	GENERAL CARGO	1998
CASSENS 218	7 270	GENERAL CARGO	1999
Schps. & Mfbk. Barkmeijer — Netherlands			
KOESTERBERG	2 000	GENERAL CARGO	1998
BARKMEIJER 287	2 000	GENERAL CARGO	1998
ARKLOW SEA	2 300	GENERAL CARGO	1998
Schpsw. en Mfbk. Gebr. Kooiman — Netherlands			
(YE20)	250	FISHING VESSEL	1998
KOOIMAN 157	250	FISHING VESSEL	1998
Seaspeed — Malta			
SEASPEED 009	200	PASS.SHIP	1998
Sedef Gemi Endustrisi A.S. — Turkey			
ASIA FEEDER	6 246	GENERAL CARGO	1998
ALKIN KALKAVAN	6 431	CONTAINERSHIP	1998
SEDEF 113	6 431	CONTAINERSHIP	1998
Selah Makina Sanayi ve Ticaret — Turkey			
ALPHAMAR	12 500	BULK CARRIER	1998
SELAH 026	5 650	CONTAINERSHIP	1998
SELAH 028	12 500	BULK CARRIER	1999
Service Marine Industries Inc. — U.S.A.			
SERVICE MARINE 191	1 395	OFFSHORE TUG/SUPPLY SHIP	1998
Sestri Cant. Nav. SpA — Italy			
REPUBBLICA DEL BRASILE	57 800	PASS./LANDING CRAFT	1998
REPUBBLICA ARGENTINA	57 800	PASS./LANDING CRAFT	1998
SESTRI 6024	10 800	LPG TANKER	1999
SESTRI 6010	10 800	LPG TANKER	1999
Severnav S.A.			
SEVERNAV	4 000	LPG TANKER	1998
SEVERNAV 160002	3 000	LPG TANKER	1998
DANUBE GAS	3 000	LPG TANKER	1998
SEVERNAV 170006	3 000	LPG TANKER	1998
BRIGITTE GAS	1 290	LPG TANKER	1998
MARINA GAS	1 290	LPG TANKER	1998
VECHT	3 996	GENERAL CARGO	1998
SEVERNAV 380002	3 996	GENERAL CARGO	1999
SEVERNAV 370007	3 996	GENERAL CARGO	1999
Severney Shipbuilding Yard — Russia			
LUCK	9 000	RoRo CARGO SHIP	1998
Shalimar Works (1980) Ltd.			
VAJRA	360	TUG	1998
SHALIMAR 758	1 100	GENERAL CARGO	1999
Shanghai Edward Shipbuilding — China, P.R.			
MARINE RICKMERS	11 929	CONTAINERSHIP	1998
SHANGHAI EDWARD H116	5 175	LPG TANKER	1999
Shangyou Shipyard — China, P.R.			
GREY FOX	22 500	GENERAL CARGO	1998
SHANGHAI 173	27 000	BULK CARRIER	1999
SHANGYOU KM/94-1204	296	TUG	1998
Shikoku Dockyard Co. Ltd. — Japan			
COTE D'IVOIRIAN STAR	12 000	REF. CARGO SHIP	1998
COLUMBIAN STAR	12 000	REF. CARGO SHIP	1998
Shin Kochi Jyuko K.K. — Japan			
SHIN KOCHI 7111	3 510	LPG TANKER	1998
SHIN KOCHI 7108	3 000	CHEM. TANKER	1998
SHIN KOCHI 7110	7 750	GENERAL CARGO	1998
HEUNG-A INCHON	6 900	CONTAINERSHIP	1998
HEUNG-A KWANGYANG	6 900	CONTAINERSHIP	1998
WAN HAI 163	13 300	CONTAINERSHIP	1998
WAN HAI 165	13 300	CONTAINERSHIP	1998
SHIN KOCHI 7106	10 800	REF. CARGO SHIP	1998
SHIN KOCHI 7107	10 800	REF. CARGO SHIP	1999
Shin Kurushima Dockyard Co. — Japan			
SHIN KURUSHIMA 2983	4 650	CHEM. TANKER	1998
SHIN KURUSHIMA 2975	12 000	CHEM. TANKER	1998
SHIN KURUSHIMA 2986	28 000	CHEM. TANKER	1998
SIAM LOTUS	6 079	BULK CARRIER	1998
SHIN KURUSHIMA 2970	14 430	BULK CARRIER	1998
SHIN KURUSHIMA 2972	18 700	BULK CARRIER	1998
SHIN KURUSHIMA 2973	18 700	BULK CARRIER	1998
ASIA CEMENT No. 7	12 500	LIMESTONE CARRIER	1998
SHIN KURUSHIMA 2962	9 400	GENERAL CARGO	1998
SHIN KURUSHIMA 2963	9 400	GENERAL CARGO	1998
SHIN KURUSHIMA 2982	4 750	GENERAL CARGO	1998
SHIN KURUSHIMA 2959	7 750	GENERAL CARGO	1998
SHIN KURUSHIMA 2976	6 800	GENERAL CARGO	1998
SHIN KURUSHIMA 2977	6 800	GENERAL CARGO	1998
SHIN KURUSHIMA 2968	7 750	GENERAL CARGO	1998
ASIA CONCERTO	4 510	GENERAL CARGO	1998
SHIN KURUSHIMA 2978	6 800	GENERAL CARGO	1998
ACE CONTAINER	17 613	CONTAINERSHIP	1998
JUSTICE CONTAINER	17 800	CONTAINERSHIP	1998
AQUARIUS LEADER	57 500	PASS./LANDING CRAFT	1998
CYGNUS LEADER	57 500	PASS./LANDING CRAFT	1998
UBRA LEADER	57 500	PASS./LANDING CRAFT	1998
SHIN KURUSHIMA 5005	12 000	CHEM. TANKER	1999
SHIN KURUSHIMA 5006	12 000	CHEM. TANKER	1999
SHIN KURUSHIMA 5007	12 000	CHEM. TANKER	1999
SHIN KURUSHIMA 2985	12 000	CHEM. TANKER	1999
SHIN KURUSHIMA 2987	28 000	CHEM. TANKER	1999
SHIN KURUSHIMA 5011	23 500	CHEM./OIL PROD. TANKER	1999
SHIN KURUSHIMA 2998	17 800	CONTAINERSHIP	1999
SHIN KURUSHIMA 2991	17 800	CONTAINERSHIP	1999
SHIN KURUSHIMA 2992	17 800	CONTAINERSHIP	1999
SHIN KURUSHIMA 2993	17 800	CONTAINERSHIP	1999
SHIN KURUSHIMA 5000	9 990	PASS./LANDING CRAFT	1999
SHIN KURUSHIMA 5001	9 990	PASS./LANDING CRAFT	1999
SHIN KURUSHIMA 5002	9 990	PASS./LANDING CRAFT	1999
SHIN KURUSHIMA 5013	57 500	PASS./LANDING CRAFT	1999
SHIN KURUSHIMA 5012	57 500	PASS./LANDING CRAFT	1999
SHIN KURUSHIMA 5010	12 000	CHEM. TANKER	2000
SHIN KURUSHIMA 5008	12 000	CHEM. TANKER	2000
Shin A Shipbuilding Co. Ltd. — Korea (South)			
SHIN-A 395	5 999	CEMENT CARRIER	1998
GLOBAL NUBIRA	3 809	CONTAINERSHIP	1998
SHIN-A 396	7 250	CONTAINERSHIP	1998
SHIN-A 394	7 250	CONTAINERSHIP	1998
Shinhama Dockyard Co. Ltd. — Japan			
SHINHAMA TAMANO 273	105	GENERAL CARGO	1998
Shinosaki Zosen — Japan			
SHINOSAKI 117	999	CHEM. TANKER	1998
Shipbuilding (Fiji) Ltd. (SFL)— Fiji			
SHIPBUILDING FIJI 03	200	FISHING VESSEL	1998
SHIPBUILDING FIJI 04	200	FISHING VESSEL	1998
SHIPBUILDING FIJI 05	200	FISHING VESSEL	1998
Sigbjorn Iversen M/V A/S — Norway			
SIMEK 89	1 500	TRAWLER	1998
SIMEK 87	3 050	OFFSHORE SUPPLY SHIP	1999
SIMEK 91	3 050	OFFSHORE SUPPLY SHIP	1999
SIMA Serv. Ind. de la Marina — Peru			
SIMA CALLAO 58	1 000	TRAWLER	1998
SIMA CALLAO 59	1 000	TRAWLER	1998
DONA EMMA	1 000	FISHING VESSEL	1998
SIMA CALLAO 62	500	FISHING VESSEL	1998
SIMA CALLAO 63	500	FISHING VESSEL	1998
SIMA CALLAO 61	1 000	FISHING VESSEL	1998
Sing Koon Seng Shipyard Pte. — Singapore			
SING KOON SENG 705	183	TRAWLER	1998
SING KOON SENG 704	183	TRAWLER	1998
Skipalyftan h/f — Iceland			
SKIPALYFTAN 1	170	TUG	1998
Slipen Mek Verksted A/S — Norway			
TORSON	1 960	TRAWLER	1998
Slovenske Lodenice AG			
SANKT PETERBURG	2 446	GENERAL CARGO	1998
LEDA	2 500	GENERAL CARGO	1998
NORTHERN COAST	2 446	GENERAL CARGO	1998
NORTHERN LAKE	2 446	GENERAL CARGO	1998
NORTHERN ISLAND	2 446	GENERAL CARGO	1998
DUTCH NAVIGATOR	1 997	GENERAL CARGO	1998
SLOVENSKE 3008	2 997	GENERAL CARGO	1998
SLOVENSKE 3009	2 997	GENERAL CARGO	1998
Soc. Esercizio Cant. S.p.A. — Itlay			
ESERCIZIO 1555	12 000	CHEM. TANKER	1998
ESERCIZIO 1556	12 000	CHEM. TANKER	1998
STENA AUSONIA	14 500	RoRo CARGO SHIP	1998
HISPANIA	14 500	RoRo CARGO SHIP	1998
GRECIA	14 500	RoRo CARGO SHIP	1998
ESERCIZIO 1549	14 500	RoRo CARGO SHIP	1998
ESERCIZIO 1550	14 500	RoRo CARGO SHIP	1998
ESERCIZIO 1551	14 500	RoRo CARGO SHIP	1999
ESERCIZIO 1552	14 500	RoRo CARGO SHIP	1999
Sociedad Co-operativa de Ast. — Spain			
OJEDA Y ANICETO 26	248	TRAWLER	1997
SEMLALA	400	TRAWLER	1998
OJEDA Y ANICETO 19	248	TRAWLER	1998
PEIX MAR DIECINUEVE	243	TRAWLER	1998
Societatea Comerciala Naval			
NAVOL 392	2 500	GENERAL CARGO	1998
NAVOL 391	2 500	GENERAL CARGO	1998
NAVOL 394	2 500	GENERAL CARGO	1998
NAVOL 393	2 500	GENERAL CARGO	1998
BETSY	2 986	CONTAINERSHIP	1998
HEIKE	2 986	CONTAINERSHIP	1998
Soviknes Verft A/S — Norway			
SOVIKNES 115	6 000	CHEM./OIL PROD. TANKER	1998
SOVIKNES 114	3 050	OFFSHORE SUPPLY SHIP	1998
St. Barbara Contracting N.V. — Belgium			
JEANINE-THERESA	1 800	CHEM. TANKER	1998
ST. BARBARA	1 200	GENERAL CARGO	1998
Sterkoder A/S — Norway			
STERKODER 185	10 570	RoRo CARGO SHIP	1998
KVAERNER LEIRVIK 280	3 000	OFFSHORE SUPPLY SHIP	1999
STERKODER 188	7 300	WELL-STIMULATION VESSEL	1999
Stocznia Gdanska S.A. — Poland			

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Ship Name	GT	Ship Type	Year
CAPE NORTH	15 700	CONTAINERSHIP	1998
CAPE NEGRO	15 700	CONTAINERSHIP	1998
CAPE NORMAN	17 285	CONTAINERSHIP	1998
REGENT SKY	50 000	PASS. (CRUISE) SHIP	1998
GWAREK	4 600	PASS. (CRUISE) SHIP	1999
Stocznia Gdynia S.A. — Poland			
PEGASUS	21 600	CONTAINERSHIP	1998
TAURUS	21 600	CONTAINERSHIP	1998
SIRIUS	21 600	CONTAINERSHIP	1998
ZENIT	21 600	CONTAINERSHIP	1998
WESTERHAMN	23 500	CONTAINERSHIP	1998
COLUMBA	23 500	CONTAINERSHIP	1998
CLASSICA	23 500	CONTAINERSHIP	1998
GDYNIA B145/2	23 500	CONTAINERSHIP	1998
GDYNIA B183/1	56 700	CRUDE OIL TANKER	1999
ELBWOLF	33 000	CONTAINERSHIP	1999
GDYNIA B184/2	33 000	CONTAINERSHIP	1999
Stocznia Polnocna S.A. — Poland			
POLNOCNA B184/04	5 963	GENERAL CARGO	1998
MAASKANT STELLENDAM	500	TRAWLER	1998
GANTHI	820	TRAWLER	1998
GINNETON	820	TRAWLER	1998
POLNOCNA B300/3	500	TRAWLER	1998
POLNOCNA B685/2	500	TRAWLER	1998
POLNOCNA B686/1	145	TRAWLER	1998
POLNOCNA B304/01	2 000	TRAWLER	1998
POLNOCNA B305/01	2 500	TRAWLER	1998
POLNOCNA B305/02	2 500	TRAWLER	1998
POLNOCNA BB73/1	1 618	RESEARCH VESSEL	1998
Stocznia Porta Odra — Poland			
ODRA TB665/03	250	TRAWLER	1998
ODRA TB665/02	250	FISHING VESSEL	1998
Stocznia Szczecinska S.A. — Poland			

GE Marine Secures 10-Year Gas Turbine Maintenance Agreement From Stena

GE Marine Engines has secured a 10-year gas turbine maintenance agreement with Swedish company Stena Line AB for three Stena High Speed Sea Service (HSS) fast ferries.

"The Stena contract for the HSS fast ferries is a first-of-a-kind for GE in the commercial marine industry, although we currently have long-standing gas turbine maintenance agreements with various marine and industrial customers," said GE Marine Engines General Manager Bill Millhaem. "The agreement with Stena Line illustrates that GE offers customers not only the equipment but the value-added expertise and knowledge to maintain this machinery."

The agreement covers full onboard and shop repair maintenance for the 12 GE LM aeroderivative gas turbines on three HSS fast ferries, Stena Explorer, Stena Voyager and Stena Discovery, which began commercial operation in April 1996, July 1996 and June 1997, respectively.

Each semi-swath fast ferry has two GE LM1600 and two GE LM2500 aeroderivative gas turbines in a COGAG configuration. The LM1600s are rated at 13.1 megawatts and the LM2500s are rated at 20.2 megawatts.

The vessels were built by Finnyards in Rauma, Finland and measure 413 x 131 ft. (126 x 40 m).

Each vessel can achieve speeds of more than 40 knots and has the capacity for 1,500 passengers. The vessels are operated by Stena Line on the Irish Sea between the U.K. and The Netherlands.

Ship Name	GT	Ship Type	Year
SZCZECINSKA B570/3/9	11 800	CHEM. TANKER	1998
SZCZECINSKA B579/1	4 700	CHEM. TANKER	1998
SZCZECINSKA B573/5/1	27 800	OIL PROD. TANKER	1998
VALBELLA	28 118	GENERAL CARGO	1998
VAIDIVIA	28 118	GENERAL CARGO	1998
VALPARAISO	28 118	GENERAL CARGO	1998
VALDEMOSA	28 118	GENERAL CARGO	1998
SZCZECINSKA B577/1/7	28 118	GENERAL CARGO	1998
SZCZECINSKA B183/2/30	9 600	CONTAINERSHIP	1998
SZCZECINSKA 8183/2/29	9 600	CONTAINERSHIP	1998
HANS SCHUITE	14 300	CONTAINERSHIP	1998
SZCZECINSKA B170/1/16	16 600	CONTAINERSHIP	1998
SZCZECINSKA B170/1/17	16 600	CONTAINERSHIP	1998
SZCZECINSKA B170/4/2	16 600	CONTAINERSHIP	1998
SZCZECINSKA B170/4/3	16 600	CONTAINERSHIP	1998
CSAV RIO URUGUAY	16 500	CONTAINERSHIP	1998
WEHR MUDEN	16 801	CONTAINERSHIP	1998
HELENE RICKMERS	16 600	CONTAINERSHIP	1998
SOPHIE RICKMERS	16 600	CONTAINERSHIP	1998
FORTUNE	5 650	RESEARCH VESSEL	1998
SZCZECINSKA 8570/3/10	11 390	CHEM. TANKER	1999
SZCZECINSKA B579/2	4 700	CHEM. TANKER	1999
SZCZECINSKA B579/3	4 700	CHEM. TANKER	1999
SZCZECINSKA B579/4	4 700	CHEM. TANKER	1999
SZCZECINSKA B577/2/2	23 450	BULK CARRIER	1999
SZCZECINSKA B570/2/6	11 540	BULK CARRIER	1999
SZCZECINSKA 8570/2/7	11 540	BULK CARRIER	1999
SZCZECINSKA 8570/2/8	11 540	BULK CARRIER	1999
SZCZECINSKA B577/2/1	23 450	GENERAL CARGO	1999
SZCZECINSKA B584/1/1	30 000	GENERAL CARGO	1999
SZCZECINSKA 8584/1/2	30 000	GENERAL CARGO	1999
SZCZECINSKA B584/1/3	30 000	GENERAL CARGO	1999
SZCZECINSKA B170/1/20	16 600	CONTAINERSHIP	1999
SZCZECINSKA B170/1/19	16 600	CONTAINERSHIP	1999
GRIFFIN CLIO	16 600	CONTAINERSHIP	1999
SZCZECINSKA B577/2/3	23 450	BULK CARRIER	2000
SZCZECINSKA B577/2/4	23 450	BULK CARRIER	2000
SZCZECINSKA B577/2/5	23 450	BULK CARRIER	2000
SZCZECINSKA B584/1/4	30 000	GENERAL CARGO	2000
SZCZECINSKA B170/1/21	16 600	CONTAINERSHIP	2000
SZCZECINSKA B170/1/22	16 600	CONTAINERSHIP	2000
TCZEW 0554/02	100	TRAWLER	1998

Sumitomo Heavy Industries Ltd.— Japan

Ship Name	GT	Ship Type	Year
SUMITOMO YOKOSUKA 1239	38 400	BULK CARRIER	1998
SUMITOMO YOKOSUKA 1237	38 400	BULK CARRIER	1998
SUMITOMO YOKOSUKA 1238	38 400	BULK CARRIER	1998
SUMITOMO YOKOSUKA 1232	38 400	BULK CARRIER	1998
BUNGA SAGA LIMA	38 489	BULK CARRIER	1998
BUNGA SAGA ENAM	38 400	BULK CARRIER	1998
BUNGA SAGA TUJUH	38 400	BULK CARRIER	1998
SUMITOMO YOKOSUKA 1233	160 000	CRUDE OIL TANKER	1999
SUMITOMO YOKOSUKA 1251	56 500	CRUDE OIL TANKER	1999
SUMITOMO YOKOSUKA 1246	38 400	BULK CARRIER	1999
SUMITOMO YOKOSUKA 1247	38 400	BULK CARRIER	1999
SUMITOMO YOKOSUKA 1241	38 364	BULK CARRIER	1999
SUMITOMO YOKOSUKA 1242	38 364	BULK CARRIER	1999
SUMITOMO YOKOSUKA 1243	38 364	BULK CARRIER	1999
SUMITOMO YOKOSUKA 1244	38 364	BULK CARRIER	1999
SUMITOMO YOKOSUKA 1248	38 364	BULK CARRIER	1999
SUMITOMO YOKOSUKA 1249	38 364	BULK CARRIER	1999
SUMITOMO YOKOSUKA 1245	38 364	BULK CARRIER	1999

Minoan Lines To Buy Small Passenger Line

Greece's passenger shipping firm Minoan Lines reached an initial agreement for the acquisition of smaller passenger shipper LANE. LANE operates one ferry boat in the Piraeus-Crete route and had turnover of $5.7 million in 1997. LANE agreed to be absorbed in exchange for Minoan Lines stock, at a ratio to be determined by an appraisal of its assets.

Keppel Wins Contract To Build Four Harbor Tugs

Through its parent company Keppel Singmarine Dockyard (Keppel Singmarine), Keppel Marine Industries was recently awarded a contract to build four units of harbor tugs.

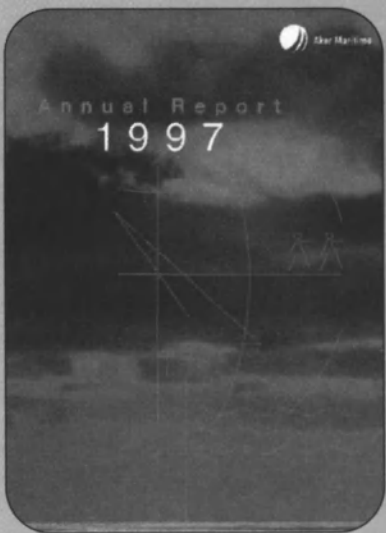
The deal was awarded by Keppel Smit Towage (Keppel Smit), a repeat customer of Keppel Singmarine.

Features of the 98.4-ft. (30-m) tugboats will include an off-ship fire and oil dispersant system. Each vessel will have a bollard pull exceeding 40 tons, powered by two units of 1,500 BHP diesel engines.

The four tugs will be built to the classification of American Bureau of Shipping with a notation of Maltese Cross A1 Circle E Towing Vessel Maltese Cross AMS. The first two tugboats are scheduled for delivery by the end of this year, with the remaining two will be completed by mid-1999.

Ship Name	GT	Ship Type	Year
Super Light Shipbuilding — Malaysia			
ASME CRYSTAL	120	TUG	1998
QM PIONEER 8183	165	TUG	1998
Suzuki Shipyard Co. Ltd. — Japan			
SUZUKI 651	101	PUSHER TUG	1998
KINEI MARU No. 28	100	PUSHER TUG	1998
Syarikat Sarawak Slipways Sdn. — Malaysia			
ARMADA TUAH 3	299	TUG	1998
ARMADA TUAH 4	299	TUG	1998
Tai Kong Trading Co. — Singapore			
TAI KONG 313	299	TUG	1999
TAI KONG 319	299	TUG	1999
Taiyo Zosen K.K.— Japan			
EBISU MARU No. 25	199	CHEM. TANKER	1998
TAIYO 273	199	CHEM. TANKER	1998
TAIYO 275	199	GENERAL CARGO	1998
Tangen Verft A/S — Norwayu			
RAMEORM VIKING	10 150	RESEARCH VESSEL	1998
Tebma Engineering Pvt. Ltd. — India			
TEBMA 061	260	TUG	1998
TEBMA 062	270	TUG	1999
TEBMA 063	260	TUG	1999
TEBMA 064	270	TUG	1999
Th. Hellesoy Skipsbyggeri A/S — Norway			
STRIL POSEIDON	3 200	OFFSHORE SUPPLY SHIP	1998
HELLESOY 135	4 200	OFFSHORE TUG/SUPPLY SHIP	1999
HELLESOY	3 000	OFFSHORE TUG/SUPPLY SHIP	1999
HELLESOY	3 000	OFFSHORE TUG/SUPPLY SHIP	2000
The Mechanical Eng. Enterprise — Russia			
ZVYOZDOCHKA 004	375	GENERAL CARGO	1998
Thyssen Nordseewerke GmbH — Germany (United)			
CLIPPER VIKING	9 500	LPG TANKER	1998
GENOVEVA	16 200	CONTAINERSHIP	1998
GEMINI	25 500	CONTAINERSHIP	1998
HISPANIA	24 000	CONTAINERSHIP	1998
MEYER 652	13 500	LPG TANKER	1999
THYSSEN 523	25 499	CONTAINERSHIP	1999
THYSSEN 524	25 499	CONTAINERSHIP	1999
Tille Shipyards BV. — Netherlands			
RADESINGEL	2 560	GENERAL CARGO	1998
TILLE 324	2 560	CONTAINERSHIP	1998
RADEPOORT	2 560	GENERAL CARGO	1999
RADEPLEIN	2 560	GENERAL CARGO	1999
Timsah SB. Co. — Egypt			
TIMSAH ISMAILIA 1367	280	TUG	1998
TIMSAH ISMAILIA 1369	280	TUG	1998
TIMSAH ABU QIR 1362	280	TUG	1998
TIMSAH ABU QIR 1363	280	TUG	1998
TIMSAH ABU OIR 1364	280	TUG	1998
Todd Pacific Shipyards Corp. — U.S.A.			
WENATCHEE	4 340	PASS./RoRo CARGO SHIP	1998
PUYALLUP	4 340	PASS./RoRo CARGO SHIP	1999
Transfield Shipbuilding WA — Australia			
TENIX 347	212	TRAINING SHIP	1998
Tsuneishi Heavy Industries — Japan			
KAPETAN TRADER	14 700	BULK CARRIER	1998
TSUNEISHI BALAMBAN SC006	14 700	BULK CARRIER	1998
EVER REGAL	14 762	BULK CARRIER	1998
Tsuneishi Zosen K.K. — Japan			
TSUNEISHI 1131	26 400	BULK CARRIER	1998
TSUNEISHI 1119	38 700	BULK CARRIER	1998
ZHI QIANG	26 400	BULK CARRIER	1998
HUA QIANG	26 400	BULK CARRIER	1998
XIN QIANG	26 400	BULK CARRIER	1998
GAO QIANG	26 400	BULK CARRIER	1998
CHANG QIANG	26 400	BULK CARRIER	1998
SHENG QIANG	26 400	BULK CARRIER	1998
TSUNEISHI 1132	26 400	BULK CARRIER	1998
TSUNEISHI 1137	26 400	BULK CARRIER	1998
TSUNEISHI 1138	38 800	BULK CARRIER	1998
TSUNEISHI 1139	38 800	BULK CARRIER	1998
TSUNEISHI 1142	8 550	LIMESTONE CARRIER	1998
TAKUYO MARU	8 700	GENERAL CARGO	1998
NKK TSU 187	86 000	BULK CARRIER	1999
TSUNEISHI 1154	26 400	BULK CARRIER	1999
TSUNEISHI 1158	26 200	BULK CARRIER	1999
TSUNEISHI 1147	51 900	PASS./LANDING CRAFT	1999
TSUNEISHI 1155	26 400	BULK CARRIER	2000
Turkiye Gemi Sanayii A.S. — Turkey			
PENDIK 027	4 500	OIL PROD. TANKER	1998
PENDIK 028	4 500	OIL PROD. TANKER	1998
PENDIK 029	4 500	OIL PROD. TANKER	1998
PENDIK 026	4 500	OIL PROD. TANKER	1998
TASKENT	42 000	BULK CARRIER	1998
AGATHA	5 381	BULK CARRIER	1998
ALINA	5 381	BULK CARRIER	1998
ALMA ATA	42 000	BULK CARRIER	1998
BAKU	13 650	GENERAL CARGO	1998
ASKABAT	13 650	GENERAL CARGO	1998
PENDIK 020	4 000	RoRo CARGO SHIP	1998
PENDIK 021	4 000	RoRo CARGO SHIP	1998
PENDIK 025	658	PASS./RoRo CARGO SHIP	1998
PENDIK 024	658	PASS./RoRo CARGO SHIP	1998
PENDIK 030	4 500	OIL PROD. TANKER	1999
PENDIK 022	4 000	RoRo CARGO SHIP	1999
PENDIK 023	4 000	RoRo CARGO SHIP	1999
EMILIA TERESA	2 900	CHEM. TANKER	1998
UAE004054 — UAE			
DUBAI DRYDOCKS S9990	320	TUG	1998
UDL Engineering Pte. Ltd. — Singapore			
UDL SINGAPORE 8629	3 300	OIL PROD. TANKER	1998
Ulstein Verft A/S — Norway			
NORMAND VESTER	3 100	OFFSHORE SUPPLY SHIP	1998
PACIFIC BANNER	1 836	OFFSHORE TUG/SUPPLY SHIP	1998
PACIFIC BLADE	1 836	OFFSHORE TUG/SUPPLY SHIP	1998
ULSTEIN 236	5 800	OFFSHORE TUG/SUPPLY SHIP	1999
ULSTEIN 247	5 800	OFFSHORE TUG/SUPPLY SHIP	1999
ULSTEIN 241	9 600	RESEARCH VESSEL	1999
ULSTEIN 242	9 600	RESEARCH VESSEL	1999
Union Naval de Levante S.A. — Spain			
LEVANTE 247	10 210	OIL PROD. TANKER	1998
LEVANTE 248	10 210	OIL PROD. TANKER	1998
LEVANTE 249	10 460	OIL PROD. TANKER	1998
OUED ZIZ	5 556	CONTAINERSHIP	1998
LEVANTE 253	12 700	CHEM. TANKER	1999
LEVANTE 254	12 700	CHEM. TANKER	1999
LEVANTE 250	10 460	OIL PROD. TANKER	1999
LEVANTE 255	12 700	CHEM. TANKER	2000
USA104059 — U.S.A.			
CLOUD X	1 025	PASS.SHIP	1998
NICHOLS 127	200	TUG	1998
NICHOLS 128	200	TUG	1998
NICHOLS 129	200	TUG	1998
NICHOLS 130	200	TUG	1999
NICHOLS 131	200	TUG	1999
NICHOLS 132	200	TUG	1999
USA115251 — U.S.A.			
NORTH AMERICAN LAROSE 154	1 525	RESEARCH VESSEL	1998
NORTH AMERICAN LAROSE 163	199	TUG	1998
NORTH AMERICAN LAROSE 167	499	TUG	1998
NORTH AMERICAN LAROSE 170	499	TUG	1998
NORTH AMERICAN LAROSE 171	499	TUG	1998
NORTH AMERICAN LAROSE 172	499	TUG	1998
USA117057 — U.S.A.			
STEINER 321	200	PASS.SHIP	1998
STEINER 222	106	TRAWLER	1998
STEINER 255	120	FISHING VESSEL	1998
STEINER 261	106	FISHING VESSEL	1998
STEINER 262	106	FISHING VESSEL	1998
USA270052 — U.S.A.			
DAKOTA CREEK 33	900	TUG	1999
DAKOTA CREEK 34	900	TUG	1999
USA331051 — U.S.A.			
JAMES RANKIN	450	BUOY/LIGHTHOUSE VESSEL	1998
KUKUI	1 300	BUOY/LIGHTHOUSE VESSEL	1998
ELM	1 300	BUOY/LIGHTHOUSE VESSEL	1998
KATHERINE WALKER	450	BUOY/LIGHTHOUSE VESSEL	1998
JOSHUA APPLEBY	450	BUOY/LIGHTHOUSE VESSEL	1999
FRANK DREW	450	BUOY/LIGHTHOUSE VESSEL	1999
HARRY CLAIBORNE	450	BUOY/LIGHTHOUSE VESSEL	1999
WALNUT	1 300	BUOY/LIGHTHOUSE VESSEL	1999
ANTHONY PETTIT	450	BUOY/LIGHTHOUSE VESSEL	2000
BARBARA MABRITY	450	BUOY/LIGHTHOUSE VESSEL	2000
WILLIAM TATE	450	BUOY/LIGHTHOUSE VESSEL	2000
MARIA BRAY	450	BUOY/LIGHTHOUSE VESSEL	2000
HENRY BLAKE	450	BUOY/LIGHTHOUSE VESSEL	2000
GEORGE COBB	450	BUOY/LIGHTHOUSE VESSEL	2000
INNOVATEUR JR	150	PASS.SHIP	1998
Uudenkaupungin Tyovene Oy — Finland			
UUDENKAUPUNGIN 97/98	700	PASS./RoRo CARGO SHIP	1998
Vaagland Batbyggeri A/S — Norway			
WITH JUNIOR	1 700	PALLETISED CARGO SHIP	1998
Valstybine Laivu Statykla			
DAINA	3 893	GENERAL CARGO	1998
RASA	3 628	GENERAL CARGO	1998
BALTIJA	466	TUG	1998
BALTIJA	466	TUG	1998
Van der Giessen de Noord B.V. — Netherlands			
BEN-MY-CHREE	12 600	PASS./RoRo CARGO SHIP	1998
GIESSEN-DE NOORD 972	6 000	OFFSHORE SUPPLY SHIP	1998
GIESSEN-DE NOORD 974	6 000	OFFSHORE SUPPLY SHIP	1998
QUEEN OF PENTA-OCEAN	21 500	HOPPER DREDGER	1999
Van der Werf en Visser — Netherlands			
VAN DER WERF 286	200	FISHING VESSEL	1998
VAN DER WERF 289	200	FISHING VESSEL	1998
Varna Shipyard JSC			
DORA	24 700	BULK CARRIER	1998
PERELIK	10 228	BULK CARRIER	1998
PERSENK	10 228	BULK CARRIER	1998
VARNA 455	13 967	BULK CARRIER	1998
VARNA 456	13 967	BULK CARRIER	1998
DENIS	24 700	BULK CARRIER	1998
VARNA 511	24 700	BULK CARRIER	1999
MARY BROWN	7 660	GENERAL CARGO	1999
MARY BLU	7 660	GENERAL CARGO	1999
Verolme Scheepswerf Heusden B. — Netherlands			
QUEEN OF THE NETHERLANDS	22 000	HOPPER DREDGER	1998
HAM 316	8 000	HOPPER DREDGER	1998
YSSELWERF 273	3 999	OFFSHORE SUPPLY SHIP	1999
Vickers SB. & Eng. Ltd. — Great Britain			
MERSEY FISHER	3 000	OIL PROD. TANKER	1998
Vindholmen Services A/S — Norway			
SIMEK 94	4 363	OFFSHORE TUG/SUPPLY SHIP	1998
SIMEK 95	2 750	OFFSHORE TUG/SUPPLY SHIP	1998
Voldnes Skipsverft A/S — Norway			
VOLDNES 56	350	FISHING VESSEL	1998
Volgograd Shipyard — Russia			
VOLGOGRAD 103	4 000	OIL PROD. TANKER	1998
VOLGOGRAD	4 000	OIL PROD. TANKER	1998
VOLGOGRAD 104	4 000	OIL PROD. TANKER	1999
VOLGOGRAD 105	4 000	OIL PROD. TANKER	1999
VOLGOGRAD 106	4 000	OIL PROD. TANKER	1999
VOLGOGRAD 107	4 000	OIL PROD. TANKER	1999
VOLGOGRAD 108	4 000	OIL PROD. TANKER	2000
VOLGOGRAD 109	4 000	OIL PROD. TANKER	2000
VOLGOGRAD 110	4 000	OIL PROD. TANKER	2000
VOLGOGRAD 111	4 000	OIL PROD. TANKER	2000
VOLGOGRAD 112	4 000	OIL PROD. TANKER	2001
Volkswerft GmbH — Germany (United)			
UTE OLTMANN	25 300	CONTAINERSHIP	1998
LAURA S	25 300	CONTAINERSHIP	1998
HEINRICH S	25 300	CONTAINERSHIP	1998
ALEXANDER VON HUMBOLDT	9 445	HOPPER DREDGER	1998
NEUWERK	3 580	POLLUTION CONTROL VESSEL	1998
PACIFIC VOYAGER	25 500	CONTAINERSHIP	1999
ATLANTIC VOYAGER	25 500	CONTAINERSHIP	1999
Wakamatsu Zosen K.K. — Japan			
FUKUI MARU	165	FISHING VESSEL	1998
Watanabe Zosen K.K.— Japan			
OCEAN DREAM	4 100	GENERAL CARGO	1998
WATANABE 308	4 100	GENERAL CARGO	1998
WATANABE 309	4 100	GENERAL CARGO	1998
HEUNG-A OSAKA	4 290	CONTAINERSHIP	1998
WaveMaster International Pty. — Australia			
ASEAN RAIDER II	200	PASS.SHIP	1998
WAVEMASTER 147	450	PASS.SHIP	1998
WAVEMASTER 155	200	PASS.SHIP	1998
WAVEMASTER 157	200	PASS.SHIP	1998
WATERFRONT 1	145	PASS.SHIP	1998
WATERFRONT 2	145	PASS.SHIP	1998
WAVEMASTER 158	200	PASS.SHIP	1999
Weihai Shipyard — China, P.R.			
CAPE CHARLES	8 892	CONTAINERSHIP	1998
CAPE COOK	8 892	CONTAINERSHIP	1998
CAPE CRETIN	8 892	CONTAINERSHIP	1998
CAPE CAPSTAN	8 892	CONTAINERSHIP	1999
Wuchang Shipyard — China, P.R.			
CHANG MAO 1	1 109	LPG TANKER	1998
Wuhu Shipyard — China, P.R.			
WUHU 9518	13 645	BULK CARRIER	1998
WUHU 9517	13 645	BULK CARRIER	1998
ELISE OLDENDOREF	13 781	BULK CARRIER	1998
WUHU W9713	16 000	GENERAL CARGO	1999
WUHU W9711	16 000	GENERAL CARGO	1999
WUHU W9712	16 000	GENERAL CARGO	1999
Wusong Shipyard — China, P.R.			
WUSONG 96-1-5A	1 600	PASS.SHIP	1998
Xiamen Shipyard — China, P.R.			
XIAMEN XC97NB001	8 986	CONTAINERSHIP	1998
Xingang Shipyard — China, P.R.			
XINGANG 309	16 000	BULK CARRIER	1998
SHENG MU	11 000	BULK CARRIER	1998
XINGANG 302	4 095	GENERAL CARGO	1998
XINGANG 303	4 095	GENERAL CARGO	1998
XINGANG 321	8 000	GENERAL CARGO	1998
XINGANG 322	8 000	GENERAL CARGO	1998
XINGANG 313	4 000	GENERAL CARGO	1998
XINGANG 315	4 000	GENERAL CARGO	1999
XINGANG 316	4 000	GENERAL CARGO	1999
XINGANG 314	4 000	GENERAL CARGO	1999
Yakup Kacaranlioglu Tersanesi — Turkey			
SEHER	1 200	GENERAL CARGO	1998
Yamakawa Zosen Tekko K.K. — Japan			
KOEI MARU No. 81	499	GENERAL CARGO	1998
Yamanaka Zosen K.K. — Japan			
YAMANAKA 621	1 599	CHEM. TANKER	1998
ASAKAZE No. 5	1 900	PASS./RoRo CARGO SHIP	1998
FUKUSHIMA MARU	499	TRAINING SHIP	1998
Yantar Shipyard — Russia			
YANTAR 101	10 040	GENERAL CARGO	1998
YANTAR 102	10 040	GENERAL CARGO	1998
YANTAR 201	2 400	GENERAL CARGO	1998
YANTAR 202	2 400	GENERAL CARGO	1998
YANTAR 203	2 400	GENERAL CARGO	1998
YANTAR 204	2 400	GENERAL CARGO	1998
YANTAR 205	2 400	GENERAL CARGO	1998
HARJUMAA	10 040	GENERAL CARGO	1998
YANTAR 503	10 040	GENERAL CARGO	1998
YANTAR 504	10 040	GENERAL CARGO	1998
YANTAR 505	10 040	GENERAL CARGO	1998
Yaroslavskiy Shipyard — Russia			
YAROSLAVSKIY 390	780	FISHING VESSEL	1998
YAROSLAVSKIY 391	780	FISHING VESSEL	1998
YAROSLAVSKIY 392	780	FISHING VESSEL	1998
YAROSLAVSKIY 393	780	FISHING VESSEL	1998
YAROSLAVSKIY 389	780	FISHING VESSEL	1998
Yichang Shipyard — China, P.R.			
YICHANG 568001	4 300	CONTAINERSHIP	1998
HYDRA J	4 450	CONTAINERSHIP	1998
AMISIA J	4 450	CONTAINERSHIP	1998
Yokohama Yacht Co. Ltd. — Japan			
GENKAI	114	FISHING SUPPORT VESSEL	1998
York Marine Pty. Ltd. — Australia			
FIVE STAR	100	PASS.SHIP	1998
YVC Ysselwerf B.V. — Netherlands			
YSSELWERF 271	6 000	CHEM. TANKER	1998
YSSELWERF 272	6 500	FISH FACTORY SHIP	1999
YSSELWERF 274	3 999	OFFSHORE SUPPLY SHIP	1999
Zaliv Shipyard — Ukraine			
ZALIV 502	38 792	CRUDE OIL TANKER	1999
ZALIV 501	38 792	CRUDE OIL TANKER	1999
Zhejiang Shipyard — China, P.R.			
ZHEJIANG 932-53	1 588	OIL PROD. TANKER	1998
ECHO TRADER	3 999	GENERAL CARGO	1998
DELTA	3 999	GENERAL CARGO	1998
Zhonghua Shipyard — China, P.R.			
ZHONGHUA 390	6 311	CEMENT CARRIER	1998
CLIPPER COWBRIDGE	8 134	GENERAL CARGO	1998
CLIPPER CARDIFF	8 134	GENERAL CARGO	1998
CLIPPER CARMARTHON	8 134	GENERAL CARGO	1998
CLIPPER CALIDCOT	8 134	GENERAL CARGO	1999
CLIPPER CHEPSTOW	8 134	GENERAL CARGO	1999

Annual Report Reviews



Aker Maritime
Aker Maritime is one of the largest international companies involved with the safe and profitable exploitation of offshore oil and gas resources. By the year 2000 the company aims to double its revenues compared with 1996 and quadruple profits to 1 billion. The company's1997 report touches on many aspects of their corporate strategy. These include maintaining their position as the leading supplier of floating production facilities, while continuing to grow in the product area, with an emphasis on organic growth in the equipment companies. Aker will increase its focus on operations, maintenance and modifications mainly in Norway and the U.K..
Circle 81 on Reader Service Card

Dresser
Dresser's message has never been more clear:"Energy is our business." The company is the leading global supplier of full-spectrum and discrete products and services for the oil and natural gas industry. Through 19 operating units and three joint ventures, Dresser maintains the industry's broadest capabilities. Dresser offers a complement of services to arrive at any solution from the drill bit to the gas pump. The company also takes great pride in their commitment to their shareholders and employees, the people who have made them the success story that they are today.
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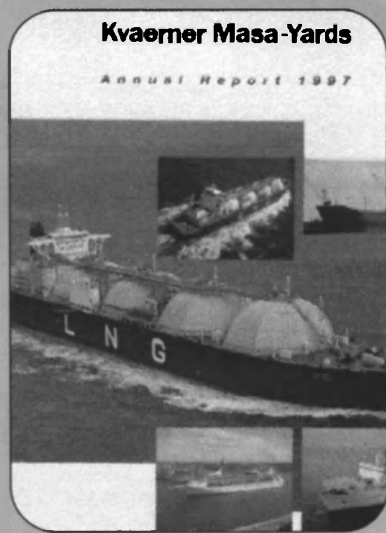

Kvaerner Masa-Yards
Kvaerner is an international engineering and construction group. With six core business units -- shipbuilding (with Kvearner Masa Yards being world renowned), process, construction, oil and gas, metals and pulp and paper -- the group is a leader in technology-based engineering, manufacturing and construction services for a wide range of industries. Kvaerner is also a key manufacturer and developer of systems and technologies for environment-friendly solutions needed for processing natural resources such as forests, oil, gas, minerals, steel and hydropower.
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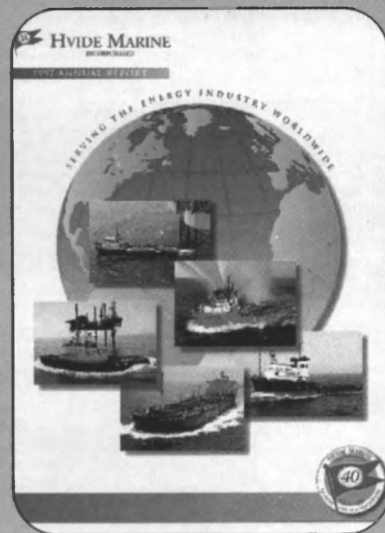

Hvide Marine
Based in Port Everglades, Florida, Hvide Marine is one of the world's leading providers of marine support and transportation services. The company is made up of two sectors. The Marine Support Services division deals primarily in the offshore energy industry; it encompasses Hvide's Seabulk Offshore subsidiary, the world's third largest operator of oilfield support vessels. Hvide's Marine Transportation Services division is the leading carrier in the domestic chemical transportation trade. The company also has a large share in transporting petroleum.
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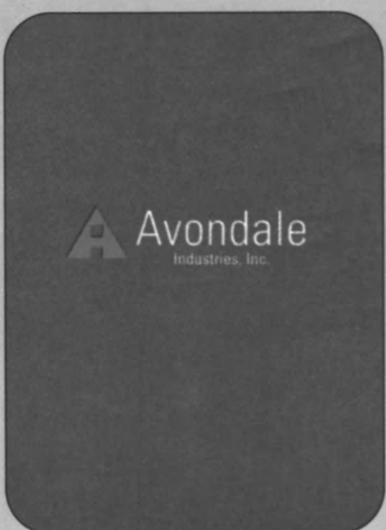

Avondale
Avondale Industries continues to make substantial progress in construction for the maritime industry. The company's operational achievements include six ships in the Navy's Strategic Sealift program, a new maritime technology center and a contract for up to five 125,000 DWT double hull crude oil carriers for ARCO Marine. Avondale's goal is to build on these milestones and to forge an organization that is equipped for the challenges that lie ahead.
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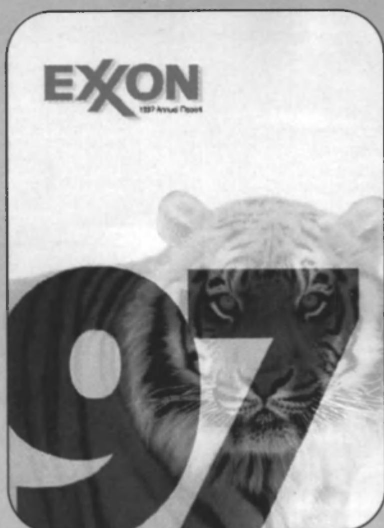

Exxon
Exxon produces more gas and oil than any other company in the nation. Its plans for the millennium include: continuing safe and reliable operations; exploring for oil in over 30 countries; maximizing existing oil and gas production; and increasing sales of high value fuels and specialty products. Exxon has a hand in every promising aspect of the energy field and invests over half a billion dollars a year in research and development.
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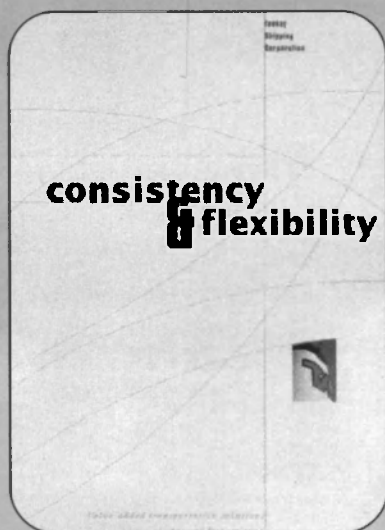

Teekay Shipping Corporation
Founded in 1973 by the late Torben Karlshoej, Teekay Shipping Corporation owns and manages the world's largest and most modern fleet of medium-sized tankers. Since its inception the company has established a reputation for excellence as a provider of quality transportation services to the oil industry. Teekay operates primarily in the Indo-Pacific Basin, maintaining a continuous presence in the world tanker market.
Circle 74 on Reader Service Card

Port of Portland
A booming economy is what the Port of Portland has achieved. Recent advancements to the Port's facilities and services have made it an international center for trade and transportation. Each day, more trans-Pacific carriers call Portland to take advantage of the excellent selection of cost-competitive transportation options to all parts of the world. This selection and the volume of containers moving through the Port of Portland have made it the 15th largest container port in the U.S.
Circle 80 on Reader Service Card

BUYERS DIRECTORY

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

AIR CONDITIONING AND REFRIGERATION - Repair & Installation
ABB Flakt Marine, Box 1043, S-436 21 ASKIM SWEDEN
Adrick Marine, 81 Mahan St., West Babylon, N.Y. 11704
Carrier Transicold, P.O. B. 4805, Syracuse, NY 132211
Refrigeration Resources, 210 Westside Ave., Jersey City, NJ 07305
Stork Canada, 47 boul. Marie Victorin, Candiac, Quebec, Canada, J5R 1B6

ALARMS, FACTORY MUTUAL-APPROVED
Datastar Marine Products Inc., Unit 100 18 Gostick Pl., N.Vancouver, Canada V7M3G31
SELCO 353 A Asbury Commons Dr., Atlanta, GA 30338

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

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

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

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

AUTOMATION SYSTEMS
Electronic Design, 3020 20th St., Metairie, LA 70002-4911

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

BALLAST
Ballast Technologies .,4620 S. Coach Dr., 85714 , Tucson, AZ
Redland Genstar Inc., Executive Plaza IV, Hunt Valley, MD 10912-1031

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

BASKET STRAINERS
Beaird Industries Inc, 601 Benton Kelly Street, Shreveport, LA 71106-7198

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

BEARING—Rubber, Metallic, Non-Metallic
Blohm & Voss Industrie GmbH,P.O. B. 100720, D-2000 Hamburg 1, GERMANY;
Simplex- Turmar Inc., P.O. B. 168, Little Neck, NY 11363-0168 U.S.A. Reps:
Railko Ltd., Loudwater, High Wycombe, Bucks Hamshire ENGLAND HP109QV
Kahlenberg Bros. Co., P.O. Box 358. Two Rivers, WI 54241
Orion Corp., 1111 Cedar Creek Rd., Grafton, WI 53024
Duramax Marine, 16025 Johnson St., Middlefield, OH 44062
Thordon Bearings Inc., 3225 Mainway, Burlington, Ont., CANADA L7M 1A6
Vesco Plastics, P.O. B. 40647, Cleveland 2022 SOUTH AFRICA

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

BLOCKS & RIGGING
Skookum, P.O. Box 280, Hubbard, OR 97032

BOAT BUILDER
Blount Marine, 461 Water Street, Warren, RI 02895

BOAT RENTAL
Edison Chaiset, P.O. Box 309, Galliand, LA 70354

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

BOILER MANAGEMENT
Technical Marine Services, 6040 North Cutter Circle, Portland, OR 97217

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

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

BROKERS
151 Maritime Services, 34062 El Encanto/B, Dana Pt. CA 92629
Captain Astad Company, Inc., P.O. Box 350486, Ft Lauderdale, FL 33335
Jack Faulkner, 2419 Caddy Lane, P.O. Box 371, Flossmoor IL 60422
Mowbray's Tug & Barge Sales Corp., 35 De Hart St., Morristown NJ 07960

BULKHEAD SEALS/PANELS
CSD North America, 250 Commercial St., Unit 2006A, Manchester, NH 03101
Blohm & Voss Industrie GmbH, P.O. B. 100720, D-2000 Hamburg 1, GERMANY
Panel Specialists, Inc./Thermax, 3115 Range Rd., Temple, TX 76501
Railko Ltd., U.S.A. Reps: Simplex-Turmar Inc., P.O.B. 675, Tonawanda, NY 14151-0675
Rox Corp., 12402 E. 60th St., Tulsa, OK 74146-6922

CABLE TRANSIT SYSTEMS
CSD North America, 250 Commercial St., Unit 2006A, Manchester, NH 03101
O-Z Gedney • Nelson Firestop, P.O. B. 726, Tulsa, OK 74101-0726
Rox Corp., 12402 E. 60th St., Tulsa, OK 74146-6922

CAD/CAM SYSTEMS
Albacore Research, 4196 Kashtan Place, Victora, B.C. Canada V8X4L7
All Alpha Int'l., Inc. P.O. B. 498985, Cincinnati, OH 45249
Autoship Systems Corp., #403, 611 Alexander St., Vancouver, BC, Canada V6A1E
Creative Systems, Inc., P.O. B. 1910, Port Townsend, WA 98368
IMSA, 13 Jenkins Court, Suite 200, Durham, NH 03824
Kockums Computer Systems AB, PO Box 50555, S-202 15 MalmoSWEDEN
Scientific Marine Services, Inc., 101 State Pl., Suite F, Escondido, CA 92029
TIMSCO, P.O. B. 91360, Mobile, AL 36691

Ship Motion Associates, 10 Danforth St., Portland, ME 04101-4567

CARGO MONITORING & CONTROL SYSTEM
Ian-Conrad Bergan, Inc., 3409 Gulf Breeze Parkway, Gulf Breeze, FL 32561
Radio-Holland USA, 8943 Gulf Freeway, Houston, TX 77017

CHAINS
Columbus McKinnon Corp., 140 John James Audobon Pkwy, Amherst, NY 14228
New England Marine & Industrial, 200 Spaulding Trunpike, Portmouth, NH 03801
Washington Chain, P.O. Box 3645, Seattle, Wa. 98124

CHARGE AIR COOLERS
Crane Heatex, 17 Grandview Ave., W. Orange, NJ 07052

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

CLASSIFICATION SOCIETY
American Bureau of Shipping, 2 World Trade Center, 106th Fl, New York, NY 10048
Det Norske Veritas, 70 Grand Ave.,Riveredge, N.J. 07661

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

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

COATINGS / COATINGS PROTECTION
Eureka Chemical Co., 234 Lawrence Ave., South San Francisco, CA 94080
Hempel, 6901 Cavalrade St., Houston, TX 77028
Products Research Service, 9229 Highway 23, Belle Chasse, LA 70037
TMT Services Corp./RUSTECO , P.O.B 11398, Torrence, CA 90510-1398

COMMERCIAL DIVING COMPANIES
Cruzan Diver's Inc., 300 Strand St., Frederiksted Steroix, Virgin Islands 00840

COMMUNICATIONS SERVICE
Hose McCann, 1241 W. Newport Gender, Deerfield Beach, FL 33442
ICG Satellite Services, 8400 NW 52nd St., Suite 110, Miami, FL 33166
Maritime Telecommunications Networks, Inc., 8400 NW 52nd St, Suite 110, Miami, FL 33166
Ascom Tateco AB, Eppendorfer Weg 234, D-20251 Hamburg, GERMANY
AT & T Maritime Services, 412 Mt. Kemble Ave 5170, Morristown, NJ 07960
Newmar, 2911 West Garry Ave., Santa Ana, CA 92663

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

COMPACTORS/FILTER CRUSHERS
Tech Oil Products Inc., 4308 W. Admiral Doyle Dr., New Iberia, LA 70560

COMPOSITES PROCESSING
Composite Technology Consultants, Inc. 12310 Northwinder Row, Bayonet Point, Fla. 34667

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

COMPUTER LOFTING
Barataria Lofting Co., Inc., 1616 Barataria Blvd., Ste. 4, Marrero, LA 70072

COMPUTER / COMPUTER SOFTWARE
Autoship Systems Corp., #403, 611 Alexander St., Vancouver, BC, CANADA V6A1E
Chand Corporation, 157 Hwy 654, Mathews, LA 70375
Coastal Oceanographics, Inc., 11-G Old Indian Trail, Middlefield, CT 06455
Creative Systems, Inc., .O. Box 1910, Port Townsend, WA 98368
Sener, C/Severo Ochoa, 4 Parque Technologico de Madrid, 28760 Tres Cantos - Madrid SPAIN
Intecolor Corp., 2150 Boggs Rd., Deluth GA 30096
Proteus Engineering, 301 Pier One Rd., Stevensville, MD 21666

CONDENSERS/SEPARATORS
Beaird Industries Inc., P.O. Box 31115, Shreveport LA 71130

CONSOLE-GMDSS
Furuno USA, Inc., 271 Harbor Way, S. San Francisco, CA 94080
Radio-Holland USA, 8943 Gulf Freeway, Houston, TX 77017

CONSTRUCTION MATERIALS
Plastic Pilings Inc., 1485 South Willow Ave., Rialto, CA 92376

CONSULTANTS
PCS Marine, 174 Colonnade Road S., Nepean, Ontario K2E715
Resolution Management, 11 Eves Drive Suite 140, Marlton, NJ 08053
Hornblower Marine, Pier 3 Ferryboat Santa Rosa, San Francisco, CA 94111
Boland Industrial & Consulting Services, P.O.B. 91360, Mobile, AL 36691

CONTROL SYSTEM-Monitoring
Engine Monitor, Inc., 179 Hickory Ave. Harahan, LA 70123
GEC ALSTHOM Diesels Inc., 10801 Kempwood Drive, Suite 1 Houston, TX 77043-1412
Ian-Conrad Bergan, 3409 Gulf Breeze Pkwy, Gulf Breeze, FL 32561
Gems Sensors Division, One Cowles Rd., Plainville CT 06062
MMC International, 60 Inip Dr, Inwood NY 11096
Prime Mover Controls, 3600 Gilmore Way, Burnaby V5G 4R8 CANADA
Robertson Marine Systems, 3000 Kingman St., Suite 207, Metairie, LA 70006
Scientific Marine Services, Inc., 101 State Pl., Suite F, Escondido, CA 92029
Stork-Kwant BV, P.O.B. 23, 8600 AA Sneek, Netherlands
Electronic Marine Systems, 800 Ferndale Pl., Rahway, N.J. 07065

CONTROL SYSTEM-Steering
AutoNav Marine Systems Inc., 55A Clipper St., Coquitlam, B.C., Canada V3K 6X2
Kobelt Manufacturing Corp., 8238 129th St., Surrey, B.C. Canada V3W0A6
Engine Monitor, Inc., 179 Hickory Avenue Harahan, LA 70123
Kockum Sonics, Inc., 819 Veterans Blvd., Suite 201, Kenner, LA 70068
Stork-Kwant BV, P.O.B. 23, 8600 AA Sneek, Netherlands

CONTROL VALVES
Leslie Controls, 12501 Telecom Dr., Tampa, FL 33637

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

COOLERS/FREEZERS
Western Engineers, 2112 SE 8th Ave., Porland, OR 97214

CORROSION CONTROL
Nace Int'l, 1440 South Creek Dr., Houston, TX 77084
TMT Services Corp./RUSTECO , P.O.B 11398, Torrence, CA 90510-1398

COUPLINGS
Mapeco Products, 90 Forest Ave., Locust Valley NY 11560
Centa Corp., 8185 Cass Ave., Darien, IL 60561
Haley Clutch and Coupling Corp., 1820 Hwy. 1 North, Greenville, MS 38702
Lo-Rez Vibration Control, Ltd., 186 West 8th Ave., Vancouver, B.C. V5Y 1N2
Renold Hi-Tec, 512 W. Crescentville Rd, Cincinnati, OH 45246
Walz & Krenzer, 90 Forest Ave., Locust Valley, NY

CRANE–HOIST–DERRICK–WHIRLEYS
Lake Shore Inc., P.O. Box 809, Iron Mountain, MI 49801, 1150 West U.S. 2, Iron River, MI 49935, 921 River St., Iron River, MI 49953, 3600 Lake Shore Lane, Rhinelander, WI 54501
Bisso Marine Co. P.O. Box 4113, New Orleans, LA 70178
Holly Hoist Corp., P.O. Box 86, St. Clair Shores, MI 48080-0086
Marine Travelift, Inc., 49 E. Yew St., Sturgeon Bay, WI 54235
McElroy Machine & Mfg Co., Inc., P.O. Box 4454, Biloxi MS 39535-4454
New England Trawler Equipment Co., 291 Eastern Avenue, Chelsea, MA 02150
Liebherr-Werk Nenzing GMBH, A-6710 Nenzig/Austria, Tschalenga 3, P.O. Box 10
Xtek, Inc., 11451 Reading Road, Cincinnati, OH 45241

CRANKSHAFT DEFLECTION ANALYZER
FCS, Inc., 22 Main St., Centerbrook, CT 06409

CUSTOM CABLE CONNECTOR
Glenair, Inc., 1211 Airway, Glendale, CA 91201-2497

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

DAVIT SYSTEMS
Lake Shore Inc., P.O. Box 809, Iron Mountain, MI 49801, 1150 West U.S. 2, Iron River, MI 49935, 921 River St., Iron River, MI 49953, 3600 Lake Shore Lane, Rhinelander, WI 54501
Datastar, Unit 100 18 Gostick Pl., N.Vancouver, Canada V7M3G3
Holly Hoist Corp., P.O. Box 86, St. Cair Shores, MI 48080-0086
Welin Lambie N.A. Inc., 18 Ridgecrest Drive, Bridgewater Nova Scotia, Canada B4V 3 V8

DECK MACHINERY — Cargo Handling Equipment
Lake Shore Inc., P.O. Box 809, Iron Mountain, MI 49801, 1150 West U.S. 2, Iron River, MI 49935, 921 River St., Iron River, MI 49953, 3600 Lake Shore Lane, Rhinelander, WI 54501
Markey Machinery Co., Inc., P.O. Box 24788, Seattle, WA 98124-0788
McElroy Machine & Mfg. Co., Inc., P.O. Box 4454, Biloxi, MS 39535-4454
Skookum, Inc., P.O. Box 280, Hubbard, OR 97032
Leenstra Machine, P.O. Box 9, Drachten, Netherlands, 9200AA
Smith Berger Marine Inc., 516 South Chicago Street, Seattle, WA 98108

DECK MACHINERY
Skookum, P.O. Box 280, Hubbard, OR 97032
Intercontinental Engineering, P.O. Box 9055, Kansas City, MO 64168
McElroy Machine & Mfg Co., Inc., P.O. Box 4454, Biloxi, MS 39535-4454
New England Trawler Equipment Co., 291 Eastern Avenue, Chelsea, MA 02150
Pusnes, PO Box 102, N-4818, Faervik, NORWAY
Smith Berger Marine Inc., 516 South Chicago St., Seattle, WA 98108
Timberland Equipment, P.O. Box 490, Woodstock, Ontario N4S 7Z2 CANADA
Waterman Supply Co., P.O. Box 596, Wilmington, CA 90748

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

DESALINATION - REVERSE OSMOSIS
Lifestream Watersystems, Inc., P.O. Box 634, Huntington Beach, CA 92647
Matrix Desalination, 3295 S.W. 11th Ave., Fort Lauderdale, FL 33315
Reverse Osmosis of South Florida. 12301 SW. 133 Court, Miami, FL, 33186

DIESEL ENGINE ANALYZER
FCS, Inc., 22 Main Street, Centerbrook, CT 06409
Icon Research, 8 Market Street, Ellesmere, Shropshire SY12 OAN, England
Hermont Marine Inc., 3528 Griffith, St. Laurent, Quebec Canada

DIESEL ENGINE — Spare Parts & Repair
Scardana Americas Bkg., 502 Empire St., Greefield Park, J4V1V7 Canada
Alaska Diesel,4420 14th Ave.,NW,Seattle,WA 98107
Brigantine Services Ltd, 48 Wang Lok St., Yuen Long
Hermont Marine Inc., 3528 Griffith, St. Laurent, Quebec Canada Industrial Estate, New Territories, HONG KONG
Caterpillar, Inc., Engine Div., P.O. Box 610, Mossville, IL 61552-0610
Castoldi S.p.A., Viale Mazzini, 161, 20081, Abbiategrasso, ITALY
Cummins Engine Co., 4500 Leeds Ave., Ste. 301, Charleston, SC 29405-8521
Cummins Mid-South, Inc., 110 E. Airline Highway, Kenner, LA 70062
John Deere, John Deere Rd., Moline, IL 61265
DMI Norshipco Co., P.O. Box 2100, Norfolk, VA 23501-2100
GEC ALSTHOM Diesels Inc., 10801 Kempwood Drive, Suite 1, Houston TX 77043-1412
Klattenberg Marine, 17 Grandview Ave., W. Orange, NJ 07052
MAN B&W Diesel AG, Stadtbachstrasse 1, D-86153 Augsburg 1,GERMANY
MAN B&W Diesel A/S, Teglholmsgade 41, DK-2450 Copenhagen SV, DENMARK
MAN B&W Diesel, 17 State St., New York, NY 10004
Motor-Service AB, Box 2115, S-144 04 Ronninge, SWEDEN
Motor Service-Hugo Stamp, 3190 S.W. 4th Ave., Ft. Lauderdale, FL 33315
Paxman Diesels, P.O. Box 8, Paxman Works, Colchester, Essex, CO1 2HW,ENGLAND
Ulstein Bergen AS, PO Box 924, N5002 Bergen, NORWAY
Wartsila Diesel, 201 Defense Highway, Annapolis, MD 21401
Goltens, 160 Van Brunt St., Brooklyn, NY 11231

DIESEL ENGINE REPLACEMENT
FM / Alco 701 Lawton Ave., Beloit, WI 53511
Goltens, 160 Van Brunt St., Brooklyn, NY 11231

DIGITAL SINGLE HANDED RADIO
Sea, Inc., 7030 220th S.W. Mt. Lake Terrace, WA 98043

DIVING & SALVAGE
Coast Diving Services, Inc. 793 B Mira Flores, San Pedro CA 90733
Bisso Marine Co. P.O. Box 4113, New Orleans, LA 70178
H.J. Merrihue, P.O. Box 23123, New Orleans LA 70183
JW Fishers, 65 Anthony St., Berkley, MA 02779
South Texas Underwater Divers, 2921 16th Ave. North, Texas City, Texas 77590
Muldoon Marine Services, Inc., P.O. Box 3221, Terminal Island, CA 90731

DOCK FENDERING SYSTEMS
Poly Hi Solidur, 2710 American Way. Fort Wayne IN, 46899

DOORS - MARINE & INDUSTRIAL
Branton Ind., 1101 Edwards Ave., Jefferson, LA 70181
Insulations, Inc., 1101 Edwards Ave. Harahan, LA 70123
Mapeco Walz & Krenzer, Inc., 90 Forest Ave., Locust Valley, NY 11560
Marine Accomodations, 3830 Willaimsburg Park, Suite 7 Jacksonville FL 32257
Railway Specialties Corp., 2979 State Rd., P.O. Box 29, Bristol, PA 19007

DRY DOCKS-Design
Conrad Industries, 1501 Front Street, P.O. Box 790, Morgan City, LA 70381
Crandall Dry Dock Engineers, Inc., P.O. Box 505804, Chelsea, MA 02150
Heger Dry Dock Engineers, Inc., P.O.B. 6605, Holliston, MA 01746
Poly Hi Solidur, 2710 American Way, Fort Wayne, IN 46899

EDUCTORS
Vita Motivator, 566 Parker St., Newark, NJ 07104

ELECTRICAL EQUIPMENT
Baylor Co., 500 Industrial Blvd., Sugarland, TX 77478
L. F. Gaubert & Co., Inc., P. O. Box 50500, New Orleans LA 70150
MMC International, 60 Inip Dr, Inwood NY 11096
Semco Marine Inc., 3721 SW 47th Ave., Ste 309, Ft. Lauderdale, FL 33314

ELECTRICAL MOTOR DRIVES
Tech Power Controls, 10850 S. Wilcrest, Houston, TX 77099

ELECTRONICS/ELECTRONIC DISPLAY
Advanced Marine Technology, 2003 Western Ave., Suite 725, Seattle, WA 98121
Kockum Sonics, Inc., 819 Veterans Blvd., Suite 201, Kenner, LA 70068
Scandinavian Micro Systems, P.O. Box 155, N-1411, Kolboton, NORWAY

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

EMPLOYMENT
Boat Crews, 1 Seine Court, Suite 309, New Orleans, LA 70114
Marine Jobs, Inc., 800 Downtowner Blvd. Ste. 111, Mobile, AL 36609

ENGINEERING SERVICES / MARINE ENGS
Kvaerner Masa Marine Inc., 201 Defense Highway, Suite 202, Annapolis, MD 21401
NKF Engineering, Inc., 4200 Wilson Blvd., Arlington, VA 22203
Scientific Marine Services, Inc., 101 State Pl., Suite F, Escondido, CA 92029

ENGINE LUBRICATION SYSTEMS
Engine Lubrication Systems, 64 State Rd., Paoli, PA 19301

ENGINE ROOM LIGHTING/MONITORING & CONTROL SYSTEMS
Pauluhn Electric Mfg. Co., Inc. 1616 N. Main, P.O. Box 53, Pearland, TX 77581
Radio-Holland USA, 8943 Gulf Freeway, Houston, TX 77017

ENGINES
CMB Cummins Engine Co., 500 Jackson St., Comunbus, IN 47202
GE Industrial & Marine Engineering, 1 Neuman Way, Cincinnati, OH 45215

EPIRBS
ACR Electronics, Inc., 5757 Ravenswood Rd., P.O. Box 5247, Ft. Lauderdale, FL 33310-5247

EVACUATION SYSTEMS
DBC, 12351 Bridgeport Rd., Richmond, BC Canada

EVAPORATORS
Alfa-Laval Separation, Inc., 955 Mearns Rd., Warminster, PA 18974
Beaird Industries Inc., P.O. Box 31115, Shreveport, LA 71130

EXPANSION JOINTS
Silex Inc., 7850 Tranmere Dr., Mississauga, Ontario L5S1L9
Applegate Industrial, 1440 Government Street, Baton Rouge, LA 70802

FAIRING COMPOUND
Philadelphia Resins, P.O.B. 309, Montgomeryville, PA 18936

FANS - VENTILATORS - BLOWERS
Dry Air Technologies 313 N. Oak St, Burlington, Wa 98233
Jon M. Liss Associates, Inc., 411 Borel Ave., San Mateo, CA 94402

FASTENERS
Jamestown Distributors, 28 Narragansett Ave., P.O. Box 348, Jamestown, RI 02835
Superbolt, P.O.B. 683, Carnegie, PA 15106

FENDERING SYSTEMS/BUOYS - Dock & Vessel
Kahlenberg Bros. Co., P.O. Box 358, Two Rivers, WI 54241
Seaward International, Inc., Clearbrook Industrial Park, P.O. Box 98, Clearbrook, VA 22624
Urethane Products, 17007 South Broadway, Garden, CA 90248
Viking Fender Co., 1160 State St., Perth Amboy, NJ 08861
Schuyler Rubber Co., 16901 Woodred Rd., Woodinville, WA 98072

FIBERS
Wellington, P.O.B. 244, Madison, GA 30650

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

FILTERS
Boll Filter, 15 International Dr., East Granby, Ct. 06206
Kraissl Co., 299 Williams Avenue, Hackensack, NJ 07061

FILTER SYSTEMS
Luber-Finer, Inc., 5050 Quorum Drive, Dallas, TX 75240

FINANCE
Bank Corp., 3 Riverway Ste, 1900 Houston, TX 77056

FIN STABILIZERS
Blohm & Voss Industrie GmbH, P.O. Box 10 07 20, D-2000 Hamburg 1, GERMANY;

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

FIRE FIGHTING EQUIPMENT
IMSSCO, 2040 Harbor Island Dr., Suite 201A, San Diego, CA. 92101

FIRE PROTECTION
Grinnell Fire Protection, 835 Sharon Drive, Westlake, OH 44145

FIRE RESISTANT PANELS
Bainbridge Aquabatten, 252 Revere St., Canton, MA 02021
Panel Specialists, Inc./Thermax, 3115 Range Rd., Temple, TX 76501

FIRE SUPPRESSION EQUIPMENT
Grinnell Fire Protection, 835 Sharon Drive, Westlake, OH 44145
American Pacific Corp., 3770 Howard Hughes Pkwy, Las Vegas, NV 89100

FLAME RETARDANT TEMPORARY COVERING
Bainbridge, 252 Revere St., Canton, Mass. 02021

FLUID FILLED GUAGES
King Engineering, P.O. Box 1228, Ann Arbor, MI 48106-1228

FLUID HANDLING EQUIPMENT
Graco, Inc., P.O. Box 1441, Minneapolis, MN 55441

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

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

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

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

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

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

GMDSS
Sea, Inc., 7030 220th S.W. Mt. Lake Terrace, WA 98043

HEAT EXCHANGERS
Alfa-Laval Separation Inc., 955 Mearns Rd., Warminster, PA 18974
Beaird Industries Inc., P.O. Box 31115, Shreveport, LA 71130
Crane Heatex, 17 Grandview Ave., West Orange, NJ 07052

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

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

HOSE & FITTINGS
Hydrasearch Co., Chesapeak Bay Business Park, 100 Log Canoe Circle, Stevensville MD 21666

HYDRAULICS
Cunningham Marine Hydraulics Co., 201 Harrison St., Hoboken, NJ 07030
Engine Monitor, Inc., 179 Hickory Ave. Harahan, LA 70123
Hamilton Jet, P.O. Box 709, Christchurch, NEW ZEALAND
Offshore Inland, Inc. 3521 Brookdale Drive, Mobile, AL 36618
Ultra Hydraulics Limited, Cheltenham Road East, Gloucester, GL2 9QN, ENGLAND
Demaree Infatables Boats, 410 Oak St., Friendsville, MD 21531
Ocean Technical Services Inc., 1140 Peters Rd., Harvey, LA 70058-1705

INMARSAT-C
Sea, Inc., 7030 220th S.W. Mt. Lake Terrace, WA 98043

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

INTEGRATED MONITORING SYSTEMS
Datastar, Unit 100, 18 Gostick Place, N. Vancouver, BC Canada

INTERIORS
Custom Ship Interiors, Inc., P.O. Box 882, Solomons, MD 20688
Hopeman Brothers, P.O. Box 820, 435 Essex Ave., Waynesboro, VA 22980
Insulations, Inc., Rt. 5, 12360 Leisure Rd, Baton Rouge, LA 70807
Jamestown Metal Marine Sales, Inc., 4710 NW Second Ave, Boca Raton, FL 33431
Marine Accomodations, 3830 Williamsburg Rd., Jacksonville, FL 32256
Maritime Services Corp., 3457 Guignard Drive, Hood River, OR 97031
James P. Colie & Associates, 2116 Sherman St., Hollywood, FL 33020

JOINER—Watertight Door—Paneling—Ceiling System—Decking
All Alpha Int'l., Inc. P.O. Box 498985, Cincinnati, OH 45249
Branton Ind., 1101 Edwards Ave., Jefferson, LA 70181
CustomShip Interiors, Inc. P.O. Box 882, Solomons MD 20688
Hopeman Brothers, Inc., P.O. Box 820, Waynesboro, VA 22980
Insulations, Inc., 1101 Edwards Ave., Harahan, LA 70123
Marine Accomodations, 3830 Williamsburg Park, Suite7 Jacksonville, FL 32257
Maritime Services Corp., 3457 Guignard Drive, Hood River, OR 97031
Panel Specialists, Inc./Thermax, 3115 Range Rd., Temple, TX 76501
Walz & Krenzer, Inc., 90 Forest Ave. Locust Valley N.Y. 11560

KEEL COOLERS
R.W. Fernstrum & Co., 1716 Eleventh Ave., Menominee, MI 49858
Kahlenberg Bros. Co., P.O. Box 358, Two Rivers, WI 54241
The Walter Machine Co., Inc., 84-98 Cambridge Avenue, Jersey City, NJ 07307

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

LIFEBOATS/RAFTS
American Eagle Mfg., Inc., 780 Pearle Jensen Way, LaConner, WA 98257
Avon Marine, 11215 Young River Ave., Fountain Valley, CA 92708
DBC Marine Safety Systems, 12351 Bridgeport Rd., Richmond, B.C. CANADA V6V1J4
Norsafe AS, P.O. Box 115, N-4818 Faervik, Norway
Viking Life Saving Equipment, 1625 N. Miami Ave., Miami, FL 33136

Willard Marine Co., Inc., 1250 N. Grove St., Anaheim, CA 92806
Zodiac of North America, P.O. Box 400, Stevensville, MD 21666

LIFESAVING EQUIPMENT
MGI International, 119-225 West 1st St., North Vancouver, B.C. CANADA
Stearns Manufacturing, P.O. Box 1498, St. Cloud, MN 56302

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

LINE & NET CUTTER SYSTEMS
Spurs Marine, 201 S.W. 33rd Street, Ft. Lauderdale, FL 33315

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

LIQUID OVERFILL PROTECTION SYSTEMS
E.R.L. Marine Products, P.O.Box 1026, New Albany, IN 47151-1026
Metritape, Inc., 59 Porter Rd., Littleton, MA 01460
Gems Sensors, Inc., 1 Cowels Rd., Plainville, CT, 06062

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

MACHINERY MAINTENANCE, REPAIR, OVERHAUL, AND TESTING
Lake Shore Inc., P.O. Box 809, Iron Mountain, MI 49801, 1150 West U.S. 2, Iron River, MI 49935, 921 River St., Iron River, MI 49953, 3600 Lake Shore Lane, Rhinelander, WI 54501
Golten Marine Company Inc., 160 Van Brunt Street, Brooklyn, NY 11231
Maritime Power 200 Henderson St., Jersey City, NJ 07302

MANAGEMENT SYSTEMS
PCS Marine, 174 Colonnade Road S., Nepean, Ontario K2E715

MARINE CEILINGS
Hydro-Alumunium, Vik Verk, N-5880 VIK I SOGN, Norway
Insulations, Inc., Rt. 5, 12360 Leisure Road, Baton Rouge, LA 70807
Panel Specialists, Inc., 3115 Range Rd., Temple, TX 76501

MARINE CONSULTANTS
Kvaerner Masa Marine, 201 Defense Hwy., Annopolis, MD 21401

MARINE DECKING
E.H. O'Neill Co., 1405 Chippendale Rd., Lutherville, MD 21093
Hopeman Brothers, Inc., P.O. Box 820, Waynesboro, VA 22980
Insulations, Inc., Rt. 5, 12360 Leisure Road, Baton Rouge, LA 70807
Selby, P.O.Box 1600, Sapulpa, OK 74067
Slipnot Safety Flooring, 2545 Beaufait Street, Detroit, MI 48207

MARINE DRILLING & BLASTING
Marine Drilling & Blasting, Inc., P.O. Box 18098, Beverly Hills, CA 90209-4098

MARINE ELECTRONICS
Frank L. Beier Radio, 2001 Ridgelake Drive, Metairie, LA 70001
Kockum Sonics, Inc., 819 Veterans Blvd., Suite 201, Kenner, LA 70068
Saab Marine Electronics AB, Box 13045, 402 51 Goteborg, SWEDEN
Scientific Marine Services, Inc., 101 State Pl., Suite F, Escondido, CA 92029

MARINE ELEVATORS
McElroy Machine, 1101 Lorraine Rd., Biloxi, MI 39535-4454

MARINE EQUIPMENT
Lake Shore Inc., P.O. Box 809, Iron Mountain, MI 49801, 1150 West U.S. 2, Iron River, MI 49935, 921 River St., Iron River, MI 49953, 3600 Lake Shore Lane, Rhinelander, WI 54501
Plastic Pilings Inc., 1485 South Willow Ave., Rialto, CA 92376
Waterman Supply, P.O. Box 596, Wilmington, CA 90748
Maritime Power Corp., 200 Henderson Street, Jersey City, NJ 07302
Northeast Technical, P.O. Box 38189, Olmstead Falls, Ohio, 44138
Bohnet & Associates, 1150 Rule Rochelle, Sidell, VA 70458
Scardana Americas Bkg., 502 Empire St., Montreal, Greenfield Park, J4V1V7, Canada
McElroy Machine, P.O. Box 4454, Biloxi, MS 39535-4454

MARINE FINANCING
Saleco Credit Co. Inc. 4909 156th Ave. NE, Redmond, WA 98052

MARINE FIRE PROTECTION
Insulations, Inc., Rt. 5, 12360 Leisure Road, Baton Rouge, LA 70807
Unitor Ship Service Inc., 2375 West Esther Street, Long Beach, CA 90813

MARINE GEARS
The Falk Corp., PO Box 492, Milwaukee, WI 53201-0492
Marine Gears, P.O. Box 689, Greenville, MI 38702
Cincinnati Gear Company, 5657 Wooster Pike, Cincinnati, OH 45227

MARINE INSURANCE
John G. Alden, 1300 SE 17th St., Fort Lauderdale, FL 33316

MARINE MANAGEMENT SERVICES
Hornblower Marine, Pier 3 Ferrboat Santa Rosa, San Francisco, CA 94111

MARINE PAINTINGS
Sarba Art Studio, 6 Ridge Drive, Old Saybrook, Ct 06475

MARINE PUMPS
Scardana Americas Bkg., 502 Empire St., Montreal, Greenfield Park, J4V1V7, Canada
Gilkes Inc., P.O. Box 628, Seabrook, TX 77586

MARINE SEATING
Stidd Systmes Inc., P.O. Box 87, 220 Carpenter Drive, Greenport, NY 11944

MARINE SHAFTING
Kahlenberg Bros, P.O. Box 358, Two Rivers, WI 54241

MARINE SURPLUS SALES
Defense Reutilization & Marketing Service, 2163 Airways Blvd., Memphis, TN 38114

MARINE SYSTEMS SIMULATION
Applied High Technology, 4 Place Dee Commerce Brossard, Suite 201 Quebec Canada J4W-3B3

MECHANICAL PUMP SEALS
John Crane Marine, USA, 1536 Barclay Blvd, Bufallo Grove, IL 60089

METERS
Selco USA, 2508 Lakebrook Ct., Atlanta, GA 30360

MONITORS
Intercolor Corp., 2150 Boggs Rd., Deluth GA 30096

MONITORING SYSTEMS
Datastar Marine Products Inc., Unit 100 18 Gostick Pl., N.Vancouver, Canada V7M3G3

MOORING LINES
Phillystran, Inc., 151 Commerce Drive, Montgomeryville, PA 18936-9628

MOTOR PROTECTION EQUIPMENT
Marine Safe Electronics, 37 Staffern Dr., Concord, Ontario L4K CANADA

NAUTICAL JEWELRY
Nautical Gold Creations, 23731 Madison St., Torrance, CA 90505

NAVAL ARCHITECTS, MARINE ENGINEERS, SURVEYORS
Band, Lavis, & Associates, 900 Ritchie Hwy, Suite 203, Severna Park, MD 21146
Northeast Technical, P.O. Box 38189, Olmsted Falls, Ohio, 44138
Advanced Marine Enterprises, Inc., 1725 Jefferson Davis Hwy., Arlington, VA 22202
Bay Engineering, 253 N. First Ave., Sturgeon Bay, WI 54235
Donald L. Blount, 2550 Ellsmere Ave., Ste. K, Norfolk, VA 23513
C. Baxter & Associates, P.O. Box 9006, Mobile, AL 36609
CDI Marine Co., 4040 Woodcock Dr., Suite 200, Jacksonville, FL 32207
Childs Engineering Corp., Box 333, Medfield, MA 02052
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Crane Consultants, 15301 First Ave S., Seattle WA 98148
C.R. Cushing, 18 Vesey St., New York, NY 10007
CT Marine, 56 Crooked Trail, Rowayton, CT 06853
Cunningham & Walker, 1762 Providence Hollow Lane, Jacksonville, FL 32223
Arthur D. Darden, 3200 Ridgelake Dr., Suite 403, Metairie LA 70002
DeJong & Lebet, Inc., 1734 Emerson Street, Jacksonville, FL 32207
Design Associates Inc., 14360 Chef Menteur Highway, New Orleans, LA 70129
Designers & Planners, 2120 Washington Blvd. Ste.200, Arlington, VA 22204
Elliot Bay Design Group 5301 Shilshole Ave. N.W. Ste. 200, Seattle, WA 98107
Encon Mgmt.& Engineering Consultant Services, P.O. Box 7760, Beaumont, TX 77706
GHM Inc. (Ind. Measurement Consultants), P.O. Box 1836, Newport News, VA 23601
Gibbs & Cox, Inc., 50 West 23rd St., New York, NY 10010
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John W. Gilbert & Assoc., Inc., 199 State St., Boston, MA 02109
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Alan C. McClure Associates, Inc., 2600 South Gessner, Houston, TX 77063
McElroy Machine & Mfg Co., Inc., P.O. Box 4454, Biloxi, MS 39535-4454
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2341 Jefferson Davis Hwy, Arlington, VA 22202
Fendall Marbury, P.O. Box 2321, Annapolis, MD 21401
Marine Design & Operations, Inc., 225 E. 1st Ave., Roselle, NJ 07203
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Maritech, Seacliff, Bay Road, Newmarket, NH 03857
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Nautical Designs, Inc. 2101 S. Andrews Ave,Suite 202, Ft Lauderdale FL 33316
Olsen Marine Surveyors Co., P.O. Box 283, Port Jefferson, NY 11777
M. Rosenblatt & Son, Inc., 350 Broadway, New York, NY 10013
Sargent & Herkes, 225 Baronne St., Suite 1405, New Orleans LA 70112
Scientific Marine Services, Inc., 101 State Pl., Suite F, Escondido, CA 92029
Sea School, 10812 Gandy Boulevard, St. Petersburg, FL 33702
Seaworthy Systems Inc., P.O. Box 965, Essex, CT 06426; 17 Battery Pl., New York, NY 10004; 50 Vashell Way, Orlinda, CA 94563
George G. Sharp, Inc., 100 Church St., New York, NY 10007
R.A. Stearn, Inc., 253 N. 1st Ave., Sturgeon Bay, WI 54235
A.K. Suda & Ass., 3004 19th St., Metairie, LA 70002-4989
TIMSCO, P. O. Box 91360, Mobile AL 36691

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Northern Airborn Tech., 28 Lord Road, Suite 130, Marlborough, MA 01752
Electronic Marine Systems, 800 Ferndale Pl., Rahway, N.J. 07065
Furuno U.S.A., 271 Harbor Way, S. San Francisco, CA 94080
ICS Electronics Ltd., Unit V, Rudford Industrial Estate, Ford, Arundel, West Sussex, UK
Mackay Communications, 2721 Discovery Dr., Raleigh, N.C.
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Scandinavian Micro Systems P.O. Box 155, N-1411, Kolboton, NORWAY
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Simrad Robertson, 10801 Hammerly, Suite 100, Houston, TX 77043-1923
Standard Communications, P.O. Box 92151, Los Angeles, CA 90009
Trimble Navigation, 585 North Mary Avenue, P.O. Box 3642, Sunnyvale, CA 94086
Waterway Communications System, Inc. 453 E. Park Pl., Jeffersonville, IN 47130
Offshore Systems International, 5013 Pacific Hwy East, Fife, WA 98424
Q-Mar Inc., 1801 McGill College, Montreal, Quebec H3A2N4
Land Sea Systems, 849 Seahawik Circle, Suite 103, Virginia Beach, VA 23452
Litton Marine Systems, 1070 Seminole Trail, Charlottesville, VA 22901-2591

NOZZLE SYSTEM
Custom Nozzle Fabrication, P.O. Box 547, Pascagoulo, MS 39568
Harrington Metals, 6720 124th Ave., Fennville, MI 49408
Rice Propellers, Av Rios Espinoza #88, Mazathan, MEXICO 82180

OIL—Marine—Additives—TESTING
Mobil Oil Corporation, 3225 Gallows Road, Fairfax, VA 22037-0001

OIL - LESS FRYER
Ro-Fry, 1400 Toastmaster Dr., Elgin, IL 60120

OIL TANK CLEANING
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OIL/WATER SEPARATORS
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Alfa-Laval Separation, Inc., 955 Mearns Rd., Warminster, PA 18974-0556
Blohm& Voss U.S.A. Reps:Simplex-Turmar Inc., P.O. Box 168, Little Neck, NY 11363-0168
Fast Systems, 3240 North Broadway, St. Louis, MO 63147
MMC International, 60 Inip Dr, Inwood NY 11096
Westfalia Separators, 100 Fairway Ct., Northvale N.J. 07647
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Products Research Service, 9229 Highway 23, Belle Chasse, LA 70037
Sigma Coatings, 8979 Market St., Houston, TX 77029, 330 Rover Rd.,Harvey, LA 70059,
Atlantic Systems Supply Co.,1100 Adams St., Hoboken, NJ 07030
TNO Institute of Industrial Technology, P.O.B. 3, 2600 AA Delft, Netherlands
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PIPE JOINING PRODUCTS
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PIPING SYSTEMS
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Associated Marine Technologies, 4016 Seaboard St., Portsmouth, VA 23701
Holland Roer Propellers, 2273 Batataria Blvd, New Orleans LA, 70072
S & S Propeller, 26-15 123rd St., Flushing, NY 11354
Rolla SP Propellers SA, P.O. Box 251, Via Silva 5, 6828 Balerna, SWITZERLAND

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ABB Industry Oy, P.O. Box 185, 00381 Helsinki, FINLAND
ABB TURBOCHARGER, INC.,1460 Livingston Avenue, N. Brunswick, NJ 08902
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Centa Corp., 8185 Cass Ave., Darien, IL 60561
Cincinnati Gear Co., 5657 Wooster Pike, Cincinnati, OH 45227
deWijs Marine International B.V., Postbus 320, 1969 NJ Heemskerk, Nederland
The Falk Corp., PO Box 492, Milwaukee, WI 53201-0492
Fincantieri, Diesel Engines Div—GMT, Bagnoli della Rosandra 334, Trieste, ITALY
GE Naval & Drive Turbine Systems, 166 Boulder Dr., Fitchburg MA 01420
GEC ALSTHOM Diesels Inc., 10801 Kempwood Dr. Ste 1, Houston, TX 77043-1412
Goltens Worldwide, 160 VanBrunt St., Brooklyn, NY 11231
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Markisches Werk, P.O. Box 1442, D-5884 Halver GERMANY
MAN B&W Diesel, 17 State St., New York, NY 10004
MAN B&W Diesel A/S, Ostervej 2, DK-4960 Holeby, DENMARK
MAN B&W Diesel A/S, Alpha Diesel, Niels Juels Vej 15. DK-9900 Frederikshavn, DENMARK
MAN B&W Diesel GmbH, Stadtbachstrasse 1, D-86153 Augsburg 1 GERMANY
Omnithruster, Inc., 743 N. Main St., Orange, CA 92868
Orion Corp., 1111 Cedar Creek Rd., Grafton, WI 53024
Oy Wartsila Ab, Vasa and Abo Divisions, P.O. Box 244, SF65100 Vasa, FINLAND
Rolla SP Propellers SA, Via Silva 5, P.O. Box 251, 6828 Balerna SWITZERLAND
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Schottel North America, Inc., 1505 Corbin Ave., Hammond, LA 70403
Siemens Electric Ltd., 1180 Courtneypark Rd., Mississauga, ONTARIO
Stewart & Stevenson, 1400 Destrehan, P.O. Box 8, Harvey LA 70059-0008
Thrustmaster of Texas, P.O. Box 840189-12227 IFM 529, Houston, TX 77284-0189
Ulstein Bergen Diesel A/S, P.O. Box 924, N-5002, Bergen, NORWAY
Ultra Hydraulics Limited, Cheltenham Road East, Gloucester, GL2 9QN, ENGLAND
Voith Hydro Marine Technology, P.O.B. 1125, D89509, Heidenheim, GERMANY
Marine Propulsion Inc., 1505 Corbin Ave., Hammond, LA 70403
The Cincinnati Gear Company, 5657 Wooster Pike, Cincinnati, OH 45227
Propulsion Systems, 609 N.W. St., Seattle, WA 98107
U.S. Rep: Voith Schneider America Inc., 121 Susquehanna Ave., Great Neck, NY 11021

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Gilkes, Inc., PO Box 628, Seabrook, TX 77586
Hamworthy Marine, Inc., 1129 Hospital Dr. Ste 3C, Stockbridge, GA 30281
Kraissl Co., 299 Williams Avenue, Hackensack, NJ 07061
Vita Motivator, 566 Parker St., Newark, NJ 07104
Alfa Tec Inc., 4027 21st Ave. West, Seatle WA 98199
Ampco Pumps, 4000 West Burnham St., Milwaukee, WI 53215

RADARS—ARPAS
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Radio-Holland USA, 8943 Gulf Freeway, Houston, TX 77017

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Bailey Refrigeration, 2323 Randolf Ave., Avenel, NJ 07001
Unitor Ship Service Inc., 2375 West Esther Street, Long Beach, CA 90813

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Elliott Manufacturing, P.O. Box 773,Binghamton, NY 13902

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Goltens, 160 Van Brunt St., Brooklyn, NY 11231

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American Eagle, 780 E. Pearle Jensen Way, LaConner, WA 98257
Willard Marine, Inc. 1250 N. Grove St., Anaheim, CA 92806
Zodiac of N. America Thompson Creek, P.O. Box 400, Stevesville, MD 21666

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Phillystran, Inc., 151 Commerce Drive, Montgomeryville, PA 18936-9628
Puget Sound Rope, 1012 Second St., Anacortes, WA 98221
Pelican Rope Works, 4001 Carriage Dr., Santa Ana, Ca 92704
Rasmussen Equipment Co., 8727 5th Ave., P.O. Box 81206, Seattle, WA 98108
Wellington, P.O.B. 244, Madison, GA 30650

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Fast Systems, 3240 North Broadway, St. Louis, MO 63147
Headhunter Inc., 214 SW 21st Terrace, Fort Lauderdale, FL 33312
AlfaTec, Inc., 4027 21st Ave. West, Seatle, WA 98199
Owens Mfg., Hwy 92, Youngsville, LA 70592

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Boatracs, Inc., 6440 Lusk Blvd. #D-201, San Diego, CA 92121-2758
Furuno USA, Inc., 271 Harbor Way, S. San Francisco, CA 94080
KVH Industries, Inc., 110 Enterprise Center, Middleton, R.I. 02842-5268
ICG Satellite Communications, 8400 NW 52nd St., Suite 110, Miami, FL 33166
Mackay Communications, 2721 Discovery Dr., Raleigh, N.C. 27604-1851
Norwegian Telecom, Postboks 6701 St. Olivs Plass, N-0130, Oslo, Norway
PTT Telecom, Station 12, P.O. Box 30150-2500 JD The Hajue, NETHERLANDS
Radio-Holland USA, 8943 Gulf Freeway, Houston, TX 77017
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Telstra Mobile Satellite & Radio Services, 79 St. Hilliers Rd., Auburn NSW 2144, AUSTRALIA
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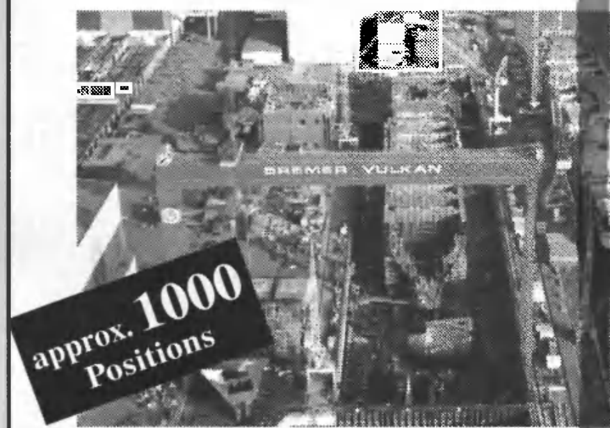

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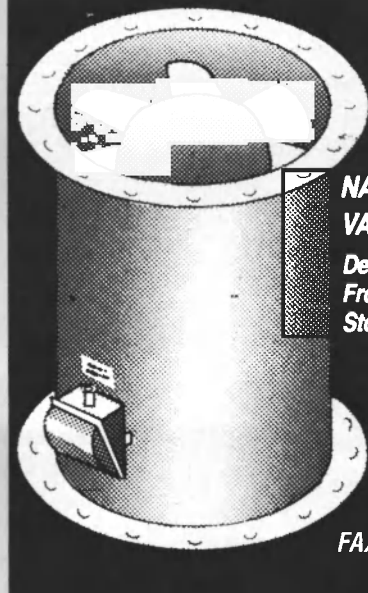

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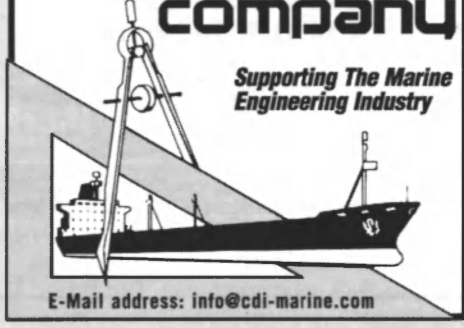

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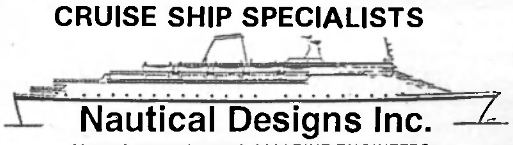

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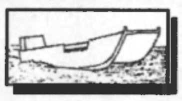

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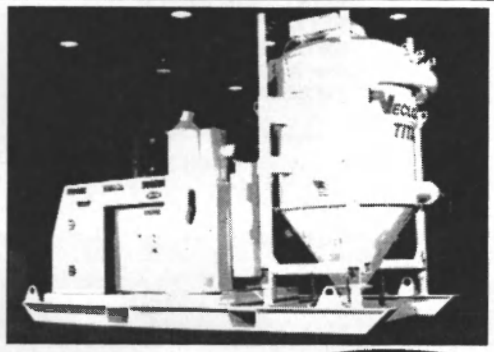

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