MARITIME REPORTER AND ENGINEERING NEWS

Developments in TANKER TECHNOLOGY

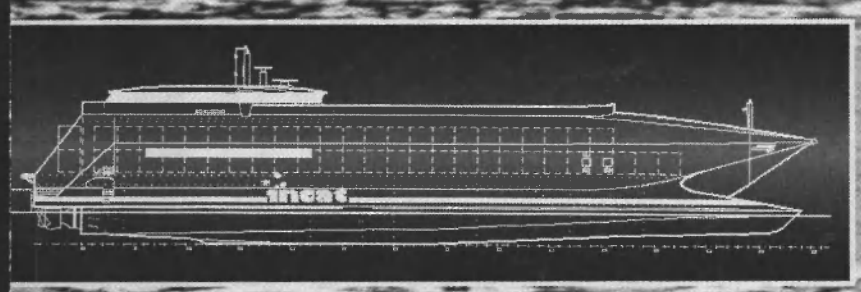
Plus:

Floating Production Systems

A prime business opportunity

US GULF COAST:

Will offshore resurgence spur OSV & rig newbuilding?

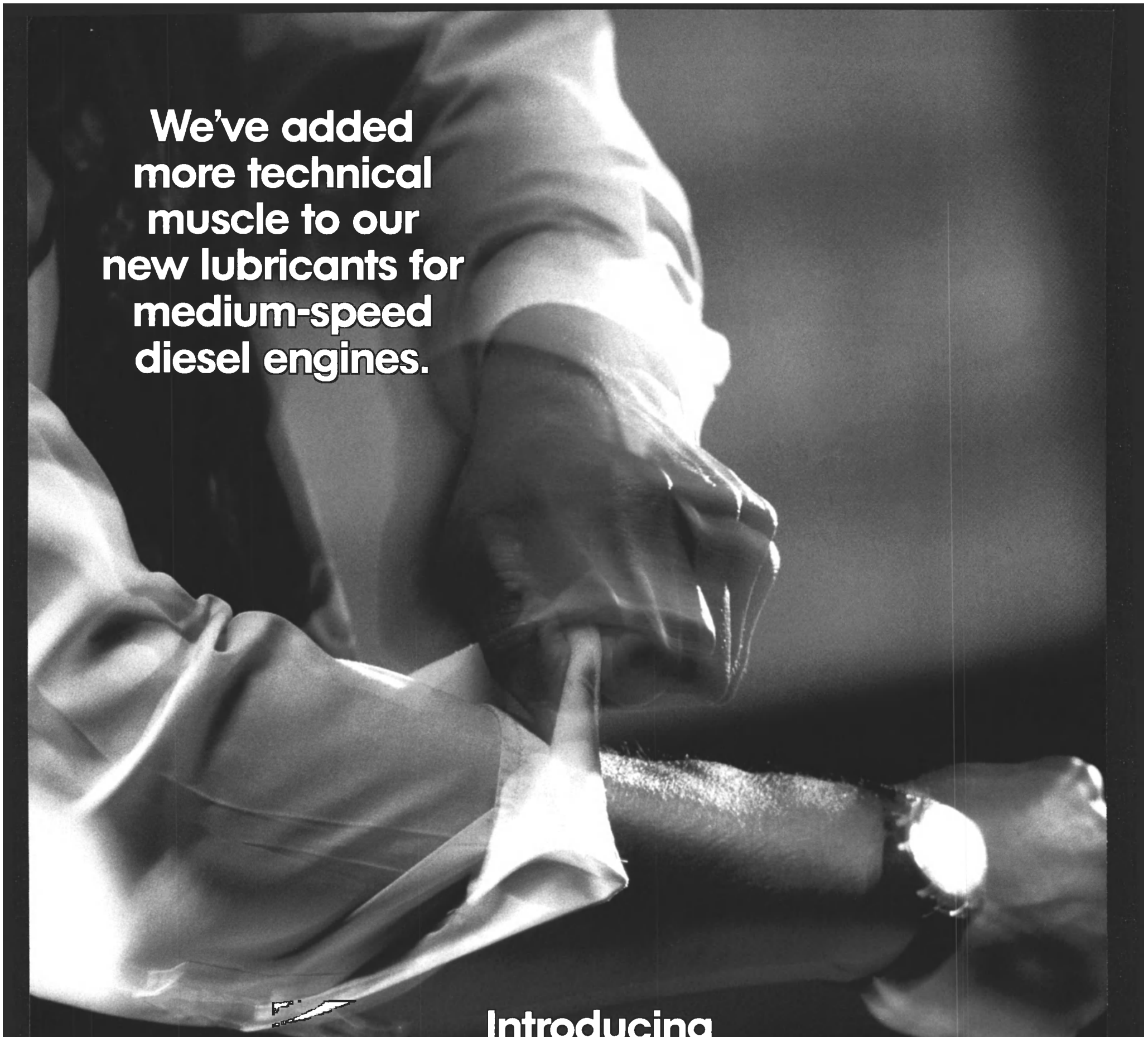


Plus

FORGING AHEAD: A fast ferry market review

hemical Tanker Market Analysis • Noise Control • Fuels, Lubricants & Additives Review

MAY 1996



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EDITOR'S NOTE

Driven by rapidly evolving technology, the construction and conversion market for Floating Production Systems is estimated to be between $10 and $16 billion, according to data contained in a recent IMA Associates report (see page 36 for full details). While this is just one facet of MR/EN's *coverage of Tanker Technology in this edition, it is indicative of the greater trend in the maritime industry: advancing technologies — aimed at creating a safer and more efficient world fleet — driving the newbuilding and conversion markets.*

Next-generation technology today is also a central theme in our coverage of the Fast Ferry industry, which starts on page 44. Featured in this section are the latest vessels, designs and equipment that will propel this growing niche for years to come.

Finally, post-show coverage of two significant U.S.-based events — CMA and AISE — is delivered by ***Bridget Murphy****, starting on page 69. The AISE '96 exhibition drew fewer attendees than projected and has drawn the ire of some exhibitors. But this should not be taken as an indictment of the U.S. commercial shipbuilding industry. Construction has begun or is set to begin on the high-profile orders placed at Newport News and Alabama Shipyard, respectively, and the interest in "buying American" remains strong.*

Gregory R. Trauthwein, editor

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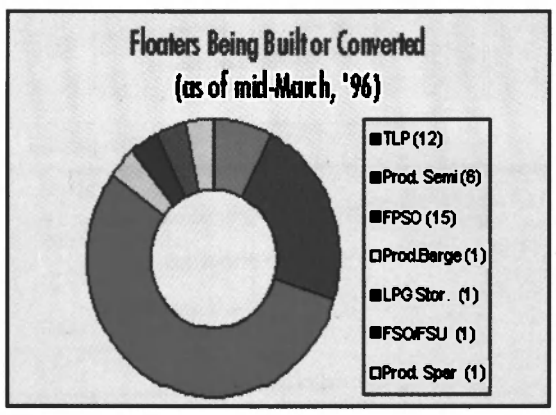
In its recent study, **IMA Associates** found that about 60 floating production systems are operating worldwide, and an additional 27 are currently on order, with contract values totaling approximately $7.2 billion. For more on IMA Associate's new report, turn to page 36, the beginning of the Tanker Technology section.



MARITIME REPORTER
& ENGINEERING NEWS

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Subscriptions: One full year (12 issues) $18.00 in U.S.; outside of U.S. $96.00 including postage and handling. For subscription information, contact: Dale Barnett, fax: (212) 254-6271.

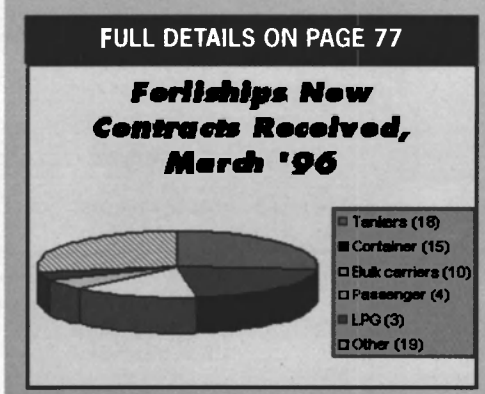
ON THE COVER

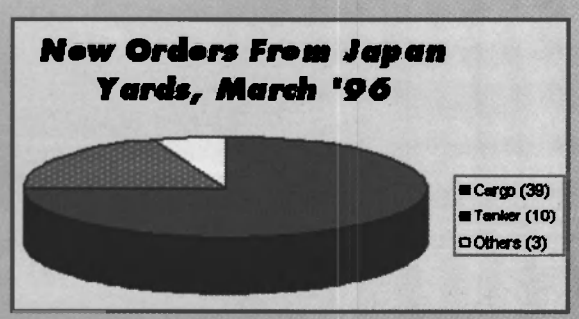
Pictured on the cover is M/V *Knock Muir*, a 146,000-dwt Suezmax oil tanker built by Harland & Wolff Shipbuilding & Heavy Industries, Ltd., Belfast. The ship features a double hull and can carry one million barrels of oil. Tanker Technology is a focus of this edition, and the section starts on page 36.

Also in this edition

Data & Statistics

FULL DETAILS ON PAGE 77





MARITIME REPORTER AND ENGINEERING NEWS

ISSN-0025-3448
USPS-016-750

No. 5 Vol. 58

118 East 25th Street
New York, NY 10010
(212) 477-6700

Founder: John J. O'Malley 1905 - 1980

Maritime Reporter/Engineering News is published monthly by Maritime Activity Reports, Inc. Mailed at Second Class Postage Rates at Waterbury, CT 06701 and additional mailing offices.

Postmaster send notification (Form 3579) regarding undeliverable magazines to Maritime Reporter/Engineering News, 118 East 25th Street, New York, NY 10010.

Publishers are not responsible for the safekeeping or return of editorial material.

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$36 Million In Federal Assistance Goes To Help The Louisiana Maritime Industry

President **Clinton** approved $36 million in federal assistance to help finance construction of five vessels in three Louisiana shipyards, and to help modernize one shipyard.

President **Clinton** said "We are enabling American shipbuilders to compete in a global marketplace and be an economic force into the next century."

A seven-year, $13 million Title XI loan guarantee is for Alpha Marine Services, Inc. to construct a deep submergence rescue vehicle support ship. According to the Maritime Administration (MarAd), the estimated cost of the new ship is $16 million. It will be built by North American Shipbuilding, Inc., and is to be delivered by mid-1996. Global Industries, Ltd. was granted a 25-year, $20 million Title XI loan guarantee to build two lift boats, a 300-ft. (91-m) deck barge and a 400-ft. (122-m) launch barge. Bollinger Shipyards, Inc. will build the liftboats, and Service Marine Industries will build the barges. These vessels will operate in the Gulf of Mexico but will be able t operate worldwide, according MarAd.

A third Title XI loan guarante was approved for T.T. Barg Services, Inc., to help finance a million shipyard modernization. 15-year, $3 million guarantee w approved for this project, whic will involve installing a Syncroli vessel transfer system.

Libra Group To Build 8 Container Vessels, Lease Shipyard

Libra Group of Brazil, paren company of Companhia Maritim Nacional, will build eight contai erships at a cost of $560 million CCN/Maua Rio de Janeiro. In move to avoid financial problem within the Brazilian shipbuildin industry and ensure quality co trol and delivery dates, Libra wi undertake a four-year lease of th shipyard. The order is for fou 2,300-TEU vessels, two 3,700-TE and two 1,700-TEU vessels.

The 3,700-TEU ships will be 79 ft. (242 m) long, and will call at tw ports in North Europe and two i Brazil. The other ships will carr containers and some breakbul cargo, and will have container gea onboard. Operating under a newl formed Libra subsidiary calle Estaleiiro Niteroi (Niterq Shipyard), the facility will be cor pletely controlled by Libra, excep for the vessel repair business.

"This is the first time that Brazilian shipowner has take control of building its own vessel in a Brazilian yard. Libra's 5 year commitment to Brazil's worl trade was a major factor in bein able to secure this arrangement, said **Thomas Lloyd**, vice pres dent and general manager Nacional.

According to Mr. **Lloyd**, the shi yard lease is part of an investmer program created by Libra Grou that will run to the year 2000.

The project will be 85 percer financed by the Banco Nacional Economic and Social Developmen (BNDES) through a merchan marine financing program. I most countries, shipyards obtai financing for newbuildings However, Brazil requires shipowr ers to obtain the funding and the pass it along to the vessel cor struction order. The Libra leas program will bypass the probler encountered by shipyards that d not have the assets to guarante the funds.

Chinese Yard To Fill Six Vessel Order

Steamers Maritime Holdings has ordered six containe ships for approximately $85 million. All the vessels will b built by China's Jinling Shipyard in Nanjing. Each of th larger ships is valued at approximately $16 million. Th first will be delivered in late 1997. The two 383-TEU unit are valued at $10.5 million each. These will be delivere in the second and third quarters of 1997. The ships will b classified by Germanischer Lloyd. This contract brings th total number of vessels under Steamers' current newbuild ing program to nine. The company has also ordered tw 383-TEU ships from Wuhu Shipyard.

Dry Bulk Fleet's Main Niche Sector Faces Increased Competition

A spate of Handy/Handymax size newbuildings — especially part open, flexible and multi-purpose bulk carriers — is set to increase the level of competition in the neo-bulk and unitized sectors of the bulk shipping industry, according a new briefing report from Drewry Shipping Consultants, entitled *Open Hatch And Container/Bulk Carriers: Demand, The Fleet and Competition*. Nevertheless, the major established players continu to have an optimistic outlook, a take the view that they will ha the experience and expertise to s them through any near term dif culties.

In part, this belief relies ont fact that, because open hatch to nage carries a sizable price pre um on the newbuilding mark (perhaps $7 to $8 million befo the topic of cargo handling ge has been addressed), entry b purely speculative interests deterred. In addition, these shi tend to see their natural tradi home in neo-bulk traffic areas especially forest products, steel aluminum ingots — and/or co tainers where factors such as se vice quality and reliability assur major importance. Neverthele the market allows no room for co placency.

At the end of 1995, the repo said that the open hatch and co tainer/bulk carrier fleet of mo than 20,000 dwt amounted to 3 ships, with an additional 49 o order.

Furthermore, the first t months of 1996 have brough reports of an additional ni orders, representing 325,000 d for vessels described as open part open, including fo Handymax units on CCNI account and a 50,000-dwt examp contracted by Leif Hoegh.

The fleet contains three distin elements: fully open hatch shi fitted with shipboard travelin gantry cranes; part open hatc ships fitted with conventio cranes which "partly overhang" t hatch access; and conbulker which are more conventional uni

Fleet of Open Hatch and Container/Bulk Carriers of 20,000+ DWT (End of 1995)

	In Service		On Order	
	No.	'000 DWT	No.	'000 DWT
Fully Open Hatch	130	4,928	5	208
Port Open Hatch	166	5,547	44	1,527
Other Conbulkers	69	2,143	0	0
Total	365	12,618	49	1,735

Source: Drewry Shipping Consultants

with a fairly high TEU rating and, perhaps, some cell guides fitted.

The first of these, where the hatch area and that of the hold floor match and the hatch opening runs to 70 to 80 percent of the beam measurement, are more sophisticated.

Ownership is in relatively few hands, with Gearbulk and Star Shipping being the major forces, collectively running more than 75 ships. The open hatch concept emerged initially to meet the demands of specialist niches within the forest products trades. These include sawnwoods, board products, paper products, and especially woodpulp, a trade generating more than 21 million tons per year of seaborne traffic globally.

However, the square hold design has proved attractive to other neobulk parcel trades such as steel, while the layout is also conducive to working containers. Drewry reports that some operators seem to be seeking to distance themselves from the bulk carrier epithet, as the longevity of some of their ships has caused cargo insurer problems.

This, allied to "liner type" operating schedules, has encouraged some operators to consider their ships to be general cargo vessels despite the Handymax size.

For information on obtaining a copy of this new Drewry report
Circle 56 on Reader Service Card

Pappas Joins Intergraph Federal Systems

Intergraph Corporation, Huntsville, Ala., announced that **Jimmy Pappas**, U.S. Navy Vice Admiral (Ret.), has joined Intergraph Federal Systems as an executive consultant for Federal Programs. He will be assisting the Navy in the use of Intergraph CAD-2 technology for consolidation and base closure, as well as increased facility management efficiency. Prior to joining Intergraph, Vadm. **Pappas** served as president and CEO of the Navy-Marine Corps Relief Society. He has also commanded Naval Station Norfolk and Naval Station San Diego. Prior to retiring in 1991, Vadm. **Pappas** served as Director of Logistics (J-4) on the Joint Staff, coordinating the movement of combat forces and support in Desert Shield/Desert Storm.

Jimmy Pappas

The first CAD-2 contract, from the Naval Sea Systems Command (NAVSEA), was awarded to Intergraph in 1991 for engineering and design hardware, software, and services for applications such as shipbuilding, overhaul and repair. The most recent contract was awarded in 1994 by the Naval Air Systems Command and Space and Naval Warfare Systems Command for computer-aided systems and services for electronic and mechanical design, manufacturing and engineering in aeronautical and aerospace applications.

For more information on Intergraph
Circle 92 on Reader Service Card

Global Electronic Communications Speed Ship Financing Process

by Guy E.C. Maitland

The maintenance of an orderly regime for financing the construction,. purchase and operation of ships is a prime function of flag states, but it is a process which has begun to change because of the application of global electronic communications, as well as a more flexible legal approach to ship registration.

With the exception of a small core of specialists, the technical procedures of ship registration and the recording of mortgages are gene ally not well known. They can i very burdensome, as a scrutiny the Norwegian or Japanese sh sale forms, or a Memorandum Agreement (MOA) will indicat The legal and technical snares ship and mortgage registration a brought into play by the need expeditiously secure the financi rights of those parties with a interest in the transaction.

Ship registries offer the on internationally recognized syste for securing a loan by means recording a mortgage, using t vessel itself as collateral. Suc financings follow forms prescribe by the national law of the ship re istry, with mortgages, bills of sa and other recordable instrumen conforming to the 1993 Conventi on Maritime Liens and Mortgage

An earlier international agre ment dating from 1926, states th the mortgage must be "registere ... in a public register at the port registry of the vessel or at a centr office." This usually requires a tr ditional form of legal procedu known as a closing. The nature this will be governed by the co

(To replace aging tonnage) The World Bank estimates that approximately $350 billion or more will be required by the year 2000.

plexity of the transaction, th degree of preparation, and th legal systems of the registrie involved. A bad closing can co sume considerable additional tim and money, as well as participant

Each ship delivery brings with its own rigorous commercial an financial deadlines. This has led t a demand for virtually constan access to recordation and registr facilities, for the sake of efficien and to eliminate unnecessar expense. This demand is growin along with the industry's need f the large sums that are being, an will be, advanced to replace th world's aging tonnage. The Worl Bank estimates that approximat ly $350 billion or more will b required by the year 2000.

The advent of computers an satellite communications mea that a ship mortgage, as well a other recordable documents suc as bills of sale, can be recorded a either an office in the port registr at the registry's central office o

any other office maintained for that purpose, by submitting the documents in any such office.

Provided that its own law permits, a major registry with this capability can coordinate ship documentation and recordation services in any major financial center where it has a registry office. This is not as simple as it may be supposed, for banks that lend money for which one or more ships are collateral usually require a lawyer's opinion that each vessel is free of senior — or superior — maritime liens, mostly mortgages, that may be recorded in the registry. They may also require an official statement from the registry identifying them by date, time, book and page number.

Before the advent of computers, satellites and fax machines, this often meant the expending of much effort to assemble the necessary people and documents at a central office. The personnel involved would include lawyers, bankers, brokers, agents and the ship registry's officials. The location of this office could be fairly distant from the place where the most important parts of the transaction took place, such as the shipyard or the bank.

It is difficult to estimate the cost of time and work involved in transmitting signed original documents, often notarized, legalized or consularized, to the ship registry's central office. Those who are familiar with producing directors' resolutions, powers of attorney, releases, mortgage drafts and other paperwork can appreciate the value of dealing with a registry office that is close to home, or with a registry which has a number of accessible offices in locations convenient to the transaction as a whole.

The often difficult road to registration can be made faster and smoother when the necessary ingredients, including instruments such as mortgages, can be recorded at the registry's local offices in different cities, under the control of a central computer system.

In a situation where a number of lenders are involved, a first mortgage can be delivered in Rotterdam, a second mortgage in Tokyo and a bill of sale in London, during business hours in each city, in a coordinated sequence orchestrated through the registry's central computer system.

Such documents will have been recorded in compliance with generally accepted international law because they will have been "deposited with the registrar" in accordance with the law of the state in which the vessel is registered.

The 1926 Convention's provision that mortgages be registered in a public register at a central office are satisfied by the computerized nature of a multi-office transaction. This is because all of the appropriate mortgage data is immediately transmitted to the central office through the registry's computer system, linking those offices to the central office.

When a recordation is taking place, and often before this event, the central computer's safety system can "lock in" the appropriate time, book and page numbers to ensure the protection of the lenders' mortgage priority, as well as the rights of other interested parties.

***Guy E.C. Maitland** is executive vice president of International Registries, Inc., which administers the Liberian and Marshall Islands ship registries.*

Southwest Marine Announces Plans To Acquire Continental Maritime

San Diego-based yard Southwest Marine, Inc. (SWM) announced on April 15 that a letter of intent to purchase a majority interest in Continental Maritime of San Diego (CMSD) had been signed. SWM's intended acquisition follows the trend of consolidation and restructuring in the defense industry, which has resulted in a lower volume of Navy repair work.

Terms of the deal between the two shipyards are currently being worked out, and the transaction is expected to be completed in June. "The coming together of SWM and CMSD ensures the long term viability and stability of the industry in San Diego. It also enables us to pool the talent from both companies creating a unique type of synergism.

Together, we'll be able to provide a broader range of capabilities to our customers," said SWM President **Herb Engel**.

For more information on Southwest Marine, Inc.
Circle 94 on Reader Service Card

Astilleros Españoles Delivers *Bunga Mas Empat*

Astilleros Espanoles' (AESA) Juliana Yard has delivered *Bunga Mas Empat*, the fourth and final containership in a series the Spanish shipbuilder has built for Malaysian International Shipping Corporation (MISC).

The layout for this series of four feeder containerships reportedly has the advantage of offering a near-box-shaped cargo space and a large, clear deck area. Six cargo holds are arranged within a wheelhouse/accommodation block positioned right forward on the forecastle, with a machinery room aft. The holds are divided by a centerline bulkhead and closed by 12 pontoon hatch covers, each of equal size, and thus interchangeable.

***Bunga Mas Empat* particulars**

Length, o.a.	443.5 ft. (135.2 m)
Length, b.p.	408.6 ft. (124.6 m)
Breadth (molded)	68.2 ft. (20.8 m)
Depth	34.4 ft. (10.5 m)

For more information on Astilleros Espanoles
Circle 131 on Reader Service Card

Newport News Forms Nuclear Division

Newport News Shipbuilding (NNS) has formed a new division to focus on pursuing contracts to help operate the Department of Energy and other federally controlled sites, as well as grow its existing commercial nuclear power repair and maintenance work. The new organization, to be known as Newport News Nuclear, will capitalize on the company's 40-plus years of experience in handling nuclear material. **James A. Palmer** has been named president of Newport News Nuclear.

For more information on NNS
Circle 135 on Reader Service Card

TMA Awarded Surface Ship Program Contract

Technology, Management and Analysis Corporation (TMA) has been awarded a five-year, 931,000-hour contract valued at $30 million to provide naval architecture, marine engineering, program management and logistics support services for the Strategic Sealift Program Office (PMS 385) at the Naval Sea Systems Command. PMS 385 is tasked with meeting the challenge defined by the Mobility Requirements Study by constructing and converting surge, prepositioning ships and developing Sealift Enhancement Features (SEF) to augment the military capability of the U.S. merchant fleet. Ship construction and conversions involve three shipyards — Newport News, NASSCO and

NOISE CONTROL: *Fincantieri first with Active Noise Control on cruise ship* Veendam

The latest whisper in noise control technology is the use of fast electronics, speakers and elaborate software that generate phase-shifted noise which intercepts and suppresses medium and low frequency noise from fans, pumps, motors, engines, etc. This technology is called ANC, short for Active Noise Control.

In a joint development program between Fincantieri, Trieste, and ABB Flakt Marine, Gothenburg, an active noise control system was recently installed in a segment of the air-conditioning system (HVAC) onboard Holland America Lines' new cruise liner M/S *Veendam,* presently under construction at Fincantieri Marghera shipyard. This is believed to be the first ever application of ANC to a ship.

(The objective of the ongoing development program is to exploit the latest advances in active silencing technology also in shipbuilding.) A leading developer of ANC technology is the Wisconsin-based acoustics and vibration specialist company, Digisonix Inc. The company has successfully applied ANC to a multitude of industrial and automotive noise sources and to many HVAC systems in buildings. The company is the specialist subcontractor to ABB Flakt Marine for the development program at Fincantieri.

On board M/S *Veendam*, the team installed a single channel ANC system in a circular duct supplying air to a ship boutique. Low frequency noise radiated from the supply register into the otherwise very quiet room. Although the base line noise near the register measured only 45 dB(A), the noise was quite disturbing due to the very low background noise of only 38 dB(A) in the boutique. Most of the sound energy was concentrated to frequencies between 100-500 Hz, and originated from rotational noise from the supply fan in the airhandler and from flow-induced noise in the duct.

"When the ANC system was switched on, the noise from the supply register in the ship boutique simply disappeared said Fincantieri acoustics specialist Ing. **De Lorenzo,** who sees several candidate noise areas onboard ships where this technology can be applied. "Right now, we are evaluating this particular installation, but we also intend investigating several other areas where we think ANC can be applied. Over the years, we have developed a good understanding of this impressive technology in order to stay at the forefront of technical advancements and to remain an educated customer, able to exploit new technology in the best interest of our own customers."

The principle of ANC is simple.

Noise propagating down a duct is canceled by "anti- noise" from one or several speakers attached to the duct. However, it was not until recently that enough computational capacity could be packed into a small and relatively inexpensive controller so that the principle could be exploited commercially. To suppress or cancel a repetitive tone is simple, but to cancel random noise such as fan noise requires a significant computational capacity, clever control algorithms and very

(continued next page)

Photograph of the ANC installation on board M/S *Veendam*. One of the microphones and the speaker can be seen fitted to the supply duct with a simple T-piece.

(continued from previous page)

robust hardware.

Noise in a duct, from a fan for instance, is picked up by the first microphone that sends a signal to the controller, which interprets signal, and phase shifts the signal and sends an amplified signal to the loudspeaker.

The speaker injects the "anti-noise" precisely at the correct moment, the anti-noise intercepts the fan noise the two pressure waves "collide" and cancel each other.

Residual noise is picked up by the second microphone, and this signal is used by the controller to fine-tune the system, particularly in respect to changes in the air flow, temperature and characteristics of the noise.

As a major supplier to the maritime industry, the ABB group of companies considers ANC a strategic technology and has therefore invested in various development programs since 1991. As a result of these efforts, ANC systems from Digisonix are now being applied both as retrofit measures and as active components of originally manufactured equipment such as air handling units (AHU) and, in the near future, large baffle silencers for heavy duty fans.

Propulsion Updates

GL To Manage Diesel Exhaust Gas Emission Reduction Program

Germanischer Lloyd (GL) has been given the overall project management of a three-year, industry-wide research program to reduce exhaust gas omissions from marine diesel engines. The project, dubbed CLEAN (Clean and Low soot Engine with Advanced techniques for NOx reduction) is being sponsored by the German Federal Ministry for Education, Science, Research and Technology (BMBF). The aim is to drastically reduce the visible emissions of soot and particles in exhaust gas, and to decrease the levels of nitrogen oxide, without increasing fuel consumption.

Thirteen leading German ship diesel manufacturers, as well as subcontractors, universities and research institutions, are involved in the joint project. The following organizations are involved in the project: Research Association for Combustion Engines; Germanischer Lloyd; ABB Turbomaschinen; AVL Graz; Dieselmotorenwerk Vulkan; FMC — Fiedler Motoren Consulting; Krupp MaK; MAN B&W Diesel; Motoren-Werke Mannheim; Siemens Energieerzeugung; SKL Motoren-und Systemtechnik; TT-Line; and Woodward Governor.

MAN B&W Adds To MC Program Of Super-Long-Stroke Engines

MAN B&W Diesel has introduced the S70MC-C, S60MC-C and S50MC-C type super-long-stroke engines to its 1996 MC program. The units are compact versions of their predecessors — S70MC, S60MC and S50MC — with the same cylinder bores, but increased outputs based on a mean effective pressure of 19 bar. The characteristics of these engine types are reduced cylinder distance and lower weight, compared with the previous type, and a stroke/bore ration of four to one.

Also, MAN B&W Diesel has introduced the S46MC engine which, by providing an additional bore size option, will reportedly enhance the application possibilities in the market segment so far covered by the S42MC and S50MC types. The S46MC shares the same design features as the compact engines.

An additional feature in the 1996 MC program is that the L70MC is reportedly available with a higher rating, based on a mean effective 18 bar, adding approximately six percent to its power output.

For more information on MAN B&W Circle 136 on Reader Service Card

SEA Introduces Complete GMDSS System

SEA Inc. has introduced its newest product, the SEA 400-A3 GMDSS Console, which integrates the basic carriage requirements for Sea Area 3. The unit, available for the first time last month, is designed to allow the end user to purchase the system already assembled for instant installation onboard. This turnkey GMDSS communications system is indicative of SEA's growing prominence in providing marine communications equipment. SEA's manufactures a full line of products which has been FCC type-accepted for GMDSS. SEA has been selling VHF and HF/SSB communications products to the high seas, workboat/fishboat and large yacht marketplace for more than 20 years.

For more information on SEA Inc.
Circle 121 on Reader Service Card

FONASBA Introduces New Commission Contract

The Federation of National Associations of Ship Brokers and Agents (FONASBA) has introduced a standard International Brokers Commission Contract to help alleviate the problem faced by shipbrokers when chasing payment of their commission from recalcitrant shipowners. FONASBA's solution is a simple, one-page contract which the broker invites the owner to sign. The contract lays out the terms under which commission is payable, and establishes where, should a dispute arise, arbitration proceedings should be held.

For more information on FONASBA
Circle 122 on Reader Service Card

MarAd OKs Sale Of Tanker

Western Overseas, Inc. has received approval to sell the 36,061-dwt tanker *Neches* to Ruby Enterprises, Inc., a British Virgin Islands corporation. The vessel, built in 1958 in San Francisco, will be transferred to St. Vincent and The Grenadines registry.

USCG Proposes Changes To Training Standards For Seafarers

To comply with the 1995 amendments to the 1978 International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW), the U.S. Coast Guard (USCG) has published a proposed rulemaking and will hold three public hearings during the comment period to discuss it.

According to the USCG, changes to the STCW could impact virtually all phases of the system used in the U.S. to train, test, evaluate, document and license merchant mariners. The proposed regulations, which would take effect February 1, 1997, apply to mariners aboard U.S. vessels sailing beyond the U.S. boundary line on ocean and coastwise voyages. The public hearings are scheduled for May 8 in New Orleans, May 14 in Seattle and May 25 in Washington, D.C. Written comments on the proposed rulemaking must be received by July 24, 1996.

For additional information on the proposed rulemaking, contact **Christopher Young**, project manager, tel: (202) 267-0216.

Schelde Shipbuilding Lays Keel For Amphibious Transport Ship

The keel for *Rotterdam*, an Amphibious Transport Ship (ATS) for the Royal Netherlands Navy, was laid on February 23 at the Schelde-East yard of Schelde Shipbuilding. The ATS is scheduled to be delivered in 1997, and is designed for crisis control calamity situations, as well as humanitarian aid and evacuations. The vessel is being built in a modular form, and it is being classed by Lloyd's Register.

In this project, the Royal Netherlands Navy and Schelde Shipbuilding have worked with the Spanish Navy, as there is currently a nearly identical ship under construction in Spain. Through this partnering, there has been unified purchasing of sensors and communications equipment, which has allowed considerable savings.

For more information
Circle 55 on Reader Service Card

Netherlands Company Selects Boatracs BUI Software

Boatracs Inc. has completed its first European sale to Wijgula, an European inland shipping company. Wijgula purchased the BOATCOMM User Interface (BUI) system for its fleet. The BUI system reportedly allows marine companies to interface onboard personal computer systems with the Boatracs system. BUI gives the user the ability to use the full computer screen to send messages and data files between boats and the office. In addition, Boatracs has signed a Memorandum of Understanding with Alcatel-Qualcomm granting distribution rights to Boatracs in marine markets in the U.K., Germany, Austria and the Benelux states.

For more information on Boatracs
Circle 132 on Reader Service Card

Vitro To Acquire Program Support Contract From Litton

Vitro Corporation, a subsidiary of Tracor, Inc., will purchase the assets of a PRC Inc. (a subsidiary of Litton Industries, Inc.) line of business related to the performance of Aegis engineering and technical services.

Vitro will acquire the business supporting the U.S. Navy's acquisition of Aegis ship systems, which is covered by a five-year Navy contract valued at approximately $42.4 million.

For more information on Tracor
Circle 133 on Reader Service Card

D&P To Work With Projemar

Designers & Planners, Inc. (D&P) has entered into an exclusive agreement with Projemar, SA of Brazil, to enhance the company's commercial ship design offering. Projemar provides engineering services for the shipbuilding, shipping and offshore industries worldwide. Projemar has developed more than 500 designs of a wide range of commercial ships and offshore platforms. Approximately 50 of these designs have been built in Brazil by Emaq, Ishibras and Verolme shipyards for the domestic and export markets. D&P will market Projemar designs in North America and supply liaison services.

Cathelco Group Acquires Ailsa-Perth Shipbuilders

U.K-based Ailsa-Perth yard has been bought by the Cathelco Group, a British marine engineering company. "We have been seeking opportunities to diversify our business in the marine field over the last few years and we have had an interest in the yard for some considerable time. Ailsa-Perth will fit well into our long term strategy and we are committed to adding new shipbuilding orders to the well established sectors of the business," said **Justin Salisbury**, managing director of the Cathelco Group. A ferry for the Orkeny Islands Council, the first new ship to leave the yard for 10 years, will be launched in the spring, re-establishing a tradition of shipbuilding which began at the Troon site in 1843.

For more information on Cathelco
Circle 145 on Reader Service Card

Iarossi Reports Strong Year For ABS

In a report presented at the American Bureau of Shipping (ABS) Annual Meeting, Chairman **Frank F. Iarossi** said, "The vessels classed, contracts received for classing new vessels and year-end-new-vessel orderbook all surpassed the levels registered in 1994 by sizable margins." He also reported that ABS consolidated revenue reached $229 million in 1995, versus $197 million in 1994. Mr. **Iarossi** commented on the success of SafeHull 96 and SafeNet technology. Addressing the human element, he said: "Another major area in which ABS has been striving individually and cooperatively is the complex one of the human factor in marine safety. During the year, ABS held numerous seminars on ISM and ISO, while assisting more than 100 owners to implement management systems. In 1996 we plan to add a linkage to the revised STCW code to help the industry better understand these new requirements."

Princess Orders Another Cruise Ship

Princess Cruises has ordered another sistership to *Sun Princess*, which debuted in December 1995. The new ship — to be built by Fincantieri — will be named *Sea Princess*, and is scheduled to enter service in early 1999. Together with its sisterships *Sun Princess*, *Dawn Princess* and *Grand Princess*, this order brings the number of Grand Class ships which Princess will introduce by 1999 to four. The contract price for 77,000-ton, 1,950-passenger *Sea Princess* is $295 million.

NASSCO Holds Naming Ceremony

Stephanie Shughart, widow of Sergeant First Class **Randall D. Shughart**, recently christened the USNS *Shughart* at NASSCO. Also attending the cermony were: Assistant Secretary of the Navy **John W. Douglass**; General **Dennis J. Reimer**, Army chief of staff; **Herbert** and **Lois Shughart**; U.S. Senator **J. Robert Kerrey**; and **Richard H. Vortmann**, NASSCO president.

Hatch And Kirk Buys Fuel Product Line

Hatch and Kirk, Inc. has purchased the majority of the fuel injection manufacturing and remanufacturing assets of Korody Colyer from CR Services of Chicago. Hatch & Kirk will relocate the Korody Colyer facilities within the Los Angeles, Calif., area.

MarAd Makes Final Push To Sign Up Companies For SMM '96

With the U.S. selected as the prestigious partner country for the SMM '96 exhibition, the Maritime Administration is trying to gather as many companies as possible to exhibit in Hall 1, the partner country pavilion. The U.S. Pavilion at SMM already has the support of MarAd, the American Shipbuilding Association, the American Waterways Shipyard Conference, the Foreign Commercial Service of the Department of Commerce, the Shipbuilders Council of America, the American Machinery Association and Maritech. Aside from these organizations, MarAd reports that the following companies have already signed on to exhibit in the pavilion:

Alabama Shipyard
Automated Marine Propulsion
Avondale Industries
Bardex Corp.
Claremont Corp.
Dry Air Technology
GE Marine & Industrial Engines
Gulfco International
Newport News Shipbuilding
Marinette Marine Corp.
Hopeman Brothers
Houston Ship Repair
In-Place Machining
International Marine Software
Maritime Services Corp.
Marine Accommodations Inc.
Omnithruster
Permastoprust
Scale Reproductions
Todd Pacific Shipyards
Trinity Marine Group
Victaulic Corp.

For more information on joining the U.S. Pavilion at SMM '96, contact **Shawn Ireland**, Maritime Administration, at tel: (202) 366-5787; fax: (202) 366-5522.

NRDA Cooperation Overshadowed As Regs Face Court Challenge

by Bridget A. Murphy, associate editor

"We're happy to sit down with you and work out pre-spill protocols" was the message communicated to The Baltic and International Maritime Council (BIMCO) members by NOAA General Counsel **Terry Garcia** on March 21 — marking the occasion of the first joint government/industry discussion on natural resource damage assessment (NRDA) since the reformed mandates took effect.

True to form, NOAA officials continued to insist that NRDA does not sanction arbitrary environmental price tags, but invokes programs that will, over time, replace or restore the equivalency of baseline losses resulting from oil spills. "It is about fixing the resource," said NOAA Deputy Administrator **Douglas K. Hall**, who added that companies have misunderstood the NRDA process, confusing new regulations with contingency valuation methods used after the *Valdez* incident and other spills in the Palos Verdes shelf off the California coast.

Maritime interests responded by repeating concerns regarding their perceptions of the legislation's clash with liability limitations under OPA 90. Among those voicing concerns were the Water Quality Insurance Syndicate (WQIS), the North Cape insurance outfit, and the American Institute of Marine Underwriters (AIMU).

Emerging from the discussion was the realization that a serious gap in understanding has fueled opposition to the regulations and has also left maritime interests, including shipowners, operators and insurance agencies, unprepared to work successfully within NOAA's legal framework should a spill incident arise. As stated by environmental law expert **Thomas C. Gricks, III**, partner, Schnader, Harrison, Segal & Lewis, "A lot of the fear comes from the unknown. For the most part, these regulations are unknown because they've only been out a month or two."

Navigating The Legal Framework

With NRDA regulations still subject to final challenges, Mr. **Gricks** encouraged BIMCO members to become familiar with NOAA's regulatory framework, in order to constructively criticize the legislation as well as to prepare to react in a way that will maximize benefits to their companies in the event of an incident. "Ensure that if an oil spill happens, you're in the best possible situation," advised the attorney.

He then proceeded to put forth guidelines for pre-incident planning, which included three key ideas, namely: identifying trustees; having R.P. draft agreements or Memorandums of Understanding ready for action in every case; and signing tiered contracts with spill responders and consultants.

He recommended that R.P.s submit formal comments on draft restoration plans in the event of an incident, and added that companies should utilize the Administrative Record to suggest alternate methods of restoration. Alluding to NRDA Section 990.27, Mr. **Gricks** said that "trustees are required to choose the most cost-effective measures" for restoring baseline conditions, and advised, "You have to be able to demonstrate that the alternative selected by the trustee is the wrong one."

He said that companies arranging from the start to direct and pay for restoration programs often save money in the long run, considering the cost of litigation combined with the expense of having a bureaucratic agency implement a plan. "Assume control and direct the process as early as possible ... In Superfund, we have found that you can cut costs by two-thirds if you do the work yourself," said Mr. **Gricks**.

Aiming For Cooperation

It is without question that the maritime industry will continue to hold the U.S. government accountable for legislation that some believe seriously lacks of a system of checks and balances. Aware of this circumstance, NOAA has enthusiastically extended an offer to work with maritime interests in the next few years in order to fine-tune NRDA legislation. According to Deputy Administrator **Hall**, the Department of Commerce is "committed to dialogue" with industry, and is currently working with the American Petroleum Institute to answer concerns while protecting the rights of the public. He assured BIMCO delegates, "there will be tangible benefits of restoration efforts," and added that the recent Rhode Island spill was a "very successful effort to demonstrate how this can work."

The NOAA administrator also stated that U.S. federal control over the regulations has a stabilizing influence on the entire process, partially due to the fact that the federal government has experienced employees. He emphasized that techniques for shoreline cleanup have been extensively studied since the late 1980s, and that NOAA has the ability to mobilize highly skilled technical teams within hours of an oil spill.

Beyond explaining that "the exercise is not to calculate damages," Mr. **Garcia** implored maritime interests to take advantage of NOAA's

offer to educate companies on the ins and outs of NRDA. He said that NOAA experts are willing to visit industry offices at agency expense "in order to put to rest some of those concerns," and suggested that BIMCO become involved in arranging NOAA meetings with maritime interests in Europe and Asia — a proposition met with approval by those present at the meeting.

On April 3 in Washington, D.C., a petition was filed with the U.S. Circuit Court of Appeals asking for review of the procedures under which the final rule establishing NRDA was promulgated by NOAA. WQIS and AIMU are the petitioners, represented by **Marilyn L. Lytle**, partner, Thacher Profitt & Wood — who hinted that action would be taken regarding alleged shortcomings of the regulations at BIMCO's March 21 meeting.

According to a release circulated to the press on the day the petition was filed, AIMU President **Walter M. Kramer** was credited as saying: "In our nearly one hundred year history, we have never challenged existing regulations before ... But the seriousness of this situation calls for unprecedented action ... This is a serious problem from an insurance point of view because it will be difficult, if not impossible, to anticipate costs and create proper reserves." He added, "The position of the American marine insurance market is clear. Only provable damages should be recoverable and assessments should be used to restore the impacted resources." While NOAA officials would probably agree with Mr. **Kramer**'s last comment, the legislation will undoubtedly stay in the hot seat as industry and government learn to cooperate, or compromise, with a goal towards protecting public resources and private reserves.

Now Measuremont System Can Also Be Used For Measuring Real-Time Hull Deflections

SAJ Instruments has introduced a new design of its dynamic Trim/Heel measuring system which can also be used as the basis for measuring real-time hull deflections. SAJ introduced a dynamic trim measuring device in the 1980s, and the latest version — TLC-2001 — is also designed to provide an efficient and cost-effective means of dynamic measuring hull deflection and torsion, both in port and at sea. The development project was supported by The Finnish Technology Development Centre. The SAJ solution requires only the fitting of two of the company's latest dynamic trim/heel measuring sensors. No bottom intakes are required, making the system reportedly easy to install in either newbuildings or as a retrofit. The accuracy of the new TLC-2001 sensor has been increased by a factor of 10, and this has enabled the company to accurately measure the bending and twisting moments, i.e. hog, sag and torsion. Deflection and torsion data are provided in centimeters and degrees, respectively, to an extremely high degree of accuracy: +/- 0.001° of deflection and +/- 0.0025° of torsion.

Included free with the optional SAJ Draft measurement system is the Windows-based software "PRO-HYDRO Lite." This allows the presentation of all output values on a standard PC screen. Alternatively, an extended version of PRO-HYDRO provides on-line hydrostatic data.

For more information on SAJ Instrument
Circle 120 on Reader Service Card

RTK Helps Speed Up Survey

Pictured is the RTK 607 survey craft.

Poole-based boatbuilder RTK Marine has constructed a specialist survey craft for Western Geophysical survey company. The RTK 607 model was reportedly selected due to its seakeeping qualities and large self-draining deck. Designed for operation in extremely shallow waters, a waterjet propulsion system was installed on the vessel — a 230-hp Volvo engine coupled to a Hamilton waterjet.

The operations cabin was mounted at the rear of the cabin to provide as much deck space as possible. Two crew operate the craft — a coxswain and a technician who has a dedicated console for computers. The 607 will travel to the survey area at speeds of 25 knots, and will work at slow speeds all day, before returning to its mothership. The RTK Series 6 craft complements the range of RTK Sea Trucks which are in operation worldwide in both military and commercial sectors, and which are suitable for various applications.

For more information on RTK
Circle 38 on Reader Service Card

Port Of Göteborg Names Nygren President

The Port of Goteborg AB is a city-owned, limited company acting as a combined port authority and stevedore, which reportedly operates without subsidies from national, regional or local governmental bodies. **Gunnar Nygren** — presiding president of Rail Combi AB, a leading Swedish unit load operator — has been named president of the company, and will succeed **Goram Wennergren** in his new position, who retired from his post on the company's general assembly in mid-March. During his career, Mr. **Nygren** has also held presidental posts with Swedish Lloyd U.K. Ltd., Scandinavian Ferry Line and Frigoscandia AB.

Steamers Maritime Appoints New Shipping Div. Director

Steamers Maritime Holdings, based in Singapore, has appointed **Yong Chee Min** as divisional director of Shipping. Reporting directly to Executive Chairman **C. N. Watson**, he will be responsible for Steamers' shipping activities, which include investing in container feeder ships, shipping services in the region, ship management and agency business. In particular, he will oversee Steamers' current program to establish a fleet of modern container feeder ships through acquisition and newbuilding. He was most recently employed as managing director of Petroships Pte. Ltd.

Intergraph To Supply CAD/CAE Systems

Intergraph Corporation, Huntsville, Ala., announced that the U.S. Navy has added its Windows NT-based computer-aided emergency dispatch system to the $422-million Facilities CAD-2 contract.

Intergraph was selected by the U.S. Navy to provide computer-aided design and engineering (CAD/CAE) systems for architecture, engineering and construction (AEC) and geographic information systems (GIS) applications.

The award is a major component of the Navy's approximately $1.2 billion CAD-2 program for the acquisition of computer-aided design, manufacturing and engineering (CAD/CAM/CAE) systems based on commercial off-the-shelf technology. The Facilities CAD-2 contract is the first opportunity for federal buyers to implement Windows NT with the concept of the technical desktop, which integrates technical and business applications in a single system for maximum productivity and economy. The first CAD-2 contract, from the Naval Sea Systems Command (NAVSEA), was awarded to Intergraph in 1991. The most recent CAD-2 contract, from the Naval Air Systems Command and Space and Naval Warfare Systems Command, was awarded in 1994.

All branches of the U.S. military may buy from Facilities CAD-2, as well as civilian federal agencies such as federal public safety agencies, the U.S. Coast Guard, the Department of Energy, and the Environmental Protection Agency.

For more information on Intergraph
Circle 64 on Reader Service Card

Clarification

The March edition *of Maritime Reporter* reported that Cross Offshore performed the salvage of the M/V *Marjorie B. McAllister* and the M/V *Reno Grande*. In fact, it was American Eagle Marine that was awarded the job. Cross was a subcontractor hired by American Eagle on the project.

For more information on
American Eagle Marine
Circle 123 on Reader Service Card

SEA Inc. was omitted from the Marine Electronics Directory in the March 1996 edition. The company, which recently introduced its complete GMDSS system (see related story, page 15), can be contacted at: 7030 220th S.W., Mountlake Terrace, WA 98043; Tel: (206) 771-2182; Fax: (206) 771-2650.

BethShip Awarded Navy Contract For Repair Of MSC Vessel

David Watson, president of Bethlehem Steel's BethShip, Sparrow Point, Md., yard, announced that the yard has been awarded a contract for more than $1.7 million for drydocking, general repairs, deactivation and lay-up of the Military Sealift Command (MSC) tanker USNS *Humphreys* (TAO-188). The vessel is scheduled to arrive at BethShip on May 20, and will reportedly provide work for approximately 160 yard employees during its 31-day repair period. *Humphreys* will join two other MSC vessels also undergoing repair at BethShip. The two other vessels, amphibious cargo ships *El Paso* (T-LKA 117) and *Mobile* (T-LKA 115), will be at the yard for 10 months, while being converted to transfer their operation from U.S. Naval Fleet Command to MSC.

Rust Converter Available From GE Chemicals

GE Chemicals has introduced Phoscote, a formula which converts rust into an effective, long-lasting polymer primer, reportedly eliminating the need to sandblast, scrape, grind or sand rusted metal surfaces prior to painting. Phoscote can be brushed, sprayed or roller-applied onto problem rust areas. Phoscote can also reportedly be applied to new metal parts and equipment to stop rust action and extend paint life. Phoscote is available in 20, 35 and 55-gallon drums.

For more information on GE Chemicals
Circle 78 on Reader Service Card

Thorn Security Supplies Equipment For Arco Trent Platform

Thorn Security's Marine and Offshore division has supplied S-200 flame detectors for the Trent platform being built for Arco British at SLP Engineering in Lowestoft. The 2,000-ton platform will operate in the southern sector of the North Sea, 165 miles northeast of Bacton, off the east Anglian coast. The platform is scheduled be in position in June, and to begin supplying gas to the Bacton main gas terminal in October. It will work alongside the smaller 1,000-ton Tyne platform, also under construction.

Thorn Security's S-200 Series of detectors were specified because they have been specifically developed for use in challenging environments such as offshore oil and gas platforms. The detectors are reportedly compatible with the fire detection network being used on the platform, and are designed to provide the highest level of protection. In addition to their solar blind characteristic, the detectors have a 100 degree field of vision, and are reportedly able to operate in extreme temperatures ranging from -40 to 80 degrees C.

For more information on Thorn Security
Circle 77 on Reader Service Card

Thorn Security's S-200 detectors are designed to overcome the problem of false alarms caused by sunlight.

Machinery Performance That's Seen, Not Heard

BBN Corporation began as an acoustics and vibration consultancy in 1948 and has grown into a corporation with more than 2,000 employees which primarily provides internetworking services, products and application solutions that help people work and learn together.

True to its heritage, however, BBN Acoustic Technologies was formed in mid-1995 to address increased customer demand for advanced noise and vibration control solutions. The new business unit, which encompasses BBN's expertise in acoustic and environmental technologies, develops and applies technology across the complete spectrum of active and passive noise and vibration control.

"By consolidating these closely related areas of our acoustics business, we've enhanced our ability to serve the needs of our government customers, while extending the benefits of noise and vibration control to commercial markets," said **George H. Conrades**, BBN CEO and president. Among those target markets are the automotive, aerospace and marine sectors.

Dr. **Erich K. Bender**, vice president of BBN and head of the new business unit, has managed many of the company's structural acoustic, environmental and noise control programs, including the development of Active Sound and Vibration Control (ASVC) systems. "Current trends toward operating lightweight machinery at higher speeds, combined with customer demand for quieter products and increased concern about noise pollution have broadened the application for these systems," he said.

With roots in acoustic technology, BBN's ground-breaking work in the field has produced many practical, cost-effective solutions for noise and vibration control problems from quieting marine vessels to various commercial products, such as automobiles, jet engines, mining and construction machinery, home appliances and office equipment.

How It Works

Sound is created by the oscillating compression and decompression of the acoustic medium, which for most marine applications can be either air or water. Methods of controlling that sound can be divided into two forms — active and passive. Passive is just what it implies, controlling sound through reinforcement of structures or providing other buffers, such as engine mounts or acoustic insulation, to reduce the impact of that oscillation. Active, on the other hand, is a more bull-by-the-horns approach that actively seeks to counteract the sound — in BBN's case, by introducing another sound wave of equal magnitude and opposite phase. When the waves overlap, they largely cancel each other out.

That principle has been understood for many years. But according to Dr. **Dan Nelson**, senior program manager at BBN Acoustic Technologies, the complexity lies in applying that principle to a real-world scenario. It's only within the relatively recent past, and thanks to BBN's multi-disciplinary nature, that it has become possible to apply these concepts practically. The technology's application owes an especially large debt to advances in high-speed digital computation, which is another BBN area of expertise.

The pieces of the puzzle, as reported by Dr. **Nelson**, include:

Acoustics. This discipline forms the basis of understanding when ASVC is and is not applicable.

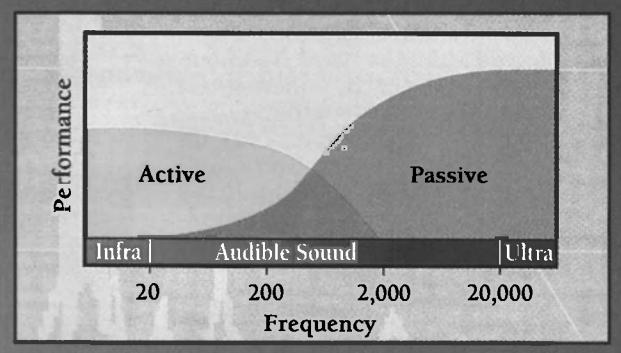
Sensor technology. This element of the system senses the disturbance. not once but twice. First it senses the original disturbance, and then senses it again after the ASVC countermeasure has been applied. In addition to sound and vibration sensors such as microphones and accelerometers, auxiliary sensors such as tachometers are often employed to collect information on the operation of the sound source to be controlled.

Signal processing. This is required to condition and manipulate the signals of various sensors, and then generate the controlling signals that determine the "shape" of the anti-wave. This element is also required to monitor the performance of the system and detect/diagnose any component fault or failure.

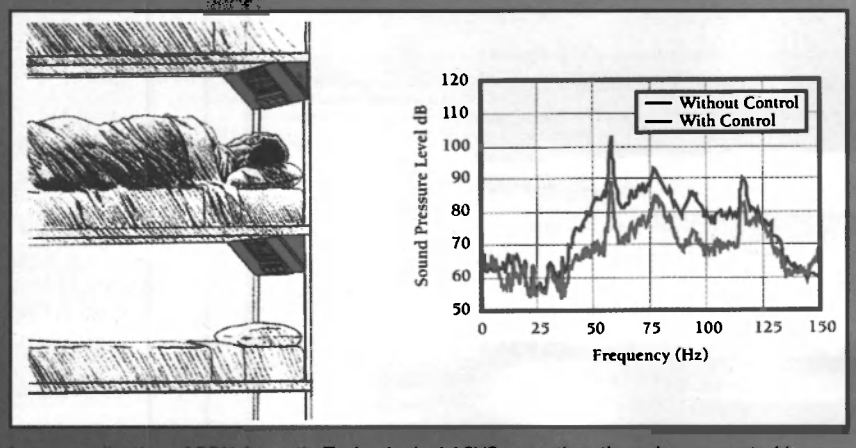
Control theory. An understanding of control theory is necessary when devising a system strategy and planning around the system's application. For example, a system needs to be specifically devised to account for multiple or single inputs or outputs, or to enable it to adjust to sound source changes in the short or long term. Long-term changes might involve temperature or tank fluid levels; short-term changes might simply be the motion of a ship in a seaway, or the acceleration of an engine.

Digital system technology. It is necessary to involve this element, as it is the means by which signal processing and control theory algorithms are implemented into the appropriate hardware.

Actuator technology. This is the means by which the active controlling sound or vibration is generated. Actuator design can be very application-specific, accounting for sound and vibration amplitude generation over a desired frequency range, and/or designed for harsh-environment operation.



The above diagram represents the effective ranges of the two forms of sound and vibration control: active and passive. Active Sound and Vibration Control (ASVC) solutions seem to work best in the frequencies where passive control systems, such as resilient engine mounts, are less effective — making them complementary technologies that can be used together when a certain level of sound and vibration control is needed.



In one application of BBN Acoustic Technologies' ASVC expertise, the noise generated by propellers and other machinery on a marine vessel at high speeds reached unacceptable levels in the aft crew berths. BBN developed a low-cost, single-input/single-output (SISO) feedback system to control the propeller narrowband (tonal) and broadband noise. The system, which was installed at the head of each bunk, reduced the noise in the berths to within customer specifications.

Knowing When Silence Is Appropriate

"ASVC is what I consider an emerging technology, as opposed to a technology that's fully arrived," said Dr. **Nelson**. You won't find the technology prepackaged, in boxes with a BBN label, on the shelves of your local marine equipment outlet. But Dr. **Nelson** said the technology exists for *generating* products which over time are likely to become "standard" hardware. "Many of the applications to date have been in the military. But I think the technology will definitely be used in commercial applications."

The technology is commercially promising partly because it seems to work on that part of the frequency spectrum (lower frequencies) where traditional resilient engine mounting systems — passive control systems — are less effective. BBN often recommends a combination of the two methods for a complete sound and vibration control solution. They are complementary, not competing technologies.

Some commercial applications in which Dr. **Nelson** envisions the use of ASVC are in the yacht and cruise ship industries, in situations where passenger comfort is a premium consideration, or any situation where more low-frequency noise control is required than a single-stage engine mounting system can provide. Two-stage passive mounting systems could also be employed — but according to Dr. **Nelson**, the weight of the engine has to be effectively doubled for those systems to function optimally. That translates into significant fuel costs over the long term. An active vibration control system can provide equivalent vibration reduction without significant mass increases, thereby saving weight and substantial life cycle costs.

Other potential applications include active silencers for HVAC applications; active mufflers for diesel exhausts, for which recent naval vessel calculations have shown a potential weight savings in tens of thousands of pounds; and what Dr. **Nelson** calls active enclosures, which are basically "envelopes" for engines that also use ASVC for noise control.

"Active sound and vibration control is not a panacea, it is a tool," said Dr. **Nelson**. "Probably the most powerful tool to come along in a long time, but it's important to keep in mind that you have to understand the problem before you can implement the solution." BBN's understanding and use of the tool, and the others at its disposal, seems to have increasing application in a highly competitive marine market.

BBN Acoustic Technologies, a business unit of BBN Corporation, develops and markets innovative, cost-effective noise and vibration control solutions to government and commercial organizations. For its fiscal year ended June 30, 1995, BBN had revenue of $215 million. For more information about BBN, visit its corporate Web site at http://www.bbn.com.

For more information on BBN Acoustic Technologies
Circle 127 on Reader Service Card

NNS Names Arczynski Director Of Strategy And Business Development

Daniel L. Arczynski has been named director of Strategy and Business Development at Newport News Shipbuilding (NNS), a division of Tenneco. In this position, Mr. **Arczynski** will oversee the development of the company's annual strategic plan and identify new growth opportunities.

Mr. **Arczynski** served on active duty in the U.S. Army for 12 years. His last tour, as a major, was on the staff of the U.S. Army Training and Doctrine Command at Fort Monroe, Va.

NNS, located in Newport News, Va., is one of America's largest privately-owned shipyards. During its 110-year history, it has built almost 800 ships, including a wide range of commercial and military vessels. Tenneco is a major diversified industrial corporation based in Houston, with 1995 sales of $8.9 billion.

For more information on NNS
Circle 15 on Reader Service Card

Stone Marine Appoints Geometric Marine Its U.S. Agent

Stone Marine Canada has announced the appointment of Geometric Marine Services of Neptune Beach, Fla., as its U.S. agent. Stone Marine manufactures aluminum and manganese bronze propellers and propeller blades at its factory near Montreal. The company already supplies the U.S. Navy and hopes to expand into commercial markets in the U.S. For more information contact **John Weldon** at 810-C Third St., Neptune Beach, Fla. 32266, tel: (904) 241-2601.

Dredeco Awarded Contract For Townsville Expansion

Dredging works required for a new phase of expansion at the Australian port of Townsville are to be carried out by Dredeco Pty. Ltd. This is the fourth contract at Townsville awarded to Dredging International's (DI) Australasian subsidiary. In 1992-1993, Dredeco was awarded the contract for the deepening of the inner harbor berth areas and turning basin. In early 1994, Dredeco completed the first part of the port's outer berth area (150,000 cu. m). The second part (measuring 500,000 cu. m) was completed in September 1995. The latest contract is the largest to date, involving an additional one million cu. m of dredging and reclamation.

According to DI's Australasian Area Manager **Marc Smeesters**, "This is a significant contract award for Dredeco. Its completion in the second half of this year will mark another milestone in Townsville's dramatic growth, which is driven by expanding trades in ores, cement, commodities and other sectors."

Dredeco's third Townsville contract began in June 1995, and was completed at the end of September. Cutter suction dredger *Wombat* — which undertook the 1992-1994 contract — dredged 150,000 cu. m. in the inner harbor during this phase, combined with 500,000 cu. m. in the outer harbor.

Wombat will also be deployed for the fourth contract, which will involve dredging for the further development of the outer berth area. The award was announced at the end of February, after the signing of the Development Agreement between Townsville Port Authority and BHP Minerals Proprietary Ltd., with respect to exporting mineral concentrates from the Cannington Mine in northwest Queensland. Work is scheduled to commence this month.

New Developments At CRIS

New developments have taken place within CRIS, the credit risks

insurance plan designed to meet the debt protection and credit information needs of the international bunker industry. Risk Services Limited, established in September 1995, has taken over the management role previously conducted by Clausius Skandinavia AS, Oslo. Risk Services Ltd. is a subsidiary of MRC Business Information Group Ltd., Oxford-based international credit information specialists. CRIS has also settled its first claim, which was for $350,000. An addition to the provision of full MRC reports on all the insured's customers within CRIS has been added as a free service.

NOL To Call Shanghai Direct

Neptune Orient Lines Ltd. (NOL) has announced its commencement of a direct weekly call at Shanghai on its Japan-California Express (JCX) service. The upgraded JCX service is scheduled to begin on April 20, with the call of *California Luna* V83 at Shanghai. The new JCX service will call Shanghai in addition to the current ports of Hakata, Kobe, Nagoya, Shimizu, Tokyo, Los Angeles and Oakland. A total of five vessels will be deployed, and the roundtrip voyage will take 35 days.

New Amsterdam Tunnel On Schedule For Spring 1997 Opening

Amsterdam's Piet Hein Tunnel — reportedly the largest of its kind in the Netherlands — is on schedule for a spring 1997 opening. The tunnel is now a "walk-through" structure, and work is progressing on the installation of all internal systems and construction of associated service buildings.

The Piet Hein tunnel scheme is a $150 million project designed to relieve road congestion between Amsterdam's city center and its eastern suburbs. The 4,921-ft. (1,500-m) road and tram tunnel — named after a 17th century Dutch admiral — crosses the Amsterdam Rheincanal, linking the city with the A10 orbital motorway.

The design and build contract was awarded to the Belgian consortium CPHT (Combinatie Piet Hein Tunnel v.o.f.) in 1992. CPHT comprises the Belgian contractors CFE, Strukton De Meyer, Dredging International, Besix and Van Laere.

The tunnel is constructed of eight concrete elements, each weighing 40,000 tons. The rectangular elements — measuring 525 x 105 x 262 ft. (160 x 105 x 26.2 m) — were constructed at the Verrebroek Building Dock. Each tunnel element consists of three "tubes," allowing for two road lanes in each direction, and tram lines. Each was fitted with ballast tanks and advanced positioning equipment.

Over the course of 1996 and the first quarter of 1997, the final installation tasks are scheduled to be completed. Bouyancy will be eliminated by a 2.6-ft. (.8-m) layer of concrete on the floor of the elements. Inside the tunnel, electrical and mechanical equipment will be installed. The tunnel elements beneath the shipping channel will be covered with a layer of sand to protect the structure from potential danger.

Shell GM, U.K. Energy Official Visit AESA Yard

British Minister of Industry and Energy **Tim Eggar** and General Manager of Shell **Heinz Rothermund**, along with top mangers of Shell, have visited Astano, the offshore construction yard of Astilleros Espanoles in Ferrol, northwestern Spain.

Chairman and CEO of Astilleros Espanoles' Group Carlos **Albornoz**, Executive Vice President in charge of offshore construction Mr. **Gavito**, and General Manager of the yard Mr. **Dopico** held a meeting with the visitors to explain the evolution of Astano from a conventional shipyard into an offshore units builder and commissioner.

Also discussed were the technical characteristics of the units under construction — FPSO *Petrojarl Foinaven* for Golar Nor, to be used by British Petroleum on its Foinaven field and FPSO *Texaco Captain,* to be delivered from the yard by the end of this year, and installed in the North Sea. *Petrojarl Foinaven* is scheduled to be delivered at the end of June, and will produce its first oil on the Foinaven field in late August.

For more information on Astilleros Españoles
Circle 91 on Reader Service Card

Cenargo And Astilleros Españoles Sign For Two Ferries

British owner Cenargo International has placed an order with Astilleros Espanoles for the construction of two passenger RoRo ferries, with an option for two more. The vessels, to be built at the Astilleros Espanoles Seville yard, are scheduled to be delivered in April and July 1998. Each of the ferries will be able to accommodate 214 passengers — 114 in two-bed cabins and 100 in large armchair rooms — and 47 crew.

Design has reportedly been focused on complying with the strictest safety conditions, reportedly surpassing recent regulations approved by the International Maritime Organization (IMO) following the lessons of the *Estonia* disaster. For example, the vessels will reportedly be able to keep afloat, even in the case of fully flooded vehicle decks under full load, according to Astilleros Espanoles' standards for design and construction of passenger vessels.

For more information on Astilleros Españoles
Circle 59 on Reader Service Card

Main Particulars

Length o.a.	590.5 ft. (180 m)
Length b.p.	553.3 ft. (168.7 m)
Breadth, molded	82 ft. (25 m)
Depth, molded	49 ft. (14.9 m)
Draft	21.3 ft. (6.5 m)
DWT	6,300

Hvide To Acquire Eight Offshore Supply Vessels

Hvide Marine Inc. has entered into contracts to purchase eight offshore supply vessels. Three of the vessels and related marine assets will be purchased from Seal Fleet, Inc., of Galveston, Texas, for $6.3 million. The five remaining vessels will be purchased from affiliates of the Three R Trusts of Galveston, along with the company's shareholdings in Seal Fleet, Inc. Upon completion of this transaction, a portion of these shareholdings will be sold by Hvide to an unrelated party. Terms of the transaction with Three R Trusts were not disclosed.

J. Erik Hvide, chairman and CEO of Hvide, said, "These acquisitions, when concluded, will increase our Seabulk Offshore, Ltd. fleet to 60 vessels, positioning us as a major competitor in the offshore service vessel business in the Gulf of Mexico, and will further our goal of consolidating this energy exploration and production support industry."

Hvide Marine Inc. presently operates 91 vessels in four operating segments: coastal and harbor towing; chemical transportation; energy transportation; and offshore energy services. Based in Port Everglades, Fla., Hvide Marine's global operations cover three U.S. coasts, the Caribbean, Southeast Asia and the Middle East.

Southwest Wins $34 M Navy Repair Contract

The Navy has awarded Southwest Marine Inc. (SWM) a five-year, phased maintenance contract for repair work on three LSD class ships. Work on the first vessel, USS *Anchorage* (LSD-36), will begin in June. The entire contract goes through August 2001. The other two ships scheduled for work are USS *Fort Fisher* (LSD-40) and USS *Mount Vernon* (LSD-39). The package includes advance planning, repair and alterations on the hull and mechanical and electrical systems on each ship.

"We've been concerned about the Navy's recently announced plan for severe cuts in the ship repair budget, so this award was very good news to us. With the help of our Congressmen, **Duncan Hunter** and **Randy Cunningham**, we were able to have millions of dollars restored to the Navy's repair budget in San Diego this fiscal year," said **Herb Engle**, SWM president. All work will be performed at SWM's San Diego facility, the company's headquarters. Additional shipyards are located in San Pedro, American Samoa and Ingleside, Texas.

For more information on Southwest Marine
Circle 60 on Reader Service Card

Merwede Awards Contract To Schelde

Schelde Shipbuilding in Vlissingen, the Netherlands, has received a contract from Merwede Shipyard to build the final vessel in a series of three containerships which Merwede contracted to build for Mammoet Shipping Company. The vessel is to be delivered on December 1, 1997.

Schelde is the shipbuilding company within the maritime group of companies of Royal Schelde, which is undergoing a strategic restructuring aimed at providing a secure future for the company as a whole. Investments in new facilities at Schelde-Oost have reportedly increased its building capabilities and broadened the market in which Schelde Shipbuilding is interested.

For more information on Schelde Shipbuilding
Circle 58 on Reader Service Card

Particulars

Length o.a.	452.7 ft. (138 m)
Beam o.a.	75 ft. (22.8 m)
Draft	31.2 ft. (9.5 m)
DWT	15,700

RORO 96 Conference Programme

To be held at Lübeck Congress & Exhibition Centre, Germany on 21-22-23 May 1996

10.30 DAY ONE - Tuesday May 21

OPENING ADDRESS: *Matthias Wissmann, Minister of Transport, Federal Republic of Germany*

KEYNOTE PAPER: **The role of Ports in the Trans-European network with emphasis on the Baltic region — the European Commission's View** *Jürgen Erdmenger, Director, Directorate-General for Transport of the European Commission, Brussels*

WHAT DOES SPEED MEAN TO THE RORO INDUSTRY? - Session 1

Fast or conventional - the economics *Arnulf Hader, Senior Researcher, Institute for Shipping Economics and Logistics, Bremen*

Fast at Sea - Fast in Port but RoRo or LoLo? *Kai Levander, Senior Vice President, Kvaerner Masa-Yards, Technology, Finland*

A 40-knot wave piercing freighter for RoRo or LoLo transport *Philip Hercus, Executive Chairman, Incat Designs, Sydney*

Two fast newbuildings for Fred Olsen permitting a higher sailing frequency on their Norway - UK Continent services *Tor Erik Andreassen, Vice President - Roy Beswick, Vice President Technical, Fred Olsen & Co, Oslo*

NEW SHIP TYPES AND SERVICES - Session 2

Deepsea RoRo now and for the Future *Sverre Svenning, Project Manager, Barber Ship Management AS, Norway*

A new generation of multi-purpose car carriers capable of accommodating 700 TEU's or 3350 lane metres are under construction for Grimaldi *Angelo Cumin, Project Leader, Fincantieri, Trieste - Antonio Barbaro, Technical Manager, Grimaldi Group, Italy*

RoRo systems to improve the logistics of steel transportation *Evert Wijkander, Logistics Director, Avesta Sheffield AB, Stockholm*

Four levels of freight decks - two for trucks and two for rail wagons plus 600 passengers make a monster RoRo for the Hansa route *Bo Severed, Managing Director, SweFerry, Helsingborg*

Panellist *Erik Østergård, Manager, Business Development and Planning, DSB Ferries Ltd, Copenhagen*

NEW THINKING FOR RORO TRANSPORT AND HANDLING - Session 3

The real problem in RoRo transport is the lack of cargo securing inside the trailer *Marten Carlquist, Operations Director, Tor Line AB, Gothenburg*

CPT - Container Pallet Transfer - an automatic, high capacity ship/shore RoRo system *Björn Hansen, Managing Director, TTS Drøbak AS, Norway*

A new concept for RoRo transport *Sven-Olof Berntsson, President, Ancra ABT AB, Sweden*

THE FUTURE RORO UNIT? - Session 4

From Road to Sea - The seaworthy Swap Body *Ulrich Cramer, Managing Director, CONTEC, Germany*

What do we need for rational Door-to-Door Transport? *Paper to be confirmed, Norsk Hydro, Oslo*

Panellist *Horst Hebeler, Technical Director, EUROKAI, Hamburg*

STARTING A NEW RORO SERVICE OR ROUTE - THE PRACTICAL AND LEGAL ASPECTS - Session 5

The practicalities and tribulations of starting a RoRo service from scratch *Colin Crawford, former General Manager of Mannin Line, Great Yarmouth, UK*

EU Competition Law raises serious issues for RoRo operators *Trevor Soames, Partner, Norton Rose, Brussels*

18.30 RORO 96 WELCOME RECEPTION HOSTED BY THE HANSEATIC CITY OF LUBECK IN THE RATHAUS

09.00 DAY TWO - Wednesday May 22

RORO SHIP SURVIVABILITY - Session 6

The new survivability requirements for RoRo passenger vessels from the 1995 SOLAS conference - including regional agreements made up to May 1996 *Tom Allan, Chief Surveyor, Marine Safety Agency, UK (Member of IMO Panel of Experts)*

Safety initiatives from SNAME Ad Hoc RoRo Safety Panel *Bruce Hutchison, Panel Chairman, The Glosten Associates Inc, USA - Patrick Little, Lieutenant, US Coast Guard - Robert Tagg, Vice President, Herbert Engineering, USA - David Molyneux, Senior Research Officer, Institute for Marine Dynamics, Canada - Peter Noble, Vice President, ABS Americas, USA*

Meeting the new SOLAS regulations for RoRo ships without the need for transverse bulkheads on the vehicle decks *Ian Winkle, Department of Naval Architecture and Ocean Engineering, University of Glasgow*

Survivability tests with a damaged RoRo passenger vessels according to the new IMO - regulations and further activities planned by CONFITARMA & HSVA *R Marsano, Compagnia Sarda di Navigazione, Genoa - M Nattero, Studio Associato di Ing. Navale, Genoa - P Blume, Hamburg Ship Model Basin, Hamburg*

Cost Effective Solutions to enhance RoRo survivability - practical developments of SOLAS 90 *Dracos Vassalos and Osman Turan, Ship & Marine Technology Department, Strathclyde University, Scotland - Rolf Kjaer, Technical Director, Color Line, Norway*

New Stability Standards for New Ships - The Way Ahead *Tor E Svensen, Project Leader - Joint North West European Project, Det Norske Veritas, Norway*

FOREST PRODUCTS TRANSPORT BY RORO - Session 7

A new series of 20-knot newbuildings designed for multiple handling methods including StoRo, RoRo and LoLo containers on the upper deck *Torsten Grandell, Technical Manager, Transfennica Ltd, Helsinki*

Computerised cargo planning for forest product distribution *Peter Andersson, Naval Architect, MariTerm AB, Helsingborg*

Lashing covers for RoRo paper cargoes have replaced traditional cargo securing lashings *Johan Wik, Wisapak Oy Ab, Finland*

Ro-Ro Cassette development *Ulrich Cramer, Managing Director, CONTEC, Germany*

RORO PORT DEVELOPMENT - Session 8

Fixed link competition can stimulate short-sea ferry port development *John Gerrard, Services General Manager, Dover Harbour Board, UK*

The Ports of Lubeck - their role within Europe *Hans-Gerd Gieleßen, Managing Director, Lübecker Hafen-Gesellschaft mbH, Germany*

CAR DISTRIBUTION AND HANDLING - Session 9

Sailing with the Market *Kjell-Åke Andersson, Manager-Group Coordination & Contracting, Volvo Transport Corporation, Gothenburg*

A middle-sized Port has become a main player for the automotive industry - 550 000 new cars p.a. together with 850 000 trucks and 195 000 RoRo TEU's *Luc Maertens, Assistant Manager, Economic Study Department, Bruges-Zeebrugge Port Authority*

Logistical Strategies for securing the customer's commitment *Dietrich Hupke, Managing Director Automobile Division, BLG Bremen/Bremerhaven*

The influence of changing patterns in car distribution on port terminals *Paul Plomteux, Commercial Department, Car and RoRo, Hessenatie NV, Antwerp*

ON VIEW: THE LATEST DEVELOPMENTS IN RORO HANDLING AND SHIP DESIGN - Session 10 (outside visit)

At Skandinavienkai/Travemünde delegates will see TT's new "green" RoPax "Robin Hood" with its unique arrangement of 2400 lane metres permitting full utilisation of tanktop, maindeck and upperdeck for fast handling. Skandinavienkai has seven more RoRo berths for inspection, with 400 000m² of trailer and vehicle parking and transshipment by rail and road. Three of the berths are devoted rail terminals - including one for the world's largest rail ferry. The passenger access facilities for "Finnjet" will be seen.

Then to Nordlandkai terminal which has four RoRo berths, one being the new twin level ramp serving the world's largest combi - RoRo "FinnPartner". It has 3200 lane metres handling roll trailers and roll cassettes. Delegates will be able to study at first hand the most advanced RoRo cassette handling of paper products and their storage and warehousing, together with general and unitised cargo.

19.30 - RORO 96 GALA EVENING RECEPTION

09.30 DAY THREE - Thursday May 23

RORO SHIP DESIGN FEATURES - Session 11

Bow loads on RoRo ships *Jan Lundgren, Project Manager, SSPA Maritime Consulting AB, Gothenburg*

RoRo ship bow door design: first principle analysis of wave loads and strength *Carsten Ostergaard, Head of Basic Research Department - Helge Rathje, Hydrodynamics & Structural Mechanics - Pierre Sames, Hydrodynamics & Numerical Methods, Germanischer Lloyd, Hamburg*

New solutions for improved gas turbine efficiency *David Nordlander, Sales Manager, ABB Stal, Sweden*

Fire Safety: active cooling versus passive insulation *Otto M Weiler, Naval Architect, Mardoc BV - Jan ter Haar, Salvage Inspector, Smit Tak BV - Jos Lems, Marketing Manager, Pyro Cool Safety Products BV*

Increased safety and payload achieved by in-service stability measurement *Horst Halden, Managing Director, Intering GmbH, Germany*

TERMINAL DESIGN AND PORT PLANNING FOR RORO - Session 12

Combined RoPax terminals - recent experience and recommendations *Richard Marks, Associate, Posford Duvivier, UK*

Port planning with particular reference to the RoRo mode in the Baltic trades *Rainer Ebert, Harbour Planning Engineer - Falk Ohlig, Marketing Manager, Lübecker Hafen GmbH, Germany*

The new large fast ferries have made new demands on linkspan design - can they be met? *John Rose, Managing Director, Marine Development, Scotland*

Transition of a newsprint receiving facility into a premier roll-on/roll-off handling facility *Nigel Nixon, Chairman, Nigel Nixon & Partners, UK*

"GREEN" RORO SHIPS - Session 13

$SINO_x$ - Catalysts on TT-Line RoRo for a more economical and cleaner mode of operation *Frank Witzel, Manager Research & Development - Raimund Müller, Manager Engineering - Wieland Mathes, Manager $SINO_x$ - Systems and Plants - Jurgen Zurbig, Deputy Director and Head of Catalytic Systems, Siemens AG, Germany*

Reducing Emissions from RoRo ship propulsion machinery *Wolfram Lausch, VP Marketing, Medium-Speed Engines Department, MAN B&W Diesel AG, Augsburg*

RORO AND THE ISM CODE - Session 14

Emergency Preparedness for RoRo Ships *Martin Brooking, Head of Emergency Technology Group, Lloyd's Register of Shipping, London*

RoRo Safety with special reference to the new Chapter IX of SOLAS '74' 90 *Gianni Faraguna, Head of Safety Department, Adriatica di Navigazione, Venice*

Operational Legislation, Safety Management and the ISM Code *Speaker to be advised: ABS Europe, London*

The Legal consequences for owners and operators of the introduction of the ISM Code *Roger Heward, Partner, Norton Rose, London*

13.00 Conference ends

16.00 Exhibition closes

For the full conference programme and registration details, please fax or phone:
RoRo Secretariat, 2 Station Road, Rickmansworth, Herts, WD3 1QP, UK Tel: +44 1923 776363 Fax: +44 1923 777206

Circle 210 on Reader Service Card

USCG Awards Bollinger Contract For First Coastal Patrol Boats

The U.S. Coast Guard (USCG) has awarded an $8.9 million contract to Bollinger Shipyards, Inc. of Lockport, La., to design and construct an 87-ft. (26.5-m) coastal patrol boat. The initial contract award includes the design and construction of a lead ship with options for up to 50 additional cutters. According to the shipyard, the contract will create approximately 100 new jobs. Bollinger constructed forty-nine 110-ft. (33.5-m) Island class cutters between October 1984 and March 1992.

The new coastal patrol boat will be the first of an expected 31 to 51 cutters, and will be named *Condor*. This marks the construction of a new cutter class to replace the 82-ft. (25-m) Point class cutters currently in service.

For more information on Bollinger
Circle 83 on Reader Service Card

USCG Targets Repeat Offenders Under Foreign Shipboarding Program

The U.S. Coast Guard (USCG) has released its 1996 list of target-

ed flag states, in conjunction with its Port State Control Initiative. The goal of the initiative is to focus USCG shipboarding resources on those parties most likely to be operating substandard ships which, by nature of their condition, pose an increased risk to crew safety, the marine environment and ports. The updated list names those flag states whose registered ships had a higher than average history of Port State Control detention over the past three years, while operating in U.S. waters.

Eleven flag states have been added to the 1996 list: Cape Verde Islands; Peru; Algeria; Kuwait; Myanmar; Marshall Islands; Lithuania; Mexico; Antigua & Barbuda; China; and Brazil. In addition, some flag states have improved their performances by being associated with fewer than average Port State Control detentions, and have been removed from the 1996 list, namely: Argentina; Colombia; Dominican Republic; and the Bahamas.

Following is the complete 1996 list:

Algeria	Malta
Antigua & Barbuda	Marshall Islands
Belize	Mexico
Brazil	Myanmar (Burma)
Cape Verde Islands	Panama
China	Peru
Cyprus	Romania
Honduras	Russia
India	St. Vincent & The Grenadines
Italy	Turkey
Kuwait	Ukraine
Lithuania	Venezuela

Nichols Research Announces Intent To Acquire Advanced Marine

Chris H. Horgen, CEO of Nichols Research Corporation (NRC), announced that NRC has signed a Letter of Intent to acquire Advanced Marine Enterprises, Inc. (AME), with headquarters in Arlington, Va., and additional facilities in Cherry Hill, N.J.; Fulton, Md.; and Memphis, Tenn.

AME is one of the nation's leading naval architectural and marine engineering service firms. In addition, the company provides support in ship acquisition management, production support, human systems integration and ship survivability and protection. "This acquisition is another step in NRC's strategy to develop a broad-based technical services segment, managed from Washington, D.C.," said Mr. **Horgen**.

Founded in 1976, AME had revenues of $29.1 million in FY 1995, and currently employs more than 300 people. Approximately 90 percent of AME's business is defense related, and 10 percent is in the commercial marine simulator business. The company's primary business areas are ship design and engineering, and information technology services.

NNS Awards Contract To Jamestown Metal

Jamestown Metal Marine Sales has been awarded a major contract by Newport News Shipbuilding (NNS). Jamestown Metal will be providing the complete deckhouse package, including piping, ventilation, electrical and joiner work, for five additional product carriers for owner Hvide Van Ommeren Tankers of Ft. Lauderdale, Fla.

The five new Double Eagle Van Ommeren tankers will measure 620 x 105 ft. (189 x 32 m), with a service speed of 16 knots and a weight of 45,300 dwt. Construction will commence in 1997, for a late 1998 delivery.

This award is in addition to the current work Jamestown Metal is performing at the NNS facility on four Double Eagle tanker deckhouses owned by Eletson.

For more information on
Jamestown Metal Marine Sales
Circle 61 on Reader Service Card

U.S. Flag Cruise-To-Nowhere Vessel Headed To Florida

Bender Shipbuilding & Repair Co., Inc., Mobile, Ala., has contracted with Atlantic Cruise Lines, Inc. to deliver 450-ft. (137.2-m) U.S.-flagged entertainment vessel M/V *Latin Quarter* for operation in southwest Florida's cruise-to-nowhere trade.

Latin Quarter is the first vessel owned by Atlantic Cruise Lines, Inc. of Florida. The company has wide ranging plans for future growth, including the addition of several similar entertainment vessels that will operate from selected U.S. ports in the cruise-to-nowhere trade.

"We hope to operate out of Port Everglades because we will have the only five-star cruise-to-nowhere outfit in Florida," said Atlantic's spokesman **William D. San Hamel**. "We consider Port Everglades to be the nation's pre-eminent cruise port, home base to many of the world's leading luxury cruise ships. Because of our five-star status, *Latin Quarter* belongs with the premier cruise ships. We expect to bring credit to Port Everglades."

Guido Perla & Associates has been named *Latin Quarter*'s naval architect. Paul Steelman Architects of Las Vegas will create the interior design using an art-deco theme. Delivery of the vessel is expected in December 1996.

For more information on Bender Circle 62 on Reader Service Card

COMSAT Offers Communications Concession To Cruise Lines

COMSAT Mobile Investments has announced the launching of a program under which cruise lines can reportedly expand their telecommunications facilities while turning the radio room into a profit center. Communications Concession is a turnkey program in which COMSAT creates and administers a total maritime telecommunications service package for cruise ships. This includes hiring personnel, purchasing new equipment, passenger call accounting, providing satellite services for ship business and all other aspects of radio room operations.

Together, the cruise line and COMSAT will evaluate current communications equipment on ships to decide what combination of technologies are most highly suited to ships' requirements, while maximizing revenues and business efficiency. COMSAT provides the additional capital required for the new equipment, and is also responsible for maintenance and repairs. The cruise line does not have to make capital investment for new equipment.

COMSAT reportedly hires a qualified GMDSS-certified radio crew for each ship. COMSAT trains the radio officers in Inmarsat A,B,C and M systems, as well as specialized credit billing services and onboard accounting systems.

Initial trials of the Communications Concession took place on several Cunard ships, according to **Kathryn Y. Holman**, vice president of sales, COMSAT Mobile Communications. It was first instituted on *Sea Goddess I* in October 1994. Shortly after, *Royal Viking Sun*, *Vistafjord*, *Sagafjord*, and *Sea Goddess II* added the Communications Concession to their portfolios.

For more information on COMSAT Circle 63 on Reader Service Card


135 Foot Crew Utility Boat


241 Foot Tow Boat


82 Foot Extra Fast Patrol Boat


220 Foot Supply Boat


200 Foot, 10,000 BBL Tank Barge


467 Foot Double Hull Tank Barge/127 Foot Tug


208 Foot Oil Recovery Ship

Need A Vessel?

140 Foot Tug


97 Foot Motoryacht

189 Foot Casino/Excursion Boat


273 Foot Oceanographic Ship

Trinity's Probably Already Designed And Built It.

Since the 1800's, our 13 shipyards have designed and built over 14,000 ships, boats, and barges. Name the type of vessel you need, and we've probably already designed and built many. You can use one of our designs, modify one, or let us design to your specifications. And we meet the requirements of worldwide regulatory agencies.

We employ leading edge technology in design and construction, and are backed by the financial strength and stability of our parent company, Trinity Industries, Inc., a "Fortune 500" company.

Because of our high quality and on-time deliveries, we have built vessels for 27 foreign nations, scores of private customers, and the U.S. Navy, Army, Air Force and Coast Guard. We also have five dry docks for ship repair, overhaul and conversion.

No other shipbuilder can match Trinity's experience in building such a wide variety of vessels in steel, aluminum and GRP. We can, and want to build your next vessel.

TRINITY MARINE GROUP

Trinity Industries, Inc.

13085 Industrial Seaway Road, Gulfport, MS 39503 USA
Tel: 601-896-0029, Fax: 601-897-4828, Telex: 6821246, Cable: HALMAR, Easylink: 62218740

Circle 294 on Reader Service Card

Royal Caribbean Takes Delivery Of *Splendour Of The Seas*

In a special ceremony at Chantiers de l'Atlantique shipyard in St. Nazaire, France, Royal Caribbean Cruise Lines' Chairman and CEO **Richard Fain** accepted delivery of the company's newest cruise ship — the 1,800-passenger, 69,130-ton *Splendour of the Seas*. The ship began its inaugural summer season of 12-night cruises to the British Isles, Mediterranean, Scandinavia and Russia on March 31. On November 1, she will cross the Atlantic for a winter season of seven-night cruises to the southern Caribbean from San Juan.

Royal Caribbean is one of the world's largest cruise lines and operates 10 modern ships with a total capacity of 16,800 passengers. *Splendour of the Seas* is the first of five ships to be introduced by Royal Caribbean over the next two years. These ships will offer a combined total capacity of 7,900 passengers. The vessels of the fleet offer passengers 54 itineraries and 134 destinations in the Caribbean, the Bahamas, Bermuda, Mexico, Alaska, Europe, Scandinavia, Russia, Hawaii and the Far East.

Maine Excursion Operator Orders Second High-Speed Whale Watcher

Less than two years after Gladding-Hearn Shipbuilding, The Duclos Corp., delivered its first high-speed, whalewatching vessel to Bar Harbor Whale Watch Co. for service in the Gulf of Maine, the vessel's owner has ordered another vessel from the Somerset, Mass., shipyard. The 112-ft. (34.1-m) aluminum catamaran, designed by Incat Designs of Sydney, Australia, is scheduled for delivery in May.

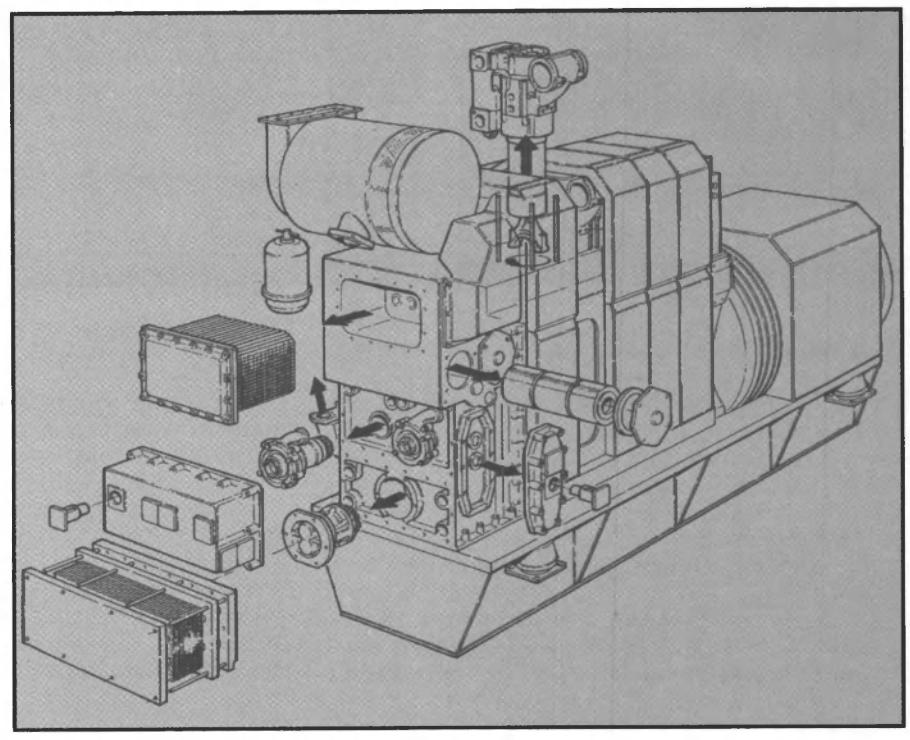
According to shipyard President **George Duclos**, the new 350-passenger catamaran, *Friendship V*, has more than twice the passenger capacity of *Friendship IV*, which has been sold to Florida Cruise & Ferry Service, Naples, Fla., for year-round excursion service to Key West. The flybridge deck has open seating for an additional 123 passengers, and a dedicated naturalist viewing station, enclosed in glass and equipped with telephone service to the wheelhouse and a wireless microphone to the public address system. Passengers can reportedly view whales from the vessel's three decks, bow pulpits, wide walkaround sidedecks and three-tiered grandstand located in the front of the main cabin.

The boat is powered by four 12V-92TA DDEC Detroit Diesel engines, turning Hamilton HM461 waterjets through Reintjes gears. Each engine produces 815 bhp at 2,100 rpm. The vessel is designed for 28 to 35-knot speeds.

For more information on Gladding-Hearn
Circle 57 on Reader Service Card

MAN B&W HOLEBY

L16/24 Genset Wins Design Prize



The MAN B&W Diesel Holeby genset type L16/24 recently won a 1996 Industrial Design Prize. The ID Prize is awarded in recognition of good industrial design.

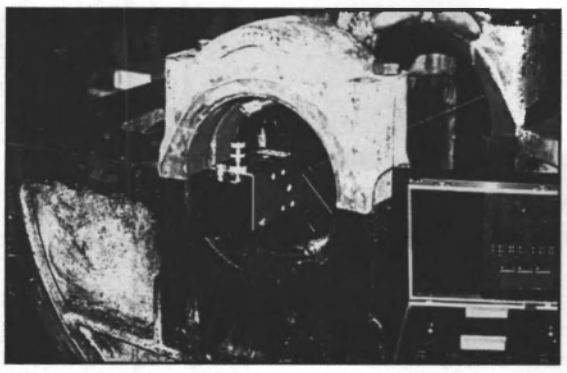
The L16/24 was introduced in September 1995. It was designed to provide better soundproofing, easier cleaning, easier maintenance, better fire protection, a better work environment, and greater flexibility. To make the unit easier to maintain, a modular maintenance design approach was taken. All support elements, such as filters, coolers and thermostatic valves, are designed to be removed easily, due to the clip-on/clip-off principle, and to the incorporation of piping channels within the engine structure, rather than external mounting. The cylinder unit concept is designed to offer other benefits. Overhauling is designed to be carried out easily and swiftly on the basis of recycling, minimizing the genset shutdown period. MAN B&W reports that recycling makes it possible for the complete cylinder unit to be removed in one step and replaced with a new unit, allowing the overhaul to be performed onboard ship, or ashore by the owner or the manufacturer.

The engine controls its own operating conditions through the automatically controlled cooling water system, which is a single-string system with only one inlet and one outlet to the external system. The system is equipped with pumps and thermostatic valves for both high and low temperature circuits, to ensure that both circuits will always have optimal temperature conditions. In addition, a valve regulating the charge air temperature is installed. If the loading is below 40 percent, the charge air temperature will increase to a level yielding the best combustion condition. The valve regulates the low temperature, not as an on/off function, but by constantly adjusting to the load level.

The engine's automatic control equipment is arranged for compatibility with MAN B&W Diesel's CoCos system, which facilitates engine diagnosis and optimized planning of overhauls. On top of these performance demands, the designers sought to reduce the number of components by 40 percent.

For more information on the L16/24 Circle 52 on Reader Service Card

Fixturlaser Introduces Measurement System



Fixturlaser AB has introduced a measurement system for measuring and aligning bearing journals in larger diesel engines, propeller shaft installations and similar applications. The measurement system is based on technology which includes visible laser light, and provides a resolution of .001 mm/m of the measured value.

The system includes a laser transmitter, a position sensitive detector, a display unit and a set of fixtures for measurement of bore diameters from 150 to 550 mm. Storage, processing, printing and transfer of measurement values to existing databases from a PC are reportedly possible with an optional A/D converter. The system is targeted at manufacturers of engines, engine workshops, shipyards and companies in mobile machining.

For more information on Fixturlaser
Circle 16 on Reader Service Card

Steel Distributor Expands Product Line

Denman & Davis, a steel service center company and East Coast steel distribution organizer, offers customers carbon, alloy and stainless bars in small quantities.

The company has invested in two plate saws, enabling itself to expand its product line and services. "The plate saws open up new bar markets while allowing us to serve our present clients better," said **Dave Deinzer**,company president. "The saws' productivity allows us to be responsive to our largest customers' needs for delivery of special-sized stainless and alloy bars, in the exact quantity they need."

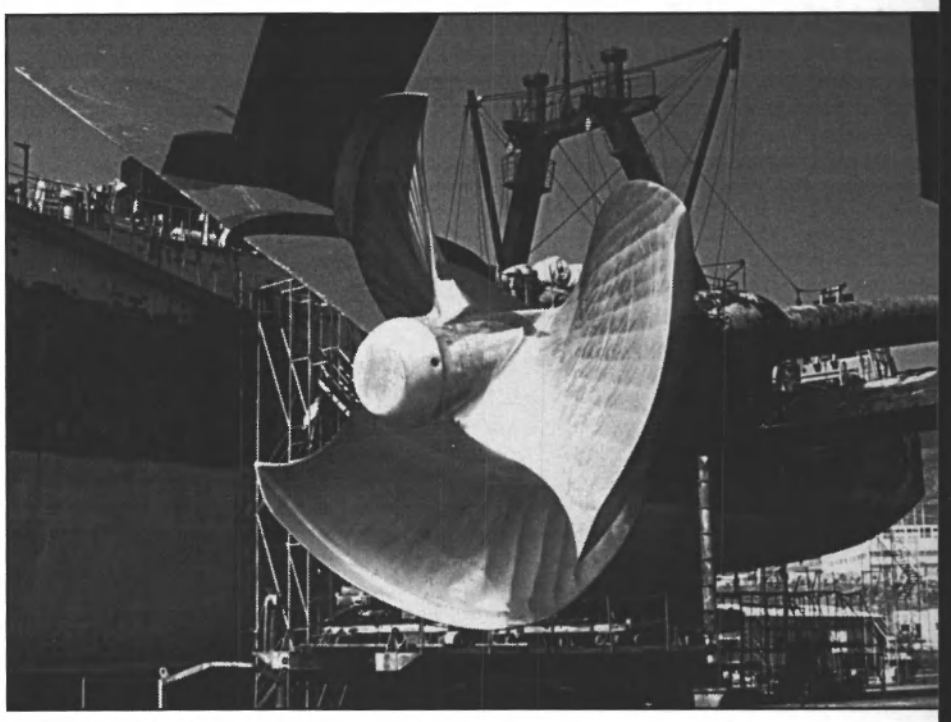
He said that the quality of the cuts is well within standard bar tolerances and ISO 9002 standards.

Denman & Davis can now supply steel bars in sizes and quantities that are usually only available in mill run quantities, due to its investment in two plate saws for its Albany, N.Y., metals service center.

For more information on
Denman & Davis
Circle 17 on Reader Service Card

Sistemar Extends Range Of CLT Propeller Applications

Recent orders for CLT propellers for a Capesize bulk carrier and a 98.4-ft. (30-m) hydrofoil effectively demonstrate the range of vessels which benefit from Sistemar's high-efficiency propellers. The manufacturer also reported that at the end of February, successful results had been achieved with a pair of 3.3-ft. (1-m) diameter, three-bladed CLT propellers fitted to a Trasmediterranea hydrofoil *Barracuda*. The vessel has a 34-knot service speed, and each propeller is driven at a nominal 986 rpm by a 2,100-bhp main engine. Trasmediterranea operates four hydrofoils, and sought to improve their performance by reducing main engine overloading during take-off, and the length of the acceleration period. Tests reportedly show that the new CLT propellers have helped meet that challenge, and Trasmediterranea has confirmed its intention to order CLT propellers for the remaining hydrofoils in its fleet.

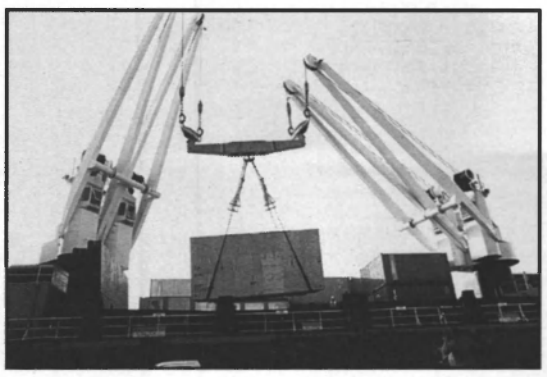


Last month, a 26-ft. (7.9-m)-diameter CLT propeller was delivered for *Comanche*, Cargill International's second 160,000-dwt bulk carrier, which is under construction at AESA's Puerto Real Yard. The 37.6-ton propeller was manufactured by Navalips at its Cadiz works. Cargill has experience with Sistemar's CLT propellers, having fitted a 16-ft. (4.8-m), five-bladed version on its 13,600-dwt orange juice carrier *Bebedouro*. The propeller was replaced to reduce propeller-excited vibration levels, but a fuel savings of nine percent (shown during tests last July) was an added bonus.

For more information from Sistemar
Circle 53 on Reader Service Card

Trasmediterranea's hydrofoil *Barracuda* features CLT propellers from Sistemar.

South Soos Brings Project Cargo To New Zealand



South Seas Steamship Co. marries double cranes for a single lift of power equipment headed for New Zealand.

South Seas Steamship Co. has been transporting geothermal powerplant components on *Moana Pacific* from Long Beach, Calif., to Auckland, New Zealand. The components were shipped to New Zealand's North Island as part of a series of project cargo for New Plymouth. South Seas currently calls the Pacific Islands direct from Seattle, Wash.; Coos Bay, Ore.; the San Francisco Bay Area; and Long Beach, Calif. South Seas' multi-purpose vessels are reportedly equipped to handle dry, refrigerated breakbulk and heavylift cargo.

Damon Delivers *Anglian Man* To Klyne Tugs

Anglian Man, a tug delivered from Damen Shipyards to Klyne Tugs Lowestoft Ltd. of Lowestoft, U.K., in February, is a Damen standard type Stan Tug 1906, with a length of 64 ft. (19.5 m), a beam of 20 ft. (6 m) and a depth of 9 ft. (2.7 m). The vessel is designed to be suitable for towing and berthing, in addition to being equipped with a sternroll for anchor handling and a dredging plough. A Kraaijeveld winch is fitted on the aft deck, which can be used to handle the plough, and also as a towing and anchor handling winch. Further towing gear consists of a 25-ton SWL Manpaey towing hook, connected to the double pole towing bitt. For pushing, a single pushbow is fitted. For the plough dredge, an easily removable A-frame is fitted at the stern. During the plough dredging, the tow lines of the plough are connected to the amidship's bollards.

An Effer hydraulic deck crane, with a safe

Pictured is Damen tug *Anglian Man*.

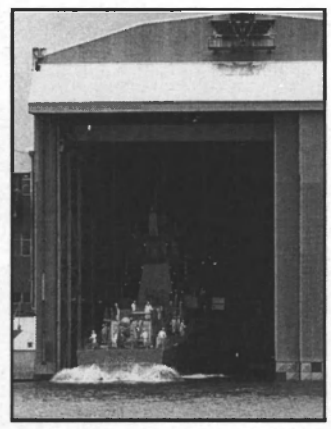
working load of .45 tons at 31.2 ft. (9.5 m), is also available as a sternroll of 30-tons SWL, which can be used for anchor handling. Two Caterpillar 3412 TA diesel engines are fitted for propulsion, each with an output of 500 kW (671 hp) at 1,800 rpm, and driving a three-blade propeller through a Reintjes reverse/reduction gearbox. Free running speed at the trials was 10.9 knots, and the bollard pull was 7.5 tons. A Lister CRK 3 engine driving a Stamford generator for 27.5 KVA makes up the generator set.

The nautical and communications equipment in the wheelhouse consists of: a Furuno FR-8050 radar; a Robertson AP-45 autopilot; a Furuno GP-70 MK2 GPS navigator; a Furuno FE-606 echosounder; a Furuno NX-500 Navtex receiver; and two Sailor RT 2048 VHF radios. *Anglian Man* is classified by Lloyd's Register of Shipping with the notation +100 A1 Specified Coastal Service LMC, and the tug complies with MSA regulations for class IX vessels.

For more information on Damen
Circle 18 on Reader Service Card

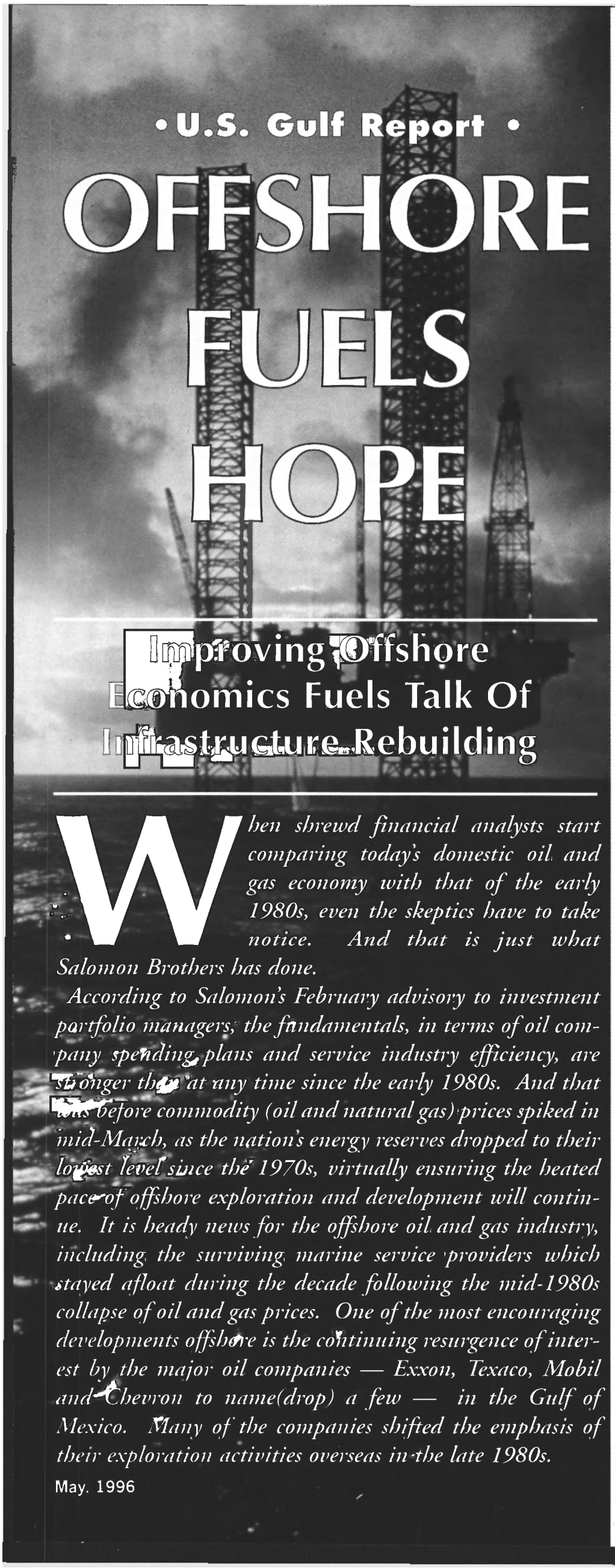
VT Launches Latest Qatar Emiri Navy Strike Craft

Vosper Thornycroft (VT) has launched the third of four fast strike craft for the Qatar Emiri Navy at its Southampton shipyard. The 184-ft. (56-m) vessel was named *Qens Al Udeid* in a ceremony performed by Brigadier General **Said Al Sowaidi**, commander of the Qatar Emiri Naval Forces. *Qens Al Udeid* is part of a class which will reportedly rank among the most advanced and powerful vessels of their type in the world when they enter service. The first two of the class, *Qens Barzan* and *Qens Huwar*, are scheduled to be delivered later this year. The Qatar Emiri Navy strike craft is another example of VT's family of warships which extends from patrol boats to strike craft, corvettes, frigates and minehunters. In addition to the shipbuilding contract, VT will be providing the Qatar Emiri Navy with extensive integrated logistics support including ship documentation, through-life support and training. VT is also supplying a new advanced Machinery Control and Surveillance System.



Qens Al Udeid is shown being launched from VT's Woolston, Southampton, shipyard.

For more information on Vosper Thornycroft
Circle 37 on Reader Service Card



• U.S. Gulf Report •

OFFSHORE FUELS HOPE

Improving Offshore Economics Fuels Talk Of Infrastructure Rebuilding

When shrewd financial analysts start comparing today's domestic oil and gas economy with that of the early 1980s, even the skeptics have to take notice. And that is just what Salomon Brothers has done.

According to Salomon's February advisory to investment portfolio managers, the fundamentals, in terms of oil company spending plans and service industry efficiency, are stronger than at any time since the early 1980s. And that was before commodity (oil and natural gas) prices spiked in mid-March, as the nation's energy reserves dropped to their lowest level since the 1970s, virtually ensuring the heated pace of offshore exploration and development will continue. It is heady news for the offshore oil and gas industry, including the surviving marine service providers which stayed afloat during the decade following the mid-1980s collapse of oil and gas prices. One of the most encouraging developments offshore is the continuing resurgence of interest by the major oil companies — Exxon, Texaco, Mobil and Chevron to name(drop) a few — in the Gulf of Mexico. Many of the companies shifted the emphasis of their exploration activities overseas in the late 1980s.

Their return to the Gulf is widely attributed to improved seismic and drilling technologies, making it easier to find and produce oil and gas beneath salt domes and in deeper water. **Steve Kenny**, construction manger with Cliffs Drilling Company, a provider of mobile drilling rigs, said there also may be other reasons.

"There is the hassle factor, the complications oil companies have run up against in overseas operations — political instability, lack of infrastructure and so on — which make doing business in the Gulf more appealing, in spite of environmental regulations and liabilities which contributed to their pulling out," said Mr. **Kenny**. In recent years, his company has seen its customer base heavily weighted toward independent operators, once again growing to include major players.

An issue which has been simmering on the back burner for years is now coming to a boil. Virtually every viable drilling rig and supply vessel in the Gulf is spoken for. Utilization rates are 85 percent for rigs, and 95 percent for workboats — the vast majority of which are well past the age at which they were originally expected to be replaced. Construction of offshore hardware has been at a standstill for more than a decade. Add to that the growing success of deep water (1,000 to 7,000 ft.) exploration, which requires new-generation equipment capabilities, and the question remains: who is going to start the rebuilding and when?

Rigs

Of the two prevalent types of rigs operating in the Gulf — jack-ups and semisubmersibles — there are currently 164, of which 137 are under contract — more than at any time since 1986. At the peak of the offshore boom in 1984, 178 rigs were working, as compared with the 1992 figure of 86.

The significance of the "rig count" is that drilling is the engine which drives the offshore services industry of workboats, production platform fabrications and installation and pipelining. Vessel utilization generally responds quickly to the pace of drilling while offshore construction tends to lag two to three years behind, as new reserves are found and evaluated.

"The average age of the Gulf rig fleet is about 20 years," said **Kevin College**, production manager of HAM/PMB Shipyards at Pascagoula, Miss. "However, their working lives can be extended and capability increased considerably at a fraction of the cost of newbuilding — perhaps $70 to $100 million to upgrade a semi from 1,500 to 4,000-ft. (457.2 to 1,219.2-m) depth capability, compared with $300 million for a comparable new rig.

"Replicating the workhorse jack-up rigs capable of working in water depths of 100 to 300 ft. (30.5 to 91.4 m), which make up about 80 percent of the fleet, would cost in the range of $70 to $100 million," he added.

The Le Tourneau yard at Vicksburg, Miss., which built an estimated one third of the jack-ups currently at work when it

(Continued on page 52)

E.N. Bisso & Son Christens Two Trinity Tugs

Two Trinity Marine-built high-hp river/ocean tugs, *Jackie B.* and *Dee White*, built for E.N. Bisso & Son, Inc., New Orleans, were christened on March 23. The *Jackie B.* and *Dee White* were built at Trinity Marine Group's Halter Marine, Inc. in Lockport, La., and have been working since their delivery in October and November 1995, respectively. The new tugs are being used primarily to assist larger ships using the Port of New Orleans and other ports.

Jackie B. is 110 ft. (33.5 m) in length, and *Dee White* is 118 ft. (36 m) long. Both have a 34-ft. (10.4-m) beam, a 15 ft. (4.6 m) operating draft, and are powered by two GM-EMD16-645E2 remanufactured diesel engines developing 2,000 hp each at 900 rpm. They drive 126 x 87-in. stainless steel propellers through Haley reverse/reduction gears. Electrical and ships service power in each tug is produced by two 75-kW Kato generators driven by two Detroit Diesel 7-71 engines.

Both tugs have heavy anchor handling and towing gear, and both are equipped with an International double-drum towing winch with 2,400 ft. (731.5 m) of two-in. wire rope. The winches are driven by Detroit Diesel 6-71 engines. Anchor windlasses, tow pins and stern rollers were supplied by Fritz Culver.

Jackie B. and *Dee White* have semi-hydraulic steering systems with five control stations: the pilothouse; port and starboard wings; at the top of the upper deck house; and in the engine room. The tugs are also equipped with 57-sq.-in. rudders on 13-in. diameter stocks with built-up stainless steel liners.

The vessels' pilothouses are equipped with advanced navigation and communications equipment including two Furuno 48-mi. radars, two Furuno GPSs, two SEA VHF radios, a SEA SSB radio, two Datamarine depth sounders and a Sperry gyrocompass. Each tug is also equipped with a Sperry ADG 3000 VT autopilot with automatic track control, radius of turn control and a rate of turn control.

For more information on Trintiy
Circle 51 on Reader Service Card

Pictured are *Jackie B.* and *Dee White*, two Trinity Marine-built high-hp river/ocean tugs, built for E.N. Bisso & Son, Inc.

Floating Production Systems

A Burgeoning Business Opportunity For Shipbuilders

by James R. McCaul, president, IMA Associates, Inc.

Construction and conversion of FPSO vessels and other floating production systems is one of the most dynamic market sectors available to shipbuilders and ship conversion yards. IMA has just completed an in-depth analysis of this business sector, and the findings indicate a market which should be of interest to virtually all shipbuilders and most equipment suppliers.

Growing Role Of Floating Production

Floating systems can be economically utilized in fields to 2,000 meters water depth, or be deployed in marginal fields with reserves of 30 million barrels (or less). They offer the advantage of minimizing time to first oil and reducing cost of field abandonment. It is not surprising that demand for new floaters is burgeoning and floating production technology is one of the hottest topics in the offshore industry.

$10 - $16 Billion Construction And Conversion Market

About 60 floating production systems are operating worldwide in offshore oil fields. Another 27 are currently on order, representing a contract value of $7.2 billion. More important, 90 new floating production projects are at various stages of development, and acquisition of additional floaters for these projects will generate capital expenditures of $10 to 16 billion.

Rapidly Evolving Technology

Floating offshore production is a rapidly evolving industry. Many changes in technology and operations have recently taken place, and many more are in the conceptual design or engineering phase. Some of the more promising developments on the horizon are:

- high capacity, pipeline capable FPSO vessels
- multi-purpose shuttle/production tankers
- fifth generation drill/production rigs
- gas conversion or liquefaction barges
- conversion of flotels to production semisubmersibles
- more economical tension leg platform designs
- mini tension leg platforms
- unmanned wellhead TLPs
- triangular TLPs
- tension raft jackets
- improved capability of subsea boosting systems.

Companies Active In Floating System Construction

This market sector has attracted a variety of builders, system suppliers, design firms and installation contractors. While FPSO construction is a small market relative to the 150 to 175 tankers built annually, the sector has attracted considerable attention among world shipbuilders. Eighteen builders have been actively involved in recent fabrication contracts for FPSO vessels. Among them are:

- **AESA Astano:** This northern Spanish shipbuilder has been one of the more active players in FPSO construction. Astano is currently performing the major conversion of

Tomasos Brothers Receives *Sirius I*

Astilleros Españoles-built tanker constructed in 18 months

The first oil product carrier designed and built in Europe according to Lloyd's Register (LR) ShipRight procedures was recently delivered. The *Sirius I* is a 46,500-dwt, double-hulled oil and product carrier built for non-restricted service in world traffic.

She is powered by a 6.S50 MC MAN B&W diesel engine rated 11,640 bhp at 127 rpm. This arrangement enables a speed of 14.8 knots, fully loaded at 90 percent MCR.

Built by Astilleros Espanoles for Tomasos Brothers, the vessel measures 599 ft. (182.5 m) overall, with a 568-ft. (173-m) length between perpendiculars, a 106-ft. (32.2-m) breadth, a 58-ft. (17.8-m) depth, and a 40-ft. (12.25-m) scantling draft. Flying the Bahamian flag, the ship is owned by Emerald Star Shipping.

Eight cargo tanks, plus two slop tanks give a total capacity of 53,200-cu.-m. Every cargo and slop tank has its own submerged pump, permitting the cargo to be unloaded in 15 hours. Cargo and slop tanks are coated with a Phenolic Coating Scheme, allowing the ship to carry clean products such as MTBE and Pentane, for example.

Sirius I has obtained notation SDA, FDA and CM of LR. ShipRight procedures guarantee that standards of safety, quality and reliability are applied during the design, construction and operating life of a ship's hull. ShipRight comprises eight procedures and the notations it carries in the Register of Ships are proof of both owner and builder commitment to the ongoing care and safety of the ship.

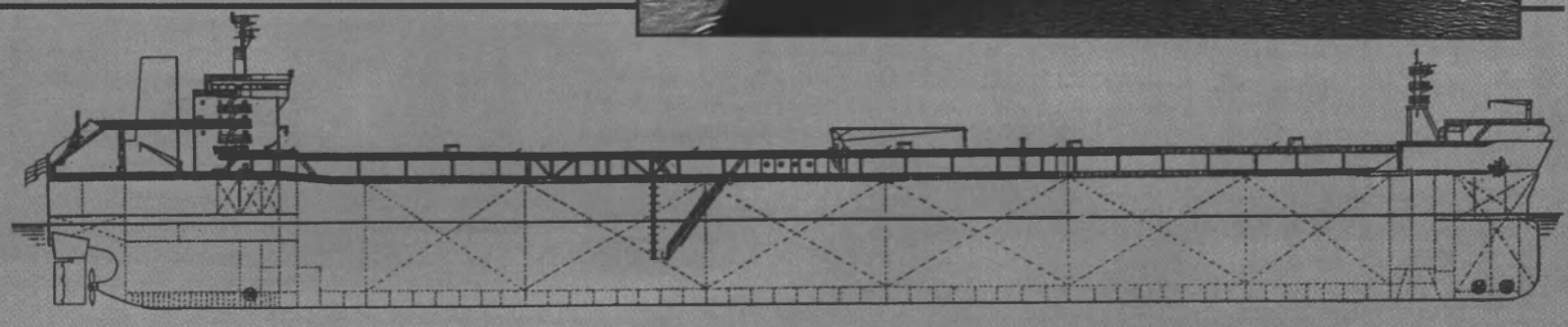
Structural Design Assessment (SDA) is a detailed analysis of a ship's structural response to applied static and dynamic loadings. This mandatory procedure enables the derivation of an optimum distribution of material, and also an appropriate level of scantlings in both primary and secondary structures. It is applied, in addition to the normal plan approval requirement, to the structural arrangement of all new oil tankers over 190 m, and to other ships where the ship type, size and structural configuration demand it.

Fatigue Design Assessment (FDA) is supported by an enhanced direct calculation methodology using several data, i.e. sheer against the reversals to failure, supplemented with large scale models of actual ship structural details. In using FDA, a ship designer or plan approval surveyor can reportedly easily modify the scantlings and arrangements in order to improve the fatigue life.

Construction Monitoring (CM) is to ensure that all recommendations and specifications arising from the SDA and FDA procedures are consolidated and implemented during construction.

It is undertaken in addition to the usual surveying tasks carried out during construction and comprises careful controls on the alignment, fit-up and welding of the structural details identified as being critical.

For more information from Astilleros Espanoles Circle 97 on Reader Service Card



Sirius I is the first oil product carrier designed and built in Europe according to Lloyd's Register (LR) ShipRight. The 46,500-dwt, double-hulled oil and product carrier was built by Astilleros Espanoles.

the *Petrojarl Foinaven* and is building the FPSO vessel for the Captain field. In 1993, Astano delivered *Gyphon A*.

• **AESA Cadiz:** The southern Spanish shipyard has been another major player in FPSO work. The yard is currently converting *Cairu* for use as an FPSO vessel in Brazil's Marlim field. Cadiz also converted the *Uisge Gorm* to an FPSO vessel for the Fife field.

• **FELS:** A long-time major player in rig construction, this Singaporean yard has established a very active presence in floating production fabrication. The yard is currently finishing the *SPU 380*, an FPSO vessel speculatively ordered by Smedvig that has been sold to Esso Norge for use in the Balder field. FELS is also building two FPSO vessels for Statoil and Saga, one for the Norne field, the other for the Varg field.

While there is some overlap with ship shape builders, a different set of players is generally involved in fabricating semi-submersible, TLP, spar and barge production systems. For example, some of the players are:

• **Aker:** The Norwegian company fabricated topsides for the Snorre TLP, constructed the concrete hull for the Heidrun TLP and is currently building the production semi-submersible hull for the Njord field.

• **Fincantieri:** The production semisubmersible, *Spirit of Columbus*, has been built by this Italian yard. The unit has not yet found employment.

• **Kvaerner:** This Norwegian company built the Troll Olje production semi-submersible hull. Kvaerner has been actively promoting designs for a production ship and a variety of floating semi-submersibles, TLPs and production spars constructed of concrete.

The turret mooring system in an FPSO is a major component of total capital expenditure. There are a number of companies active in supplying this equipment, including:

• **Single Buoy Moorings (SBM):** This Swiss company has delivered more than three dozen mooring systems for FPSOs or FSOs. It is currently contracted to supply the turret mooring for the Guillemot/Teal FPSO and is working with Saipem on the conversion of *Agip Firenze*. SBM is a subsidiary of the Dutch parent company IHC Caland.

• **IMODCO:** This U.S. company pioneered development of the single point mooring system, having delivered more than 120 CALM terminals since 1958. More than 20 mooring systems have been supplied for FPSOs/FSOs and the company is now supplying SPT turrets for the *Tantawan* FPSO and *Maxus Intan* FSO. IMODCO has been a subsidiary of IHC Caland since 1990.

• **SOFEC:** The U.S.-based company is supplying the internal turret system for the upgraded PP *Moreas*, the internal turret for the *Liuhua* FPSO and external turrets for both the *Escravos* barge and *Maui B* FPSO vessel. SOFEC is a subsidiary of FMC Corporation.

• **Frank Mohn/Statoil:** Working with Statoil, the Norwegian pump and offshore equipment manufacturer Frank Mohn has developed a submerged turret loading system that has been installed on eight shuttle tankers to date. The concept is being promoted for use in multi-purpose shuttle/production tankers.

IMA believes that this is a market which should be examined by many companies for new business opportunities. It is a rapidly growing market sector, and the vessels have a large electrical requirement, utilize sophisticated mooring devices, incorporate an extensive cargo pumping system, require elaborate control systems and frequently need dynamic positioning capability.

RECEIVING THE REPORT

IMA's new study — *Floating Production Systems* — pinpoints information needed by business planners and provides a road map to this attractive, growing business sector. The report is available from IMA Associates for $675. To order: IMA Associates, 600 New Hampshire Ave., NW, Washington, D.C. 20037, USA; tel: (202) 333-8501, fax: (202) 333-8504.

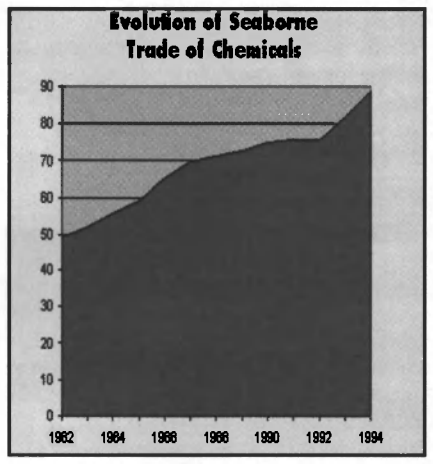
Chemical Tanker Market Improves

Operating conditions in the chemical tanker market have improved dramatically in the past two years, according to a new report from Drewry Shipping Consultants, as spot freight rates on some of the key Atlantic and Pacific routes have risen by as much as 75 percent, coupled with a steep increase in contract rates.

The recovery of the freight market has been led by a fundamental improvement in the relationship between supply and demand. To be specific, trade in organic chemicals has increased by as much as seven percent per year in the 1990s. Taken as whole, seaborne movements of organic and inorganic chemicals, vegetable oils and fats, and some specialist products, have grown from 49 million tons in 1982 to an estimated 89 million tons in 1994 — equivalent to a 5.1 percent growth rate per year.

Renewed growth in the world economy and new chemical plant capacity coming on line in the Far East have been two strong reasons for the underlying strength in vessel demand. Looking ahead, the Drewry report concludes that the level of economic activity will continue to play a crucial role in shaping chemical tanker demand, as will the location of base chemical production capacity.

On the supply side, the size of the total fleet with chemical carrying capacity, which today comprises



U.S. yard looks to chemical tankers as launching pad

Alabama Shipyard, a wholly owned subsidiary of Atlantic Marine Holding Co., has made tremendous strides in its push to become an internationally viable builder of commercial ships. The yard's most recent upgrade includes the refurbishment of its 1,100 ft. (335 m) long x 226 ft. (69 m) wide erection area, an area which includes a 275-ton bridge crane and two 150-ton gantry cranes.

The most significant news from the yard of late is, of course, the order for two 16,000-dwt IMO II chemical tankers — with an option for a third — from Denmark's Dannebrog Rederi. Construction on the first ship is slated to begin in June, with construction on the second scheduled to start in December. The ships are due for delivery in May and September 1997, respectively.

Dannebrog, which was established in 1883, was granted a Title XI loan guarantee by the U.S. Maritime Administration for the project. The double hull tankers were designed by Skipkonsulent AS of Bergen, Norway. The ships will be approximately 472.4 ft. (144 m) long, 75 ft. (23 m) wide and 41 ft. (12.4 m) deep. Each will be classed to Lloyd's Register's highest class: +A1 chemical tanker.

Meeting the need

Located on the Mobile River, across the river from Mobile, Ala., and 29 miles (46 km) from the Gulf of Mexico, Alabama Shipyard occupies approximately 150 acres of the 650 acres available on Pinto Island. Acquired by Atlantic Marine in 1989, the yard has been operating since 1916, building a variety of commercial and naval ships over the years, as well as barges, offshore drill platforms and semi-submersible drill rigs.

The yard is able to build ships to a maximum size of 950 ft. (290 m) long by 160 ft. (49 m) wide. It has 496,000 sq. ft. of manufacturing space, 75,806 sq. ft. of covered warehouse space, as well as two finger piers with a total usable pier space of 3,998 ft. (1,219 m).

Recent additions have focused on maximizing efficiencies to help the yard compete in the international market, and include a 90 x 400-ft. (27 x 122-m) panel line ship, which has a modified series arc submerged, one-sided butt welding station. This is capable of welding to 3/4-in. (19-mm) thick plates.

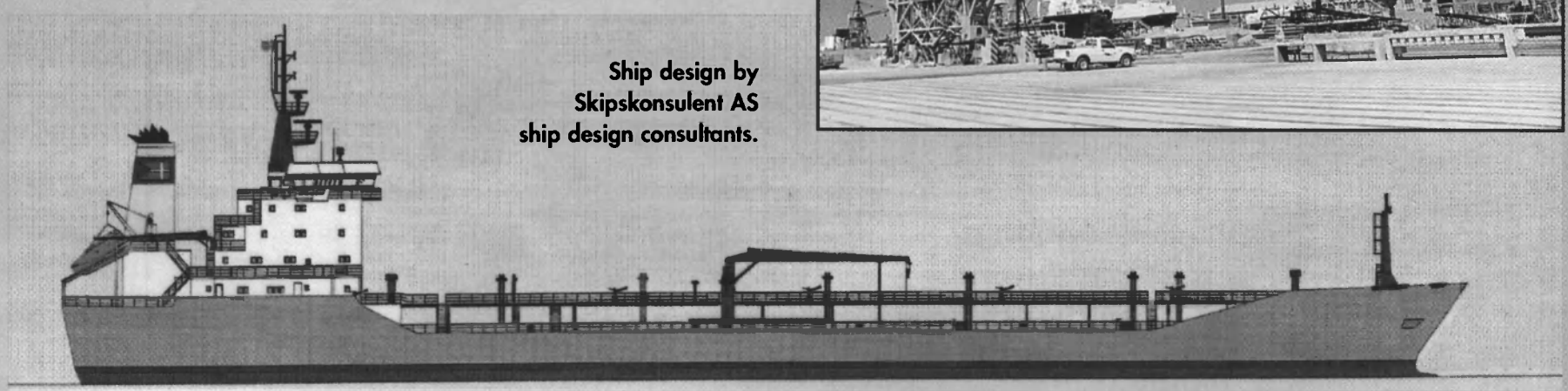
Future expansion plans include: an enclosed paint and touch-up building, set for completion this August; a new pipe fabrication facility, which was scheduled for completion last month; additional warehouse space; a parts shop (web line); and a bow and stern shop.

For more information on Alabama Shipyard
Circle 98 on Reader Service Card

Alabama Shipyard-built Chemical Tankers

Length o.a.	472 ft. (144 m)
Length b.p.	439 ft. (133.8 m)
Breadth, molded	75 ft. (23 m)
Depth, main deck	41 ft. (12.4 m)
Draft, design	28 ft. (8.4 m)
Draft, scantling	29 ft. (8.7 m)
GT	11,000
DWT	16,000
Cargo tanks	19,000 cu. m.
Clean water ballast	7,850 cu. m.
Fresh water	approx. 200 cu. m.
Lubricating oil	approx. 50 cu. m.
Main engines	Wartsilo
Propeller	CP, 4-blade

Work on the Dannebrog chemical tankers is set to commence soon at Alabama Shipyard. The yard is continuing an upgrading process which will help it reap dividends on this and future commercial work.



Ship design by Skipskonsulent AS ship design consultants.

more than 1,000 vessels of 18 million dwt, has grown consistently since the early 1980s. However, the increase in the size of the fleet has levelled. As for the future, trends in supply will be dictated by the size of the current orderbook and the level of scrapping. Scrapping is, however, unlikely to be a major feature of the market for some time to come, as the chemical fleet still has a relatively youthful age profile. The current chemical tanker orderbook consists of some 90 vessels of 2.3 million dwt, of which just over half of the tonnage can be considered pure chemical carriers. A good proportion of these ships are due to be delivered in 1996 and early 1997. With this, a modest increase in vessel supply is anticipated over the next 18 months or so. Nevertheless, the general expectation is the volume of new deliveries scheduled for 1996 and 1997 should be absorbed by the forecast increases in vessel demand, provided that organizations such as Stolt-Nielsen proceed with their stated policy of phasing out older ships as they take delivery of newbuildings.

For more information on ordering *Chemical Tankers: Market Prospects, Costs and Profitability*
Circle 116 on Reader Service Card

Unitor Wins Contract For FPSO Conversion

Unitor Ships Services' Houston operation received a contract for the conversion of a VLCC into an FPSO (Floating Production, Storage and Offloading unit) for Oceaneering Products Systems.

The 268,000-dwt vessel is undergoing conversion at the HAM/PMB Joint Ventures Inc. shipyard in Galveston, Texas. The contract calls for Unitor to design, supply and install the FPSO's new fire and gas detection systems, systems which are required due to the vessel's reclassification to ABS standards. The new fire and gas detection system is required for use in the vessel's on-deck production modules, as well as in the vessel itself. Norway-based Unitor is eyeing the U.S. market with increasing optimism, and is anticipating increased activity in the commercial sector in North America.

For more information from Unitor
Circle 99 on Reader Service Card

Midland Introduces OptiScan

Midland Manufacturing introduced an electronic system to advance liquid level gauging and monitoring. OptiScan, which was developed for shippers, terminal operators and tank car owners, provides continuous digital data for measuring and recording tank liquid levels. It also offers alarm points that are operator-programmable for specific products. OptiScan incorporates Midland's model B-612 magnetic level gauge, its model B-590Q optic sensor head and its model B-3590Q cargo loading monitor. OptiScan is designed for use with a Windows-based PC.

For more information from Midland
Circle 100 on Reader Service Card

Bergan Expands Cargo Monitoring System

Ian-Conrad Bergan, Inc. recently released an expanded version of its integrated cargo monitoring system for tank ships.

The expanded Guard Level system is now fully integrated with load computing software and local area network (LAN) support. The system also has the capability to support portable wireless display units (pocket monitors).

Additional advantages touted by the manufacturer are its redundancy and modular design.

The Guard Level system meets the stringent standards of the latest IEC and class requirements for EMC and ESD protection.

For more information on Ian-Conrad Bergan
Circle 119 on Reader Service Card

Wärtsilä Diesel Wins Significant Contracts In Singapore And China

Wartsila Diesel has captured orders for 36 engines worth a total of $35 million in Singapore and China.

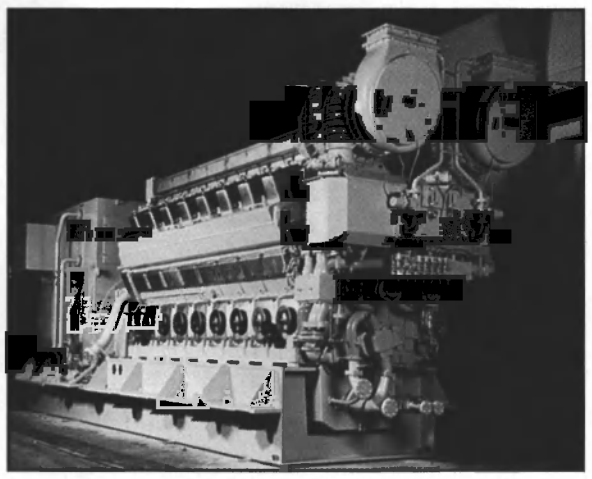
Wartsila will deliver six generating sets for the Tentech 700 SP floating production, storage and offloading vessel ordered by the Norwegian oil company Saga Petroleum at Far East Levingston Shipbuilding Ltd., in Singapore. The main generating sets for the vessel are Wartsila Vasa 18V32 gas-diesel units. The installation also includes one MDO burning diesel generating set of the same type, and one Wartsila 12V200 standby unit. The total output of the installation is 36,700 kW.

Steamers Maritime of Singapore will feature Wärtsilä's propulsion units in its latest feeder vessels to be built in China. The company's two 4,700-dwt multi-purpose feeder vessels ordered at the JinLing Shipyard will each be fitted with one Wartsila Vasa 9R32 Propac unit for propulsion and three Wartsila 6L UD 25 auxiliary units. The four 650-TEU container feeder vessels ordered by Steamers Maritime at the JinLing Shipyard will each be equipped with one Wartsila 6L46 Propac unit and three Wartsila Diesel high-speed auxiliary units.

The two 37,000-dwt bulk carriers ordered by the Chinese shipowning company Sinotrans at the Sembawang Bethlehem Shipyard in Singapore will each be equipped with three Wartsila 6L20 auxiliary gensets.

Engines for all of the above installations will be delivered from the company's factories in Finland and France. The Propac units, including gearbox, CP propeller and control unit, will be delivered by Wartsila's Norwegian factory.

For more information from Wärtsilä
Circle 114 on Reader Service Card



Saga Petroleum's new FPSO vessel will be equipped with Wartsila Diesel's Vasa 32 gas-diesel engines. Pictured is a 16-cylinder Wartsila Vasa 32GD.

Keppel Nears Completion Of FPSO Conversion

Keppel Shipyard will soon complete the conversion of the *Whakaaropai* (formerly *Ellida*), a 137,684-dwt tanker, to a Floating Production, Storage and Offloading (FPSO) vessel.

The conversion, worth about $30 million, was awarded to Keppel Shipyard by Modec of Japan, a subsidiary of Mitsui.

A significant operation in the conversion of *Whakaaropai* was the installation of a 1,400-ton turret mooring system, complete with supporting ancillary at the bow of the vessel. The turret mooring system was jointly fabricated by Keppel and sister company, Far East Levingston Shipbuilding (FELS). A tandem mooring facility and an offloading station was also installed at the stern of the vessel. Other major jobs were the installation of crude process systems onboard the vessel, including a gas compression system and flare system with a 30-m tower. The main boilers were converted for duel fuel firing. Major modification to the piping system was carried out in order to facilitate the storage of processed oil in the cargo tanks. It was also outfitted with a 100-ton helideck, a 20-ton capacity deck crane and laboratory house. Keppel also carried out refurbishment of accommodation and deckhouse facilities onboard the vessel.

For more information on Keppel
Circle 118 on Reader Service Card

Saab TankRadar Measures With Microwave Radar

Saab's TankRadar system measures level, temperature and inert gas pressure in cargo tanks, and the level in ballast and bunker tanks. The system will also compute volume and weight, and can measure draft, list, pressure as well as other parameters. Information is presented in analog or digital displays, in the form of mimic diagrams on a color VDU.

The Saab TankRadar uses a microwave radar for level gauging. The method, developed by Saab and first introduced more than a decade ago, is installed on hundreds of tankers worldwide. Saab touts the system's accuracy and low maintenance as advantages. The system works on all types of liquids, and is reportedly unaffected by the chemical composition, temperature or density of the cargo.

For more information from Saab
Circle 140 on Reader Service Card

Ulstein Wins Contract From Hitachi Zosen For FPSO

Hitachi Zosen placed an order for azimuth thrusters with Ulstein Propeller of Norway, for delivery to its newbuilding K. No. 1070, which is reportedly the largest FPSO ever ordered. The contract is for five Ulstein azimuth thrusters, which are worth approximately $4 million. The thruster design is according to DNV's requirement for dynamic positioning, in addition to the NMD and NPD requirements for offshore vessels. Each Ulstein thruster, type TCNP 120/M-310, transmits 2,800 kW and produces more than 50 tons of nominal thrust. The thrusters are designed for underwater installation and demounting, enabling service and maintenance without drydocking the FPSO. The FPSO is a Tentech-900 design, with a storage capacity of 148,000 cbm. Statoil will use the FPSO on the Asgard oilfield development project off of Norway.

For more information on Ulstein
Circle 139 on Reader Service Card

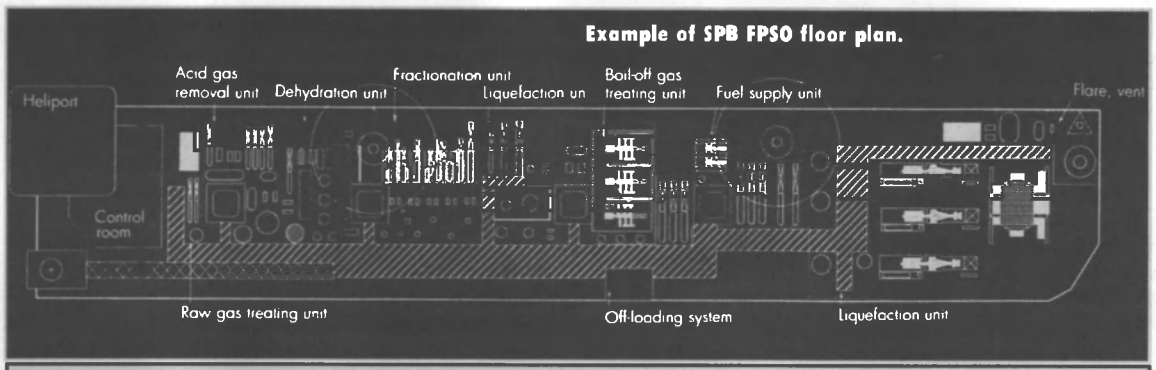
Study on FPSO for Natural Gas Liquefaction Plant Using SPB Tank

The annual LNG trade worldwide totals about 60 million tons, of which approximately 70 percent is imported by Japan. Growing concerns of global warming and air pollution will only help to increase the worldwide demand for LNG, as it has the reputation as an energy source offering viable environmental solutions into the 21st century. In fact, studies suggest that by 2010, the natural gas supply and demand situation will be so tight that gas development will have to start taking place in remote areas, with difficult infrastructural development or where environmental conditions are harsh.

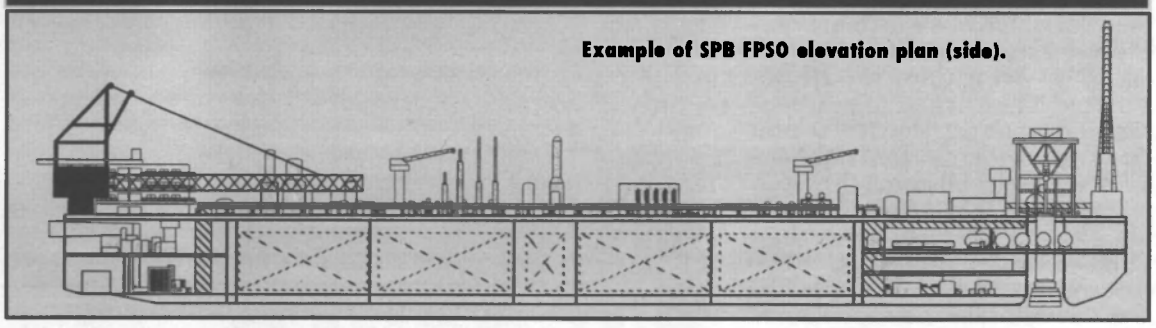
IHI has developed an LNG carrier with self-supporting prismatic shape IMO type B LNG tanks (SPB tanks), and constructed two SPB LNG carriers for LNG transportation between Alaska and Tokyo Bay. The SPB tank system, in the development stages, was targeted for a floating storage facility, and has been confirmed as suitable for offshore facilities. Recent studies at IHI have reportedly proven that the floating natural gas liquefaction plant using the SPB tank system is justifiable both technically and economically for the future needs of natural gas development.

With the SPB tank system, the LNG plant is hardly susceptible to changes in meteorological and oceanographic conditions, as the SPB system is reportedly unaffected by problems caused by wave-excited sloshing, at any liquid level. The tank offers flexibility, as it can be designed to any prismatic form and dimensions, and can be accommodated in the hull to provide a flat-topped deck on which to arrange plant and equipment freely. High operations safety is provided by the unit's high structural strength against positive and negative pressures. The tank incorporates several other advantages, including:

- High space efficiency, making the FPSO dimensions small, and reducing the influence of the wind. The low center of gravity is advantageous for ensuring the stability of the barge and mooring system;
- The SPB tanks reportedly have lower LNG boil-off rates, as compared to other types; and



Example of SPB FPSO floor plan.


Example of SPB FPSO elevation plan (side).

- The flat deck and adequate clearance between tanks and hull facilitate inspection and maintenance work.

The Study

A feasibility study on an LNG FPSO plant was developed by IHI under the following conditions:

LNG production	2 million ton/year
Storage tank capacity	150,000/cu. m.
Storage system	SPB tank system
Operation	Offshore in Southeast Asia

To meet these requirements, the barge was dimensioned as follows:

Length	1,148 ft. (350 m)
Breadth	190 ft. (58 m)
Depth	92 ft. (28 m)
Design load draft	33 ft. (10 m)

Process equipment is installed on the deck for safety against gas leakage accidents and for ease of maintenance and servicing. The utility equipment is arranged under the deck. The clearance around each piece of equipment is determined to meet the requirements of applicable rules and regulations, and the ergonomic requirements for operability and maintainability. Major equipment on the FPSO includes:

- A liquefaction unit, which consists of a main heat exchanger, refrigerant compressors and prime movers;
- Gas compressor units (boil-off gas compressors and prime movers); and
- A storage unit.

Safety measures for the offshore floating LNG plant operating under specific conditions are incorporated in addition to those required for the ordinary shore plant. Specifically, spills of cryogenic liquid are guided to a safe place and gasified for burning through the flare stack. Compartments installed with gas appliances are isolated for safety assurance, and are

(Continued next page)

Minimizing Stress During Distress

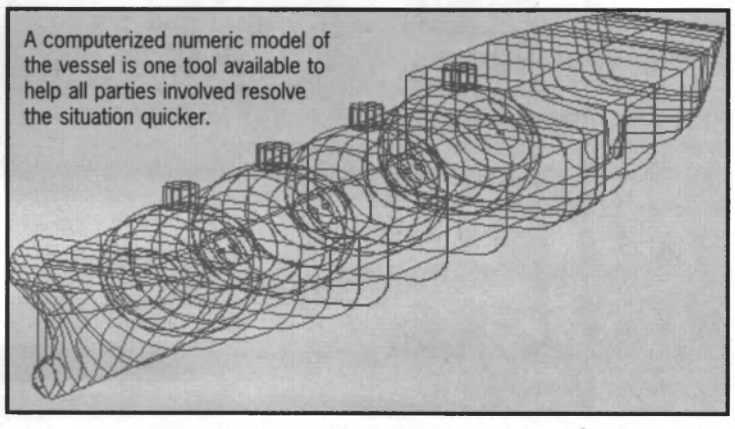
When and if tragedy strikes an oil carrier, time is of the essence to minimize environmental damage and financial liability. A potential problem during these stressful and confusing situations is that information that is received regarding the condition of the vessel is dubious and unreliable, and often contradictory as the situation progresses. The owners must face federal, state, and local officials, as well as the press, to explain not only what is going on, but how the situation is being handled, and most important, the predicted timetable for controlling the spill.

A computerized numeric model of the vessel is one tool available to help all parties involved resolve the situation quicker.

These models, required by 33 CFR 155.240, are typically held for the owner by a salvage engineering firm, and are available on a 24-hour basis. The models are comprised of the complete vessel characteristics including: hull form; hydrostatics; compartmentalization; and baseline strength and stability characteristics. This information is then used during the salvage operation to provide residual hull girder strength based on the reported extent of damage, and residual stability based on damaged compartments. It can also be used to develop the most favorable offloading, ballasting or cargo transferring sequences that improve stability and reduce stresses.

The communications link

These capabilities give the salvage engineer, the owner, the authorities and the on-scene coordinator the time and capability to form a consensus on the condition of the vessel, even though the parties involved may be separated by hundreds of miles. Using satellite communications and electronic file transfer capabilities, distance no longer hinders salvage engineering efforts. Instead of preparing to clean up oil that has not been lost, the response personnel can now work on saving the ship and preventing further cargo loss and environmental damage.


A computerized numeric model of the vessel is one tool available to help all parties involved resolve the situation quicker.

Since the passage of this regulation's deadline on January 21, 1995, many salvage companies

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Minimizing Stress During Distress

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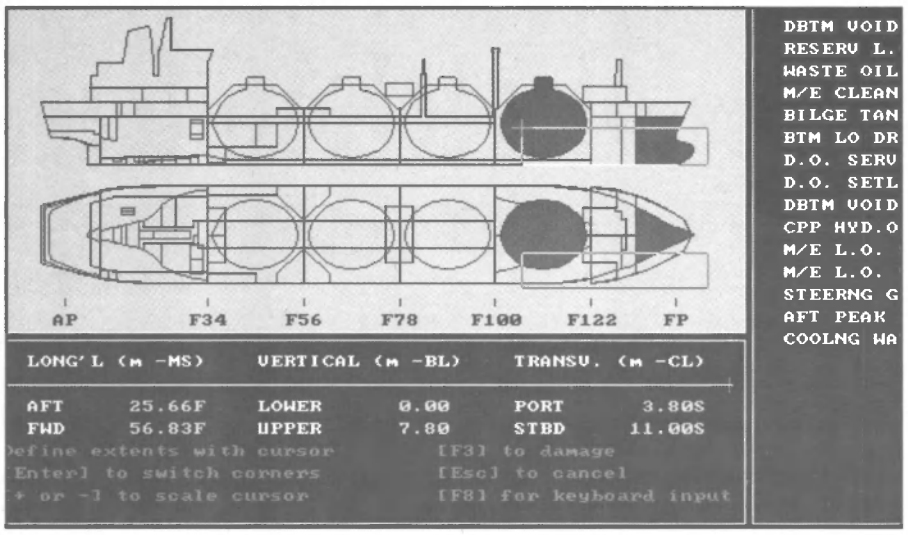


Using satellite communications and electronic file transfer capabilities, distance no longer hinders salvage engineering efforts.

have experienced a noticeable shift in the types of ships being modeled. Operators of non-oil carrying ships are seeing the advantages in having this type of service on hand in case they should need it. Owners of bulk carriers, containerships and passenger vessels are turning to numeric modeling in order to give engineers the ability to rapidly assess damage stability following an accident.

Over the past few years, having a numeric model has proven invaluable in dozens of incidents. **Bruce Banks**, president of Jamestown Marine Services, a company that specializes in providing operators with both computerized numeric modeling and 24-hour salvage engineering support, is one of the many preachers of pro-active ship modeling. "33 CFR 155-240 is a regulation that works," said Mr. **Banks**. "In the last year alone, we have participated in a half a dozen incidents in which the owners had their vessels pre-modeled and JMS was able to provide real-time information that exceeded the local Coast Guard's expectations."

For information on computerized numeric modeling

Circle 49 on Reader Service Card

(Continued from previous page)

equipped with ventilators and gas leak detectors. The gas turbines are installed to windward, in principle for isolation from gas sources, or at an adequate distance. The flare stack and vent stack are installed on the opposite side from the side that the LNG carrier berths. Gas detectors and alarm systems are arranged in the raw gas receiving area, LNG unloading area, process fluid handling area, storage area, operation control room, accommodation area and heliport.

When the motion of the FPSO becomes great in rough weather, some equipment can't be operated stably due to difficulty of liquid level control during processing. It is therefore necessary to obtain meteorological and oceanographic information in advance, and to suspend the receiving of raw gas, and ship the plant to the standby state as the circumstances require.

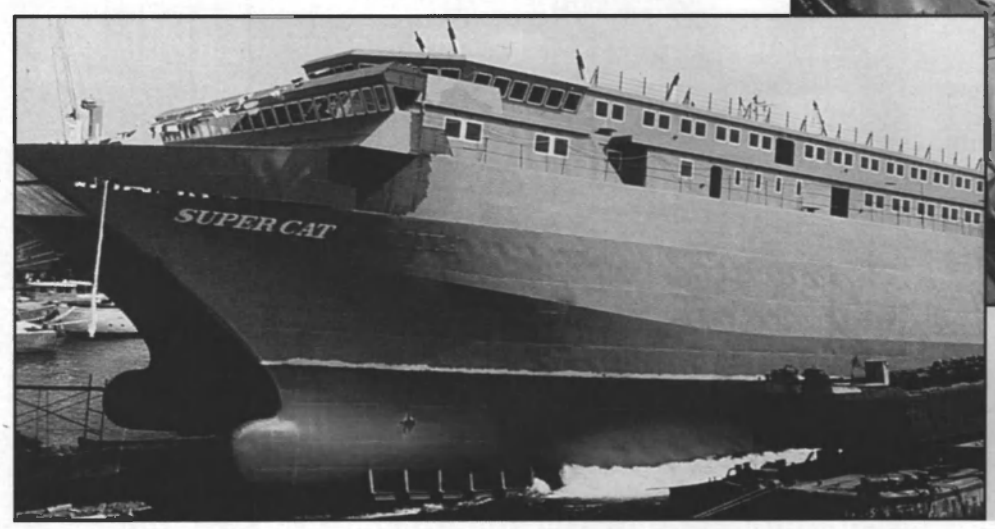
In addition to use as a floating plant, the entire plant, including the barge, may be grounded. After construction at a shipbuilding yard, the plant is towed to the site and fixed on a foundation structure. This plan has the advantages of the floating LNG plant as well as those of a shore plant because the plant is stably supported by the land foundation. This application is particularly attractive where the plant must be operated in areas with hostile environments and insufficient infrastructures, or where the construction period must be minimized.

The preceding article was excerpted from the IHI Engineering Review, *vol. 29, no. 1, January 1996.*

Pushing the boundaries of technology

The fast ferry is at a crucial point in its development. In Northern Europe and the Far East, high speed travel over water is accepted as commonplace, generally reliable, and above all, convenient. Despite the proven track record of established designs, experienced operators continue to force the pace of innovation by insisting on bigger, more cost-effective payloads, while customers demand reduced journey times and improved comfort.

By Andy Smith & Carol Fulford, contributing editors



Delphin **(above) is scheduled to leave for the Baltic this month to serve on the Rostock, Germany, to Trelleborg, Sweden, route for TT-Line GmbH. Four 600-kW MTU diesels each driving a KaMeWa waterjet will give the vessel a 36-knot service speed when carrying 600 passengers and 175 cars.**

These pressures are driving naval architects and equipment suppliers to push the boundaries of current technology.

Meanwhile, in some parts of the world, operators appear hesitant to join the fast ferry bandwagon. Their dilemma is compounded by the never ending succession of claims that the biggest, fastest, smoothest or most innovative ferry has been developed. Operators must decide whether to opt for the tried and tested, or continue to wait out the market.

A shortage of skilled welders made the world wait longer than anticipated for the ferry being billed as the strongest contender for "most innovative," but the first of three, 407-ft. (124-m) HSS 1500 catamarans ordered by Stena Line from Finnyards arrived off the English Channel port of Dover at the height of a February gale. While other ships scurried for shelter at the foot of the famous white cliffs, an option ironically denied the HSS 1500 pending alterations at the port to accommodate its 131-ft. (40-m) beam, the new pride of the Stena fleet demonstrated its unquestionable seaworthiness.

Constructed primarily of aluminum and powered by two pairs of different-sized, Kvaerner-built, General Electric gas turbines driving four KaMeWa waterjets with a total output of 73,500 kW (100,000 bhp), these huge craft will each carry up to 1,500 passengers and 375 cars (or 50 trucks and 100 cars) at a service speed of 40 knots. On the occasion of the mid-February delivery, Finnyards President and CEO **Aarno Mannonen** said: "The HS 1500 is expected to do for the ferry industry what the jet engine did for aviation." While this remains to be seen, gas turbines, mostly aero engine derivatives, are becoming more established in fast ferry applications.

Stena appears convinced, both by the catamaran concept and the use of gas turbine power, and has ordered two scaled down versions for use on Scandinavian routes. Designated the HS 900, these vessels are being built at Westamarin in Norway and are configured to carry 900 passengers and 210 cars at 40 knots, from a propulsion system comprising a pair of 17MW ABB Stal turbines driving waterjets.

Scandinavia has established an impressive record in the development of fast ferries, driven by the geography of the region which has compelled its inhabitants to look towards the sea even for local transport. Norway's Kvaerner Fjellstrand remains one of the world's most prolific builders of vessels in the 115 to 130-ft. (35 to 40-m) class with many in service across the world. Although sales of the diesel/waterjet 40-m Flying Cat, achieving 35 to 38 knots, are expected to continue steadily (13 were built in 1995), Kvaerner's goal for several years has been to develop a 50-knot plus craft. Persistence, despite a less than convincing prototype, has resulted in the 115-ft. (35-m) Foilcats *Barca* and *Penha*, now carrying 400 passengers on the Hong Kong to Macau route. They are powered by twin 4,485-kW Kvaerner Energy/GE LM500 gas turbines driving waterjets. Extra lift is provided by forward T-foils with a full width foil aft supported on three struts, with the outer two also forming the waterjet intakes. All the foils incorporate flaps coupled to a ride/flight control system, and at around 30 knots the vessel reportedly "flies" 2 ft. (0.6 m) above the water.

Also in Norway, Båtservice has occupied building its Sea Lord series. Five years ago two 92-ft. (28-m) craft were built, followed in 1992 by a 177-passenger, 105-ft. (32-m) Sea Lord which utilized a pair of MTU diesels developing a total of 1,100 kW to drive Servogear controllable pitch propellers giving a service speed of 27 knots. Its success prompted the development of a 125 x 37-ft. (38 x 11.2-m) version for a Tromso-based operator with a mixed fleet of similarly sized craft. The new Sea Lord is unusual in its size class. The vessel's four MTU diesels, each generating 625 kW and turning controllable pitch propellers, carry 336 passengers. Based on figures averaged over a four-month period, on a 2.5-hour, 81-nm trip, the Sea Lord takes four minutes longer than a newer ferry, but the four diesel engine/propeller system burns only 76 percent of the fuel consumed by the twin diesel/waterjet vessel. Båtservice's Managing Director **Bjorn Fjellhaugen** claims that four small engines cost less than two larger units, the spares are cheaper and the recommended interval between overhaul is a third longer.

Exceptionally low resistance through the water and minimal wake characteristic, resulting from extensive tank testing, are also touted for the 124.6-ft. (38-m) vessel, which has a stern tab motion damping system developed by Maritime Dynamics. The passenger accommodation can be adjusted to suit individual operator requirements up to 500.

Sweden maintains the region's fast ferry tradition at its Marinteknik yard in Oregrund. Its latest newbuild, due for delivery in October, also features a quadruple MTU diesel engine configuration, but this 148 x 36-ft. (45 x 11-m) craft will be propelled in a more conventional fast ferry fashion, with waterjets producing speeds in excess of 41 knots. Destined for the French West Indies, the vessel has a seating capacity for 445. It has a sleek and exciting shape — as eye appeal is a significant factor in attracting customers.

Across the Kattegat in Denmark, all was on schedule at Danyard to meet the March delivery date for the first of two Seajet 250s for Danish operator Mols-Linien. Designed in association with NQEA Australia to transport 450 passengers and 120 cars at 44 knots, these 250-ft. (76-m) aluminium catamarans have been constructed in 40-ft. (12-m) sections.

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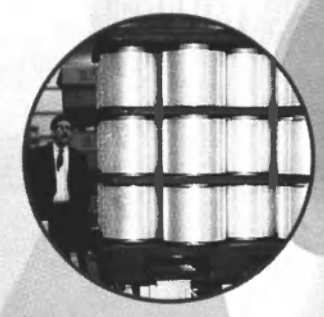
MEETING WORLDWIDE COMMITMENTS

For Advanced Polyester Fibers

Moncure, North Carolina
(Manufacturing)



Longlaville, France
(Technical Center/ Manufacturing)

Petersburg, Virginia
(Technical Center)

Hopewell, Virginia
(Manufacturing)

For almost three decades, AlliedSignal Fibers has been a leading global innovator and supplier of advanced polyester fibers. Backed by a strong commitment to R&D, AlliedSignal has achieved a significant global market position in industrial fibers by introducing continually improved generations of products that meet the changing needs of customers.

Today, AlliedSignal Fibers manufactures more than 80 polyester products for thousands of end-use applications. And, with an emphasis on customer satisfaction, AlliedSignal stands ready to meet the global challenge for more demanding performance requirements in all product offerings.

On the InfoBahn

Customers can visit us on the Internet at the Global Polymer Resource Center Site, Akron, Ohio, USA. See a full listing of our products and their properties at: **(http://polysort.com/allied/)**.

For further information, contact:

AlliedSignal Fibers, 224 West 35th Street, Suite 1500
New York, NY 10001, *email: canonshea@aol.com*

AlliedSignal FIBERS

Circle 200 on Reader Service Card

Austal Vessel Stabilizing System Developed For Fast Applications

Western Australian shipbuilder Austal Ships is one of the world's most successful builders of high speed passenger catamarans and vehicle ferries in the 98.4- 328-ft. (30- 100 m) size range. The company has become a dominant supplier to Asia, and with several large car ferries already completed and on order, is fast becoming a leading choice with European operators.

Conscious of the need to improve safety and passenger comfort onboard high speed craft, in 1992 Austal began development of its Ocean Leveller stabilizing system — an automatic, electronically controlled and hydraulically operated motion dampening system.

Reducing Vertical Acceleration

According to Austal, the results of the system have been impressive, reducing vertical acceleration levels — known as the primary cause of seasickness — by at least 50 percent on vessels fitted with the system. Whereas the seasickness threshold is typically in 4.9-ft. (1.5-m) seas for a vessel without a stabilizing system, Ocean Leveller reportedly moves this threshold out to 8.2 ft. (2.5 m) and allows operation in conditions up to Beaufort Force 7. Since its development, Austal has installed the system in 10 vessels, including a fast monohull ferry, and on the second generation T-foil system designed specifically for their large car ferry designs. These vessels are in operation along the coastline of Guangzhou and Shanghai in the People's Republic of China, Indonesia, the Inland Sea of Japan, the French Polynesian islands around Tahiti, Scandinavia and the Baltic Sea.

Adding Value Through Engineering

Designed specifically for Austal's high speed catamarans, the Ocean Leveller stabilizing system comprises two T-foil control surfaces fitted beneath the forward hulls. Where the draft is limited, two fins positioned forward on the inboard side of each hull can be used. In addition to the T-foil or fin control surface, two flaps aft, flush with the bottom of the hull just forward of the transom are also fitted. The system has also been successfully applied to a fast monohull ferry in a configuration which utilizes aft flaps only. Acceleration at the foil/fin and flap positions monitor movement at each "corner" of the vessel. A central microprocessor system, incorporating a sophisticated high speed monitoring and control algorithm, constantly monitors output from the motion sensors, then drives the foil and flap angles to counter movement and maximize passenger comfort. The foils and flaps are powered by independent hydraulic systems; the foil hydraulics are powered by separate electrical pumps in each hull, while the hydraulic power for the flaps comes from separate pumps mounted on the gearboxes in each hull. With the foils and flaps each able to operate independently, roll, pitch and heave movements can be minimized. The system was designed to be fully computerized and requires no further input from the crew once activated. Automatic adjustment is made if going from a head sea to a beam sea. A VDU screen on the bridge displays foil and flap positions, accelerations and angles of vessel roll and pitch. A second screen page is dedicated to alarm displays. In the unlikely event of a system failure, the foils and flaps are driven to neutral positions and hydraulically locked.

A new feature of the system is "trim control," which allows a vessel's trim to be optimized to suit different loading conditions.

Tracing System Development

In mid-1992, Austal commenced an R&D project in collaboration with the Australian Maritime Engineering Co-operative Research Centre (AMECRC) at Curtin University in Western Australia. The project's aim was to develop a pitch, heave and roll control system for high speed passenger catamarans.

The project commenced with the writing of a computer program to simulate vessel response in waves with various control systems implemented. It is this program that is used to determine the response of a vessel in a given set of conditions. Once the uncontrolled vessel response is established, it is then possible to implement various control algorithms.

The first complete stabilizing systems were fitted on two identical 40-m (131.2-ft.) catamarans, and full scale trials were conducted in May 1993.

As the vessels were identical, it was possible to omit the fins on one vessel and make a direct assessment of motion improvement attributed to the stabilizing system. Though both vessels were ultimately delivered with the stabilizing system, for the course of the trials, one vessel's fins were removed and the flaps locked into a flush position with the underside of the hull. The second vessel had a fully functioning Ocean Leveller stabilizing system.

The Ocean Leveller system is fitted to the 43-m *Speeder*, a passenger catamaran operating in Japan. Fins are located on the in-board side of each hull forward. The stabilizing system has also been installed on TT-Line's *Delphin*.

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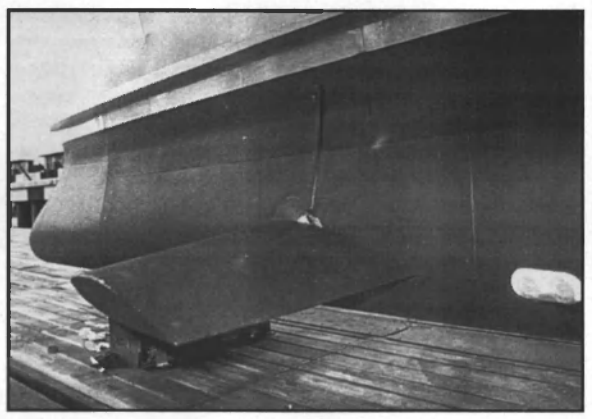


Austal's side-mounted stabilizing system for high speed passenger ferries is pictured.

Austal's T-foil stabilizing system is shown fitted to a catamaran.

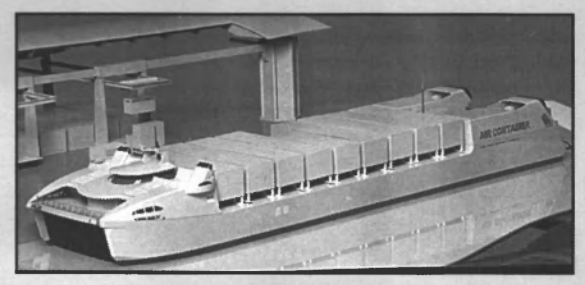
Art Anderson Publishes Design For SWATH Cruise Liner

Art Anderson Associates, Bremerton, Wash., has published a general description and design specs for a 400-passenger, 400 x 100-ft. (121.9 x 30.4-m) SWATH (Small Waterplane Area Twin Hull) cruise ship. This particular hull form was utilized to increase passenger comfort by improving vessel seakeeping characteristics, and providing more useful deckhouse volume than conventional vessels of similar length.

The engineering spaces are located in the lower portion of the hull, in order to significantly reduce the noise and vibration in the passenger compartment. Propulsion power is provided by four main engines, and auxiliary power is provided by three diesel generators and an emergency generator. The arrangements provide for all passenger cabins to be equipped with either a private balcony or a large porthole, and the ship's design includes a midship atrium, capped by a skylight. Projected vessel speed is 14 knots.

For more information on Art Anderson Associates
Circle 40 on Reader Service Card

Mitsubishi Offers New SES Design



A prototype of **Mitsubishi Heavy Industries' (MHI)** Fast Containership SES (Surface Effect Ship) type vessel is pictured. The vessel is intended to provide quick, safe, overnight sea transport of goods. The vessel has a service speed of approximately 50 knots, a cargo payload of 150 TEU, is 416.6 ft. (127 m.) long, and powered by gas turbines.

For more information on MHI
Circle 48 on Reader Service Card

Keeping Fast Company

Presenting a unified message of quality and performance to the owners, designers and builders of fast ferries, the Fast Ferry Forum is comprised of a group Norwegian companies offering products and services to this vessel segment. The following are brief descriptions of some of the companies involved.

Servogear supplies controllable pitch (CP) propeller systems — comprised of propellers, propeller tunnels, shaft brackets, effect rudders, reductions gears and stern tubes — designed to maximize efficiency while minimizing noise and vibration.

Circle 101 on Reader Service Card

Mar-El is constantly advancing its remote control systems for fast ferries. Its systems — designed to enhance operational safety and economy — are especially valuable in the fast ferry environment, which often involves high speed and unpredictable weather conditions.

Circle 102 on Reader Service Card

Moland specializes in the manufacture of compact, easy to operate alarm, monitoring and control systems. The company's new MA100 main alarm benefits fast ferry builders with its minimal installation and commissioning time. The systems are delivered configured, tested and ready to use.

Circle 103 on Reader Service Card

High quality internal communications and information systems for marine applications is the specialty of **Vingtor Marine**. Vingtor is unique in that its technology allows it to supply totally integrated systems handling all critical communications functions onboard.

Circle 104 on Reader Service Card

The SeaCockpit integrated bridge navigation and control concept from **Kongsberg Norcontrol** Seacraft helps ensure safe navigation. The system, which was reportedly the first total bridge concept to attain DNV Naut standard for classification of high speed and light craft, was designed with the high speed, intense concentration atmosphere in mind. Norcontrol offers free design consultancy to the owner and builder for achieving optimum layout.

Circle 105 on Reader Service Card

Tranberg offers navigation and signal lighting able to perform in all climatic conditions, from arctic cold to tropical heat. Transberg's series TES 2870/2840 lanterns were designed specifically on fast ferries up to and over 164 ft. (50 m) and larger.

Circle 106 on Reader Service Card

Hydro Aluminium Vik Verk's Danacoustic Marine Ceiling (DMC) was selected by leading high speed passenger vessel builder Kvaerner Fjellstrand for most of the vessels the yard has built. The company's lightweight aluminum DMC systems are reportedly in high demand among fast ferry builders.

Circle 107 on Reader Service Card

Colt Industrier is a market leader in developing lightweight and flexible aluminum window systems for the high speed ferry market. See page 49 for further information on the company.

Circle 108 on Reader Service Card

(continued on page 49)

Assessing Practicality, Cost-Effectiveness

In 9.8-ft. (3-m) seas, the vessels were run side by side in a number of different headings and a direct comparison was made. The vessel fitted with the system reportedly achieved speeds higher than 30 knots at 1,750 rpm, with accelerations reduced by approximately 50 percent.

In the absence of Ocean Leveller, 1,950 rpm was needed to maintain the same speed.

As uncovered by Austal, apart from improved levels of passenger comfort, these results represented a fuel savings of around 160 liters per hour in trial conditions, for the same trial speed.

For more information on Austal Ships Circle 117 on Reader Service Card

GE LM500 Gas Turbine Powers Kvaerner-Built FoilCats For Far East Interest

The first commercial installation of General Electric Marine & Industrial Engines' (M&I) smallest aeroderivative gas turbine — LM500 — was on two FoilCat hydrofoil fast ferries. The ferries, built by Kvaerner Fjellstrand for Hong Kong's Far East Hydrofoil, Ltd., each have two LM500 propulsion system packages, providing a total power output of 9,400 kW per vessel. The propulsion system packages were built and supplied by Kvaerner Energy. Commercial operation of these 400-passenger vessels, which provide service between Hong Kong and Maçao, began late last year. M&I develops, designs and manufactures aeroderivative gas turbines for a variety of commercial and military marine propulsion and industrial applications.

Aeroderivative gas turbine-powered ferries include the Aquastrada class ferries (*Guizzo* and *Scatto*) and High Speed Sea Service ferries (Stena *Explorer*). Kvaerner Energy and GE are currently working on Seajet 250 passenger/car fast ferries, which will contain LM1600 gas turbines. These vessels were designed by Danyard in cooperation with NQEA Australia, and are expected to be supplied to Danish operator **Mols-Linien** this spring.

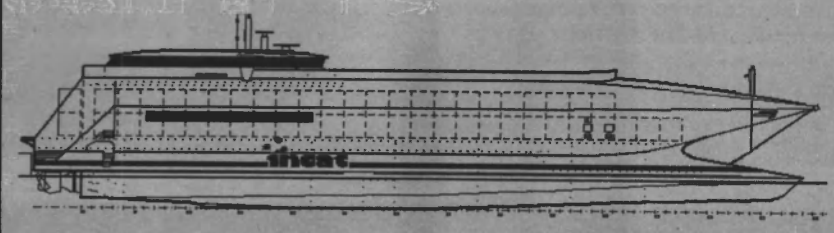
Aeroderivative Gas Turbines Meet Propulsion Challenges

According to GE and other turbine manufacturers, aeroderivative gas turbines offer several advantages over more traditional propulsion systems. Benefits of turbine use include lower acquisition and installation costs, lower vibration and noise levels, and the lack of visible smoke and soot. Turbine emissions are reported to contain considerably lower concentrations of noxious substances, as compared with diesel engine emissions. GE also offers a Dry Low Emissions (DLE) combustion system for its LM6000, LM2500 and LM1600 industrial models, and has plans to make the system available for marine propulsion applications in the near future.

Other benefits of turbine propulsion include: lower maintenance costs and higher reliability, allowing for a smaller engineering crew and lower manning requirements; propulsion speeds in excess of 40 knots; and minimum use of engine room space, facilitating larger passenger and vehicle capacities.

For more information on General Electric Marine & Industrial Engines
Circle 46 on Reader Service Card

Incat Releases 92-M Freight Cat Specs



Pictured is Incat's sketch for its 92-m., high speed freight catamaran.

Incat's 301.8 ft. (92-m) high speed freight catamaran, to be constructed with marine grade aluminum alloys, is a further development of the company's 242.7, 255.9 and 265.7-ft. (74, 78 and 81-m) car and passenger ferries. The vessel will be built to comply with Det Norske Veritas' High Speed Light Craft Rules and IMO's High Speed Craft Code, and is designed to operate at 45 knots lightship and 32 knots fully loaded.

The vessel's main deck will be fitted to carry a total of 152 containers double stow, with a total dwt of 980 tons. Loading and unloading will be via a transom over an external loading platform, and by overhead container crane from the open hold. Powered by four conventional, medium speed diesels each developing 7,080 kW, each of the vessel's engines drive a transom mounted waterjet through a reduction gearbox with internal clutch. An optional application involves two marine type gas turbines driving transom mounted waterjets through a reduction gearbox with internal clutch. A ride control system is fitted to the vessel, providing trim and motion dampening with structural foundations and hydraulic services for the fitting of forward active ride control foils as an option.

For more information on Incat
Circle 82 on Reader Service Card

In the background: The "blueprint" pattern on this page is the general arrangement drawings of an Incat designed vessel.

Renk Wins Contract To Supply Gearboxes

Renk AG has been awarded a contract to supply 12 gearboxes to Incat Australia Pty. Ltd., for installation on the yard's three, 282.1-ft. (86-m) catamaran ferries that are building.

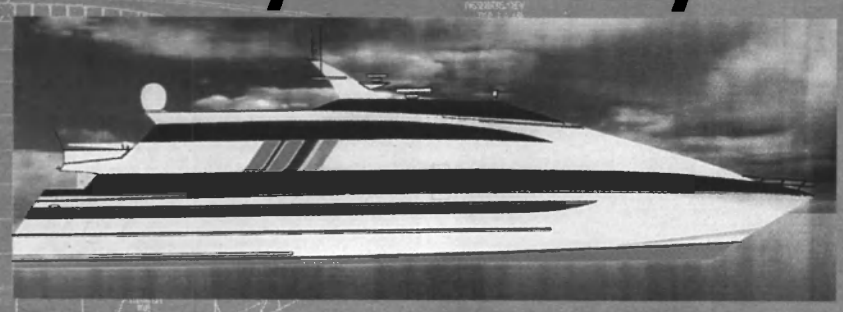
Each vessel features four drive trains with Ruston 20VRK270 diesel engines; Renk ASL 60 gearboxes, with horizontally offset input and output shafts and integrated, multi-plate clutches; and Lips waterjets.

The gearboxes are of lightweight design and are equipped with integrated thrust bearings.

For more information on Renk AG
Circle 50 on Reader Service Card

GEC Alsthom Paxman Diesels To Power Hyundai Fast Ferry

Pictured is a rendering of Batservice's 47-m *Sea Lord*, equipped with GEC Alsthom Paxman diesels.



Colchester, U.K.-based company GEC Alsthom Paxman Diesels manufactures high speed diesel engines in the 610-3,710 kWb power range, supplying marine propulsion and power generation for military vessels, and recently, the fast ferry market. Paxman's 12VP185 engine entered the ferry market in 1995, with two of these engines outfitted on Batservice's *Sea Lord*, a 154.1-ft. (47-m) ferry, capable of carrying 449 passengers at a service speed of 38 knots.

Early this year, the company won an order to supply two of the engines for a new 114.8-ft. (35-m) Hyundai high speed catamaran ferry. The 12VP185 engines, each rated at 2,185 kWb at 1,835 r/min, will be installed with Reintjes gearboxes driving KaMeWa waterjets. The catamaran, the first of a new series, will carry 250 passengers, a crew of 10, and will operate at a maximum speed of 45 knots. The engines were scheduled to be delivered last month, and the vessel is expected to begin service in Korean waters later in 1996.

The company also supplied 18-cylinder Valenta engines for Hyundai fast ferry *Han Ma Eum Ho*, which is already in service. Paxman engines are also in service on U.S. Coast Guard Island class vessels, U.S. Navy Special Warfare Cyclone class vessels, and U.K. and Greek Customs vessels.

For more information on GEC Alsthom Paxman Diesels
Circle 43 on Reader Service Card

Colt Industrier Ferry Windows Designed To Increase Vessel Payload

Norwegian company Colt Industrier AS has launched a window system specially designed for fast ferries — the Golar K48 system. The aluminum-framed, polycarbonate-glazed windows weigh approximately 1,000 kg less than traditionally glazed windows for an average fast ferry, and reportedly increase vessel payload by 10 to 15 passengers. This weight reduction can facilitate changes in vessel design, and a reduction in fuel costs.

The windows are supplied in a variety of dimensions and shapes, and have a durable, non-corrosive surface. Golar windows are based on a clamped-frame system, in which the interior and exterior frames are connected through self-treading screws from the interior side. Combined with suitable seals, the system reportedly provides maximum leakage protection and secures a firm grip for the glass and bulkhead. The company reports that Fincantieri, Ulstein, Kvaerner, Swede Ship/Westamarin, Lindstøl, Holen, Rosendal Verft and Båtservice are among its list of customers.

For more information on Colt Industrier
Circle 44 on Reader Service Card

Reintjes Gears Made For Fast Vessel Applications

Reintjes produces gears specifically designed and manufactured for fast vessel applications, offering reverse and cut-off reduction gears.

The company's gearbox casings are constructed of aluminum alloy and are designed compactly and to reduce vibration, with case-hardened, helical gear units.

The company offers three gear series: WVS reverse-reduction gears for fixed propeller reduction; WLS reduction gears for propulsion with controllable pitch propeller; and VLJ reduction gears for waterjet propulsion.

Reintjes also offers solutions for fast vessels with special maneuverability requirements, offering gears with additional drives.

For more information on Reintjes
Circle 47 on Reader Service Card

Keeping Fast Company

(continued from page 47)

Achieving the best lighting solution on fast ferries requires cooperation by owners and yards in the early stages of design. **Glamox** is positioned to advise clients regarding choice of materials, corrosion protection, resistance to environmental strain, adaptation to meet special requirements and selection of reliable lighting under the roughest conditions.

Circle 109 on Reader Service Card

Jets Vacuum offers toilet and sewage systems designed to minimize weight while providing ease of installation and reliable operation. Its unique Vacuumarator concept, with lightweight and compact vacuum generators, allows for flexibility in the location of the equipment.

Circle 110 on Reader Service Card

Marintek, with more than 50 years of experience in ship model testing and hull design, has made many significant breakthroughs for improved fast ferry performance. Marintek has designed and tested foils and propulsion systems for a new generation of foilcats built at Kvaerner Fjellstrand in Norway. Also, critical research related to catamaran hull design has been carried out in the Ocean Basin facility at its Trondheim headquarters.

Circle 111 on Reader Service Card

Eksoportfinans provides financial packages competitive in both medium and long terms, and attractive to foreign buyers of Norwegian fast ferry equipment. Financing is available for export of ship's gear, together with newbuildings and conversions at Norwegian yards.

Circle 112 on Reader Service Card

Pushing the boundaries of technology

(Continued from page 44)

In Holland, Royal Schelde is putting the finishing touches on a 252 x 71-ft. (76.8 x 21.7-m) passenger car ferry being built for Catamaran Lines in Greece, to link Igoumenitsa with Brindisi in Italy. To achieve a service speed of 36 knots, the all-aluminum vessel has four 5,700 kW Caterpillar diesels driving waterjets, and is capable of transporting 600 passengers in three lounges and 154 cars. Greece has also joined the ranks of catamaran ferry-building nations with a 262-ft. (80-m) vessel building at the Piraeus-based yard of Atsalakis for Goutos Lines. A pair of 6,100-hp Mirlees Blackstone diesels are expected to provide propulsive power for the transport of up to 1,600 passengers, 250 cars and 18 trucks at 25 knots.

Big, British-built diesels are also to be used in the six 328-ft. (100-m) monohulls ordered by Sea Containers from Fincantieri in Italy, for various routes across the Irish Sea, English Channel and in Scandinavia. Four Ruston 20RK270s, each developing 6,875 kW, will drive KaMeWa waterjets to give a full load speed of 37.8 knots at 90 percent MCR. Capable of accepting 800 passengers and 175 cars, these vessels will replace the company's five original wavepiercing SeaCats built by Incat Australia, which will be consigned to South American routes. Some consider this a bold move by Sea Containers, in light of the mixed success of recently built monohulls of similar size. The company's in-house naval architects assert that, above a certain size, a monohull will not only outperform a catamaran, but will also be cheaper to build. It should be noted that good reports have been heard regarding the first six operating months of Mjellem & Karlsen's 312-ft. (95-m) monohull *Kattegat*. Furthermore, Bazan in Spain claims to have solved the mechanical problems which beset its 96-m Mestral class monohull, and has sufficient faith to proceed with the construction of a 410-ft. (125-m) version. The Far East continues to be a prime market for fast ferries. Kvaerner Fjellstrand already has a ferry building facility in Singapore which delivered three Flying Cats to the Philippines, one to Taiwan and four to South Korea during 1995, in addition to the two Hong Kong Foilcats built in Norway. A joint venture between the builder and a Philippines operator will reportedly involve building an additional craft, with an option described by the parties to the consortium as "a series of additional vessels." In a similar move by FBM Marine, reported in *MR/EN*'s February issue, the U.K. company is setting up a yard in the Philippines which will build part of the second batch of five TriCats for Hong Kong, and has joined a joint venture agreement with an Indonesian operator. Builder-operator tie-ups have obvious advantages on both sides and the number of such alliances is expected to increase. Any review of the world's fast ferry scene would be incomplete without mentioning the remarkable influence of Australian industry. Six years have passed since the first Incat Wavepiercer arrived in the English Channel, making the fastest trans-Atlantic crossing en route. Since then, operators in Argentina, Europe, Japan, New Zealand and other Pacific countries have imported Australian-built vessels from Alufast, Cougar, Image, Incat, NQEA, SBF, and Ferries Australia (a joint venture between Austal and Oceanfast).

Ferries Australia is to deliver two 269-ft. (82-m) Auto Express vehicle/passenger ferries to Europe this year. *Delphin* is scheduled to leave for the Baltic in May to serve on the Rostock, Germany, to Trelleborg, Sweden, route for TT-Line GmbH. Four 600-kW MTU diesels each driving a KaMeWa waterjet will give the vessel a 36-knot service speed when carrying 600 passengers and 175 cars. SweFerry/DSO is to take delivery in the early fall of a version which will differ slightly, primarily by featuring a drive through vehicle deck to minimize turnaround — which slightly reduces the vehicle capacity to 154. Incat Australia's design influence has spread to the U.S. The Fast Ferry Operators Directory lists 235 operators worldwide with 792 vessels. Of the total number of vessels operated by U.S.-based companies over 65 ft. (20 m) in length and capable of more than 25 knots, over half are Incat designs built by either Nichols Bros. or Gladding-Hearn. However, this represents just 18 craft, a statistic which puts the most interesting announcement of the year into even greater perspective. British Columbia Ferry Corporation will build three, 400-ft. (122-m) Incat aluminium catamaran ferries in a new custom-built facility, through a cooperative formed by several local shipyards. A MTU diesel/KaMeWa waterjet set-up will reportedly provide a service speed of 37 knots, while transporting 1,000 passengers and 250 cars to Vancouver Island.

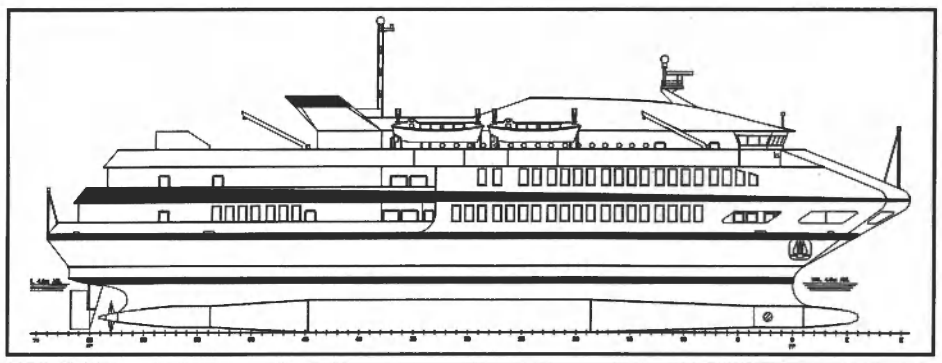
John J. McMullen Develops SWATH For Commercial Applications

John J. McMullen Associates, Inc. (JJMA) has produced a series of cost-effective preliminary designs of SWATH vessels for various commercial applications, a number of which have been supplied to NOAA (National Oceanic and Atmospheric Administration). The firm's design experience was gained through support of the U.S. Navy's SWATH surveillance ship programs, T-AGOS 19 and T-AGOS 23.

JJMA's SWATH commuter boats and passenger ferries can carry from approximately 250 to 1,000 passengers, and have been designed to operate at speeds ranging from 25 to 45 knots. These vessels are suitable for use on the Great Lakes as well as open ocean, with the hull form ideal for open water cruising. According to JJMA, the vessel hull form provides more revenue-generating deck space, contributes to on-time performance and operability, and can achieve reduced noise and vibration by isolating sources from personnel spaces.

The firm has focused its design efforts on developing applications of this stable platform where open water use is required and crew and passenger comfort is a top priority. Other vessel applications include: cruise ship; day cruise ship; crewboat; and patrol and rescue boat designs.

For more information on John J. McMullen Assoc., Inc.
Circle 45 on Reader Service Card



MJP Waterjet Technology Powers Fast Ferries

Swedish company Marine Jet Power AB (MJP) designs waterjet propulsion systems with patented innovations, such as the floating driveshaft, that are ideal for fast ferry applications. The waterjets reportedly provide excellent thrust, good continuous operation and smooth and rapid speed changeover, and have been utilized by major fast ferry builders for newbuild projects, namely Marinteknik Shipbuilders, Austal Ships, Incat, FBM Marine and Kvaerner Energy. The waterjets are quality-assured by Det Norske Veritas, and are available in the MJP Mark II and MJP 300 series, with outputs ranging from 120 kW to 15,000 kW.

Niigata Engineering Co., Ltd. is MJP's licensee for the Japanese and Korean markets, and manufactures complete drive trains, including diesel engines, gearboxes, couplings, shaftings and waterjets, together with remote control systems and alarm monitoring systems. All Niigata-MJP waterjets up to 6,500 kW are reportedly tested in Niigata's new waterjet test tunnel, in order to check the performance of pump units in actual working conditions. Bird-Johnson Co. is the exclusive North American licensee of MJP, and works in cooperation with General Electric on high-powered marine propulsion systems. MJP is presently involved in an Advanced Waterjet Consortium together with GE and other companies.

For more information on Marine Jet
Circle 41 on Reader Service Card

U.S. Gulf Report: Offshore Fuels Hope

(Continued from page 35)

was known as Marathon-Le Tourneau, is now building a beefed up version of what has been called a "super jack-up" for its parent company, Rowan Drilling, at a cost of $170 million. The big rigs, dubbed Gorilla-class by Rowan, are designed for harsh environments and command day rates of $70,000 to $75,000, more than twice the rate for a typical jack-up in the Gulf.

"The *Gorilla V* will be able to work in 400 ft. (122 m) of water on 562-ft. (171.3 m) legs," said **Robert Rimlinger**, Rowan's project manager for the rig. "It will be 306 ft. (93.3 m) long, 300 ft. (91.4 m) wide and 36 ft. (11 m) deep, with a displacement of 28,006 tons." The Le Tourneau yard is getting inquiries from several potential new rig customers, according to Human Resources Manager **Mark Dearman**.

Money may not be the only consideration in rebuilding the rig fleet. Many of the facilities and much of the experience which contributed to building this unique offshore infrastructure in the first place are no longer available to the task. In the 1970s and 1980s, preeminent offshore fabricators included Brown & Root in Houston and J. Ray McDermott in Morgan City, La. Avondale Shipyard in New Orleans also built semis to the innovative designs of ODECO.

Brown & Root has been out of the marine construction business for several years. McDermott and Avondale have focused on capturing a share of the world shipbuilding and repair markets. A multiple cargo vessel or tanker contract could be more attractive than an order for a single semi because of the economies of duplication of the former, and the greater complexity of the latter.

Yards seemingly poised to provide drillers with new rigs would include: HAM/PMB, Pascagoula, Miss., and Galveston, Texas locations; Texas Dry Dock with four yards in South Texas; and Amfels at Brownsville, Texas.

Trinity Marine Group is upgrading facilities at Pascagoula, Miss., to accommodate blue water ship repair, which would also be available for major rig repair, according to **Charles A. Hall**, manager for sales and marketing of the group's Ship Repair & Conversion operations. "We could also work on new rig construction with other yards, such as Texas Dry Dock, fabricating hulls and other structural components to be assembled and outfitted elsewhere," he said.

HAM's Facility Manager at Galveston, **Jack Schmidt**, believes that newbuilding time may not be too far off. "With demand increasing and another year or so for Title XI loan guarantees, I wouldn't be surprised to see some moves (to new construction)," said Mr. **Schmidt**. "A major consideration would be the willingness of oil companies to enter into long-term contracts, and that is already happening with several major companies."

The Gulf OSV fleet consists of approximately 280 supply, towing and anchor handling vessels (generally known as workboats) of more than 150 ft. (45.7 m). For all practical purposes, all of them are working. There are hundreds more of crewboats, utility vessels and specialized craft, used for diving support and seismic survey work. Along with the rigs and platforms they serve, these vessels share ages approaching 20 years.

Operators of OSVs have thus far opted to spend substantial amounts for maintenance and repair of aging vessels, rather than commit to new construction.

Tidewater, Inc. spends more than $60 million annually — about a quarter of total operating cost — to keep them certifiable and productive.

The rule of thumb is that an OSV must generate a day rate of one-tenth of one percent of its cost consistently, over a 10-year period. Therefore, a new vessel costing $5.5 million — the average current cost projection for a 180-ft. (55-m) vessel — would have to command a day rate of $5,500. The current rate in the Gulf is about $4,000.

Newbuilding is a touchy subject among executives of vessel operating companies, one which they are reluctant to address publicly other than to proclaim their determination to wait out the market before commencing newbuilding.

However, at least some acknowledge privately that there is a point, perhaps $4,500 per day in the above scenario, at which new construction would be justified because of the expectation that a new vessel with enhanced performance and capabilities could generate an additional $1,000 in day rate in a $4,500 per day market environment.

"Operators are bringing us their drawings and specifications which generally call for vessels in the 205 to 225-ft. (62.5 to 68.6-m) range with greater payloads for deck and liquid cargoes and more sophisticated maneuvering and positioning capability required for deepwater work," said Mr. **Hall** of Trinity. "Starting from scratch, with designs and regulatory approvals, it would take 18 to 24 months to deliver a new workboat. I am sure a number of operators are well beyond that point by now."

Despite the fact that a wave of consolidations in the 1990s has resulted in 80 percent of the Gulf workboat fleet being concentrated in five companies, OSV operators must factor another reality into their newbuilding strategies.

The cost of entry into their business is relatively low. Combined with rising day rates and high demand, it could prove irresistible to entrepreneurs who might try to cash in on the appeal of new equipment at premium rates. It happened in the mid-1980s, resulting in massive overbuilding, repossessions and a glut of OSVs which has only been absorbed in the last 12 to 18 months.

Many yards are eager to take on the OSV market. These include Bollinger, Leevac and Service Marine in the Southern Louisiana area, and across the Gulf Coast, Trinity Marine Group's 20 facilities capable of building vessels' upkeep and/or components for assembly at another Trinity yard.

The rebuilding of the offshore fleets of rigs and vessels has been hopefully, and prematurely, predicted since the early 1990s. More than just an escalation of demand and day rates, operating companies, their shareholders and lenders have insisted on seeing an offshore rebound with legs, one sustained and sustainable for the long term.

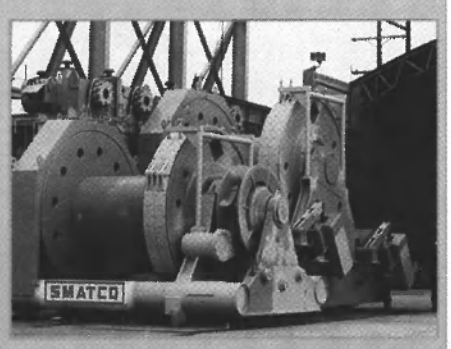
Now, as Salomon Brothers advises, the fundamentals seem to be in place for such a sustainable recovery. Commodity prices are being driven by real market forces of supply and demand, rather than geopolitical ones.

Record low levels of domestic energy reserves would appear to insulate the market from even the impact of a resumption of oil sales by Iraq.

New technologies have materially decreased the cost of finding oil and gas offshore.

Understandably cautious but strengthened by massive consolidation of assets in both the rig and vessel sectors, the people who make the decisions may finally be ready to begin the inevitable and formidable task of recreating the infrastructure which spawned the growth of the worldwide offshore industry nearly three decades ago.

Smatco Set To Cash In On Gulf Resurgence



Based on sales of recent offshore oil and gas leases in the Gulf of Mexico, it looks like the oil majors are planning for ultra-deep water exploration, providing the potential for greater untapped resources. Smatco Industries in Houma, La., is prepared for a resurgent Gulf of Mexico oil market. Smatco designed and built a winch capable of handling a unique, first-quarter 1996 job of Exxon's. Exxon planned to drill a well in the East Bank area of the Gulf of Mexico. Ensco Marine Co. of Broussard, La., was contracted by Exxon to furnish 12,000-hp M/V *Kodiak I* to perform anchor handling duties in a record setting deepwater location in the Gulf. In order for Ensco to perform this feat, it called upon Smatco for the winch. The mega-winch designed and built for Ensco is a Smatco model 140-EAW-1000/1000 double-drum waterfall winch. Each drum is powered by two 1,000-hp GE-752 DC electric motors capable of generating 2,000 hp per drum (4,000 hp total). The Smatco design allows for one million-lb. line drum on each drum, simultaneously, for a total of two million-lbs. of line pull. The winch also features a combination of four different braking systems.

For more information from Smatco
Circle 54 on Reader Service Card

Harris Fire Protection Equipment Receives DNV Approval

Harris Fire Protection Co., Inc., Baltimore, Md., has recently been certified by Det Norske Veritas (DNV) to survey and maintain fire extinguishing equipment and systems classed by the society. The company reported that it is also approved by the U.S. Coast Guard, American Bureau of Shipping and Lloyd's Register for the design, installation and service of fire protection systems. Harris' expertise includes systems utilizing detection through the use of addressable smoke and heat detectors, air sampling cargo smoke cabinets, and optical and gas detection. Suppression systems include those utilizing high/low pressure carbon dioxide, foam, sprinkler, water mist and halon alternatives.

For more information on Harris Fire Protection Co., Inc. Circle 2 on Reader Service Card

Jeffboat Names Barauskas VP

Ronald F. Barauskas

Ronald F. Barauskas has been named vice president of employee relations for Jeffboat, an inland shipbuilder located in Jeffersonville, Ind. Prior to accepting this position, Mr. **Barauskas** was employed by Rubbermaid in Wooster, Ohio. He has also held management positions with General Foods and Canada Packers Inc.

For more information on Jeffboat Circle 3 on Reader Service Card

Ritchie Named Christensen Shipyards Engineering Director

David H. Christensen, president of Christensen Shipyards, Ltd., Vancouver, Wash., announced the appointment of **Eric R. Ritchie** as the company's director of engineering. Mr. **Ritchie** has been employed by General Motors, General Electric and John Deere, and has worked as a private consultant.

For more information on Christensen Shipyards, Ltd. Circle 1 on Reader Service Card

Falk Assigns Brusk To New Orleans Office

John C. Brusk

John C. Brusk has been assigned to the New Orleans, La., district sales staff of The Falk Corporation, a division of the Sundstrand Corporation. In his new position, Mr. **Brusk** will join district sales manager **Mike Bouchon** in serving the company's customers in Louisiana, Mississippi, Alabama and Florida. Most recently, Mr. **Brusk** served as a distributor sales respresentative in the company's Milwaukee office.

For more information on The Falk Corp. Circle 5 on Reader Service Card

Drew Ameroid Announces Management Appointments


Paul DeVivo


Bob Rogaski


John Wolf

Drew Ameroid Marine, a division of Ashland Chemical, recently announced management appointments within the Boonton, N.J., company. **Paul DeVivo**, who began his career with Drew Marine as sales manager for the U.S. and Caribbean, has been named regional vice president for North and South America. **Bob Rogaski**, previously regional vice president, North and South America, has assumed global marketing responsibility as the division's new vice president of marketing. **John Wolf** has been named technical director and will direct Drew Ameroid's Quality and Product Stewardship programs. Mr. **Wolf** has served the past six years as vice president of marketing.

For more information on Drew Ameroid Marine
Circle 4 on Reader Service Card

Aqua Sled Names Russell Comptroller


Bob Russell

Bob Russell was recently named comptroller for Aqua Sled Inc. of Fort Worth, Texas. He will oversee all accounting and financial functions for the company, including reception and processing of sales orders. The company produces a 16.5-cu.-ft. cargo carrier that can be towed behind personal watercraft.

For more information on Aqua Sled
Circle 7 on Reader Service Card

Svanehøj International Names Jensen Sales Director


Hans Høyer Jensen

Svanehøj International AS, a Danish manufacturer of deepwell cargo pumps for LPG/ethylene, chemical and product tankers, has appointed **Han Høyer Jensen** as its sales director. He will be responsible for the company's sales drives worldwide, and will oversee the continued development and expansion of the range of electric drive deepwell cargo pumps and booster pumps. Prior to his new appointment, Mr. **Jensen** was the company's technical director responsible for production, logistics, design and R&D.

For more information on Svanehoj
Circle 8 on Reader Service Card

Coming in June:

MR/EN's Annual YEARBOOK Edition

ABB Turbocharger Expands U.S. Representation

ABB Turbocharger Co., with U.S. headquarters in North Brunswick, N.J., has announced the opening of service centers in Los Angeles and Miami.

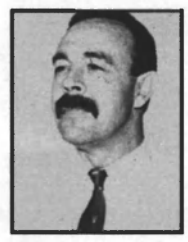
These service centers join the two previously established centers in Houston and Tacoma, which opened in 1994.

Thomas Federation, formerly engineering manager of Tecmarine Lines, Inc., will serve as general manager of the new Miami office. **Michael Kriner**, previously repair manager at Houston Ship Repair, Inc., will manage the Houston office. **Michael Stephen-McRae**, formerly employed as superintendent engineer at Princess Cruises, will manage the ABB Los Angeles service center. **Richard Cooke**, formerly general manager of Applied Diesel Engineering Inc., will serve as general manager of the ABB Tacoma office.

Each of the ABB service centers provides 24-hour service by trained technicians, including spare parts supply and shop repairs.

For more information on ABB Turbocharger
Circle 6 on Reader Service Card


Michael Kriner


Michael Stephen-McRae


Richard Cooke

Carrier Transicold Names Laubenstein VP

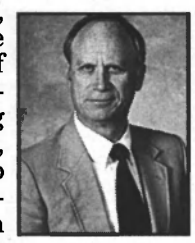

Richard Laubenstein

Richard Laubenstein has been named vice president of Carrier Transicold's Container Products group. He will lead the group's worldwide activities, including marketing, manufacturing and sales and service. Since 1991, Mr. **Laubenstein** has served as the company's plant manager, responsible for the Syracuse, N.Y., manufacturing operations. He succeeds **John Malloy**, who has been named vice president of Carrier Transicold's Global Truck/Trailer Group.

Carrier Transicold is a division of Carrier Corp., a large manufacturer of air conditioning and heating systems and equipment. Carrier is a subsidiary of United Technologies Corp.

For more information on Carrier Transicold
Circle 9 on Reader Service Card

Smith Named SeaArk Operations VP


Phil Smith

SeaArk Marine of Monticello, Ark., has named **Philip D. Smith** to the position of senior vice president of operations. Previous to his appointment, he worked as a manufacturing specialist for Winrock International, helping mid-sized manufacturers to increase their efficiency and productivity. Mr. **Smith** has also been employed by Teledine and The Crane Co. In his new position at SeaArk, he will work with all areas directly involved in the manufacturing process, including production, purchasing and engineering.

SeaArk Marine manufactures aluminum vessels up to 85 ft. (25.9 m) long.

For more information on SeaArk Marine
Circle 10 on Reader Service Card

Hamworthy Marine Ltd. Launches U.S. Company


Peter Pilon

Newly created marine equipment company Hamworthy Marine Inc. has appointed **Peter Pilon** as its first president. The company is headquartered in Atlanta, Ga., and has been created by U.K.-based Hamworthy Marine Ltd., which is part of the Powell Duffryn Group, to bolster sales of marine equipment in the U.S. and support existing U.S. customers. Mr. **Pilon**, a member of the Society of Naval Architects and Marine Engineers (SNAME), has more than 15 years of

mechanical engineering experience covering a wide range of activities, from systems design to dealing with servicing issues and spare parts. Hamworthy Marine Inc.'s goal is become a leading supplier of engine room pumps, starting air compressors, deepwell cargo pumps, environmental protection systems, rudder and maneuvering equipment/systems, and offshore and seismic-related equipment and services. The new company will act as a direct sales outlet for the U.K. company's three divisions, Hamworthy Pumps & Compressors, Hamworthy Marine Technology and Svanehøj International.

For more information on Hamworthy Marine Inc.
Circle 11 on Reader Service Card

Hamworthy Establishes Norwegian HQ

Terje Bjørnemo

In addition to establishing a U.S. office in Atlanta, Ga., the U.K.-based Hamworthy Marine Ltd., part of the Powell Duffryn Group, has established new headquarters in Norway. The new Norwegian business, Hamworthy Marine A/S, has been established to boost sales for Hamworthy's range of marine equipment in the country, as well as to serve existing customers in the area. **Terje Bjørnemo** has been named general manager of the company.

Mr. **Bjørnemo** has notable experience in the Norwegian marine market, having worked for Kvaerner Eureka A/S in a variety of managerial and engineering roles. He was most recently employed by the U.S.-based Keystone Group, which specializes in products for the LPG market worldwide.

For more information on Hamworthy Marine A/S
Circle 96 on Reader Service Card

MacFarlane Named Sonsub Managing Director For Asia-Pacific Region

Paul MacFarlane

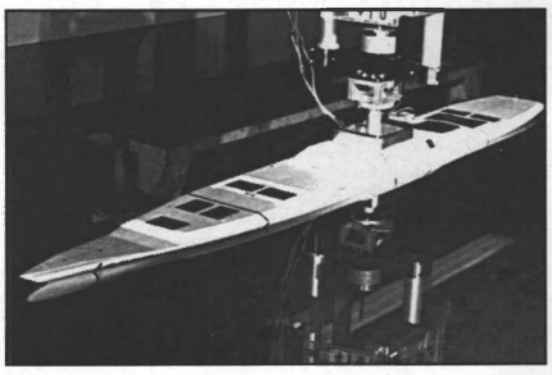
Paul MacFarlane has been named managing director of Sonsub International's Asia-Pacific regional center in Perth, Western Australia. He has extensive management and marketing experience working with a number of engineering and offshore construction companies in the region. The Perth facility acts as a focal center for administration, engineering and marketing opportunities for an extensive territory which includes the Middle East, the People's Republic of China, India, Southeast Asia, Australia and New Zealand. In his new position, Mr. **MacFarlane** will oversee this territory, and will work to further develop the company's role in the region. Sonsub develops and applies cost-effective solutions for subsea and hazardous environments. The company specializes in ROVs, subsea production systems, remote systems engineering, cable and pipeline burial and environmental remediation.

For more information on Sonsub
Circle 13 on Reader Service Card

Bagnell Awarded Navy's Meritorious Public Service Citation

Pictured (l. to r.) ore: Admiral **Marc Y.E. Pelaez**, chief of naval research· **Eugene A. Silva**, head of engineering, Office of Naval Rearch; **Daniel G. Bagnell**, chief naval architect, Band, Lavis and Assoc.; and **David R. Lavis**, CEO, Band, Lavis and Assoc.

On March 12, **Daniel G. Bagnell**, chief naval architect, Band, Lavis and Associates, Inc. (BLA), was presented with a Meritorious Public Service Citation by Admiral **Marc Y.E. Pelaez**, chief of naval research, Office of Naval Research (ONR). This award is reportedly the highest honor ever presented to a civilian by Admiral **Pelaez**'s office. Mr. **Bagnell** was recognized for his exemplary efforts in ship design work for ONR -- in particular, for his work on developing the Arsenal Ship under the direction of **Eugene A. Silva**, Ph.D., head of ONR's Engineering, Materials and Physical Science & Technology department.



Pictured is a model of the ONR's Arsenal Ship undergoing tank tests.

BLA, a naval architecture and marine engineering firm located in Severna Park, Md., provides advanced marine technology services to government and commercial marine interests worldwide.

For more information on Band, Lavis and Assoc., Inc.
Circle 14 on Reader Service Card

Inventory Locator Service Names Langsen VP

Bruce Langsen has been named executive vice president at Inventory Locator Service, Inc. (ILS), a Memphis, Tenn., company which provides an electronic marketplace for buyers and sellers of commercial marine and aviation parts and services. Mr. **Langsen** joined ILS in 1993 as the vice president of marketing and sales. **Eric E. Anderson**, who has been president of the company since 1993, has assumed the additional position of executive vice president of Aviall, Inc., a company which carries responsibilities for both Aviall Distribution Services and ILS.

For more information on Inventory Locator Service
Circle 24 on Reader Service Card

Southwest Marine Exec Recognized With Risk Management Award

Ellen Yinck, corporate director of Risk Management and Benefits for Southwest Marine Inc., a San Diego, Calif.-based yard, was named "Risk Manager of the Year" by the San Diego chapter of the Risk and Insurance Management Society Inc. (RIMS). The newly created award was instituted to recognize the outstanding work of risk managers from local San Diego companies. Companies with membership in RIMS include San Diego Transit Corp. and National Steel and Shipbuilding Co. (NASSCO).

For more information on Southwest Marine Inc.
Circle 27 on Reader Service Card

Resolution Management Consultants Opens South Carolina Office

Resolution Management Consultants Inc., a firm specializing in providing program management and dispute resolution services to the construction, shipbuilding and repair and cruise line industries, announced the opening of an office in Mount Pleasant, S.C. The new Charleston-area office will join the company's existing offices in Norcross, Ga., and Marlton, N.J.

The company's staff is reportedly experienced in providing expert witness testimony in negotiations, arbitration and litigation, and has lectured on scheduling and cost control, claims avoidance and dispute resolution. Members of the marine group have also reportedly furnished contract and schedule development services, plan and specification review, on-site monitoring and claims avoidance services to state marine transportation agencies and private companies for ferries and riverboats.

Jerry O'Keefe directs the company's Charleston operation, **Joe Meredith** heads up the Norcross office, and the Marlton office runs under the direction of **Tom Cummings**.

For more information on
Resolution Management Consultants Inc.
Circle 25 on Reader Service Card

OTECH Announces ISO 9002 Certification

The Harvey, La., shipyard Ocean Technical Services (OTECH) has announced its ISO 9002 certification, applicable to the provision of marine vessel building, conversion and repair services by ABS Quality Evaluations, Inc. (ABS QE). The yard is reportedly the first in the state to obtain the certification for both construction and repair services by ABS QE. Responding to the implementation of the new system, **Michael Wildman**, OTECH quality assurance manager, stated: "Accomplishing certification had entailed two years of dedicated effort toward a quality system that will continually improve the products and services that OTECH provides."

For more information on Ocean Technical Services Circle 26 on Reader Service Card

ESI, Inc. Named U.S. Distributor Of Fuel Decontamination Units

In an effort to develop a U.S. presence, De-Bug Worldwide Limited of New Zealand, a provider of fuel microbial decontamination units, has named Environmental Solutions International, Inc., of Reston, Va., (ESI) as its U.S. product distributor. De-Bug's decontamination units employ magnetic technology to provide solutions to the problems associated with bacteria growth in fuel and circulating oils. According to the company, it has reportedly installed more than 20,000 units in commercial and recreational marine equipment applications. ESI will reportedly initiate a reduced pricing structure and distribution strategy to make the units cost-effective as a preventative maintenance product for all fuel systems.

For more information on Environmental Solutions International, Inc. Circle 28 on Reader Service Card

Frost Named Seaclear Marketing/Sales Manager

Seaclear Industries Inc., a Woodinville, Wash., manufacturer of laminated window defoggers and de-icers, has named **Eric L. Frost** to the position of marketing and sales manager. His primary duties include strengthening the company's growing dealer network in North America, and developing relations with aggressive international distributors.

Seaclear reportedly has supplied its products to the U.S. Coast Guard, U.S. Navy and NOAA, as well as to fishing, ferry and workboat owners.

For more information on Seaclear Industries Inc. Circle 29 on Reader Service Card

Celebrity Cruises Names Sbarsky Senior Marketing VP

Richard E. Sasso, president and CEO of Celebrity Cruises Inc., has announced that **Arthur A. Sbarsky** will serve as the company's senior vice president of marketing, effective April 15. Mr. **Sbarsky** has held senior marketing positions within the travel and hospitality industry for the past 17 years, and prior to his new appointment, served as senior vice president of marketing for Crystal Cruises since the line's inception in 1988.

Celebrity Cruises' fourth and largest luxury ship — 70,000-gt *Century* — debuted in December 1995. With the upcoming introduction of 73,000-gt *Galaxy* this year, followed by the emergence of liner *Mercury* next year, the cruise line's fleet will total more than 9,000 berths.

AMSC Appoints New SKYCELL Team Members

American Mobile Satellite Corp. (AMSC) has announced the addition of four new members to the SKYCELL Satellite Telephone Service Maritime Group. **Kelly Dressier,** a former COMSAT Mobile Communications employee, has joined the company as account manager for the mid-Atlantic and Great Lakes region. **Fred Wilder**, a U.S. Coast Guard captain and telecommunications expert, has joined the company as senior account manager for the Southeast region. Previously employed as a sales manager for two marine trade journals, **Mike Lodato** has joined AMSC as account manager for the Gulf coast region. AMSC has also announced that **Andy Cool** has been named to the posi-

tion of SKYCELL maritime dealer representative. With AMSC since July 1995, he was previously responsible for managing inbound telemarketing leads, and in his new position, will coordinate dealer training seminars and manage the sales and marketing support for all dealer locations.

For more information on American Mobile Satellite Corp.
Circle 33 on Reader Service Card

Rieke Recognized For Geoscience/Petroleum Engineering Work

The Russian Academy of Natural Sciences has awarded University of Southwestern Louisiana professor **Herman Rieke** its Kapitsa Gold Medal of Honor in recognition of his lifetime of academic achievements in the fields of geoscience and petroleum engineering. This award is reportedly comparable in distinction to a Nobel Prize, and is awarded in fields such as engineering, where no Nobel Prize exists.

Dr. **Rieke**'s research has helped explain the origin and maintenance of high subsurface formation pressures that need to be controlled while drilling for oil and gas in geologically young basins, making it easier for companies to understand where to drill for oil and gas. The other 1995 Kaptisa award recipient, **George Olah**, a professor at the University of Southern California, was also awarded the Nobel Prize in chemistry last year.

Aker Omega Announces Managerial Appointments

Aker Omega, Inc., a Houston, Texas-based provider of quality project management, engineering and construction management services for the offshore oil, gas and marine industries, wholly owned by Aker Oil & Gas Technology, Inc., has recently announced new managerial appointments. **W. Mike Isenhower** has joined the company as manager of structural engineering, responsible for the company's structural engineering design and drafting of all fixed and floating production marine terminals.

Lew C. Skaug has joined Aker Omega as manager of facilities engineering, responsible for overall management and technical guidance of his department, including proposals, project management, planning and forecasts, project controls and business development. **George W. Mock**, former facilities engineering manager, has been appointed senior project manager within the Aker Omega organization, in which capacity he will organize project and construction management assignments.

For more information on Aker Omega, Inc.
Circle 34 on Reader Service Card

B.C. Yard Completes ISO Certification Process

Nanaimo Shipyard Ltd., British Columbia, Canada, has completed the ISO 9002 certification process. The certification is applicable to the manufacture and service/repairs of vessels and other machinery. Sister company Alberni Engineering is also reportedly in the process of comforming to ISO quality standards, and anticipates award of a certificate in the near future.

For more information on Nanaimo Shipyard Ltd.
Circle 35 on Reader Service Card

Int'l Yard Rep Firm Opens Houston Office

Al Stanford, president of T.A.S.T. Corporation, announced that the company has opened a second office, located in Houston, Texas, to look after the increase in ship repair and offshore business in the southern U.S. states. **Chris Stanford** will manage the new office.

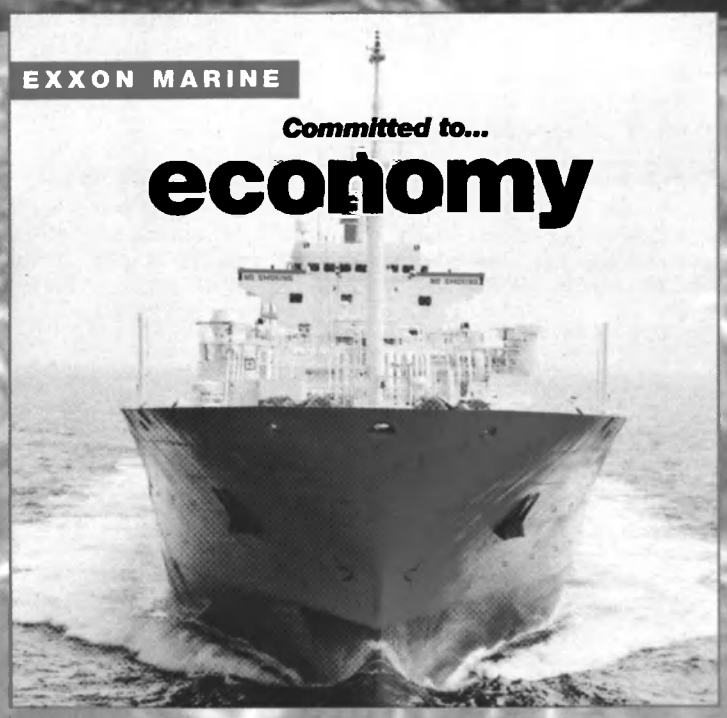
For more information on T.A.S.T. Corp.
Circle 36 on Reader Service Card

Stinson Joins Thrustmaster


Rick Stinson

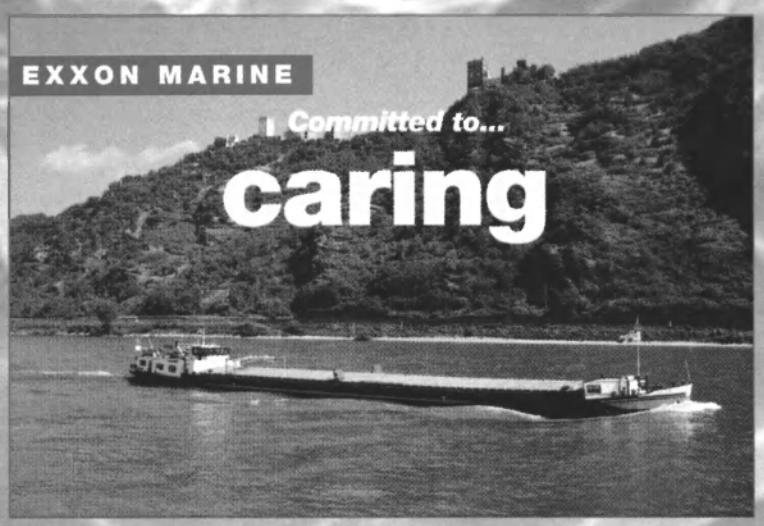
Thrustmaster of Texas, Inc. announced that **Rick Stinson** has joined its domestic sales force. Previously employed by Schottel of North America and Iveco Aifo, he has been involved in the marine industry for 18 years. He is now responsible for sales of the company's line of steerable thrusters and tunnel thruster systems in North America, Canada and the Caribbean.

For more information
Circle 93 on Reader Service Card



EXXON

EXXON MARINE



The Commitment Continues...

Commitment to provide our customers with quality service and lubricants. EXXON provides a complete line of high-performance products for the marine industry. In addition, products such as our biodegradable UNIVIS® BIO 40 are an example of EXXON marine quality in harmony with environmental awareness. EXXON also offers a wide range of synthetic lubricants designed to meet your unique performance requirements. For more information regarding EXXON products and services call 1-800-44-EXXON.

Angus Chemical

Circle 89 on Reader Service Card

Angus Chemical is a producer of nitroparaffins and their derivatives. These specialty chemicals are used in a range of applications, including in fuel systems; paints, coatings and inks; water treatment; personal care products; and metal workings fluids. Angus' Antimicrobial Agent Fuelsaver is used to kill microbes and prevent their regrowth to reduce contamination of diesel fuel systems. Gasaver Antimicrobial Agent provides the same type of protection for gasoline systems.

AS&M

Circle 19 on Reader Service Card

Analytical Services & Materials, Inc. (AS&M) is a provider of fuel and lube oil analysis. AS&M has an ISO 9002 - certified lab and uses state-of-the-art equipment. AS&M has experts with extensive marine experience to interpret fuel analysis results and offer advice.

BP Marine

Circle 20 on Reader Service Card

BP Marine is a supplier of marine lubricants and fuels. The company's product range — which includes synthetic oils — can be supplied in 8 ports across 80 countries. This backed by worldwide technical suppo and the Enercare Lubricant Analy service. BP is planning to launch new trunk piston engine oil called I HFX, which reportedly reduces th problem of sludge deposits in trun piston engines using residual fuel.

Brookfield

Circle 69 on Reader Service Card

Available from Brookfield is the com pany's 1996 color catalog, describin its line of viscometers and rheometer This 40-page users' guide contain application and product information o viscosity measuring instruments material specific adapters and othe accessories for measurement of liquids slurries, pastes, creams and gels.

Cambridge Applied Systems

Circle 72 on Reader Service Card

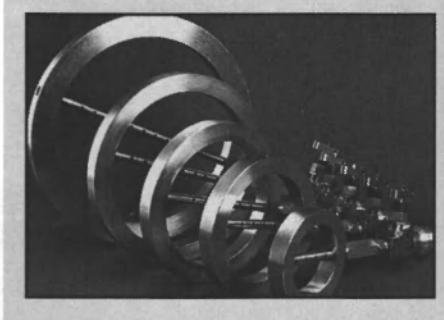
Cambridge Applied Systems (CAS), a provider of solutions for viscosity mea surement and control, has announced the availability of the TCV200 and TCV214 shipboard viscometers. These microprocessor-based viscometers reportedly provide fully automated shipboard measurement of 9250 and 2104 lubricants. Based on CAS' patented technology, the TCV200 and TCV214 viscometers are distinguished by a single moving part — a highly polished, stainless steel piston.

Cartel Products, Inc.

Circle 125 on Reader Service Card

Cartel Petroleum Products manufactures multi-functional diesel fuel treatments for marine applications. Cartel's marine-grade diesel fuel treatments reportedly treat for: algae; wate; fuel lubricity; corrosion; and cetane. Cartel's additive packages

Fuel Oil Bunker Sampling System Available From Kittiwake



West Sussex-based Kittiwake Developments Ltd. offers a fuel oil bunker sampling system which features standards fitting to BS, ISO, DIN, ANSI or NIS flange specification. "Shipowners have come to realize the benefits that can be obtained — in terms of cost, efficiency and safety — from an early analysis of the fuel oil delivery. A simple drip sampler is the most common type of bunker fuel sampler available today," said **Chris Leigh-Jones**, managing director of Kittiwake.

For more information on Kittiwake Circle 71 on Reader Service Card

prease the performance of the diesel fuel, thus increas- fuel economy while decreasing emissions/ smoke.

Castrol

Circle 75 on Reader Service Card

astrol Marine has developed a range of lubricants which portedly offers the benefits of extended oil drain inter- ls and enhanced protection against the conditions nich can lead to bore polishing in high-speed marine esel engines. Castrol Marine HLX is available in SAE and SAE 40 versions, with an alkalinity level of 13.5 ase Number. The product is fully approved by MTU as Type 2 Monograde Oil, and meets the performance lev- s required for the following specifications: European otor Manufacturers Specification CCMC D5; MAN 270; nd Mercedes Benz 228.2, including OM 364A. Castrol larine HLX will reportedly benefit companies operating igh-speed marine diesel engines where SHPD perfor- hance is required. Its alkalinity level makes it suitable pr applications employing fuels with a sulfur content in xcess of .5 percent.

Chevron

Circle 81 on Reader Service Card

hevron markets a variety of premium marine lubricants nternationally. These include Chevron Marine Engine Oils Delo 477 (SAE 20W-40 and 40) superior high disper- ancy, high alkalinity, 17 TBN engine oils. They are for se in diesel engines in towboats, tugs, workboats, redges, and in other marine industrial engine applica- ions requiring a zinc-free oil. Also available from hevron are its Marine Engine Oils Delo 1000, 2000, 3000 nd 3400 Marine (SAE 30 and 40). These are high quali- y engine oils developed for use in a wide variety of medi- m-speed trunk piston engines, including the latest esign, high output engines burning marine diesel oils, or residual fuels with low, moderate, or high sulfur content. In addition, Chevron offers Marine Engine Oil Symbol 9250, a high quality, high performance engine oil which fully complies with Symbol 9250 of the U.S. Military spec- ification MIL-L-9000H.

De-Bug USA

Circle 66 on Reader Service Card

De-Bug USA has announced a new series of products in its line of fuel conditioners. The FC500 and FC1000, in conjunction with De-Bug fuel decontamination units, utilize the same patented magnetic technology that the company has marketed for the treatment and conditioning of diesel and other fuels. The FC units' high quality marine grade pump and valves reportedly work with the De-Bug unit to recycle fuel without running the engine, thus controlling and eliminating microbial contaminants in the fuel. The new models are designed for use in fuel systems which are used infrequently, such as storage tanks, standby power generators and in any vessel that remains idle for extended periods of time.

Drew Marine

Circle 21 on Reader Service Card

Fuel treatment diagnostics — a major initiative of

Leak Detection Method Offered

Tracer Products — a division of Spectronics Corporation, a leader in ultraviolet technology — has announced the availability of a leak detection method that is reportedly effective for all marine engine fluid, air conditioning and refrigeration applications. This method is said to eliminate equipment failure and slash downtime of all circulating fluid systems, including engine oil, coolant, gasoline and diesel fuels, transmission lubricants, hydraulic fluids and refrigerants.

For more information on Tracer Products
Circle 74 on Reader Service Card

Ashland Chemical's Drew Marine Division — is an energy management concept promoting the cost-effective use of fuel additives for specific, confirmed problems. Decisions about handling, storage and usage can be made based upon shipboard analysis of individual bunkers using Drew Marine's Mar-Tec sampling and testing equipment. Further analysis of bunker samples using shoreside laboratory techniques — available through Drew Marine's Pace Fuel Evaluation program — provides the more extensive data needed to minimize problems with the optimal combination of mechanical and chemical treatments.

Ferrous Corporation

Circle 23 on Reader Service Card

Ferrous Corporation supplies a variety of fuel additives designed to reduce problems related to fuel storage, handling and combustion. Ferrous products reportedly solve problems resulting from fuel instability and microbial growth, as well as high carbon residue, asphaltenes and metals in the fuel. All Ferrous products have a high percentage of active ingredients and are backed by expert technical service. The company's partnerships in Europe, Latin America and Asia facilitate product delivery and service worldwide.

Flouramics Inc.

Circle 22 on Reader Service Card

According to U.S. government results reported by the company, Tufoil, manufactured by Flouramics, Inc., has a surface friction of .029. The Canadian government reportedly found the lubricant increased cranking speed by 10 percent.

ITT Standard

Circle 65 on Reader Service Card

ITT Standard offers two different types of ammonia condensers for efficient cooling in corrosive marine environments. Shell-and-tube models offer a secure design featuring no gasket contact with the ammonia and resistance to salt water corrosion, and new welded plate condensers feature quality construction with laser welded titanium plates for reported longer life, operating efficiency and lower maintenance. ITT Standard, a unit of ITT Fluid Technology Corporation, is a supplier of heat transfer technology to commercial markets, as well as to the U.S. Navy.

MagnaFilter International, Inc.

Circle 86 on Reader Service Card

Available from MagnaFilter International, Inc. is the MagnaFilter Oil Filter Magnatizer. In a .010-in. thick steel band, the product encircles disposable filter canisters to remove wear-causing ferrous particles and solids, soot and silicon from engine oil in vehicles and off-road equipment, and from hydraulic fluids in compressors and manufacturing equipment. Reportedly, the magnets are long lasting and will withstand temperatures of up to 300 degrees F. The unit is removed at each maintenance change, and reinstalled on the new filter. Field tests in extreme applications reportedly show an average 63 percent reduction 15-microns and below ferrous particles that cause most engine wear; 52 percent less solids, a reduction in soot and silicon that clog filters and cause more abrasive wear; and 50 percent less wear-causing particles such as chromium, molybdenum, nickel, aluminum, copper, lead and boron, which contribute to further wear of components and parts.

Marykate

Circle 70 on Reader Service Card

Marykate offers its Year-Round Fuel Treatment and Stabilizer, featuring the patented Duralt Formula which reportedly reduces exhaust valve and set recession, lowers octane requirement to reduce knock, fights rust and corrosion and enhances oxidation stability for fuel storage for up to eight months.

Mobil

Circle 126 on Reader Service Card

Mobil's Mobilgard 30 and 40 series oils reportedly protect medium-speed diesel engines from the adverse effects of heavy fuel contamination. Residual fuel is a common contaminant of oil in medium-speed diesel engines, and it often causes excessive piston deposits and sludge. Both Mobilgard 30 and 40 series oils are specially formulated to be compatible with residual fuel.

Oronite — Chevron Chemical

Circle 80 on Reader Service Card

Oronite, a division of Chevron Chemical Company, is a leading manufacturer of lubricant and fuel additives for use in all types of diesel, gasoline and natural gas engines. In addition, the company manufactures additives for lubricants used in tractor, gear and hydraulic systems, as well as lubricant building blocks such as polyalphaolefins and alkylates. Oronite's product line includes: OLOA lubricating oil additives; OGA/ODA gasoline/diesel fuel additives; synfluid polyalphaolefins; and ZEROL refrigeration oils.

Ottomans AS

Circle 85 on Reader Service Card

Ottomans AS deals in petrol, distillate and residual fuel oil, with offices in Sortland and Oslo, Norway, in addition to Germany and Denmark. Ottomans is the exclusive authorized distributor of DFT Hammerdown fuel conditioners in Europe for international shipping. The product family of fuel conditioners treats a variety of problems related to the quality of fuel oil. For gasoline, distillate or residual fuel oil service, the products are designed to reduce operational costs, enhance safety and improve combustion. For marine applications, Hammerdown is available for distillate fuel and residual oil service.

Research Laboratories, Inc.

Circle 87 on Reader Service Card

Research Laboratories, Inc. specializes in the testing of all fuel grades from refinery crude through jobber to enduser fuels, including: heating oil; diesel; aviation and marine fuel; and gasoline. Fuel analysis documentation reports EPA compliance and counter liability. Sulfur, cetane index, reid vapor pressure, aromatics, octane and petroleum requirements for emergency generators and stored fuel are available. Special analysis packages are offered with sampling service.

Royal Purple

Circle 90 on Reader Service Card

Royal Purple offers Maxoil motor oil which features Synerlec — slippery, super-tough synthetic film, which reportedly can not be squeezed out of pressure areas. Synerlec adheres to engine surfaces and remains there after shutdown, reportedly providing instant protection on start-up. Reported benefits of Maxoil include: corrosion and wear protection; increased hp; and API warranty approval. Maxoil is recommended for gasoline four-cycle engines and diesel two and four-cycle engines.

Shell

Circle 84 on Reader Service Card

Shell offers its Spot Test Kit intended for marine, power generation and industrial markets, and developed to provide a field method for ensuring the stability and compatibility of residual fuel oils. Key features of the kit include: fuel stability and compatibility assessment; cost effective testing, use of established Shell methods; simple and rapid visual analysis; rugged construction for use at sea or on land; a portable, lightweight, self-contained unit suitable for the non-specialist user; and automatic dual voltage control. To determine fuel stability, a sample is first diluted with hexadecane and stored at 95 degrees C for one hour. A drop of the mixture is then allowed to spread on a filter paper. The spot formed is washed with heptane and examined visually for presence of a dark inner ring. The absence of such a ring indicates that the fuel is stable. For compatibility, the component fuels are blended as required, and a procedure similar to the stability test is carried out. In this case, the absence of an inner ring indicates that the components of the blend are compatible.

Texaco

Circle 68 on Reader Service Card

Texaco has introduced a lubrication management program for commercial and industrial lubricant users called Texaco Fluid Management, as announced by **S. Shariq Yosufzai**, president of Texaco Lubricants Company (TLC). The program reportedly provides responsible, cost-effective alternatives for recycling used lubricants, while helping prevent costly equipment downtime and prolonging lubricant life in machinery. "With Texaco Fluid Management, TLC is helping customers save money and improve the efficiency and effectiveness of their

quipment and their operations, while racticing environmental responsibili- by prolonging the lubricant's life, hich reduces the amount of used roduct disposal," said Mr. **Yosufzai.**

TF Purifiner, Inc.

Circle 88 on Reader Service Card

TF Purifiner, Inc. (TFP) develops, manufactures and markets technology used to preserve the useful life of lubricating oil used in gas and diesel engines, as well as hydraulic fluid used in industrial machinery. The company's core product is the TF Purifiner onboard oil purification system which, during operation of an engine or machinery, continually extracts from the oil solid particles down to one micron, as well as liquid contaminants (water, fuel and coolant). This reportedly protects and extends the useful life of the oil, industrial equipment and automotive engines.

The company markets to industrial users of hydraulic presses, transportation and marine industries, construction and mining companies, and government agencies and corporations with large fleets of vehicles. Manufacturing plants, large transportation vehicles, heavy off-road equipment, boats, locomotives and automobiles can reportedly derive benefits from the use of the oil purification system.

The TF Purifiner is attached to industrial-use engines (power generators, pumps), transportation vehicles (diesel trucks, ships/locomotives) and other types of engines (pleasure boats, automobiles).

The full product line includes: the TF Purifiner onboard oil purification system; replacement filters; and industrial batch system (a standalone unit designed to recycle hydraulic fluid).

Enviro Response Introduces Fuel Mag To U.S. Market

De-Bug USA, a division of Enviro Products, Inc., which manufactures and markets magnetic fluid conditioners (MFCs), has signed a distribution agreement with Fuel Mag International of New Zealand, to be the exclusive North and South America distributor for the Fuel Mag line of fuel decontamination devices.

The new products, which eliminate the problem of microbial contamination in diesel fuel, represent the next generation of MFCs currently being marketed to the commercial, military and recreational marine industries, as well as to the trucking and transportation industries.

The first unit in the series is the LG-X400. It is designed to be installed in engines of up to 400 hp, with fuel line sizes of 1/4, 3/8 and 1/2-in. and fuel flow rates of up to 90 gallons per hour. The LG-X 1200 and 200 units — larger versions of the new design — are currently under construction. These are intended for larger engines (8,000 hp and up).

For more information from Enviro Response
Circle 124 on Reader Service Card

Fuel-Tek Offers Video On Combustion Chemistry

Fuel-Tek has announced the completion and availability of a seven-minute video highlighting Ferox Combustion Managers. This new approach to combustion chemistry was featured in a segment that appeared on the Discovery Channel. It explains what Ferox is and how it works to reduce fuel consumption and emissions. Fuel-Tek is a distributor of the Ferox product line.

For a copy of the video
Circle 128 on Reader Service Card

RoRo '96 Reflects Peak Activity Of Sector Orderbook

The RoRo '96 Conference and Exhibition is scheduled to take place in Lübeck, Germany, on May 21-23. Anticipation for the event is growing, as the world orderbook for this niche totals more than 80 new vessels. According to conference organizers, the location for the event reflects the Port of Lübeck's utilization of advanced technologies for RoRo handling, and the frequenting of new generation RoRo vessels and ferries in Lübeck and Travemünde harbors.

An extensive conference program has been arranged, with an emphasis placed on a few key issues, namely: the debate over use of fast or conventional tonnage; new RoRo investments, such as large, deepsea RoRo carriers and RoPax vessels; port development planning and terminal development; and safety.

According to **Richard A.B. Sim**, RoRo '96 conference director, "There's going to be talking about: should the RoRo ships be fast, or should they be conventional?" He added, "Kvaerner Masa-Yards' paper does analyze will it be fast or slow ... People are also going to talk about whether feeder ships will be RoRo or LoLo."

Notable presenters at the conference include representatives from the world's most influential design sources, including **Phil Hercus** of Incat Designs, and **Kai Levander** of Kvaerner Masa, who will explain why his company recently ordered fast newbuildings after extensively evaluating existing tonnage. Discussions on new sector investments will include presentations on shortsea vessels, such as Sweden's SweFerry, and deepsea vessels, such as Wilhelmsen Lines' MK III vessel. Grimaldi's series of large multi-purpose carriers will also be discussed, with participation by Fincantieri.

Another promising conference presentation concerns the replacement of three large trailer ships of U.S.-based Totem Ocean Trailer Express with a new design which has high military utility. The discussion is likely to center on National Steel and Shipbuilding Co.'s (NASSCO) fourth order for a RoRo-equipped strategic sealift ship, which parallels four RoRo contracts awarded to Avondale Shipyards for strategic sealift vessels. A paper will discuss the 35,000-gt, four-freight deck RoPax vessel for SweFerry, which is being built by Astilleros Españoles — whose yards have reportedly attracted two more such contracts from Cenargo, with an option for two additional vessels.

A visit to Lübeck's port facilities will include inspections of TT Line's *Robin Hood*, held up to be the world's most environmentally-conscious RoRo ship, and the Finncarriers-operated *FinnPartner*, a large combi-RoRo. Several rounds on RoRo survivability will be heard, including safety presentations by the U.K. Marine Safety Agency, SNAME's RoRo Safety Panel, and Det Norske Veritas. In a pre-show interview with *MR/EN*, Mr. **Sim** offered evidence as to the growing RoRo sector. "You start off in a mode of transport and you don't know where you're going," he stated, continuing by discussing the market's evolution. According to him, in the heady days of RoRo shows, "Everybody wanted large RoRos to ship heavy equipment out to the Middle East." He stated that today's show delegates are experienced RoRo and LoLo operators. "They're not looking to go into RoRos ... These people are now looking at the MK III vessels."

He continued, "These people know the trade. The trade is being used in a much more productive way and this is being reflected in the number of ships ordered ... New ships are being ordered every week." The conference director added that "heavy input from the operators" is expected at RoRo '96, which is good news for the equipment suppliers who will be in attendance at the concurrent exhibition.

For more information, contact the RoRo Conference Secretariat, BML Business Meetings Ltd., 2 Station Rd., Rickmansworth, Hertfordshire, WC3 1QP, U.K., tel: +44 1923 7766363; fax: +44 1923 777206.

TT Line's two ferries — *Robin Hood* and *Nils Dache* — are equipped with systems that reduce pollution from their engines.

Recent Ship Sales

This report, compiled by Shipping Intelligence, Inc., a New York maritime consulting firm, tracks sale prices of secondhand bulk carriers and tankers. For more information, call (212) 997-0966.

Date Reported	Vessel Name	Vessel Type	DWT	Year Built	Sale Price (M$)
/15/96	Magda P	Bulker	11,598	76	$2.2
/15/96	Marygold	Bulker	11,964	76	$2.3
/1/96	Cidade De Sao Paulo	Bulker	15,680	79	$3.2
/15/96	Orchis Island	Bulker	23,418	85	$9.3
/15/96	Ocean Grace	Bulker	23,945	80	$6
/22/96	Copernico	Bulker	25,700	71	$1.47
/15/96	Danakos	Bulker	27,000	72	$3.1
/18/96	Vienna Sky	Bulker	27,200	74	$3
/18/96	Salvador 1	Bulker	27,243	74	$2.6
/1/96	Mathildaki	Bulker	37,616	76	$6
/15/96	Carlo M	Bulker	37,657	77	$6.9
/15/96	Steel Flower	Bulker	39,925	77	$5
/15/96	Bareli	Bulker	41,800	86	$15.6
/15/96	Bergen Malaya	Bulker	42,069	85	$13.9
/18/96	Fuji Angel	Bulker	42,512	85	$13.1
/2/96	Maritime Conqueror	Bulker	43,370	83	$12.4
/15/96	Toscana	Bulker	50,202	76	$7.3
3/22/96	Co-op Express	Bulker	53,000	83	$10
4/4/96	Centurion	Bulker	54,311	80	$7.2
3/22/96	Star of Magellan	Bulker	60,000	76	$4.3
3/29/96	Captain Forever	Bulker	63,000	81	$10.9
3/22/96	Crystal Grace	Bulker	64,000	86	$15.9
3/18/96	Rubin Prosper	Bulker	67,478	84	$13
4/1/96	Iron Shortland	Bulker	107,140	79	$7.3
3/29/96	Oceanic Mindoro	Bulker	123,000	75	$5.7
3/18/96	Mineral Nippon	Bulker	194,744	84	$20.5
4/1/96	Shiokaze	Tanker	16,983	80	$7.5
4/4/96	Valbruna	Tanker	19,994	81	$8
3/18/96	Red Sea	Tanker	29,680	73	$4
3/18/96	Nervi	Tanker	31,351	74	$3.1
3/22/96	Fearless	Tanker	31,692	77	$7
4/15/96	Team Trinta	Tanker	35,731	80	$11.5
4/1/96	Product King	Tanker	36,572	73	$3.1
4/15/96	Seapride II	Tanker	38,134	74	$3.8
3/18/96	Timur Endurance	Tanker	38,705	81	$10.5
4/15/96	Star Orchid	Tanker	96,530	76	$6.5
3/25/96	Nissos Amorgos	Tanker	97,172	88	$30
3/22/96	Konck Nevis	Tanker	135,000	75	$7.6
3/29/96	Atheras Bay	Tanker	140,037	75	$4.6
4/15/96	Cosmos Andromeda	Tanker	238,500	84	$20
3/22/96	General Monarch	Tanker	275,993	90	$52

Star Clippers To Use MMS Fleet Management Applications

Star Clippers has chosen Marine Management Systems' (MMS) Fleet Manager series for its PC-based fleet management applications. Star Clippers, a cruise company located in Coral Gables, Fla., chose FleetWorks Inventory and Maintenance systems for its two ships, *Star Clipper* and *Star Flyer* — reportedly the largest clipper ships ever built. The vessels were designed in the Netherlands and modeled after 19th century clipper ships. Each 3-gt ship is 360 ft. (110 m) long with 3.025 gt.

Prior to implementing MMS' FleetWorks Inventory and Maintenance system, Star Clippers completed all managerial work manually. FleetWorks has reportedly allowed Star Clippers to streamline its operations and reduce time spent on managing spare parts inventory, tracking equipment history, requisitioning and scheduling maintenance.

For more information on MMS
Circle 113 on Reader Service Card

Furuno Unveils FR8001 Series Commercial Radars

Furuno, a leader in advanced marine electronics systems, has introduced the FR8001 Series Radars, a line of 12-in., X-band, commercial radars designed to meet the most stringent requirements of commercial mariners and fishermen. The FR8001 Series, which replaces the FR8000D/DA Series, consists of the FR8051, FR8111 and FR8251. The series features four operating modes — Head-up; North-up; Course-up; and True Motion — to give users chart reference and bearings. Also available is the FMD8010 radar remote display for second station use. Features include enhanced visual target detection ability, automatic control of tuning, interference rejection and sea clutter circuitry for optimum performance under all conditions.

For more information on Furuno
Circle 79 on Reader Service Card

PROPULSION UPDATE

Krupp MaK Introduces M 25 Long-Stroke Engine

German diesel engine manufacturer Krupp MaK, Kiel, one of the world leaders in the medium speed range, has introduced the new M 25 long-stroke engine covering the output range from 1,740 to 2,700 kW. The M 25 design — available in six, eight and nine-cylinder in-line versions — is the latest in a program introduced by the company starting in the early 1990s. Krupp MaK introduced the M 20 in 1992, which has an output range of between 1,020 and 1,710 kW. To date, the company reports a total of 320 units are sold, 160 of which are in service with the longest engine operating time standing at 18,000 hrs. The M 32 was introduced in 1994 with an output range of between 2,640 to 7,680 kW. To date, 145 units are sold, with the longest running time being 6,000 hrs. There will also be a V-form M 32 unit (12 and 16-cylinders) introduced during the latter part of this year. This engine line-up gives Krupp MaK a total output range of between 1,020 and 10,000 kW. For the new M 25 version, four engines have already been sold for installation into three 3,000-dwt, 12/14-knot general cargo vessels building at Scheepswerf Peters BV, Kampen, in the Netherlands for Dutch owner Switynkl. An additional unit has been sold for installation into a fishing vessel, also for the Dutch owners. The first engine will be ready for delivery later this year.

For more information on Krupp MaK
Circle 146 on Reader Service Card

M25 Engine Specifications

Bore	255 mm
Stroke	400 mm
Cylinder rating	290/300 kW
Speed	720/750 rpm
Mean piston speed	9.6/10 m/s
BMEP	23.7/23.5 bar
Pmax	190 bar
Specific fuel oil consumption	185 g/kWh at 100% mcr
	184 g/kWh at 85%
Specific lube oil consumption	0.8 g/kWh
Engine rating (6M 25)	1,740/1,800 kW
(8M 25)	2,320/2,400 kW
(9M 25)	2,610/2,700 kW
Gen rating (6M 25)	2,060/2,140 kVA
(8M 25)	2,750/2,850 kVA
(9M 25)	3,100/3,210 kVA

Renaissance Cruises To Order Three New Ships

R Shipping Inc., an affiliate of Renaissance Cruises, Inc., has signed a binding letter of intent with Chantiers de l'Atlantique for the construction of three, 600-passenger cruise vessels.

Projected cost for the new ships is in excess of $500 million, and they will be operated by Renaissance Cruises.

Renaissance Cruises will, for the first time, deploy a ship in Alaska. Each ship will have 300 oversized cabins with private balconies offered in more than two-thirds of them.

Dry Air Technology Offers Portable Pneumatic Fan

Dry Air Technology offers the Americ Vane Axial Fan VAF-3000P, a portable, pneumatic ventilator to be UL and CUL-listed. The fan is designed for safe use in all classes of hazardous locations (Class I: Groups A, B, C and D; Class II: Groups E, F and G; and Class III) and runs on compressed air. It can reportedly be used in a variety of applications from ventilating confined spaces to extracting fumes.

For more information
Circle 144 on Reader Service Card

Arethusa In Rig Deal With Petrobras

Arethusa (Off-Shore) Limited has received a five-year contract with Petrobras, the Brazilian oil company, for the semisubmersible drilling rig *Arethusa Yorktown*. The rig will be upgraded to work in approximately 2,850 ft. (868.6 m) of water. The contract, effective immediately, will earn Arethusa revenues of $115 to $131 million depending upon earned bonus.

Lovelace Offers Watercraft Lighting Accessory

Lovelace Enterprises, manufacturer of marine accessory equipment, offers its TL Light System. Controlled from the helm of the craft, the TL Light System's wireless pan and tilt remote control adjustment reportedly allows its operator to project up to a 1.8 million candle power halogen beam for one mile, across an azimuth of up to 360 degrees and an elevation of 75 degrees.

For more information on Lovelace
Circle 30 on Reader Service Card

Railko Bearings Featured On *Regina Maersk*

Regina Maersk, which has been completed in Denmark and is reportedly the world's largest containership, features marine stern tube bearings supplied by Railko Limited of High Wycombe.

For more information on Railko
Circle 31 on Reader Service Card

U.S. Paint Acquires ISO 9001 Certification

U.S. Paint Corporation has announced that its Quality Management System has been approved by Lloyd's Register Quality Assurance for ISO 9001 certification.

For more information on U.S. Paint
Circle 39 on Reader Service Card

SPD Technologies Wins $50 Million Contract

SPD Technologies has won a contract to supply shock-hardened circuit breakers and switchgear for the U.S. Navy's DDG-class destroyers with the new Flight IIA ship design.

For more information on SPD
Circle 142 on Reader Service Card

Lykes Appoints New President

Joe. B. Freeman has been appointed president of Lykes Bros. Steamship Co., Inc., as announced by **Tom L. Rankin**, company chairman and CEO. Mr. **Freeman** will direct the company's ongoing reorganization efforts, including the formulation of a long-term plan that is expected to enable Lykes to emerge successfully.

Steamship Authority Purchases Foam Vest System

The Woods Hole, Martha's Vineyard and Nantucket Steamship Authority has purchased the Maverick Foam Vest System (MFVS), from Derbyshire Foam Systems Products. The MFVS reportedly allows shipboard personnel to respond quickly to an onboard fire, with the added ability of the operator to switch from AR-AFFF Foam to sea water and back, as conditions warrant. The MFVS is ABS-type approved for SOLAS compliance and the MFVN BR-95 is UL-Listed to both American NFPA and British standards.

U.S. President Officially Ends Ban On Exports From ANS

President Clinton took final action to end t 23-year ban against exports of Alaskan No Slope (ANS) crude oil. This historic event — fo malized by the President's determination th exporting ANS crude oil is in the national intere — is expected decrease U.S. reliance on in porte oil by increasing crude oil production in the U.S.

Additional oil production of about 100,000 bo rels per day is expected, according to DOE proje tions. The Administration's five-month review pro duced recommendations for four restrictions, all o which were endorsed by the President. Unde authority contained in the legislation he supporte and signed in November, Public Law 104-58, th President decided to permit ANS exports, subject t the following restrictions:

1. Tankers exporting ANS crude oil must remain outside of the 200-mile Economic Exclusion Zone. This will ensure that tankers in the ANS export trade remain far from the U.S. coastline, including environmentally sensitive areas along the Aleutian Islands.

2. ANS export tankers must be equipped with a satellite communications system to permit the U.S. Coast Guard to monitor the tankers' positions.

3. ANS export tankers must be inspected annually, in accordance with U.S. Coast Guard (USCG) policies and procedures. This condition will ensure that the tankers are kept in safe working order.

4. ANS export tankers will be required to exchange their ballast water in deep ocean water prior to entering Alaska's Prince William Sound. Ship logs will record ballast exchanges and will be checked periodically by the USCG. This condition will help prevent the introduction into Alaskan fisheries of non-indigenous, aquatic nuisance species.

These requirements, which will be applied to ANS oil exports as export license conditions, will protect Alaska's unique environment and abundant natural resources. A fifth requirement — that all exports be carried on U.S.-flag tankers — is included in the ANS export law enacted last fall.

While the review indicated no likelihood of adverse impacts, concern is rising in Washington state about the increasing volume of vessel traffic estimated to occur as a result of other factors. For example, the growing international trade between Washington state and Pacific Rim nations, while a boon to the state's economy, is raising public concerns about vessel safety and the environment in Puget Sound, and prompting debate over the adequacy of current vessel safety procedures and resources. Accordingly, the President requested that the USCG prepare a status report on the plan it is preparing for a vessel assistance system. He also asked the USCG to accelerate completion of that plan, which will be submitted to Congress, and to offer its assistance to any serious private-sector efforts to improve vessel safety.

by Bridget A. Murphy, associate editor

Shipping '96

While some conference speakers seemed somewhat baffled by the Connecticut Maritime Association's (CMA) "New Era ... New Realities" conference theme choice for Shipping '96 — a variety of interpretations were served up to attending delegates, spurring a number of discussions on the state of maritime affairs and the direction in which the industry is headed. World-Wide Shipping Agency Chairman **Helmut Sohmen** offered the first, and perhaps, most lucid spin on the theme in his keynote address, stating: "I am also not certain that shipping is confronting a new era, or whether we are not just going on bouncing from one goal post to another, like balls in the pinball machines in the penny arcades. They — almost like shipping — provide for games of chance, with rather limited opportunities for financial success."

Dr. **Sohmen** launched into a series of "illustrations" of recent shipping history, discussing several issues, including: setting limits to oil pollution liability and P&I insurance cover; insuring an aged fleet; new legislation and conventions designed to produce discipline through enforcement of technical standards; tanker developments; the danger of making market predictions; safety and classification society supergroups; and the need for industry leaders to maintain political connections.

For the most part, the 1996 Commodore Award recipient's comments centered on four topics: establishing standards in a changing business; financing; the industry's self-image; and the future of maritime commerce. Following Dr. **Sohmen**'s lead, these areas dominated discussions throughout the rest of the two-day conference program, held March 19 and 20.

Highlighting one of his points, Dr. **Sohmen** stated, "Considered unable to properly regulate itself, the industry today faces tighter legislation everywhere and an insistence on the better quality of ships, management and personnel from all quarters."

He later advised, "Friends in the shipping business, please remember two fundamental rules: first, that administrative bureaucracy does not improve standards, but poor standards breed more bureaucracy. And second, you cannot blame a bad image on others, nor expect others to change it for you."

Wary of forecasting market predictions, the Austrian shared his concerns on the financial state of the industry: "I never worry about a lack of financial resources for the industry. I worry rather about too much of a good thing, accompanied by short memories of painful losses, and the common belief — characteristic among shipping people — that business must be worth doing just as long as the downside risk is limited."

Summing up, Dr. **Sohmen** said, "Maritime transport will be around for a long time to come, but shipping needs a much better lobby than we have been able to muster, and every voice therefore counts." If even a modest portion of the reported 1,000 attendees from 30 countries, and 90 exhibitors present at the event took this message back to their companies, the event could be considered quite a success.

Photo credit: William Wrenn

Panelists **James D. Bell** (right) and **Frederick Tsao** (center) listen as **Helmut Sohmen** fields a question from a Shipping '96 conference attendee.

American International Shipbuilding Exposition

AISE '96 kicked off in New Orleans on April 11 with a press conference devoted to a discussion and debate of shipbuilding initiatives under the **Clinton**'s Administration five-part plan, originated in 1993 under the National Defense Authorization Act.

Maritime Administrator Rear Admiral **Albert Herberger** spoke of the bipartisan effort on the part of Congress and the **Clinton** Administration to provide U.S. yards with the resources necessary for translating defense building experience into successful commercial ship production, in order to establish the nation as a formidable force in the international market.

MAN B&W Diesel, Inc. President **Claus Windelev** (right) and Director of Business Development **Les Gingell** (left) are pictured on the AISE exhibition floor.

According to Radm. **Herberger**, the initiative programs — including the pending OECD agreement, the MARITECH joint public-private technology program, and the Title XI loan guarantee program — are beginning to produce results. "It's a start," said the administrator, adding, "This exhibition is a direct product of the five-year plan initiated in 1993."

Radm. **Herberger** also commented on how OECD ratification could affect other facets of the Administration's shipbuilding plan. "Either way the Title XI program will continue. There will be substantial work we can do with the current parameters and some we can do with reduced parameters," said Radm. **Herberger**.

The Maritime Administrator went to say that the maritime industry is a "primarily industry-financed industry," and classified the five-part initiative as a product of the U.S. government's assumption of the role of business catalyst, with the application of only modest amounts of federal dollars. He pointed to the recent Newport News Van Ommeren contract and Alabama Shipyard Dannebrog contract as examples of how government dollars can stimulate commercial business for U.S. yards, and added that the Title XI default rate stands at two percent, meaning $200 million worth of ships have had to be recouped and resold.

With the government subsidy issue continuing to swing in the balance, and the OECD vote expected to be delayed until at least mid-summer, a great deal of the subsequent conference discussions were dominated by this issue, with large, mid-sized and small yard representatives and influential maritime voices taking firm stances on both sides.

What was said at AISE

"The U.S. industry is on a comeback ... U.S. industry is here and here to stay ... In five years, the world will be saying: We thought they were dead, but by God, they're back." — **Penny Eastman, Shipbuilders Council of America**

"There's a difference between being committed and being involved. These yards are committed to returning and being successful in the commercial market." — **Tom Bowler, American Shipbuilding Association**

"Without U.S. (OECD) ratification by June or July, the agreement might unravel ... We need to continue Title XI because even under OECD, foreign countries will continue to find ways to support their shipbuilding." — **Rear Admiral Albert Herberger, MarAd**

"Title XI helped us to get the show on the road. We're not Newport News or General Dynamics ... We do know how to build commercial ships, moderately priced." — **Al Bossier, Jr., Avondale Industries, Inc.**

"American shipyards can be successful even without Title XI. It is an opportunity for U.S. shipbuilders, in tandem with U.S. government, to show the world that something's happening here." — **Gregory Hadjieleftheriadis, Eletson Corporation**

"None is this is possible without partnering ... The Coast Guard will do its part to contribute to the success of U.S. commercial shipbuilding." — **Rear Admiral James C. Card, USCG Office of Marine Safety, Security and Environmental Protection**

"The most viable method of improving our industry is to work from within the industry." — **Joseph Cox, American Institute of Merchant Shipping**

BUYERS DIRECTORY

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

ABRASIVES
Emerald Creek Garnet, 2615 North Fourth Street, Coer d'Alene, ID 83814
Ervin Industries, Inc., 3893 Research Park Drive,Ann Arbor, MI 48106-1668

ACOUSTICS
Predict/DLI, 253 Winslow Way West, Bainbridge Island, WA 98110
BBN Acoustic Technologies, 70 Faucett St., Cambridge, MA 02138

ADHESIVES
Life Industries, Corp., 2081 Bridge View Dr., N. Charleston, SC 29405

AIR CONDITIONING AND REFRIGERATION - Repair & Installation
ABB Flakt Marine, Box 1043, S-436 21 ASKIM SWEDEN
Adrick Marine, 141D Central Ave., Farmingdale, NY 11735
Bill Brown Enterprises, Inc., 4995 Ocean Pines, Berlin, MD 21811
Carrier Transicold, P.O. Box 4805, Syracuse, NY 132211
Novenco Hi-Press A/S, P.O. Box 310, Roskildevej 325A, DK-2630 Taastrup, DENMARK

ALARMS, FACTORY MUTUAL-APPROVED
Midland Mfg. Corp., 7733 Gross Point Rd., Skokie IL 60076-0226
Pan American Systems, 125 S. Witchduck Rd. 101, Virginia Beach, VA 23462
SELCO 353 A Asbury Commons Dr., Atlanta, GA 30338

ALUMINUM BOATS
American Eagle Mfg., 780 Pearie Jensen Way, La Conner WA 98257
Munson Mfg., 780 Peale Jensen Way, La Conner WA 98257
Workskiff, Inc., 10824 Bothell Hwy S.E., Bothell, WA 98012-6869

ASBESTOS ABATEMENT
Chemplex Environmental, 3405 Highway 33, Neptune, NJ 07753

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

BALLAST
Mineral Research & Recovery Inc.,4620 South Coach Dr., Tucson, AZ 85714

BASKET STRAINERS
Beaird Industries, P.O. Box 31115, Shreveport, LA 71130

BEARING—Rubber, Metallic, Non-Metallic
B.F. Goodrich, Engineered Polymer Products, 150 Division Dr., Wilmington,NC 28401
Blohm & Voss AG,P.O. Box 100720, D-2000 Hamburg 1, GERMANY;
U.S.A. Reps: Simplex- Turmar Inc., P.O. Box 168, Little Neck, NY 11363p., -0168
Kahlenberg Bros. Co., P.O. Box 358, Two Rivers, WI 54241
Orion Corp., 1111 Cedar Creek Rd., Grafton, WI 53024
Orkot Engineering Plastics, 2535 Prairie Rd., Eugene, OR 97402
Thordon Bearings Inc., 3225 Mainway, Burlington, Ont., CANADA L7M 1A6

BILGE OIL/FUEL ABSORBER
Northstar Marine, 84 Wall Street, Farmingdale, NY 11735
RGF Marine, 3875 Fiscal Court, West Palm Beach, FL 33404

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

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

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

BROKERS
151 Maritime Services, 34062 El Encanto/B, Dana Pt. CA 92629
Captain Astad Company, Inc., P.O. Box 350486, Ft Lauderdale, FL 33335
Jack Faulkner, 2419 Caddy Lane, P.O. Box 371, Flossmoor IL 60422
Mowbray's Tug & Barge Sales Corp., 35 De Hart St., Morristown NJ 07960

BULKHEAD SEALS/PANELS
Blohm & Voss AG, P.O. Box 100720, D-2000 Hamburg 1, GERMANY
U.S.A. Reps: Simplex-Turmar Inc., P.O. Box 168, Little Neck, NY 11363-0168
Panels Specialists, Inc., 306 Dodge Drive, Temple, TX 76504

CABLE ASSEMBLIES
Times Microwave Systems, P.O. Box 5039, Wallington, CT 06492

CABLE TRANSIT SYSTEMS
NMP Corp., P.O. Box 35493, Tulsa OK 74153-0493

CAD/CAM SYSTEMS
All Alpha Int'l., Inc. P.O. Box 498985, Cincinnati, OH 45249
Autoship Systems Corp., #403, 611 Alexander St., Vancouver, BC, Canada V6A1E
Creative Systems, Inc., P.O. Box 1910, Port Townsend, WA 98368
IMSA 20 ridgely Ave., Annapolis, MD 21401
Kockums Computer Systems AB, PO Box 50555, S-202 15 Malmo SWEDEN
Scietific Marine Services, Inc., 101 State Pl., Suite F, Escondido, CA 92029
TIMSCO, P.O. Box 91360, Mobile, AL 36691

CATHODIC PROTECTION SYSTEM
Electrocatalytic Inc., 2 Milltown Ct., Union, NJ 07083

CHAINS
All Alpha Int'l., Inc. P.O. Box 498985, Cincinnati, OH 45249
Crandall Dry Dock Engineers Inc., 2 Williams Street, Chelsea, MA 02150
Dreyfus Supply & Machinery Corp., 2121 Poland Ave., New Orleans, LA 70177
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

CHEMICALS
Ashland Chemical/Drew Ameroid Marine, One Drew Plaza, Boonton, NJ 07005
Unitor Ship service Inc., 2375 West Esther Street, Long Beach, CA 90813

CLAMPING—Pipe, Tubes, Hose
ZSI, 12749 Richfield Ct., Livonia, MI 48150

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

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

COAMING WELDER
Bug-O-Systems 3003 W. Carson St., Pittsburgh, PA 15204

COATINGS / COATINGS PROTECTION
Corroseal Inc., 1045 12th Ave. NW FSA, Issaquah, WA 98027
NACE Int'l, P.O. Box 218340, Houston, TX 77218-8340

COAXIAL CABLES
Times Microwave Systems, P.O. Box 5039, Wallingtord, CT 06492

COMMUNICATIONS SERVICE
Ascom Tateco AB, Eppendorfer Weg 234, D-20251 Hamburg, GERMANY
Inventory Locator Service, 3965 Mendenhall Rd., Memphis, TN 38115

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

COMPRESSORS
Hamworhty Marine Inc., 1129 Hospital Dr. Ste 3C, Stockbridge, GA 30281

COMPUTER LOFTING
Barataria Lofting Co., Inc., 1616 Barataria Blvd., Ste. 4, Marrero, LA 70072

COMPUTER SOFTWARE
Applied Flow Technology, 7293 Hahn St., Louisville, OH 44641
Autoship Systems Corp., #403, 611 Alexander St., Vancouver, BC, CANADA V6A1E
Chand Corporation, 157 Hwy 654, Mathews, LA 70375
Creative Systems, Inc., P.O. Box 1910, Port Townsend, WA 98368
IMSA 202 C Packets Ct., Williamsburg, VA 23185
Plankowner Software, P.O. Box 536, Ledyard, CT 06339
Sener, C/Severo Ochoa, 4 Parque Technologico de Madrid, 28760 Tres Cantos - Madrid SPAIN

CONDENSERS/SEPARATORS
Beaird Industries Inc., P.O. Box 31115, Shreveport LA 71130

CONTROL SYSTEM–Monitoring
Engine Monitor, Inc., 179 Hickory Ave. Harahan, LA 70123
GEC ALSTHOM Diesels Inc., 10801 Kempwood Drive, Suite 1, Houston, TX 77043-1412
Ian-Conrad Bergan, 3409 Gulf Breeze Pkwy, Gulf Breeze, FL 32561
IMO Industries, Gems Sensors Division, One Cowles Rd., Plainville CT 06062
MMC International, 60 Inip Dr, Inwood NY 11696
Robertson Marine Systems, 3000 Kingman St., Suite 207, Metairie, LA 70006
Scientific Marine Services, Inc., 101 State Pl., Suite F, Escondido, CA 92029

CONTROL SYSTEM-Steering
Engine Monitor, Inc., 179 Hickory Avenue Harahan, LA 70123
Kockum Sonics, Inc., 819 Veterans Blvd., Suite 201, Kenner, LA 70068

CONTROL VALVES
Leslie Controls, 12501 Telecom Dr., Tampa, FL 33637

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

CORROSION CONTROL
Corroseal Inc., 1045 12th Ave. NW #F5A, Issaquah, WA 98027
TMT Services Corp./RUSTECO P.O. Box 11398, Torrance, CA 90813

COUPLINGS
American Vulkan, P.O. Drawer 673, Winter Haven, FL 33882
Haley Clutch and Coupling Corp., 1820 Hwy. 1 North, Greenville, MS 38702
Mapeco Products, 90 Forest Avenue, P.O. Box 382, Locust Valley, NY 11560

CRANE--HOIST--DERRICK—WHIRLEYS
Bisso Marine Co. P.O. Box 4113, New Orleans, LA 70178
Del Gavio Marine Hydraulics Inc., 619 Industrial Rd., Carlstadt, NJ 07072
Liebherr-Werk Nenzing GES.mbh, P.O. Box 10, A-6710 Nenzing, AUSTRIA
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

CRANES
Lakeshore, Inc., P.O. Box 809, Iron Mountain, MI 49801
T.C.W., 1607 port Barmouth Pl., Newport Beach, CA 92660
Tech Crane Int'l., Inc., 61130 Timberbend Dr., Lacombe, LA 70445

CRANKSHAFT REPAIR
Goltens Worldwide, 160 Van Brunt St., Brooklyn, NY 11231
In-Place Machining Co., Inc. 1929 North Buffum Street, Milwaukee, WI 53212-3793

DECK CAULKING/REPAIR
Life Industries, Corp., 2081 Bridge View Dr., N. Charleston, SC 29405

DECK MACHINERY — Cargo Handling Equipment
Lakeshore, Inc., P.O. Box 809, Iron Mountain, MI 49801
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
New England Trawler Equipment Co., 291 Eastern Avenue, Chelsea, MA 02150
Smith Berger Marine Inc., 516 South Chicago Street, Seattle, WA 98108

DECK MACHINERY
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
Skookum/Rope Master, P.O. Box 280, Hubbard, OR 97032
Smith Berger Marine Inc., 516 South Chicago St., Seattle, WA 98108
T.C.W., 1607 Port Barmouth Pl., Newport Beach, CA 92660
Timberland Equipment, P.O. Box 490, Woodstock, Ontario N4S 7Z2 CANADA
Waterman Supply Co., P.O. Box 596, Wilmington, CA 90748

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
Rochem Separation Sys., 10 Grand Ru C-41, Divonne Les Bains, FRANCE

DIESEL ACCESSORIES
General Thermodynamics Corp., 210 South Meadow Rd., P.O. Box 1105, Plymouth, MA 02360
Kiene Diesel Accessories, 325 S. Fairbanks St., P.O. Box 386, Addison, IL 60101

DIESEL ENGINE ANALYZER
FCS, Inc., 22 Main Street, Centerbrook, CT 06409

DIESEL ENGINE — Spare Parts & Repair
Alaska Diesel,4420 14th Ave.,NW,Seattle,WA 98107
Caterpillar, Inc., Engine Div., P.O. Box 610, Mossville, IL 61552-0610
Coltec Industries, 701 LawtonAve., Beloit, WI 53511
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
Goltens Worldwide, 160 Van Brunt St., Brooklyn, NY 11231
In-Place Machining Co. Inc. 1929 North Buffum Street, Milwaukee, WI 53212-3793
Kiene Diesel, 325 S. Fairbanks, Addison, IL 60101
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
Nor-Tech, Inc., 100 Wall St., New York, NY 10005
Paxman Diesels, P.O. Box 8, Paxman Works, Colchester, Essex, CO1 2HW, ENGLAND
Ulstein Bergen AS, PO Box 924, N5002 Bergen, NORWAY
Wartsiia Diesel, 201 Defense Highway, Annapolis, MD 21401

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

DIVING & SALVAGE
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
Muldoon Marine Services, Inc., P.O. Box 3221, Terminal Island, CA 90731

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

DRIVE SHAFTS
Aquadrive Systems, 17 Ave. D, Atlantic Highlands, NJ 07716

DRY DOCKS-Design
Conrad Industries, 1501 Front Street, P.O. Box 790, Morgan City, LA 70381
Crandall Dry Dock, 2 Williams St., Chelesa, MA 02150

EDUCTORS
Vila Motivator, 566 Parker St., Newark, NJ 07104

ELECTRICAL EQUIPMENT
L. F. Gaubert & Co., Inc., P. O. Box 50500, New Orleans LA 70150
MMC International, 60 Inip Dr, Inwood NY 11696

ELECTRONICS/ELECTRONIC DISPLAY
Jotron Electronics AS, P.O. Box 85, N-3280 Tjodalyng NORWAY
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

EMISSION CONTROLS
ABB Flakt Marine, Box 1043, S-436 21 ASKIM SWEDEN
Haldor Topsoe Nymollevel 55, DK-2800, Lyngby, Denmark

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 ENGINEERS
Kvaerner Masa Marine Inc., 201 Defense Highway, Suite 202, Annapolis, MD 2
Scientific Marine Services, Inc., 101 State Pl., Suite F, Escondido, CA 92029

ENGINE EFFICIENCY EQUIPMENT
Stellar Marketing, 7759 Townsend Place, New Orleans, LA 70126

ENGINE ROOM LIGHTING
Pauluhn Electric Mfg. Co., Inc. 1616 N. Main, P.O. Box 53, Pearland, TX 77581

ENGINE TEST EQUIPMENT
General Thermodynamics Corp., P.O. Box 1105, 210 S. Meadow Rd., Plymouth, M 02360

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

EVAPORATORS
Alfa-Laval Separation, Inc., 955 Mearns Rd., Warminster, PA 18974
Beaird Industries Inc., P.O. Box 31115, Shreveport, LA 71130

FANS - VENTILATORS - BLOWERS
ABB Flakt Marine, Box 1043, S-436 21 ASKIM SWEDEN
Jon M. Liss Associates, Inc., 411 Borel Ave., San Mateo, CA 94402

FASTENERS
Jamestown Distributors, 28 Narragansett Ave., P.O. Box 348, Jamestown, RI 028
Okabe Co., Inc., 645 Forest Edge Drive, Vernon Hills, IL 600661-3106

FENDERING SYSTEMS/BUOYS - Dock & Vessel
B.F. Goodrich, 150 Division Drive, Wilmington, NC 28401
Kahlenberg Bros. Co., P.O. Box 358, Two Rivers, WI 54241
Schuyler Mfg. Co., Inc., 16901 Woodinville-Redmond Rd., Woodinville, WA 98072
Seaward International, inc., Clearbrook Industrial Park, P.O. Box 98, Clearbrook, VA 22624
Ultra Poly Inc., 2926 South Steele, Tacoma, WA 98409
Viking Fender Co., 1160 State St., Perth Amboy, NJ 08861

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

FILTER SYSTEMS
Everpure Inc., 660 N. Blackhawk Dr., Westmont IL 60559
Luber-Finer, Inc., 5050 Quorum Drive, Dallas, TX 75240

FIN STABILIZERS
Blohm & Voss AG, P.O. Box 10 07 20, D-2000 Hamburg 1, GERMANY;
U.S.A. Reps: Simplex-Turmar Inc., P.O. Box 168, Little Neck, NY 11363-0168

FIRE FIGHTING EQUIPMENT
International Marine Supply & Service Co., 2726 Shelter Island Dr., Ste. 73, San Die

FIRE RESISTANT PANELS
Thermax N.A., 13115 Dulaney Valley Rd., Glen Arm, Baltimore, MD 21057

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

FLAME CUTTING MACHINE
Bug-O-Systems, 3003 West Carson St., Pittsburg, PA 15204

FLEXIBLE COUPLINGS
American Vulkan, P.O. Drawer 673, Winter Haven, FL 33882

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

GALLEY EQUIPMENT
Cospolich Refrigerator Co., 949 Industry Rd., Kenner LA 70062
Jamestown Metal Marine Sales, 4710 Northwest Second Ave., Boca Raton, FL3343
Lang Manufacturing, P.O. Box 905, Redmond, WA 98073

GANGWAYS, LADDERS
Sea Systems Inc., 187 Ward Hill Ave., Ward Hill, MA 01835-0679
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

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

HATCH COVER SEAL RENOVATION
Baywood Inc., 3841 Soundway, Bellingham, WA 982263
KIBI Corporation, U.S. Reps: Simplex-Turmar Inc., P.O. Box 168, Little Neck, NY 11363-0168

HEAT EXCHANGERS
Alfa-Laval Separation Inc., 955 Mearns Rd., Warminster, PA 18974
Beaird Industries Inc., P.O. Box 31115, Shreveport, LA 71130

HOISTS
JD Neuhaus Corp., 2603 Rolling Rd., Gwynn Oak, MD 21207

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

HYDRAULICS
Cunningham Marine Hydraulics Co., 201 Harrison St., Hoboken, NJ 07030
Del Gavio Marine Hydraulics Inc., 619 Industrial Rd., Carlstadt, NJ 07072
Engine Monitor, Inc., 179 Hickory Ave. Harahan, LA 70123
Hamilton Jet, P.O. Box 709, Christchurch, New Zealand

INERT GAS SYSTEMS
Hiller Systems, 3710 Lakeside Court, Mobile AL 36693

INFORMATION TECHNOLOGIES
Marine Management Systems, 102 Hamilton Ave., Stamford, CT 06902

INSULATION
Insulations, Inc., 1101 Edwards Ave., Harahan, LA 70123

INTERIORS
Custom Ship Interiors, Inc., P.O. Box 237, Lusby, MD 20657
Hopeman Brothers, 435 Essex Ave., Waynesboro, VA 22980
Insulations, Inc., 1101 Edwards Ave., Harahan, LA 70123
Jamestown Metal Marine Sales, 4710 Northwest Second Ave., Boca Raton, FL 33431
Maritime Services Corp., 3457 Guignard Dr.,Hood River, OR 97031
TODCO, Inc., P.O. Box 1087, Marion, OH 43302

JOINER—Watertight Door—Paneling—Ceiling System—Decking
All Alpha Int'l., Inc. P.O. Box 498985, Cincinnati, OH 45249
Branton Ind., 1101 Edwards Ave., Jefferson, LA 70181
CustomShip Interiors, Inc. P.O. Box 237, Lusby, MD 20657
Hopeman Brothers, Inc., P.O. Box 820, Waynesboro, VA 22980
Insulations, Inc., 1101 Edwards Ave., Harahan, LA 70123
Jamestown Metal Marine Sales, 4710 Northwest Second Ave., Boca Raton, FL 3
Stidd Systems, Inc., 220 Carpenter St., Greenport, NY 11944
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

LIFEBOATS/RAFTS
American Eagle Mfg., Inc., 780 Pearie Jensen Way, LaConner, WA 98257
Norsafe AS, P.O. Box 115, N-4818 Faervik, Norway
Viking Life Saving Equipment, 1625 N. Miami Ave., Miami, FL 33136
Willard Marine Co., Inc., 1250 N. Grove St., Anaheim, CA 92806
Zodiac of North America, P.O. Box 400, Stevensville, MD 21666

LIFESAVING EQUIPMENT
MGI International, 119-225 West 1st St., North Vancouver, B.C. CANADA
Stearns Manufacturing, P.O. Box 1498, St. Cloud, MN 56302

LIGHTING SYSTEMS / EQUIPMENT—Lamps, Fixtures, Searchlights
ACR Electronics, Inc., 5757 Ravenswood Rd., Ft. Lauderdale, FL 33310-5247
Archway Marine, 4501 Swan Ave., St. Louis, MO 63110
Datrex Inc., P.O. Box 1150, Kinder, LA 70648
Golten Marine, 160 Van Brunt St., Brooklyn, NY 11231

kum Sonics, Inc., 819 Veterans Blvd., Suite 201, Kenner, LA 70068
. Doane, P.O. Box 975, Essex, CT. 06426
uluhn Electric Mfg. Co., Inc. 1616 N. Main, P.O. Box 53, Pearland, TX 77581
ancis Searchlights/Stam Supply Co., 4415 6th N.W., Seattle, WA 98107

ID LEVEL GAUGES
ng Engineering Corp., P.O. Box 1228, Ann Arbor, MI 48106

ID LEVEL INDICATORS
idland Mfg. Corp., 7733 Gross Point Rd., Skokie IL 60076-0226

ID OVERFILL PROTECTION SYSTEMS
R.L. Marine Products, P.O.Box 1026, New Albany, IN 47151-1026
etritape, Inc., 59 Porter Rd., Littleton, MA 01460
idland Mfg. Corp., 7733 Gross Point Rd., Skokie IL 60076-0226

STICS
ewport News Shipbuilding, Logistics & Technical Services, 12129 Jefferson Ave.,
ewport News, VA 23603
L Logistics Consultants, Inc., 3420 Bienville Blvd., Ocean Springs, MS 39564

ICANTS
xxon Co. USA, 800 Bell St., Houston, TX 77002
oyal Lubricants, P.O. Box 518, East Hanover, NJ 07936

HINERY MAINTENANCE, REPAIR, OVERHAUL, AND TESTING
el Gavio, 619 Industrial Rd., Carlstadt, NJ 07072
olten Marine Company Inc., 160 Van Brunt Street, Brooklyn, NY 11231
aritime Power 200 Henderson St., Jersey City, NJ 07302
ew England Trawler Equipment Co., 291 Eastern Avenue, Chelsea, MA 02150
allace Coast Machining, 1920 Waukegan Rd., Glenview, IL 60025

INE ACCOMMODATIONS
opeman Brothers, P.O. Box 820, 435 Essex Ave., Waynesboro, VA 22980
nsulations, Inc., Rt. 5, 12360 Leisure Road, Baton Rouge, LA 70807
am stown Metal Marine Sales, Inc., 4710 Northwest Second Ave, Boca Raton, FL 33431
Maritime Services Corp., 3457 Guignard Dr., Hood River, OR 97031

INE CEILINGS
Hydro-Alumunium, Vik Verk, N-5880 VIK I SOGN, Norway
Insulations, Inc., Rt. 5, 12360 Leisure Road, Baton Rouge, LA 70807

INE DECKING
E.H. O'neill Co., Inc., 1405 Chippendale Road, 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

INE DRILLING & BLASTING
Marine Drilling & Blasting, Inc., P.O. Box 10455, Jacksonville, FL 32247-0455

RINE 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

INE ELEVATORS
McElroy Machine, 1101 Lorraine Rd., Biloxi, MI 39535-4454

INE EQUIPMENT
Bohnet & Associates, 1150 Rule Rochelle, Sidell, VA 70458
McElroy Machine, P.O. Box 4454, Biloxi, MS 39535-4454

INE FINANCING
Safeco Credit Co. Inc. 4909 156th Ave. NE, Redmond, WA 98052

INE FIRE PROTECTION
Hiller Systems, 3710 Lakeside Court, Mobile, AL 36693
Insulations, Inc., Rt. 5, 12360 Leisure Road, Baton Rouge, LA 70807
Unitor Ship Service Inc., 2375 West Esther STreet, Long Beach, CA 90813

INE FUEL MANAGEMENT
Det Norske Veritas, Haastrechtstraat 7, 3079 DC Rotterdam, The Netherlands

INE FURNITURE
Insulations, Inc., Rt. 5, 12360 Leisure Road, Baton Rouge, LA 70807
Jamestown Metal Marine Sales, Inc., 4710 NW Second Ave,Boca Raton, FL 33431
Maritime Services Corp., 3457 Guignard Dr., Hood River, OR 97031

INE GEARS
Cincinnati Gear Co., 5657 Wooster Pike, Cincinnati, OH 45227
The Falk Corp., PO Box 492, Milwaukee, WI 53201-0492
Haley Marine Gears, Inc. P.O. Box 689, Greenville, MS 38702
Marine Gears, P.O. Box 689, Greenville, MI 38701

INE HYDRAULICS
Del Gavio Marine, 619 Industrial Rd., Carlstadt, NJ 07072

INE INSURANCE
John G. Alden, 1300 SE 17th St., Fort Lauderdale, FL 33316

INE INTERIORS
Insulations, Inc., Rt. 5, 12360 Leisure Road, Baton Rouge, LA 70807
Jamestown Metal Marine Sales, 4710 Northwest Second Ave, Boca Raton, FL 33431
Johnson Construction Specialties, Inc., 3420 Rusk P.O. Box 1360 Houston
Texas 77251
Maritime Services Corp., 3457 Guignard Drive, Hood River, OR 97031

INE PLUMBING
Bill Brown Enterprises, Inc., 4995 Ocean Pines, Berlin, MD 21811

INE PUMPS
Gilkes Inc., P.O. Box 628, Seabrook, TX 77586

INE SURPLUS SALES
Defense Reutilization & Marketing Service, 2163 Airways Blvd., Memphis, TN 38114

ITME ARTWORK
Sarba Art Studio, 6 Ridge Drive, Old Saybrook, CT 06475

VAL ARCHITECTS, MARINE ENGINEERS, SURVEYORS
Advanced Marine Enterprises, Inc., 1725 Jefferson Davis Hwy., Arlington, VA 22202
Donald L. Blount, 2550 Ellsmere Ave., Ste. K, Norfolk, VA 23513
C. Baxter & Associates, P.O. Box 9006, Mobile, AL 36609
CDI Marine Co., 4040 Woodcock Dr., Suite 200, Jacksonville, FL 32207
Childs Engineering Corp., Box 333, Medfield, MA 02052
Crandall Dry Dock Engrs., Inc., 2 Williams St., Chelesa, MA 02150
Crane Consultants, 15301 First Ave S., Seattle WA 98148
C.R. Cushing, 18 Vesey St., New York, NY 10007
CT Marine, 56 Crooked Trail, Rowayton, CT 06853
Cunningham & Walker, 1762 Providence Hollow Lane, Jacksonville, FL 32223
Arthur D. Darden, 3200 Ridgelake Dr., Suite 403, Metairie LA 70002
DeJong & Lebet, Inc., 1734 Emerson Street, Jacksonville, FL 32207
Design Associates Inc., 14360 Chef Menteur Highway, New Orleans, LA 70129
Designers & Planners, 2120 Washington Blvd. Ste.200, Arlington, VA 22204
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
John W. Gilbert & Assoc., Inc., 66 Long Wharf. Boston, MA 02110
The Glosten Assoc. Inc., 600 Mutual Life Bldg., 605 First Ave., Seattle, WA 98104
Guido Perla & Assoc., 720 3rd Ave., Ste. 1200, Seattle, WA 98104
Morris Guralnick Associates, Inc., 130 Sutter St., Ste. 400, SanFrancisco, CA 94104
C. Raymond Hunt Associates, 69 Long Wharf, Boston MA 02110
Hydrocomp, Inc., 202 C Packets Court, Williamsburg, VA 23185
IMSA 20 Ridgely Ave., Annapolis, MD 21401
JJH Inc., 3412 Progress Dr., Bensalem, PA 19020
R.D. Jacobs & Associates, 11405 Main St., Roscoe, IL 61073
Kvaerner Masa Marine Inc., 201 Defense Highway, Suite 202, Annapolis, MD 21401
James S. Krogen, 799 Brickelli Plaza Ste. 701, Miami, FL 33131
Rodney E. Lay & Associates, 13891 Atlantic Blvd., Jacksonville, FL 32225
MCA Engineers, Inc., 2960 Airway Ave., #A-103, Costa Mesa, CA 92626
Alan C. McClure Associates, Inc., 2600 South Gessner, Houston, TX 77063
McElroy Machine & Mfg Co., Inc., P.O. Box 4454, Biloxi, MS 39535-4454
John J. McMullen Associates, Inc., 1 World Trade Ctr, Ste 3000, N Y,NY 10048
Fendall Marbury, P.O. Box 2321, Annapolis, MD 21401
Marine Design & Operations, Inc., 225 E. 1st Ave., Roselle, NJ 07203
Marine Management Systems Inc., 102 Hamilton Ave., Stamford CT 06902
Marine Power Associates, 1010 Turquois St., Ste 217, San Diego, CA 92109
Maritech, Seacliff, Bay Road, Newmarket, NH 03857
Maritime Design, Inc., 3020 Hartley Rd., Jacksonville, FL 32257
R.J. Mellusi & Co., 71 Hudson St, New York, NY 10013
Nautical Designs, Inc. 2101 S. Andrews Ave,Suite 202, Ft Lauderdale FL 33316
Ocean Motions Co., P.O. Box 130, 49 Shore Drive, Barrington, RI 02806-0130
Olsen Marine Surveyors Co., P.O. Box 283, Port Jefferson, NY 11777
M. Rosenblatt & Son, Inc., 350 Broadway, New York, NY 10013 and 620 Fulsom St.,
Ste. 301, San Francisco, CA 94107
Sargent & Herkes, 225 Baronne St., Suite 1405, New Orleans LA 70112
Scientific Marine Services, Inc., 101 State Pl., Suite F, Escondido, CA 92029
Sea School, 10812 Gandy Boulevard, St. Petersburg, FL 33702
Seaworthy Systems Inc., P.O. Box 965, Essex, CT 06426; 17 Battery Pl., New
York, NY 10004; P.O. Box 975, Barnegat Light, NJ 08006; 2 Skyline Pl., 5203
Leesburg Pike, Suite 700, Falls Church, VA 22041;
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

NAVIGATION & COMMUNICATIONS EQUIPMENT
Furuno U.S.A., 271 Harbor Way, S. San Francisco, CA 94080
ICS Electronics Ltd., Unit V, Rudford Industrial Estate, Ford, Arundel, West Essex, UK
KVH Industries, Inc., 110 Enterprise Center, Middletown, RI 02842-5268
Mackay Communications, 300 Columbus Circle, Edison, NJ 08837
Negron Marine Consultants, 840 Bond Street, Elizabeth, NJ 07201
Offshore Systems Ltd., 107-930 West 1st St., North Vancouver, B.C. V7P 3N4 CANADA
Racal Survey USA, 3624 Westachase, Houston, TX 77042
Raytheon Marine Co, 676 Island Pond Rd, Manchester, NH 03109-5420
Scandinavian Micro Systems P.O. Box 155, N-1411, Kolboton, NORWAY
Scientific Atlanta, Inc., 1650 International Court, Norcross, GA 30093
Sea, Inc., 7030 220th S.W., Mountlake Terrace, WA 98043
Simrad, 19210 33rd Avenue West, Lynwood, WA 98036
Simrad Robertson, 10801 Hammerly, Suite 100, Houston, TX 77043-1923
Sperry Marine Inc., 1070 Seminole Trail, Charlottesville VA 22901
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

NOZZLE SYSTEM
Rice Propellers, Av Rios Espinoza #88, Mazathan, MEXICO 82180

OIL—Marine—Additives—TESTING
Lubriport Laboratories, Inc., 1650 Airline Hwy, Kenner, LA 70062
Mobil Oil Corporation, 3225 Gallows Road, Fairfax, VA 22037-0001
Texaco, International, 2000 Westchester Avenue, White Plains NY 10650
TF Purifiner, 3020 High Ridge Rd., Boynton Beach, FL 33426

OIL/WATER SEPARATORS
Alfa-Laval Separation, Inc., 955 Mearns Rd., Warminster, PA 18974-0556
Blohm & Voss AG, P.O. Box 10 07 20, D-20457 Hamburg 1, GERMANY;
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
Hamworthy Marine Inc., 1129 Hospital Dr. Ste 3C, Stockbridge, GA 30281
MMC International, 60 Inip Dr, Inwood NY 11696
National Fluid Separators, 827 Hanley Industrial Ct., St. Louis, MO 63144
Nelson Industries, Highway 51 West, Stoughton, WI 53589

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Corroseal, Inc., 1045 12th Ave. NW-F5A, Issaquah, WA 98027
Devoe Coatings 4000 Dupont Circle, Louisville, KY 40207
Esgard, Inc., P.O. Drawer 2698, Lafayette, LA 70502
Ferro Corp., 1301 North Flora St., Plymouth, IN 46563
Jamestown Distrib., 28 Narragansett Ave., P.O. Box 348, Jamestown, RI 02835
Hempel Coatings, 6901 Cavalcade St., Houston, TX 77028
Microphor, Inc., Marine Div., 452 E. Hill Rd., P.O. Box 1460, Willits, CA 95490
Permastop Rust, 264 South Main St, Wallingford, CT 06492
Product Research Service, Inc.229 Hwy 23, PO Box 159, Belle Chasse, LA 70037
Royal Chemical, 2705 Concord Road, Belle Chasse, LA 70037
Sigma Coatings, 8979 Market St., Houston, TX 77029, 330 Rover Rd.,
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Rolla SP Propellers SA, Via Silva, 5 - P.O. Box 251 - 6828 Balerna - SWITZERLAND
Rolla SP Propellers USA Inc., 4030 Mustang Road, Melbourne, FL 32934 USA
Sound Propeller, 1608 Fairview Avenue E., Seattle, WA 98102

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American Air Filter, P.O. Box 35690, Louisville, KY 40432
ABB Drives Inc., P.O. Box 372, Milwaukee, WI 53201-0372, USA
ABB Industry Oy, P.O. Box 185, 00381 Helsinki, FINLAND
ABB TURBOCHARGER, INC.,1460 Livingston Avenue, N. Brunswick, NJ 08902
Aquamaster-Rauma Ltd., Box 220, SF-26101, Rauma, FINLAND
Aquamaster-Rauma Inc., 2315 North Woodlawn Ave., Ste. 103, Metarie, LA 70001
Bird Johnson Company, P.O. Box 1528, Pascagoula, MS 39567
Brunvoll A/S, P.O. Box 370, N-6401, Molde, Norway
Caterpillar, 100 NE Adams Street, Peoria, IL 61629-2320
Cincinnati Gear Co., 5657 Wooster Pike, Cincinnati, OH 45227
The Falk Corp., PO Box 492, Milwaukee, WI 53201-0492
Fincantieri, Diesel Engines Div—GMT, Bagnoli della Rosandra 334, Trieste, ITALY
GE Naval & Drive Turbine Systems, 166 Boulder Dr., Fitchburg MA 01420
GEC ALSTHOM Diesels Inc., 10801 Kempwood Dr. Ste 1, Houston, TX 77043-1412
Goltens Marine Company, 160 VanBrunt St., Brooklyn, NY 11231
Holset Engineering, Inc., 1320 Kemper Meadow, Ste. 500, Cincinnati, OH 45240
In-Place Machining Co., Inc. 1929 North BuffumStreet, Milwaukee, WI 53212-3793
Kahlenberg Bros. Co., P.O. Box 358, Two Rivers, WI 54241
Krupp Mak, 7555 Danbro Crescent, Mississauga, Ontario, CANADA L5N 6P9
Kobelt Manufacturing, 8238 129th Street, Surrey, B.C. CANADA V3W 0A6
LIPS B.V., P.O. Box 6, 5151 RP Drunen, The Netherlands
Lohmann & Stolterfoht, P.O. Box 1860, D-58408 Witten, Germany
Lo-Rez Vibration Control, 186 West 8th Ave., Vancouver, BC CANADA, V5Y 1N2
Mapeco Products Inc., 90 Forest Ave., Locust Valley, N..Y. 11560
Markisches Werk, P.O. Box 1442, D-5884 Halver GERMANY
MAN B&W Diesel, 17 State St., New York, NY 10004
MAN B&W Diesel A/S, Ostervej 2, DK-4960 Holeby, DENMARK
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MAN B&W Diesel GmbH, Stadtbachstrasse 1, D-86153 Augsburg 1 GERMANY
Omnithruster, Inc., 9515 Sorensen Ave., Santa Fe Springs, CA 90670
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Rolla SP Propellers SA, Via Silva 5, P.O. Box 251, 6828 Balema SWITZERLAND
Rolla SP Propellers USA, 4030 Mustang Road, Melbourne, FL 32934, USA
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Schottel-Werlt, Manizer Strasse 99, D-56322 Spay/Rhein, GERMANY
Schottel North America, Inc., 1505 Corbin Ave., Hammond, LA 70403
Ships Machinery International, Inc., 8375 N.W. 56 Street, Miami, FL. 33166
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
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Ave.. Great Neck. NY 11021
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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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Zodiac of N. America Thompson Creek, P.O. Box 400, Stevesville, MD 21666

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American Mfg. Co., 200 Southpark Rd., Lafayette, LA 70508-3609

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Eltech International Corp., 1110 Industrial Blvd.,Sugarland, TX 77478
Envirovac Inc., 1260 Turret Dr., Rockford, IL 61111
Fast Systems, 3240 North Broadway, St. Louis, MO 63147
ITT Jabsco, 1485 Dale Way, Costa Mesa, CA 92626
Research Products Blankenship, 2639 Andjon Dallas, TX 75220

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IDB Mobile Comm., 6903 Rockledge Dr., Ste. 500, West Bethesda, MD 20817
Maritime Cellular Network, 560 Village Blvd., W. Palm Beach, FL 33409
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Scientific Atlanta, inc., 1650 International Court, Norcross, GA 30093
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Atlantic Marine, Inc., 8500 Heckscher Dr., Jacksonville, FL 32226
Avondale Industries Inc., P.O. Box 50280, New Orleans LA 70150
Bender Shipbuilding & Repair, P.O. Box 42, Mobile AL 36601
Bisso Marine Co., P.O.Box 4113, New Orleans, LA 70178
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Caridoc, P.O. Box 1147 Port Of Spain, Trinidad, W.I.
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Jeffboat, Inc., P.O. Box 610, Jeffersonville IN 47130
Kvaerner Masa-Yards Oy, Box 132, SF-00151, Helsinki, FINLAND
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Lindenau Gmbh, Skagerrakufer 10, Postfach 9093 D-2300 Kiel, Friedrichsort GERMANY
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Munson Hammerhead, 780 Pearle Jesen Way, La Conner WA 98257
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SeaFab, P.O. Box 1651, 4111 Cedar St. Pascagoula, MS 39567
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Via Nova Engineering Solutions, Via E. Toti, 20, 34074 Monfalcone ITALY
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Kobelco Marine Engineering Co., 6F Tatsunuma Bldg., 3-19 Yaesu 1-Chome, Chuo-Ku,
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Principal Contracts Recorded, March 1996

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Owner/ Operator	Country (Shipowner)	Shipyard	Country (Shipbuilder)	Type	No.	DWT	Delivery	Price (M$)
UNKNOWN	—	SOUTHERN OCEAN	SINGAPORE	ASPHALT CARRIER	1	4,000	1996	9.5
NAVIGATION MARITIME BULGARE	BULGARIA	VARNA SHIPYARD	BULGARIA	BULK CARRIER	4	13,900	97/98	—
STEPHENSON CLARKE	U.K.	PT PAL	INDONESIA	BULK CARRIER	1	18,500	1997	18
MITSUI O.S.K. LINES	JAPAN	HAKODATE DOCK	JAPAN	BULK CARRIER	3	24,200	1997	18.7
NYK LINE	JAPAN	OSHIMA SHIPBUILDING	JAPAN	BULK CARRIER	1	48,000	1998	26.19
UNKNOWN	JAPAN	NAMURA ZOSENSHO	JAPAN	BULK CARRIER	2	71,000	1997	—
HALLA MERCHANT MARINE	KOREA	HALLA	KOREA	BULK CARRIER	1	72,900	1997	28.5
K LINE	JAPAN	NIPPON KKK	JAPAN	BULK CARRIER	1	170,000	—	44
MITSUI O.S.K. LINES	JAPAN	NKK CORP	JAPAN	BULK CARRIER	1	170,000	1997	—
NYK LINE	JAPAN	NIPPON KKK	JAPAN	BULK CARRIER	1	170,000	—	44
MITSUBISHI CORP	JAPAN	JIANGNAN	CHINA	BULK CARRIER	2	72,000	97/98	—
NISSHO SHIPPING	JAPAN	MURAKAMI HIDE	JAPAN	CHEMICAL	1	5,500	1/97	—
C F AHRENKIEL	GERMANY	VIANA DO CASTELO	PORTUGAL	CHEMICAL	1	5,700	9/96	20
CHRISTIAN F AHRENKIEL	GERMANY	VIANA DO CASTELO	PORTUGAL	CHEMICAL	1	5,700	1997	—
MAROCAINE DE NAVIGATION	MOROCCO	UNION NAVAL DE LEVANTE	SPAIN	CONTAINERSHIP	2	6,300	1997	—
HANSA MARE	GERMANY	HYUNDAI	KOREA	CONTAINERSHIP	1	29,530	10/97	42
NEPTUNE ORIENT LINES (NOL)	SINGAPORE	MITSUBISHI H.I.	JAPAN	CONTAINERSHIP	2	70,000	1997	160
CHILENA INTEROCEANICA	CHILE	SOTOCZ SZCZECIN	POLAND	CONTAINERSHIP	2	—	1998	—
CONTI REEDEREI	GERMANY	DAEWOO	KOREA	CONTAINERSHIP	2	—	1997	—
DSR	GERMANY	HYUNDAI	KOREA	CONTAINERSHIP	3	—	1998	64.8
GERMAN INTERESTS	GERMANY	J.J. SIETAS	GERMANY	CONTAINERSHIP	2	—	1997	—
HANSA MARE	GERMANY	HYUNDAI	KOREA	CONTAINERSHIP	1	—	7/97	42
HERMAN BUSS KG	GERMANY	GDYNIA	POLAND	CONTAINERSHIP	2	—	4/98	35
HEUNG-A	KOREA	HANJIN	KOREA	CONTAINERSHIP	1	—	1997	17
NYK LINE	JAPAN	I.H.I.	JAPAN	CONTAINERSHIP	2	—	1998	—
NYK LINE	JAPAN	MITSUBISHI H.I.	JAPAN	CONTAINERSHIP	2	—	1998	—
NYK LINE	JAPAN	MITSUI	JAPAN	CONTAINERSHIP	1	—	1998	—
RCL	THAILAND	KYOKUYO ZOSEN	JAPAN	CONTAINERSHIP	2	9,000	5/97	36
NORDDEUTSCHE REEDEREI	GERMANY	HYUNDAI	KOREA	CONTAINERSHIP	6	61,000	97/98	—
HAM	NETHERLANDS	IHC	NETHERLANDS	DREDGER	1	4,200	1997	19
GERMAN INTERESTS	GERMANY	KRASNOYE SORMOVO	RUSSIA	DRY CARGO	5	5,800	1998	—
HYUNDAI GROUP	KOREA	HYUNDAI	KOREA	FERRY	1	—	1996	—
ADENES HAVFISK	NORWAY	KVAERNER KLEVEN	NORWAY	FISHING	1	—	1996	—
STEADFAST FISHING COMPANY	U.K.	CAMPBELTOWN SHIPYARD	U.K.	FISHING	1	—	—	2.4
QUANTUS FISHING COMPANY	U.K.	FLEKKEFJORD SLIP & MASK	NORWAY	FISHING	1	—	—	—
WAGENBORG SHIPPING BV	NETHERLANDS	SCHEEPSWERF BIJLSMA	NETHERLANDS	GENERAL CARGO	2	9,400	1998	—
CARBOCOKE	ITALY	FINCANTIERI	ITALY	LPG	1	—	1998	—
NORSK HYDRO	NORWAY	HITACHI ZOSEN	JAPAN	LPG	2	—	1997	—
VLASOV GROUP	MONACO	FUKUOKA	JAPAN	LPG	1	5,000	1997	17
SIMONSEN & SLANG	NORWAY	ABG SHIPYARD	INDIA	MULTI-PURPOSE	1	5,500	1997	17
CHIPOL	U.K.	3 MAJ	CROATIA	MULTI-PURPOSE	1	22,000	1998	—
PINAD GIDA SANAYI VE	TURKEY	SELAH MAK SANAYII	TURKEY	MULTI-PURPOSE	1	12,500	10/97	—
MURMANSK SHIPPING	RUSSIA	ADMIRALTEISKI SHIPYARD	RUSSIA	NUCLEAR WASTE TRANSPORT	1	1,400	1998	11.5
FORDE REEDEREI SEETOURISTIK G.	GERMANY	KVAERNER FJELLSTRAND	NORWAY	PASSENGER	1	—	—	6.3
MINOAN LINES	GREECE	FOSEN MEK VERKSTEDER	NORWAY	PASSENGER/CAR FERRY	1	—	1997	117.5
CENARGO INTERNATIONAL	U.K.	AESA (SEVILLA)	SPAIN	PASSENGER/RoRo	2	6,300	3/98	150
ZEELAND PROVINCE	NEW ZEALAND	ROYAL SCHELDE	NETHERLANDS	PASSENGER/RoRo	1	—	1997	—
ESTON RO-RO SHIPPING	ESTONIA	ASTILLEROS DE HUELVA	SPAIN	RoLo	2	—	1997	—
GERMAN INTERESTS	GERMANY	PEENE-WERFT	GERMANY	RoRo	2	—	1996	—
HARREN & PARTNERS SCHIFFS	GERMANY	PEENE-WERFT	GERMANY	RoRo	2	—	1996	—
DUTCH INTERESTS	NETHERLANDS	ALBIAS	—	SAND LOADING DREDGER	1	3,200	1996	—
FRAM SHIPPING	NORWAY	KHERSON	UKRAINE	TANKER	4	29,000	—	104
UNKNOWN	—	NAMURA ZOSENSHO	JAPAN	TANKER	1	80,900	8/97	37.5
ANGELICOUSSIS	GREECE	DAEWOO	KOREA	TANKER	1	98,000	9/97	42
[illegible] OLDENDORFF	CYPRUS	[illegible]	[illegible]	TANKER	1	105,000	[illegible]	44
ALAFOUZOS	—	NIPPON KKK	JAPAN	TANKER	4	106,000	10/97-98	180
THENEMARIS MARITIME	GREECE	DALIAN SHIPYARD	CHINA	TANKER	1	110,000	1999	44
STATOIL	NORWAY	ASTILLEROS ESPAÑOLES	SPAIN	TANKER	1	125,000	1998	—
SUN ENTERPRISES	—	HYUNDAI	KOREA	TANKER	1	295,000	1997	—
GOLDEN OCEAN	U.K.	HITACHI ZOSEN	JAPAN	TANKER	2	310,000	1998	90
KRISTEN NAVIGATION	GREECE	DAEWOO	KOREA	TANKER	1	98,000	9/97	42
DAITOH TRADING CO.	JAPAN	ASAKAWA ZOSEN	JAPAN	TANKER	1	10,000	1996	—
SHINTOKU KAIUN	JAPAN	SASEBO	JAPAN	TANKER	1	15,000	1996	30
SHINTOKU KAIUN	JAPAN	SASEBO	JAPAN	TANKER	1	18,000	1996	32
[illegible] MARINE	JAPAN	SHINKURUSHIMA	JAPAN	TANKER	1	—	1997	—
JAMES FISHER & SONS	U.K.	VSEL	U.K.	TANKER	2	4,500	1997	22.54
PRIMORSK SHIPPING	RUSSIA	CHEUNG KU MARINE IND.	KOREA	TANKER	2	5,000	1997	15
SCANDINAVIAN INTERESTS	—	KHERSON	UKRAINE	TANKER	3	29,000	97/98	78
HVIDE / VAN OMMEREN	NETHERLANDS	NEWPORT NEWS	U.S.	TANKER	5	45,300	97/98	—
TUGZ INTERNATIONAL	U.S.	HALTER MARINE INC.	U.S.	TRACTOR TUG	2	—	1996	—
GREAT LAKES TOWING	U.S.	HALTER MARINE INC.	U.S.	TUG	2	—	—	—

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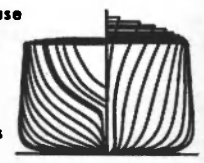

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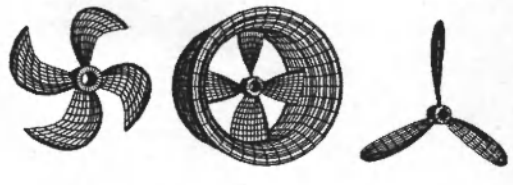

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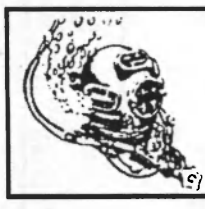

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2 COLUMN - 6 1/4"	MAXIMUM - 12"
3 COLUMN - 9 1/2"	

EQUIPMENT/PRODUCTS/SERVICES FOR SALE

NOTICE TO THE NATIONAL & INTERNATIONAL HEAVY LIFT COMMUNITY

The Port of Memphis is soliciting Statements of Qualifications and Interest from prospective contract operators of a 1,250 ton, 360 degree rotating stiff leg derrick crane and 14 acre fabrication - assembly site in Memphis, TN. Additional information can be obtained by contacting the Port of Memphis. Phone (901) 948-4422, Fax (901) 775-9818 or at P.O. Box 13142, Memphis, TN 38113. The Deadline for submittal is June 1, 1996.

GOLDEN GATE BRIDGE, HIGHWAY AND TRANSPORTATION DISTRICT NOTICE INVITING SEALED BIDS

NOTICE IS HEREBY GIVEN that sealed bids will be received by the Golden Gate Bridge, Highway and Transportation District at its mailing address: P.O. Box 9000, Presidio Station, San Francisco, California 94129-0601, or by delivery to the Office of the Secretary of the District, Administration Building, Toll Plaza, Golden Gate Bridge, San Francisco, California, until 2:00 p.m., Pacific Local Time, **Tuesday, June 4, 1996,** at which time bids will be publicly opened and read for **CONTRACT 96-FT-5, PROCUREMENT OF A FAST ALUMINUM PASSENGER FERRY.** The vessel is to be a twin-hulled catamaran configuration, excluding Air Cushion, SWATH and Hydrofoil vessels, designed for maximum utilization in fast passenger ferry service on San Francisco Bay and adjacent inland waters. Propulsion shall be provided by water jet propulsion units driven by four diesel engines through reduction gears.

This contract is subject to a financial assistance contract between the District and the U.S. Department of Transportation. Any name appearing on the Comptroller General's list of ineligible contractors for federally financed and assisted construction is not an eligible bidder, and ahy contract that may be entered into with such a contractor may be canceled, terminated or suspended by the District.

Bids must be accompanied by a bidder's security as described in the contract documents. Bids will be reported to the District Board of Directors, which reserves the right to waive any irregularities or informalities in any bid or in the bidding procedure or to reject any and all bids.

The District hereby notifies all bidders that it will affirmatively insure that in any contract entered into pursuant to this advertisement, Disadvantaged Business Enterprises (DBEs) will be afforded full opportunity to submit bids in response to this invitation and will not be discriminated against on the basis of race, color, national origin, religion, sex, age, disability, ancestry, medical condition, sexual orientation, marital status, or pregnancy, as provided for in federal, state and local laws, in consideration of an award. The District hereby notifies all bidders that a DBE participation goal of fourteen (14) percent has been established for this contract.

Specifications, proposal forms, bonds and contract documents may be inspected and purchased at the non-refundable price of $40.00 at said Office of the Secretary of the District, telephone 415-923-2211. Questions should be directed to Eric A. Robinson, Ferry Transit Manager, telephone 415-925-5570. Dated at San Francisco, California this 20th day of March, 1996. /s/ Gene P. Rexrode, Secretary of the District.

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BSA-96-RBA-024

Friday, June 14th, 1996

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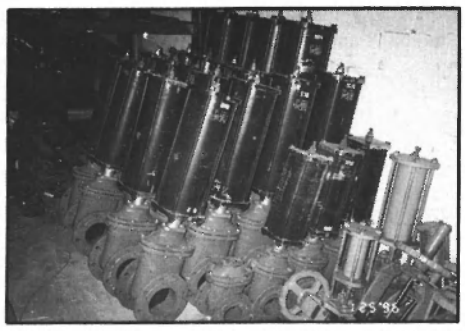

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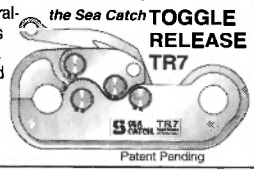

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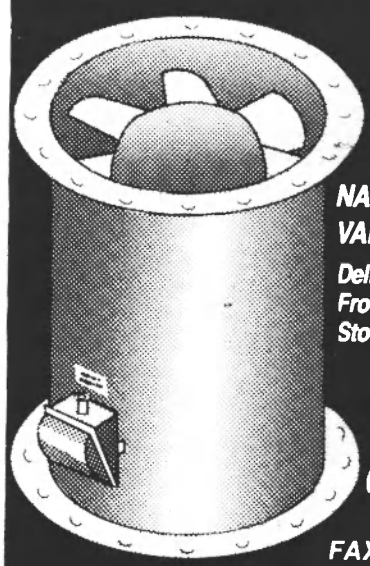

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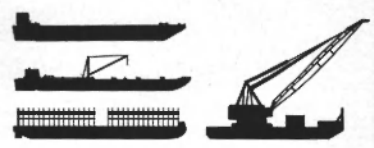

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