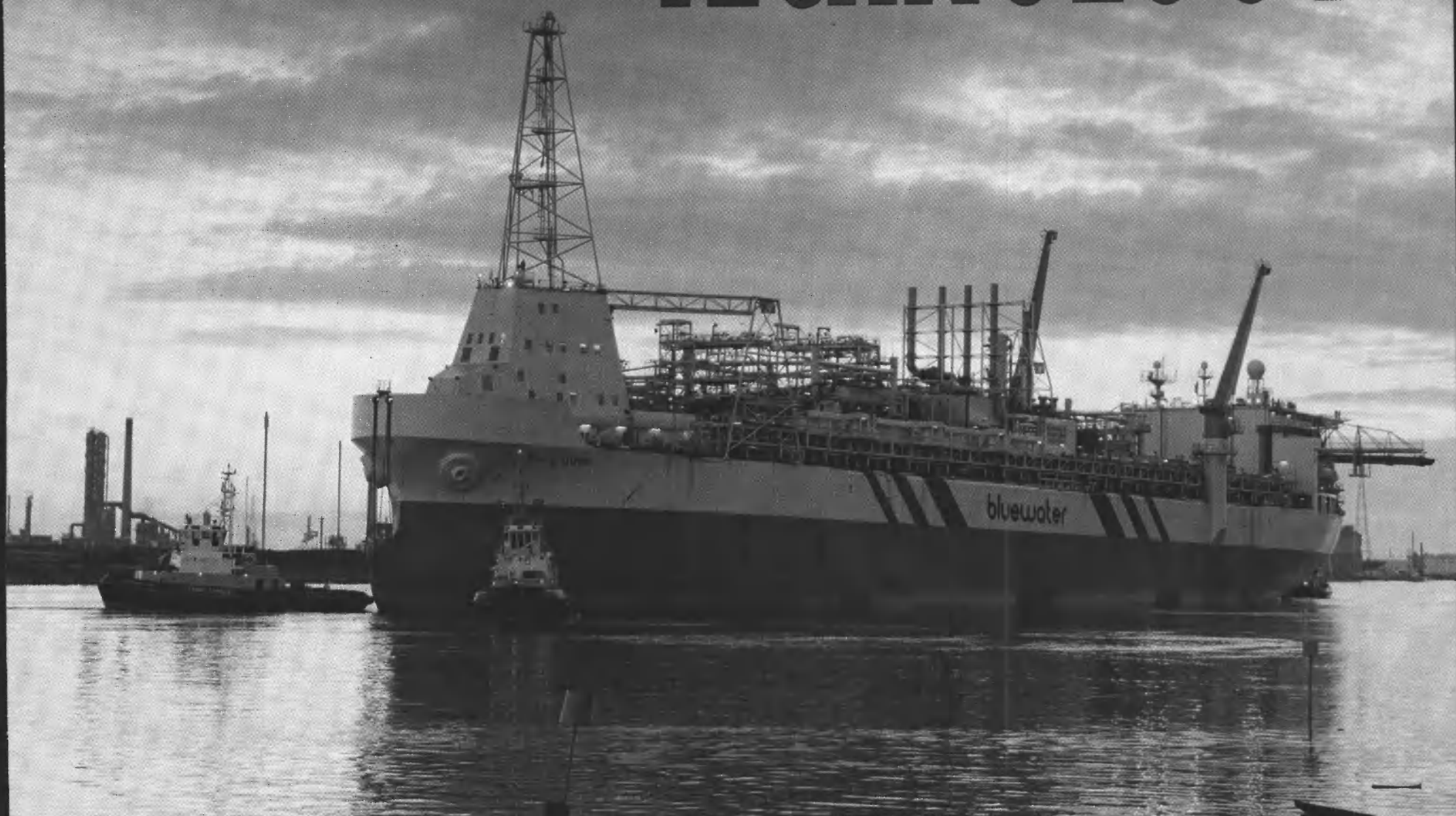


SEPTEMBER 1997

**MARITIME
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**TANKER
TECHNOLOGY**

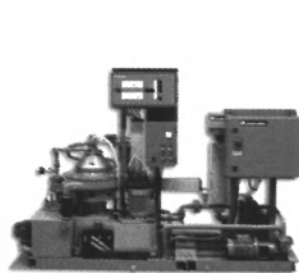
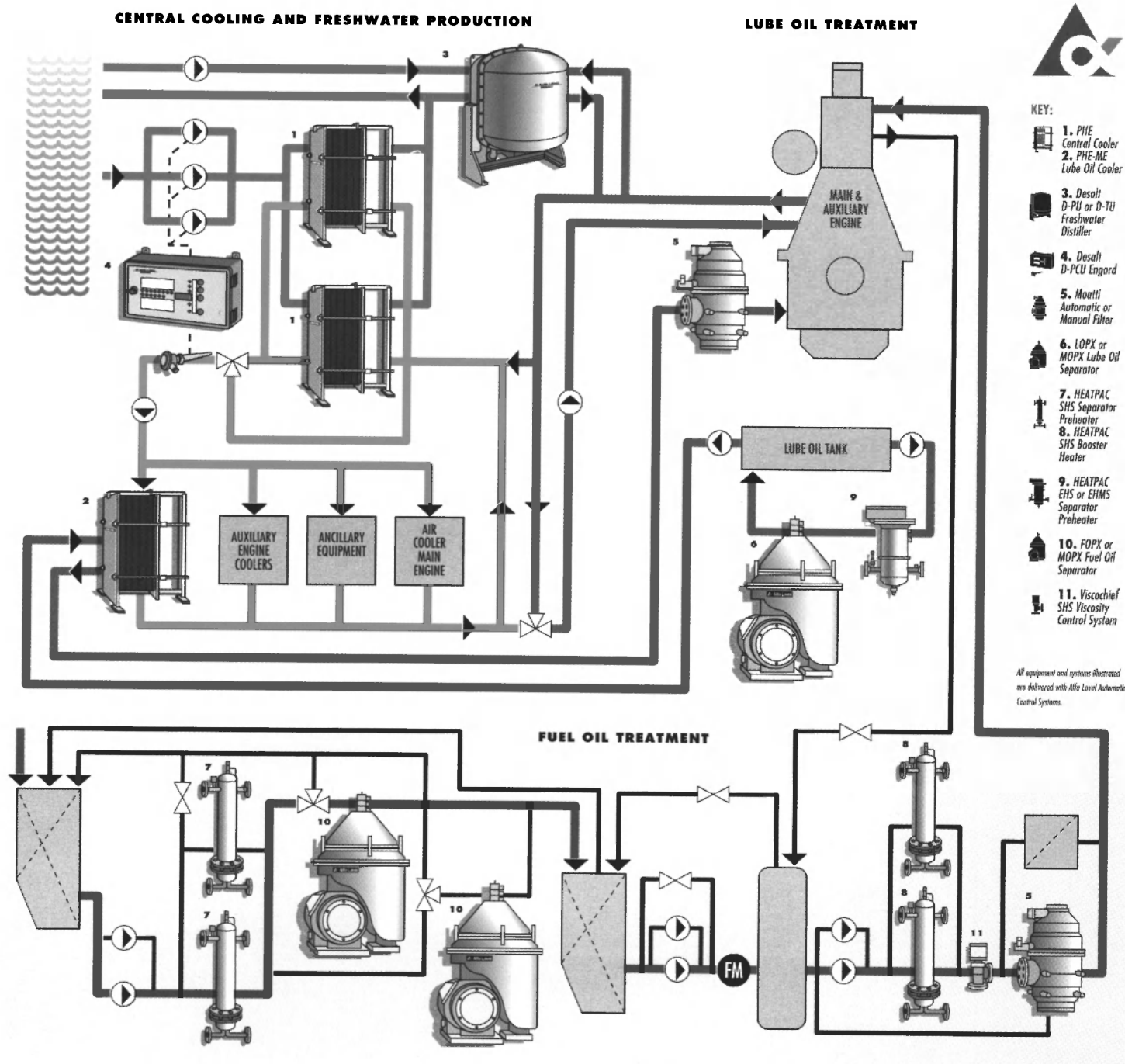


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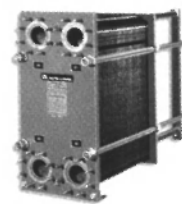


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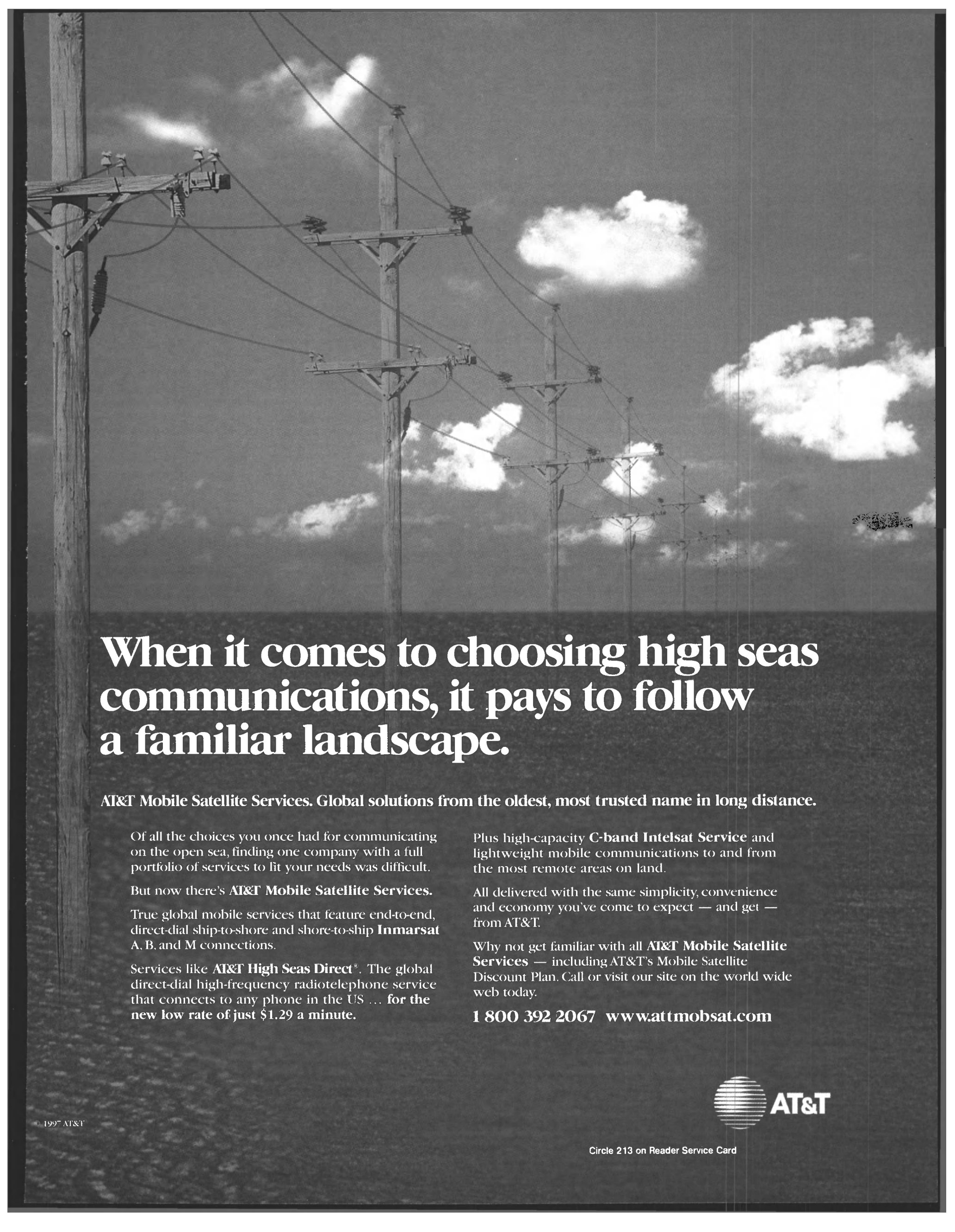
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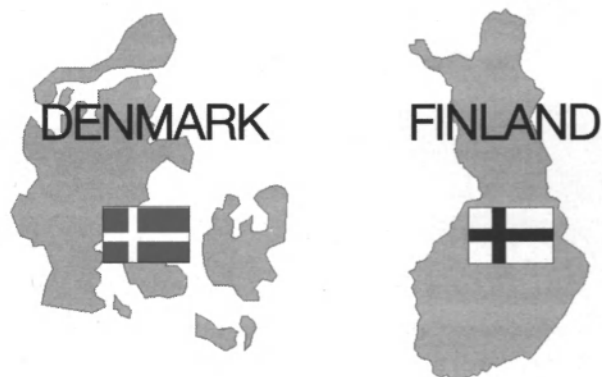
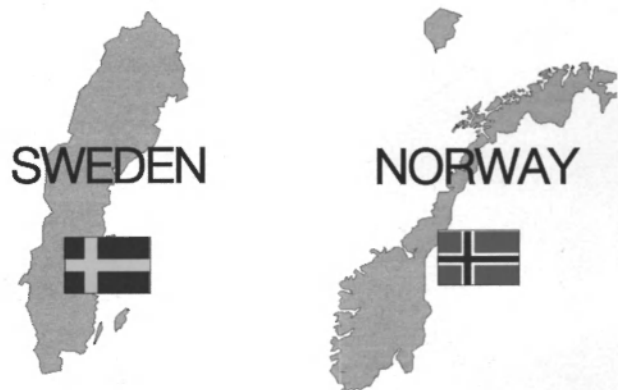
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In this edition

Pictured on the cover: Bluewater FPSO *Glas Dowr* recently produced first oil from Dauntless and Durward reservoirs. The Bluewater production program kicks off the Tanker Technology feature on page 39.

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- 39 TANKER TECHNOLOGY**
With a booming worldwide offshore oil market, getting the product from beneath the sea to market as quickly, safely and efficiently as possible is more important than ever. Innovative tanker design, outfitting and use is actively employed to achieve these ends.

Special Pull-Out Section

- 57 MARINE PROPULSION TECHNOLOGY**
Propulsion systems have become the centerpiece of ship and boat owners' fight to ensure their vessels meet ever tightening environmental regulations and operational efficiencies. While mergers, acquisitions and down-sizing trends worldwide have reduced the overall number of propulsion manufacturers and suppliers, the amount of propulsion choices continues to grow, as technology helps equipment makers deliver better solutions seemingly every month.

- 112 IS THERE A SHIP REPAIR BOOM COMING?**
When the IMO meets in November to discuss bulk carrier safety, the result could be a boom to ship repair industries around the world.

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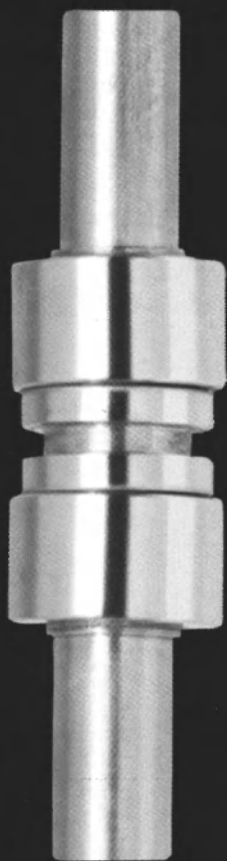
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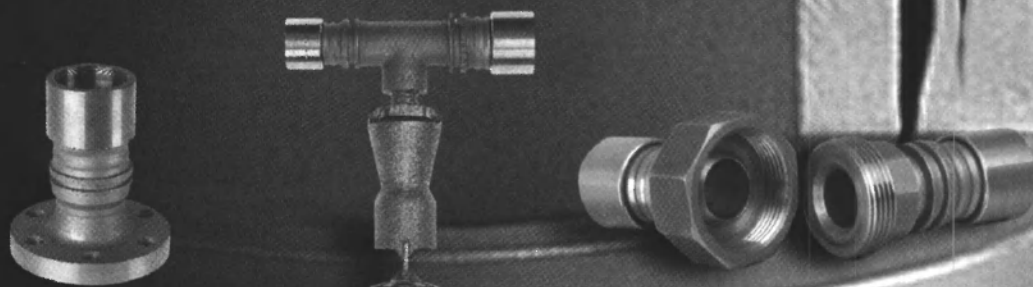
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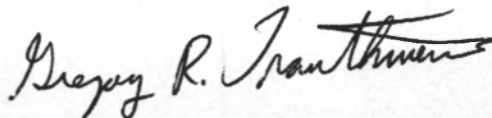
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EDITOR'S NOTE

Propulsion coverage — whether it is product specific or it encompasses the vast spectrum of related products, systems and topical issues — is always of high interest because of its tremendous effect on a shipowner's bottom line. While the number of component and system suppliers seemingly shrinks daily with the rapid rate of mergers and takeovers, the number of component and system options continues to widen. Manufacturers are working at warp speed to deliver products that stand out in a congested market and provide better efficiency, longer life, less maintenance costs and total environmental compliance.

As the bar for environmental protection continues to rise — driven by ever-tightening international, national and regional legislation — the importance of making the right propulsion system choice rises proportionately. While choosing the lowest emission, best efficiency propulsion unit is crucial, environmental pressures have changed another aspect of propulsion selection and supply, a change embodied in the new ARCO tankers ordered two months ago. The new tankers, being built by Avondale for the Alaska to Washington State run, are designed with complete redundant propulsion packages, comprised of two engines, two engine rooms, two rudders, two propellers, two control packages and more. The system is state-of-the-art in safety, designed to ensure control of the vessel in case catastrophe strikes. The story on the new Millennium Class tanker is a central piece of our Tanker Technology coverage, and starts on page 42. The Tanker Tech section starts off with technical details of Bluewater's latest FPSO, Glas Dowr, a vessel which recently started producing at the Durward reservoir. In the "time-is-money" world of the offshore boom, the FPSO was delivered just 20 months after the contract was signed and appears on this month's cover.

The Marine Propulsion Technology coverage this month is housed in a special pull-out section, beginning on page 57. The propulsion pull-out offers a variety of propulsion-related features, including Technical Editor David Tinsley's examination of recent advances in the area of diesel power (page 63); Contributing Writer Rodney Lanz's story on monitoring systems (page 66); and the first installment of a four-part series regarding an exciting engine room design project, currently underway at the David Taylor Model Basin (page 70).



Gregory R. Trauthwein, editorial director

Please contact me with any comments regarding the publication and/or news leads at:
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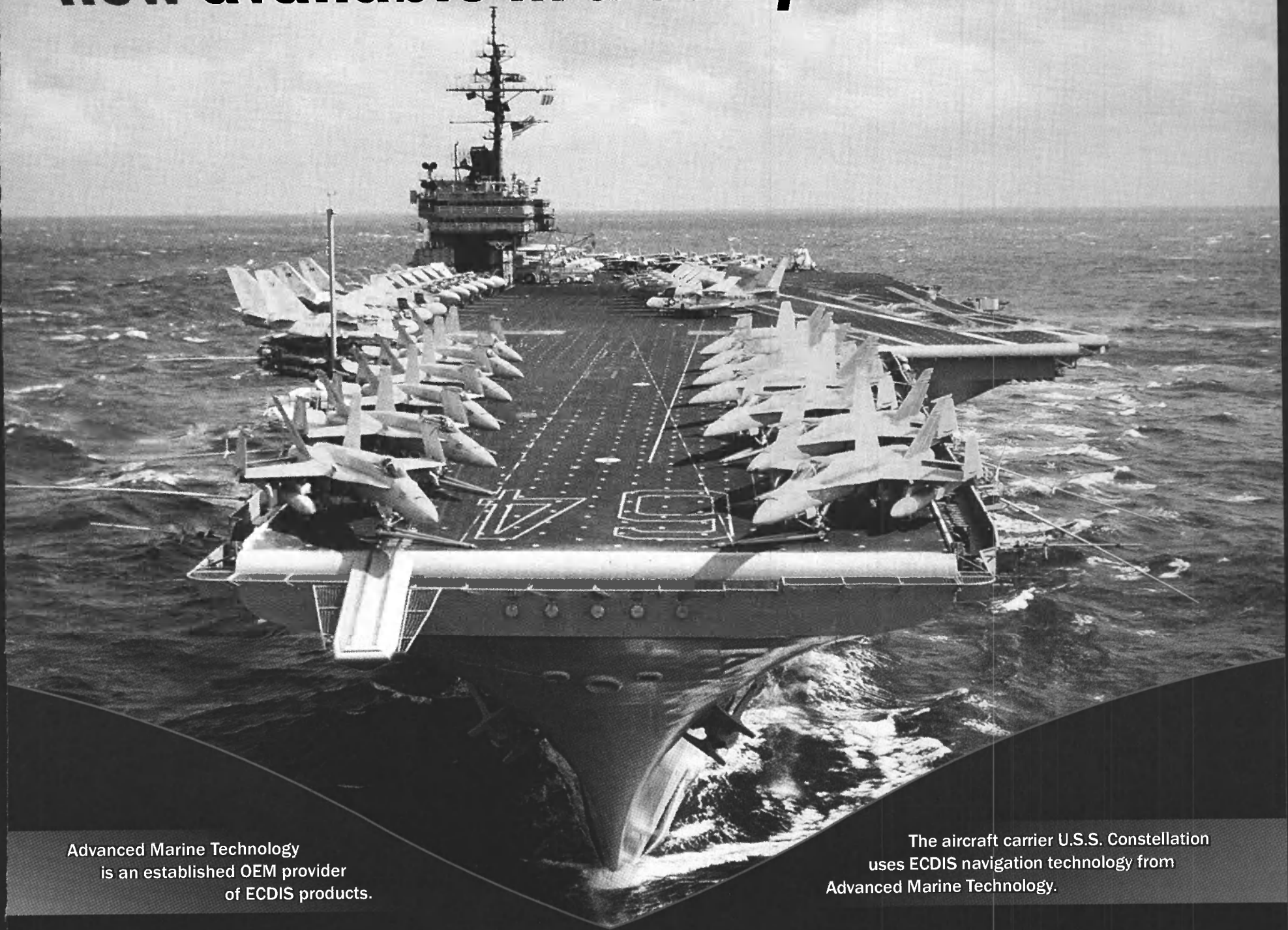
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Coal Unloader Delivered To Worldport LA

Group Effort Needed To Breakdown, Deliver and Rebuild Large Unit

The Port of Los Angeles is aggressively expanding its facilities, an expansion which includes an improvement of the coal storage and redistribution facility at Berth

301. The new coal transfer equipment, designed by Krupp, is presently close to completion. One major milestone was the delivery of the coal loader. This loader was

built in Malaysia and shipped in large pieces to Los Angeles where Bickerton Iron Works, Inc. of Torrance, Calif., assembled it at the old Todd Shipyard.

Todd was also responsible for transportation from this assembly site to the final destination. Liftech Consultants, Inc. of Oakland, Calif., was hired to design a dolly arrangement that could lift and roll the coal loader over the dock and onto the transport barges. Argonautics Marine Engineering of Sausalito, Calif., was hired for the marine aspects of the project, including load-out ballast calculations and on-site assistance with the actual loading and offloading.

For the transport, two 242 x 60 x 16-ft. (73.7 x 18.3 x 4.8-m) flat top cargo barges, owned by Sause Bros. of Portland, Ore., were used. These barges were connected together in a catamaran configuration with two hinged spacer beams and two hinged bracings. This flexible connection was designed to minimize load transfer from one barge to the other, and allowed each barge to move relative to the other in vertical direction, while being restrained in sideways and longitudinal direction. Once loaded, the Krupp coal loader would span both barges.

Once successfully loaded, the barge catamaran was safely towed to Berth 301, using one pusher tug and two assist tugs, all provided by Sause Bros. During the four-mile, two-hour tow, the barges behaved satisfactorily, acting as one single unit.

Since the hull depths of the cargo barges were equal to the height of the offloading quay above MLLW, the offloading operation was very tide-sensitive. The coal loader was jacked up and freed from its supports. The barges' sterns were aligned with the quay and spacer plates were installed.

Once the water level reached the optimum height, the coal loader was pushed by the two trucks and slowly rolled from the barges onto the quay. Simultaneous ballasting ensured continuous alignment of the barges.

Two hours after starting the offloading operation, the coal loader was reportedly safely in position, with its wheels over the rails.



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MARINE FINANCE

Seacor Smit Enters Rig Alliance; Reports Earnings

Seacor Smit Inc. and Chiles Offshore announced an agreement for a strategic alliance under which Seacor will invest \$9 million in Chiles — of which it will become half-owner — and will commit \$26

million to investment in rig-owning partnerships.

Chiles Offshore also announced a contract with Amfels, Inc. for the construction of a second rig, a LeTourneau Super 116 jack-up drilling unit.

Seacor Chairman **Charles Fabrikant** said, "We believe that new, modern jack-up rigs will be a

fruitful investment and provide returns on capital consistent with our corporate objectives. We also believe there are synergies between the rig business and the boat business and Seacor's global marketing network and broad customer base will contribute to each other."

Seacor Smit Inc. recently

announced net earnings for the second quarter of this year of \$38 million, or \$2.75 per primary share on revenues of \$85.2 million. The company sold 22 vessels in the six months ended June 30, namely seven supply, five utility, four towing supply, three AHTS, two crew and one freight vessel. In the comparable quarter ended last year, Seacor earned \$6.9 million per primary share on revenues of \$52.6 million.



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Offshore Systems Receives \$2.3 Million Order

The Canadian Coast Guard has reportedly purchased 24 units of Offshore Systems' electronic chart precise integrated navigation systems (ECPINS). The \$2.3 million order is the second phase of a 36-system installation program, and the systems will be used in buoy tending, icebreaking, search and rescue, fisheries patrol and training operations.

U.S. Navy Awards Telecommunications Contract

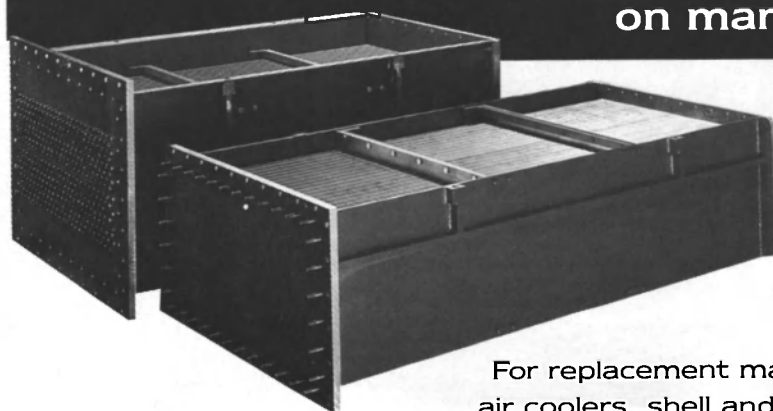
The U.S. Navy awarded a contract worth nearly \$3 billion to Lucent Technologies Inc., GTE Government Systems Corp., Bell Atlantic Federal Integrated Systems Inc. and AT&T Government Markets for voice, video and data modernization of Navy telecommunications. The contract is expected to be completed by July 2007.

AT&T Corp. withdrew its bid after the announcement. "We bid on the whole contract but were allotted only a portion, so under those circumstances, we withdrew the bid," said a company spokesperson.

Navy Awards \$41 Million IT Contract

DynCorp subsidiary DynTel won a \$41 million contract to provide IT support to eight local centers of the Naval Education and Training Professional Development and Technology Center. The one-year contract includes three option years, over which time the company's services will include computer systems administration, network system management support, soft-

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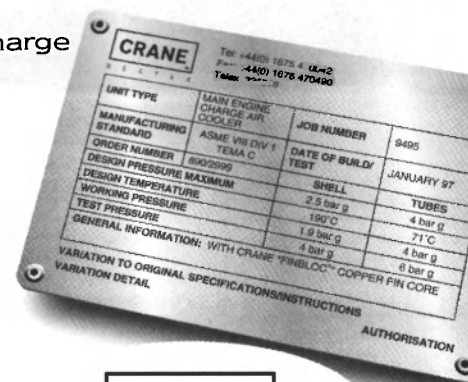
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ware maintenance, technical support and facilities management.

Bethlehem Steel To Close Maryland Shipyard

Bethlehem Steel Corp. has terminated discussions with Baltimore Shipbuilding and Drydock, LLC, regarding the sale of its BethShip Sparrows Point Yard in Maryland. Bethlehem said it will continue to focus its efforts and resources on its steel business, implementing the restructuring plan announced last October, and ending the losses from its underperforming divisions, including BethShip. The yard presently has 100 active employees who are performing maintenance-related and other miscellaneous work. Bethlehem will now initiate a sale of the yard's assets.

Global Industries Cuts \$102 Million Deal

Dresser Industries, Inc. announced that its Sub Sea International unit completed the sale of certain assets to Global Industries, Ltd. for \$102 million in cash.

The transaction will be booked in the third quarter of this year and principal assets included in the sale are construction barges, lift-boats and dive support vessels based in the U.S., Middle East and Far East.

Hvide Reports Results

Hvide Marine Inc. reported net income before an extraordinary item for the three months ended June 30, of \$5.7 million, or \$0.37 per share, compared with net income of \$0.10 per share in the year-earlier period. Revenues totaled \$46.3 million, more than double last year's \$21.5 million.

"We expanded our reach not only in the Gulf of Mexico but also internationally with the acquisition in late May of the offshore fleet of Gulf Marine Maintenance and Offshore Service Company (GMMOS), the largest independent operator of offshore energy support vessels in the Arabian Gulf. Day rates in the Middle East have a ways to go compared to the rest of the world, and we see this as a strong growth opportunity,"

said CEO **J. Erik Hvide**.

Avondale Reports Q2 Results

Avondale's second quarter results registered a 24 percent increase in income before taxes to

\$10.4 million, versus \$8.4 million a year ago. Net income for the quarter was \$6.4 million, or \$0.44 per share. This compares with last year's \$14.3 million, or \$0.99 per share.

"The increase in income before income taxes for the second quarter follows a similar positive per-

formance in the first period," said CEO **Al Bossier, Jr.** "This favorable trend directly reflects the considerable investments we have made in capital and new manufacturing systems to increase the company's productivity and efficiency."

He said the yard's backlog stands

LUGGER TECH TALK # 3

A Technical Information Series From Alaska Diesel Electric

Six heads are better than one.

Lugger diesels, from 11 to 30 liters, have one cylinder head per piston. Individual cylinder heads allow Luggers to increase the power output per cylinder without a reduction in engine life. They also dramatically reduce service and rebuild costs.

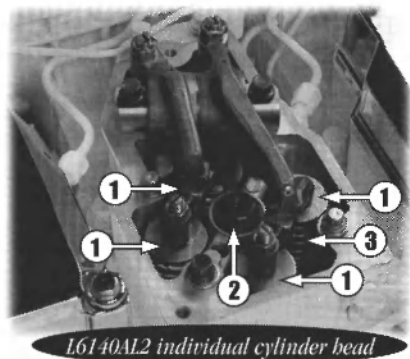
More Power Without Sacrificing Engine Life Cycle.

Individual heads are smaller than a head that covers 2 to 6 cylinders. The small size minimizes the possibility of it warping from thermal stress.

The small head-to-block mating surface and seven head bolts in a circular pattern give a strong, evenly distributed clamping force for a more effective combustion chamber seal.

Individual Heads Simplify Service and Lower Rebuild Costs.

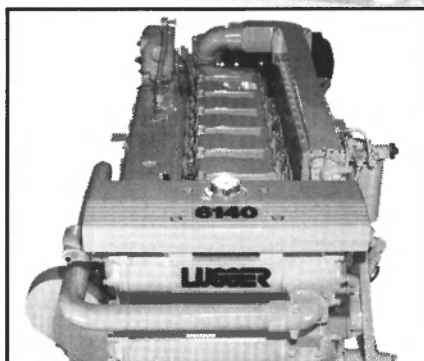
Engine problems are often limited to one cylinder. Individual heads allow one cylinder to be rebuilt without disturbing the rest. The piston, rod, liner and rod bearing of one cylinder can be replaced, *in the boat*, without even removing the rocker arm cover of the other cylinders. Think of the downtime and labor costs this will save.



16140AL2 individual cylinder head

Not Just Individual Heads. Better Individual Heads.

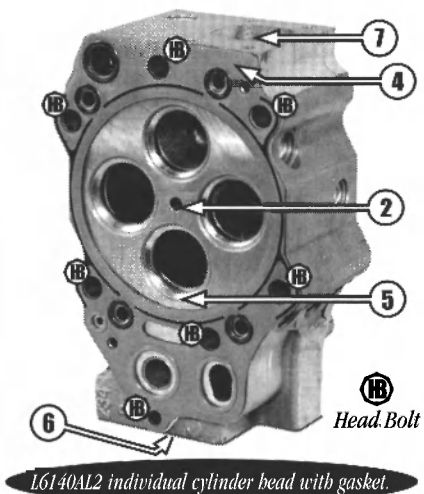
- Lugger heads are interchangeable. If you have one on board you can rebuild any cylinder. Light too. One person can lift it on and off the engine.
- Cross-flow design is more efficient. Intake on one side and exhaust on the other simplifies the engine design.



Inline Muscle. 16140AL2, 500-700 HP. One of four Luggers with individual cylinder heads

- Four internal coolant channels cool the "bridge" between the valves and around the injector tip. This prevents bridge cracks, a common failure on some engines.
- Rocker arm cover floats on o-ring seals to isolate it from the head and to reduce valve train noise transfer.

1. Four valves (two intake and two exhaust) improve engine breathing. More air in, more power out. Steel alloy valves have chrome plated stems for longer life.
2. Fuel injector and piston combustion bowl are centered to maximize air and fuel mixture for more complete combustion. It also pushes the piston straight down and avoids "piston slap."



16140AL2 individual cylinder head with gasket.

3. A "dropped valve" can destroy an engine. Luggers have dual valve springs. If one breaks, the other holds the valve in place.

4. Solid steel head gaskets. All perforations have bonded silicone grommets that seal the oil and coolant passages. If a seal should fail, relief channels carry the fluid out of the engine. You can visually identify the problem and mixture of coolant and oil is avoided.

5. Valve seats and guides are replaceable. The head can be rebuilt again and again.

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7. Short exhaust port minimize the heat transferred to head and maximizes the energy delivered to power the engine's liquid cooled turbocharger.

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EA Engineering Wins Navy Contract Extension

EA Engineering, Science and Technology, Inc. won extensions on four task orders worth more than

\$1.4 million under its indefinite delivery/indefinite quantity order (ID/IQ) contract with the U.S. Navy. These orders will be used to fund an array of multidisciplinary environmental projects at the Naval Air Station (NAS) in Brunswick, Maine, including sub-surface investigations, opera-

tions and maintenance of three remediation systems, and long-term monitoring and sampling at more than 100 locations.

H.E.R.C. Completes Coast Guard Job

H.E.R.C. Products Inc. completed

the chemical cleaning of the vacuum waste water lines aboard U.S. Coast Guard cutters *Gentian*, *Thetis* and *Valiant* — ships based out of Atlanta Beach, N.C., and Key West and Miami, Fla., respectively. The company has now chemically cleaned 12 of the agency's cutters, and just completed a Navy contract to clean the condenser used for the boilers and potable water supply aboard USS *Guam*.

Rhapsody Propulsion Troubles Affect RCI Earnings

Royal Caribbean's newest ship, *Rhapsody of the Seas*, will enter drydock Sept. 13 for replacement of its starboard propulsion motor which has malfunctioned in recent months.

The ship will return to service Oct. 5, but the drydocking will necessitate cancellation of two repositioning cruises to Hawaii. CFO **Richard J. Glasier** estimated the financial impact of the cancellations will be approximately \$0.05 per share for the third quarter. On April 22, the ship was approximately 25 miles out of Chantiers de l'Atlantique when the electric motor overheated during its delivery trip. *Rhapsody* returned to the yard for repairs to the starboard propulsion motor.

Litton Announces \$25 M Shipyard Upgrade

Litton Industries announced plans to invest \$25 million in a major facilities program at Ingalls Shipbuilding, which involves expansion of the yard's floating drydock and construction of an additional production bay for building offshore structures. The drydock expansion will include adding a 160-ft. (49-m) detachable section to the shipyard's existing drydock, bringing the dock to 800 ft. (244 m) in length.

DRS Wins Lockheed Martin Contract

DRS Technologies Inc. won a contract valued at approximately \$64 million from Lockheed Martin Tactical Defense Systems to manufacture AN/UYQ-70 Advanced Display System tactical workstations for the U.S. Navy.

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advanced workstations is a cornerstone in the modernization and evolution of military combat systems.

Our receipt of this award demonstrates the U.S. Navy's confidence in the Lockheed Martin-DRS Technologies team," said DRS Chairman **Mark S. Newman**.

and related computer services required to support the yard's computerized work processes.

NNS Chief Information Officer **Steve Hogan** commented: "The Service Center is a process improvement that will eliminate non-productive delay for most user requirements. NNS' computer

needs will be satisfied in hours rather than weeks."

GE Capital Services Consolidates Assets

GE Capital Services has announced the strategic consolida-

tion of TIP Intermodal Services and Genstar Container Corp.'s domestic container assets. The new group will be called TIP Intermodal Services and will report to TIP headquarters in Devon, Pa.

More than 18,000 intermodal containers and 10,000 chassis from

Navy Selects Wang For Lucent-Led IT Contract

Wang Government Services has been selected by the U.S. Navy as part of the Lucent Technologies team which will provide technical services for the Voice, Video and Data (ViViD) contract valued at \$2.9 billion over 10 years.

Wang services will include providing integrated network management services; integrated voice, video and data network design and implementation; and multi-vendor maintenance.

Global Ocean Carriers Expands Fleet

Global Ocean Carriers Ltd. has taken delivery of two Panamax bulk carriers and two feeder container vessels which were purchased for \$55.4 million, and funded from the proceeds of Global's \$126 million issue of 10-year unsecured notes. Global reports that it has no secured debt outstanding on its existing 12-ship fleet.

"The prompt acquisition of the four vessels means that the new debt capital raised through the note issue has been immediately put to work. The four vessels are on a mixture of spot and period employment and are currently contributing \$46,500 per day in gross revenues," said President **Nikolas Tsakos**.

Newport News Shipbuilding Announces IT Advancement

MVSI, Inc. subsidiary Socrates Computer Systems Inc. has entered into an agreement with Newport News Shipbuilding (NNS) for a computer service center dedicated solely to the support of the yard and its 18,000 employees.

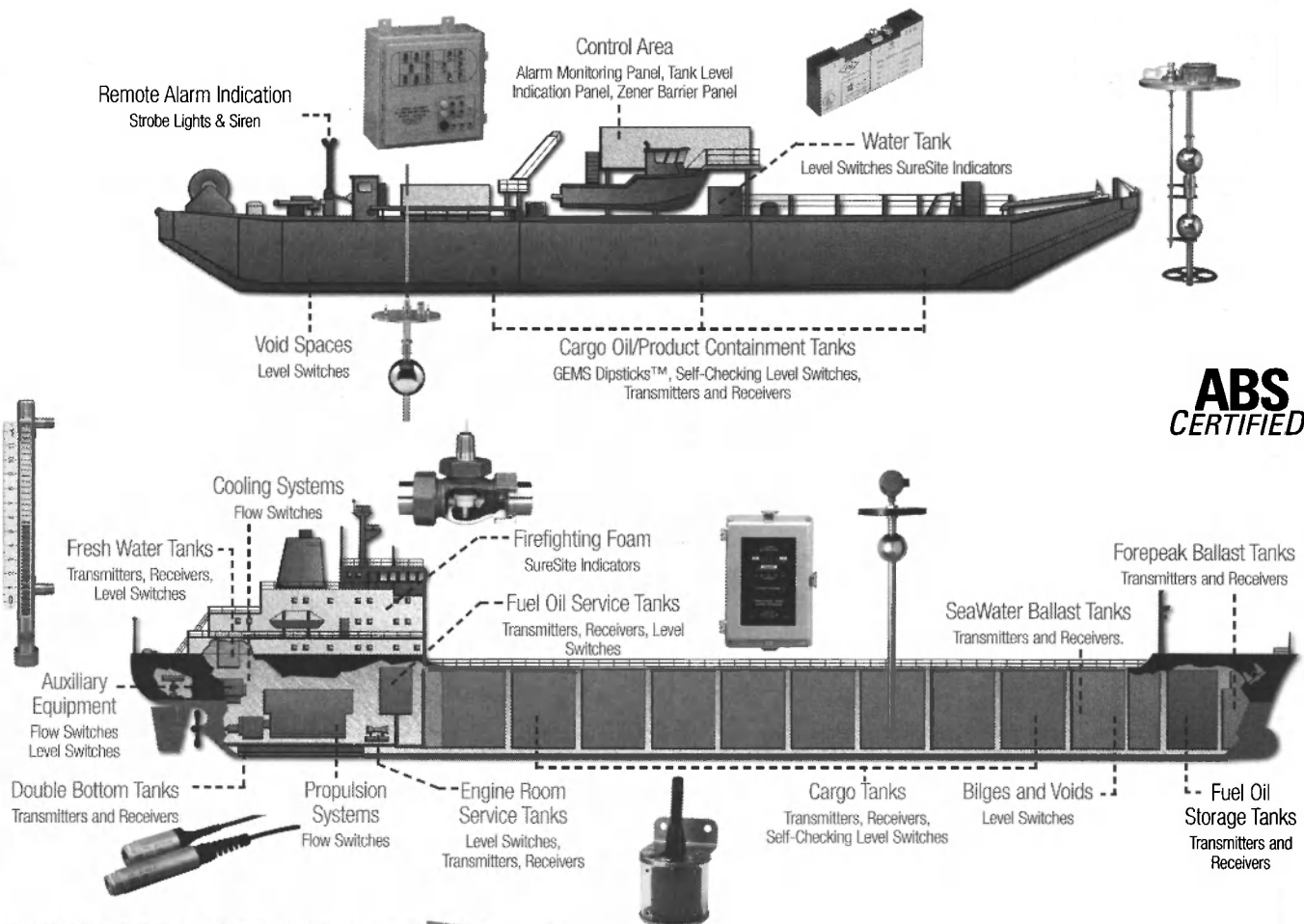
The center will be operational by September and will deliver the hardware and software products

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Genstar's fleet will be added to TIP's fleet of 6,000 intermodal trailers.

"The consolidation of assets creates an opportunity for GE Capital Services to take an expanded role in the intermodal market, which is expected to grow by more than seven percent in 1997," said Nigel

D.T. Andrews, executive vice president, GE Capital Services.

Navy Names GRC As Prime Contractor For BPA

GRC International is the prime

contractor for a BPA awarded by the East Coast division of the Naval Command, Control and Ocean Surveillance Center. The agreement covers services for systems engineering and other support for the design, analysis, development, testing, installation, documentation and support for various

systems.

The team of companies involved includes: Allied Signal Technical Services Corp.; Argon Engineering Associates; Lockheed Martin; Lucent Technologies; and Raytheon E-Systems.

Mitsui Wins FPSO Contracts

Modec Inc., a subsidiary of Mitsui Engineering & Shipbuilding Co. Ltd., won three contracts reportedly worth a total of 35 billion yen to build FPSOs for BHP Petroleum Pty. Ltd., Petroleos Mexicanos and Marathon Petroleum Gabon LDC.

Boatrac Wins 16-Vessel Equipment Contract

San Diego-based Boatrac has signed a contract with L&M Bo-Truc of Golden Meadows, La., to supply 16 vessels with satellite-based marine communications and tracking systems.

L&M is a marine transportation company based in Golden Meadows, La., that serves U.S. inland waterways.

Vosper Wins Coveted Bahamian Vessel Contract

The Royal Bahamas Defense Force has selected Vosper International's Europatrol 375 design for its new Bahamas class of offshore patrol vessels. The 200 x 29-ft. (61 x 8.9-m) vessel class will be constructed under license by the Halter Marine Group at its Moss Point Marine facility in Mississippi.

Canadian Pacific To Acquire Containership Holding

Canadian Pacific Ltd. will acquire Contship Containerlines, the container shipping business of Contship Holdings NV. Terms have not been disclosed. Canadian Pacific reportedly said the deal would include Contship's brand name, services, worldwide organization, container fleet and 19 chartered-in container vessels.

This represents the company's third major shipping acquisition in recent years, including its deal to buy Lykes Lines.

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The background image shows a large ship in a dry dock with workers and heavy machinery, including a large propeller being moved.

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Oslo Approves Secondary Share Listing For Cruise Line

Royal Caribbean International said that it will go ahead with a secondary share listing on the Oslo Stock Exchange, which the company believes is reflective of the global nature of its business and its

Scandinavian links. No new shares will be issued as part of the secondary listing.

The Oslo Stock Exchange said its board had approved the application, and thus RCI will be the third cruise shipping firm listed, after NCL Holding and Miami-based Cruise Holding Ltd.

SUNY Maritime Announces Tuition Breaks For Mid-Atlantic Scholars

Pennsylvania Gov. **Tom Ridge** recently signed an agreement with New York Gov. **George Pataki** to provide major tuition cuts for

Pennsylvania residents who wish to attend the State University of New York Maritime College at Fort Schuyler.

"Under this agreement, Pennsylvania residents will be able to attend a first-rate maritime college while enjoying in-state tuition rates of \$3,400 annually, rather than the out-of-state \$8,300 rate," Gov. **Ridge** said. The college will receive an additional \$100,000 annual grant from MarAd for its regional academy status. The newly-designated regional status will also enable the college to offer the same reduced tuition rates to five other states — Connecticut, New Jersey, Maryland, Virginia and Delaware — none of which have their own maritime colleges.



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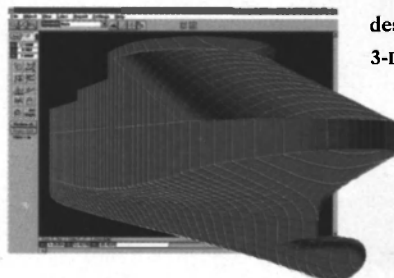
Next, we define all the tanks and compartments in **Autohydro**. Calculating volumes and balancing the ship is easy and quick, so we can spend more time to optimize the layout.

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

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

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Tacoma To Break Ground For Hyundai Terminal Construction

The Port of Tacoma was to begin construction of a new container terminal for Hyundai Merchant Marine (America) during a groundbreaking ceremony scheduled for August 13.

In April of this year, the company — a subsidiary of Korea's Hyundai Merchant Marine Co., Ltd. — signed a 30-year lease for a 50-acre container terminal on the Port's Blair Waterway. The facility is scheduled to be in operation by mid-1999.

Cascade General Begins \$14 Million Conversion Project

Cascade General Shipyard in Portland, Ore., is performing a \$14 million conversion and recommission on a former U.S. Navy frigate for its new owner, the Royal Thai Navy. Work on the 440-ft. (134-m) Knox class ship will include: system reactivations; electronic and equipment upgrades; repairs to boilers, pumps, propulsion systems, stabilizer and rudder; dry-docking; and coating. Cascade is one of a few repair yards contracted to activate ships through the Foreign Military Sales (FMS) program of the Naval Sea Systems Command (NavSea).

"Our people have performed well on past FMS contracts — we've been able to apply our commercial repair expertise to this

MARINE FINANCE

specialized area and the combination has been quite effective," said Government Programs Vice President Bill Wheeler.

Hamworthy Marine Wins British Supply Contract

The U.K. Ministry of Defense has reportedly awarded Hamworthy Marine a contract to update the sewage treatment systems onboard its Hunt class mine countermeasure vessels. The systems currently installed aboard the 13 vessels fail to meet IMO and Coast Guard standards. The design parameters of the Hamworthy systems to be installed are based on the company's Super Trident sewage treatment plant, which was designed to be in compliance with MARPOL Annex IV requirements.

For more information
Circle 52 on Reader Service Card

Delta T Systems Wins Ferry Supply Contract

Under a contract to provide two high-speed ferries to the city of Vallejo, Calif., commercial boat-builder Dakota Creek Industries of Anacortes, Wash., chose Delta T Systems, Inc. to provide salt and moisture-free ventilation to the two boats' engine rooms. Moisture eliminators constructed from polypropylene were chosen to supply the vessels' large diesel engines adequately.

For more information on Delta T Systems
Circle 51 on Reader Service Card

Halter Marine Acquires McDermott Yard

Halter Marine Group, Inc. has acquired the McDermott Inc. Three Rivers shipyard on the Industrial Seaway in Gulfport, Miss. Terms of the acquisition were not disclosed. The facility, now known as Halter Gulfport, will be used for the fabrication of steel bulk mud tanks which hold drilling muds and other materials used in the offshore energy industries. The plant will also reportedly produce aluminum components for vessels under construction at other Halter yards and will eventually build complete aluminum vessels.

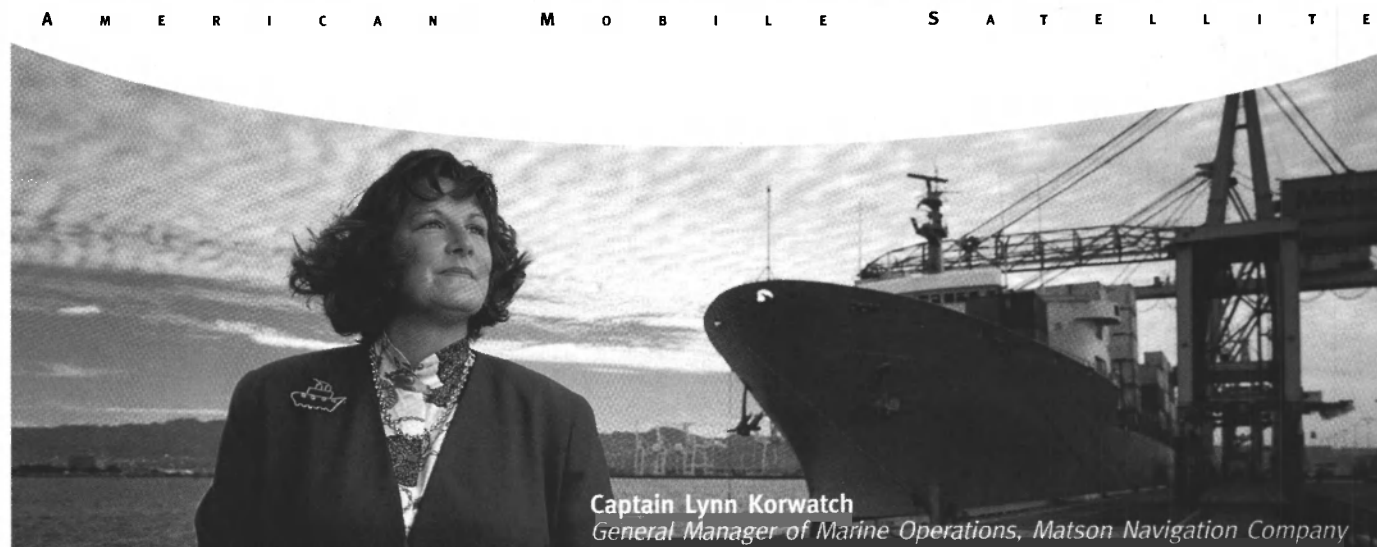
Bardex To Supply Drillship Hydraulic Power Units

Bardex Industries, Inc. of Houston, Texas, was awarded a contract from Deepwater Drilling LLC — a 50/50 joint venture of Conoco and Reading & Bates — for

two central hydraulic power units for use on the dynamically positioned drillship being built by Samsung Heavy Industries in Korea for deployment in the Gulf of Mexico. Each skid-mounted unit will consist of two 150-hp motor pump assemblies capable of delivering 75 gpm at 3,000 psi each; a

350-gallon reservoir with all associated temperature and level switches; a stainless steel heat exchanger; an air-operated fill pump assembly; and an oil filtration system.

For more information on
Bardex Industries
Circle 53 on Reader Service Card



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Thanks to our digital technology, you can count on exceptional quality and complete privacy for all your communications—including data transmissions. What's more, both the phone and antenna are fully marinated and stabilized to take the pounding that comes from life at sea.



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ASRY Reports Revenue Increase

Arab Shipbuilding and Repair Yard Co. (ASRY) has announced an increase in revenue of 18 percent above budget for the first half of this year. The rise was due to higher revenue earned per vessel — specifically, 20 percent to an aver-

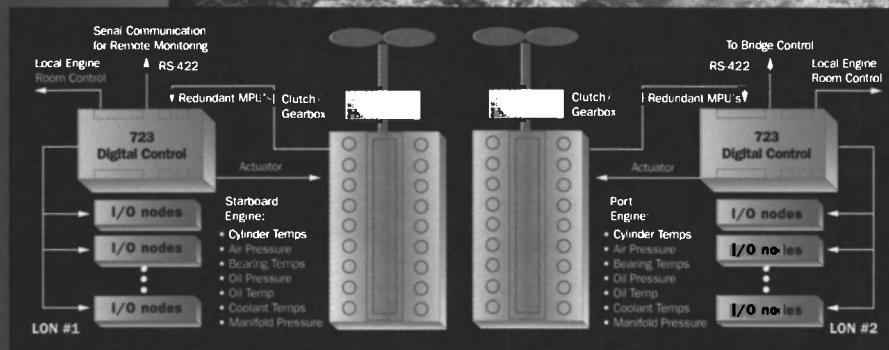
age of more than \$800,000 per vessel. Owners which contracted VLCC repairs for repair included Vela, KOTC, ICB Shipping, Docenave, Andriaki Shipping, Bergesen, Thenamaris, Andros Maritime, Frontline and Stena AB. Other vessels repaired included chemical carriers supplied by Stori, A.P. Moller and SCI; an LPG carrier from KOTC and several bulk

carriers. Next month, ASRY will celebrate the 20th anniversary of the inauguration of the yard, when the first vessel, VLCC *Mobil Pride* was docked. Since that time, the yard has reportedly repaired approximately 1,800 vessels with a combined tonnage close to 200 million dwt.

**For more information on ASRY
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Pictured is Bergesen's *Berge Duke*, one of the VLCCs docked at ASRY in the first half of this year.



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Westfalia To Launch New Separator Line

Westfalia Separator was scheduled to launch its new line of C-Generation separators this month, including the model 50, which is reportedly the highest capacity separator in the world. The new line features a water monitoring system which measures the water content in the bowl, ensuring optimum separation, and a hydrostop bowl hydraulic system which reportedly enables precise solids ejection in a highly compacted state.

**For more information on Westfalia
Circle 4 on Reader Service Card**

Leif Hoegh Orders \$57 Million Car Carrier

Norway's Leif Hoegh & Co ordered a \$57 million car carrier to be built at Poland's Stocznia Gdynia SA.

The ship is to be delivered in June 1999, and the contract includes an option for the construction of two more vessels. The car carrier will be operated by HUAL, which is owned 50/50 by Leif Hoegh and Ugland International Holdings.

Hitec Wins ROV Contract

Hitec Subsea has won a contract from Seateam Technology AS for four complete survey class ROV systems. The contract is valued at \$6.6 million and includes options for provision of 20 additional ROV systems over a three-year period. The system, dubbed **Stealth**, comprises Hitec's graphic interface command system **Cyberbase**.

"This is a breakthrough not only for our own technology and concept, but also for the Norwegian subsea technology industry in gen-

ral. Never before has a series of ROVs been built in Norway to such an extent, and this positions Hitec Subsea in the premier league of ROV manufacturers," said Hitec Managing Director **Jørn Haugvaldstad**.

CECo To Acquire Smatco

Continental Emsco Company (CECo) has acquired all outstanding stock of Smatco Industries, Inc. Smatco will combine with the Skagit division of CECo, and the new division will operate as CE Marine Products. **Bobby Thompson Sr.**, president of Smatco, will be president of the new company. **Emery Panosh** has signed on as vice president of Sales and Marketing, and **Edward Mangold** will serve as executive vice president of the new company.

"No jobs will be lost during the merger," said Mr. **Thompson**. "In fact, CE Marine Products may hire additional employees to meet the growing demand for our products."

For more information on CECo
Circle 19 on Reader Service Card

Hyde Offers New HIB Skimmer

Hyde Products Inc. offers HIB submersion plane skimmer technology to ensure effectiveness in responding to open ocean spills. The new Webster Barnes Model HIB-20 skimmer features a hydrodynamic induction bow design and oil/water separation to increase the range of operating speed and to provide high recovery efficiency. With a minimum operating speed of .5 knots and a maximum operating speed of five knots, an HIB-20 was recently delivered to Alaska Chadux for diesel oil recovery operations in Western Alaska.

For more information on
Hyde Products Inc.
Circle 6 on Reader Service Card

ISM Extension Not In The Cards

William O'Neil, Secretary General of the U.N.'s International Maritime Organization (IMO), said there was no likelihood of extension of the deadline for the implementation of the

International Safety Management (ISM) Code, and with less than a year before the ISM Code becomes mandatory, **O'Neil** warned shipping companies that missing the July 1, 1998 deadline could have disastrous consequences for their business.

"The shipping industry must realize that the Code cannot be

stopped, delayed or avoided. Instead of wasting time praying for an extension to the July 1 deadline, shipowners should simply start the compliance process now and make sure that they meet it," **O'Neil** said.

The ISM Code is an amendment to the International Convention for the Safety of Life at Sea (SOLAS)

adopted by IMO members in 1994. It will enter into force next July for passenger ships, oil and chemical tankers, bulk carriers, gas carriers and cargo high speed craft of 500 gt.

It will be extended to other cargo ships and mobile offshore drilling units of 500 gt and above not later than July 1, 2002.

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The ISM Code has been touted one of the most important measures to be adopted by IMO during the last few years because it is designed to ensure that shipowners make safety a priority. However, some shipowners have objected with complaints of over-regulation, and it has become clear that only a small percentage of

shipowners currently comply with the ISM Code and has been speculation that some companies will miss the July 1 deadline.

"There has been some talk recently about the difficulties sections of the industry are likely to encounter if they fail to meet the deadline and the possibility of extending it," O'Neil said. "But

those who do so are simply wasting time. Instead of hoping for an extension, which will not be granted, they should take steps immediately to ensure that they comply with ISM requirements. If they start at once they can still meet the deadline."

He added, "Many parties to SOLAS have made it clear that

they intend to enforce the Code and shipping companies that fail to meet the target date could therefore find their ships being banned from many ports."

Sun Expects Savings In Move From Maritime

Sun Transport expects savings equaling \$30 million from the disposal of its remaining shipping fleet to Maritrans.

"We expect to see some savings from getting out of the maritime business and instead buying in those specialist services," a Sun spokesman said. "What we need is for our petroleum products to be moved. We do not need to be the mover."

Maritrans will acquire the 34,000-dwt petroleum product tankers *Philadelphia Sun* and *New York Sun* and two tug/oil products barge combinations. Sun said it had agreed long-term contracts for the future operation of the assets being sold. The two tug/barge combinations will continue to operate between Sun's Puerto Rico refinery and other parts of the island.

In June, Sun Transport sold its 3,550-dwt tanker *Eastern Sun* to John W. Stone, and four tug/barge combinations to LeeVac Corp. Terms for either deal were not disclosed.

Cruise Ship Aida Sold

Norway's NCL Holding ASA has entered into a purchase and charter-back agreement for the 1,186-berth cruise ship *Aida*.

The company entered into an agreement to buy the ship for \$180 million from Deutsche Seetouristik GmbH, and charter it back to the German company for \$27 million for a year.

The charter will start from October 24, the planned delivery date.

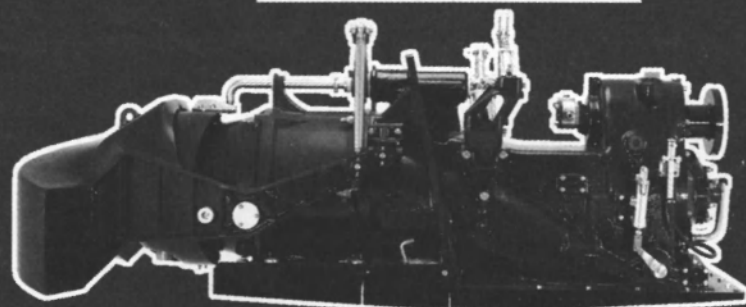
NCL said the purchase is linked to a currency clause that could allow for the gross price to be reduced by \$2.9 million.

The purchase is part of NCL's overall plan, as it intends to form a cooperation agreement with Arkona Reisen, a travel company linked to Deutsche Seetouristik. The German cruise company controls a second cruise vessel, *Arkona*.

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P&I Pressure Helps Push Salvage Contract Changes

By David Tinsley, technical editor

Leading marine salvors have backed plans to formulate a new, standard salvage contract in response to pressure for an alternative system from Protection & Indemnity (P&I) insurers. It would not be the industry's intention, though, to dispense with the Lloyd's Open Form (LOF).

Members of the International Salvage Union (ISU) have given the body a mandate to develop new arrangements through discussion with the property (ship and cargo) insurers, shipowners and P&I Clubs. The idea is to provide a further option, rather than a replacement, to existing salvage contracts. The move addresses concerns within the P&I community related to salvage costs and participation. There is a view in P&I circles that Clubs should assume liability for all salvage, involving property as well as pollution.

As a result of the decision at the recent Gothenburg meeting of the ISU, detailed talks will be set in motion, with the International Group of P&I Clubs, property insurers and other parties. Salvors feel that LOF should be retained for most casualty situations, but acknowledge that there is scope for a new basis for casualty response in situations where a spill has occurred and rapid intervention is needed to minimize environmental damage.

The ISU is advocating a new approach designed to meld what are seen as the best features of the existing LOF, the world's most commonly used salvage agreement, with the 'Salvage 2000' concept advanced by the P&I sector.

ISU president Arnold Witte said, "The LOF system still offers many advantages to the international shipping community and its underwriters. Nevertheless, the P&I Clubs, who have financial responsibility for pollution claims arising from shipping accidents have a number of legitimate claims which cannot be ignored by the salvage industry."

"Equally, the property insurers...are strong supporters of the existing system. Their interests must be taken into account as they meet almost the entire cost of salvage services rendered on a global basis," observed Witte.


In recognition of concerns in the P&I business, the ISU said it was prepared to offer an agreed rate

structure for salvage services deployed to deal with direct pollution threats, and to support the P&I desire for separate representation at associated salvage arbitrations. The marine salvage con-

tractors' body also believes that a new LOF Salvage 2000 contract should be drafted in such a way as to "maximize opportunities for amicable settlement and prompt payment, without recourse to arbi-

tration." Total values under the various "no cure, no pay" agreements worldwide declined in 1996 by one-third from the preceding year's all-time high of \$1.7 million, to \$1.2 million.

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Balanced Budget Act Also Kind To Foreign Ship Owners/Operators

Foreign shipowners and operators of vessels calling at U.S. ports can thank the U.S. cruise industry for successfully lobbying favorable changes to U.S. tax laws that otherwise would have affected them.

Section 1174 of the Taxpayer Relief Act of 1997, signed by the President on August 5th, definitively exempts the taxation of

income earned by nonresident alien crewmen in connection with foreign vessels engaged in transportation between the U.S. and a foreign country. Foreign shipown-

ing and operating corporations that have been subject to the filing requirements imposed by the 4 percent gross transportation income tax are all too familiar with the withholding voucher books that are automatically sent to all foreign corporations filing Form 1120F, irrespective of their tax-exempt status under an applicable tax-treaty.

In recent years, the IRS has published internal position papers justifying the taxation of alien crewmen aboard vessels and aircraft earning U.S.-source wages. Last year, the IRS's stance and intention to enforce the withholding requirement for wages earned by alien crewmen was solidified through the promulgation of regulations imposing the requirement on foreign employers.

Section 1174(a)(1) rectifies the inconsistency by amending section 861(a)(3) of the

Internal Revenue Code, which now reads in pertinent part that:

...[C]ompensation for labor or services performed in the United States shall not be deemed to be income from sources within the United States if the labor or services are performed by a nonresident alien individual in connection with the individual's temporary presence in the United States as a regular member of the crew of a foreign vessel engaged in transportation between the United States and a foreign country or possession of the United States.

The welcomed legislation benefits all foreign companies that have vessels trading to the U.S. and especially the cruise industry whose largest market is the U.S. Because of the large number of employees working aboard cruise vessels, administration of the withholding tax would have resulted in high administrative costs.

Moreover, the withholding tax could have had further adverse ramifications in the event that withholding triggered an obligation for foreign crewmen to file U.S. income tax returns.

For more information on the preceding article, contact Arthur Dimopoulos at Fort & Schlefer, L.L.P., 1401 New York Ave., N.W., Washington, D.C. 20005, tel: (202) 467-5900; fax: (202) 783-6898.

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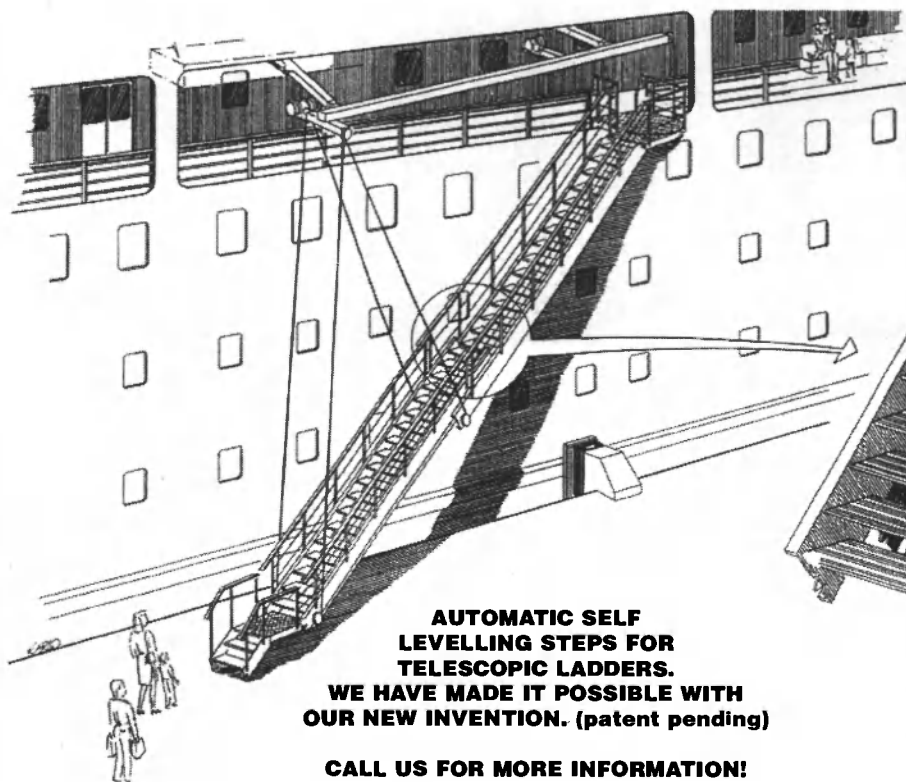
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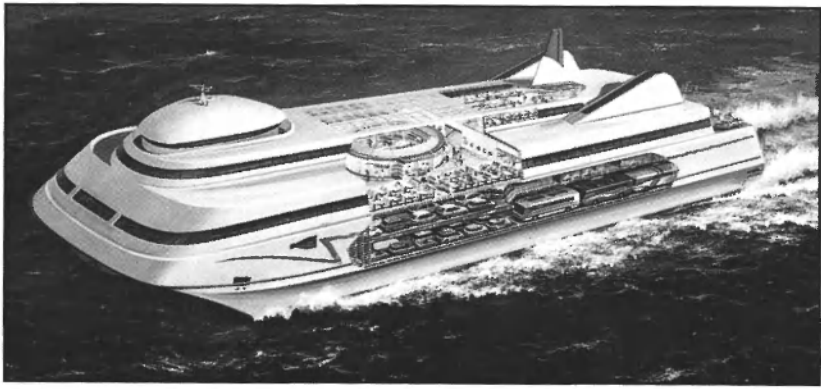
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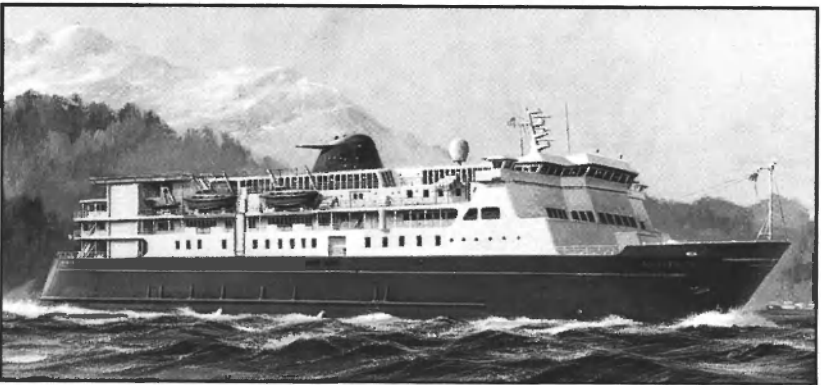
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CANADIAN MARITIME REVIEW

The Canadian shipbuilding industry consists primarily of companies that construct and repair a variety of vessels including barges, cargo vessels, dredges, drilling vessels, icebreakers, jack-up drilling rigs, military vessels, passenger ships, semi-submersibles, tankers and tugs, with a displacement of five tons and up. Currently, seven larger shipyards, which employ approximately 4,500 people, are involved in both new construction and ship repair. The industry is largely Canadian-owned; however, there are some successful shipyards owned by companies which also operate fleets of ships. In recent years import and export tonnage for Canada has increased substantially. International cargo makes up a large percentage of the total tonnage, and transborder traffic to and from the U.S. accounts for nearly all of it.

The 12 companies represented by the Canadian Shipowners Association handles most of the Canada-U.S. traffic on Canadian flagged vessels in eastern Canada.

In addition to the shipbuilding and repair sector, Canada's marine industry is supplemented by several companies involved in design, supply, consulting, engineering, manufacturing and software. The following is an update of recent activities at major Canadian maritime companies.

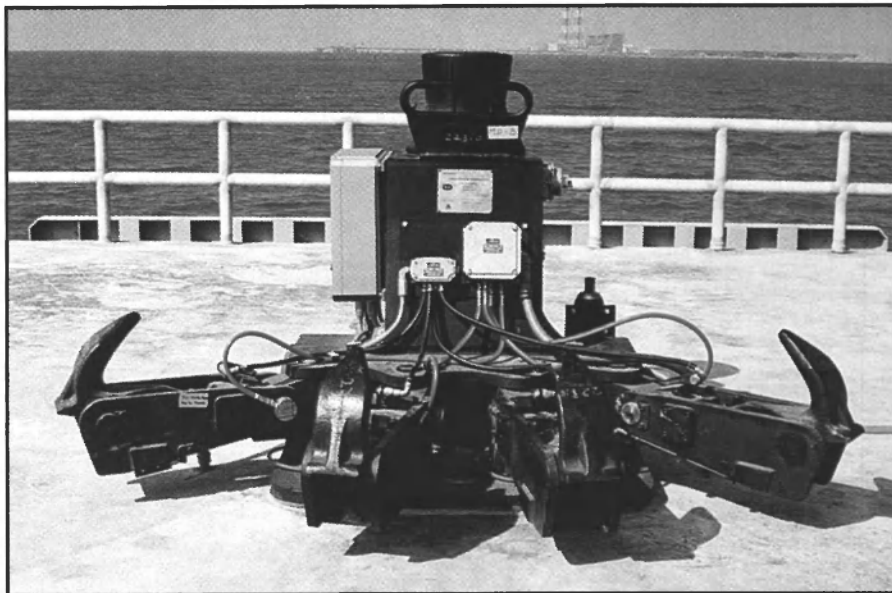
MGI International

MGI International, a supplier of marine safety equipment to the North American market, recently obtained a contract to provide the Liferaft Racking Systems for the two new cruise ships being built at Meyer Weft in Germany for Star Cruise.

On the heels of this newly acquired contract, MGI also announced the fall opening of a new office in the Netherlands. Due to stricter regulations for RoRo passenger ships, MGI hopes to expand its marine safety operations into the European market.

Davie Industries

Davie Industries, an international engineering, infrastructure company, offers engineering and manufacturing, construction, installation, repair and quality assurance services for a wide range of ships as well as for the construction of heavy industrial and offshore fabrications. Davie, with operations in North America, Europe, and Asia, is currently repositioning itself in the international market as builders of tankers and bulk carriers in the 20,000-70,000 dwt range, container vessels in the 1,500-2,500 TEU size range, and semi-submersible and jack-up type drilling platforms.



Harbour & Marine Engineering's Mooring equipment for Chevron's Hibernia project.

Stork Canada Inc.

Stork Canada Inc. designs and supplies Marine HVAC and refrigeration systems and equipment and has many recent successful projects including 12 Canadian Patrol Frigates, a patrol vessel for the country of Mauritius, a ferry and several Z-drive tugs. Currently on contract are 12 multi-purpose coastal defense vessels, 12 125-ton screw chillers, passenger and catamaran fast ferries, diving support vessels and tugs. Making a debut on Stork's product line are fire dampers tested to the latest IMO and SOLAS standards. New to Stork's staff is Ed Bergeron, former sales manager of Carrier Transcold's Gulf Coast office, now representing Stork out of New Orleans.

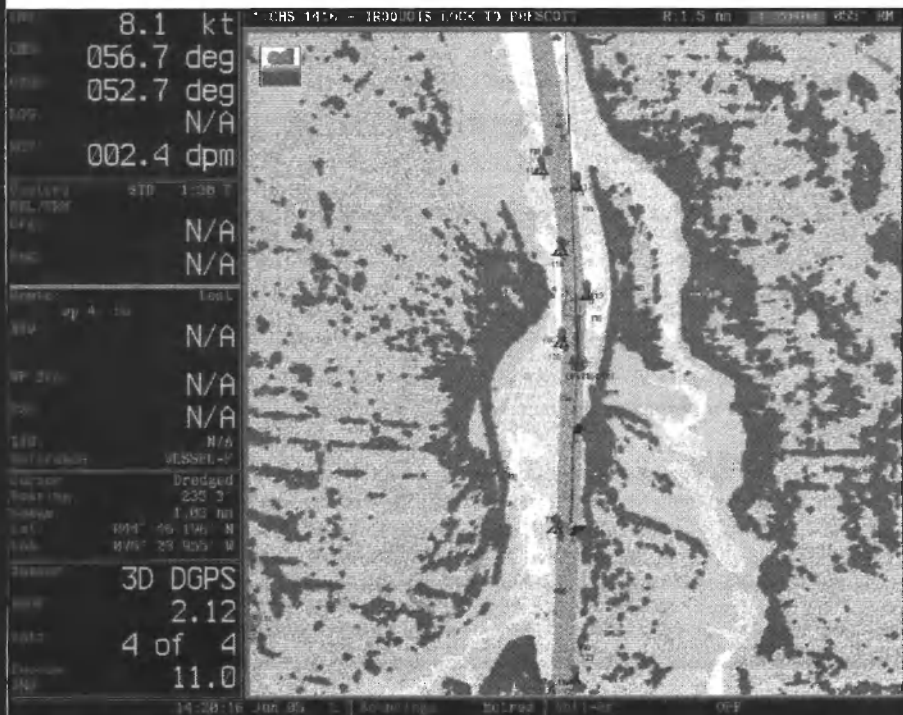
DBC Marine Safety Systems

DBC Marine Safety Systems, a

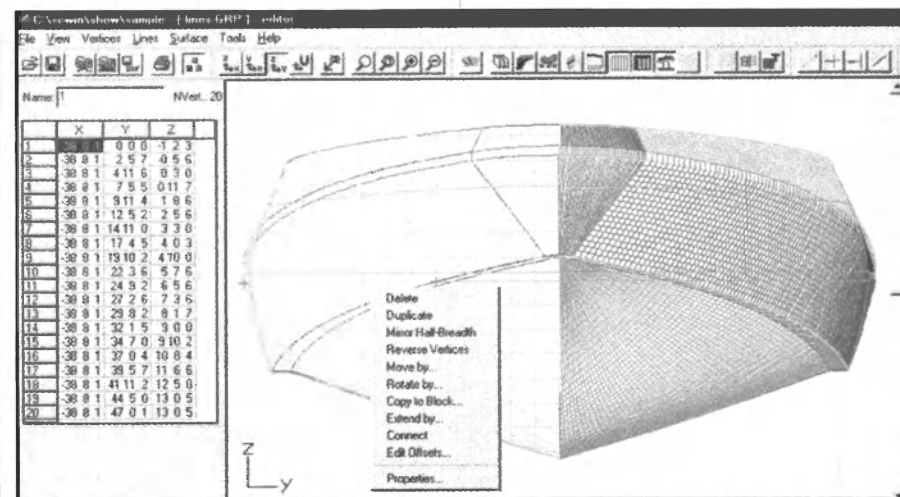
division of Dunlop Beaufort Canada, and World Fame Shipping Ltd. (WFS), a division of Hong Kong Ferry (Holdings) Co. Ltd. have entered into an agreement whereby WFS will be the official representative to exclusively market and service DBC's Escape Slide System (ESS) to mainland China, Macau, Taiwan, Singapore and Hong Kong.

"We at DBC Marine Safety are very pleased to be associated with one of Asia's largest ferry owners and marine trading groups," said Dell Haylock, Global Marketing Director. DBC Marine also manufactures Marine Evacuation Chutes and is currently working on reversible liferafts to meet IMO/SOLAS regulations for RoRo ferries.

The new rafts will be available in 50 and 150 person sizes as well as 25 person davit mounted systems and will feature a patent



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pending dual canopy structure which is reversible prior to the occupant's entry into the rafts. The SeaSmart vertical pillar in the reversible raft automatically serves as a means to elevate the dual sided canopy to the most appropriate position.

DNV

Toronto, Canada, is the site for DNV's newest district office which will work in conjunction with offices in Vancouver, Montreal and Halifax to promote DNV's full range of products and services in the area.

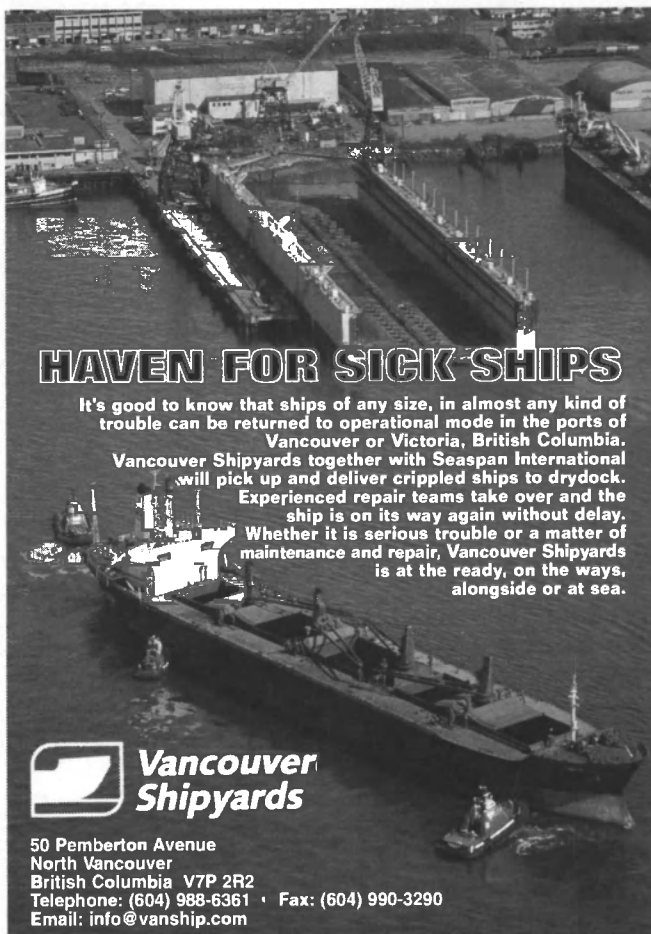
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kets," country manager **Paul Bishop** explained.

The Port of Prince Rupert


The Port of Prince Rupert is currently making substantial

(Continued on next page)



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(Continued from previous page)

improvements at its Fairview Terminal. Such improvements are designed to accommodate the changing needs of Canadian agricultural industries.

The specialty grain handling facilities, for instance, are undergoing changes that should increase the storage and improve the shiploading equipment. In addition, its wood pulp storage will be expanded to address the increased interest the forest industry has shown in using Prince Rupert as a gateway to the Pacific. Millar Western Pulp Ltd. may be the first of many new wood pulp customers to utilize Fairview Terminal with its recent agreement to move 15,000 tons per year starting in January 1998.

Marine Safe Electronics

Marine Safe Electronics supplies MotoSafe and FailSafe monitors, which continuously monitor insulation while the motor is idle and detect the environmentally-caused deterioration of insulation weeks before failure level is reached. This alert system has been marketed to major marine clients worldwide, including both military and commercial customers.

DataStar Marine Products Inc.

DataStar Marine Products Inc. has shipped its first V-MAC Vessel Monitoring and Control System. The DataStar V-MAC 5500 was installed on the 195-ft. (59.44-m) Seabulk Veritas built in Green Cove Springs, Fla., and was supplied by Electrical Cable, Connectors & Lugs of Lafayette, La.

The alarm system can monitor all shipboard alarm conditions, such as fire, high bilge, hazardous vapors, nav lamp fail, and intrusion.

It has engine and fuel management capability and may be programmed to operate any pumps or any other onboard equipment.

The system log records and tags all monitored events by time and position and can report the entire voyage for later analysis.

Siemens Marine Group

Siemens Marine Group delivers systems ranging from a ship's

entire electrical generating, propulsion and control needs to stand-alone systems that replace or automate routine shipboard tasks to North American customers.

Recent projects include refits for three new Jumbo Mark II series

ferries for Washington State Ferries, three Washington State Steel Electric Class ferries, and for Canadian Coast Guard icebreakers, electrical propulsion, automation and control systems for BC Ferries. Other recent projects include trawl winch refit for

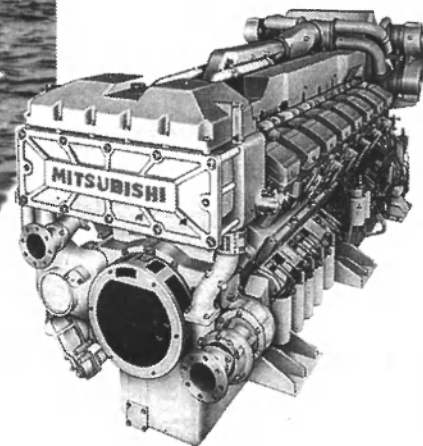
Fisheries Products International, and auxiliary propulsion water-cooled Master Drive and integrated alarm and control system for a U.S. Navy training vessel. Siemens also recently applied an all-digital approach on the Sedco-Forex 707 oil rig project, which



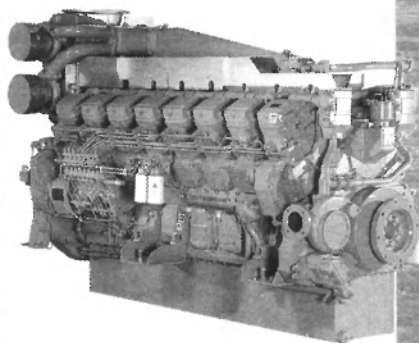
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permits the development of an integrated system providing relay functions, metering and controls. Alarm, monitoring and control for three ship self-unloaders was also supplied for Canada Steamship Lines.

A Global Marine drilling rig was

the recent recipient of main propulsion, drilling and thruster drives and a Trans-Ocean Offshore Drilling semi-submersible drilling rig received an upgrade from Siemens. Also in the works are four 340kW leg drives and two 1,200 hp bow thrusters for an off-

shore maintenance vessel for Halliburton.

Fleet Technology Ltd.

Fleet Technology Ltd. is currently expanding its ship technology services and recent contracts include a new unloading system

for bulkers, an ice-capable bulker and a small tourist submersible. Also, a large scale materials testing program has recently gotten underway for Navy. SML Software has launched its Windows version of the seakeeping program ShipmoPC, and developed a number of other marine software products including one for concept design of ships.

Hermont Marine Inc.

Specializing in pollution abatement, engine efficiency and monitoring, Hermont Marine Inc. supplies a range of marine products and services to the North American marine industry. The company offers annual calibration of the bilge alarms and a complete line of monitoring and alarm systems, oil mist detectors, viscometers and electronic engine indicators.

The PREMETS XL electronic engine indicator assists owners in balancing the engine and optimizing output while minimizing fuel consumption.

Condition monitoring can then be done on-line with an exhaust gas temperature monitoring system. Drifts from cylinder outputs show up on the temperature deviations.

The causes for these engine changes can then be identified with the use of the PREMETS XL engine indicator without any disassembly of the engine.

Currently, Hermont is engaged in obtaining ISO 9000 certification.

Harbour & Marine Engineering

Mooring specialists Harbour & Marine Engineering recently won a contract to supply quick release hooks and vessel load monitoring equipment for Chevron's Hibernia floating production platform, which was recently completed in St. John's, Newfoundland. The contract requires a fast track delivery program with equipment being designed, manufactured and tested under the company's ISO 9001 quality assurance system and delivered by December 1997. The German construction company Bilfinger and Berger have selected Harbour & Marine Engineering to supply mooring quick release hooks and capstans for Shell's new LNG Terminal at Bonny Island, Nigeria.

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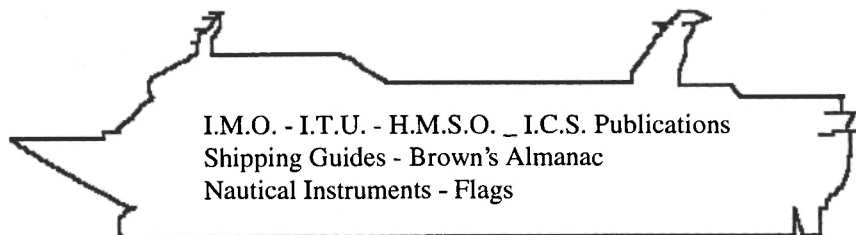
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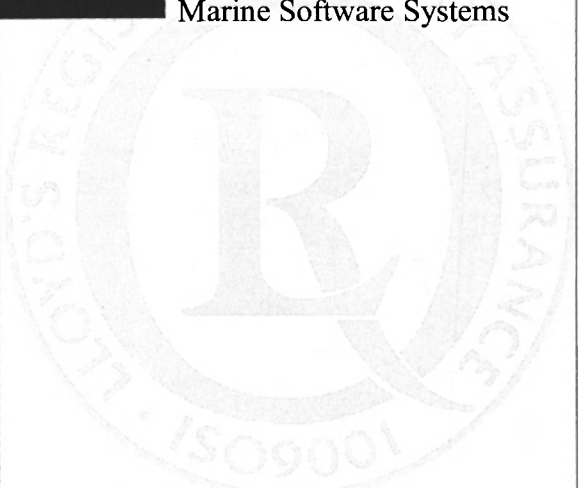
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The Institute for Marine Dynamics

The Institute for Marine Dynamics is a branch of the National Research Council of Canada and is the Canadian

national center for ocean technology research and development. The Institute provides technical services in the areas of ship technology and ocean engineering. Its major clients are the Canadian ship design and shipping indus-

tries, and offshore oil and gas products.

Offshore Systems Ltd.

Offshore Systems Ltd. of North Vancouver developed and supplies Electronic Chart Precise

Integrated Navigation System (ECPINS), an electronic chart display and information system. ECPINS integrates a digitized vector version of the familiar paper chart, differential Global Positioning System (DGPS) information which gives the mariner fix on his position with an accuracy as close as three meters, radar information provided to the screen as an overlay, and a computer which integrates not only the chart, positioning and radar information, but also the whole range of sensor inputs available on board. The computer supports the mariner's navigation, track-keeping, maneuvering, docking and voyage management with accuracy, real-time dynamic data. ECPINS displays a scaled outline of the ship on its video screen and updates the ship's position twice a second by inputs from its DGPS. The ship's location is superimposed on an electronic chart display of the waterway, and the video screen shows the ship's position in the channel, its track, its heading, and its speed.

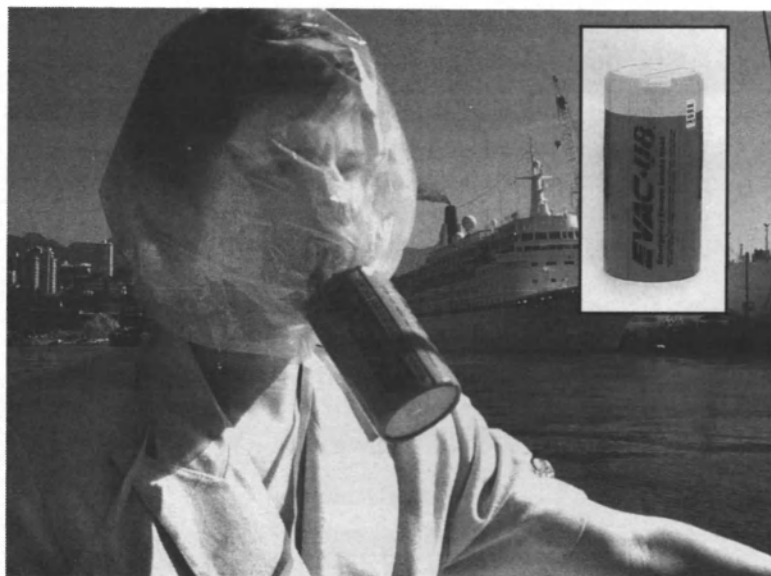
All hazards, surface and submerged, are indicated on the electronic chart presentation. Radar overlay indicates the position of other vessels in the shipping lane. The precision fix capabilities combined with autopilot allow buoys and tenders to hold a near-perfect position while the crew sets navigational aids.

That same capability makes it useful for determining the location of intruders in surveillance operations and pinpointing survivors in search and rescue missions. Offshore systems has now implemented over 150 of these systems.

ComNav Marine

ComNav Marine is a manufacturer of autopilot systems and accessories for all types and sizes of vessels. The company is a major supplier to the British Columbia Ferry Corporation. Its 2001G Autopilot, which is designed for vessels of greater length and interfaces with a gyro compass as well as most other navigational equipment, is presently installed on three vessels. This particular autopilot system has additional highlights including: adjustable rudder gain; counter rudder gain; yaw and turn rate; three turn function; and automatic trim control. The B.C. Ferry Corporation

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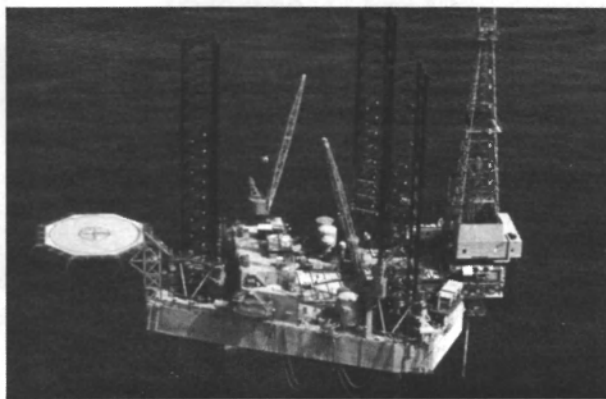
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cently installed the 2001G on the Queen, the first of two new Century Class vessels which are approximately 361-ft. (110m) in length. In addition to its installation on their new vessels, B.C. Ferries has also installed the 2001G on the Queen of Coquitlam and the Queen of Surrey, which are "C" class vessels measuring approximately 359-ft. (140m) long and 6969-gt. This fall, ComNav will install the 2001G Autopilot on the Queen of Oak Bay as well as three other Victoria Class ferries.

Canadian Shipbuilding and Engineering Ltd.

Canadian Shipbuilding and Engineering Ltd. (CS & E) is a full service provider of marine technology and services including design, production and service support for new ships of any type.

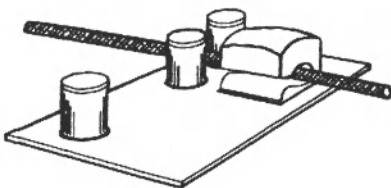
Its production facilities range from heavy engineering, steel fabrication and electrical contracting to the supply of control systems, software and system management technology.

(Continued on page 106)

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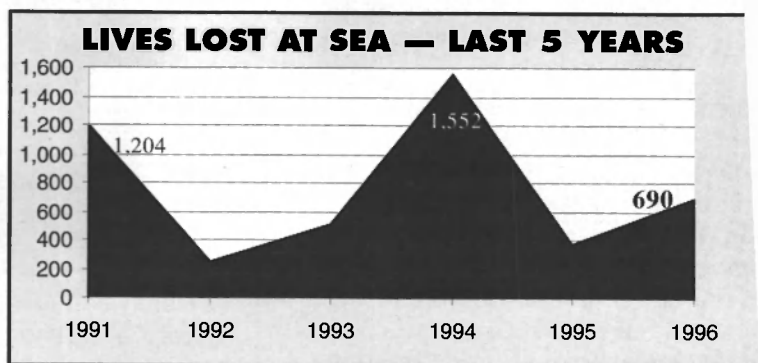
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During 1996, lives lost as a result of accidents at sea almost doubled over the previous year, figures in World Casualty Statistics published by Lloyd's Register's reveal.

The report said that while tonnage lost remained at .9 million gt — the same as for 1995 — the number of people reported missing or dead as a result of total losses during the 1996 was 690, compared with 379 for the previous year. The heaviest loss of life reported by Lloyd's occurred when Indonesian-registered passenger/RoRo cargo ship *Gurita* struck rocks off Banda Aceh, Indonesia, resulting in 338 reported missing or dead.

Although it is not listed in Lloyd's statistical study, the greatest loss last year came when Tanzanian-registered passenger ferry *Bukoba* capsized and sank on Lake Victoria, East Africa, taking 869 lives.

Lives Lost At Sea 1991 to 1996

	1991	1992	1993	1994	1995	1996
Oil	48	2	15	70	2	3
Bulk Dry	154	28	41	148	84	50
General Cargo	217	78	219	149	192	168
Passenger/ General Cargo	39	—	—	145	2	—
RoRo	—	—	5	51	28	1
Passenger/RoRo	608	1	58	876	—	342
Passenger	17	9	—	—	3	4
All Cargo Carrying Ship Types	1,103	148	401	1,474	325	645
All Shiptypes	1,204	246	504	1,552	379	690

Source: Lloyd's Registry

Strategic Alliance Struck Between SEACOR SMIT And Chiles Offshore

SEACOR SMIT Inc. and Chiles Offshore announced on August 6 an agreement for a strategic alliance between the two companies. Under the terms of the agreement, SEACOR will invest approximately \$9 million in Chiles Offshore LLC and will commit \$26 million for investment in rig-owning partnerships to be formed. Chiles Offshore also announced a contract with Amfels, Inc., for the construction of a second rig, a LeTourneau Super 116 jack-up drilling unit. Both this unit and a previously contracted rig now under construction at Amfels, a LeTourneau Enhanced 116C unit, will be capable of drilling in water depths up to 360 ft. (109.73m)

According to SEACOR's chairman, **Charles Fabrikant**, SEACOR will still primarily be concerned with its financing and marketing marine assets. He sees the investment in Chiles Offshore as a complement to SEACOR's main business of providing transportation and logistics services to support drilling and production in offshore areas. Commenting on the agreement, **Bill Chiles**, president of Chiles Offshore, said, "We have chosen to offer investors an alternative to indirect ownership of rigs via common stock. Ownership of the assets via partnerships means that investors can benefit directly from the substantial cash flows attainable under today's market conditions and also realize any potential capital appreciation."

In addition, Chiles reportedly intends to order additional rigs and syndicate units in the rig-owning partnerships. As a result of the agreement, SEACOR will own 50 percent of Chiles Offshore and provide strategic and financial direction for the developmental program.

Cory Towage Limited Wins Tanker And Barge Handling Contract

U.K.-based Cory Towage Limited has won a contract to serve the tanker and barge handling requirements of Stata Terminals N.V. at its St. Eustatius oil storage and transshipment terminal in the Netherlands Antilles. The long-term contract, commencing in July,

involved assisting tankers up to 300,000 dwt onto Stata Terminals' SPM (Single Point Mooring) buoy, controlling each vessel's position during discharging operations, push and pull towing of tankers to the finger jetty, towing barges between the terminal and ships at anchor, and fire-fighting and pollution control duties.

Two 3,800 bhp/54 tons bollard pull tugs have been assigned to the Stata Terminals N.V. contract by Cory Towage. The 14-knot vessels feature twin screw cp propellers and Kort steering nozzles, to provide the precise control of tug speed, power and maneuverability. In addition, the vessels are equipped for fire-fighting and pol-

lution control requirements. They carry 40 tons of foam and 11 tons of oil dispersant, plus full Warren Springs Laboratory equipment with a fixed Megator pump for fast, effective distribution of emulsifiers and dispersant onto oil polluted waters.

"These features have enabled Stata Terminals N.V. to provide



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Stazione Marittima Porto di Genova S.p.A. designs, builds and manages structures for passenger traffic services. In addition, the Company know-how and management systems supplied may be easily adapted to other harbour needs. Apart from managing the traffic of passengers in the Port of Genoa, the Company has:

- restructured the Cruise Terminal of Ponte dei Mille and awarded contracts for wharf extension works in Ponte dei Mille;
- awarded contracts the New Ferryboat Terminal;
- organised the "Seatrade Mediterranean Cruise and Ferry Convention", held in Genoa every two years, in collaboration with The Seatrade Organisation.

The Company has been granted the concession of the area going from Ponte dei Mille to Ponte Caracciolo, covering approximately 250,000 sq.m. The new transport logistics applied, specially tailored to the needs of passengers (speed, service quality, on board and ground assistance) permits to:

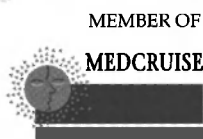
- supply better assistance to both Cruise and Ferry passengers;
- simplify passenger and luggage Customs operations in the case of international flights;
- rationalise passenger, car and heavy transport traffic by applying airport methodologies in the case of cruise passengers and motorway methodologies in the case of passengers and vehicles embarked on ferries;
- optimise mooring, refuelling and catering departure of ships;
- considerably reduce passenger embarkation and landing times thus favouring tourism in the Old Town Centre of Genoa, full of cultural and artistic resources.

PROJECT CONSTRUCTIONS MANAGEMENT

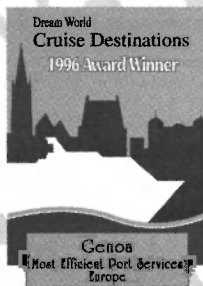
The Company makes tenders for the realisation of harbour works in Europe and America.

In addition to the technical parameters defined in accordance with each specific site and maritime effectiveness, a series of models have been borrowed from the current logistics utilised at airport and motorway systems for the design of projects.

The company know-how is the result of the technical knowledge acquired in the field of architecture, engineering and logistics. The know-how thus developed, in fact, may be placed at the disposal of over Italian and foreign harbours to build New Terminals or better manage passenger traffic.



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terminal users with significantly improved towage services, achieved through the increased bollard pull now available, as well as the introduction of an upgraded firefighting and pollution control capability," Cory Towage's Managing Director **Graham Philip** commented. "We are delighted to have been awarded this significant overseas contract."

Royal Caribbean And MTN Sign Agreement

Maritime Telecommunications Network (MTN), a subsidiary of ICG Satellite Services (ICGSS), and Royal Caribbean International (RCI) have signed a three-year agreement making MTN the telecommunications provider for

three of Royal Caribbean's newly launched ships: *Enchantment of the Seas*; *Grandeur of the Seas*; and *Rhapsody of the Seas*.

A provider of C-band voice, fax, and data communications to the cruise industry, the U.S. Navy, and offshore oil and gas platforms, MTN's systems will facilitate inbound and outbound calls and switched or dedicated voice and fax

data communication for RCI. **Richard Glasier**, executive vice president and CFO of Royal Caribbean International, "I chose MTN because of their state-of-the-art equipment and dedication to service, adding to our passengers' overall cruise experience."

Douglas Falk, president of MTN, indicated, "We have great plans for the future and are looking forward to forging a lasting and successful business relationship with a major cruise line like Royal Caribbean."

For more information on MTN
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Land Earth Stations and Mobile Terminals



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Nera is the world's leading supplier of Inmarsat Land Earth Stations and Mobile Terminals.

Saturn – 8,000 units on ships and on land

Joint Venture Agreement For Halter Marine, Inc. And Bollinger Shipyards

Responding to the anticipated request for proposals for the U.S. Coast Guard's (USCG) Deepwater Capability Replacement Project, Halter Marine, Inc., a subsidiary of Halter Marine Group, Inc., and Bollinger Shipyards have agreed in principle to form a joint venture to be named Halter-Bollinger. The USCG's program, expected to run into several billions of dollars over the next two decades, is being designed to replace or upgrade the USCG's aging fleet of ships, cutters, aircraft and other assets.

The preliminary agreement was announced in a joint statement by Halter CEO **John Dane III**, and Bollinger CEO **Boysie Bollinger**. According to the two company heads, "Our two companies have built a significant number of the U.S. Coast Guard's and the U.S. Navy's small to medium size ships in the last 12 years. Our shipyards, with built-in production flexibilities, specialize in the design and construction of vessels in the 100-ft. to 400-ft. range which meet Coast Guard requirements. This will be a significant shipbuilding program."

Umoe-Schat Harding To Supply Lifeboats and Davits

Umoe-Schat Harding has been contracted to supply 26 lifeboats and davits to each of the two plus one option RCCL Project Eagle cruiseships building for RCCL at Finland's Kvaerner Masa-Yard. These reportedly will be the world's largest cruise ships, but sources say Schat-Harding won the order because it was able to supply lifeboats which are shorter

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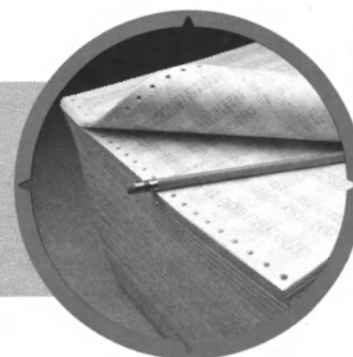
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than normal.

Schat-Harding developed a new 150-person partially enclosed lifeboat, the MPC 32, especially for use on very large cruiseships where straight side length available for lifeboats is limited compared to the passenger capacity of the vessel. At an overall length of 31.5 ft. (9.6 m), the new craft is

reportedly the smallest of its kind in the world. For vessels of the size of the Eagle project, there is only sufficient straight side for 12 normal lifeboats. Thirteen of Schat-Harding's new MPC 32s can be accommodated, adding 150 persons capacity to each side.

The Eagle contract also includes complete installation and testing

of boats and davits on the vessel.

For more information
Circle 88 on Reader Service Card

Shepard-Patterson & Associates, Inc. Awarded MarAd Contract

The Maritime Administration

(MarAd) has awarded a contract to Shepard-Patterson & Associates, Inc. for the procurement of Ready Reserve Force (RRF) vessel parts and associated components. The contract specifies that the company will use a procurement tracking system compatible with MarAd's Equipment Configuration Spares Management Information System and a database for vendor sources.

While Shepard-Patterson will focus on technology development, a subcontractor, Peterson Builders, Inc., will handle the procurement activities. The total value of the contract for procurement services is \$1.9 million. In addition, the Federal Government will reimburse the contractor the actual cost of the parts and equipment procured. The contract is for one year, with options for two one-year extensions.

MarAd maintains ships in the RRF for activation in the event of a national emergency. When activated, RRF ships are crewed by civilian American seafarers.

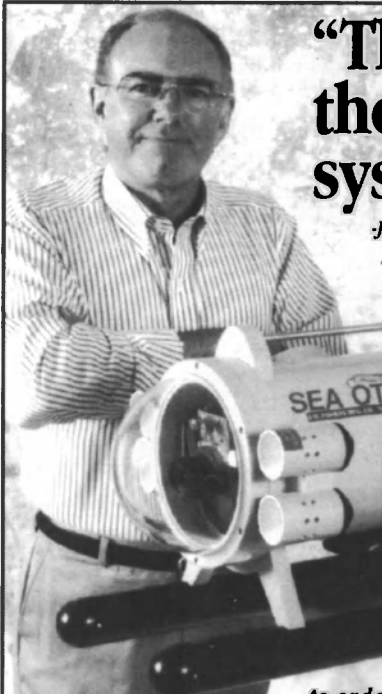
New Headquarters For Thomas Gunn Navigation Services

The official opening of Anchor House, the new headquarters of Thomas Gunn Navigation Services (TGNS), was performed by the Hydrographer of the Navy, Radm. John P. Clarke, on July 15 in Aberdeen. The new location reportedly will provide the company with an improved working environment. According to TGNS' senior partner, Thomas Gunn, the new premises will provide the company with a much better working environment especially with regard to its chart department, customer services department and workshops.

"We are now able to store the full range of British Admiralty charts and publications — some 3,600 different items — on separate shelves," Gunn said. "This of course simplifies the work of our chart department and customer services department staff but also makes the never-ending task of chart updating much easier to perform and monitor."

New Executive VP Announced At East Coast Overseas Corp.

Mr. Joao Melo Franco, the new chairman of East Coast Overseas



Jack Fisber, President
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"The SeaOtter meets or exceeds the specifications of other ROV systems sold at twice the price."

"The SeaOtter is powerful enough to handle currents, and rugged enough to reach depths of up to 500 feet. It features four variable-speed remote controlled motors, a CCD color camera, four 100w lamps, and a 13" topside color monitor. A more powerful ROV called the SeaLion is also available, and any SeaOtter may be upgraded to a SeaLion."

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Leaders in Marine Design Software

FlagShip

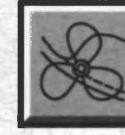
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FlagShip is a complete ship design system, including hullform design (*FastShip*), structural design and optimization (*MAESTRO*), stability, powering, maneuvering, seakeeping, shipyard cost estimating and interfaces to CAD and ship production programs. *FlagShip* is based on time-tested, best-in-class applications, which are in use by more than 1,000 designers in over 30 countries around the world.

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from HydroComp, Inc.



NavCad offers an integrated platform to predict resistance and power, and to determine optimum propeller parameters. With *NavCad* each aspect of a ship's performance can be evaluated for virtually every type of displacement hull, semi-displacement and planing craft, river barge train, catamaran and auxiliary-powered sailboat.

General HydroStatics (GHS)

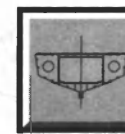
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Integrated ship production for Win95/NT. **ShipCAM97**: Fairing and lofting including frames with cutouts, plate expansion, shell expansion and inv. bending. **CAD-Link97**: AutoCAD13 based 3D structural modeling as easy as 2D drafting plus weight & CG. **NC-Pyros97**: NC-code generation from CAD drawings.

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INTERNATIONAL MARINE SOFTWARE ASSOCIATES

Circle 276 on Reader Service Card

Corp. (ECOC) and CEO of Sopotana Tankships, recently announced the appointment of Mr. **Carlos Campos** as executive vice president of ECOC.

Mr. **Campos** replaces Captain **Maryn Reynolds**, who will be working full time in the group's ship repair agency business. Mr. **Campos** was most recently a senior shipping executive in charge of the agency division of one of the leading shipping groups in Portugal.

In his new position, Mr. **Campos** will assist ECOC in consolidating its participation as a steamship agent to its current principals and managing agent of a new vessel operator in the trades to and from the Middle East, the Persian Gulf, Pakistan, Southeast Asia, the Far East, Baltic states and North and West Africa.

Carter, Ledyard & Milburn Adds "Rising Star" Associate

Wall Street law firm Carter, Ledyard & Milburn announced Aug. 19 the addition of **Alexandra G. Lyras** as an associate.

Ms. **Lyras** was recently named one of 10 rising stars in the maritime community by a leading maritime journal. She was previously at the law firm of Dyer Ellis & Joseph.

Said **Thomas J. Whalen** of the firm's Maritime Practice Group, "**Alexandra** brings substantial shipping industry business and legal experience covering a wide array of issues such as compliance with regulatory matters, ship sales and financings, charter parties, and environmental oil pollution liability to name a few. We are delighted to have her become part of our growing practice."

New President Appointed At MacGregor

Anders Jagraeus has been appointed new president of MacGregor, effective September 1, 1997.

Currently, he is an executive vice president of the Incentive Group, a position he will retain once he takes up his new post.

Jagraeus succeeds **Ulf Hedberg**, who has been president of the company since 1986, and who will be involved in the contin-

ued development of MacGregor's position in Asia. Hedberg will also remain a member of the board of directors of the Japanese company, MacGregor-Kayaba.

Promotion at Gulf & Atlantic

Sid Gaudet III was promoted to vice president of general cargo

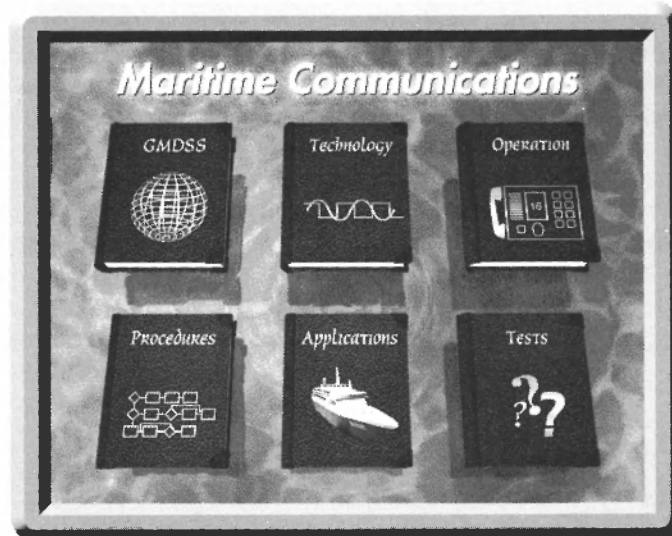
and project services at Gulf & Atlantic, a steamship agency. His responsibilities will include client service of current G&A customers, as well as new business development.

Brendan R. McCahill, president of G&A, noting the company's success in attracting carriers that specialize in non-containerized

cargoes, said Mr. Gaudet's appointment will strengthen G&A's commitment to these specialized carriers.

Newcomer At Inexa Profil

Roland Torngren will succeed **John Thybald** as manager of the engineering industry business sec-



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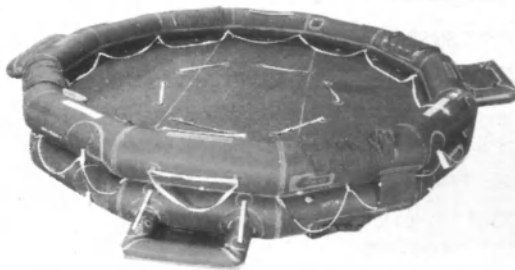
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tor at Inexa Profil in mid-August, 1997. Before joining Inexa Profil, Torngren was a sales representative at Tibnor, responsible for the North Bothnia region.

"The move from Tibnor to Inexa Profil is a natural one and is a step in the right direction with my background," Torngren commented. He continued, "It is going to be both interesting and fun to work for Inexa Profil."

Permalight Moves to Larger Facilities

American Permalight Inc., manufacturer of photoluminescent low location lighting, recently relocated to larger facilities. It can now be contacted at 2531 W. 237th Street #113, Torrance, Ca., 90505; phone: 310-891-0924; fax: 310-891-0996.

Moran Towing Corp. Announces Promotions

Effective Aug. 20, 1997, Mr. **Ronald G. Droop** will move into his new position as manager of Marine Transportation at Moran Towing Corp.'s Greenwich office, and Mr. **Matthew R. Walton** will take over as general manager of the Moran of Miami division. The promotions were announced by Mr. **Malcolm MacLeod**, president and CEO of Moran.

In his new position, Mr. Droop will be

responsible for the operation and administration of Moran's fleet of five dry bulk barges and ten petroleum barges. He began his career as assistant manager of Offshore Operations at Moran's Greenwich headquarters, and in 1995 he was transferred to Moran Towing of Miami to serve as vice president and general manager.

Walton joined Moran in 1993, after several months in the dry cargo brokerage business, where he assisted in the start-up of the Miami division as the assistant manager.

Newport News Announces New Director of Naval Marketing

William C. Bell was recently appointed director of Naval Marketing at Newport News Shipbuilding.

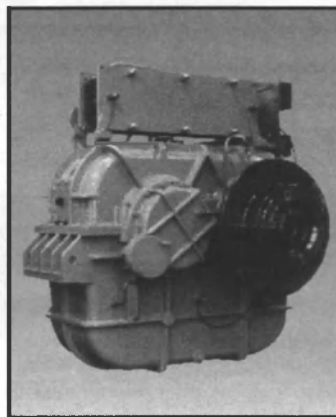
He will be responsible for the market analysis, development and overall management of the company's sales to both the U.S. and international military customers. **Bell** began his career at NNS more than 23 years ago.

Most recently, he served as director for International Naval Sales and is currently president of Newport News Global, the shipyard's foreign sales corporation. After graduating law school, Bell worked in private practice until his return to NNS in 1986. He joined the Legal Department and was instrumental in assisting the company in reentering the international market.

DIESEL OR GAS TURBINE?

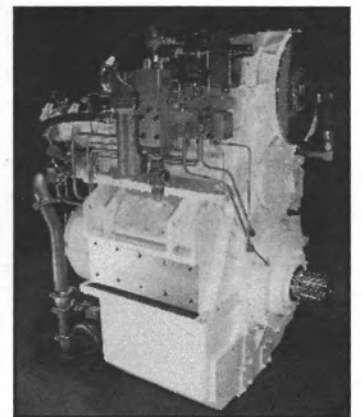
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Contract To Production In 20 Months

Bluewater's Latest FPSO Enters Production

By Greg Trauthwein

Glas Dour, the fifth Bluewater owned and operated FPSO, produced first oil from the Dauntless reservoir on Saturday, August 9, and the first oil from the Durward reservoir on Monday, August 11. This was achieved just one month after the vessel arrived on location and just 20 months after the contract award for the vessel. *Glas Dour* is installed near Amerada Hess' Durward & Dauntless Fields (Blocks 21/16 and 21/11, UKCS).

Bluewater's role is providing the FPSO, risers and umbilicals, as well as operating the FPSO, including well head control. The lease contract has a minimum period of four years.

During its 20-year life, the FPSO is designed to operate 95 percent of the time in production. In fact, it is capable of retaining certificates without leaving the field for eight years.

The basis for the *Glas Dour* was a new 105,000-dwt tanker, which was modified for FPSO duty. The FPSO's turret mooring system and the flare boom are located in the forward part of the vessel, while the main process and utility systems are located on deck.

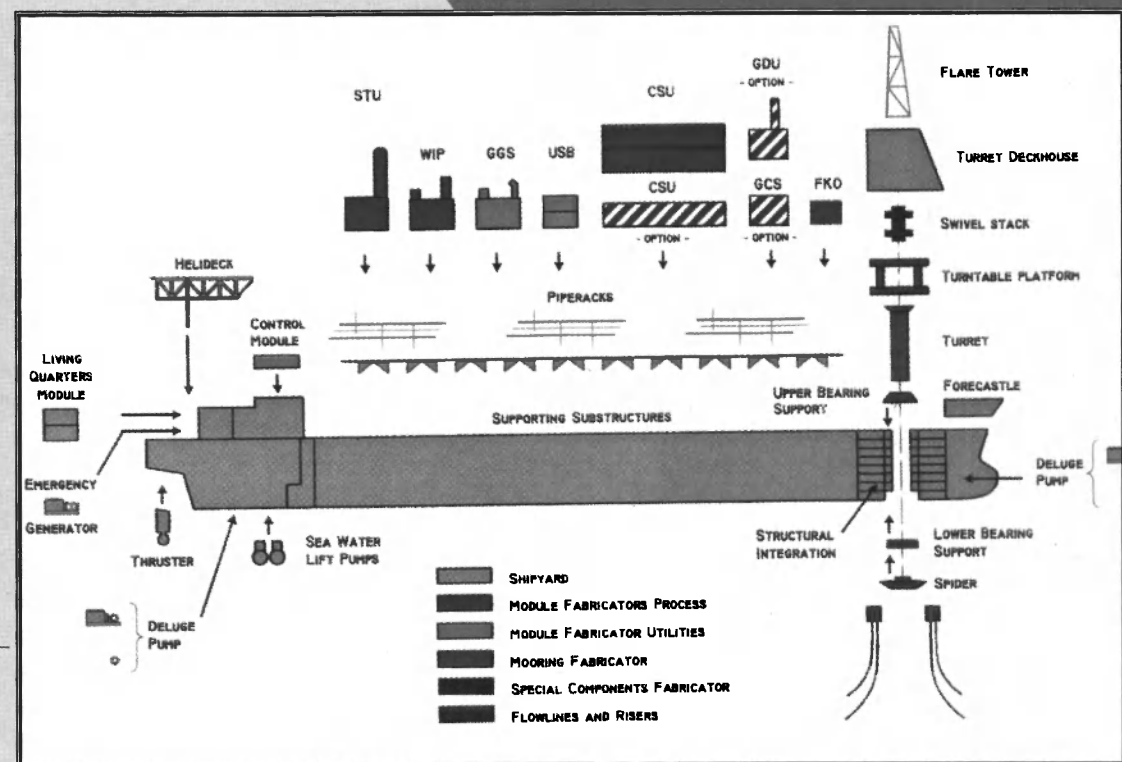
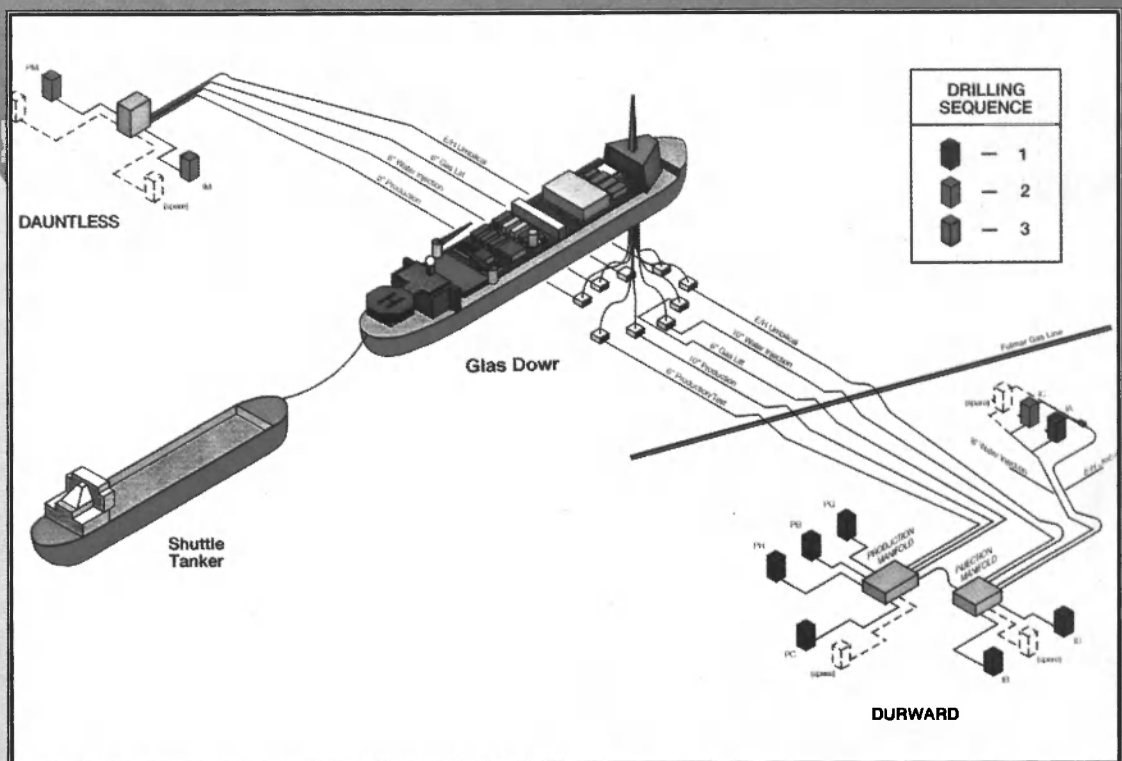
A highly automated and flexible control and monitoring system was chosen based on digital process system technology. Essential alarms of the vessel's existing control systems are integrated into the new control system, and a central control room provides control and display terminals and data management systems. Seawater is used for cooling and for well water injection. Fresh cooling water closed loops are provided for diesel engines.

In addition to the vessel's existing power generation plant in the engine room, a topside electrical power generation plant is installed.

The plant consists of one diesel generator set and three gas turbine generator sets. The power plant is located on the main deck. The diesel genset runs on diesel oil and heavy fuel oil delivered by the vessel's existing fuel system.

The gas turbine gensets normally run on fuel gas or gas oil delivered by the vessel's existing fuel system. Steam generation is provided by the existing steam boiler and a new topside steam boiler unit. Both boilers are run on LP fuel gas and/or liquid fuel. *Glas Dour* has accommodations for 96 persons, but the normal opera-

FPSO popularity and utilization continues to grow, as it provides a fast track to oil production. Bluewater's newest FPSO, the *Glas Dour*, is shown at the right, top. The middle photo is the *Glas Dour*'s production scheme, and the bottom graphic provides an exploded view of the unit.



tion crew is 40. The extra capacity is to house temporary crew during planned maintenance activities.

Processing Systems

The topside processing system consists of three major plants: the crude oil processing plant; the water injection plant; and the gas

lift compression plant (future option). The crude oil processing plant separates well effluent in dry crude, gas and water. The dry crude is stored in tanks.

The available gas is used in the power plant as fuel gas, lift gas, pilot and purge gas, and the balance is flared in a flare stack. The

produced water is cleaned prior to discharge overboard.

Water injection facilities consist of filtration de-aeration, chemical injection and HP water injection pumps.

As an option, gas lift facilities can be installed aboard *Glas Dowl*. The gas lift facilities will consist of

a treatment plant, compressors, knock-out drums and gas coolers, to recycle lift gas between the FPSO and the reservoirs.

All processing and injection equipment is served by chemical injection skid injecting chemicals to various locations.

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Glas Dowl Data

Storage Capacities:

Exportable crude storage (dry crude @ 98%)104,437 cu. m. (657,000 bbls)

Slop tanks (produced water)6,652 cu. m. (41,838 bbls)

HFO storage2,655 cu. m.

DD storage1,764 cu. m.

Handling Capacity

Intake:

Max. fluid intake75,000 bpd

Min. fluid intake3,000 bpd

Offloading:

Offloading rate (max.) .3,975 cu. m./hr. (25,000 bbls/hr.)

Max. discharge pressure at pump15.7 bar

Max. water content in export crude5%

Note: The offloading system can handle shuttle tankers up to 150,000 dwt.

Process Plant:

Fluid capacity3,000 to 75,000 bpd

Max. crude production60,000 bpd

RVP10.0 psia

H2S0 ppm

Note: The range of the inlet pressure at the ESD valve upstream of the process plant is 150 to 300 psi. The range of the inlet temperature at the ESD valve upstream of the process plant is 85 to 99 degrees F (start-up, minimum 7 degrees)

Water Injection

Max. capacity100,000 bwpd

Injection wellhead pressure3,800 psia

Oxygen content10 ppb max.

Filtration quality 95 percent removal of all particles greater than 5 microns

Max. injection temp. .1 to 5 degrees above actual seawater temp.

TANKER TECHNOLOGY

7 LNG Carriers Worth \$1.75 Billion Ordered

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

Each selected firm teamed up with a shipbuilding company: Hyundai with Hyundai Heavy Industries Co.; Yukong with Samsung Heavy Industries Ltd.; Hanjin with Hanjin Heavy Industries Co.; and Korea Line with Daewoo Heavy Industries Co. South Korea, which does not produce natural gas, but plans to have the carriers ready for operation in the year 2000 for transporting LNG imports. Each LNG carrier is estimated to cost approximately \$250 million, bringing the seven-ship order total to about \$1.75 billion.

Lisnave Gets Conversion Contract

Lisnave-Estaleiros Navais de Lisboa won two contracts worth 17 billion escudos to be carried out this year. One contract, worth \$61.6 million, is to convert *Peregrine VI*, a gas transport vessel with a capacity of 130,000 tons, into a ship capable of working on oil terminals. The second contract, worth \$32 million, is for work on a ship belonging to Brazilian oil company Petrobras.

For more information on Lisnave
Circle 198 on Reader Service Card

Danyard Delivers Chem Tanker To Stolt Nielsen

Stolt Parcel Tankers Inc., a subsidiary of Stolt-Nielsen SA, has taken delivery of the fourth in a series of seven 37,000-dwt chemical carriers being built by Danyard, a subsidiary of Denmark's J. Lauritzen Holding A/S.

NASSCO Selected To Design New Tanker For BP

National Steel And Shipbuilding Company (NASSCO)

has announced that it has been selected to design a million-barrel-capacity, double-hull tanker for British Petroleum (BP), with options for two more vessels.

The design development phase for the new commercial ship will be a joint project with BP and Maritime Overseas Corporation

(MOC) — the operating agent for Overseas Shipholding Group, Inc. — whom BP has selected to operate the first of up to three ships.

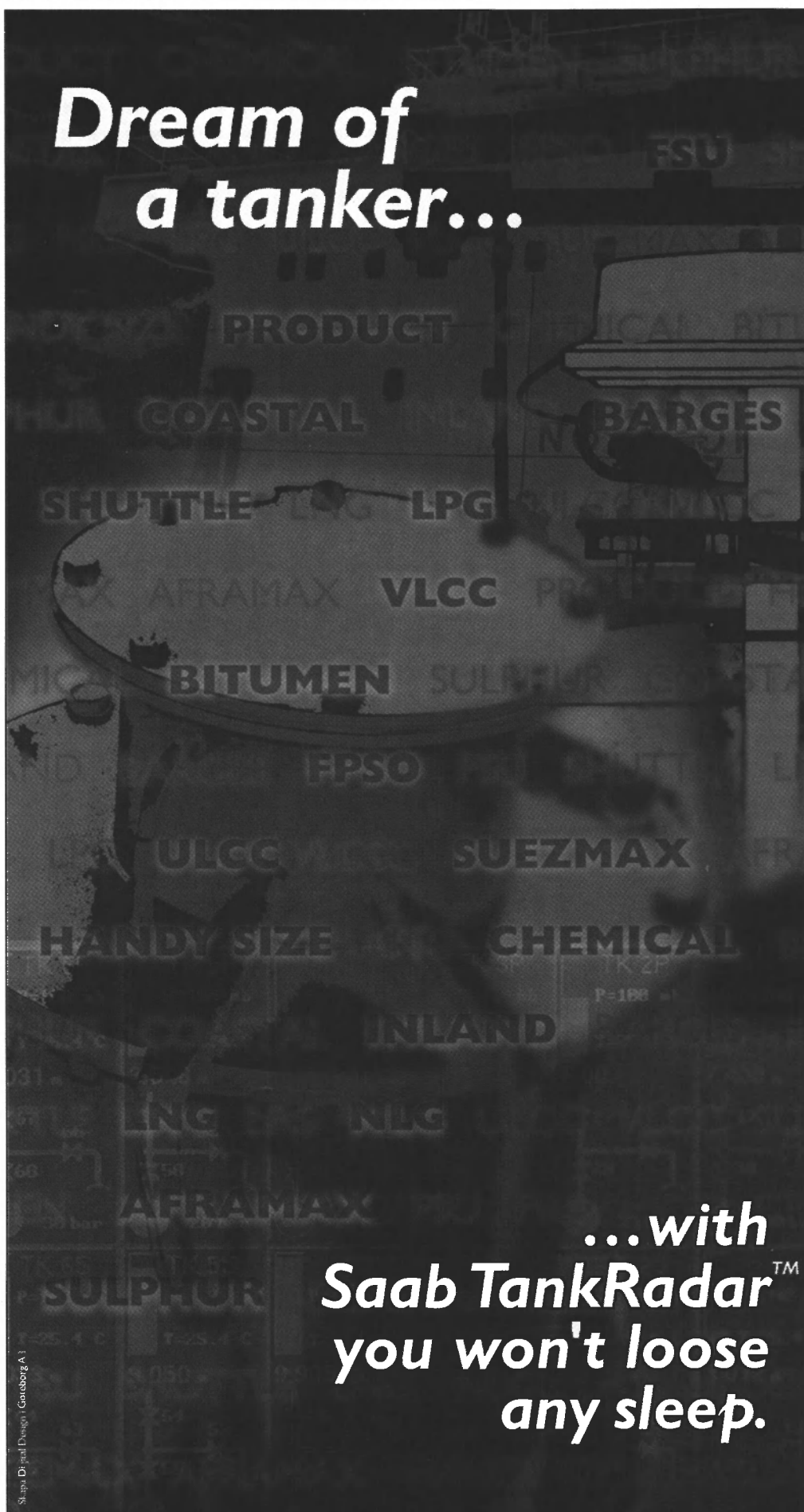
In addition to the BP design contract, NASSCO is part of the team led by Northrop Grumman that has been selected as one of three teams to design the Navy's

21st century Arsenal Ship for the Defense Advanced Research Project Agency (DARPA). The company is also currently completing work on the third of three Sealift Conversion ships.

For more information
on NASSCO

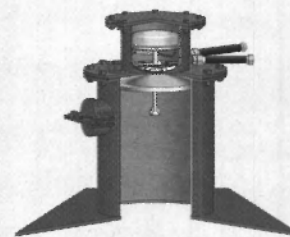
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Dream of a tanker...

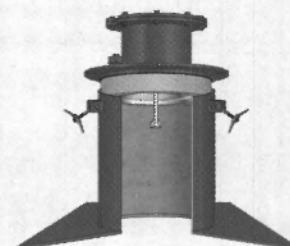


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The **Cone Antenna Gauge** is used on small tankers, in shallow tanks and where space on deck is limited.



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ARCO: Environmental, Business Advances Forged Through Technology

When ARCO ordered two double hull tankers for the U.S. West Coast to Alaska oil trade, it sent minor tremors throughout the industry as the \$166 million per ship price tag was divulged. (See *MR/EN* August 1997, pg. 98). Price (high, low or just right) notwithstanding, the new Millennium Class vessels, which will be built at Avondale's New Orleans facility, encompass dozens of technological advances which are designed to keep the ships running — efficiently and environmentally safe — for three decades.

Meeting The Challenge

The words "the State of Washington" stir up reactions ranging from disgust to rage in most tanker owner circle.

The state, in an effort to protect its environmentally-sensitive areas and citizens, has been at the forefront of developing and implementing regulations, over and above international and national rules, for tankers trading in its water. Shipowners contend that any rules and regulations beyond what is mandated by the IMO prove unnecessary, confusing and burdensome — particularly in regards to the bottom line.

ARCO, which will use the new vessels specifically for the 2,400-mile round-trip route from Valdez, Alaska to Cherry Point, Wash., has delivered a design which has won the endorsement and praise of Washington State legislators.

The company — which currently owns and operates 10 vessels with a total capacity of 9.5 million barrels — obviously has set out to

design, build, own and operate a ship which is both economical and safe.

The Millennium class will combine double hulls, independent engine rooms, redundant propulsion and twin steering systems, as well as a separate bowthruster and navigation system.

The Design

ARCO's new 125,000-dwt Millennium design takes advantage of the company's 80 years of experience in operating tankers, but it is truly a collaboration of some of the world's foremost ship designers and builders.

The new class was developed with the help of J.J. McMullen Assoc., MCA Engineers Inc., SSPA Maritime Consulting AB, Herbert Engineering Co., Glosten Associates Inc., Anna Knutsen and Astilleros Espanoles.

Determining a size for the vessel, given its route, was easy, considering that 125,000-dwt is the maximum permitted by law in the Puget Sound area.

The ship's 12 cargo tanks have a combined capacity of just over one million barrels. The double-hulled ship is designed to provide protection against collision and grounding. The second skin completely envelops the cargo area and other tanks containing fuel or lubricating oil. ARCO has implemented the double hull requirement with a very conservative structural design philosophy.

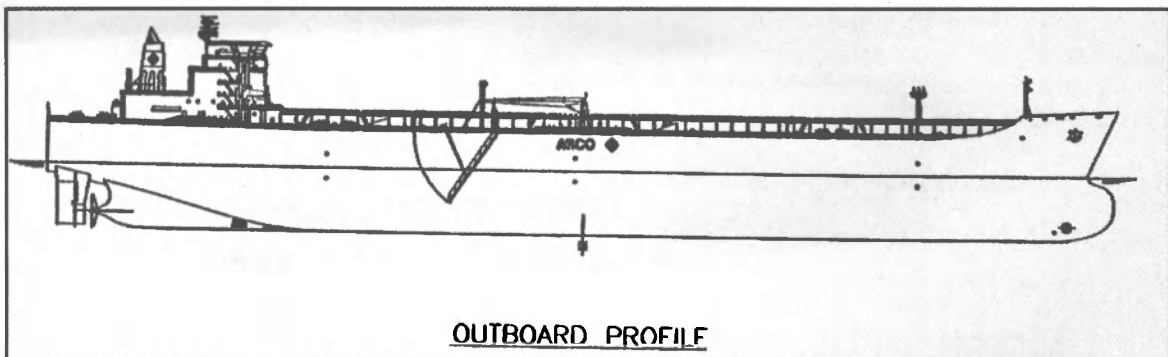
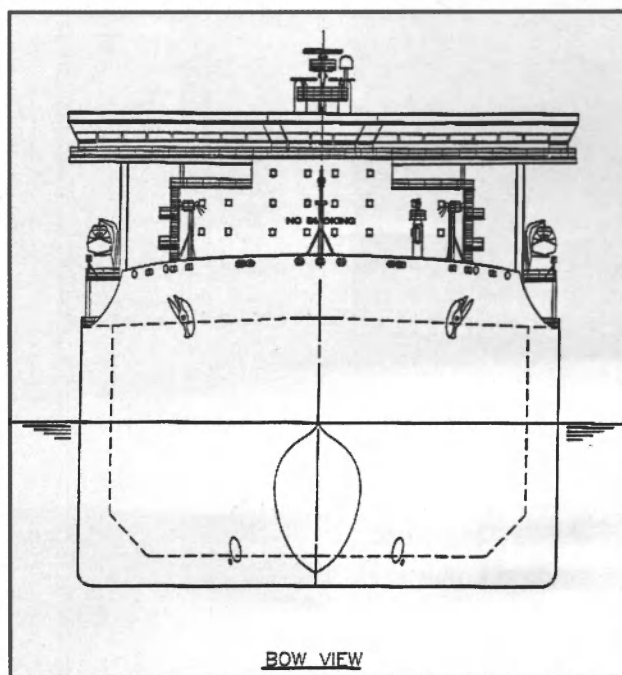
The distance between the inner and outer hull is 10 ft. (3 m), or 50 percent greater than required by OPA 90. The ships are designed for maximum durability, given not only the environmental concerns, but the harsh operating environment which they will be subjected to for more than 30 years. For example, an additional 8,000 tons of steel will be used for the Millennium design versus comparably sized tankers.

While the double hull is beneficial (and mandated under OPA 90), ARCO considers it the last line of defense, and has incorporated the several redundant systems to ensure the vessel avoids trouble from the start.

Two main, slow-speed diesels will be employed on each ship and located in completely independent engine rooms. The engines will be fueled by independent fuel systems and can be operated, if desired, from independent control systems. Failure to one engine due to fire, flooding, fuel contamination or mechanical failure will not affect the ability of the vessel to complete its voyage.

Each engine will drive a separate, controllable, reversible pitch (CRP) propeller, greatly adding to the vessel's maneuverability. The CRP propellers can go from full-ahead thrust to full-astern thrust in a matter of seconds, without reversing the direction of the engine rota-

(Continued on page 44)



Environmental Groups Sue USCG For Lack Of Oil Spill Regulation

USCG, viewed as a tough enforcer by the international maritime community, is nonetheless taken to task by domestic groups

The U.S. Coast Guard (USCG) is being sued by a coalition of environmental groups which claims that the government agency has fallen down on the task of requiring tankers to make structural changes and other improvements as extra safety measures against oil spills.

"Congress ordered the Coast Guard to protect the environment from oil spills ... nonetheless, the Coast Guard threw up its hands and determined that virtually nothing was economical to do," Peter Lehner, a senior attorney with the Natural Resources Defense Council, said.

The NRDC and several other organizations filed the lawsuit in U.S. District Court in New Jersey.

Under a law passed after the March 1989 Valdez spill in Alaska's Prince William Sound, Congress called for tankers in U.S. waters to have double hulls, but allowed that requirement to be phased in over 25 years. In the meantime, Congress ordered operating and structural improvements be made in single hull tankers to provide as much protection as was economically and technologically feasible.

In January, the USCG, which administers ocean spill prevention programs, said it would not require retrofits to prevent spills in single hull tankers before they are retired or rebuilt to meet double hull requirements by 2015.

The environmental groups complained that the USCG also backed off other non-structural requirements that could have provided extra protections.

"Several measures such as 'hydrostatically balanced loading' — which simply means not overfilling the tanker so that oil does not gush out if the tank breaks — were found feasible, affordable and very effective," Lehner said. "But after the industry complained, the

Coast Guard gave in and withdrew that proposal."

In January, the USCG said its rule, which is designed to reduce

human error and the risk of accidents caused by equipment or structural failure, and other oil spill emergency rules imposed ear-

lier should be enough protection until all tankers have double hulls.

The USCG offered no comment on the lawsuit.

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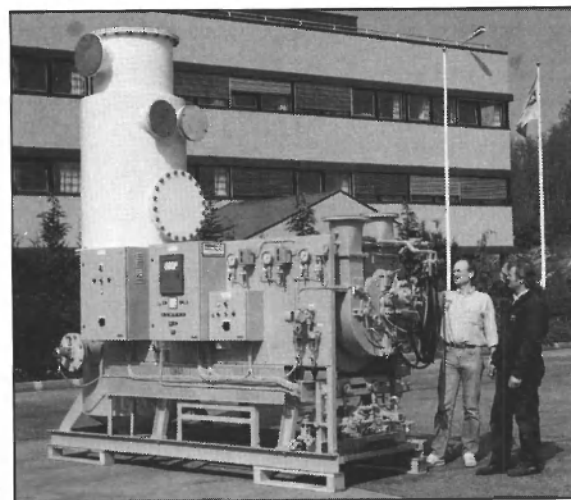


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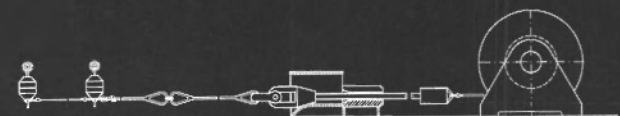
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TANKER TECHNOLOGY

(Continued from page 42)

tion — a key component in stopping the vessel in short distances. The addition of a separate bowthruster will provide even greater maneuverability in tight conditions. Completing the redundant design are two independent

rudders, each with its own steering system. This provides redundancy, as well as increased maneuverability in case of emergency. Using this advanced propulsion package, the vessel can turn through a complete 360-degree turn in its own

length. In fact, using just one rudder, the Millennium Class exceeds IMO maneuvering standards.

Finding The Way

While the focus has primarily been on propulsion equipment, the

Millennium Class vessel is designed to be outfitted with next-generation navigation, electronics, command and control systems as well. Included on the bridge will be Electronic Chart Display and Information Systems (ECDIS), three automatic plotting collision avoidance radars, and Global Marine Distress Safety System (GMDSS).

Overall, the bridge will be highly automated with an emphasis on presenting all pertinent information in one concise area, allowing the operator more time to formulate responses instead of searching for data. Taking an additional step, propellers, rudder and bowthruster will all be controlled via a control stick.

The concept has also been extended to the efficient command and control of the machinery, cargo and firefighting equipment. For example, the engine and machinery controls are not only redundant in the engine rooms, but are also integrated into the bridge control system.

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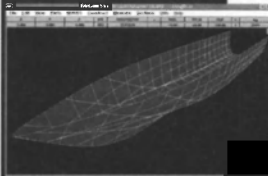
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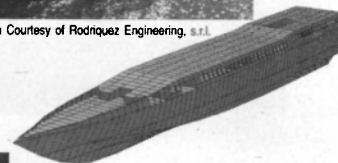
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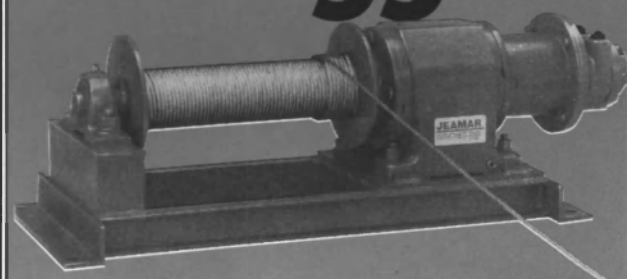
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Millennium Class Main Particulars

Length, o.a.	894.6 ft. (272.7 m)
Length, b.p. (design)	847 ft. (258.2 m)
Beam, molded (design) ...	151.5 ft. (46.2 m)
Depth, molded (at side) (design)	83 ft. (25.3 m)
Draft (design)	53.5 ft. (16.3 m)
Draft, scantling	57.5 ft. (17.5 m)
Lightship Weight	32,664 lt (33,188 MT)
Deadweight, at design draft	125,000 lt (127,005 MT)
Deadweight, at scantling draft	137,909 lt (140,122 MT)
Displacement, at design draft	157,664 lt (160,193 MT)
Displacement, at scantling draft	170,573 lt (173,310 MT)
Cargo Tanks	1,017,161 bbls (161,706 cu. m.)
Propulsion	(2) Diesel, Low Speed
Engine (mcr) each	15,015 hp (11.06 MW)
Propellers	(2) 19-ft. (5.8-m) diameter
Speed (trial) 90% mcr	16 knots

Conversion Gets Underway On *Bleo Holm*

The 105,000-grt Bluewater vessel *Bleo Holm* arrived on the River Clyde after a 105-day tow from Japan. It is reportedly the largest vessel ever seen on the upper reaches of the Clyde. The vessel is berthed at UiE's Clydebank facility, where it will remain for approximately 12 months for conversion into an FPSO (Floating Production Storage and Offloading) vessel.

After entering into a service agreement with Talisman Energy (UK) Limited, Bluewater awarded the contract for the vessel conversion and outfitting to Fluor Daniel/UiE in May 1997. All construction work will be carried out by UiE. In addition, the majority of the equipment to be installed onboard *Bleo Holm* has been procured through Fluor Daniel.

Bluewater has also awarded the EPC contract for the accommodation to Consafe, Burntisland, and the contract for the turret system to Lewis Offshore, Isle of Lewis, both to be delivered to Clydeside for installation on the *Bleo Holm* in early 1998. Once completed in Aug. 1998, the *Bleo Holm* will be towed to the North Sea, where Bluewater will operate the FPSO for Talisman Energy (UK) Limited for the development of the Ross Field.

Techno Fibre Activates Lifeboat Repair In India

Singapore-based lifeboat and davit maintenance company Techno Fibre recently activated its operations in India in support of a major American offshore drilling operator which had its lifeboat severely damaged during operations off Chennai, India. The severity of the damage necessitated the removal of the lifeboat from the drill ship to Techno Fibre's affiliated company's facilities in Chennai. Fiber composite repairs were carried out in accordance with classification standards. Apart from the fiber composite repairs the engine, water spray, compress air and lifting hook systems were also serviced and restored to good order. The repairs took a total of approximately six weeks to complete.

For more information on Techno Fibre
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OSG Car Carriers Asks For MarAd Approval Of Fleet Capacity

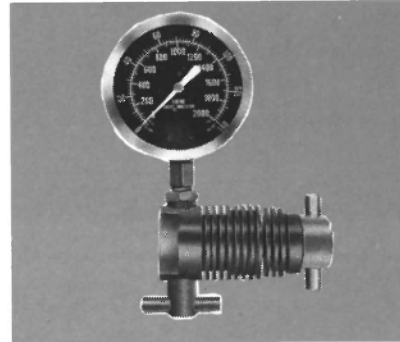
OSG Car Carriers, Inc. has asked the Maritime Administration (MarAd) to approve its total fleet capacity of 845,950-dwt as its level of non-contiguous domestic service for the 12-calendar month preceding Aug. 9, 1995, and the level of service grandfathered for purposes of section 656 of the Merchant Marine Act, 1936, as amended. In October 1996, OSG requested award of an Operating Agreement under the Maritime Security Program to cover its vessel *Overseas Joyce*. Subsequently, by action of the Administrator dated December 13, 1996, OSG, among others, was awarded a MSP Operating Agreement, subject to, among other conditions, the satisfactory establishment of the level of service OSG and its affiliates provided in the non-contiguous domestic trades.

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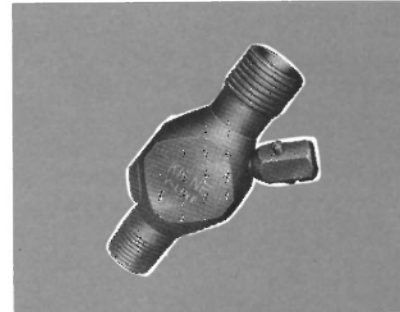
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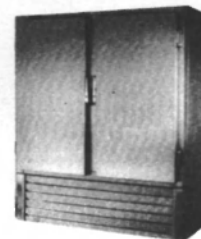
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The International Workboat Show hours are from 10:00 a.m. to 6:00 p.m. Wednesday and Thursday, and 10:00 a.m. to 5:00 p.m. on Friday, November 5-7. For more information on attending this conference or registering for the show call (800) 454-3007, or visit the website at www.workboatshow.com.

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WORKBOAT PREVIEW

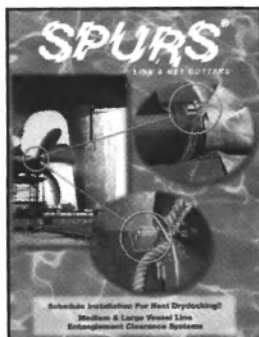
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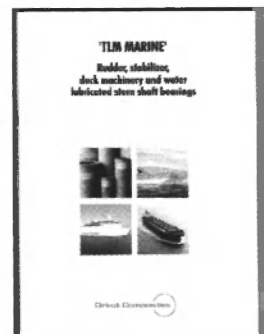
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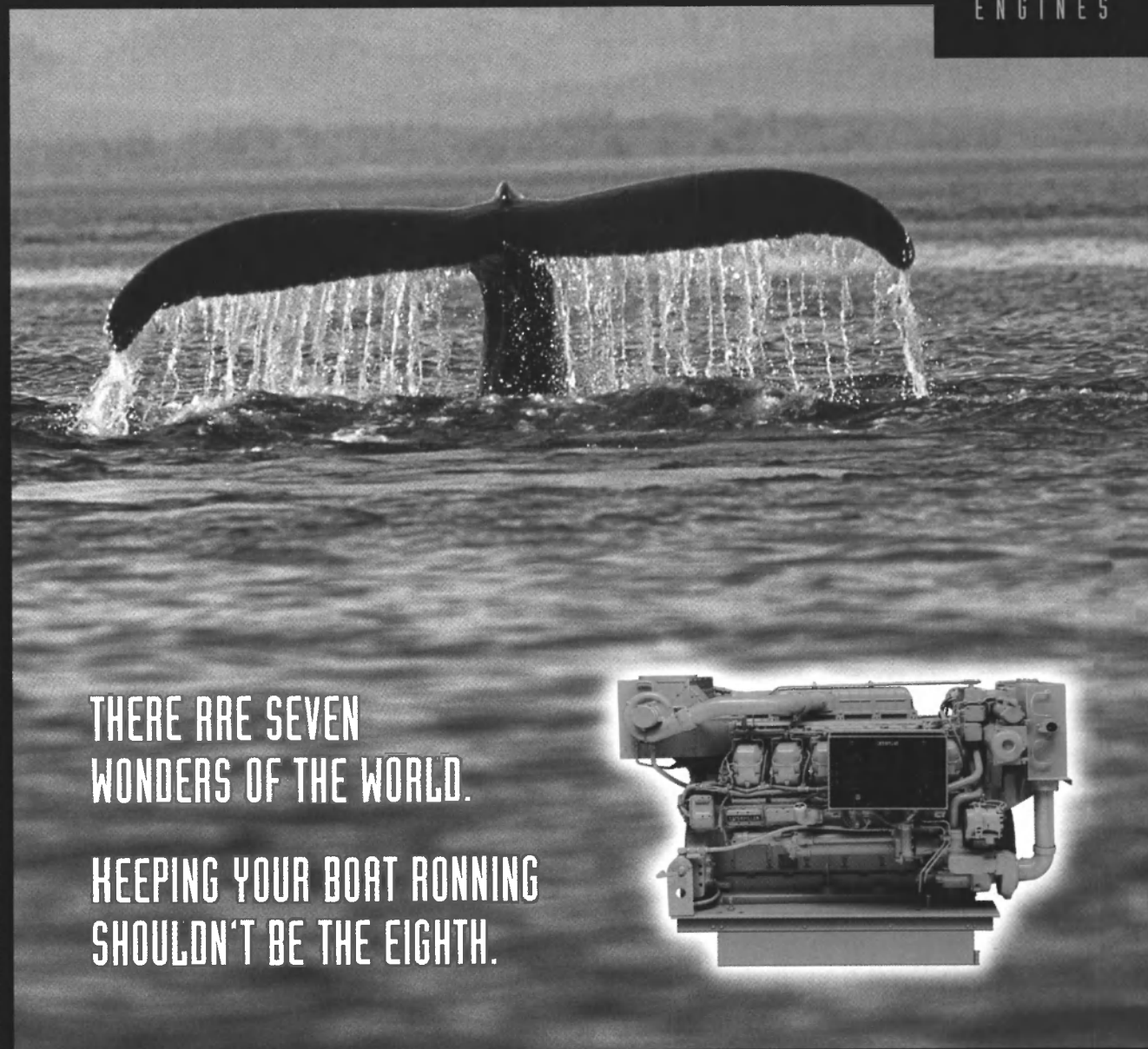
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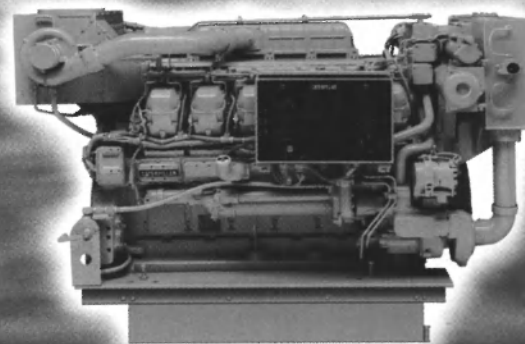
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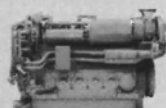
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WORKBOAT PREVIEW

Crowley Wins Contract From Alaskan Interest

Crowley Marine Services, Inc. (CMS) has won a 10-year, design/build/operate contract with Alyeska Pipeline Service Company for two 10,192-hp tractor tugs designed for tanker escort operations in Valdez Harbor and Prince William Sound, Alaska.

Upon delivery in 1999, the 120 x 41 ft. (37 x 12.5 m) tugs will be dedicated to serve as part of Alyeska's Ship Escort/Response Vessel Systems (SERVS) to escort laden tankers as they depart from the terminals of the



Trans-Alaska Pipeline at Valdez, and proceed south-bound through Prince William Sound.

For more information on Crowley Circle 21 on Reader Service Card

Minerals Research & Recovery, Inc.

Minerals Research & Recovery, Inc. is active in the mining, processing and marketing of various metallic and non-metallic minerals and ores, as well as the manufacture of the ship ballasting system, Perma Ballast. This ballasting system



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RTF Manufacturing

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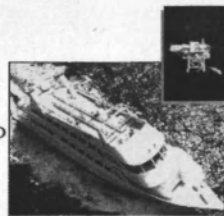
JDN Delivers Jack-Up Rig Handling System

J.D. Neuhaus (JDN) has received an order from Rowan Companies Inc. for two air-driven monorail hoists with a total safe working load (SWL) of 250 tons for a Blow Out Preventor (BOP) handling system on jack-up rig *Gorilla V*. The rig, which will soon commence operation in the North Sea, is designed for water depths of up to 400 ft. (122 m) and drilling depths of up to 35,00 ft. (10,670 m).

For more information on JD Neuhaus
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WORKBOAT PREVIEW

Ingalls To Invest \$25 Million To Revamp Facilities

month, and work on the new production bay will start in mid-1998.

For more information on Ingalls
Circle 14 on Reader Service Card

Pictured is an aerial view of Ingalls Shipbuilding division of Litton Industries, highlighting elements of the \$25 million facilities



Litton Industries announced plans to invest \$25 million in a major facilities program at Ingalls Shipbuilding — the company's shipbuilding and marine production operations.

"The investment will enhance Ingalls' already extensive capacity for naval ship construction and modernization, and will significantly broaden our shipyard's capability to produce commercial vessels and offshore drilling rigs and production platforms," said Ingalls President **Jerry St. Pé**.

The facilities program will involve two major projects. One will be the expansion of the company's floating drydock, used to both launch and retrieve vessels and marine structures.

The other project will be the construction of an additional production bay that will be dedicated to the building of drilling rigs, production platforms and other structures for the offshore industry. Engineering work for both phases of the program is currently underway.

The drydock expansion will include adding a 160-ft. (49 m) detachable section to the shipyard's existing drydock, bringing the expanded dock to 800 ft. (244 m) in length.

Production of the new dock section is expected to commence next

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MR/EN...**

**OUTSTANDING
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OF 1997**

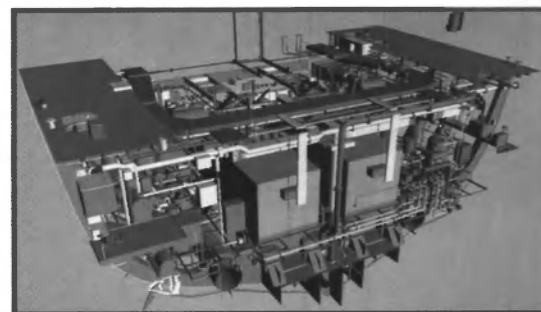
TRIBON Vitesse

TRIBON Vitesse creates a new era in ship design — the Rule-based Automated Design era.

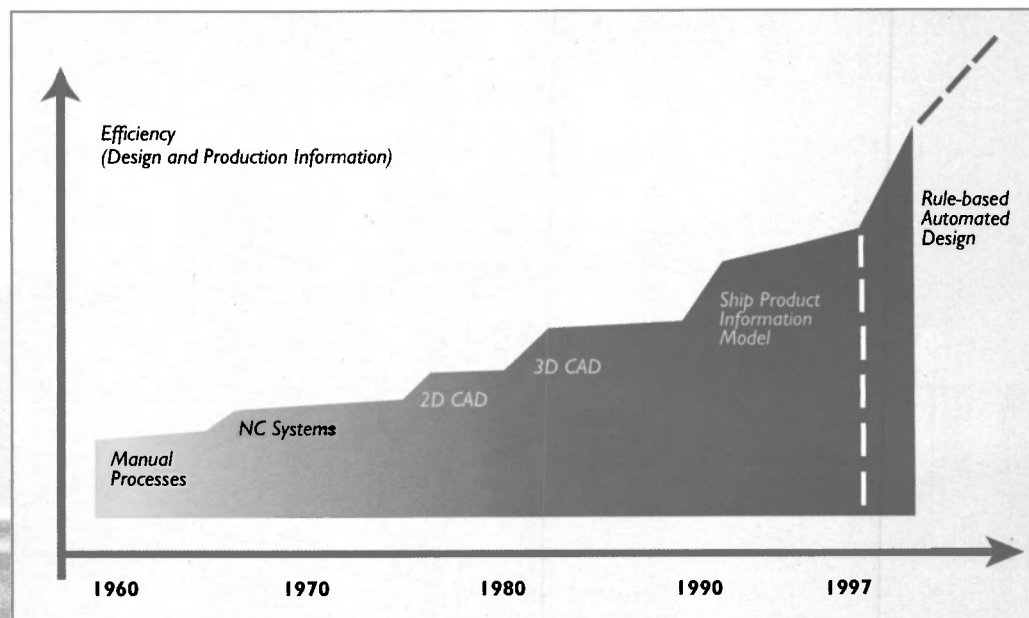
TRIBON Vitesse will enable the user to write his own Vitesse programs to control design development according to his own rules with direct access to the TRIBON Product Information Model and all the functionality of the TRIBON applications.

TRIBON Vitesse has been developed in close co-operation between KCS and the French shipyard Chantiers de l'Atlantique in St. Nazaire. Vitesse is a French word meaning speed.

TRIBON Vitesse will lead to a step change in ship design efficiency through rule-based automated design for different types of structural arrangements and outfit layouts. TRIBON Vitesse can be applied from the smallest design standard right up to major sections of ships.



The TRIBON Shipbuilding system covers all aspects of design from initial design to production, including advanced features from the assembly phase of ship production and materials control. Design and information systems from KCS are installed at more than 260 sites in 38 countries in Asia, Australia, Europe, North and South America.



**New
feature in
TRIBON 4**

During 1996 a total of 422 ships were delivered which were built using the TRIBON system.

KCS
Kockums Computer Systems

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Please send me further information about TRIBON Vitesse

To Kockums Computer Systems AB, P.O. Box 50555, S-202 15 Malmö, Sweden. Phone +46 40 10 34 55, Telefax +46 40 97 84 15, E-mail: market@kcs.se

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Company _____

Address _____

Postal code and Town _____

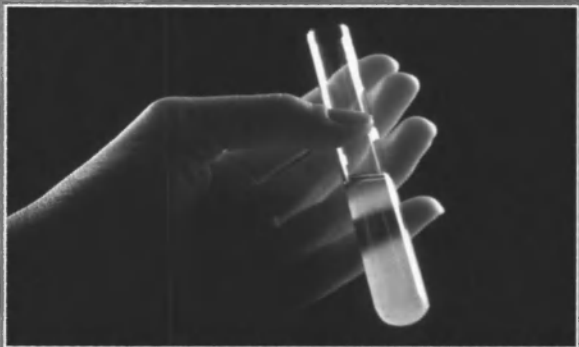
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SNAME '97 Preview

Ottawa, Ontario, Canada — Oct. 15-18

The 1997 Society of Naval Architects and Marine Engineers (SNAME) Conference and the 16th Annual International Marine Exposition is set for Ottawa, Canada. The much anticipated event is always the setting for lively debate on maritime technical matters. The following pages provide a brief glimpse of some of the exhibitor's plans for the exhibition.

Airchime Manufacturing Co., Ltd.

Airchime is a manufacturer of marine horns and controls, air horns, electric piston horns, self-contained air horns, steam whistles, automatic whistle controls and accessories. **Booth No. 614**

Allied Marine Crane (Division of Allied Systems Company)

Allied Marine Crane is a designer and manufacturer of specialized heavy lift equipment, including marine cranes, boat davits and winches. **Booth No. 201**

American Bureau of Shipping

American Bureau of Shipping — a ship classification society that establishes and administers standards for the design, construction, and operation maintenance of ships and other marine structures — will feature at its exhibit SafeHull and SafeNet and provide information on other classification services. **Booth No. 509-511**

Appleton Marine, Inc.

Appleton Marine, Inc., has supplied marine deck machinery including cranes, winches, windlasses, and capstans, for military and com-

mercial shipbuilding for the last 25 years. Its booth will feature past as well as recently developed products. **Booth No. 700**

Autonav Marine Systems Inc.

Autonav manufactures autopilots and steering systems. **Booth No. 707**

Barco Chromatics

Barco's exhibit will feature a 21-in. GL and ECDIS-ready high resolution monitor, a 2K x 2K high performance VTS workstation, a full range of rugged displays, and graphics and video controllers. **Booth No. 203-205**

Beclawat Manufacturing Inc.

Beclawat manufactures windows and doors for the shipbuilding and transit industries. **Booth No. 624**

California Maritime Academy

The California Maritime Academy, a campus of the California State University system, has been providing professional training since 1929. Its graduates are trained as facilities, marine and mechanical engineers for the nation's marine-oriented industries and businesses. **Booth No. 517**

Caterpillar

Caterpillar specializes in diesel engines from 80-10,000 hp. **Booth No. 402**

Cerberus Pyrotronics

Cerberus manufactures marine fire detection systems. **Booth No. 515**

Debis Financial Services, Inc.

Debis offers flexible and innovative financing programs for the commercial marine industry. **Booth No. 321**

FCS, Inc.

FCS is a marine engineering/naval architecture firm offering services including: ship design/conversions; diesel/steam/gas turbine power plants; system integration; pollution abatement; and environmental consulting services. **Booth No. 324**

Fleet Technology Ltd.

FTL provides advanced marine engineering/design support and trials services and will exhibit its prototype marine event recorder. **Booth No. 523-525**

Flowdata

Flowdata will feature its FuelCom Net Fuel Monitoring System at its exhibit. The FuelCom system is designed to

provided temperature compensated fuel monitoring for diesel engines used in marine propulsion and on-board power generation. **Booth No. 717**

GasTOPS

GasTOPS is a Canadian company specializing in leading-edge technologies and advanced engineering in the marine and aerospace sec-

tors. **Booth No. 504**

Gems Sensors

Gems supplies continuous level indicators and sensors for marine applications. **Booth No. 508**

Headhunter Inc.

Headhunter distributes plumbing systems including: toilets and sewage treatment systems; pumps for water distribution and waste evacuation onboard; and fluid level monitors for water, wastewater and diesel fuel. **Booth No. 404**

HydroComp, Inc.

Hydrocomp will feature PropCad Version 2, NavCad Version 3.5 for Windows, PropExpert Propeller Selection, SmartEngine and NauShip. **Booth No. 408**

Indol Technologies Inc.

Indal Technologies, Inc., of Mississauga, Ontario, will be exhibiting an array of aircraft and cable handling systems for ship-board operations. The company's products include: helicopter handling systems; mine countermeasures; and variable depth sonars. **Booth No. 117**

In-Place Machining Company

In-Place Machining Company utilizes new methods for crankshaft refurbishment while installed in the engine. **Booth No. 410**

The Institute of Marine Engineers

The Institute's booth will feature CD-ROM databases and books, along with its range of services and journals provided by the Institute. **Booth No. 114**

Inventory Locator Service

ILS will be displaying its Global Marine Parts Information Network. **Booth No. 311**

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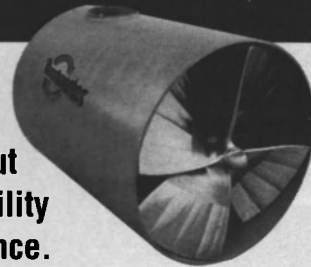
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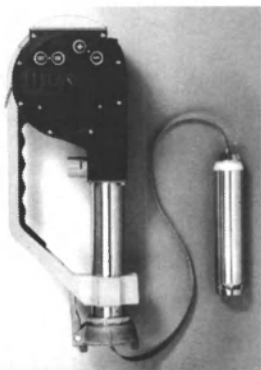
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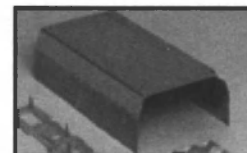
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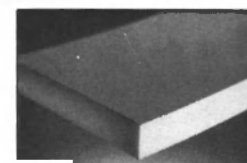
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Circle 345 on Reader Service Card

marine engineering firm providing concept through detail design services to all segments of the marine industry through its nine offices nationwide. **Booth No. 401**

Marine Management Systems, Inc.

MMS plans to exhibit its Fleet Manager Enterprise for Windows — a consolidated software solution that manages vessel maintenance, inventory, accounting, ISM and regulatory compliance, communications, reporting, payroll and personnel. **Booth No. 102**

MGI International Marine Safety Solutions Inc.

MGI is a manufacturer of marine safety equipment, including the Launch Rack System for liferafts, embarkation appliances, thermal protective aids and code red mariner computer-based training for mariners. **Booth No. 219**

Mil Systems

Naval architects and marine system engineers will demonstrate new structural inspection database software at Mil Systems' exhibit. A free demo package will be available. **Booth No. 605**

Newport News Shipbuilding

Newport News Shipbuilding is America's largest privately-owned shipyard. For more than a century the company has designed, built, overhauled and repaired a wide variety of ships for the U.S. Navy and commercial customers. **Booth No. 221/223**

PolySpec Marine Products Corporation

PolySpec's exhibit will include products for both wet and dry interior and exterior spaces including: heads; galleys; sculleries; passageways; reefer boxes; ammunition spaces; weather decks; and non-skid. **Booth No. 708**

Robert Allan Ltd.

Canadian naval architectural firm Robert Allan Ltd. will feature recent major international projects including ship-assist and escort

tugs, fireboats, and fast ferries at its exhibit. **Booth No. 711**

Scardana

Scardana specializes in all ship-

board parts and equipment and will emphasize its American-made pumps for salt and freshwater applications.

Booth No. 714



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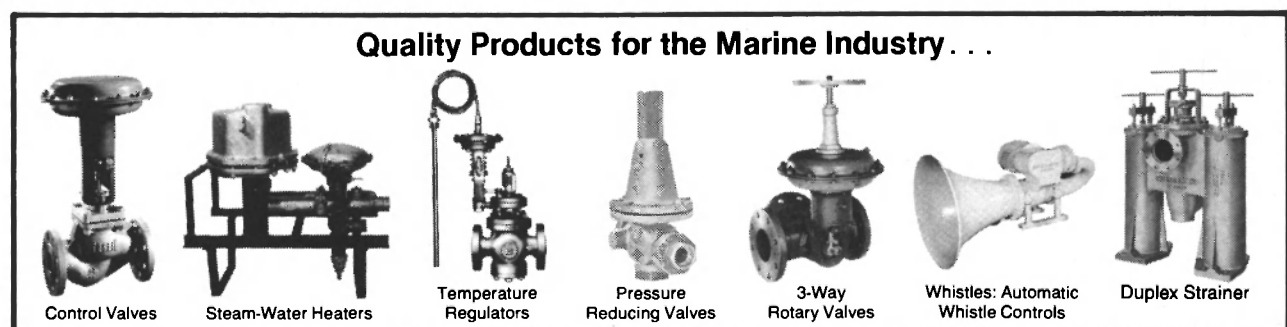
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Seaworthy Systems

Seaworthy supplies marine engineering and naval architecture services, including the Seaworthy-designed Convertible Container Carrier and Tricat, a series of 50-knot passenger vessels being built by Pequot River Shipworks, Inc. **Booth No. 424**

Siemens Electric Limited

Siemens manufactures ship automation systems, electric propulsion systems, generator systems, power management systems and alarm, monitoring and control

systems. **Booth No. 615 & 617**

Simpson Power Products Ltd.

Simpson plans to feature an SPP backdrop and photographs of its vessels. **Booth No. 724**

SML Software (A division of Fleet Technology)

SML Software sells seakeeping software and shaft kit shaftline analysis software and develops custom software for marine support. **Booth No. 523-525**

Thordon Bearings Inc.

Thordon Bearings designs and manufactures a complete range of high performance, environmentally friendly marine propeller shaft and rudder bearing systems. **Booth No. 500**

UE Systems Inc.

UE Systems supplies portable and on-line monitors that ultrasonically detect leaks in valves, steam traps and pressurized gas and vacuum systems, and that check the mechanical status of pumps, motors, gears, compressors, water

tightness integrity and hatches. **Booth No. 110**

Victaulic

Victaulic will be exhibiting its full line of U.S. Coast Guard-approved products for mechanically joining grooved pipe. **Booth No. 422**

Information Technology Update

Dataworks Revamps Broking Software

U.K.-based shipping software and IT consultancy Dataworks is upgrading its software which it markets through its joint-venture partner, Charter.

The product range includes Position List, Sale & Purchase package, Message Manager and Charter Party Editor.

Enhancements to the systems include the introduction of 32-bits working for applications for Windows 95 and a more user-friendly interface. At the same time, Dataworks is helping clients to ensure they are millennium compliant by certifying that all its software will be unaffected by the millennium bug problem. It is also offering clients consultancy to help them get the most out of the Internet. Message Manager, the core product of Dataworks. It enables clients to send, receive, amend and resend messages by all mediums across a network, working from a common Windows interface. Telex, fax and e-mail are all incorporated.

Charter Party editor was originally developed with BIMCO. It enables shipowners, charterers and brokers to edit and print the world's most used charter parties. The Dataworks Charter Party Editor comes complete with a database of charter parties. Users can edit the original forms on screen and can print as many draft copies of the forms as they wish. Draft and final copy forms can be printed in ready-to-fax A4 or letter format, and the license for the program includes the right to print 150 orig-

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Scana Moland — Engine room alarm, monitoring and control systems, data loggers and voyage recorders

Scana Mar-El — Electronic remote control systems for propulsion, manoeuvring and special applications

Scana Rotator — High velocity press-vacuum valves and hydraulic control valves

Scana Servoteknikk — High-quality electronic fire alarm products

All above companies are organized within Scana Marine Equipment for the purpose of serving the customer even better.

For more information contact: Tom Cantero, +47 37 03 06 66 or Terje Lillenes, +47 35 97 20 00/+47 51 86 94 00.

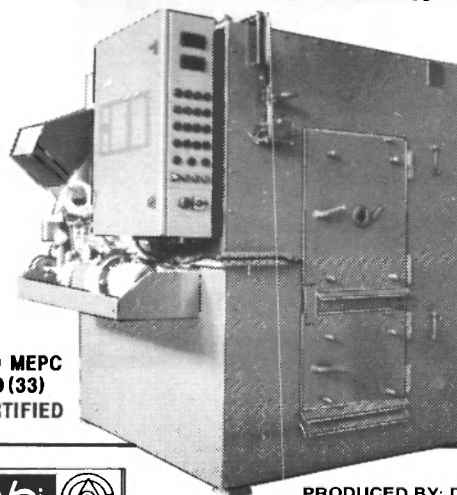
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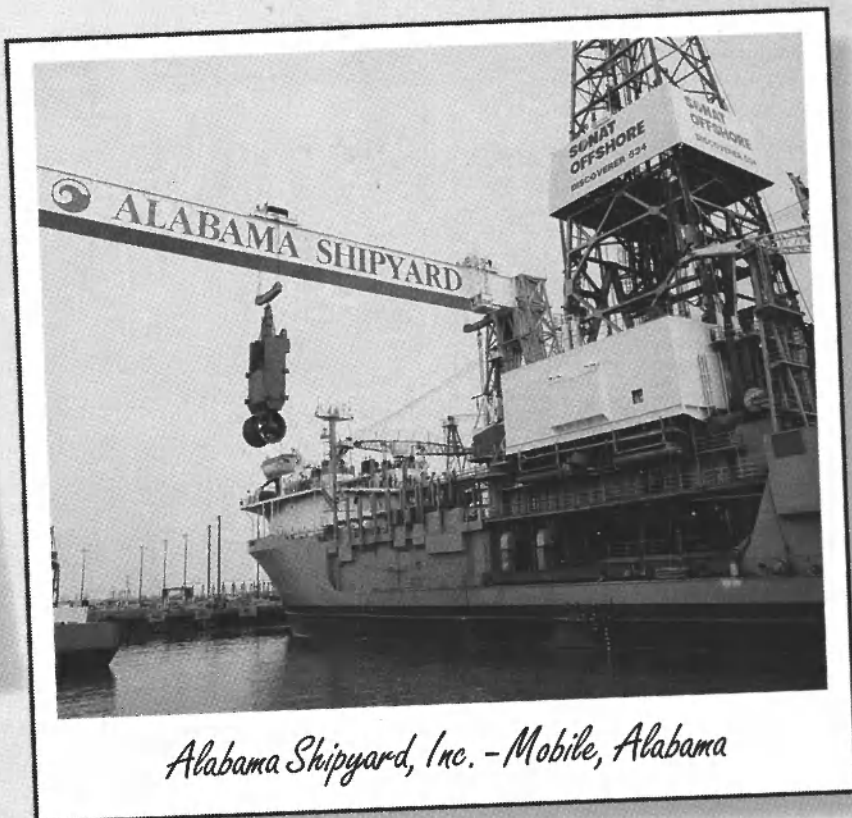
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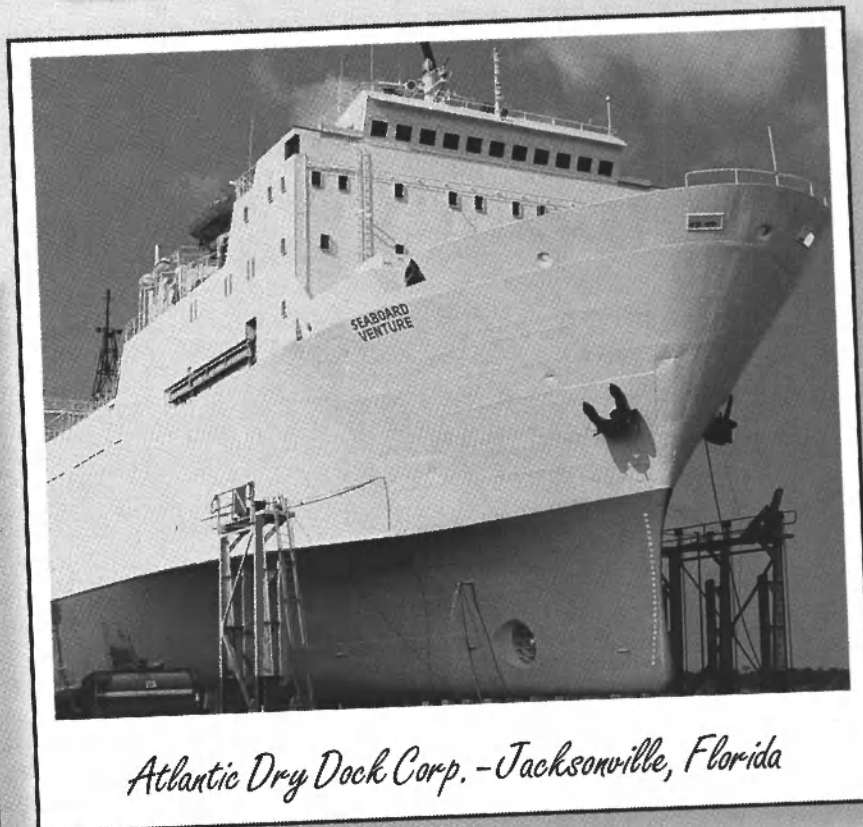
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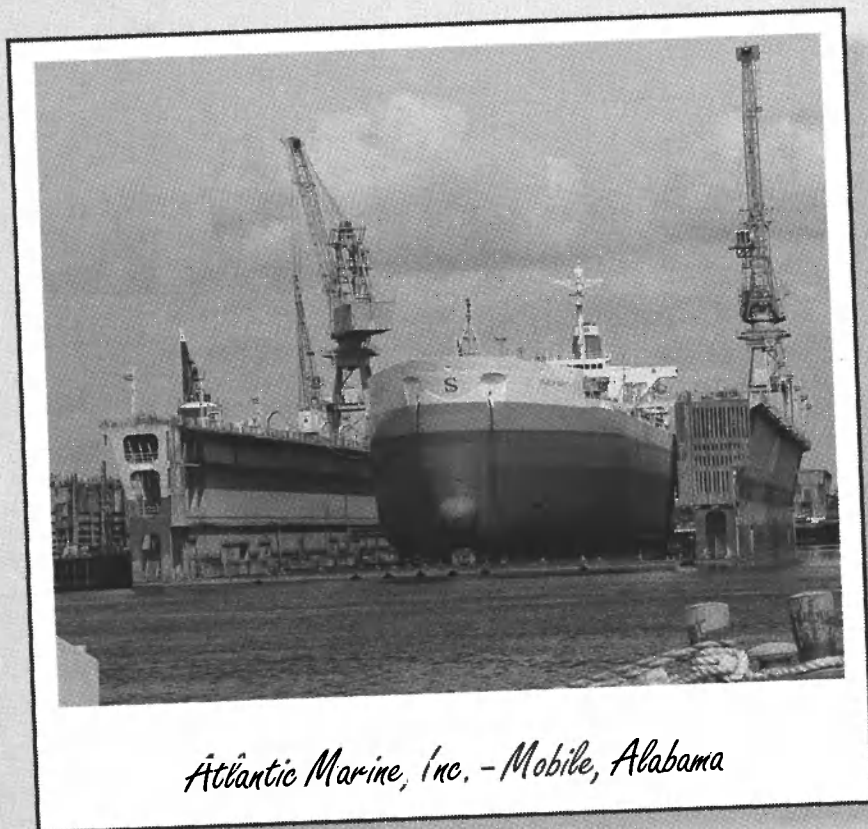
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inal copies of any selection of forms from the database. Further forms are available in quantities of 50 final prints.

For more information on Dataworks
Circle 54 on Reader Service Card

Leica To Supply DGPS Systems To India

Leica and Elcome Marine, the company's local marine distribution partner in India, has been

awarded a contract by the Department of Lighthouses and lightships to provide a DGPS beacon system for India.

The system will provide enhanced navigation accuracy in

coastal waters along the shore of India by using marine radiobeacons to broadcast DGPS error correction data.

The contract calls for the installation of DGPS reference stations at 10 existing radiobeacon sites in India.

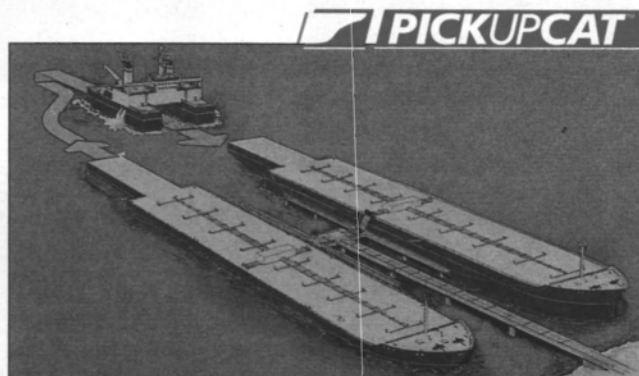
Each site will have two DGPS receivers, one integrity monitor and a broadcast station controller. The broadcast station software will be run on Microsoft Windows NT operating software. Standard RSIM message format will be used for communications between the controller, integrity monitor and reference station.

For more information on Leica
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The PICKUPCAT concept

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Circle 297 on Reader Service Card

Stratos Teams Up With Cable And Wireless

Stratos Mobile Networks has entered into a partnership with Cable and Wireless BIMCOM to provide C-Mail to maritime users. C-Mail, a messaging service for ship-to-shore and shore-to-ship communications using Inmarsat-C, offers full notification of delivery to the destination for messages sent in either direction.

BICMOM C-Mail Manager will be offered to customers in support of the new C-Mail service, and offers on-screen message delivery status and a full-feature address book with each message managed under relevant categories.

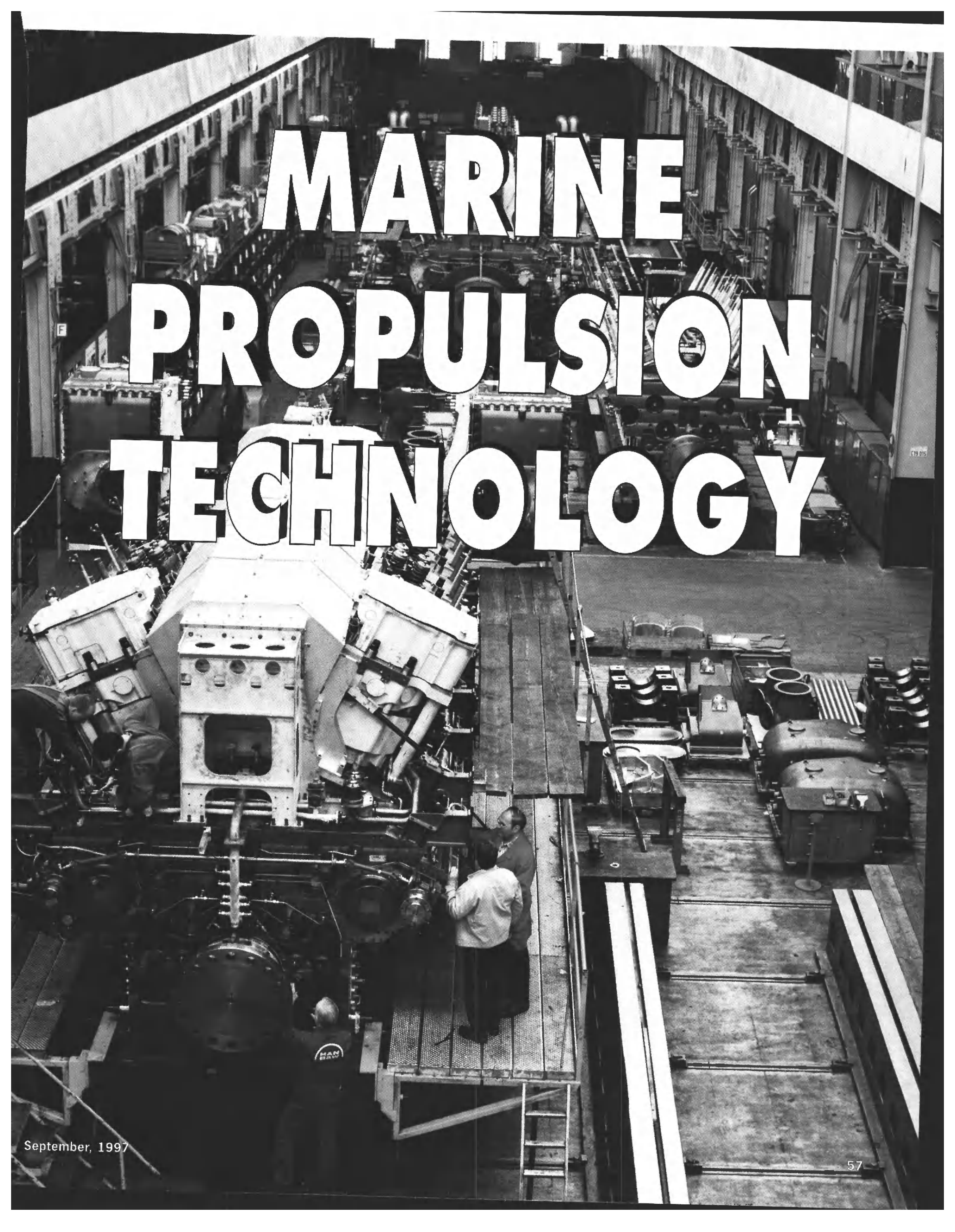
For more information on
Stratos Mobile Networks
Circle 57 on Reader Service Card

Blue Star Chooses RTE/Lyngsø Systems

Blue Star Line has chosen the CMS 2100/GRASP reefer monitoring system from Refrigerated Transport Electronics, Inc. (RTE) and Lyngsø Marine for installation onboard its entire fleet. Simultaneously, Blue Star will retrofit more than 1,000 reefer containers with RTE narrow band reefer monitoring units (RMUs).

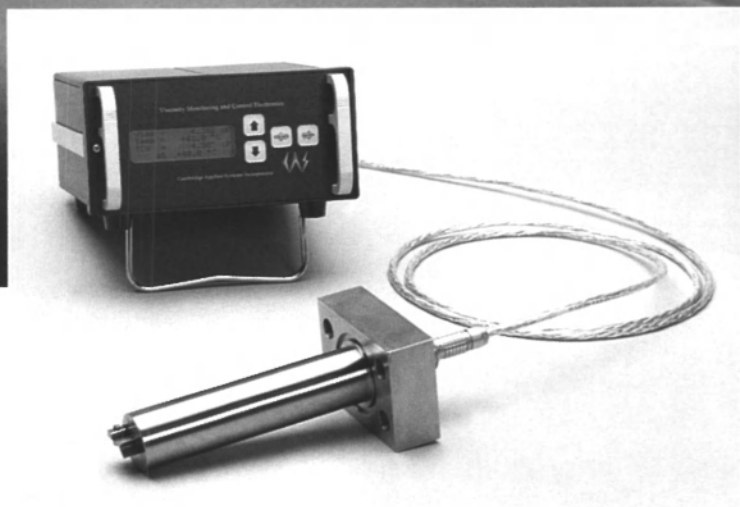
For more information on Blue Star Line
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SNAME Preview continued on page 95



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In This Section

On The Cover: The assembly of V-type, medium-speed engines at MAN B+W Diesel's Augsburg factory.

FEATURES

63 DIESEL POWER

Technical Editor David Tinsley delivers insight on the latest developments driving the diesel engine market.

66 STANDING WATCH

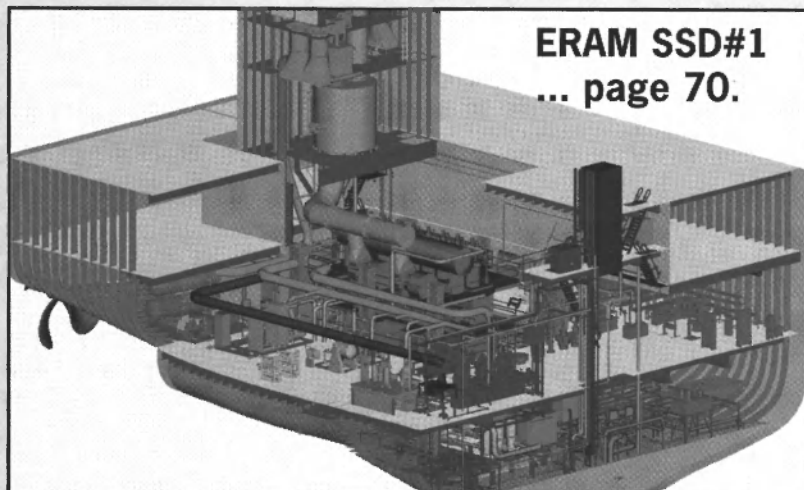
As workloads onboard increase, propulsion system surveillance has been increasingly left in the capable "hands" of sophisticated monitoring systems.

68 WITH THE GREATEST OF EASE

Propelling a vessel through the water entails far more than the traditional shaft and propeller arrangement.



Kvaerner Masa-Yards has fitted its Azipod propulsion units on Carnival Cruise Line's *Elation* ... page 68.



ERAM SSD#1
... page 70.

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ERAM: A REVOLUTIONARY APPROACH TO ENGINE ROOM DESIGN

Costs associated with the engine room aboard any vessel accounts for a large portion of a shipbuilding contract. To help streamline this crucial area in terms of cost and enhance it in terms of efficiency, an international group of top tier naval architects and marine engineers has been assembled at the U.S. Navy's David Taylor Model Basin to complete a joint industry/Navy engine room arrangement modeling project. This article is the first in a four-part series detailing the group's progress to date.

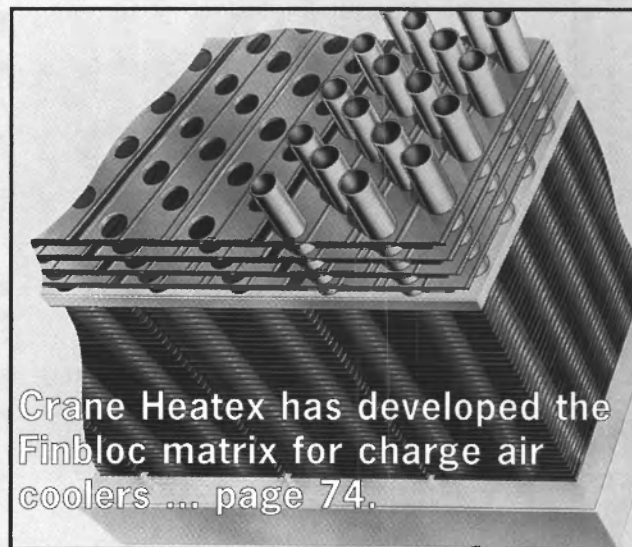
74 GIVING CHARGE AIR COOLERS INNER STRENGTH

Crane Heatex strives to fulfill the increasing demand for charge air coolers tough enough to withstand the harsh marine environment.

78 BUNKER FUEL MONITOR

80 PRODUCT PROFILE:

Cambridge Applied Systems viscometers



Crane Heatex has developed the Finbloc matrix for charge air coolers ... page 74.

Test Results: MAN B&W L 16/24

*Next in series — for main propulsion,
electrical generation — set for testing*

MAN B&W Diesel's L 16/24 was launched to fill the need of auxiliary diesel engines in the 100 to 340 kW per cylinder output range. The engine was designed to provide ease of maintenance, compliance with current and future

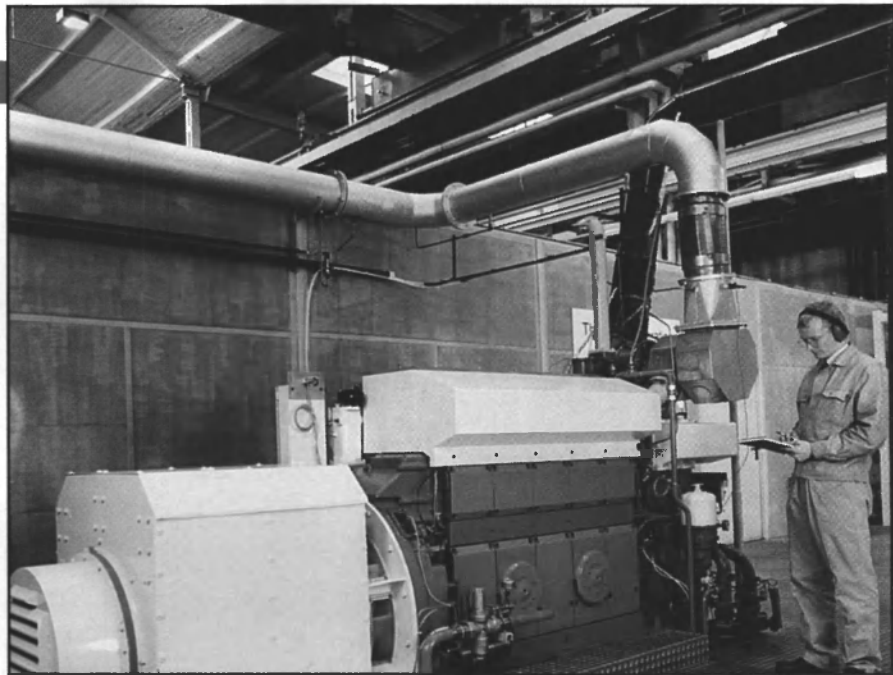
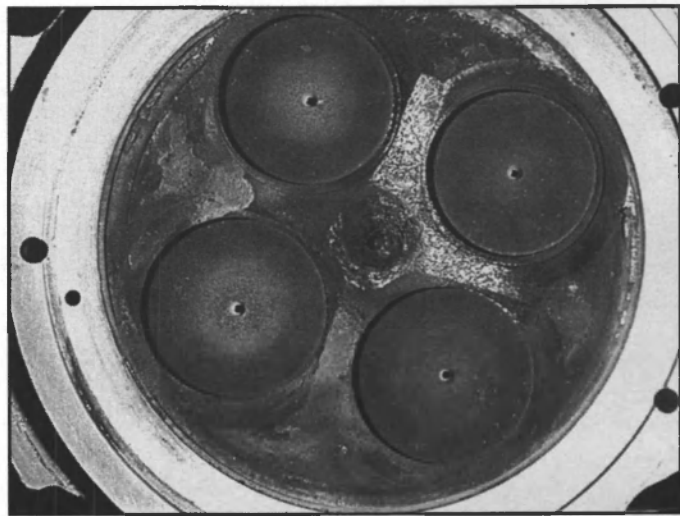
environmental demands in regards to emission levels, and provide unrestricted heavy fuel oil suitability.

The first engine of the series was started in 1994 — an engine with a 160 mm bore and a 240 mm stroke — and was designed for operation at 1,200 rpm.

One key to the diesel engine's acceptance and incorporation by the worldwide maritime market is its design for the combustion of the poorest quality fuel. The manufacturer also says that it is the smallest genuine heavy-fuel oil diesel engine on the market.

Essential to the engine's success is a high-efficiency turbocharger, which delivers more air and thus keeps temperatures within feasible limits. Tests at the company's Augsburg facility reportedly

The 5L 16/24 test engine cylinder head, after 1,000 hours of endurance testing fueled by HFO 700 cSt.



confirmed the manufacturer's design parameters.

Two five-cylinder engines were installed on the test bed, one for extended endurance runs and the other for measurements of all relevant data.

Both engines were operated only on heavy fuel oil of 700 cSt. The new test beds in Augsburg allow on-line measurement of all data.

The temperature at the cylinder liner in the area of top dead center (TDC) of the first piston ring has been set at 170 degrees C by optimizing cooling.

This is to ensure that corrosion is avoided in the cases of fuels containing sulfur.

Endurance test runs more than 1,000 hours were conducted at various load conditions. MAN B&W reports that it was possible to achieve very good results both during the course of the low-load tests and during the course of the alternative loading.

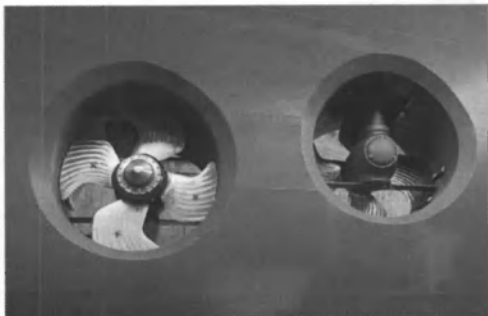
The newly developed MAN B&W turbocharger (NR 14/S) — developed specifically for auxiliary engine operation — achieved particularly good results, with copious air supply thanks to its high efficiency. Five-cylinder engines are equipped with a smaller turbocharger (NR 12/S) as a standard feature.

Test Results

The specific fuel oil consumption at full load is 193 g/kWh, including the oil and cooling water pumps integrated in the flange-mounted frame. The charge air pressure ranges at 3.2 bar, and the maximum ignition pressure is 180 bar. For generator sets, design is optimized for operation in the load range from 50 to 85 percent. The engine complies with the future emission limits stipulated by the IMO.

Excellent emission results are due, in large part, to a series of measurements of optimizing combustion by adapting the rate of injection, and the combustion

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MARINE PROPULSION TECHNOLOGY

chamber geometry in conjunction with the flexibility of the twin capshaft concept.

The specific lube oil consumption was set to .6 g/kWh and achieved, using a normal, medium-alkaline SAE 30 or 40 class of oil. The low oil consumption is a cornerstone of the simplicity of main-

tenance designed into the L16/24, as it helps avoid expensive oil changes.

To date, orders for more than 70 of the engines have been received. Following the successful introduction of the 16/24, the next, larger model of the family is scheduled to go on testbed trials soon.

The new engine will be available with a 270 mm bore and a 380 mm stroke, with a power output of 300 to 340 kW per cylinder, for use for both ship's propulsion and for electrical power generation.

**For free information on the engine series
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Thrustmaster Offers New Brochure

A new eight-page brochure from Thrustmaster describes its line of Portable Dynamic Positioning Systems.

Thrustmaster's portable DP systems allow instant conversion of a dumb barge or a conventional OSV into a dynamic positioned work vessel.

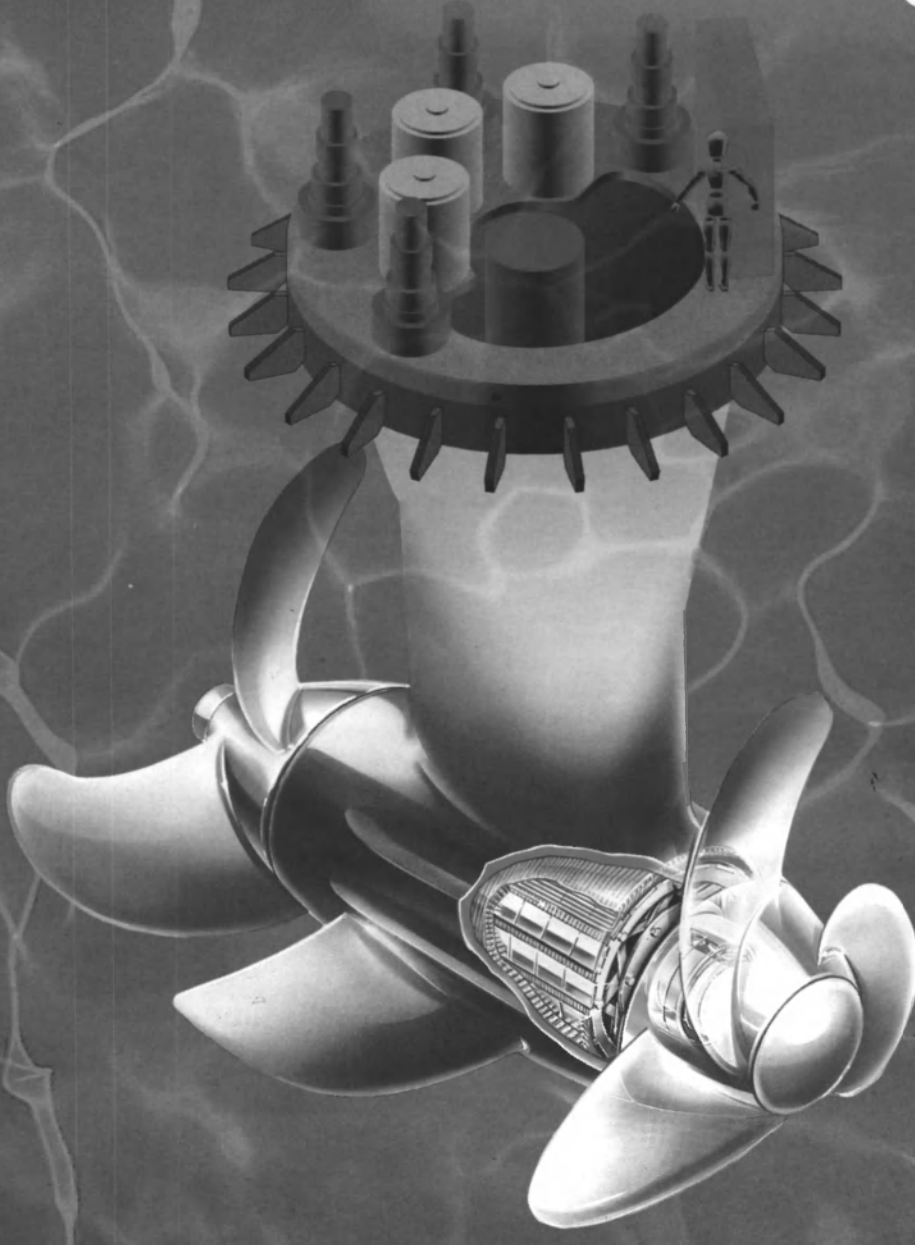
The whole system can be installed or removed in a few days, without the need for vessel modifications or drydocking.

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*The Siemens-SCHOTTEL-Propulsor is a joint development between Siemens AG, Marine Engineering and SCHOTTEL-Werft Josef Becker GmbH & Co. KG.

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DIESEL POWER

by David Tinsley, technical editor

The quickened pace of consolidation in the heavy engineering industry on one hand reflects aspirations towards business growth through acquisition of complementary or rival enterprises. On the other hand, it is a factor of the enormous costs associated with product research and development (R&D) and investments in manufacturing technology, set against persisting weak engine prices, particularly in the shipbuilding domain.

Unremitting pressure to trim unit manufacturing costs, and to maintain a vibrant product development and refinement program with ever-shorter lead times, imposes considerable structural and strategic demands on the industry. The new scale and organizational efficiency of certain players, achieved either organically or through collaboration or takeover, would suggest that smaller firms will be increasingly hard-pressed from a competitive standpoint. The process of rationalization and industrial restructuring has some way to go yet.

There will always be fear that the emergence of fewer, larger players will limit product and service choice available to the client, ultimately impelling prices upwards. However, evidence to date suggests that the creation of powerful new groupings will more efficiently safeguard the process of technological development, to the ultimate economic and competitive benefit of buyers and users.

In addition, there is little prospect of sustained, solid improvement in the shipbuilding capacity supply/demand scenario of an order that will allow the price of bought-in equipment to rise substantially, all the time that there are competing suppliers. Only a combination of the kind proposed some years ago between Europe's two leading marques could materially affect this situation. The latter move, it will be recalled, was rejected by the anti-cartel authorities.

Moreover, the continuing devel-

opment of engine building capacity in the Orient, particularly South Korea, will keep prices keen.

Growth in the global power generation market continues to have a fundamental bearing on workloads and on product development strategy. Although a resurgence in shipbuilding activity has buoyed diesel engine factory output generally, the longer term demand prognosis is more positive in the power sector.

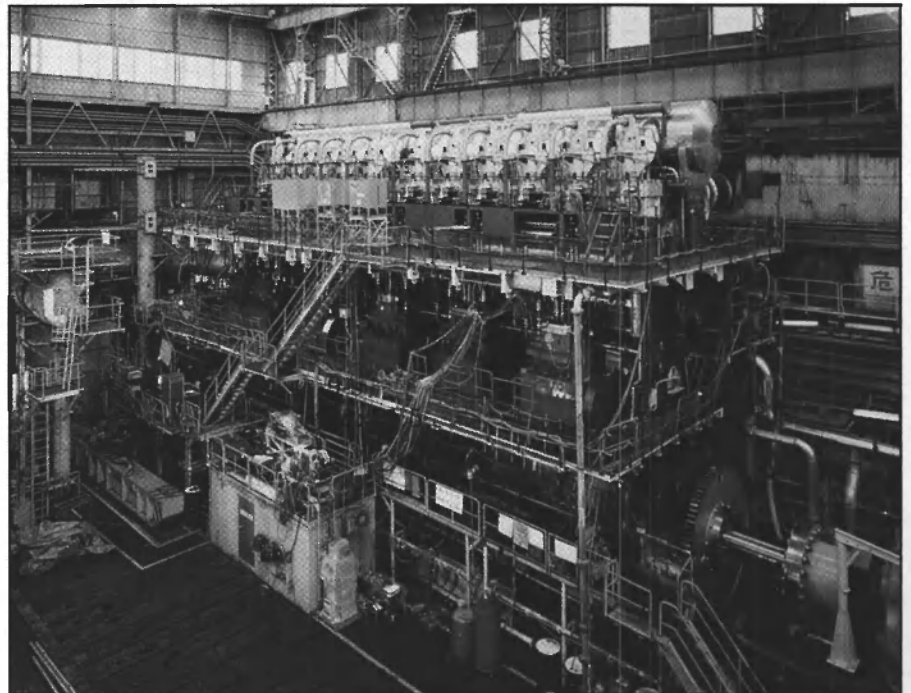
Engine designers do not underestimate the impact of environmental issues. IMO exhaust emission limits, proposed for new machinery from 2000 onwards, have occupied the minds of engine makers to constructive and positive effect. But the real test will be increasingly stringent local, regional and national requirements.

Proponents of a new generation of gas turbines better suited to commercial marine requirements may yet have their day, while electric propulsion systems can be expected to gain ground on performance, flexibility and environmental merits.

The emergence of the powerful new European force, Wartsila NSD Corporation, provides the market with a second full-line organization, like MAN B&W, offering a product range covering the gamut of propulsion, marine auxiliary and stationary power plant needs.

One of the first elements of the manufacturing strategy laid down since the melding of Metra's Wärtsilä Diesel division with the Fincantieri-owned New Sulzer Diesel and Diesel Ricerche, has been the decision to concentrate output of the world's most powerful medium-speed engine — the emerging Wartsilä 64 — in Italy. Offering an output of 2,010 kW (2,734 bhp) per cylinder at 333.3 rpm, commercial production has been assigned to Fincantieri's Grandi Motori Trieste (GMT), in which Wartsila NSD has an initial 40 percent stake.

The move is in keeping with the Wartsila philosophy of optimizing



Pictured above is the Sulzer 11RTA96C, touted as the most powerful engine delivered to date, on a test bed at Diesel United's Aiol works in Japan.

A Paxman 12VP185 high-speed engine is shown below, under assembly at the Colchester plant in the U.K.



MARINE PROPULSION TECHNOLOGY

the economics of engine manufacture by having each factory specialize in one or two product lines. Thus, major investments in engine block manufacturing and heavy assembly for the increasingly popular Wartsila 46 are underway at the Turku plant in southwestern Finland. The facilities are being

extended to cater to an expected doubling of bhp demand over the second half of this decade.

One of the most significant developments this year has been the entry into service of the first of the new 320-mm bore engines from the Finnish stable. Although the Vasa 32, one of the most successful

medium-speed types ever launched, remains in considerable demand after 20 years of continuous refinement, the new Wartsila 32 brings a 12 percent higher power yield per cylinder, and a margin for long-term development no longer available to the Vasa 32. Delivering 625 bhp per cylinder

at 750 rpm, the new type has an extended stroke of 400 mm compared with the earlier engine's 350 mm, and offers unit powers up to 11,260 bhp. Manufacture will be the province of the company's Vaasa works, where a dedicated production unit has also been phased into operation this year for the smaller, medium-speed Wartsila 20.

Vaasa will also feed engine parts for the Wartsila 20, and later for the Wartsila 32, to a new assembly facility being set up at Innoshima under the aegis of the group's recently forged alliance with Hitachi Zosen. Entailing an investment of FMk 4.6 million (Yen 100 million) from the European side, the new entity known as Wartsila Diesel Japan Company will aim to strengthen the Wartsila NSD medium-speed presence in the Japanese shipbuilding and power plant markets.

Meanwhile, Hitachi Zosen's two-stroke engine building activities, mainly involving the MAN B&W marque at present, are to be transferred this year from Sakurajima to a new machinery plant at Ariake.

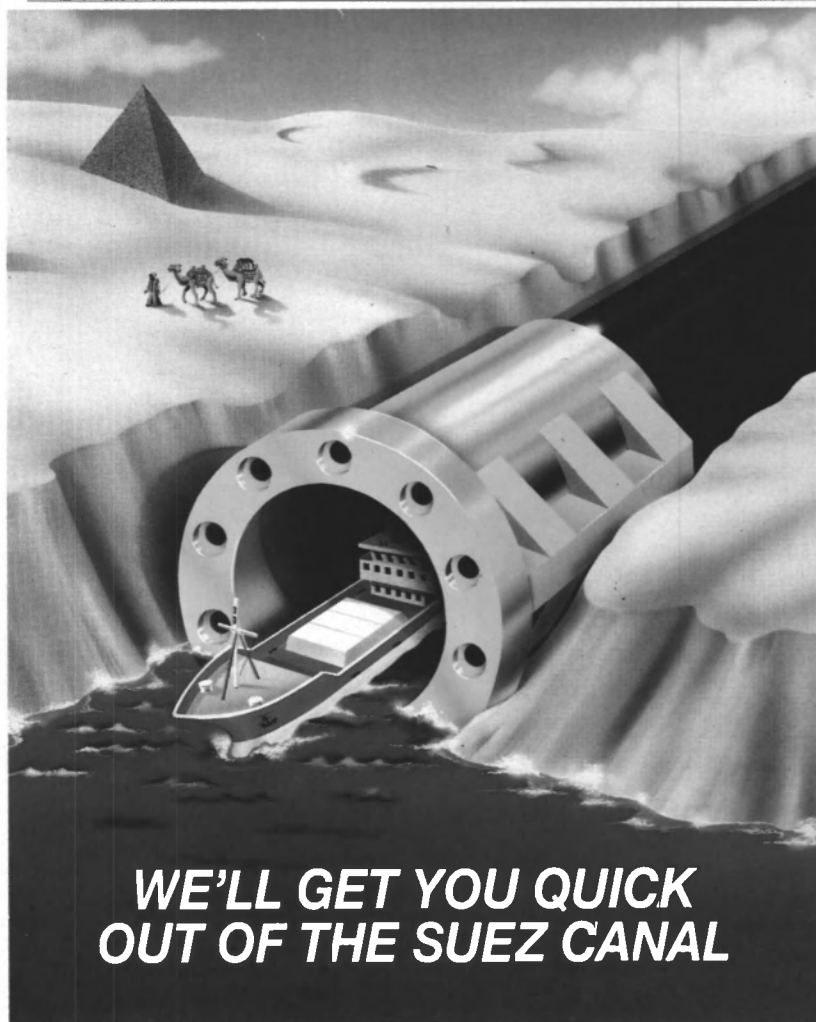
Cummins link

Selective cooperation and alliances form a central part of the business strategy of U.S.-owned Cummins, a leading manufacturer of engines over 200 bhp, which has achieved a dramatic growth in commercial marine sales of the uprated K/KV series in the past two years.

The joint venture with Wartsila NSD has spawned two new engine families which have taken Cummins from its 2,000-bhp top end to 6,000 bhp while strengthening the Wartsila name in the high-speed category.

The Cummins-designated QSV, otherwise known as the Wartsila 200, became available in limited quantities in 1996 for power generation customers and propulsion applications. Under the auspices of Cummins Wartsila Engine Company (CWEC), production of the vee engine series is gathering momentum at Wartsila's Mulhouse plant in France.

In addition, the QSW, or Wartsila 170, is being introduced this year in both diesel and gas versions from a dedicated CWEC manufacturing unit, scheduled to be completed this fall, within Cummins' Daventry factory in the English Midlands. Embracing



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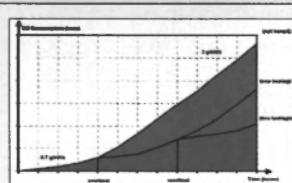
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both in-line and vee layouts, maximum power rating currently offered by the design is 3,200 bhp.

The Daventry plant continues to make a key contribution to the development of Cummins' Quantum system of compact machinery for the marine as well as industrial and stationary power markets. This is expressed in two prospective additions to the range, the QSK45 and QSK60 types, which are due to be introduced in 1998. While the existing K38/K50 models span the 800 to 1,800-bhp band, the new designs will cater to applications between 1,200 and 2,600-bhp unit output.

Sulzer population

The assimilation of New Sulzer Diesel into Wartsila NSD has added a two-stroke dimension to the Finnish-owned group, bringing with it an approximate 35 percent share of the newbuilding, low-speed propulsion market and the long-term business scope signified by the near 2,000 RTA engines ordered to date.

Since its introduction in 1981, the RTA series has been continually updated to meet market needs and to reflect advances in technology.

The current installation of super wide-bore, 960-mm RTA96C diesels in post-Panamax container ships and the recent introduction of more compact versions of the RTA-U series for tankers, bulkers, boxships and other vessels testifies to the market-led product development policy. This year's surge of orders for the RTA84T type, unveiled in 1991 as an optimized unit for VLCCs, again vindicates the forward-looking design approach.

By the end of April 1997, references for the RTA range, encompassing 10 bore sizes from 380 to 960 mm, and a power spectrum from 2,000 to nearly 90,000 bhp, had passed 39 million bhp. Marine propulsion installations reportedly account for more than 38 million bhp.

Booked for eight post-Panamax linehaul newbuildings to date, and conceived for vessels as large as the 8,000-TEU designs now under discussion, the Sulzer RTA96C accommodates speeds of up to 24 to 25 knots at the top end of the capacity band, through an output of 7,470 bhp per cylinder. It incorporates service experience with the RTA84C, the market leader in the large boxship sector with ref-

erences totaling 8 million bhp.

An enhancement to the range this year has been the introduction of shorter, lighter versions of the RTA2U series, aimed at reducing non-earning space in a ship's hull and cutting engine manufacturing costs as well as easing installation at the shipbuilding stage. The

long-legged U-types offer a stroke-to-bore ratio of about 3.5, exceeded in the Sulzer stable only by the 4.0 of the T models.

While Wartsila's preeminent market position in the medium-speed category and the acknowledged need to rationalize combined resources has major implications

for the Sulzer four-stroke family, new business has boosted the sales tally for the Swiss-developed ZA40S to 4 million bhp.

Twin 16-cylinder plants, for 32,640 bhp of propulsive energy, in each of Norasia's five 1,400-TEU container ship newbuildings at

(Continued on page 81)

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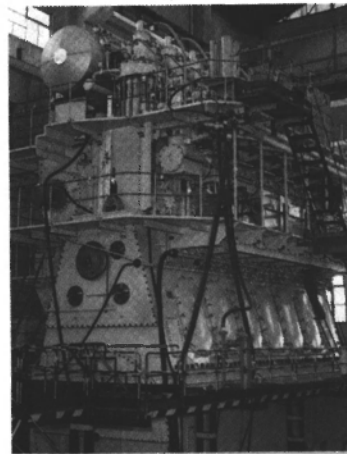
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Modern Prop Equipment Keeps Pace With New Technology

by Rodney Lanz, contributing writer

A combination of increasingly complex ships and dwindling crew numbers has increased the workload for ships' staffs. For this reason the monitoring and control of main and auxiliary machinery systems has now largely been taken over by sophisticated systems that undertake continuous surveillance of shipboard power generation.

The introduction of the ubiquitous microchip and digital technology has aided the development of very reliable and versatile shipboard monitoring systems, particularly those covering the monitoring and control of prime movers and auxiliary power generation systems.

Among the latest and well tried systems on the market is Litton Industries' Decca Isis 250.

The microprocessor-controlled system comprises a series of standard type-approved units and modules that can be configured to meet a wide range of control and monitoring duties. In the system, up to 96 channels of data can be collected by local scanning units (LSU) or scanning and control units (LSCU) which are connected to loop processors (DCU) via RS485 serial communication loops. These in turn are connected to the main processor unit located in the engine room, from which up to eight remote workstations can be net-

worked.

In addition to the workstations, a multi-purpose alarm system which incorporates an annunciator to give the duty engineer brief detail of the alarm alert is provided. Once the alarm has been accepted, all the alarm units remain on with a steady light, which is only extinguished when the alarm is accepted in the engine control room.

Autronica of Norway is using a PC-based monitoring system in its KD10-W unit. Operating through MS Windows, the system can be linked to up to 500 sensors via twenty input boards.

The central processor, known as "basic central" compares signals from these sensors with pre-set alarm limits, which then transmits group messages to the vessel's bridge and other selected alarm annunciators. Alarms are acknowledged using a local keyboard with information presented in various forms on the operator's VDU.

In addition to general alarm monitoring, bearing and exhaust temperatures are shown as bar graphs with deviation and alarm status also in bar graph form for instant comparison.

STN Atlas Elektronik of Germany has introduced a new version of its Geamot and Geamar integrated control and monitoring systems. The newly developed Geamot 40M is based on a new range of control modules which

have been specifically designed to work with main engines. The functions include stopping and starting main engines and a smooth running up procedure; avoidance of critical speeds; speed maintenance function with shaft generator operation; automatic reduction of power in a heavy sea-way and three different operating modes for harbor, sea and emergency; and full interfacing to ship's alarm system.

Based on a MS Windows presentation, the Geamar 200 ISL allows for full integration of the machinery monitoring and control system with an integrated navigation system on a ship's bridge. According to STN Atlas, in this latest version the monitoring and control functions of the system have not been changed, while the user interface has been updated using the latest technology.

U.K.-based Vosper Thornycroft is continuing to market its Vicam engine monitoring and control system that has been developed over a number of years in the defense market. The system allows for the monitoring and control of both analog and digital sensors, detection and annunciation of alarms, information display in full color graphics as well as logging, trend analysis and diagnostics.

The system has been fitted into a new fast ferry built at the U.S.' Pequot River Shipyard in Connecticut. The system will monitor and control about 400 points within the craft's machinery, including electrical power generation and distribution, and fuel, ventilation, water and bilge systems. The information is relayed to the central display workstation (CDW) on the bridge, and shown using high-resolution graphics.

High-speed craft have also been targeted by Servowatch Systems of the U.K.

Orders announced this year have included systems to be installed on four new FBM Tricats to be built in the Philippines by FBM Aboitiz.

The systems will be used to monitor and provide integrated control of the main engines and electrical systems.

In addition, Servowatch systems are available for Caterpillar 3500B series engines, utilizing the ECM/CCM protocol. Caterpillar has announced it is planning to introduce, during the third quarter of this year, the capability to monitor three propulsion sets or eight generators using one CCM module. These will allow the Caterpillar Gateway system to monitor the engines and transfer the data to the Servowatch Winmon/Mondis systems.

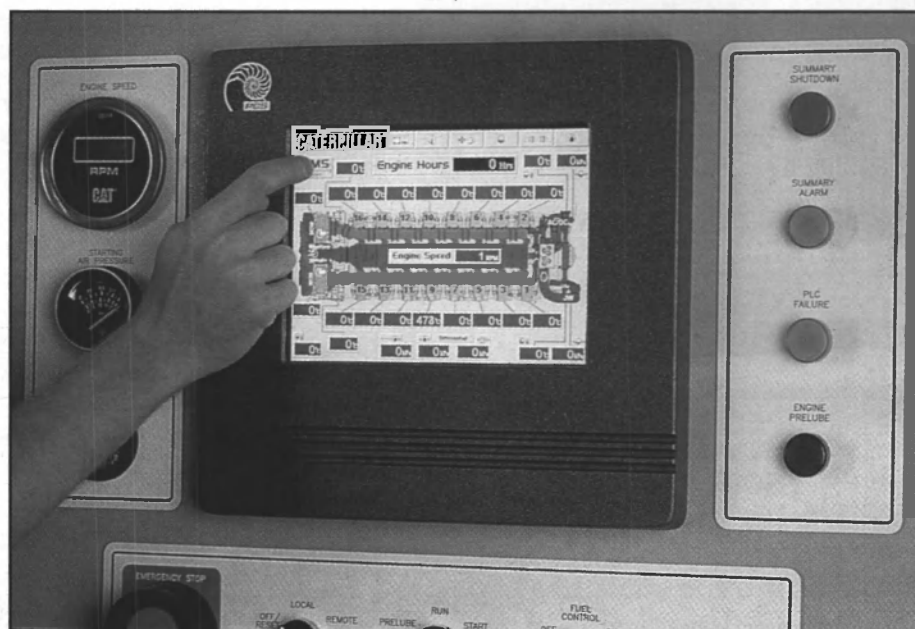
In Germany, MTU's latest engine monitoring system — MCS-5 — includes a range of standard modules for the monitoring and control of main and auxiliary plant. The modularization of the system means that it has few basic components, which simplifies the maintenance problem, reduces spare parts stock requirements and substantially reduces the training element.

The system uses a data bus arrangement with local data acquisition and actuator control. There are serial links to other devices and process data transmission to remote control stations and operating levels. The remote operating stations are located in the engine control room and on the bridge, with alarm annunciators located throughout the accommodation.

The main components in Japan's Kawasaki Heavy Industries' machinery surveillance and control system comprise an engine monitoring unit which is fed by sensor inputs, and linked to a data communications and collection computer, and operator keyboard.

Machinery trends and analyses are monitored and displayed on the system and compared with trial data.

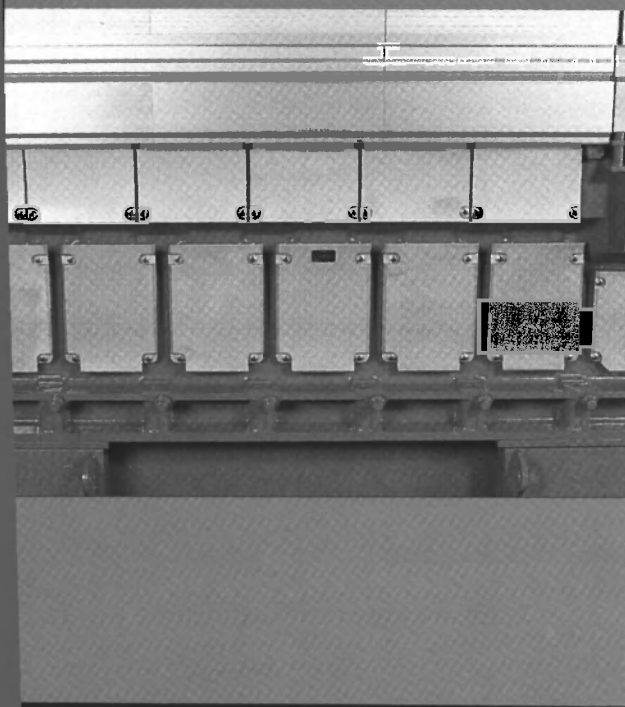
The system includes the KIS II (Kawasaki Inference System), which is used for diagnostics. A set of simple questions reportedly allows the operator to conduct an accurate assessment of the engine's state.



Pictured is Caterpillar's new electronic remote monitoring and control system for 3600 marine propulsion engines.



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Formed by the merger of Wärtsilä Diesel and New Sulzer Diesel.

More Than Just A Propeller ...

Modern methods of propulsion offer ship operators a wide variety of efficient systems to move a vessel through the water. High levels of maneuverability and enhanced propeller geometry allow higher speeds to be achieved at the same fuel consumption, while side thrusters eliminate tug requirements when berthing — helping to reduce port costs and enhancing turnaround times.

The first of two new double-ended train and car ferries for DSB Rederi, the Danish state railways ferry operator, entered service between Rodby, Denmark and Puttgarden, Germany, in June. Built at Christian Ørskov Shipyard in Frederikshavn, Denmark, the two ships are operated on behalf of the owner by Scandlines. The second vessel is due to enter service this month.

The ships are powered by four Kamewa/Aquamaster main propulsion units, powered by ABB Sami Megastar pulse width modulated (PWM) propulsion drives. The Contaz propulsors use new-generation azimuthing, contra-rotating thruster propeller technology that has been developed to provide low noise and vibration levels.

Each of the double-bow vessels has two 3,000-kW propulsors at each end, giving the ferries a normal service speed of 16.5 knots with a maximum of 18.5 knots, and allowing the vessels to operate in all weather conditions.

Using this system, it has been possible to provide a bulbous bow and streamlined body which, reportedly, provides higher efficiency and speed compared to traditional propulsion systems. Two similar vessels using Contaz propulsors are currently building at van der Giessen de Noord in the Netherlands for German owner DFO.

Kamewa, Aquamaster's parent company, has supplied S112 waterjets to the SuperSeaCat class of high-speed monohulls, the first of which has been delivered by Fincantieri to its operator, Bermuda-based Sea Containers. Entering service on the route from

Dover, England, to Calais, France, four Ruston 20RK270 engines, each rated at 6,875 kW are used to drive the four waterjets, giving the craft a fully laden service speed of 37.8 knots.

Ulstein Propeller of Norway is currently supplying thirteen model 250TV tunnel thrusters for a series of 2,500-TEU containerships building at Flender Werft and MTW in Germany for domestic owners.

Each of the thrusters is fitted with a 1.9-m diameter CP propeller with an output of 1,100 kW. The units are powered by an AC electric motor and Ulstein is also supplying the remote controls for the thrusters.

The contract for the thrusters includes an option for seven additional units.

In the Netherlands, Lips BV continues to supply a wide range of propulsion systems, including thrusters and waterjets — the latter for high-speed craft. Waterjets are used when a vessel's speed requirement exceeds that which can be generated by a propeller driven system.

In general, waterjets have a very high propulsive efficiency over a wide speed range, and without underwater protuberances, can operate in shallow waters. It allows reduced hull drag with good acceleration and crash-stop performance.

The system also allows for considerable weight reduction onboard — a pre-requisite for high-speed craft — as gearing in direct drive installations and shaft lines are not required.

A number of Lips waterjets have been supplied to Incat, an Australia-based fast ferry builder, for craft including Stena Line's Lynx fleet. Powered by Ruston 16RK270 series diesel engines, the LJ135D waterjets allow speeds in excess of 40 knots to be achieved.

Among thruster installations, three Lips steerable thrusters with 3.2-m diameter FP propellers — each driven by a 3,500-kW electric motor — were fitted to an FPSO delivered earlier this year to Rasmussen Management AS of

Norway by Mitsui Engineering of Japan.

The thrusters will be used for propulsion and for positioning the vessel when on station.

Schottel Werft of Germany has developed the twin propeller (STP) which seeks to significantly reduce efficiency loss due to vortices around the propeller. In trials, the system reportedly provided an efficiency increase of approximately 12 percent, with the use of tip-vortex-vane (TVV) propellers and hub-vortex-vane (HVV) propellers, over the more conventional rudder propellers.

The STP is a 360-degree steerable propulsion unit which has two similarly-sized propellers, both mounted on a single shaft and rotate in the same direction. Both propellers are driven via a bevel gear system through the underwater gearbox arrangement.

The forward unit operates as a pulling propeller and attains a very high efficiency level.

The water flow from this is deflected by two guide fins and the housing stem so that as it passes the second and pushing propeller, it is free from the swirling motion created by the first unit. This "clean" water also allows the second propeller to work at a high efficiency level at low loadings.

Since the introduction of the Azipod in 1990 by Kvaerner Masa-Yards (KMY) and ABB Marine of Finland, podded drives have cap-

tured the interest of two other consortia.

In Germany, Siemens and Schottel Werft have developed their version of the concept, the Siemens-Schottel Propulsor (SSP). In France, Cegelec has teamed with Kamewa of Sweden and Delta Marine of Finland to develop the Kamewa-Cegelec Pod (KCP).

Podded drives are complete propulsion and steering units suspended below the ship, in place of conventional rudders or propellers. The pod contains an electric motor, the drive end of which is attached to an FP propeller.

Power and data transmission to the motor is delivered from the vessel's alternators via electric cables and a slip ring unit. The slip ring unit allows 360-degree rotation of the pod for steering purposes.

KMY's Azipod systems are presently fitted to a waterways vessel, a river icebreaker and two icebreaking tankers.

Two 14-MW units have been fitted to Carnival Cruise Line's 70,400-gt *Elation*, with two similar units to be installed on *Paradise*.

The podded drive system gives naval architects greater freedom in designing hull form, as well as eliminates weight and space as no steering gear, reduction gearing or shaftlines are required. It is suitable for most types of vessels and offshore installations, particularly in the dynamic positioning mode.



Pictured are Kvaerner Masa-Yards Azipod propulsion units, as fitted on Carnival Cruise Line's *Elation*.

New Sales/Service Manager At Uniservice Americas

Uniservice Americas LLC, which manufactures a complete line of water-treatment, fuel additives, maintenance, tank cleaning and environmental chemical products for the marine industry, has recently employed Mr. **Stelios Serdenes** as a sales/service manager for Southeast Florida.

Mr. **Serdenes** received a degree in marketing from the University of Maryland, Baltimore County (UMBC) in 1977 and furthered his education in diesel engines at Kings Point Maritime Academy and the Calhoun school of engineering in Baltimore.

For more information on Uniservice Americas LLC
Circle 90 on Reader Service Card

MSHS Appointed As A Service Facility

Motor-Services Hugo Stamp, Inc. (MSHS), has been appointed as a service facility for Boll Filter Corporation and offers trained service engineers for field service on Boll & Kirch filter systems. MSHS also maintains an inventory of replacement filters and service-related parts to perform routine maintenance.

The MSHS computerized parts department provides maritime-related procurements for European manufacturers in addition to a stock of Deutz/MWM, MaK and MAN B&W exchange components.

In addition, MSHS was also appointed as a service facility for Hatlapa Compressors and Deck Equipment with parts procurement and customer support. MSHS also supplies factory-trained technicians, direct parts supply, and diagnostic equipment such as the Marlin 3000 MK-5 diesel engine analyzer and rotation laser alignment.

For more information on MSHS
Circle 92 on Reader Service Card

SpecTec Awarded Contract To Supply And Install AMOS Systems

SpecTec, a supplier of computerized solutions for the marine

industry, has been awarded a contract to supply and install its AMOS family of turnkey software systems to all of the vessels owned by Finaval and Marnavi, chemical tanker operators located in Italy. The contract is managed through SpecTec's Italian daughter company, SpecTec Srl.

The \$475,000 contract to supply Finaval's and Marnavi's combined fleet of 14 vessels and 11 newbuilds will encompass the full services of SpecTec in the fields of planned maintenance, spare part control, purchasing and vibration monitoring.

On all newbuildings, SpecTec will

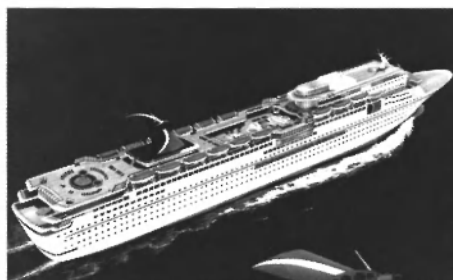
be responsible for the installation of a network, the supply of the load and stability software and database, the supply of the AMOS planned maintenance, spare parts and purchasing software and relevant database and the vibration

(Continued on page 73)

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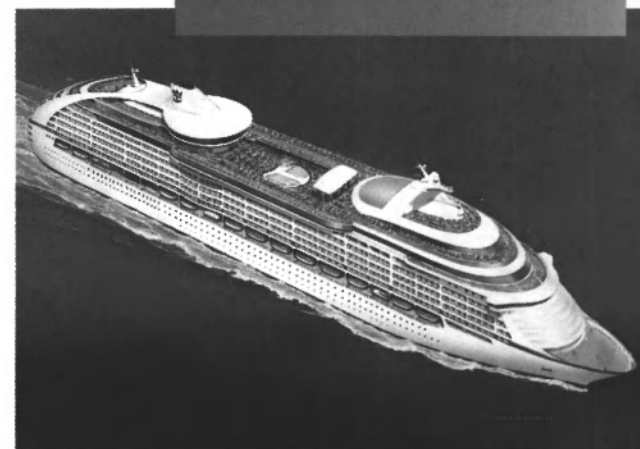
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M/S Elation, M/S Paradise
Carnival Cruise Lines



Azipod propulsion has been selected for recent cruise liner newbuilding projects



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Circle 28 on Reader Service Card

ERAM

A Revolutionary, International Approach To Engine Room Design

This is the first article in a four-part series describing a project executed by the U.S. Navy in partnership with domestic and international designers from shipyards, shipowner/operators and marine equipment vendors. The project involved an Engine Room Arrangement Model (ERAM) study. One medium-speed diesel (MSD) and three low-speed diesel (SSD) engine rooms were designed in the course of two years. Each MR/EN article will focus on one of the four engine room design products; the evolution of applying the IPPD methodology process; and the lessons learned from each stage of the project. Noteworthy product improvements realized during each stage will be highlighted.

With the end of the Cold War, the U.S. Navy was directed to pursue militarily useful and commercially viable ships for sealift.

In November 1993, the Shipbuilding Technology Department of the David Taylor Model Basin (DTMB) was tasked by the Mid-Term Strategic Sealift Technology Development Program (MTSSTDP) with conducting research to improve the efficiency of ships by focusing on the engine room — which accounts for 40 to 45 percent of the initial acquisition cost.

The Producibility Task goals were to develop product (ship) designs that could be built with a

construction schedule reduction of 40 percent (down to 18 months) and acquisition cost reduction of 15 percent (down to \$25 million for the engine room). To meet these aggressive goals, the ERAM project was initiated.

ERAM: Efficiency & Cost Effectiveness By Design

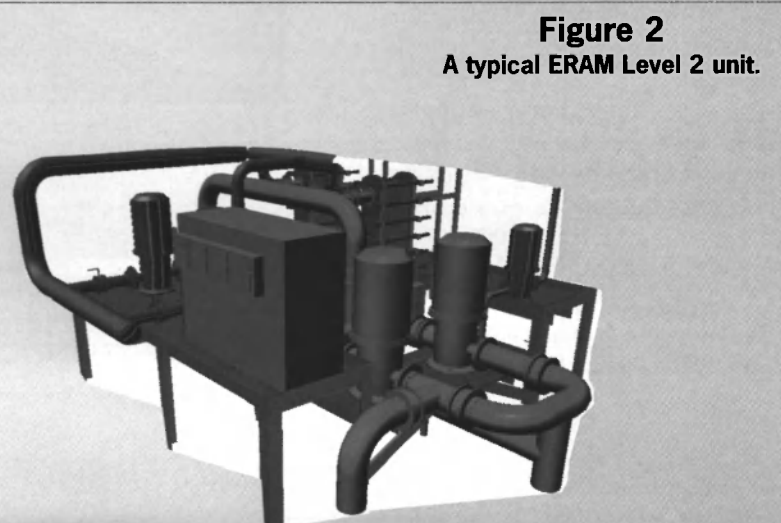
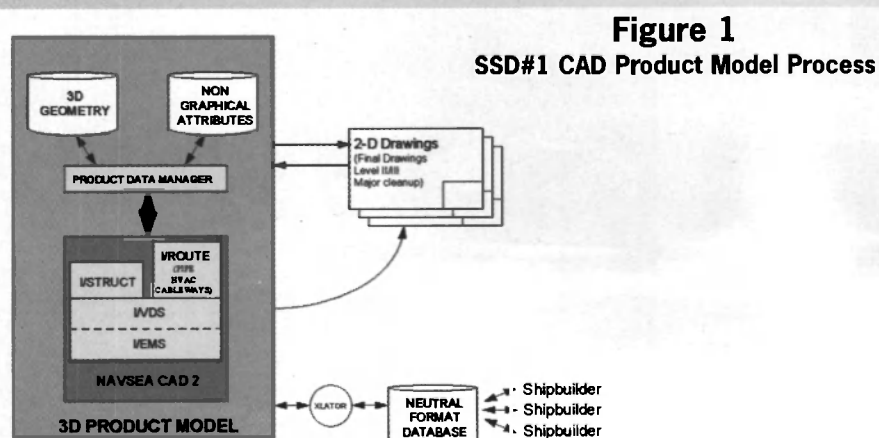
The initial efforts involved the baselining of world class (~30,000 shp) ships as well as their construction yard processes. Also, a shipbuilding industry/MTSSTDP workshop was conducted where the overall goals of the project were defined using Quality Function Deployment (QFD).

These goals were compiled in the ERAM Requirements Document, which would be the guidance document for the project.

A design site was set up at DTMB for 20 engineers and designers, using Intergraph workstations for the 3-D product modeling effort. In addition, a library of vendor-furnished information was assembled, based on lists of likely equipment types utilized in typical 30,000 shp plants. A steering committee was formed, comprised of representatives from U.S. shipyards, Navy sponsors, a design agent, ship owner/operators and a university. The Steering Committee theorized that since

the U.S. shipyards had not built commercially competitive ships in more than a decade, an Integrated Product Team (IPT) should be assembled consisting of both foreign and domestic designers from shipyards, ship operators and marine equipment vendors.

When the ERAM Team was assembled at the DTMB design site in June 1995, all core and resource members were trained in, customized and executed Concurrent Engineering (CE) techniques including: Integrated Product & Process Development (IPPD); QFD; Strategic Design Method (SDM); as well as teaming basics.



MARINE PROPULSION TECHNOLOGY

The Steering Committee modified the ERAM Requirements Document to include the vision and objectives of the project. The vision was to initiate "a customer-focused process that enables the U.S. shipbuilding industry to design and build engine rooms which promote internationally competitive commercial ships." The objectives were:

1. To provide a forum for U.S. shipbuilders to present views and needs for product and process design.

2. Within 12 months, to develop a process using IPPD for industry use, to design engine room arrangements that provide the basis for the design of internationally competitive commercial ships.

3. Within 24 months, to demonstrate the process by designing three (later increased to 4) world-class engine room arrangements.

4. To achieve customer-focus and buy-in of product design.

5. To achieve U.S. shipbuilding industry-focus and buy-in of process design.

6. To establish baseline commercial ship engine room designs as benchmarks for evaluation of future government-initiated change.

7. To document both the product and process design with rationale for use and further refinement by other users.

The first product (SSD#1) was a contract level design using the hull form of a design created by the Maritime Administration (MarAd), known as PD-337. This vessel's characteristics were based on an operating profile of a North/South American trade route that was considered most viable according to one of MarAd's market research studies.

The SSD#1 ERAM (core) team participants are listed in Table 1.

A key element of the project was the full-time on-site CAD designers from D&P, InfoTech and DTMB.

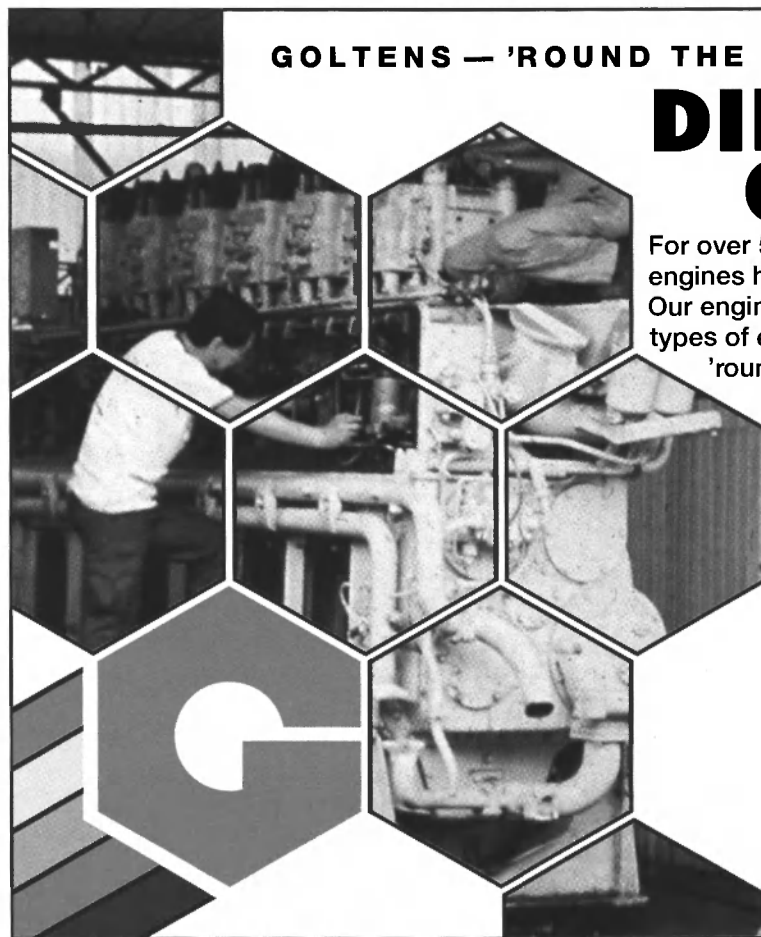
Other resources/expertise utilized on a part-time or rotating basis included: A&T - Vector Research (management consult-

ing); Alfa Laval (fuel treatment); Allweiler (pumps); Boll & Kirch (filters and strainers); Crowley Marine (ship operator); D&P (electrical and structural engineering); Maersk Lines (ship operator); and Tranter (heat exchangers).

The Strategic Design Method (SDM) was utilized to define the

TABLE 1: ERAM Team Participants

Country	Company	Name	Expertise
U.S.	D&P	Richard DeVries	Team Leader
U.S.	DTMB	Ben Kassel	MIS Manager
U.S.	Avondale Shipyard	Watson Perrin, II	Arrangements, HVAC
Brazil	CONSUNAV	Jorge Ribeiro	Arrangements, Piping
U.S.	D&P	Frank Woronkovic	Control Systems
U.S.	Bath Iron Works	Steve Bradbury	Arrangements, Piping
U.S.	NASSCO	Mike Barton	Arrangements, Piping
Denmark	MAN-B&W	Mike Jeppeson	Propulsion
Finland	Wartsila	Seppo Rautava	Arrangements, SSDG
Denmark	Odense	Carsten Sjoberg	Arrangements, Piping



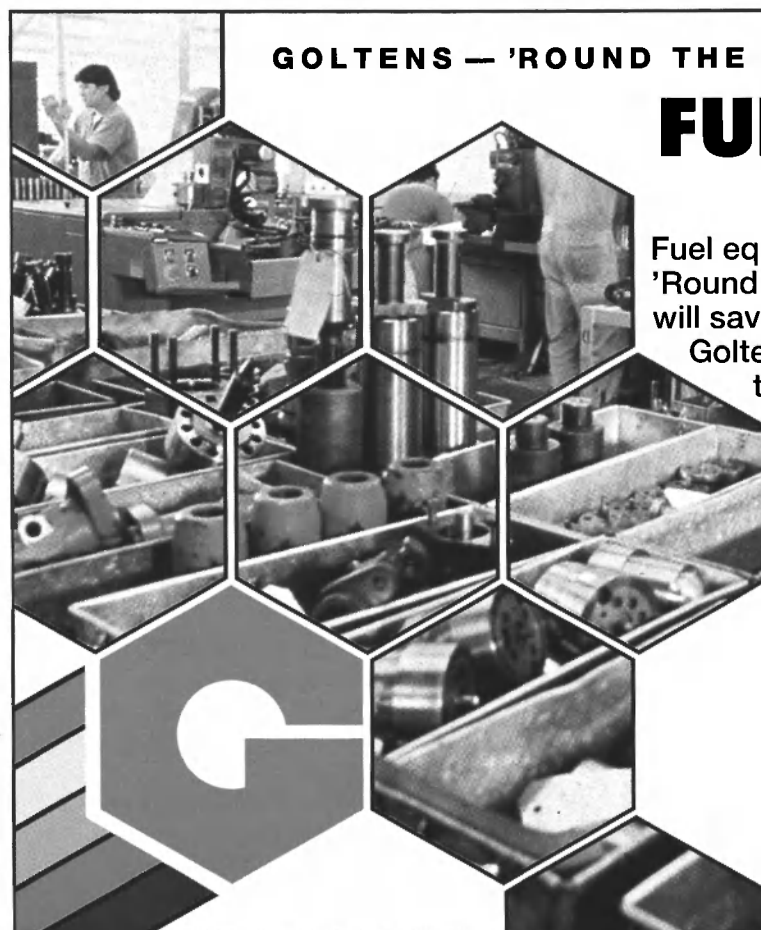
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two outputs of the project: the Team Process and the Engine Room Arrangement Models. The 'Team Process' would evolve during the four engine room designs and be documented at the conclusion of the project as the 'Integrated Product & Process Design User's Guide.'

Product

As with any technological process, the implementation of CAD required cooperation, training, understanding and acceptance.

The prospective users must be willing to modify their paradigms and approach the new technology with an open mind.

There was a huge gap in the way the CAD subteam and the core team wanted to operate. The core team believed that it was "the primary job of the CAD subteam was to prepare drawings," which was contrary to the mission of the CAD subteam, which felt that its primary job was product model development.

The core team was accustomed to the traditional methods of ship design using paper. It was felt that the development of a 3-D product model was a frivolous activity that detracted from the primary task. The result was that the CAD subteam would have to work on the development of drawings as well as the product model.

At this time the CAD team would develop explicit 2-D drawings in order to support the design schedule. Through consensus, it was decided that the CAD subteam could develop 3-D models to support product model development, but the drawings must be created on demand in order to support the

ERAM schedule. As time permitted, the 3-D product model was developed.

In the beginning the core team communicated the engine room arrangements to the CAD team through the use of hand drawn sketches. The intent was to use these sketches to develop the product model, which could be used for various analyses including volumes and interference detection, as well as to generate documentation including drawings. The ideal approach would have been to generate the drawings from the product model.

The CAD team had to develop the drawings, but since the model and drawings could not be developed concurrently the CAD team had to temporarily suspend work on the product model. The CAD subteam was tasked to provide blank templates of deck plans and cutouts of equipment. The 2-D plan view deck arrangement drawings were developed using a hybrid approach of incorporating 3-D geometry where it had already been defined. Equipment, structure and major distributed systems that were not defined were drawn in 2-D. The designers would arrange the cutouts on the plan views, and provide them back to the CAD subteam to revise the drawings.

Three-dimensional product model development continued by locating these revised 2-D drawings in the model and using them as a template to locate 3-D equipment. Two-dimensional output was still required to review the design and to convey information to external participants. These sketches were extracted from the product model, and with a minimal amount of cleanup were useful as a

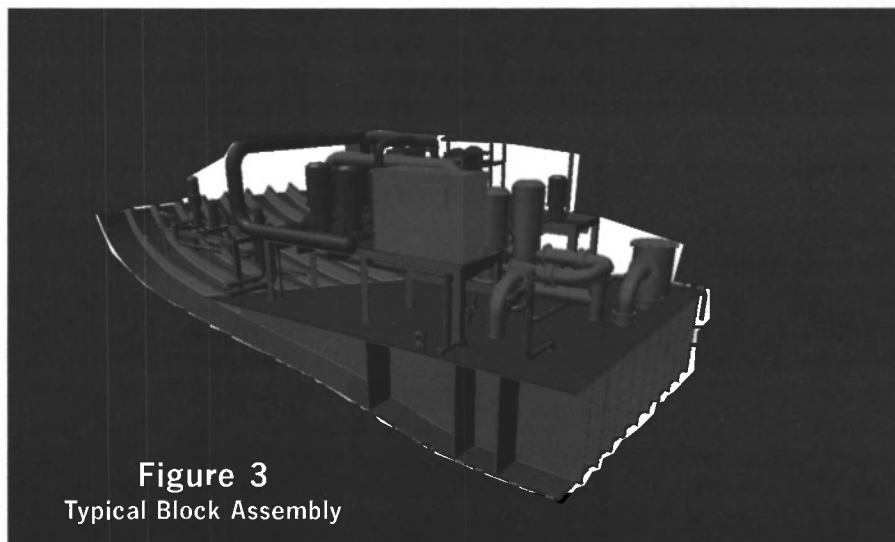


Figure 3
Typical Block Assembly

Power Generation/Distribution and Control and Monitoring	24.5%
Propulsion System	13%
Fuel Oil System	11%
Fresh Water Main and Auxiliary Cooling	8%
Lubricating Oil System	8%
Steam System	7%
Bilge, Ballast and Fire Main System	5%
Exhaust Gas Systems	4%
All Other Systems, Structure and Miscellaneous Outfitting	19.5%

design tool. Marked up drawings were returned to the CAD operators. The product model was updated, and new 2-D drawings were generated. Hard copies of the sketches were provided to the engineers who did not have direct access to the product model. Comments were provided to the CAD operators who updated the product model and regenerated the sketches that were distributed for review. (Figure 1 on page 70 depicts this SSD#1 CAD product model process.)

Concurrently, a 3-D equipment library was also developed. Information was collected from the vendors to create the equipment. Where available, 2-D CAD data was obtained from the vendors and used to generate the equipment models. The library development was a time-consuming, up front process that was essential to the eventual success of the product model.

The product model included 3-D models of all equipment placed in the engine room in relation to the primary structure. Piping larger than 50mm was shown; however, the secondary foundations, ventilation and electrical distribution were not included in the initial product model. Equipment and piping were assembled into Level 2 units to enhance the producibility of the engine room. (Level 2 units are defined as an assembly of equipment, valves and piping mounted on a secondary foundation, all of which are designed to be constructed in a shop. Figure 2, on page 70, is an example of typical ERAM Level 2 unit.) These units were either landed on block or onboard as dictated by the arrangements and block breaks.

As a shipyard average, the distribution of labor costs in the engine room for systems installation was determined as shown in Table 2, above.

Although the above distribution suggests that the emphasis should be placed on the top three systems, for SSD#1 all systems were held in equal importance. The one exception was in the design and placement of the workshop, which was focused on by the ship's chief engineers to reduce life cycle costs. Initially the Steering Committee, with the exception of the commercial operators, was very critical of the time spent in the design of the workshop. As the impact of life cycle costs became more apparent the Steering Committee fully endorsed the effort.

Enhancements to the product model that included all secondary foundations plus attributes for the block breaks on the starboard side were added at a later date. Figure 3 (Bottom left) is a typical block assembly prior to erection. Figure

(Continued on page 84)

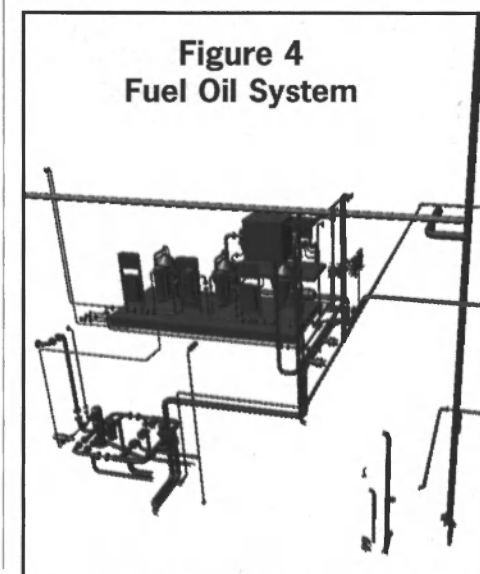


Figure 4
Fuel Oil System

MARINE PROPULSION TECHNOLOGY

(Continued from page 69)

monitoring system for all rotating machinery.

The AMOS software will be linked to the Automation Plant in order to automatically read the run time values, for complete maintenance planning.

For more information on SpecTec
Circle 93 on Reader Service Card

Interlake Steamship Purchases Portable Diesel Engine Analyzers

FCS Inc. has announced that the Interlake Steamship Company has equipped three vessels with the Malin 3000 MK-5, a portable diesel engine analyzer which increases the speed, accuracy and reliability of determining the health of the main and generator diesel engines.

Information gathered on the Malin 3000 can be downloaded onto a desktop PC. A software program produces the drawcard Indicator and derivative and provides timing, engine balance, and trends over time.

The Malin unit is supplied with the new Windows software which enhances the presentation of the data and provides color charts and graphics.

It can also store sets of trial reference engine data which can be recalled and used to compare against current engine data.

For more information on FCS Inc.
Circle 87 on Reader Service Card

Nautronix Awarded Contract By American Oil Field Divers

American Oil Field Diver's has placed an order with Nautronix to supply *American Defender* with positioning and acoustic equipment.

The order consists of an ASK4002 Dual Redundant Dynamic Positioning System, a RS914 Ultrashort Baseline System, and a RS916 Ultrashort and Long Base Line System. *American Defender* is approximately 220-ft. (67.06 m) long and will be performing deepwater ROV and diving operations in the Gulf of Mexico.

The system design for this pro-

ject includes joystick, hold position, hold heading, active wind compensation, ROV follow and low speed track follow operational modes. The ASK4002 system is built to ABS regulatory requirements.

For more information on Nautronix
Circle 89 on Reader Service Card

Digitec

Australia-based Digitec has developed the Dieseltune III system which is a diesel engine performance and condition monitoring system that uses a Windows working environment.

In addition to standard fuel injection and power diagrams, the system has a "Lightspring" display which shows the pressure in the combustion chamber during the combustion cycle.

This allows problems in the system to be quickly identified and remedied.

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Crane Heatex

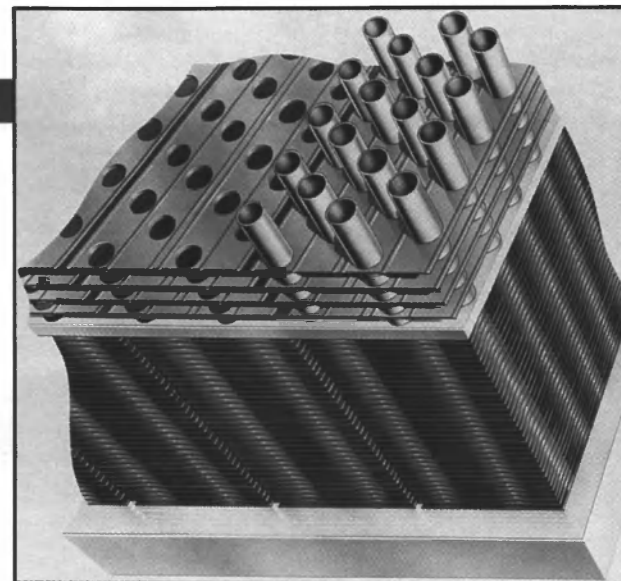
Giving Charge Air Coolers Inner Strength

Situated on the engine and downstream from the turbo charger, a marine charge air cooler is exposed to vibration. However, unlike most other components of the marine power plant, a heat exchanger cannot be strengthened simply by using thicker or more robust metals. By their very nature, heat exchangers have to be manufactured from thin but robust materials which maximize heat transfer areas while keeping

flow resistance at a minimum.

Designing and producing charge air coolers which are capable of withstanding this kind of harsh environment presents a challenge to manufacturers. **Tony Judd**, of Crane Heatex, explained how his company is meeting this challenge: "We therefore set about developing a system that can withstand high levels of vibration without jeopardizing thermal performance. The result was the Finbloc matrix."

Charge air coolers designed with the Finbloc matrix have reportedly been installed aboard vessels owned by Mobil, P&O and Safmarine, to name a few. With the Finbloc system, the tubes enter the "working" section of the exchanger through the usual end plates and have .2-mm fins spaced along their length, spacing being dependent upon thermal performance and pressure drop require-



ments.

Intermediate plates are placed along the length of the exchanger to hold tubes and fins in place. At one end, the intermediate plate is fixed rigidly to the outer casing using a cross member or support bar. Subsequent plates are fixed using dowel pins which allow movement in the direction of the tubes but not up, down, left or right.

This is necessitated by the possibility of thermal linear expansion within the exchanger.

End plates, tubes and fins are positioned prior to bulleting, the process by which a ball bearing is fired the length of every tube to create an interference fit between tubes and plates and fins. This means that the whole heat transfer structure is essentially one component within a casing.

As well as holding the tubes firmly, the intermediate plates prevent fin sections from resting on each other.

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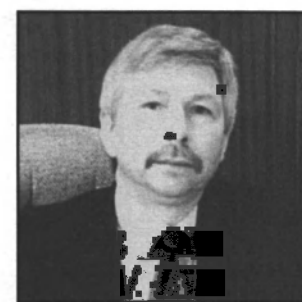
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The Netherlands
Telephone +31 416 388115
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Tony Judd, GM

Because Crane Heatex's Finbloc system is inherently stiff, the resonance frequency of the tubes is well above any frequency emanating from a diesel engine.

By compartmentalizing and strengthening the design of its heat exchangers, the company expects the marine sector to remain an impressive growth area for its business.

For more information on
Crane Heatex

Circle 1 on Reader Service Card

Lockheed Martin To Provide Navy With Control Systems

The U.S. Navy has selected Lockheed Martin Information Systems to provide 12 machinery control systems for the nation's guided missile destroyer fleet. Under terms of \$19 million of sub-contract awards from two shipyards, Bath Iron Works and Ingalls Shipbuilding, Lockheed Martin will deliver controls for six destroyers built at each facility.

"Our latest machinery control system relies upon the insertion of commercial-off-the-shelf products into a ruggedized military hardware environment," said **John Hallal**, president of Lockheed Martin Information Systems.

The Lockheed Martin machinery control systems provide supervisory control and monitoring of the ship's propulsion, electrical, damage and auxiliary functions. The computer-based environment uses U.S. Navy standard work stations and dam-

age-control software that can be used across the fleet.

For more information
Circle 86 on Reader Service Card

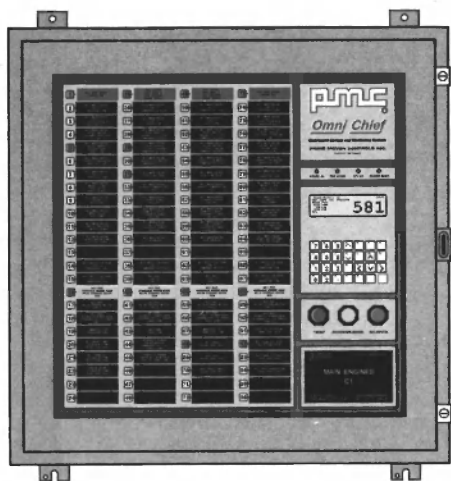
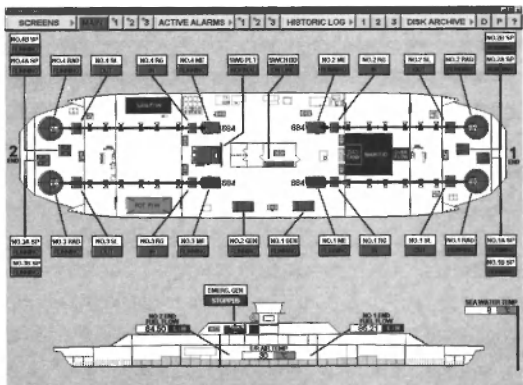
Hitec To Deliver Remote Controlled Pipe Handling Equipment

Hitec ASA has received a letter of intent from Halliburton Energy Group regarding the delivery of remote controlled pipe handling equipment for an upgrade of the drilling facilities at BP Norway's Ula field. The contract has a value of approximately \$2 million, with delivery scheduled for the first quarter 1998. The equipment will handle drilling tubulars from the pipedeck area to the drill floor and internal in the derrick (horizontal and vertical pipehandling system). The equipment is remote controlled from a separate operator cabin.

For more information
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USCG Seeks New Members Of Towing Safety Advisory Committee

The U.S. Coast Guard (USCG) is seeking applications for appointment to membership on the Towing Safety Advisory Committee (TSAC). TSAC is a 16-member federal advisory committee

that advises the Secretary of Transportation on matters related to shallow-draft inland and coastal waterways navigation and towing safety.

The advice and recommendations

of TSAC also assist the USCG in formulating U.S. positions at meetings of the International Maritime Organization (IMO). The committee usually meets at least twice a year at USCG head-

quarters, in Washington, D.C. Special meetings may also be called. Subcommittee meetings are held to consider specific problems as required.

The USCG will consider applications for five positions that expire or become vacant in October, 1997, as follows:

- two members from the barge and towing industry, reflecting a geographical balance;
- one member from port districts, authorities or terminal operators;
- one member from maritime labor; and
- one member from the general public.

(Applicants should have experience in towing operations, marine transportation, occupational safety and health, environmental protection issues, or business operations associated with the towing industry.)

Each member serves for a term of three years. A few members may serve consecutive terms. All members serve at their own expense, and receive no salary, reimbursement of travel expenses, or other compensation from the federal government.

Applicants may be required to complete an Executive Branch Confidential Financial Disclosure Report (SF 450).

To achieve the balance of membership required by the Federal Advisory Committee Act, the USCG is especially interested in receiving applications from qualified women and minorities.

Those persons who have previously submitted applications must reapply as no applications received prior to this solicitation will be considered.

Application forms may be obtained by writing to the Commandant (G-MSO-1), U.S. Coast Guard, 2100 Second St. S.W., Rm. 1210, Washington, D.C. 20593-0001; by calling (202) 267-1181; or by faxing (202) 267-4570. For further information, please call Lt. Lionel Mew, assistant executive director, at tel: (202) 267-0218.



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Schottel-Werft and Siemens AG Marine Engineering have developed a new propulsion systems with a power range between five and 30 MW per unit.

The system is designed to provide efficient propulsion, adding improved maneuverability and safety to modern ships. The Siemens Schottel Propulsor (SSP) was designed to be suited for use aboard cruise vessels, large ferries and passenger vessels, cargo vessels, ice-going vessels, large offshore structures and navy vessels.

To improve efficiency, Schottel has developed the Twin Propeller. The propeller load is distributed to two propellers, one forward and one aft of the lower housing. With two airplane type fins added to the lower housing and 50 percent load per propeller only, the STP can achieve up to 20 percent efficiencies compared to alternative systems, the manufacturer said.

As a reference vessel for tank tests, the Meyer Werft-built 70,000-ton cruise vessel Century was chosen.

The ship has a propulsive power of 2 x 14 MW and a design speed of 22 knots.

Propulsion analysis were carried out in tank tests under the research and assistance of tank test institute SVA Potsdam, and with SSPA of Sweden.

The conventional diesel mechanic propulsion system of this vessel includes two shaft lines with 5.8 m propellers, and powered by 14 MW per shaft at 120 rpm.

Two standard podded drives with propeller diameters of 5.2 m and propeller speeds of 160 rpm, as well as two SSPs with propeller diameters of 5.4 m and propeller speeds of 150 rpm were analyzed by SVA Potsdam, by tank tests and cavitation tank results.

The results reportedly showed that the SSP would reduce the power consumption of a propulsion plant by 10 percent, so that either a higher speed of .5 knots (at the same consumption) or a lower fuel consumption of 10 percent could be achieved.

For more information on the SSP
 Circle 75 on Reader Service Card

General Thermodynamics Corporation



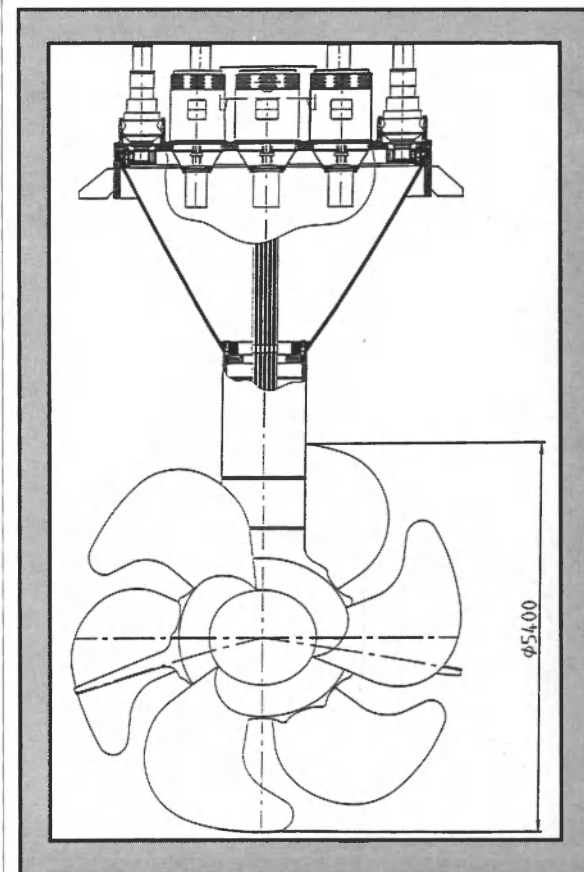
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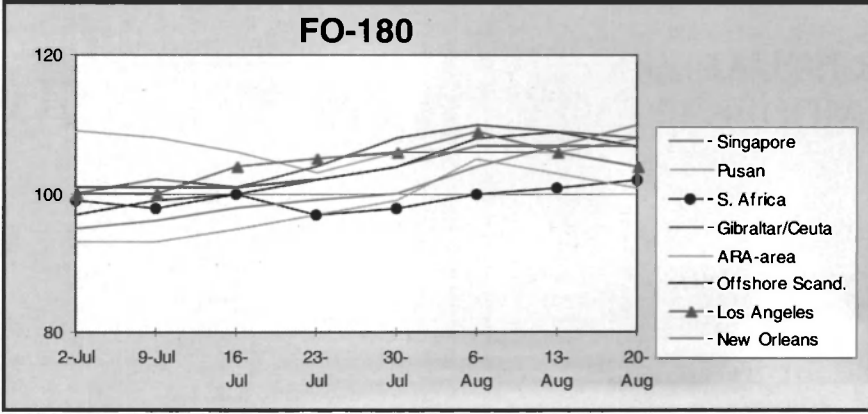
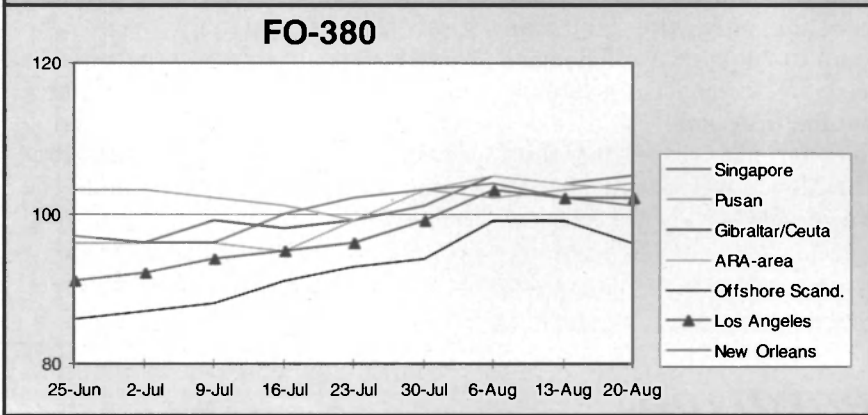
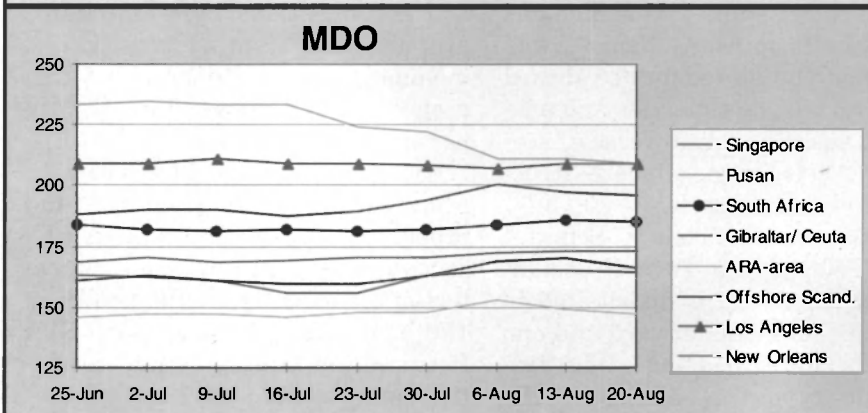
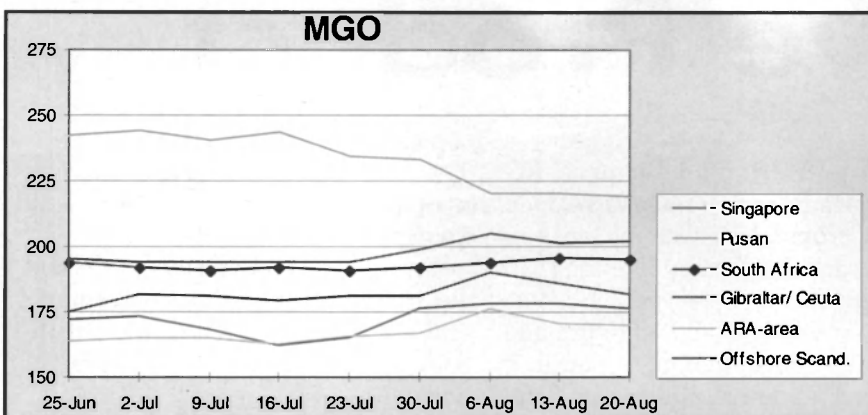
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Jet Propulsors Drive Vessels To New Heights

North American Marine Jet Debuts Two New Units

Marine jet propulsion has been increasingly embraced by vessel owner/operators as an economical and flexible means of powering a wide variety of vessels. High efficiency, combined with unrivaled shallow draft operation and maneuverability, make the units a leading contender on many new-build jobs.

A company which has helped lead the jet revolution in the marine industry is Benton, Ark.-based North American Marine Jet.

North American Marine Jet has added two powerful contenders to its already strong product arsenal, the new Traktor Jet I-300 (5,800 lbs. of thrust at 300 hp) and the Traktor Jet I-600HH (8,700 lbs. of thrust at 600 hp).

The I-300 is featured on the 53-ft. *Miss Virgie*, a 21-knot boat

which also features Twin Disc gears. The 24-in., stainless steel, 11-blade impeller is designed for long life.

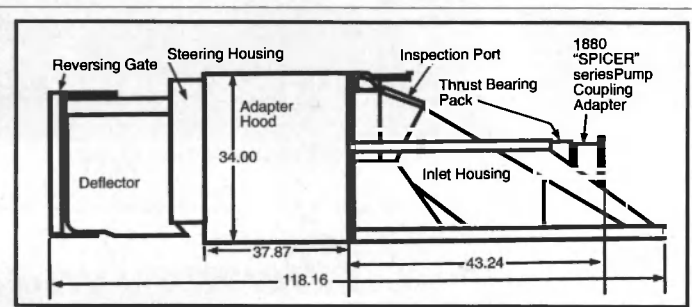
The unit's housing is constructed of fabricated 5086 marine grade aluminum, a less porous material which helps extend the unit's overall life.

The higher-power TJI-600HH counts many new vessels as reference, including the *Expedition*, constructed for Fairfield Industries by GEO Shipyard.

The TJI-600 are also installed on the seismic research catamaran *Northern Star*, which is almost complete at Peregrine Marine in Alaska. The vessel was designed by Elliott Bay Design Group.

(Continued on next page)

On the right: The TJI 600HH from North American Marine Jet produces 8,700 lbs. of thrust at 600 hp. It has a high mass flow design, meaning better load carrying capabilities and greater maneuver-



Miss Virgie features Twin Traktor Jet I-300 units.

MARINE PROPULSION TECHNOLOGY

(Continued from previous page)



Erin L features the new Traktor Jet I-600HH.

TJI-600 HH Specifications

As noted, the TJI-600 produces 8,700 lbs. of thrust at 600 hp. The unit has no underwater appendages to damage, making shallow water operation possible. Low shaft rpm allows ingestion of debris with less damage. Grease lubricated tail bearing, heavy duty one-piece stainless steel impeller and marine grade aluminum construction are all reasons the unit has quickly become a preferred propulsion choice. The TJI-600HH is specifically designed for boats requiring 300 to 600 hp diesel engines needing high thrust at low speeds.

The previously mentioned Expedition features the TJI-600HH., allowing the 65-ft. boat to take full advantage of speed and maneuverability controls.

For more information on
North American Marine Jet
Circle 76 on Reader Service Card

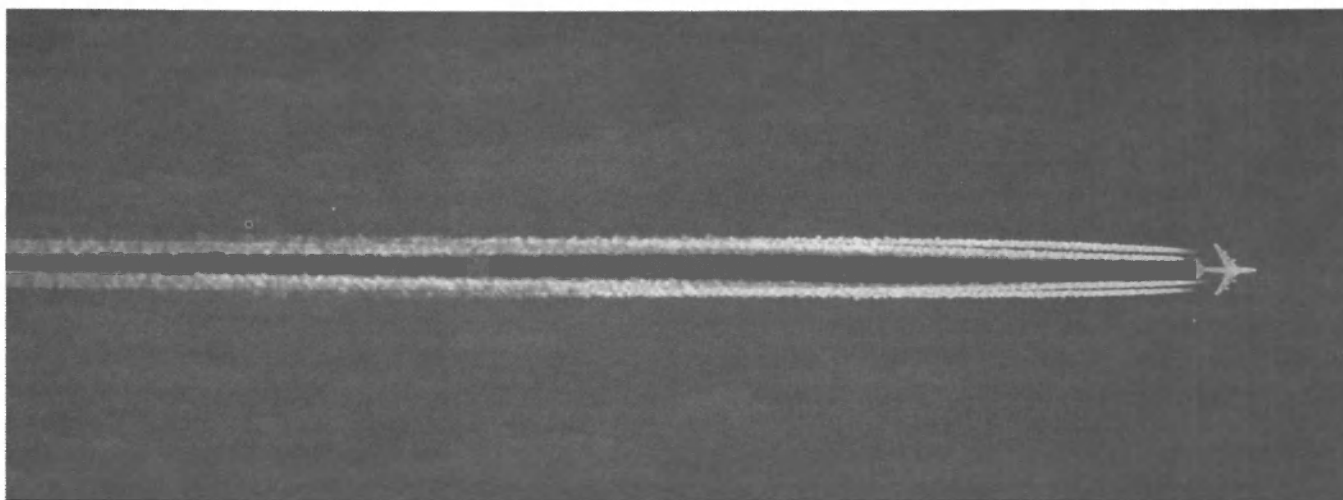
TJI-600HH specifications

Dry weight	1,100 lb.
Wet weight	1,500 lb.
Housing material	.5086 marine grade aluminum
Shaft/impeller	stainless steel
Stator assembly	stainless steeled
Impeller diameter	24 in.
Nozzle diameter	19.5 in.
HP range	300 to 600
Speed range	.5 to 35 knots
Jet RPM range	550 to 750 rpm
Length	118 in.
Height	34 in.
Width	32 in.

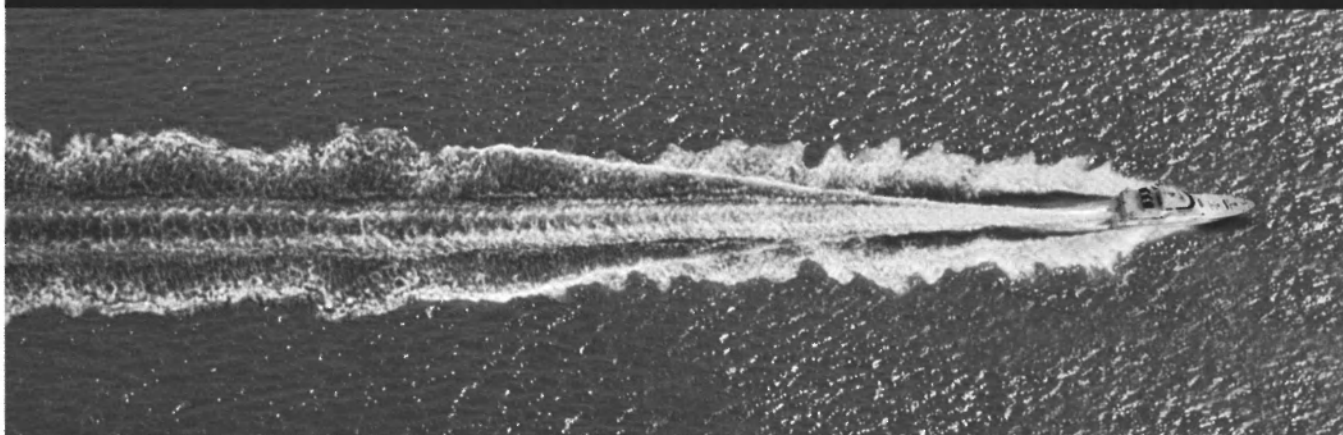
ADI Launches First Huen Minehunter

The first of six Huen class minehunters being built by ADI Ltd. for the Royal Australian Navy under a \$1 billion contract has been launched in Newcastle, England. With a sonar system reportedly capable of detecting and classifying mines in 656.2-ft. (200 m) ocean depths and remote-controlled mine disposal vehicles equipped with closed circuit television, Huen is touted by ADI as the world's most advanced minehunter.

For more information on ADI Ltd.
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Cambridge Applied Systems

Controlling Viscosity Crucial For Controlling Costs

Controlling heavy fuel oil (HFO) viscosity can be crucial for companies trying to increase fuel oil savings, lower exhaust stack emissions and reduce overall engine maintenance.

In 1991, Cambridge Applied Systems (CAS) was contacted by two American shipping companies — Sealand Services Inc. and American President Lines — to provide a reliable and accurate means of measuring and controlling the viscosity of heavy fuel oil. Poor quality bunkers received by Sealand Services and APL out of Long Beach, Ca., were continually causing their capillary tube type viscometers to fail. This resulted in frequent cleanings and extensive maintenance in order to keep these viscometers on line, forcing both shipping companies to seek an alternative solution. CAS was able to provide a reliable and accurate viscosity control system and within two years CAS had

installed more than 30 HFO viscosity control systems on vessels operating out of the port of Long Beach.

Due to its simple design, CAS viscometers require minimal maintenance time compared to the capillary tube type viscometers they replaced.

The patented CAS electromagnetic viscometer is the essence of simplicity.

The head of the sensor is inserted into a flowing HFO fuel line as shown. Inside the sensor head is a measurement chamber, flooded with fuel oil, and a hollow, neutrally-bouyant magnetic piston.

The piston is retained by a removable fence that also deflects fresh oil samples into the chamber.

Two coils are imbedded in the tip of the sensor surrounding the measurement chamber.



When the inner B coil is activated the magnetic force on the piston pulls it down toward the base of the chamber.

Fuel oil trapped behind the piston is forced to flow around the piston. The more viscous the fuel oil the slower the piston motion.

The upper A coil is used to magnetically monitor the motion. As soon as the piston reaches the bottom of the chamber, the upper A coil is activated and the lower coil is used to monitor the motion. During this up-going portion of the cycle fresh oil is pulled in behind the piston. As soon as the piston approaches the deflector fence coil B is again activated and the process repeated.

(Continued on page 134)

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MARINE PROPULSION TECHNOLOGY

(Continued from page 65)

Shanghai, and extensions to Fincantieri's cruise ship construction program, using 12 and 16-cylinder models, have increased the reference list to around 400 engines.

Compact design

Responding to the market demand for compact, long-stroke diesels in the medium output range, MAN B&W has augmented its high stroke-to-bore ratio MC-C series in the 460, 500 and 600-mm cylinder diameter sizes. Two significant developments in this field so far in 1997 have been the completion of test running of the first S50MC-C engine, and a surge in business for the various types, including breakthrough contracts for the S60MC-C and S70MC-C.

Incorporating the 4-to-1 stroke-to-bore ratio inherent to the MC-C generic group, and 10 percent shorter than the preceding design of the same bore, the first S50MC-C was put through its paces on Mitsui's Tamano testbed in April. The inaugural test involved a 12,870-bhp, six-cylinder unit — five of which have so far been placed with licensee Mitsui.

By the outset of July 1997, the new S50MC-C designs had attracted 52 firm orders for new-buildings, plus a total of 16 options and provisional contracts. The S50MC-C, giving 2,145 bhp per cylinder at 127 rpm, has thus far proved the most popular.

Statistics prepared at the end of May indicated that a total 4,300 engines of the low-speed MC type were delivered or on order, to an aggregate power of 64.2 million bhp. While the mid-range, 500-mm and 600-mm bore designs account for nearly half the population, the smaller 350-mm bore class continues to rank as one of the most successful sizes — with 800 engines reportedly sold to date.

A six-cylinder L60MC low-speed diesel specified for a 37,500-dwt chemtanker newbuilding in Norway will provide an at-sea demonstration and evaluation platform for Intelligent Engine (IE) electronic control arrangements devised by MAN B&W. On the basis of the results from a 10,000-hour test with the ship after it enters service with Storli in October 1998, MAN B&W will decide whether to implement IE technology as standard or as an option. Although the tanker's 6L60MC engine will incorporate a conventional camshaft, it will be operated in IE mode following sea trails with builder Kvaerner Kleven Floro.

A reassimilation of Danish manufacturing capacity in the large engine building sector is expressed in the newly-completed expansion of MAN B&W's Alpha Diesel factory.

The plant at Frederikshavn, in northern Jutland, which has traditionally been the supplier of propulsion packages based on medium-speed engines, cut its teeth on two-stroke production with the mini-bore S26MC, before going on to 350-mm bore and L42MC designs.

As a result of the latest investment, the facility can also take on the S42MC, plus the 460-mm and 500-mm bore types, thereby extending Alpha's ambit to the propulsion needs of ships up to Panamax size.

Cooperation between the Alpha propulsion factory and Holeby genset division has resulted in the introduction of the L27/38 design covering genset and propulsive power demands from 1,500 to 2,880 kW at 720 to 800 rpm. Compact dimensions and a 40 percent lower component count than its predecessor of similar bore size are a feature of the new class, which utilizes principles used in the smaller, L16/24 genset engine.

Specification of the L58/64 engine type for German shipbuilding's contribution to the next stage of Norasia's containership fleet development is a fillip to a design introduced in 1984 as the first of MAN B&W's modern medium-speed family.

Added significance is conferred by the fact that a twin installation of nine-cylinder units is called for in each of five 1,400-TEU newbuildings at HDW's Kiel yard. The project gives expression to the shipowning community's growing interest in the adoption of twin-engine plant in vessels such as tankers and boxships where single-engine installations have ruled supreme for many years. Considerations of system redundancy, service dependability and operational flexibility, weighed against capital and lifetime costs, shape such decisions.

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While the L58/64 had accounted for about 57 percent of the 6.2 million bhp of installations and orders for the MAN B&W medium-speed range by June 1997, the 48/60 passed the one million-bhp mark in marine applications, with a further 275,000 bhp committed to stationary power projects. Seagoing contracts for the youngest member of the family, the 32/40 series, have been at a buoyant level so far in 1997, taking total marine orders beyond 700,000 bhp, with units for power generation hoisting the overall tally to 800,000 bhp. The bulk of the 660,000 bhp of business for the 40/54 type has also been secured in the shipping domain.

Japanese contenders

The market's sole challenger to Wartsila NSD and MAN B&W in the low-speed engine stakes, Mitsubishi Heavy Industries, has augmented its portfolio with a new, longer-stroke, especially fuel-conservant, 520-mm bore design. Anticipated fuel consumption of 123 g/bhp/hr from an output of 2,320 bhp per cylinder at 127 rpm, should make the UEC52LSE an attractive option for Panamax and smaller vessels.

The strengthening of the Japanese shipbuilding industry's workload has been a boon to the

Mitsubishi UE family this year. While the 500-mm bore class (UEC50LSII) figures prominently in new commitments to bulkers, chip carriers, reefers and feeder-ships, the upturn in crude carrier contracting has generated sales for the larger types of machinery in the shape of the UEC85LSII and UEC75LSII.

A milestone has been reached in Japanese indigenous medium-speed diesel development with the delivery of the first two ADD-type engines for seagoing duty.

Unusual in the adoption of a vee configuration for just six cylinders, each 6ADD30V unit has been supplied by Mitsui's Tamano works for a survey vessel newbuilding ordered by the Japan Maritime Safety Agency. Rated at some 4,100 bhp apiece, the engines will drive the main generators in a diesel-electric system.

Mirrlees taken over

Consolidation in the U.K. engineering sector is underway with the absorption by GEC Alsthom Diesels of medium-speed engine builder Mirrlees Blackstone. The Stockport-based company has progressively focused on the power generation sector in recent years, supplying engines up to 12 MW burning heavy fuel.

The move enables the Anglo-

French buyer to extend its range beyond the maximum 7 MW available from the Ruston stable, and better tap the needs of emerging, independent power producers in developing economies. Ruston, meanwhile, has reinforced its position in the fast ferry market with the vee-20 version of its everpopular RK270 medium-speed engine. GEC Alsthom's high-speed diesel designer and manufacturer, Paxman, is gearing up for volume production of its compact VP185 class. Attracting sales across the gamut of Paxman's traditional markets, spanning naval and agency patrol vessel, industrial, rail traction and power sectors, the design has also chalked up orders from the luxury, fast motor yacht propulsion market.

Success with the 12VP185 — offering unit powers up to 2,610 kW at 1,950 rpm — has led to the development of an 18-cylinder model, which will take the range to 3,910-kW.

A number of 18VP185s are expected to be placed with launch customers before the end of 1997.

Bavarian industry

One of the main drivers of high-speed diesel technology, MTU, is looking to increased production this year at its Friedrichshafen factory in Bavaria, to around 3,000

engines of 3.5 million bhp from the circa 2,800 of 3.2 million bhp turned out in 1996. The Series 396 and 2000 vee-type engines are most prominent in the current manufacturing program, the latter being one of two types developed in conjunction with U.S.-based Detroit Diesel Corporation.

Detroit Diesel has been responsible for the development of the two-liter 2000 type, derived from the Mercedes-Benz 500, and spanning the 270 to 1,343-kW power band, while MTU had primary responsibility for the four-liter Series 4000, covering the 735 to 2,720-kW range.

The 4000 type is the first, compact high-performance series production diesel to use the common-rail injection system prepared in conjunction with the L'Orange Company. MTU occupies a leading position in fast ferry diesel propulsion, through its 1163, 595 and 396 designs. Significantly, while the 2,000-kW 16V396 (TE74L) is touted as the market leader in the 131.2-ft. (40-m), high-speed ferry segment; the 16-vee model of the 4000 offers a power setting of 2,320 kW at 2,000 rpm. MTU reports 60-plus orders to date for the Series 4000, and contracts for more than 200 units of the Series 2000.

Nordic challenger

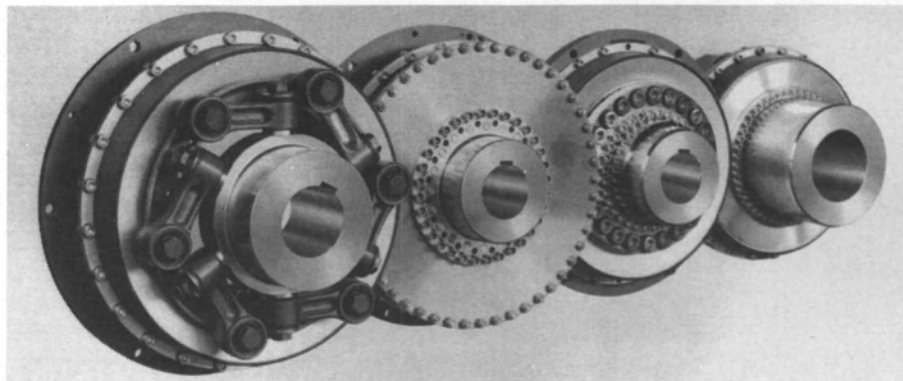
From within the Norwegian maritime cluster, the development of a new vee engine has added a further element of choice in the hotly contested 320-mm bore sector of the market.

An anchor-handling tug/supply vessel project bred on the country's rugged western shores provides the opening contract for the 12-cylinder BVM12 medium-speed design introduced by Ulstein Bergen as a long-anticipated extension to its B-series program.

The 262.4-ft. (80-m), UT722-type newbuilding entrusted to Aukra Industrier by Simon Mokster Shipping of Stavanger will be fitted with two such units for 14,410 bhp of propulsive power. Mokster's preceding phase of fleet development had afforded an important reference for the Caterpillar marque in the North Sea. A pair of 7,370-bhp, 3616 type 'Big Cats' had been specified in each case for the 1997-commissioned, 246-ft. (75-m) Stril Power and sister multi-functional support vessel.

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ly to see the release of an 18-cylinder version of the 3600 family, developed jointly by Caterpillar with Bazan Motores in Spain. Producing 9,650 hp at 1,050 rpm, the 3618 is the latest product of a transatlantic alliance, which involves coordinated parts supply, manufacture and engine assembly between plants in Indiana and Cartagena. The other dimension to the U.S. group's bold developmental strategy involving the industry in Europe has been its takeover of prolific MaK from Krupp at Kiel.

CLARIFICATION

Contact information on GEC Alstom diesel engine manufacturing units was omitted from MR/EN's July 1997 Diesel Engine Directory. The following is the latest information for contacting all of the company's manufacturing units.

GEC Alstom Diesels Inc.
10801 Kempwood Drive, Suite 1
Houston, TX 77043-4
Tel: (713) 939-0073
Fax: (713) 939-0105
Products: DE (hs); GEN

GEC Alstom Mirrlees Blackstone
Bramhall Moor Lane, Hazel Grove, Stockport, Cheshire SK7 5AH, England
Tel: +44 161 483 1000
Fax: +44 161 487 1465
Products: DE (ms); GEN

GEC Alstom Paxman Diesels
Paxman Works, Hythe Hill Colchester, Essex CO1 2HW England
Tel: +44 1206 795151
Fax: +44 1206 797869
Products: DE (hs); GEN

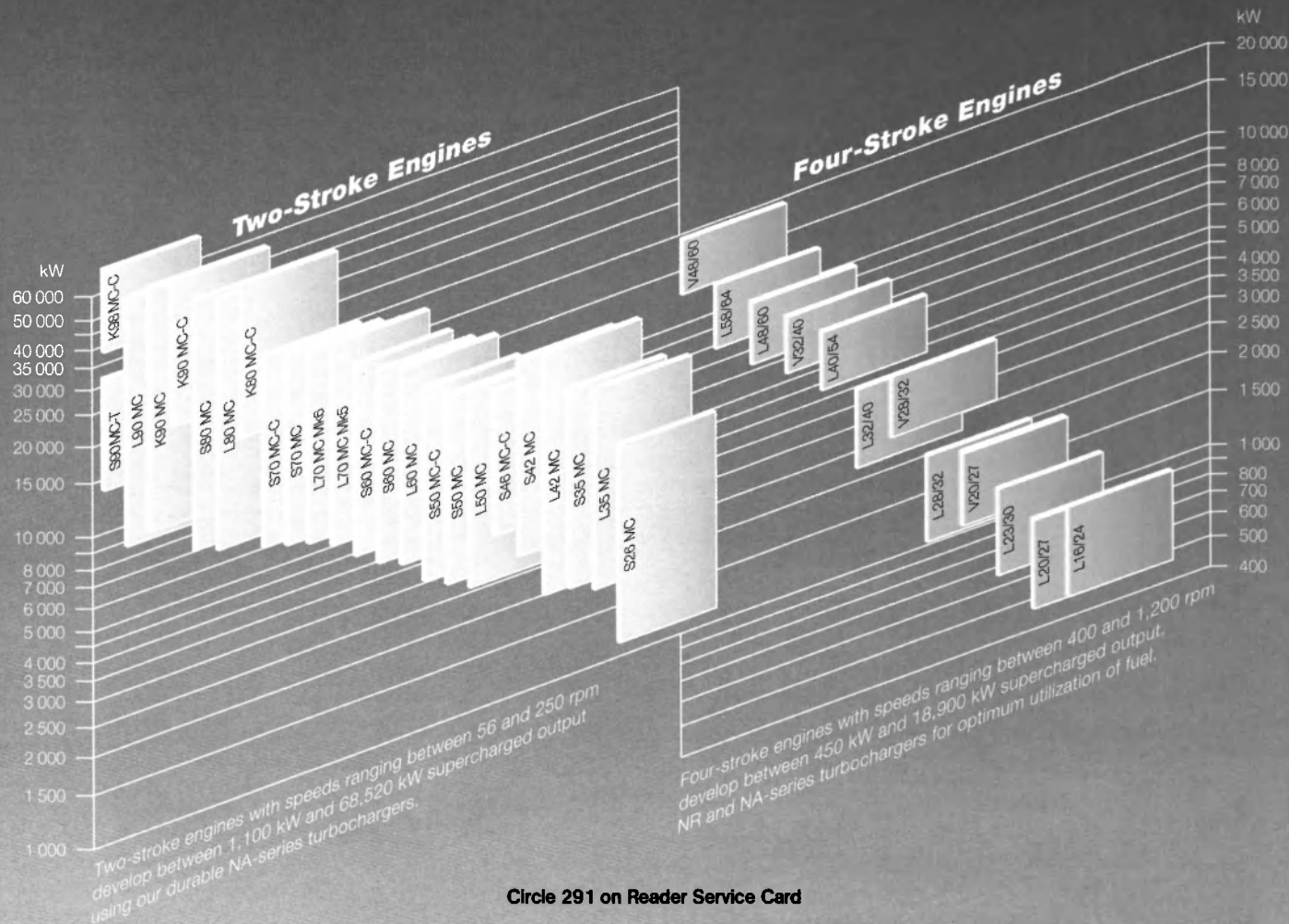
GEC Alstom Ruston Diesels
Vulcan Works, Newton-LE-Willows Merseyside, England WA3 2EP
Tel: +44 1925 225151
Fax: +44 1925 222055
Malcolm Siberry
Product(s): DE(ms); GEN

S. Korea Seven-Month Shipbuilding Orders Soar

New orders received by South Korean shipbuilders surged 206 percent to 6.51 million gt for 115 vessels in the first seven months of this year, the Korea Shipbuilders' Association said. The seven-month figure compared with 2.13 million gross tons for 57 ships from a year earlier. An official from the Association said the seven-month order total was the largest since 1993 when shipbuilders won orders for 6.67 million gross tons in the same period. "Orders have been rising, but we are more concerned about low prices," said the official without elaborating.



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PROPULSION GUIDE

(Continued from page 72)

4 (Bottom right, page 72) is the fuel oil system showing piping 50mm and larger. Machinery unitization and packaging was not heavily emphasized during this particular design, as vendor relationships were still being formed. The team felt, though, that this would be an eventual source for pushing advances in machinery packaging and unitization.

Process

At the beginning of the design process the team had already reached the "Norming" stage of the four stages of team development — "Forming, Storming, Norming and Performing." As the team was still developing there were many occasions where the team would regress to the storming stage. During this phase of the project the team was continuing to work as individuals with an increasing transfer of information between the individuals as the design progressed. Although the team was working effectively, the high synergistic output levels that are characteristic of a true IPPD team did not occur during the SSD#1 design. This level of teaming was to be expected, in that traditionally teams experience a six-month learning curve to reach the 'performing' stage. Near the end of

this first design, the team had reached the performing stage although they had not yet matured to being a 'self-directed' team. Many of the team processes that the team would embrace at the end of the project had their foundation laid during this period.

Tools by which team progress could be developed, referred to as "metrics," were developed during the SDM process. This area, more than any other, remained a bone of contention between the Steering Committee and core team throughout the entire design effort.

The team decided to divide process metrics into two categories, the first being a set of team dynamics measures and the second related to the design process itself.

The team dynamic measures of equal team participation, clear understanding of the deliverables, basic team process development, rapid decision making, good listening skills, mutual respect, commitment to making the team work, technical skills and open-minded spirit, were used in a team analysis format with decent results.

The actual design process metrics devised to assess how well the design process was performing became a nagging sore point with the team.

These metrics consisted of: value-addedability, repeatability, useabil-

ity, definability, adaptability, validateability, fundability and sanctionability. Primarily because these metrics were subjective in nature and that the team had no basis for comparison other than the design process through which they were constructing, these metrics were never used on SSD#1. The product metrics developed during the SDM process were: affordability, producibility, reliability, performability, maintainability, flexibility, availability, and operability. Although these metrics appeared on the surface to be easily measured, the application to SSD#1 divided the team and was a significant problem between the team and the Steering Committee.

Design Process

During the design of SSD#1, the basic design processes for the project were developed. As a first step the team reviewed the processes used at each of the participating shipyards. The basic approaches were similar for the foreign and domestic yards. One significant difference was that the foreign shipyards all started from a baseline design with customer requirements and operational and production improvements added to enhance the competitive nature of the design.

Throughout the project, chief engineers from Maersk Lines and

Crowley Marine were part of the team on a two-week rotating basis. Their input throughout the design process was invaluable in introducing characteristics that considerably improved the life cycle cost as well as the operational and maintenance aspects of the SSD#1 design. Early in the design, it was realized that the best product could only be created if it were an improvement over a truly operational world-class ship. Therefore, the team selected M/V Betelguese, a Brazilian designed RoRo/LoLo convertible ship, as the baseline because the design details were readily available, the horsepower was similar to the COM 20 requirements and it was a state-of-the-art, competitive design. The team retained the use of the PD-337 hull envelope. The first phase of the process (a two-week period) was to select the main engine and develop the system concepts. The second phase of the project (a one-week period) was the development of multiple engine room arrangements. These arrangements were developed by hand sketching on 2D computer-generated plans and elevations. The first step was locating the main engine and generators. The second step was the identification of the major volume drivers. This included the engine control room, workshop, purifier room, air com-

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pressors, seawater pumps and heat exchangers, fresh water pumps, main engine lube oil pumps and coolers, fuel and lube oil transfer pumps, refrigeration system and fuel oil and lube oil tanks. The major volume drivers were located in relation to the major connections to the main engine and generators.

Eight arrangements were developed, reviewed in a meeting setting to capitalize on the synergism of the multi-national composition of the team and revised according to recommendations. The modified arrangements were reviewed using a QFD analysis tool that rated the physical "locational" and the 'relational' aspects of each of the arrangements against an ideal matrix for both of those aspects. The selected arrangement was then modified to incorporate as many of the positive aspects of the other arrangements as possible.

The third phase (a 24-week period) included trade-off studies to determine equipment vendors, detailed development of the systems and the 3D product model development

Conclusions

The physical separation of ERAM core team members from their parent organizations was one of the elements of the project's success. Overall, the sources of training for the team were excellent. However, the order in which the training was

provided to the team could have been improved. The teambuilding training should have preceded the IPPD, SDM and QFD training. The team would have gotten much more out of its subsequent training if it had been educated on basic teaming skills at the beginning of the project.

Shipyard involvement and that of equipment suppliers from around the world proved invaluable. Equipment suppliers were far more forthcoming about state-of-the-art equipment technology than first anticipated. Overall, additional involvement of commercial shipbuilders would have been helpful.

The team realized that they had lacked adequate structural design support and cost engineering input throughout the course of this design. The request for a full-time structural design person was not fully responded to as only an increased presence of a part-time structural engineer was provided.

The team attempted to use a combination of IPPD and SDM as the basis for its unique design process. Both methods have strengths and weaknesses. IPPD as presented relied heavily on the use of QFD techniques. QFD is extremely labor and time consuming and should be used sparingly. IPPD did bring a proven discipline to the team that was used throughout the project.

The SDM approach, which has been used successfully by the automotive industry, was also applied throughout the project. The major drawback of SDM was the formulation and application of in-process metrics of performance for the design team. The concept and use of in-process design reviews was realized as an important element of the IPPD process by the ERAM design team. The goal was to minimize the design review preparation time and present results taken from natural breakpoints in the chosen design process. The concept of using in-process data as a progress report to be reviewed for buy-in at an "In-Process Design Review" carried very little favor with the Steering Committee during this period of the project.

Preparation for the management team had to remain open to the In-Process Design Review process in order to fully realize the gains available from the IPPD process.

The IPPD User's Guide was to the ERAM process what the 3-D CAD product model was to the ERAM product. It represented the best identified approaches tried and used by the team and can act as a valuable reference in giving future teams a head start on what processes work and which should be avoided. Upon completion of this design, the team remained intact with the exception that the

slow speed diesel engine representative returned to his parent company, MAN B&W. The team consequently needed to reorganize the workload, and also felt the need for additional teaming improvements, which was accomplished through a facilitated peer review process.

The team improved upon the baseline design of M/V *Betelgeuse* by: strategically routing distributive systems; eliminating systems and components wherever possible; consolidating systems and components; carefully justifying the use of redundancy; and minimizing exotic material types. Most of these improvements can be traced to the upfront time spent by the team developing multiple engine room arrangements. The process developed by the team to eliminate, or amalgamate, these arrangements into the final design proved to be a distinct advantage over previous practice and led to significant improvements over the baseline ship, in the areas identified above.

The importance of a good vendor library in developing equipment product models is essential to a successful product model development. The lack of vendor supplied 3D equipment models required an extensive expenditure of time to develop a suitable suite of 3D equipment models.

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engine room product model has not matured to the point where all needs are fulfilled. Limitations of the software can have a significant impact on schedule adherence. Management must realize this fact when undertaking such a task. Coupled with the software restraints, personnel capabilities

are an essential element. The cross-training of the CAD team in the different software packages as well as in such disciplines as piping, structure, library parts, plotting, data extraction, and ship design and construction is essential to the project success. In addition, the CAD team must capture

their processes and procedures in CAD standards and update them concurrently as improvements are developed. The payoff will be realized down the road by reducing model discrepancies as the product model matures.

An active interface between CAD designer and system engineer is

essential to the development of the product model that will require a minimum of rework. Regular product model reviews by the system engineers on the CAD system are essential. This enhances the design process and helps to prevent design flaws that could prove disastrous downstream.

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Metrics Lessons Learned

The need for process metrics was established during the team's training in the Strategic Design Method. However, the reality is that in-process metrics related to design team performance are extremely hard to devise and implement. Contrastingly, it was relatively easy to identify and apply metrics to measure success at the end of the project.

Product metrics were also a struggle during SSD#1. A struggle between what the team considered to be a realistic approach and what the Steering Committee felt should be a piece/part count resulted in a stalemate with the result that product metrics were not applied during SSD#1.

The concept of metrics is a difficult concept to apply and is a significant burden to place on a team in the first phase of project development.

Allowing the team the time to develop realistic metrics that can be accepted by all parties without the need to simultaneously develop the product was deemed necessary.

Stay tuned for the remaining installments on the ERAM project.

AUTHORS

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Ben Kassel — Navy MIS Manager — David Taylor Model Basin

Paul Rakow — System Engineer — Designers & Planners

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Nancy Russell — CAD Designer — David Taylor Model Basin

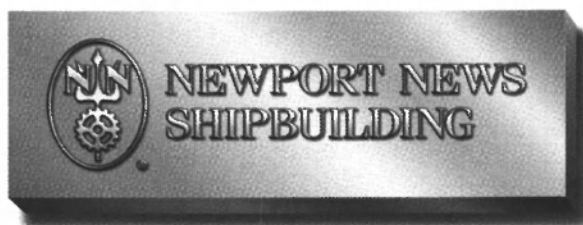
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PEOPLE & COMPANY NEWS

RCI Names New Board Member

Royal Caribbean International (RCI) announced that **Laura Laviada**, president of Editorial Televisa — a subsidiary of a company touted as the world's largest Spanish magazine publishing company — has been elected to the company's board.

"**Laura Laviada** brings to the board a wealth of knowledge and experience in business operations, especially in Latin America and the U.S. Hispanic market," said RCI's **Richard Fain**.

Former Naval Bureau Commander Dies At 91

The New York Times reported in late July that **Adm. Albert Girard Mumma**, a naval engineer who commanded the Navy Department's Bureau of Ships in the 1950s as its nuclear power and missile program went full throttle, died in Pennsylvania at age 91.

Adm. Mumma also served as a naval intelligence officer in Europe and as president of ASNE and SNAME.

After leaving the Navy he joined the private sector and was appointed by **Richard Nixon** to serve as chair of the American Shipbuilding Commission, which studied and sent recommendations to Congress regarding ways to improve U.S. Merchant Marine vessel construction.

APL Concludes Labor Negotiations With Seagoing Personnel

Bargaining between APL Ltd. and the International Organization of Masters, Mates, and Pilots, AFL-CIO (IOMMP) was concluded the last week in July after 11-month labor negotiations produced an agreement affecting 72 company deck officers.

The agreement, subject to union ratification, completed the process of arriving at new labor pacts with the company's seagoing personnel.

"We believe that this contract provides both security for our members as well as ensuring APL's presence as a premier carrier for the American flag in the Far East ... MMP believes that the marriage between NOL and APL is a signifi-

cant step forward for both companies and wishes both companies well," said IOMMP President **Timothy A. Brown**.

Allin CFO Resigns

Allin Communications Corp.

CFO **Jon E. VanAmringe** is leaving the company to pursue other opportunities.

Dean C. Praskach will assume his duties as vice president of finance.

The company's SeaVision subsidiary supplies ITV systems to the cruise industry.

Offshore Company Names Director

Noble Drilling Corp. has named **William J. Dore** to its board of directors. He brings more than 25 years of experience in the diving and marine construction industry


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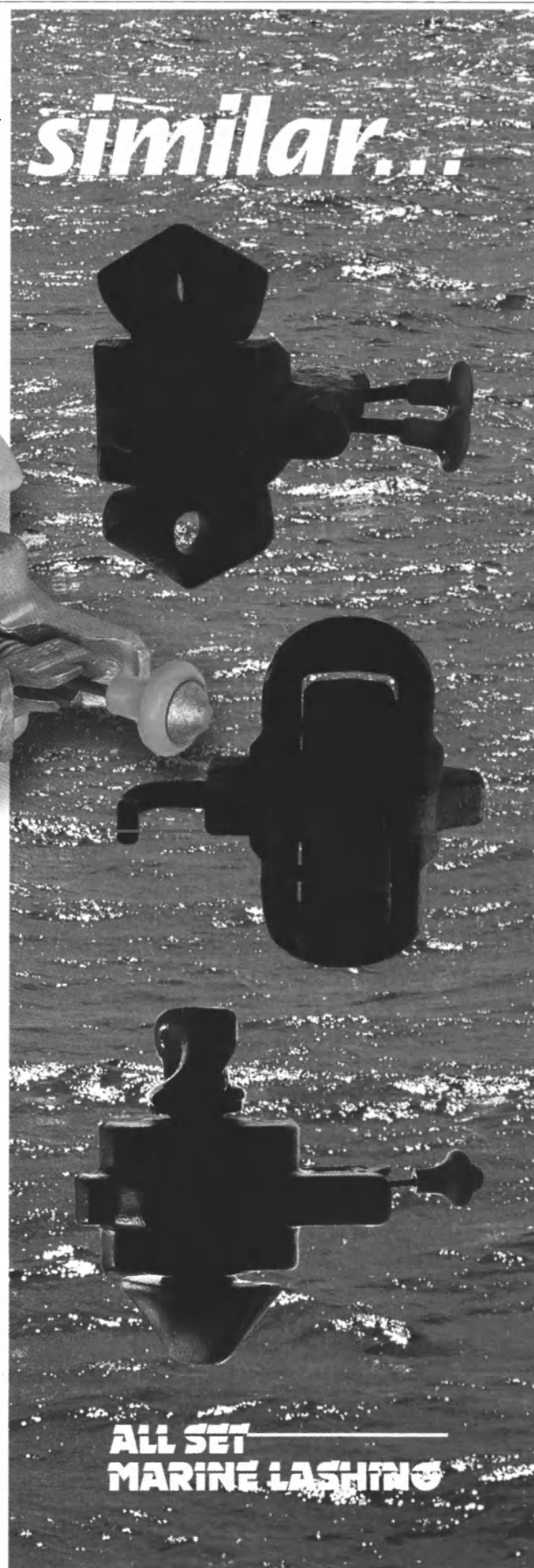
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to Noble, and currently serves as CEO of Global Industries, Ltd.

MSRC Relocates

The Marine Spill Response Corp. (MSRC) Virginia Group address has changed. The new contact

information is as follows: 455 Spring Park Place, Suite 200, Herdon, Va. 20170; tel: (703) 326-5600.

SEA Hires New Manager

Former Lunde Marine employee

Derek Lohuis has been hired as the new sales manager for Datamarine and subsidiary SEA Inc. He will be responsible for ongoing maintenance and further development of dealer networks for the marine communications equipment producer.

Dan-Bunkering Hires Pedersen

Jesper Pedersen has been hired as a bunker trader for A/S Dan-Bunkering Ltd. In total, the company has a trader team of 13 in Middlefart and five in Copenhagen, which reportedly had a total turnover of \$250 million in the last fiscal year.

BV Marine Division Announces Senior Appointment

Classification society Bureau Veritas (BV) has strengthened the management team of its Marine Division with the appointment of **Bernard Anne** to the position of senior vice president and managing director. Previously, Mr. Anne served as chief executive of French ferry operation SNCM. He takes over as head of the Marine Division for **Pierre de Livois**, who will remain senior vice president with specific responsibility for ships in service, the Greek-owned fleet and relations with IACS members.

Calhoun Joins Bisso Marine

Capt. **James W. Calhoun**, recently retired U.S. Coast Guard (USCG) Marine Safety chief of the Eighth District in New Orleans, has joined Bisso Marine Company, Inc. as vice president of Administration. Capt. Calhoun has 30 years of experience in executing marine safety assignments and shipboard duty, and in the past also served as commanding officer of the USCG Marine Safety Office in Portland, Ore.

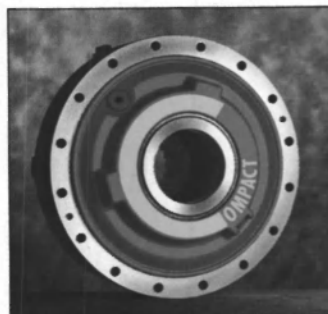


Capt. James Calhoun

AMSC Appoints New CFO

American Mobile Satellite Corp. (AMSC) has named **Stephen Peck** to the position of chief financial officer. Prior to joining AMSC, Mr. Peck served as executive vice president and CFO for Philips Publishing International — a provider of information to the satellite and telecommunications industries.

Compact Power for Marine Applications



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AMSC provides a full range of mobile communications including telephone, digital broadcast dispatch, and data and position reporting services to hundreds of miles of U.S. coastal waters and the continental U.S., Alaska, Hawaii, the Virgin Islands and Puerto Rico.

MSC Names Cruise Services Director

Eugene Roberto will manage the offices of Maritime Services Corp. (MSC) in Fort Lauderdale, Fla., as director of Cruise Services. His responsibilities will be to provide a full range of interior outfitting services for cruise, gaming and ferry operations on the U.S. East Coast, in Europe and in the Caribbean.

Mr. **Roberto** has many years of experience in land-based and vessel outfitting in North America, Europe and the Middle East, and specializes in floor covering, upholstery, window covering, glazing, ceramic tile and granite installation.

ComNav Marine Welcomes New GM

ComNav Marine Ltd., manufacturer of Marine Autopilot systems and accessories, has welcomed **Richard Summers** as its new general manager. Mr.



Eugene Roberto



Richard Summers

Summers is a professional engineer, and has just finished a tenure of 21 years with the Canadian Navy. His experience includes service as assistant engineer of a commercial design tanker and as chief engineering officer of a destroyer. During two years at the Canadian Patrol Frigate Project in Ottawa, Mr. **Summers** worked with the contractor on the design, conduct and evaluation of first-of-class sea trials of all propulsion, auxiliary and machinery control systems.

Swedserv Marine Expands Product Range

Swedish company Swedserv Marine recently announced that **Dennis Blohm** will serve as managing director of the company's Ship Spares activities. This

new product range will allow the company to offer its marine services to a larger portion of the shipping market, and is part of Swedserv's efforts to increase marine sales.

Continental Emsco Hires Panosh

Emery Panosh has joined the SKAGIT divi-

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PEOPLE & COMPANY NEWS

sion of Continental Emsco Co. as vice president of Sales and Marketing. He previously served as general sales manager of SKAG-IT Manufacturing, and has also worked for AMCA International Corp. and AmClyde Engineering Products.

The Houston-based company designs and manufactures a line of marine winches and other deck machinery.

CSI Adds Marketing Director

Dallas-based Composite Structures International, Inc. has named **John Carter** as its Marketing director. The company manufactures Fibergrate and Chemgrate fiberglass reinforced plastic (FRP) gratings and

Dynaform structural components. Mr. **Carter's** responsibilities in this newly created position will include participation in new product launches as well as oversight of all marketing communications activities, including advertising

and sales promotion, training and market research.

USCG Cutter Welcomes New Commanding Officer

In a ceremony scheduled to be

held on August 8, Chief Warrant Officer **Eric L. Olson** was to relieve Chief Warrant Officer **Tracy S. Carlson** as commanding officer of U.S. Coast Guard cutter *White Holly* (WLM 543).

CWO **Carlson** departs *White*

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PEOPLE & COMPANY NEWS

Holly, after a successful tour, for assignment at the National Data Buoy Center near Bay St. Louis, Mo. Under this commanding officer, the cutter was awarded the USCG's Meritorious Unit Commendation for its performance during a hurricane in 1995.

CWO **Olson** reports to *White Holly* from cutter *Cowslip*, homeported in Astoria, Ore. His previous assignments included service aboard seven Coast Guard cutters and several shore units.

ACBL Promotes Waters



Thomas Waters

American Commercial Barge Line (ACBL) has promoted **Thomas E. Waters** to the position of Coal Sales director. He previously served as assistant director of the same business area, and has been an employee of the company since 1985.

Ford Joins PCCI



Quinton Ford

PCCI, Inc., a marine and environmental engineering company in Alexandria, Va., has welcomed **Quinton Ford** to its staff. Initially, Mr. **Ford** will provide technical support for the First Coast Guard District Aids to Navigation Battery Aquatic Recovery Project, and to the Military Sealift Command environmental program. Previous to this appointment, he served as an environmental technician for Clean Harbors Environmental Services, Inc.

Matson Elects Hayman To Run Operations

Susan Hayman has been promoted by Matson Navigation Company as Operations manager for Southern California. In this capacity she will oversee all vessel and terminal operations at Terminal Island, the company's largest West Coast facility.

Ms. **Hayman** is a Lt. Commander in the Navy Reserve and began her maritime career 16 years ago as a third mate aboard

an Exxon tanker.

She joined Matson in 1989 as a manager in Corporate Planning and Development, and has since served in numerous capacities, including director of Operations Administration and Financial Analysis; vice president of Matson Terminals, Inc.; and as Customer Service manager, where she supervised the center which carries out all of the company's administrative functions including booking, billing and shipment tracking.

Leica Names Business Director For Marine GPS

Gunnar Mangs has been

appointed business director of Leica's Marine GPS Group. He is responsible for product development, engineering, manufacturing, marketing, sales and support of the company's navigation and positioning product lines for both marine and land-based applications.

Prior to accepting this new position, Mr. **Mangs** was managing director of CA Clase AB, in Gothenburg, Sweden, since 1988, where he spearheaded the company's emergence as a GPS technolo-



Gunnar Mangs

gy leader in Scandinavia.

Florida Yard Names New President

Michael Keenan has assumed the top position at Tampa Bay Shipbuilding & Repair (TBS&R). Prior to accepting this job, he was employed by Newport News Shipbuilding as a tanker project program director.

TBS&R is a partnership between Bender Shipbuilding & Repair in Mobile, Ala., and Gulf Marine Repair in Tampa, Fla. The yard has four drydocks including deep berth graving docks which can accommodate vessels up to 150 ft.

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Yacht Builder Names North American Agent

Spanish company Astilleros Astondoa S.A. has named **Robert P. Laska** as its exclusive agent for Astondoa Yachts in North America, the Bahamas and the Caribbean basin. The company is known for its fiberglass construction of custom yachts up to 120 ft. (36.5 m) long, and is recognized for its use of exotic wood interiors and employment of precision mechani-



Robert Laska

cal equipment. Mr. **Laska** will introduce the company's 95-ft. (28.9-m) Palm Beach model yacht at the 1998 Miami Boat Show.

Walpert To Serve In Navy League

Harvey B. Walpert, Halter Marine Group's senior vice president of Corporate Affairs, has been elected Louisiana state president of the Navy League of the U.S.



Harvey Walpert

The Navy League is a civilian maritime organization founded in 1902, dedicated to educating Americans about sea power. Its

70,000 members in 330 councils worldwide engage in activities supportive of the U.S. Navy, Marine Corps, Coast Guard and Merchant Marine.

Mr. **Walpert** is the immediate past chairman of the New Orleans chapter of the League, and current president of the Southeast Shipyard Association.

Halter Delivers Seacor Vision

Halter Marine has delivered *Seacor Vision*, a 225-ft., 12,280-bhp anchor handling/towing supply (AHTS) vessel to Seacor Smit, Inc. Built at Halter's Moss Point Marine, the vessel is the first in a series of four contracted by Seacor, designed to meet requirements for deepwater service in the Gulf of Mexico and the worldwide market.

For more information on Halter Marine
Circle 13 on Reader Service Card

Schottel And Baylor Form Joint Venture

Schottel-Werft and Baylor Co. will form a new joint venture company for the manufacture, sale and service of Schottel-Werft prod-

ucts in North and Central America. The new company will be located in Sugar Land, Texas. Schottel North America, Inc. will continue as the agent for Schottel-Werft until the new corporation is formed. Schottel-Werft activities in North and Central America will be integrated into the new joint venture. Schottel North America will continue with all assigned projects.

For more information
Circle 16 on Reader Service Card

Jensen Maritime Announces GM Appointment

Jensen Maritime Consultants, Inc. president and principal owner **Susan Williams** has announced that **Gerry D. Elston** has been named general manager of the firm.

For the past two years, Mr. **Elston** has been the principal naval architect for the Jumbo Mark II ferries working for Todd Pacific Shipyards and was previously employed in a management capacity for Ak-Wa Shipyard and J.M. Martinac Shipbuilding Corp.

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ISIT Update: Quest For Automation Continues

Reduced crew sizes and the technology revolution have led to the implementation of a wide array of systems onboard ships, creating the need for a better way of administering and managing these systems. Marine Management Systems (MMS) President **Gene Story** recognized this growing problem and envisioned a solution that solves this problem and offers a host of other benefits to shipowners and professionals throughout the marine industry. That vision is the Integrated Shipboard Information Technology Platform (ISIT), an industrial strength IT platform featuring a communications program, hardware systems and software applications. The communications component (initially designed to be a dedicated INMARSAT link) makes it possible for shipowners and operators to remotely manage and monitor their ships' information systems from a single shoreside location, reducing the need for highly trained IT personnel on every vessel.

Traditionally, most software applications have been built with a "stovepipe" architecture, a unique format that makes it difficult or impossible for data which is utilized and collected to be transferred to other systems. In addition to providing a platform, ISIT specifies a common architectural format. It provides the building blocks that will make it possible for all shipping company programs to be able to easily exchange data.

Fleetwide Consolidation — Financial Integration

ISIT is designed to enable true fleet-wide consolidation. It enables an operator to update a part number on one computer and have the change transmitted to every computer across his or her enterprise. It also allows a company to utilize data from all of its ships. A manager can determine what ships are doing best and transfer that knowledge or skill set to the rest of the fleet. It delivers access to all of the data necessary to meet classification requirements.

The platform makes it possible for information collected by all ships in a fleet to be interfaced with a company's financial sys-

tems. An owner can look at the performance of the whole fleet, against both operating and financial standards. Access to fleet-wide data enables bulk ordering for discounts, helps



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shipowners reduce the number of spares required on their ships and eliminates redundant data entry and related errors.

Communications expenses are dramatically reduced. Interfacing

all of the systems in an enterprise makes it possible for "forms" — electronic structures that transmit only updated information to other computers in the enterprise — to be used. Utilizing forms with the

advanced bundling and compression techniques ISIT offers will reportedly save users up to 80 percent of their current communications bills.

Fleet-wide integration is just the

beginning. With a common IT platform and data structures, there is no limit to the potential for data exchange. Regulatory and class societies, vendors, shipbuilders, shipowners, ship managers and ship officers can all have instant, controlled access to ship data. Services including Inmarsat, MSAT/AMSC, Orbcom, Odyssey, VHF/HF, cellular and Iridium can be integrated.

ISIT's benefits extend into the ISM and class society approval process. With common data formats, ships can provide inspectors with critical engine operating and maintenance data prior to inspections, making it possible for inspectors to pre-evaluate the necessity of an inspection. The availability of such data can also alert inspectors as to which areas require further inspection, helping them to make the most of the brief inspection time, and improving the quality of the inspection and the safety of the world's fleets.

Industry Onboard

Since its inception, interest in ISIT has snowballed. MMS is leading the development team which is comprised of eight firms from the U.S., Canada and Norway, which is responsible for the actual development of the ISIT platform and its roll-out and test in a shipboard environment.

A second committee, the Industry Advisory Board, is comprised of shipowners/operators, communications companies, shipyards and regulatory/government organizations. This group of more than 30 organizations is responsible for ensuring that ISIT adequately addresses the industry's problems and develops commercially viable solutions.

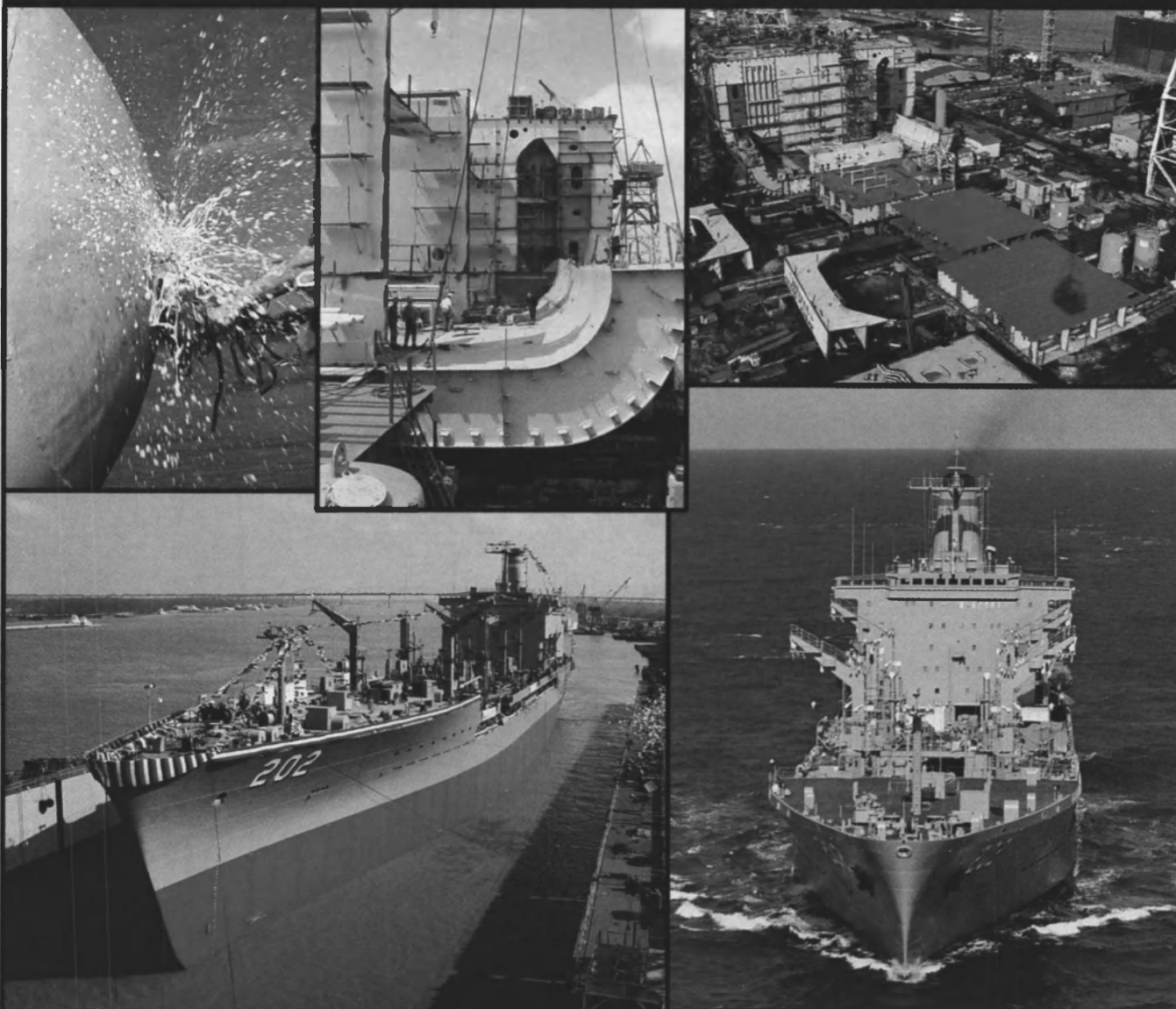
The Standards Committee, comprised of more than 40 organizations from 12 countries, has developed industry consensus standards in the area of shipboard data management and communications through the ASTM (U.S. National Standards Group).

The first ISIT related standard, The Standard Guide for the Implementation of a Fleet Management System Network (ASTM F1756), was approved by the standards organization ASTM in the last quarter of 1996. It has now been entered into the ISO process and has received the coun-

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try member support necessary to be entered as a work item for ISO standard development. ISIT's roll-out will start in the fourth quarter of this year.

ISIT will allow a ship owner in Greece to seamlessly exchange data with a class society in Norway.

It makes true fleet-wide systems integration a reality with a host of financial benefits including dramatically reduced communications costs and numerous savings from financial integration. It holds the promise that an owner will be able to view or update a work procedure on his or her computer, and have it update all of the computers on his or her ships whether they are a mile away, or half way across the world.

ISIT Industry Advisory Board

Owners/Operators:

- Stolt Parcel Tanker
- Chevron Shipping
- Sea-Land Service
- Coastal Tankers Inc.
- Osprey-Acomarit
- Marine Transport Lines
- Eletson Corp.

Shipyards:

- Ingalls Shipbuilding
- Bath Iron Works
- NASSCO
- Avondale
- McDermott
- Trinity Marine Group
- Alabama Shipbuilding
- Newport News

Communications Companies:

- Comsat
- Orbcom
- AMSC
- Iridium
- Mobile Datacom

Classification/Government

Societies:

- ABS
- DNV
- LLoyd's Register
- U.S. Coast Guard

Virtual Reality: Deneb Presents DARPA Software

Deneb Robotics, Inc. recently gave a presentation of its Defense Advanced Research Projects Agency (DARPA), utilizing the

company's Envision and Deneb/ERGO software to immerse participants in a ship firefighting scenario.

The demonstration was completed in conjunction with Electric Boat as part of a DARPA-spon-

sored Simulation Based Designed (SBD) project, the most recent stage of which was led by Lockheed Martin and focused on the Advanced Surface Combatant notional surface ship design.

Envision reportedly enables

users to design, build, test, operate and support multiple product and system scenarios in a fast, efficient and cost-effective manner. Envision provides an environment for developing and validating the design of complex mechanisms,



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assembly procedures, maintenance and operational requirements by allowing users to interact directly within virtual environments.

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P&O/Princess To Outfit Vessels With BMT Simulator

P&O Cruises and its sister company Princess Cruise have placed

a joint order for nine PC REMBRANDT systems, BMT SeaTech's new PC-based real-time ship maneuvering simulator. This order follows a successful six-month trial run and evaluation of the simulator on P&O's *Oriana*.

"PC REMBRANDT enables us to accurately assess and plan entry and berthing in unfamiliar ports before committing our modern sophisticated vessels to the real conditions of port entry and departure," said **John Marden**, director of Operations at P&O Cruises.

For more information on BMT Sea Tech
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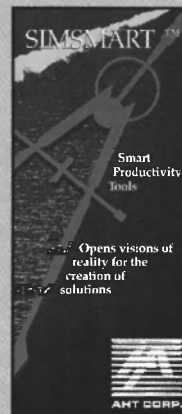
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Real-time, physics-based simulations software from AHT Corp.

For more information on AHT Corp.
Circle 23 on Reader Service Card

New Service Provides Instant Access To ClassNK Ship Data

ClassNK offers the new NK-SHIPS service, providing a direct link via computer or fax to ClassNK's in-house classification database. In addition to receiving details on their own ships, users will also have access to the particulars of any of the more than 6,400 vessels on the society's register.

"This development reflects the rapidly increasing use which we are making of information technology in order to respond to the needs of our clients. Improving the speed of secure access to such information will be of benefit to everyone," said ClassNK Chairman and President **Tadashi Mano**.

For more information on ClassNK
Circle 55 on Reader Service Card

EA Systems Elects Ko To Develop Growth Markets

EA Systems Inc., a vendor of plant design and lifecycle data management software, has named **Stephen Ko** director of Asia-Pacific sales. Mr. Ko, who is based in Hong Kong, will market the company's Plant Applications and Systems for Concurrent Engineering (PASCE) software suite and services throughout Asia and Australasia.

The appointment of Mr. Ko establishes a full-time regional presence for EA Systems, which already sells PASCE to Daewoo Heavy Industries; LG Engineering Co., Ltd.; Mitsubishi Chemical Corporation; Mitsui Engineering & Shipbuilding Co. Ltd., and Samsung Engineering Co., Ltd. PASCE is a data-centric, plant engineering and data management system that runs on Windows NT in client/server computing environments.

Its object-based approach has been shown to significantly reduce project costs and schedules, providing a competitive advantage to power and process plant owner/operators, and to the engineering firms providing services to them.

The PASCE suite of software applications is distinguished by its integrated database for 2D intelligent schematics, (PlantSCHEMA) and 3D physical modeling (PlantVIEW) for data consistency and single-time data entry. In addition to its Asian customer-base, clients of EA Systems include 3M Company; American Electric Power; APV Plc.; The Dow Chemical Company; Duke Power Company; Electricite de France; and Rohm and Haas Company

Jeppesen Enters Marine Market With ECS Package

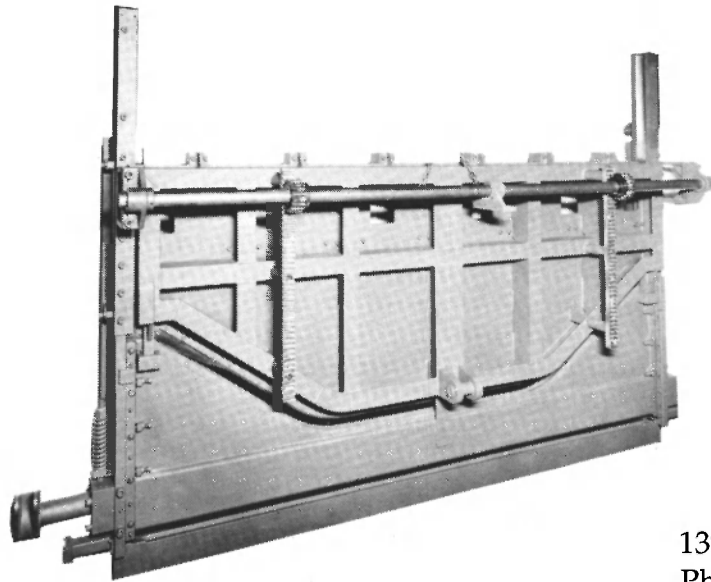
Flight information service provider Jeppesen has launched a new business unit, Jeppesen-Marine, and released a new electronic charting software (ECS) package, MarineMap. The new software offers a flexible ECS for both raster and vector-based navigation charts, and connects with standard GPS/DGPS and autopilots.

For more information on Jeppesen
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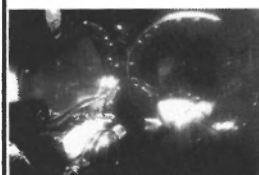
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Computervision Revamps PDM Software

Computervision Corp. has revised its Optegra product data management (PDM) software. The

new Optegra Revision 2.0 is designed to deliver enhancements in information access, security, workflow and configuration management to Computervision's Electronic Product Definition

(EPD) solution. Features of the new software include common user interface, access and security, workflow management, ECO management, Configuration management and MRP integration. Other

enhancements featured in Optegra 2.0 include common login, installation and license management of all Optegra modules and new optional configuration view and advanced configuration exchange modules.

For more information on Circle 59 on Reader Service Card

QED Systems, Inc.

Engineering and logistics firm is currently emphasizing the multimedia market, developing Interactive Electronic Technical Manuals (IETMs), electronic books and Computer Based Information/Training (CBI/CBT) programs. QED has been selected to participate in the Beta testing of the Naval Sea System Command SGML database, which is to host the Navy's operation and maintenance technical manuals.

For more information on Circle 11 on Reader Service Card

Seaborne Responds To Spill Clean-Up

Seaborne Information Technologies Ltd. has introduced SmartMATE, a Windows-based software which enables ships' officers to execute onboard oil pollution emergency plans (OPEPs). The system provides guidance specific to the circumstances of the emergency, simplifies communications and ensures accurate logging of events. SmartMATE is touted by Seaborne to dramatically reduce the amount of oil entering the water during a spill and reduce damage, clean-up and liability costs.

For more information on Seaborne Circle 12 on Reader Service Card

Maersk Data

Maersk Data offers Loadstar, a class-approved PC loading computer system for cargo handling and stress and stability calculations. The system is used for planning and controlling the handling of cargo ships and integrates all necessary functions into one program. Loadstar programs are designed for bulk carriers, car carriers, container vessels, crude/product carriers, LNG/LPG carriers, RoRos and supply vessels.

For more information on Maersk Data Circle 7 on Reader Service Card









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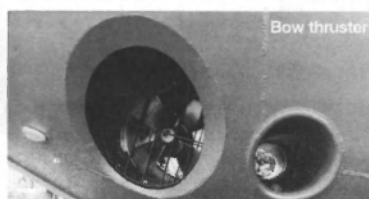
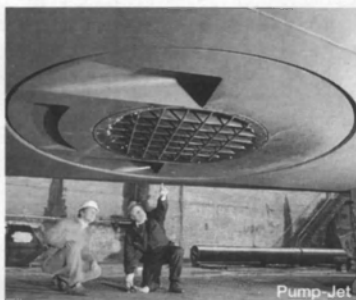
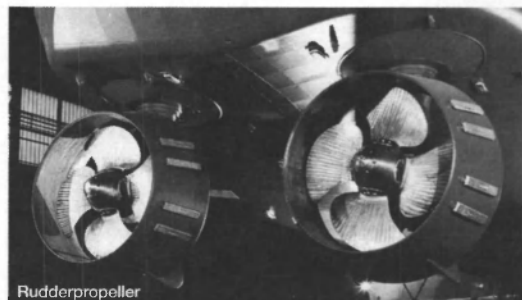
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New Human Resources Manager at HAM Marine

David W. Freeman was recently named Human Resources manager at HAM Marine, Inc. A graduate of the University of South Alabama, **Freeman** has 11 years experience in training, management and human resources.

Prior to joining HAM Marine, **Freeman** served as director of Human Resources for Grand Casinos, Inc. and CDI Services, Inc. He also worked as an operations/contract manager, contract analyst, program director and job developer for Gulf Coast Business Services Corp. **Freeman** is currently a member of the Society for Human Resource Management (SHRM).

Singapore Coast Guard Orders 20 Vessels

Shipping company Chuan Hup Holdings reported that its wholly-owned subsidiary Asia-Pacific Shipyard would join up with Australia's Geraldton Boat Builders to build 18 patrol boats and two command vessels for the Singapore Coast Guard.

Under the joint venture, the Australian company would transfer technology and expertise in boat building to the Chuan Hup unit.

Rodney E. Lay & Associates To Design Coastal Research Vessel

After an in-depth evaluation of several potential design firms, the University System of Georgia awarded Rodney E. Lay & Associates a contract for the design of a 90-ft (295.3 m) coastal research vessel, which will be operated by the Skidaway Institute of Oceanography located in Savannah, Ga.

The new craft will replace the 72-ft. (236.2 m) R/V. *Blue Fin* which has been utilized extensively by the Institute since its conversion from a yacht in 1972. The replacement vessel is intended to be a state-of-the-art platform for research on the physical, chemical, biological, and geological aspects of the south Atlantic coastal region as well as expanding marine educational studies.

The design will incorporate open working decks aft and along the starboard side, with hydraulically operated stern A-frame, side J-frame, deck crane and three scientific winches.

It will also include an internal Wet Lab and Dry Lab, a moon pool type transducer trunk extending from the weatherdeck to the keel to provide for installation of various instrumentation, and a full array of electronics installed in the Pilot House for navigation/communication needs.

For more information on Rodney E. Lay
Circle 95 on Reader Service Card

Major Order For Kelvin Hughes Observator B.V.

Kelvin Hughes Observator B.V. has secured a major order from Spliethoffs Bevrachingskantoor B.V. for the retrofitting of 20 vessels, with an option for another 12 vessels, each with two Nucleus2 5000 True Motion radar systems.

The systems being supplied are each combined with a 10kW upmast transceiver and X-band Antenna.

The full color displays use the patented tracker-ball and three button control systems that are now used in all Kelvin Hughes displays.

"We are very proud to have won this mega-order, it is good for us, the customer and continuation of the Netherlands and European maritime industry," said Kelvin Hughes Managing Director Willem Pullen.

Ugland Orders New Ships

Ugland Nordic Shipping AS plans to order up to three new shuttle tankers later this year for charter to North Sea oil producers. The company estimated that it would cost between \$60 million and \$90 million each, depending on size and equipment, and it is reportedly undecided on whether to purchase Aframax or Suezmax size units. Ugland Nordic currently controls a fleet of five shuttle tankers.

Wallenius Buys Two Ships From Daewoo

Wallenius Lines reportedly

signed a contract with South Korea's Daewoo Okpo Shipyard for two new Pure Car Truck Carriers (PCTCs), to be delivered in 1999. It also reportedly signed a 10-year charter agreement with Denmark's AP Moeller for two new car trans-

porters to be built at Japan's Tsuneishi yard. The PCTCs being built in Korea will be sister ships to six already built by Daewoo. The ships have a capacity of 5,850 cars. The Moeller ships will be delivered in 1999 and 2000.

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USCG Launches First Vessel Of \$45 Million New Construction Plan

The U.S. Coast Guard (USCG) recently celebrated the launching of Boat Utility Stern Loading (BUSL) 49403 and dedication of the BUSL fleet. Present at the ceremony were Maryland District Congressman **Wayne Gilchrest**, his daughter **Katie Gilchrest** who served as ship's sponsor, and Vadm. **James Loy**, USCG chief of staff.



Pictured is USCG Boat Utility Stern Loading 49403, which was recently launched in Baltimore, Md.

BUSL 49403 is the first of an anticipated 34, 49-ft (15-m) stern loading buoy boats to be constructed at the USCG yard in Baltimore, Md., throughout the next three years.

The yard is expected to deliver one vessel every six weeks for the duration of the \$45 million new construction program. BUSL 49403 features a 16,000 lb. deck load, two fixed propellers and two 305-hp diesel engines. The vessel will be assigned to the Aids-To-Navigation

Team Woods Hole in Woods Hole, Mass., and will perform USCG aids-to-navigation, marine environmental and ice breaking missions. The USCG expects to reduce maintenance costs and increase reliability of its short range aids-to-navigation mission by replacing the obsolete buoy boats with the new BUSLs.

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Cunard Appoints New Senior Vice President

Nikolaos Iplixian has been named senior vice president, Technical and Marine Operations at Cunard. He will be responsible for all technical and marine matters relating to Cunard's five cruise ships, including onboard safety management and the implementation and compliance with the ISM Code. Mr. **Iplixian's** experience includes 11 years with the J.C. Carras Group of Companies and most recently, he was executive vice president, Operations, at Majesty Cruise Line and Dolphin Cruise Line Inc.

Queen Supplier Undergoes \$2 Million Conversion At Bollinger

Offshore supply vessel *Queen Supplier* will undergo a \$2 million conversion at Bollinger Shipyards, Inc. subsidiary Bollinger Quick Repair (BQR). The vessel will be converted into an oilfield service vessel which will specialize in

stimulation work. *Queen Supplier* is currently being leased by BJ Services from vessel owner AS Supply Service.

The main objective of the conversion is to build a stimulation plant on the vessel. The installation of oil field equipment, related materials installation and all labor involved in the project is being handled at BQR.

A new central piping system below deck, as well as independent electrical power systems and various control systems have already been installed on the vessel.

**For more information on Bollinger
Circle 96 on Reader Service Card**

Oceaneering To Convert Tanker For Production Service

Oceaneering International, Inc. has acquired crude oil tanker SS *Arco Anchorage* and renamed it *Ocean Venture*.

The vessel is being marketed to oil companies worldwide for conversion to a floating production storage and offloading system (FPSO) or floating storage and offloading system (FSO) by Oceaneering's field development and production contracting division, Oceaneering Production Systems (OPS).

The 120,000-dwt *Ocean Venture*, with an oil storage capacity of approximately 900,000 barrels, is sized to meet worldwide requirements of FPSO/FSO projects. Features include two large main boilers which can be converted to burn gas for power generation; coated ballast tanks; four cargo pumps, each rated at 22,800 bbl/hr; a segregated ballast system; a crude oil washing system with heating capability; and an inert gas system.

Litton-Sperry Teams With NIMA For Nautical Chart Development

Litton Sperry Marine and the U.S. National Imagery and Mapping Agency (NIMA) have signed a cooperative research and development agreement (CRADA) to develop a direct chart reader for NIMA's digital nautical chart (DNC).

This software product will be integrated into Sperry Marine's

voyage management system and sold to manufacturers for use in their electronic charting systems.

The direct chart reader will use a Windows NT-based program which will read digital charts directly from CD-ROM and display them on an ECDIS-compliant display.

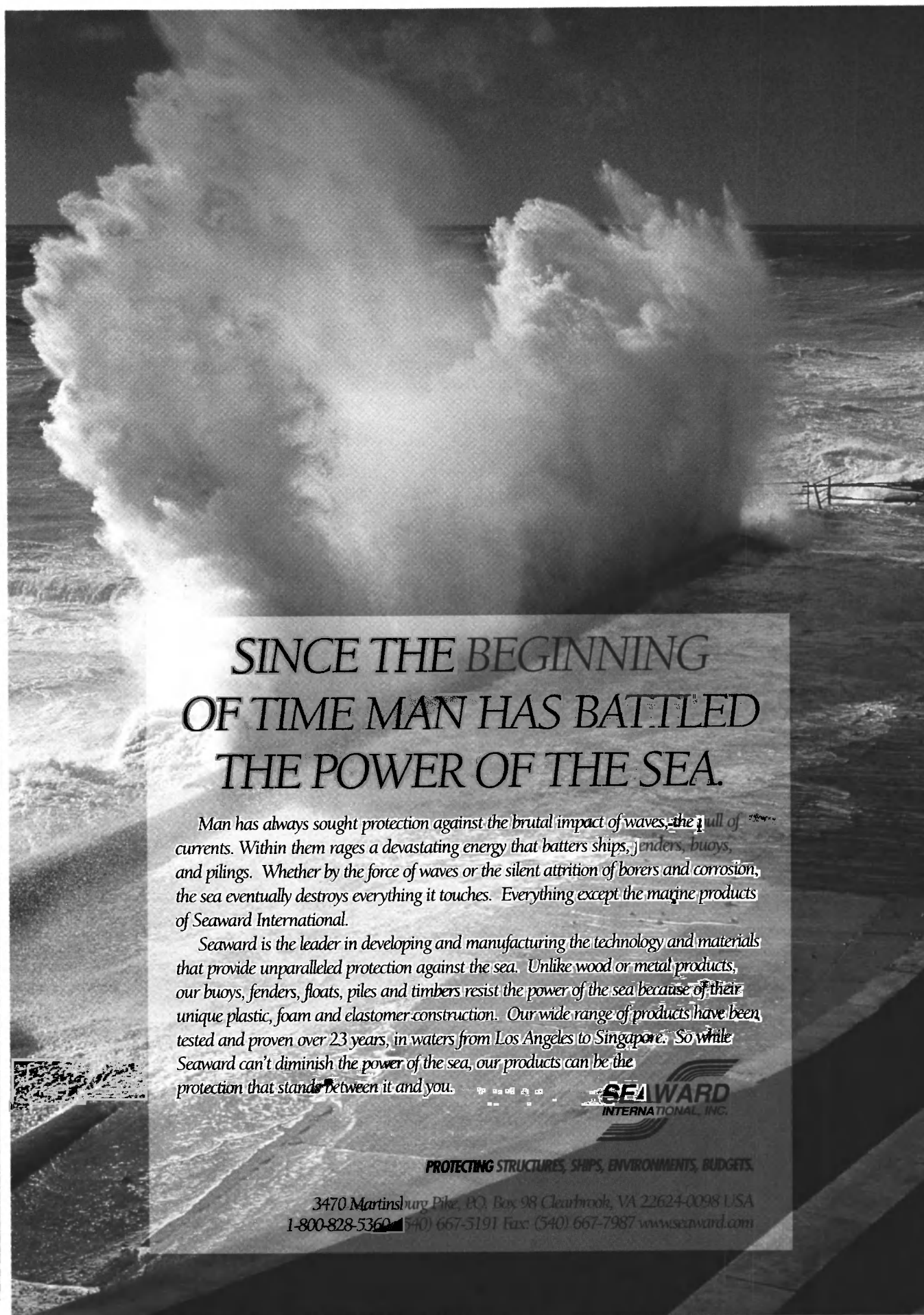
**For more information on
Litton-Sperry Marine
Circle 97 on Reader Service Card**

Canyon Offshore Completes ROV-Support Contract

Canyon Offshore Inc. has completed a contract with Amerada Hess Corp., providing ROV services to support the installation of two initiation piles and an associated template in the Gulf of Mexico.

Canyon mobilized 100-hp ROV *Triton XL* onto Diamond Offshore's *Ocean Rover* semi-submersible drilling rig, which was relocated to the Baldpate drilling where the ROV was deployed to assist in installing a 36-in. casings into a well slot.

The work was performed in water depths of up to 1,650 ft. (503 m)



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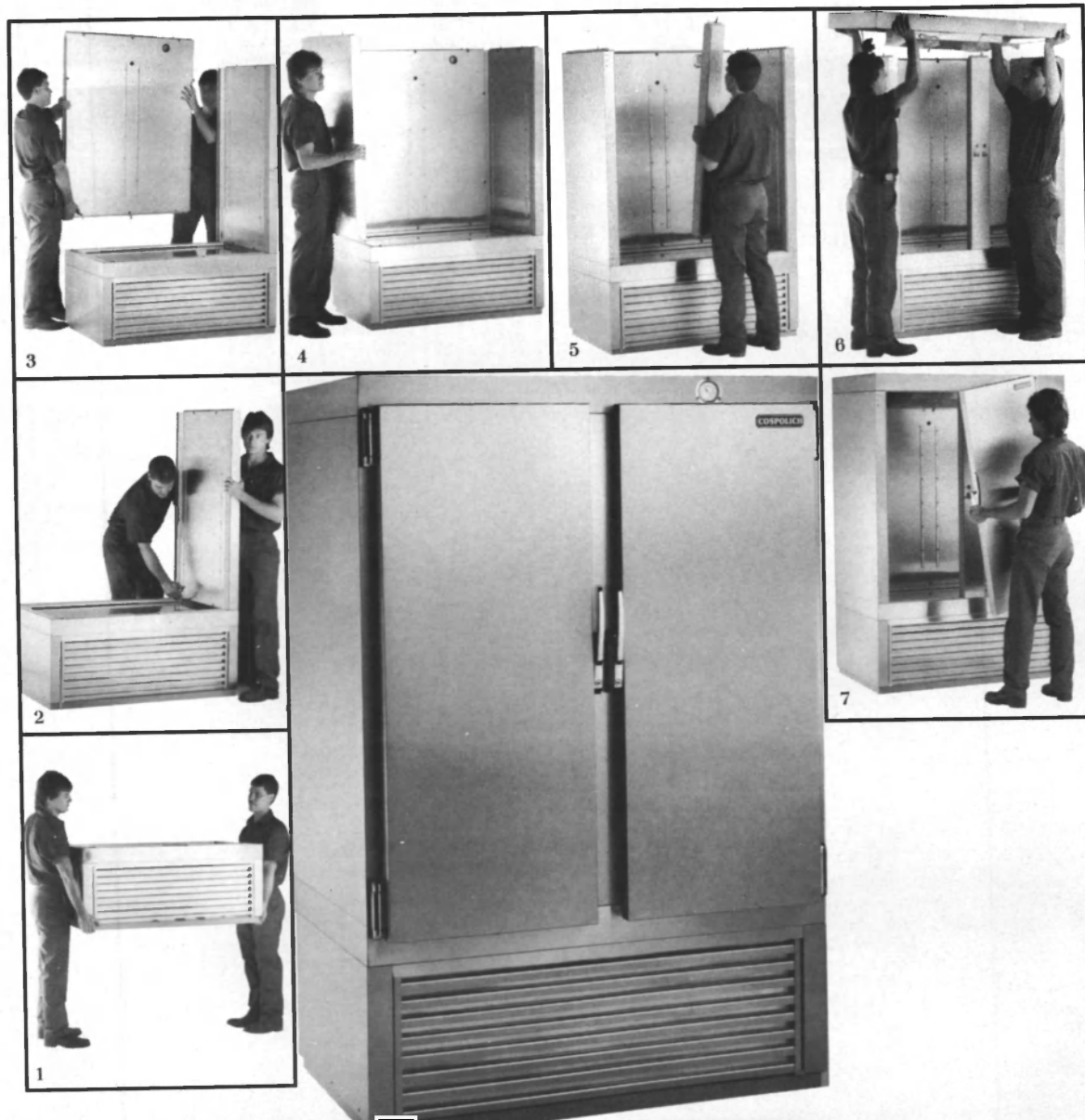
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Nichols Research Appoints New CEO

As of September 1, **Michael J. Mruz**, president and chief operating officer of Nichols Research Corp. will assume additional duties as CEO of the company. According to company Chairman **Chris. H. Horgen**, the change is part of a long-term succession plan that was put into effect three years ago to promote proven leadership in the company, while providing a smooth transition among management teams.

Navy Celebrates Keel Laying Of New T-AGS Vessel At Halter Marine

The keel laying of U.S. Navy vessel T-AGS 64, a 329-ft. (100-m) oceanographic ship, recently took place at Halter Marine's Moss Point shipyard. The vessel will be named as a result of a nationwide student competition to propose a name for the new ship. The program is intended to broaden public awareness of the Navy and its oceanographic mission through the 1998 Year of the Oceans, as well as Halter's role in designing and building the ship. Winners from each state will be selected by March 1998, and in May the overall winner and name of the vessel will be announced. The vessel is expected to be launched next summer.

T-AGS 60 class ships carry the latest in over-the-side sensors and sampling equipment including bathythermographs, bottom corers and seismic equipment.

Diamond Offshore Contracts Bardex For Jack-Up Conversion

Diamond Offshore Drilling, Inc. has contracted with Bardex Corp. for the rig skidding system on *Ocean Warwick*, which is being converted from a Levingston Class 111-S slot/skid-off type jack-up built in 1971 to a cantilever design. The Bardex cantilever extension/retraction skidding system will consist of two

(Continued on next page)

Atlantic Marine Completes Conversion Project For Protexa Group

Atlantic Marine has successfully completed the conversion of 18,000 bbl, 8,000 dwt coastal tanker *Cora* into a dynamically positioned floating production storage and offloading system (FPSO) for Condux SA, a sub-

siary of the Protexa Group.

The vessel will be on contract with Pemex upon its departure from the yard.

The project was managed by Condux's vessel maintenance department, and included major

structural modifications, installation of two thrusters and all facility equipment, which was designed and manufactured by Schlumberger.

For more information
Circle 99 on Reader Service Card



(Continued from previous page)

500-ton push/pull capacity gripper-jack assemblies operating on 36 x 21.4-in. jacking beams. Upon completion of the conversion, the vessel will reportedly be capable of drilling a 20,000 ft. (6,096 m) well.

P&I Club Offer New Video On Bulk Carrier Safety

A new video sponsored by A. Bilbrough & Co., manager of the London P&I Club, is designed to help ship crews and shore-based managers better understand their part in reducing cargo claims on bulk carriers. The video examines the most frequent cases of cargo loss and damage, and outlines the precautions which can be taken to ensure that bulk cargoes arrive at discharge ports in the same condition which they were loaded. The importance of checking the IMO Code of Safe Practice for Solid Bulk Cargoes is emphasized.

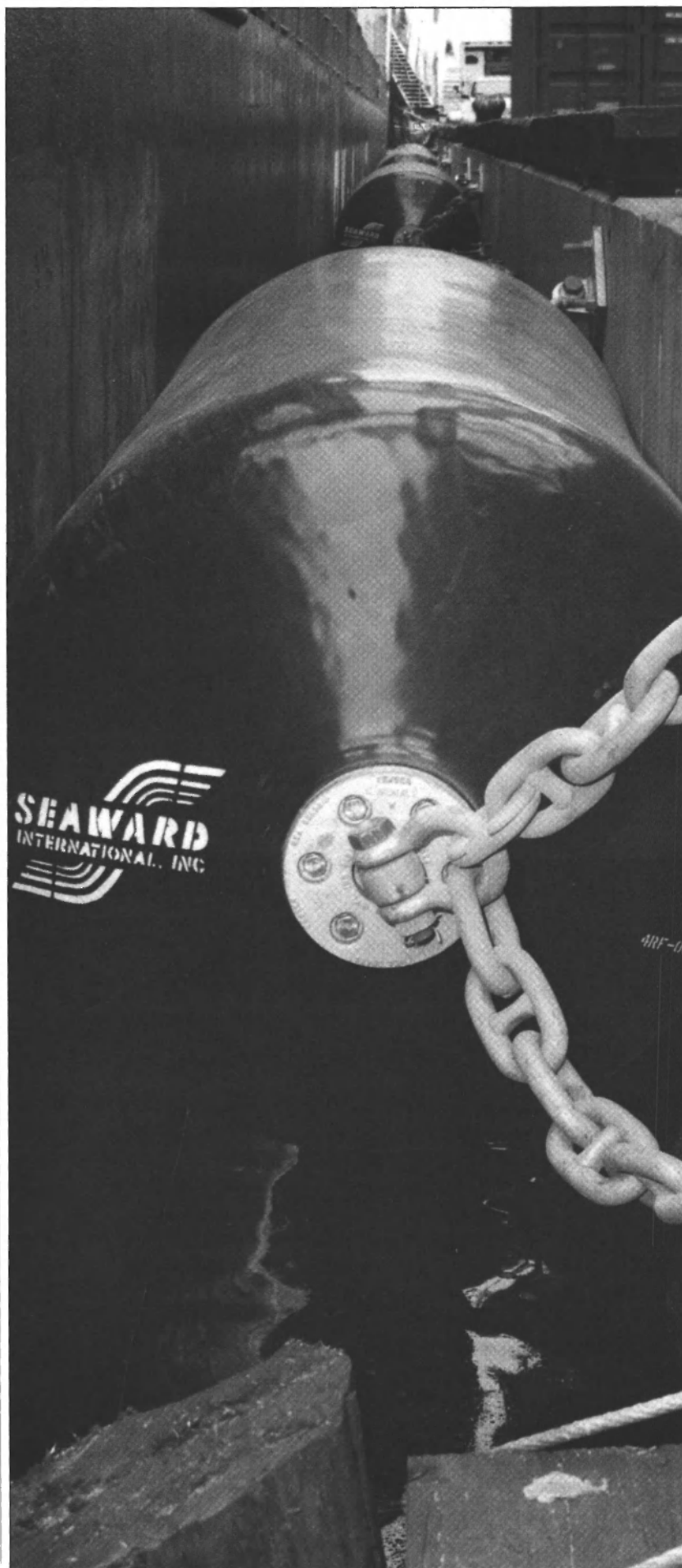
For more information on the video
Circle 98 on Reader Service Card

INTERTANKO Holds Second Meeting Of New Asian Regional Panel

New Singapore OPL Bunkering Rules Is Agenda Topper

The second meeting of the International Association of Independent Tankers Owners (INTERTANKO) newly established Asian Regional Panel took place at the Raffles Hotel in Singapore on August 28, 1997. There were 32 participants, representing INTERTANKO mem-

(Continued on page 109)



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Also visit Seaward at booths #38 and #39 at the AAPA conference in Jacksonville, FL.

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(Continued from page 31)

CORETEC Inc.

CORETEC Inc., a privately-owned engineering firm, provides professional services in environmental and ocean engineering and

information technology to national and international clients. Among their primary services are ice and oil spill management and forecasting, environmental monitoring, analysis and design of offshore structures, marine hydrodynamics, expert systems and neural networks, and database management

systems.

The company's products include the Integrated Information and Forecasting Systems and its Ship Predictor System, which is a marine navigational aid that utilizes both artificial intelligence technology and existing ship maneuvering capabilities to enable

the short-term prediction of ship trajectories in confined and restricted waters.

Formglas Inc.

Specializing in fiberglass reinforced cast products for interior use, Formglas Inc. manufactures products including Glasfiber Reinforced Gypsum ready for field finishing, QuarryCast prefinished "molded stone", and MetalCast mineral/metal powder brass and bronze castings.

International Communication and Navigation Ltd.

International Communication and Navigation Ltd. (ICAN) is a system development and integration company primarily involved in the development of Differential Global Positioning Systems (DGPS) and related services, including communications and software development. Included in its list of services are DGPS System design and installation, project management, VHF and MF/HF communications system design and installation, and CCTV security and surveillance systems (land and ship-based), fibre optic based local area network and data communications links, engineering and consulting services, navigation software products, and DGPS performance software.

Seaborne Information Technologies Ltd.

Seaborne Information Technologies Ltd. is a marine environmental and information technology consulting company specializing in offshore oil and gas exploration and development, marine transportation, fisheries, marine search and rescue, defense, pulp and paper, and all levels of government.

The company delivers services related to physical oceanography, marine meteorology, marine pollution protection and coastal environmental issues. In addition to other services, Seaborne distributes and supports SmartMATE, a Windows-based system for implementing shipboard Oil Pollution Emergency Plans.

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situation of the spill emergency and provides the operator with a prioritized action list and associated informations appropriate to the circumstances.

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Simpson Power Products distributes Mitsubishi engines throughout the Western Hemisphere. Its products include Mitsubishi-SIMPOWER marine propulsion systems and marine generator systems.

Stone Marine Canada

Celebrating 30 years of service to the North American marine industry, Stone Marine Canada manufactures propellers and blades. Among its customers are the U.S. Navy and Coast Guard.

Stone Marine also offers sales and repair services for propellers and blades.

Stikeman Elliot

Stikeman Elliot is a law partnership offering corporate, litigation, securities, shipping transactions and taxation services in the areas of insurance, the environment, energy, products liability, maritime and international trade matters. Shipping and insurance matters are handled primarily from the Montreal office, and the firm has the capacity to handle maritime litigation throughout the country.

GTR Campbell Marine Consultants

GTR Campbell Marine Consultants are involved in the design of geared, handy-sized, multi-purpose cargo vessels and bulk carriers, capable of entering secondary ports where water depth is limited and cargo handling facilities are basic or even non-existent. The firm's latest design is a 28,000-dwt multi-purpose cargo ship. So far, GTR says three of these ships have been delivered and there are another seven on order.

Applied High Technology Corp.

Applied High Technology (AHT) Corp. develops and markets SIMSMART, a physics-based Dynamic Simulation Software that shows how fluid, high pressure gas and HVAC systems will behave in real-time and in real environments. It may be used from the preliminary engineering phase of a project to the detailed design, optimization, and training through the ongoing lifecycle management phase.

The SIMSMART user can create designs using the objects from the libraries, set new parameters for different objects, place data on the simulation screen for visualization, save multiple base lines for future recall, accumulate data over time to compare relationships between computed data, and interface the simulation to most external systems or software

September, 1997

packages. SIMSMART is now available on Windows NT.

Brookdale International Systems Inc.

Brookdale International Systems Inc.'s patented EVAC-U8 combines a DuPont Kapton hood resistant to transient flames and a carbon monoxide capable air filter to protect people against toxic smoke while evacuating from fire, chemical or other emergencies in homes, offices, factories, hospitals, aircraft, and marine vessels. Used by the Canadian Coast Guard,

cruise ships, fishing fleets, and commercial airline passengers and crew, EVAC-U8 has won three international product awards.

United Marine Communications Inc.

United Marine Communications Inc. is a manufacturer of marine interior communications systems and components for the commercial and naval shipbuilding industry.

The company specializes in large and small integrated systems involving dial telephone, public address and talkback functions, often



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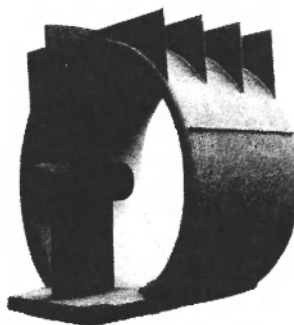
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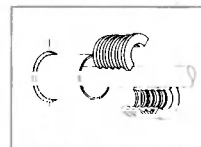
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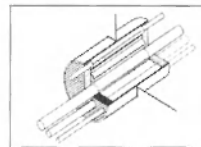
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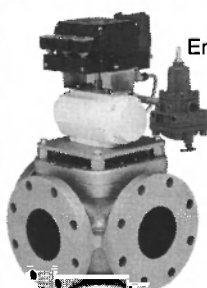
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CANADIAN MARITIME REVIEW

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Albacore Research Ltd.

Albacore Research Ltd. develops PC-based software for ship manufacturing. Recently ARL has announced the addition of CAD-Link, a shipbuilding software product designed to provide shipbuilders with an easy-to-use and powerful ship production program to create and manage the drawings required in shipbuilding.

The program runs with AutoCAS R13 for Windows, Windows 95 and Windows NT. ARL has also recently released ShipCAM96, a fairing and lofting program that provides capabilities for compound curvature and developable plate expansion, generating shell expansion drawings, inverse bending curve frames and longitudinals from stock profile without forming templates, generating pin jig assemblies, and calculating weights and centers of gravity. In addition, it provides frame and surface lofting functions and a geometry editor with features for: trimming, intersecting, and offsetting surfaces; generating a variety of cambered deck surfaces; filleting between two surfaces; and projecting lines onto surfaces. ShipCAM96 is compatible with ShipCAM4 and data imports from all ship design software and integrates with all major CAD systems using the DXF exchange format.

ARL now includes bevel cutting capabilities for its advanced NC code generation program,

NC-Pyros Pro for Windows.

Autonav Marine Systems

Autonav Marine Systems recently reported another successful year of increased sales in both autopilot and steering systems.

A 16 ton Metre steering system with integrated and automatic rudder locking pin system was recently supplied to Industries Davie in Levis Quebec, for the Polyvalent Ice Breaking Ferry under construction for STQ.

Silva Sweden, distributors of the Autonav autopilot in Europe, has reportedly placed a large order for autopilots from Autonav.

Clarke Chapman Canada

Clarke Chapman Canada offers products and management, operation, and maintenance services for naval and commercial ships, ports, terminals, and land-based and offshore industries. Its products include deck machinery, FPSO cranes and hose reels, ship loaders/unloaders, stackers and reclaimers, dockside cargo, shipbuilding, grabbing, offshore and multi-purpose cranes, syncrolift ship lift systems, marine boilers, valves and desalination equipment.

Western Machine Works

Western Machine Works, manufacturers of hydraulic tow pin units, cable hold-down blocks and stern rollers, recently recorded sales to the U.S., Spain and Italy. In addition, a new model of towing pin was developed for Rosetti Marino SPA, Italy.

This towing pin, of very heavy construction, will be fitted on a new tug to enable a tow line to be safely led from the end of the vessel when ship berthing.

Western Machine Works also provides assistance in developing or adapting special designs to suit individual requirements.

Allied Shipbuilders Ltd.

Allied Shipbuilders Ltd., a family-run shipbuilding, ship repair and ship design firm located on the north shore of Vancouver Harbour, delivered the Skeena Queen, a 110-m, 100-vehicle, Century Class Ferry for B.C. Ferries in March, 1997.

Malcolm McLaren, contracts manager at Allied, said the U.S. \$15 million ferry contract was the largest and most valuable single project completed by the shipyard in a decade.

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Circle 341 on Reader Service Card

(Continued from page 105)

bers and leading tanker owners/operators from Hong Kong, Japan, Korea, Malaysia and Singapore.

The Singapore Shipping Association and Hong Kong Shipowners Association were also represented together with **Dagfinn Lunde**, **Kristian Fuglesang** and **Minerva Alfonso** from the INTERTANKO Secretariat.

INTERTANKO established the Asian Regional panel earlier this year to boost the participation of Asias tanker shipping interests in the activities of the association.

Mr **K.H. Koo** of Tai Chong Cheang Steamship Co. (HK) Ltd. was elected Chairman of the Panel and Mr. **Joseph Kwok** of Neptune Orient Lines Ltd. the first of two Vice-Chairmen. Both Mr. **Koo** and Mr. **Kwok** are members of the

INTERTANKO Executive Committee. It was decided that the second Vice-Chairman should come from Japan, and the Japanese delegation will revert with their nomination as soon as possible. Discussions at the second panel session were reportedly constructive.

At the top of the agenda was Singapore's new port limits and Singapore Off-Port Limits (OPL) about which Captain **Anil Singh** from Tanker Pacific gave a comprehensive presentation.

Mr. **Shinji Kumagawa** of NYK Line made a brief presentation on the congested traffic situation in Tokyo Bay, and also discussed the Japanese governments plan to expedite the replacement of the existing single hull tankers by double hull prior to the mandatory specified date. INTERTANKO has been asked to take action and appeal against this initiative.

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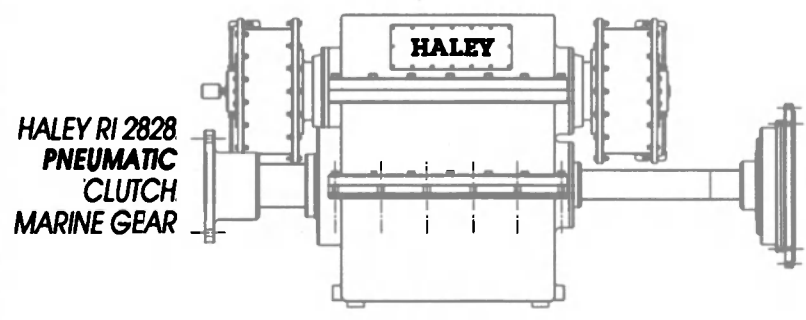
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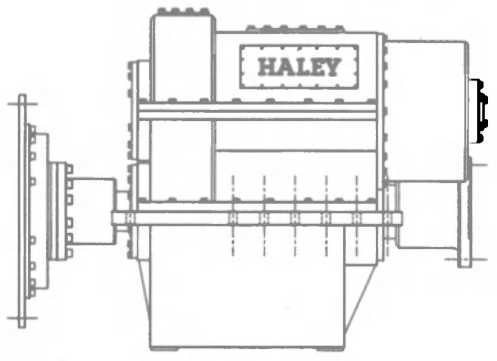
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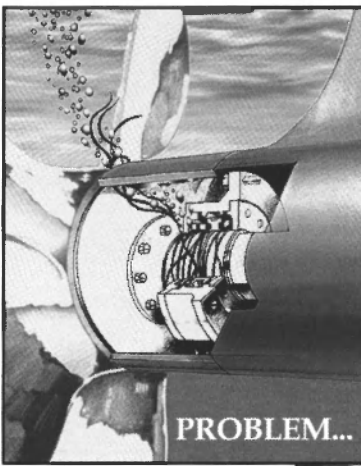
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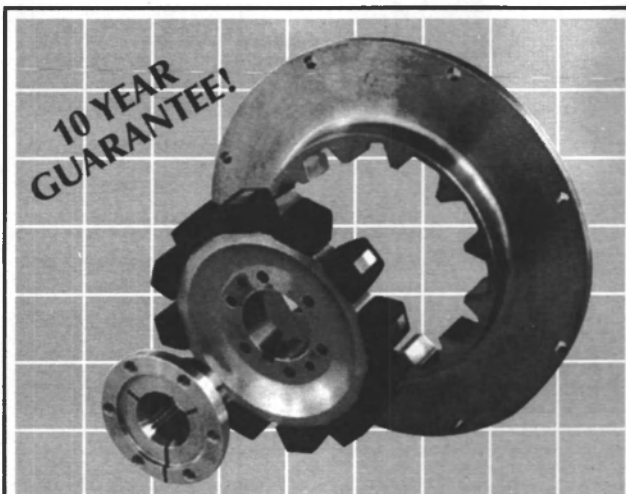
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CANADIAN MARITIME REVIEW

Catamaran Ferries International Inc.

Catamaran Ferries International Inc. (CFI) is managing the construction of three high-speed vehicle and passenger carrying aluminum catamaran ferries for the British Columbia Ferry Corporation. The ferries, which will each carry 250 vehicles and 1,000 passengers, will serve BC Ferries' Horseshoe Bay-Nanaimo route at a service speed of 37 knots. Construction of the first ferry is reportedly 60 percent complete and is currently scheduled for a mid-October launch, with service scheduled to begin in the spring of 1998. The second ship is scheduled for delivery to BC Ferries in the summer of 1998, while the third will be delivered in the winter of 1998.

For more information on
Catamaran Ferries International Inc.
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Marine Press of Canada

Distributors of nautical charts, publica-

tions and data, Marine Press of Canada is North America's only International Admiralty Chart Agent, and in June 1997 it received ISO 9002 certification.

The company also develops and provides chart correction tracings for American, British and Canadian products, and worldwide fleet portfolio management services based on ISM standards.

For more information on Marine Press of Canada
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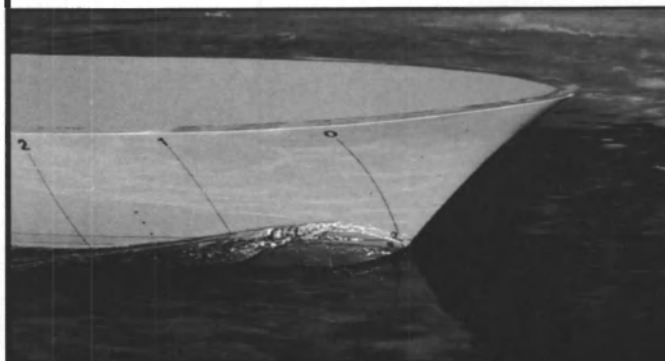
MIL Systems

MIL Systems is a full service consulting engineering company providing Naval architecture, marine and structural engineering services under an ISO 9001 Certified Quality Assurance program.

The company has recently launched a new Windows software program, Structural Inspection Database (SID), used to manage and analyze data from structural surveys, defects and repairs. In addition, MIL Systems is involved in a partnership with MetalCraft Marine Inc. to build seven 47-ft. (14.33-m) lifeboats for the Canadian Coast Guard. The vessels are to be used in search and rescue operations on the west coast and St. Lawrence River.

For more information on MIL Systems
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BC Research Ocean Engineering Center

The BC Research Ocean Engineering Center's main areas of activity are ship hydrodynamics and coastal engineering.

Work conducted at the center ranges from fundamental hydrodynamic research to extensive R&D programs on advanced marine vehicles and model studies of harbors and breakwaters.

The Center is also involved on various research projects on crafts such as surface effect ships, planing hulls, hydrofoils, high-speed catamarans, tugs, barges and ferries. Major coastal engineering projects include the Seward, Alaska, small boat harbor expansion, and Seattle's Elliot Bay cruise ship.

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Will IMO Deliberations Prove A Boon To Ship Repair?

The age of the world's bulk carrier fleet has been linked to increases in structural failures

resulting in death, injury and property loss. Statistics, tragic stories and increased media expo-

sure have prompted the International Maritime Organization (IMO) to convene in

November to consider changes to the Safety of Life at Sea Convention (SOLAS). What will culminate from the meetings will be reflected in a new Chapter XII to the Annex of SOLAS entitled: "Safety Measures for Bulk Carriers." Chapter XII of SOLAS will significantly impact the bulk carrier industry and serve as a potential boon to the ship repair industry.

Chapter XII covers bulk carriers of single and double hull construction that are 492 ft. (150 m) or longer. Under Chapter XII's

Given anticipated supply and demand needs, smaller shipyards — especially in Eastern Europe, South American, China, Indonesia, the Mediterranean and the U.S. — may be inundated with Handysize repair work

regulations, new and existing vessels governed by Chapter XII would be required to meet certain standards depending on factors unique to the ship.


New vessels, defined as capable of carrying solid bulk cargoes having a density of 1 ton/cu. m. and above, and built on, or after, July 1, 1999, would have to be constructed in such manner as to be capable of floating and maintaining satisfactory equilibrium when loaded under any loading or ballast conditions, to the summer load line, assuming that any one cargo hold is flooded.

Existing vessels, defined as single-skin bulkers carrying solid bulk cargoes having a density of 1.78 tons/cu. m. and above, and built, before July 1, 1999, face tougher standards. Existing vessels, when loaded to the summer load line, must be able to with-

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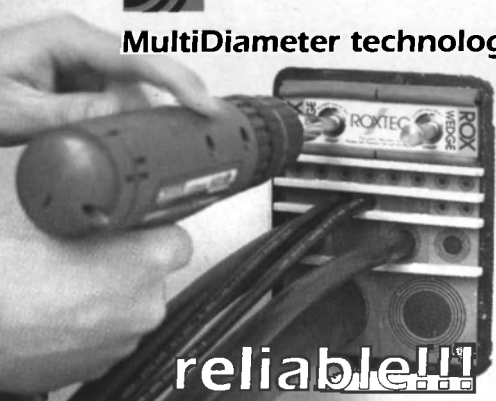
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stand flooding of the foremost cargo hold in all loading conditions and be capable of floating and maintaining satisfactory equilibrium. The applicable regulations require that the transverse watertight bulkhead between the two foremost cargo holds and the double bottom of the foremost cargo hold must have sufficient strength to withstand flooding of the foremost cargo hold, taking into account the dynamic effects resulting from the presence of water in the ship's hold.

For bulkers that are 20 years or older, on July 1, 1999, covered vessels must comply with the standards by the earlier of the vessel's first intermediate survey, or its special survey. For bulkers under 20 years of age, on July 1, 1999, each vessel must comply the latter of, the vessel's first special survey after July 1, 1999, or when the vessel reaches 15 years of age. Bulk carriers with insufficient transverse bulkheads potentially have additional requirements to meet.

Compliance Costs

The International Association of Classification Societies (IACS) estimates that 76 percent of ships covered by the anticipated regime will require strengthening of their No. 1 bulkhead. The International Association of Dry Cargo Shipowners reports that compliance can generally be achieved by adding doubling strips to corrugated flanges or adding/reinforcing gusset or shredder plates.

The collective affect of the regulations translates to massive steel reinforcement work that results in decreased drydock supply in certain sectors, especially for larger vessels. IACS estimates that vessels 50,000 dwt or less will require an average of 10 tons of steelwork; vessels between 50-80,000 deadweight tons will require an average of 12.5 tons of steelwork, and Capsize vessels (over 80,000 tons) would require an average of 25 tons of steelwork.

The cost of compliance will vary, depending upon where the work is to be completed. Owners may elect other means to achieve the desired safety ends. For example, they could choose to permanently reduce the ship's cargo carrying capacity, or they could

alter the ship's cargo carrying configurations.

However attractive these cost-saving alternatives may seem, they must be balanced against the vessel's decreased ability to earn additional freights and diminished

capability to compete. A Handysize vessel with limited cargo carrying capacity would likely find it difficult to compete against an identical Handysize ship sans restrictions.

The Shipyards

A recent report from the International Association of Dry Cargo Shipowners (INTERCARGO) indicates that most Far Eastern shipyards have full order-books through the year 2000.

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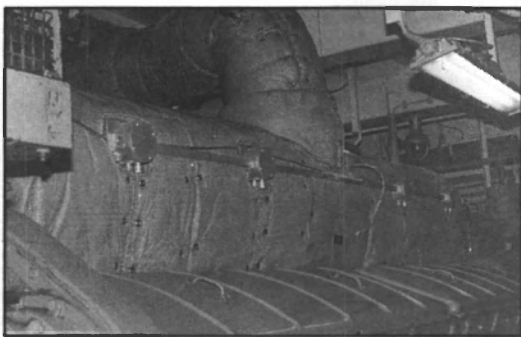
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SHIP REPAIR TRENDS

Given anticipated supply and demand needs, smaller shipyards — especially in Eastern Europe, South American, China, Indonesia, the Mediterranean and the U.S. — may be inundated with Handysize repair work. Panamax and Capesize ships may face rising costs since drydock space for larger ships will come at a premium. Acting upon the anticipated changes in the very near future, rather than waiting for the inevitable serves as a cost-effective hedge against potentially spiraling costs, uncertainties and other related risks. Conversely, scrapping, while prices are

respectively high for steel, or ordering, while prices are relatively low for newbuilds, should also be considered. A future run to the shipbreakers, or to shipbuilders, will further affect pricing.

*By Art Dimopolous, Fort & Schlefer,
Washington, D.C.*

Oil Ship To Be Delayed Two To Three Months

Saga Petroleum ASA said delivery of the production ship for the Varg oilfield in the North Sea could be delayed by two to three months. Saga said the Varg vessel was 85 percent completed at the Far East Livingston Shipbuilding (FELS) in Singapore, but five weeks behind schedule. The vessel was due to be delivered on January 26. Varg is due to come on stream in the second quarter of 1998. Saga said it was too early to say what consequences the delayed processing facilities would have on the start up plan.

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Crowley Refloats Grounded Freighter

Two Crowley Marine Services tugboats assisted in a U.S. Coast Guard operation which recently pulled a stranded freighter off a coral reef near the southeastern shore of Isla de Mona, 40 miles off the coast of Puerto Rico. The salvage was the culmination of a week-long salvage and environmental protection operation. Panamanian-registered, 306-ft. (93.3-m) M/V *Fortuna Reefer* was en route through the Panama Canal when it grounded. Although minor bottom damage was sustained, reportedly none of the 10,000 gallons of fuel oil aboard was released into the water.

Caribbean Protector, Crowley's oil spill response barge based at Crowley Environmental Services (CES) facilities in San Juan, deployed 800 ft. (244 m) of boom upon its arrival at the scene and another 1,000 ft. (305 m) of boom before pulling attempts. Crowley mobilized five tugs and one chartered supply boat to the scene. The

company reportedly lightered approximately 40,000 gallons of intermediate fuel oil (IFO) 180 and 30,000 gallons of diesel from the ship in order to lighten it sufficiently to enable two CMS tugs, *Centurion* and *Seminole*, to pull the freighter off the reef. Once the vessel came free, it was towed to Mayaguez for further inspection.

A Crowley tug is shown pulling stranded freighter M/V *Fortuna Reefer*.



State Of Alaska Strikes Back

State Seeks \$2.8 Million In Damages From British Columbian Ferry Blockade

Following a blockade of one of its ferries by a fleet of Canadian fishing vessels, the state of Alaska has threatened to seize the very fishing vessels that kept a state ferry stuck in a British Columbia port for three days in a protest over Pacific salmon allocation.

The vessel-seizure notice was dated Aug. 22, and was part of Alaska's lawsuit seeking \$2.8 million in compensation for the blockade of the ferry *Malaspina*.

The state claims the blockade caused tourism losses, plus extra costs of overtime pay for ferry workers and refunds for the *Malaspina* passengers. The ship had more than 300 passengers when it was stranded in Prince Rupert, a port about 90 miles (145 kms) southeast of Ketchikan, Alaska.

Since the blockade, Alaska has ceased ferry stops there.

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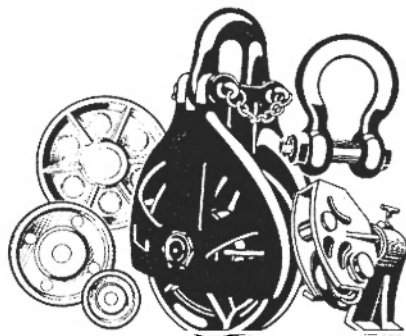
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By Ruth Ling, Inmarsat

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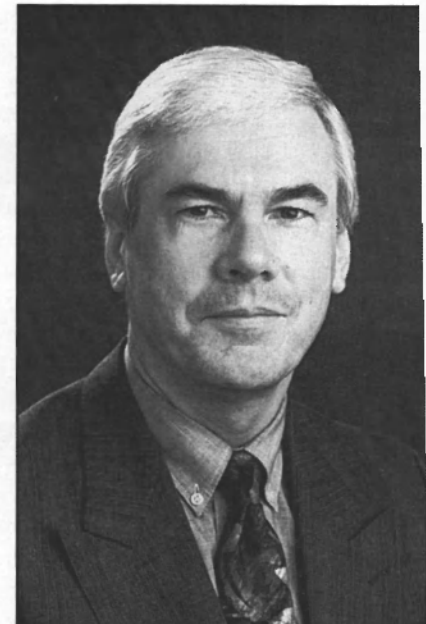
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Peter Goldsmith, Inmarsat

that had been available before.

Another new product to have had great success is Inmarsat phone, the portable personal communications system for business travelers. But this move into land mobile services has not been at the expense of the maritime market in favor of land mobile services, as **Andy Fuller**, manager of the maritime department at Inmarsat, explains: "Inmarsat's continuing commitment to the GMDSS for high quality safety communications means that we are developing and introducing a number of new products and services such as Inmarsat E and others related to the GMDSS. These initiatives are a result of what our maritime customers tell us they need."

The Inmarsat E system complies fully with the Global Maritime Distress and Safety System (GMDSS), covers virtually all the world's ocean areas, is highly reliable for both SOLAS and non-SOLAS vessels and is free of charge to users. It was developed jointly by the German government, the European Space Agency, manufacturers Nortel Dasa, Siemens and MBB and Inmarsat.

Combined Technologies

Inmarsat E combines the position determination of the Global Positioning System (GPS) or GLONASS satellite navigation technology with the geostationary satellite technology of the

(Continued on page 131)

CAD/CAM/CAE

KCS Introduces Tribon 4

Kockums Computer Systems recently announced the introduction of Tribon 4, the new version of a leading software system for ship design and building. Tribon 4, which was scheduled for release last month, includes both new applications as well as improvements to existing functions.

New applications for Tribon 4 include: Tribon Initial Structural Design; Tribon Production Data Interface; and Tribon Vitesse.

New...

Tribon Initial Structural Design is designed to allow an initial structural model of the vessel to be built and successively refined as the design develops.

The initial structural design and its properties support the classification approval stage, and the block division of the vessel, and act as a reference model for the early outfit design. The facilities provided will design all the structures, including deck houses and superstructures, normally associated with the principal types of conventional monohulls.

Tribon Production Data Interface allows all relevant production information for manufacturing and assembly of hull and outfit structures to be available in a relational database format, from which it is accessible for use by customer applications. A 3-D graphical view of the prefabrication units is also stored in the relational database.

The information is structured according to the assembly tree, which is transferred from the Tribon Work Preparation application.

In Tribon 4, the Production Data Interface application will be available for pipe data. In later releases, all types of hull and outfit objects will be available.

Tribon Production Data Interface uses open standards for database communications. This enables the Tribon user to utilize any of the leading relational database vendors for the database implementation. The database is accessible to the customer by the use of standard tools available on the market, and it can be used for both systems integration and



The Tribon Initial Structural Design. Lower left shows weight bending moment and shear force curves. Upper right shows preliminary structural configuration for a double bottom bulk carrier. The lower right shows attributes associated with a structural object.

direct end-user access.

Tribon Vitesse is the final new application of Tribon 4, and is designed to allow users to write their own Vitesse programs to control design development with direct access to the Tribon Product Information Model and all the functionality of the Tribon applications.

Tribon Vitesse will lead to a major improvement in ship design efficiency through rule-based automated design for different types of structural arrangements and outfit layouts.

Tribon Vitesse can be applied from the smallest design standard. It also defines an open layer for read and modeling access to the Product Information Model. The access to this layer is through Python, a high-level, object-oriented, interpreted programming language.

In Tribon 4, the Vitesse application is available for hull design; in later releases, it will also be available for outfit design.

... & Improved

Along with the many new features, Tribon 4 features improvements to applications included in previous versions.

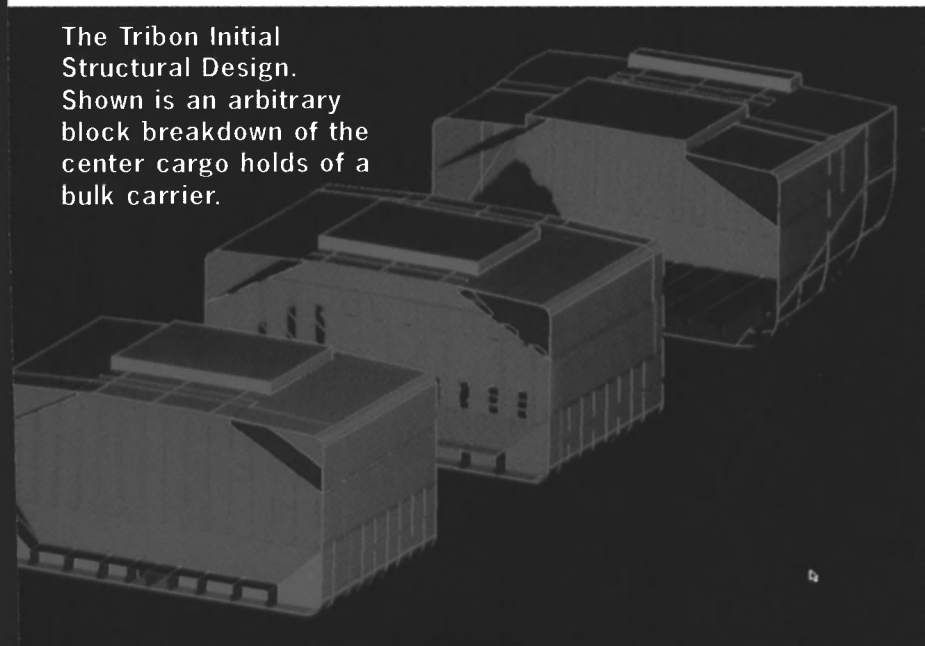
For example, there has been an improvement made to auto-fairing in lines, as there are two new auto-fairing algorithms for 2D and 3D curves, and there is now knot reduction to minimize data for fairing.

The surface modeler has been improved as well, with automatic surface fairing with curvature displays and the addition of interactive modeling of bulkheads and decks. There is also a new graphical user interface and report possibilities via Microsoft Excel on the calculations and hydrodynamics side.

In addition, there's a Hydrodynamics module combining powering, resistance, seakeeping and maneuvering functions.

For Tribon Hull, the changes are visually noticeable. The modeling functions have been modified to

The Tribon Initial Structural Design. Shown is an arbitrary block breakdown of the center cargo holds of a bulk carrier.



PRODUCT FOCUS

make use of the improved graphical handling of Tribon. This means modeled components will automatically be updated in all active views, including color-shaded views. Extended functionality has been implemented for the physical breakdown of modeled objects to assemblies; for example, a whole block may be split into two by an arbitrary plane.

A new Quick Nesting function has been implemented, which, together with other enhancements, is designed to lead to increased productivity.

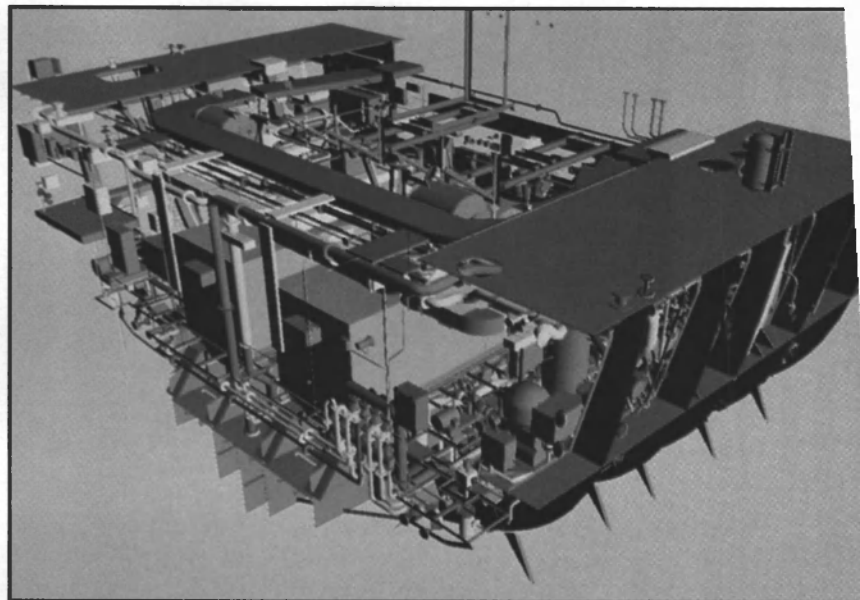
Tribon Work Preparation includes a number of improvements with respect to the handling of outfitting and complex hull parts, which allow for more flexi-

bility to reflect a shipyard's production environment in the assembly definition. KCS reports that the ease and speed of defining the breakdown of a ship into assemblies has been improved by the introduction of a file import and export facility for assembly tree structures.

Finally, a new Color Shading option makes it possible to use the true 3-D solid representation for viewing and modeling the Tribon Product Information Model.

This option makes use of the OpenGL, which is a vendor-neutral, multi-platform industry standard for 2-D and 3-D visualization.

For more information on Tribon 4
Circle 2 on Reader Service Card



The Tribon Product Information Model. Pictured is a section of the KDX Frigate, built by Daewoo's Special and Naval Shipbuilding Division, and launched at the Okpo Shipyard last year.

ARCO, BP Put Call Out For Additional Capacity

Pool Energy Services Co. received two separate letters of intent which will require the upgrade of two currently idle Alaska land drilling rigs for operation on the North Slope under term contracts. The company also said it agreed to purchase the

Oceandril Ranger, a jack-up workover rig located in the Gulf of Mexico, from Oceandril Partners LC for about \$8.2 million. It is expected that the purchase will be completed within 30 days and operations will commence soon thereafter. Pool Energy received a letter of intent from ARCO Alaska Inc. authorizing material and equipment procurement for

upgrading Rig 6, an Arctic exploration drilling rig, to a development drilling rig configuration, at an estimated cost of \$15 million. Following these modifications, the rig is expected to commence year-round drilling operations in the Kuparuk area of the North Slope in the summer of 1998 under a three-year contract. The company also received a letter of intent from

BP Exploration (Alaska) Inc. calling for the conversion of Rig 122, a land drilling rig designed for operations in South Alaska, to an Arctic exploration drilling rig at an estimated cost of \$5.2 million. After refurbishment, this rig is expected to start operations east of Prudhoe Bay on the North Slope in early 1998 under a five-year contract.

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SHIP REPAIR & CONVERSION

Super Bancini Back On Line

by Alan Thorpe, international editor

After 25 years of not being used, the large concrete floating dock, Super Bancini, which has been in the Port of Genoa since the early 1970s, has finally set on a 20 to 25-day voyage to its new home — Tuzla Shipyard in Turkey.

The 1,148-ft. (350-m) long, 330,000-cu-ft capacity floating dock was originally built for use by the repair industry in Genoa by **Ente Bancino**, the owner of the repair facilities in Genoa. However, the large tanker market, for which the unit was originally intended, changed dramatically during the late 1970s and the floating dock was never fully completed. The dock was purchased for \$1 million.

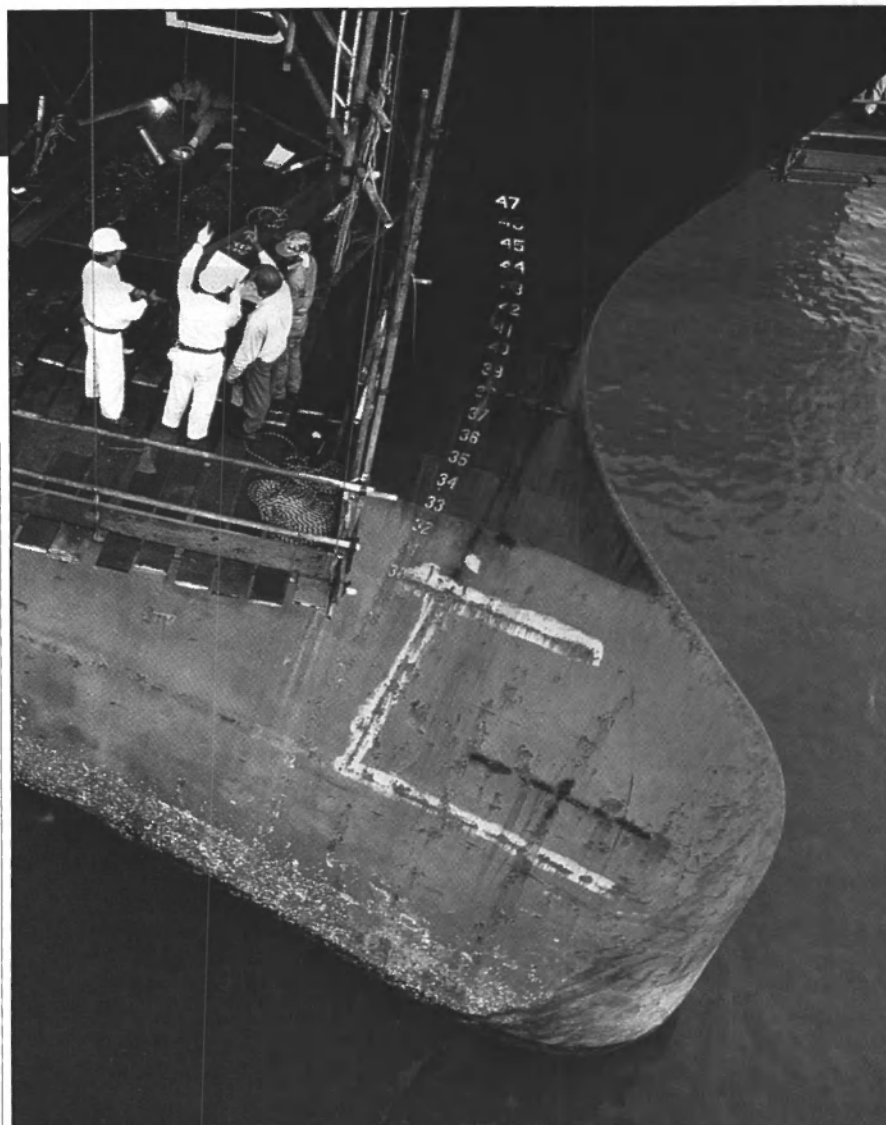
It is expected that the dock will become operational by the end of the year.

The first major repair contract to be executed in the facility will involve semi-submersible offshore rig *Scarabeo*, which will be converted by Tuzla from

an accommodation rig back to a drilling rig. One of the world's largest tankers, Papachristidis' 381,913-dwt ULCC *Hellespont Capitol*,

has been booked into Dubai Drydocks for its next five-year special survey at a cost believed to be in excess of \$4 million. This owner, which has a good reputation for the operation of its large tanker fleet, currently operates a five-year drydocking schedule for its ships.

In the first four months of Dubai Drydocks' financial year (March 1st to the end of June) a total of 72 ships (8.9 million dwt) were reportedly repaired, including: nine ULCCs (3.2 million dwt); 11 VLCCs (3.05 million dwt); 25 tankers (1.6 million dwt); 10 bulk carriers (0.8 million dwt); 13 general cargo ships (0.2 million dwt); and four miscel-



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SHIP REPAIR & CONVERSION

laneous vessels (0.027 million dwt).

In addition, Dubai Drydocks Afloat Repair Division handled another 60 contracts from Jebel Ali.

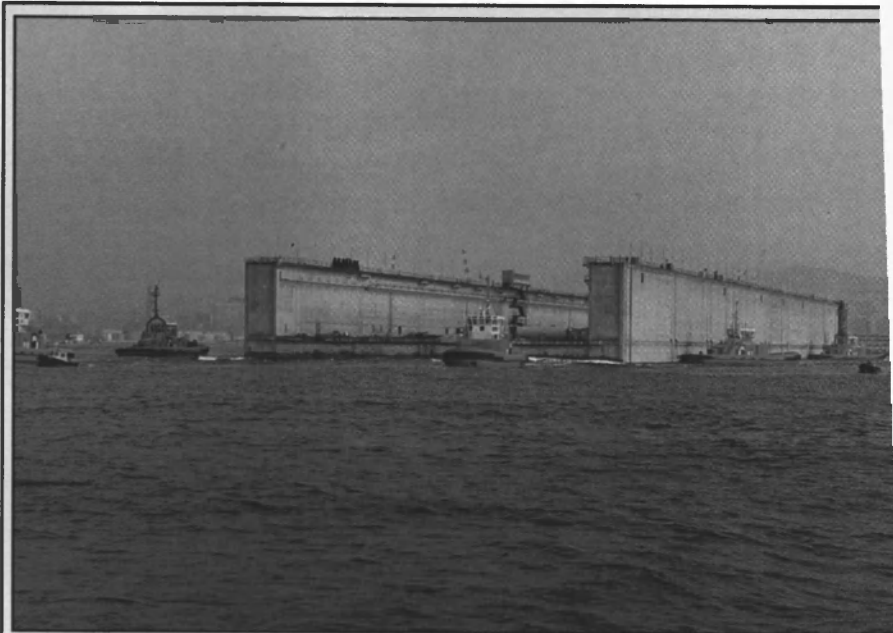
Meanwhile, Dubai Drydocks' 673 x 118-ft. (205 x 36-m) floating dock, which can accommodate vessel up to 40,000 dwt, docked it's 100th vessel since commissioning in December 1994. The history-making ship was the 8,811-dwt bulk/cement carrier *Koralia*, managed by Transocean Ship Management, Hamburg. The dock has also recorded an occupancy rate of 86 percent over the period since coming into service.

Another Persian Gulf player, Bahrain's ASRY, has followed a \$89.5 million record year in 1996 recording an increase in half-year revenue for this year, some 18 per-

cent above expectations. The upsurge in revenue was due to contract value per vessel, which rose by almost 20 percent to an average exceeding \$800,000 per vessel. This increase came mainly from mechanical and pipework operations, as well as electrical work, where cable installation of some 16 km registered an increase of more than 500 percent above 1996 first half results. The surge was also fueled by steel renewals, with a rise of more than 30 percent to 2,200 tons.

Dutch repair yard Niehuis & van den Berg, of Rotterdam has commissioned its recently-purchased 711 x 104.3-ft. (217m x 31.8-m) floating dock, with its first vessel, the 8,600-dwt Dutch cutter suction dredger *Cornelia*. Owned by

(Continued on page 124)



Super Bancini is shown leaving Genoa.

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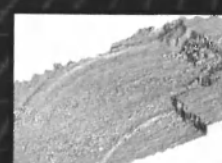
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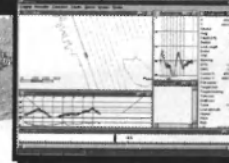
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OWNER/OPERATOR	COUNTRY	SHIPYARD	COUNTRY	TYPE	No.	TEU	DWT	GT	DELIV.	PRICE M \$
CB LINE	JAPAN	KANASASHI CO.	JAPAN	BULK CARRIER	1	—	35,000	—	1999	—
CHELLARAM SHIPPING	—	SUMITOMO	JAPAN	BULK CARRIER	1	—	73,000	—	1999	26
GERMAN INTERESTS	GERMANY	EISA SHIPYARD	BRAZIL	BULK CARRIER	2	—	63,000	—	1999	84
GOLDEN HELM	JAPAN	KANASASHI CO.	JAPAN	BULK CARRIER	1	—	35,000	—	1999	—
MAVROLEON	—	mitsubishi H.I.	JAPAN	BULK CARRIER	1	—	75,000	—	1999	27.75
NYK CORP	JAPAN	OSHIMA SHIPBUILDING	JAPAN	BULK CARRIER	2	—	48,000	—	1999	50
OSAKA SENPAKU	JAPAN	KANASASHI CO.	JAPAN	BULK CARRIER	1	—	35,000	—	1998	—
SAFETY MGMT OVERSEAS	GREECE	SAMSUNG	KOREA	BULK CARRIER	2	—	73,000	—	2000	55
SAFMARINE	SOUTH AFRICA	HITACHI ZOSEN	JAPAN	BULK CARRIER	2	—	75,200	—	1999	54
SENO KISEN	JAPAN	NKK CORP.	JAPAN	BULK CARRIER	1	—	—	—	5/99	—
SILVER DRAGON	JAPAN	KANASASHI CO.	JAPAN	BULK CARRIER	1	—	35,000	—	1999	—
TEH HU	HONG KONG	DAEWOO	KOREA	BULK CARRIER	1	—	—	—	8/99	41.65
UNKNOWN	—	TSUNEISHI CEBU	JAPAN	BULK CARRIER	1	—	23,400	—	1998	—
UNKNOWN	—	KANDA SHIPBUILDING CO.	JAPAN	BULK CARRIER	2	—	23,500	—	1998	—
UNKNOWN	—	OSHIMA SHIPBUILDING	JAPAN	BULK CARRIER	1	—	46,700	—	1998	—
mitsui O.S.K. LINES (MOL)	JAPAN	NKK CORP.	JAPAN	BULK CARRIER	1	—	—	—	2000	43
OAK MARITIME	CANADA	HALLA	KOREA	BULK CARRIER	2	—	—	—	8/99	86
JADROPLOV	CROATIA	3 MAI	CROATIA	BULK CARRIER	2	—	28,400	—	99/2000	42
BOTTIGLIERI NAV.	ITALY	FINCANTIERI	ITALY	BULK CARRIER	2	—	75,400	—	1999	75
GOLDEN OCEAN GROUP	HONG KONG	HITACHI ZOSEN	JAPAN	BULK CARRIER	2	—	75,000	—	1999	54
GREENSHIELDS & CO EDINBURGH	U.K.	MITSUBISHI H.I.	JAPAN	BULK CARRIER	1	—	73,500	—	1999	—
ESL	FINLAND	FINNYARDS	FINLAND	BULK CARRIER	1	—	13,200	—	1998	29
KNUTSEN OAS SHIPPING	NORWAY	NAVAL GJON	SPAIN	CHEMICAL TANKER	1	—	19,000	—	9/99	36
NT MARINE	JAPAN	SHIN KURUSHIMA	JAPAN	CHEMICAL TANKER	1	—	15,300	—	1999	30
SINOTRANS-PARAKOU	CHINA/HONG KONG	DAEDONG SHIPBUILDING	JAPAN	CHEMICAL TANKER	2	—	10,000	—	—	34
A. P. MOLLER	DENMARK	CHINA SHIPB. CORP.	TAIWAN	CONTAINER	4	—	—	—	1/99-5/99	—
AP MOLLER	DENMARK	CHINA SHIPB. CORP.	TAIWAN	CONTAINER	4	—	—	—	1/99/5/99	—
CHENG LIE NAVIGATION	CHINA	CHINA SHIPBUILDING CORP.	TAIWAN	CONTAINER	2	—	—	—	1998	—
CP OFFEN	GERMANY	FLENDER WERFT	GERMANY	CONTAINER	1	—	—	—	1999	—
FEEDERLINES	SINGAPORE	J. PATTJE	NETHERLANDS	CONTAINER	2	600	—	—	1998	—

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UNG SHIPPING	SOUTH KOREA	SHIN-A SHIPBUILDING	KOREA	CONTAINER	1	700	—	—	10/98	—
MARINE	U.S.	AVONDALE SHIPYARD	U.S.	CRUDE CARRIER	2	—	—	—	2000	332
JNE ORIENT LINES (NOL)	SINGAPORE	SAMSUNG	KOREA	CRUDE OIL TANKER	2	—	—	—	—	80
JNE ORIENT LINES (NOL)	SINGAPORE	IMABARI SHIPBUILDING	JAPAN	CRUDE OIL TANKER	3	—	—	—	—	120
VAL CRUISES	GREECE	CHANTIERS DE L'ATLANTIQUE	FRANCE	CRUISE	1	—	—	—	1999	240
DS LANDSKAPSSTYRELSE	FINLAND	UUDENKAUPUNGIN	FINLAND	FERRY	1	—	—	1,500	1998	8.68
IONN	—	KVAERNER FJELLSTRAND SING.	SINGAPORE	FERRY	1	—	—	475	1998	—
SH COLUMBIA FERRY CORP	CANADA	CATAMARAN FERRIES INT.	CANADA	FERRY	2	—	—	—	98/99	—
NORGE	NORWAY	KVAERNER MASA	FINLAND	FPSO	1	—	—	—	1998	310
IBSAKSJESELSKAPET SOLVANG	NORWAY	MEYER WERFT	GERMANY	GAS CARRIER	2	—	—	—	98/99	—
SAKSJESELSKAPET SOLVANG	NORWAY	MEYER WERFT	GERMANY	GAS CARRIER	2	—	—	—	99/2000	—
SUS	NETHERLANDS	CESKOSLOVENSKA	CZECHOSLOVAKIA	GENERAL CARGO	3	—	2,800	—	1998	—
UMOTO KAIUN	JAPAN	HAMAMOTO	JAPAN	GENERAL CARGO	1	—	699	—	1997	—
UMURA KAIUN	JAPAN	YOSHIDA ZOSEN	JAPAN	GENERAL CARGO	1	—	1,500	—	1997	—
OWN	—	HONDA	JAPAN	GENERAL CARGO	2	—	8,600	—	1998	—
DO	CHINA	DALIAN SHIPYARD	CHINA	GENERAL CARGO	4	—	20,000	—	98/99	92
DO	CHINA	WUHU SHIPYARD	CHINA	GENERAL CARGO	3	—	20,000	—	98/99	69
ID GAS SHIPPING	U.K.	HYUNDAI	KOREA	LPG	2	—	6,000	—	—	—
OWN	—	mitsubishi H.I.	JAPAN	LPG	2	—	48,100	—	1999	—
EL NASE EID YOUSSEF	EGYPT	KVAERNER FJELLSTRAND	NORWAY	PASSENGER	1	—	—	—	5/98	12.06
EC	ECUADOR	HYUNDAI	KOREA	PRODUCT TANKER	2	—	45,000	—	1999	68
EC	ECUADOR	HYUNDAI	KOREA	PRODUCT TANKER	2	—	65,000	—	10/99	74
TSEN OAS SHIPPING	NORWAY	NAVAL GIJON	SPAIN	PRODUCTS TANKER	1	—	36,000	—	2/99	31
ARIDIS SHIPPING	GREECE	61 KOMMUNAR	UKRAINE	REEFER	2	—	5,500	—	1998	24
O KISEN	JAPAN	KYOKUYO ZOSEN	JAPAN	REEFER	1	—	5,000	—	1997	—
ERN CAR LINER	JAPAN	KITANIHON	JAPAN	RoRo	2	—	11,500	—	1998	—
J-PRAKLA	NORWAY	MJELLEM & KARL	NORWAY	SEISMIC	1	—	4,400	—	1999	—
FOUZOS	GREECE	SAMSUNG	KOREA	TANKER	2	—	—	—	1999	93.9
NDER MARINE	GREECE	HYUNDAI	KOREA	TANKER	6	—	45,000	—	2000	189
EMA	MONACO	DAEDONG SHIPBUILDING	JAPAN	TANKER	3	—	45,000	—	1999	99.5
AMENTOS MARITIMOS	—	ULIANIK	CROATIA	TANKER	1	—	40,000	—	1999	33
ERNATIONAL ENERGY	—	MINAMI NIPPON	JAPAN	TANKER	2	—	30,000	—	1998	—
ROCEAN UGLAND	U.S.	TSUNESHI	JAPAN	TANKER	1	—	—	—	1999	—
NE	JAPAN	KOYO DOCK	JAPAN	TANKER	2	—	—	—	1999	80
CORPORATION	U.S.	DAEWOO	KOREA	TANKER	1	—	—	—	3/99	54
RLD-WIDE SHIPPING	BERMUDA	ISHIKAWAJIMA HARIMA H.I.	JAPAN	TANKER	1	—	—	—	2000	—
DELTA MARINE SERVICES, INC	U.S.	MARCO SEATTLE	U.S.	TUG	2	—	—	—	1998	—
C LINE	JAPAN	IMABARI ZOSEN	JAPAN	VEHICLE CARRIER	1	—	16,600	—	1999	50
C LINE	JAPAN	SHIN KURUSHIMA	JAPAN	VEHICLE CARRIER	1	—	15,500	—	1998	45

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**ASTILLEROS
ESPAÑOLES**

SHIP REPAIR & CONVERSION

(Continued from page 120)

Boskalis, the ship underwent installation of dredging equipment and general repairs.

Spanish shipbuilding and repair giant Astilleros Espanoles (AESAs) has been awarded another contract from the Brazilian offshore mar-

ket, namely a \$145 million contract to convert a VLCC into a FPSO unit.

The 300,000-dwt tanker, which has not yet been specified, but is expected to be lifted from the Petrobras fleet, will be converted at the AESA's Cadiz yard. Awarded by Esmeril, which will

operate the converted unit on behalf Petrobras, the vessel will be re-delivered in November 1998.

After delivery the vessel will be moored in waters reaching 3,300 ft. (1,000 m) on Petrobras' Roncador offshore field. During May, the Cadiz yard delivered the converted FPSO *Petrobras 32*,

which was formerly VLCC *Cair* six months ahead of schedule.

Germany's Lloyd Wer (Bremerhaven) has won a contract — believed to be valued in the range of \$5 million — for the conversion of the 25,950-dwt bulk/containership *Southern Dawn* to dedicated frozen orange juice carrier. The vessel was scheduled to arrive in Bremerhaven during the second week of August and was slated to stay at the yard for approximately 55 days.

The twelve 1,100-ton stainless steel tanks are being built by Holvrieka (Holland); this order is being done directly between the owner and Holvrieka.

It is understood that the conversion project will cost about \$8 million. Norway's Mjelle & Karlsen's Laksevag Verft, Berger has been awarded the refurbishment and upgrading contract for the world's oldest sailing vessel of its kind — the 305-ft. (93-m) three-masted *Statsraad Lehmkuhl*.

The upgrade includes fitting a new steel deck on the half deck and renewal of 75-mm thick deck on top of the steel deck, as well as renewal and upgrade of navigational aids, radio stations, intercom systems, fire protection equipment, safety stations, main switchboards and all cabling with terminal and switch panels, new ventilation and new cabin furniture.

The work will also include restoration of staterooms, new deck offices, sanitary piping, FW piping, as well as renovation of Mesan Mast with stays and fittings, upgrade of the EO-class engine room.

The ship is expected to enter the Laksevag yard around the first week of October and will be re-delivered by the end of January 1998.

Rumors are mounting that AESA's Astander Shipyard will change hands, possibly linking the state-owned ship repairer with fellow Spanish company Union Naval de Levante (UNL), the country's largest private shipbuilding and repair group, which has facilities at Valencia (shipbuilding) and Barcelona (ship/repair).

However, a spokesperson for UNL has intensified the Astander yard. Speculation concerning the future of the facility has been heightened by a decision to remove Astander from the conversion market as part of a broader agreement

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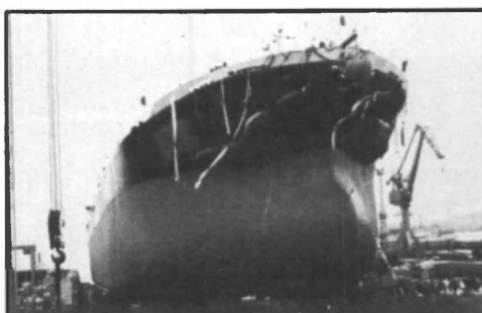
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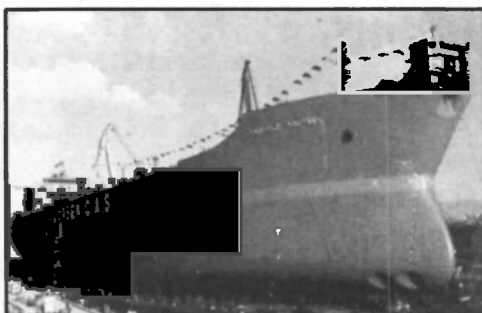
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Maritime Reporter/Engineering News

SHIP REPAIR & CONVERSION

between Spain and the European Commission (EC) on reducing shipyard capacity.

Privatization of AESA's eight yards is not officially due for consideration until the group's three-year restructuring program is completed at the end of next year (1998).

The conversion industry in Singapore continues to enjoy a busy period. Keppel Shipyard is currently involved in a number of conversion/refit projects.

During July, the yard completed the \$12 million conversion of the 9,642-dwt conventional tanker *Red Teal* to a FPSO, which will be renamed *Armada Pekasa* for its new role off the Malaysian Coast or Petrona. The yard is also currently carrying out a 11-month refit operation aboard FPSO *rawan* for Unical (Thailand), and recently won a 15-month rebuilding contract for a hull built by Peterson Shipyard, which will be lengthened by 75.5 ft. (23 m) and refitted as a drillship, to be named *Peregine 4* for new owner Falcon Drilling.

Keppel FELS is currently carrying out a number of offshore refit projects, the 9,957-grt semi-submersible drilling platform *Penrod 71* is being converted to a production rig for Brazil's Petrobras, to be renamed *PB27*; the Maersk Drilling-owned jack-up drilling rig *Maersk Victory* is having its three legs rebuilt following an accident off the Australian coast; jack-up rig *Ensco 57* is being repaired and upgraded; and semi-submersible accommodation rig *Safe Gothia* has been purchased by Keppel FELS for conversion into a drilling rig. Stena Drilling is the likely buyer.

Pan United is currently involved in three large projects, including the lengthening of two purse seiners by 39 ft. (12 m) each.

The yard is also involved in the major refit of the 975-dwt, Vanuatu-registered offshore supply vessel *June T*, ex *Sovereign Service*, which has been purchased by a U.S.-based owner for use on the inter-island service around Singapore.

Pan United is also reportedly

talking to Swedish and German owners who have uncompleted newbuildings in Indonesian yards. If the yard wins the contracts, the hulls — which are now fairly old — will be brought to Singapore and completed.

It is believed that the ships involved are a gas carrier and a chemical tanker.

The largest repair/refit contract currently underway at Sembawang Shipyard is the refit of Vietnamese FPSO *Chi Linh*, which arrived in the yard two months ago.

The vessel was converted to a FPSO approximately 10 years ago, and is now undergoing a major refurbishment prior to returning to its station off the Vietnamese coast.

Sembawang is also building the necessary process module for the Statoil FPSO, which is currently under construction at South Korea's Samsung Heavy Industries (SHI).

The modules are to be installed by Jurong Shipyard Ltd. (JSL), which is currently tackling one of

the busiest periods ever seen in the conversion and large refit industries.

Current projects involve the conversion of the 26,762-dwt Bahamas RoRo/containership *Proso* to a specialized livestock carrier to be renamed *Bader 111*.

Owners of the vessel are Jordanian, and the ship will be used for sheep and cattle transportation. Also, the BHP-owned FSU *Skua Venture 1* is currently in the yard. The unit will be purchased by Japan's Modec, after refit work, which will include the installation of additional process modules. The vessel will be renamed *Modec Venture 1*.

JSL also has the conventional tanker *Brasilia* in the yard for a conversion project, for alteration to an FSU for a charter to Petrobras. The work is scheduled for completion by the end of the year. Finally, JSL has signed a contract for installing additional topsides processing modules onboard a specialized FPSO currently being built at South Korea's Samsung Heavy Industries (SHI) for Statoil.

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SEPTEMBER 1997

BaltExpo '98: September 1-4, Gdansk, Poland.
For more information: tel/fax: +22 6255 23 98/22 628 72 95.

1997 Manning and Training Conference: September 3, Institute of Marine Engineers, London, U.K.
Contact: Shantel Costen, International Shipping Federation, 12 Carthusian St., London EC1M 6EB, U.K., fax: +44 171 417 8877.

International Maritime Lecturers' Association (IMLA) Conference/Workshop '97: September 7-9, Fisheries and Marine Institute of Memorial University, Newfoundland.
Contact: Les O'Reilly, executive director, P.O. Box 4920, St. John's, Newfoundland, Canada A1C 5R3, tel: (709) 778-0200; fax: (709) 778-0346.

1997 American Int'l Ship Expo (AISE): September 9-11, New York Coliseum, New York City.
Contact: McNabb Expositions, Inc., P.O. Box 418, Rockport, Maine 04856-0418, tel: (207) 236-6196; fax: (207) 236-0369.

Offshore Europe '97: September 9-12, Aberdeen, Scotland.
Contact: International Expositions, Inc., 1635 W. Alabama, Houston, TX 77006, tel: (713) 529-1616; fax: (713) 529-0936.

NEVA 97 (The Int'l Shipping Exhibition with Russia and the Republics): September 9-13, St.

Petersburg, Russia.
Contact: Pedro Svensson, P.O. Box 28, S-184 21, Akersberga, Sweden, tel/fax: +46 8540 24105.

MCMC '97 (Conference on Vessel Maneuvering/Control of Marine Craft): September 10-12, Brijuni, Croatia.
Contact: Prof. G.N. Roberts, University of Wales College, Newport, Faculty of Technology, Allt-yr-yn Campus, P.O. Box 180, Newport NP9 5XR, U.K., tel: +44 1633 432 441; fax: +44 1633 432 430; e-mail: geoffr@gwent.ac.uk.

Gas Trading And Transportation Forum: September 17-18, London, U.K.
For more information, tel: +44 171 878 6888.

World Fishing - Vigo '97: September 17-21, Vigo, Spain.
Contact: Nexus Media Ltd., Top Floor, 84 Kew Rd., Richmond, Surrey TW9 2PQ, U.K., tel: +44 181 332 9273; fax: +44 181 332 9335.

AAPA's 86th Annual Convention: September 22-26, Marriott at Sawgrass, Jacksonville, Fla.
Contact: Eileen Denne, P.R. director, American Association of Port Authorities, 1010 Duke St., Alexandria, Va. 22314, tel: (703) 684-5700; fax: (703) 684-6321, e-mail: aapa@ix.netcom.com.

SNAME Propeller/Shafting Symposium: September 23-24, Virginia Beach, Va.
Contact: Kevin Prince, Designers and

Planners, 2120 Washington Blvd., Sequoia Plaza, Arlington, Va. 22204; tel: (703) 920-7070; fax: (703) 920-7177.

Bunkers '97: September 23-26, Miami, FL.
Contact: Carleen Lyden-Kluss, International Marketing Strategies, 28 Southfield Ave., Stamford, CT 06902, tel: (203) 406-0106; fax: (203) 406-0110.

Seatrade North European Cruise and Ferry Conference: September 24-26, Amsterdam Rai, Amsterdam, The Netherlands.
Contact: Seatrade, Seatrade House, 42 North Station Rd., Colchester CO1 1RB, U.K., tel: +44 1206 545121; fax: +44 1206 545190.

ASNE Combat Systems Symposium: September 29-30, Kossiakoff Center, Applied Physics Laboratory, Johns Hopkins University, Laurel, MD.
Contact: American Society of Naval Engineers, 1452 Duke St., Alexandria, VA 22314-3458, tel: (703) 836-6727; fax: (703) 836-7491; e-mail: asnehq.asne@mcimail.com.

Argentina Oil & Gas Show: September 29-October 3, Buenos Aires, Argentina.
Contact: International Expositions, Inc., 1635 W. Alabama, Houston, TX 77006, tel: (713) 529-1616; fax: (713) 529-0936.

Ocean Technology Workshop: September 30-October 3, Sea Crest Ocean Front Resort and Conference Center, North Falmouth, Mass.

Contact: Massachusetts Ocea Technology Network, tel: (617) 740 1456; fax: (617) 749-1120.

OCTOBER 1997

Container Asia '97: October 7-9, Shangri-La Hotel, Kuala Lumpur, Malaysia.
Contact: Paddy Payne, Balti Conventions, Regal House, 70 Londo Rd., Twickenham TW1 3QS, U.K., tel: +44 181 892 2892; fax: +44 181 892 6767.

International Disaster and Emergency Response (IDER '97): October 7-9, The Hague.
For more information, tel: +44 198: 846618; fax: +44 1985 846163.

15th World Petroleum Congress: October 12-16, 1997, Beijing, China
Contact: Chinese Organizing Committee Secretariat, c/o China National Petroleum Corporation, P.O. Box 766, Liu Pu Kang, Beijing 100724, China, tel: +86 10 209 5455/5446; fax: +86 10 209 544/5459.

9th International Conference On Computer Applications In Shipbuilding (ICCAS '97): October 13-17, Yokohama, Japan.
Contact: ICCAS Secretariat c/o Int'l Communications Specialists, Inc. Kasho Bldg., 2-14-9, Nihombashi Chuo-ku, Tokyo 103, Japan, tel: +81 3 3272 7981; fax: +81 3 3273 2445 e-mail: iccas97@ics-inc.co.jp.

Intertanko Conference And Exhibition: October 14-16, London U.K.
Contact: Barbara Ann Viken, Oslo tel: +47 22 12 26 56.

ASNE's 6th Fleet Maintenance Symposium: October 14-17, Town and Country Hotel, San Diego, Calif.
Contact: Rich Caccese, tel: (619) 556 2623, or Cdr. Chuck Goddard, tel: (619) 556-1627.

SNAME International Maritime Exposition: October 15-17, Westin Hotel, Ottawa, Ontario, Canada.
Contact: SNAME, 601 Pavonia Ave., Jersey City, N.J. 07306, tel: (201) 798-4800.



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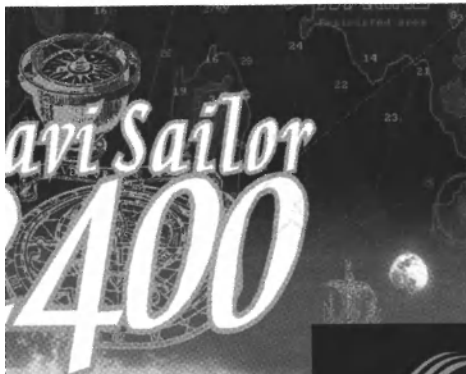
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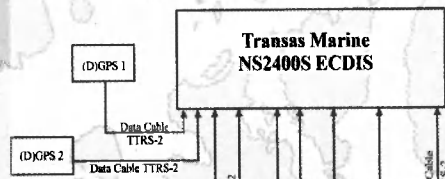


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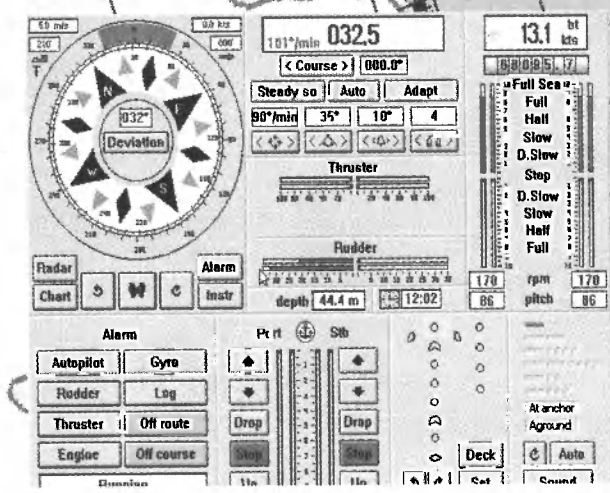
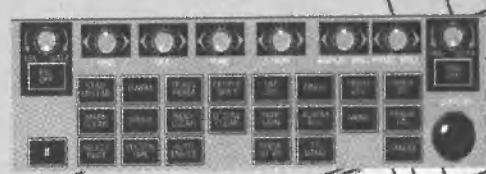
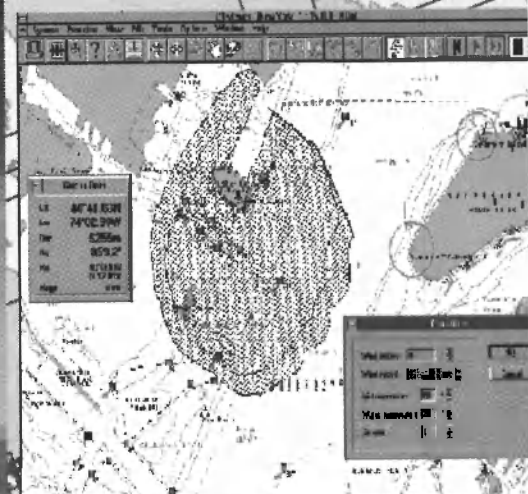
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AWO 1997 Fall Convention and Board of Directors Meeting: October 16-17, The Four Seasons Olympic Hotel, Seattle, Wash.

Contact: Tina Gardner, manager, Administrative & Member Services, American Waterways Operators, 1600 Wilson Blvd., Ste. #1000, Arlington, Va. 22209, tel: (703) 841-9300; fax: (703) 841-0389.

Women In Shipping: October 16-17, Washington, D.C.

Contact: Carleen L. Kluss, International Marketing Strategies, 28 Southfield Ave., Stamford, CT 06902, tel: (203) 406-0106; fax: (203) 406-0110.

1997 Permanent Int'l Association of Navigation Congresses (PIANC) National Conference: October 28-30, Hilton Hotel, Wilmington, N.C.

Contact: Office of U.S. Section, PIANC, 7701 Telegraph Rd., Alexandria, Va. 22315-3868, tel: (703) 428-6286; fax: (703) 428-8171.

Society of Accredited Marine Surveyors Annual Conference and Education Training Symposia: October 29-31, Downtown Riverfront Holiday Inn, St. Louis, Mo.

Contact: Mary Stahler, executive secretary, tel: (800) 344-9077; fax: (800) 388-3958.

Fort Lauderdale International Boat Show: October 30-November 3, Fort

Lauderdale, Fla.

Contact: Show Management, Inc., 1115 Northeast 9th Ave., Fort Lauderdale, Fla. 33304, tel: (954) 764-7642; fax: (954) 462-4140.

NOVEMBER 1997

Seatrade Pacific Cruise Convention: November 3-5, Cairns, Australia.

Contact: The Seatrade Organisation, Seatrade House, 42 North Station Rd., Colchester CO1 1RB, U.K.

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Maritime Reporter/Engineering News

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International Symposium On Shell & Spatial Structures: November 10-14, The Orchard Hotel, Singapore.

Contact: CI-Premier Pte. Ltd., 150 Orchard Rd. #07-14, Orchard Plaza, Singapore 238841, tel: +65 733 2922; fax: +65 235 3530.

ASNE Environmental Symposium: Environmental Stewardship, Ships and Shorelines: November 12-13, Virginia Beach Pavilion, Virginia Beach, VA.

Contact: American Society of Naval Engineers, 1452 Duke St., Alexandria, VA 22314-3458, tel: (703) 836-6727; fax: (703) 836-7491; e-mail: asnehq.asne@mci-mail.com.

1997 Tri-Service Conference On Corrosion: November 17-21, Blockade Runner Hotel, Wrightsville Beach, N.C.

Contact: David A. Shifler, NSWC - Carderock Division, tel: (301) 227-5128.

Europort 97: November 18-22, Amsterdam, The Netherlands.

Contact: Amsterdam RAI, P.O. Box 7777, NL-1070 MS Amsterdam, tel: 31 (0) 20 549 1212; fax: +31 (0) 0 644 5059; e-mail: press@rai.nl.

Expo Seattle: November 20-22, Washington State Convention and Trade Center, Seattle, Wash.

Contact: Diversified Expositions, P.O. Box 7437, Portland, ME 04112-1338, tel: (207) 842-5508; fax: (207) 842-5509.

Environmental Modeling, Simulation and Virtual Prototyping Conference II: November 24-25, Hyatt Regency, Crystal City, Arlington, Va.

Contact: American Society of Naval Engineers, 1452 Duke St., Alexandria, VA 22314-3458, tel: (703) 836-6727; fax: (703) 836-7491; e-mail: asnehq.asne@mci-mail.com.

Asia-Pacific Conference On Shock & Impact Loads On Structures: November 25-27, Hotel Sofitel, Melbourne, Australia.

Contact: CI-Premier Pte. Ltd., 150 Orchard Rd. #07-14, Orchard Plaza, Singapore 238841, tel: +65 733

2922; fax: +65 235 3530.

DECEMBER 1997

Marichem 97: December 2-4, Cologne, Germany.

Contact: Julie Caulkett, RAI Exhibitions London Ltd., Armstrong House, 38 Market Square, Uxbridge,

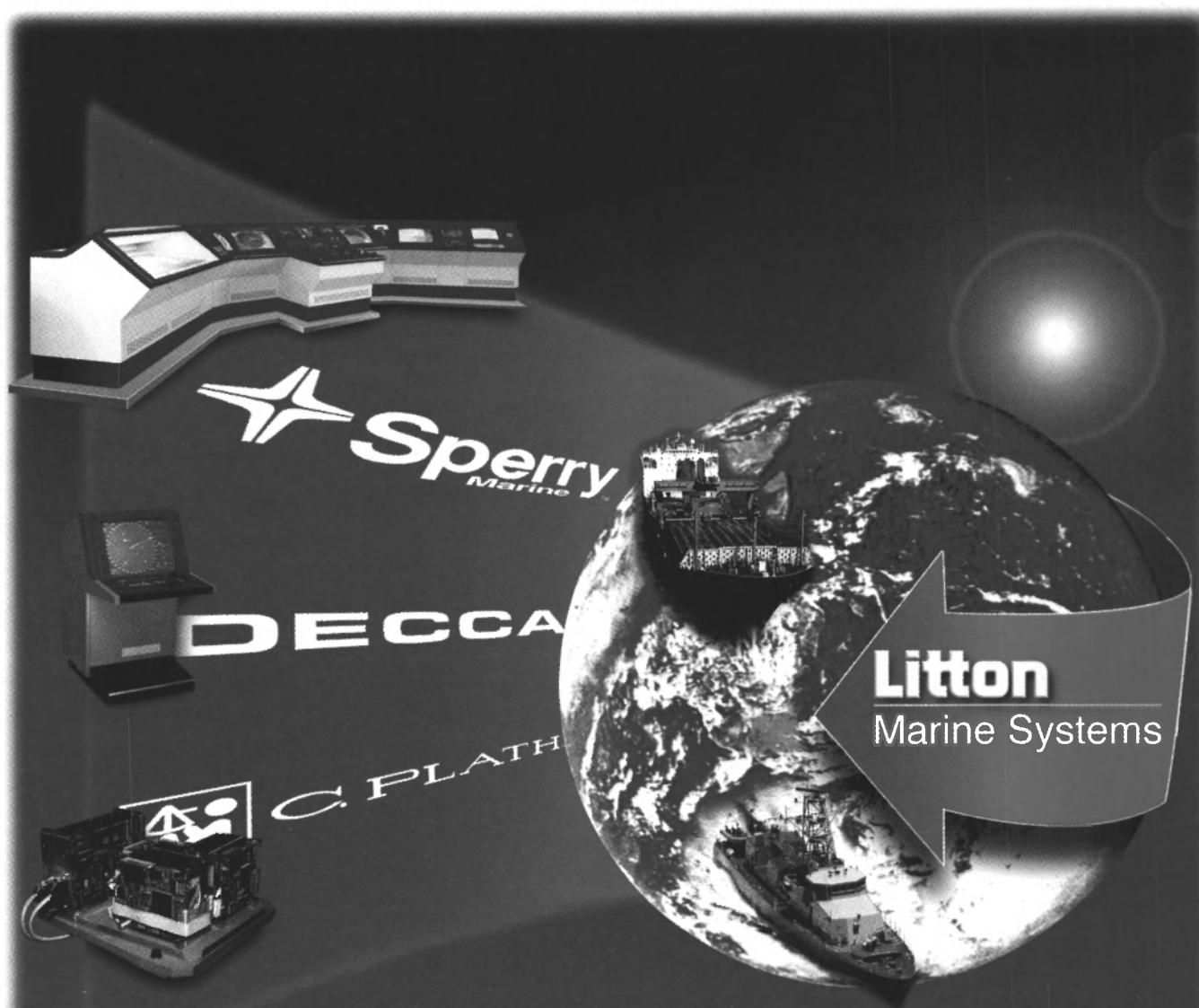
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JANUARY 1998

ASNE 21st Century Combatant

Technology Symposium: January 27-28, Mississippi Coast Coliseum, Biloxi, Miss.

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MARCH 1998

ASNE Day 1998: March 3-4, Sheraton Washington Hotel, Washington, D.C. Contact: American Society of Naval Engineers, 1452 Duke St., Alexandria, VA 22314-

3458, tel: (703) 836-6727; fax: (703) 836-7491; e-mail: asnehq.asne@mci-mail.com.

Seatrade Cruise Shipping Convention: March 3-7, Miami Beach Convention Center, Miami, Fla. Contact: Miller Freeman (Princeton) Inc., Princeton Forrestal Village, 125

Village Blvd., Ste. 220, Princeton, N.J. 08540-5703, tel: (609) 452-9414; fax: (609) 452-9374.

Ports '98: March 8-11, Long Beach Convention Center and Hyatt Regency Hotel, Long Beach, Calif. Contact: American Society of Civil Engineers (ASCE), 1801 Alexander

Bell Dr., Reston, Va. 02191-4400, tel: (800) 548-2723; fax: (703) 295-6144.

Oceanology International '98: March 10-13, The Brighton Metropole, Brighton, U.K.

Contact: Spearhead Exhibitions Ltd., Ocean House, 50 Kingston Rd., New Malden, Surrey DT3 3LZ, U.K., tel: +44 181 949 9222; fax: +44 181 949 8168.

Fishing '98: March 19-21, Scottish Exhibition and Conference Centre, Glasgow, Scotland.

Contact: Sue Hill, EMAP Heighway Events, Meed House, 21 John St., London WC1N 2BP, tel: +44 171 470 6340; fax: +44 171 831 2509.

Seatrade Tanker Industry Convention: March 23-24, Royal Lancaster Hotel, London, U.K.

Contact: Sue Cleary, the Seatrade Organisation, tel: +44 1206 545121; fax: +44 1206 545190.

SingaPort '98: March 24-27, World Trade Centre, Singapore.

Contact: Chandran Nair, SingaPort Enterprises Pte. Ltd., 1 Maritime Sq. #09-72, World Trade Centre, Singapore 099253, tel: +65 321 2130; fax: +65 274 0721; e-mail: chandran@compo.singapore.gov.sg.

ASNE Total Ship Engineering Symposium: May (exact dates TBA), Washington, D.C.

Contact: American Society of Naval Engineers, 1452 Duke St., Alexandria, VA 22314-3458, tel: (703) 836-6727; fax: (703) 836-7491; e-mail: asnehq.asne@mail.com.

APRIL 1998

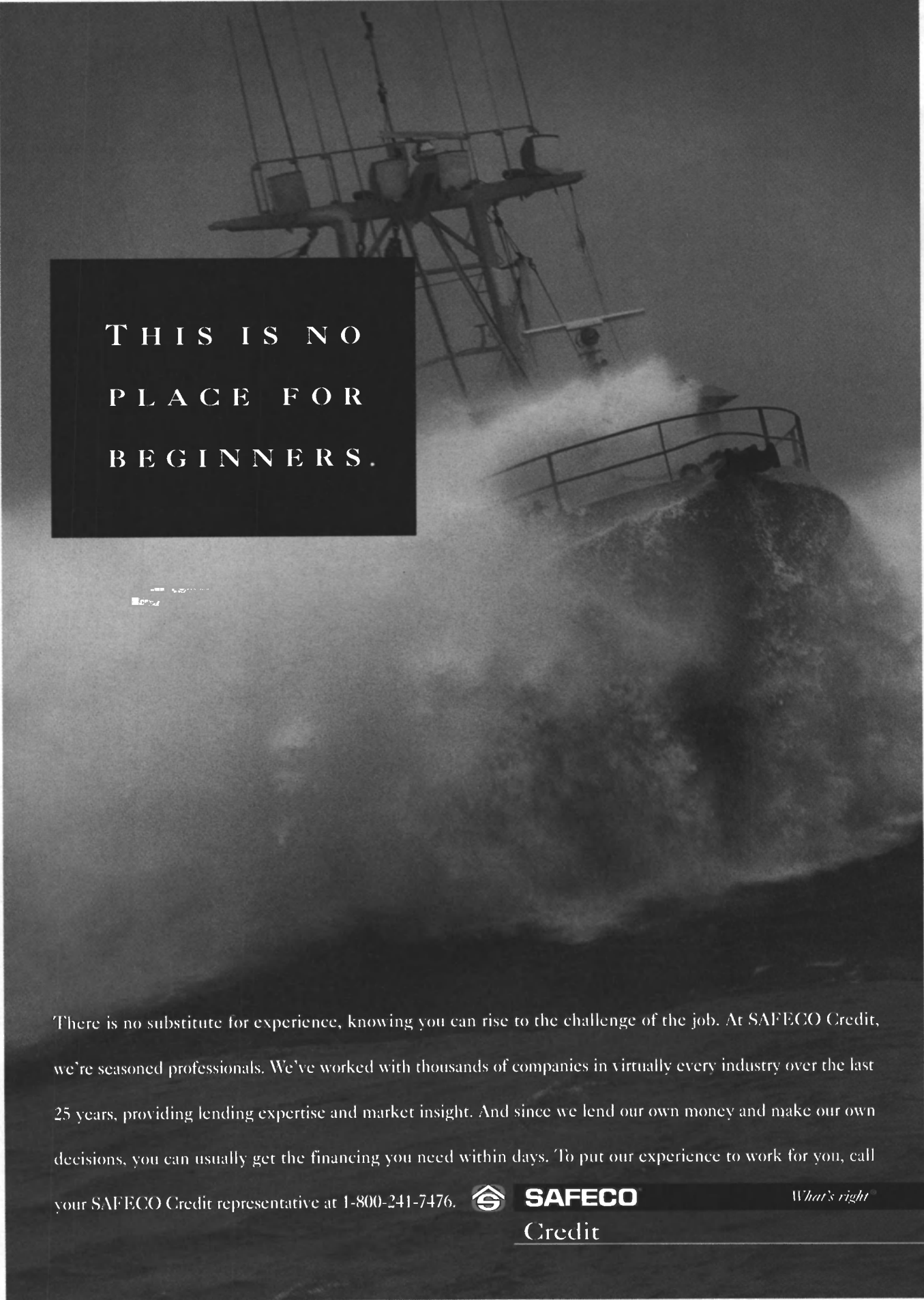
China Fast Ferry & Commercial Cruise Show: April 14-17.

Contact: Craig Moyes, direct Proshow, tel: +44 171 376 7777; fax: +44 171 352 0818.

MAY 1998

Offshore Technology Conference '98: May 4-7, Astrodome U.S.A. Complex, Houston. Contact: Offshore

Technology Conference, P.O. Box 833868, Richardson, Texas 75083-3868, tel: (214) 952-9494.



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What's right

Satellite Communications

(Continued from page 116)

Inmarsat communications system, both of which have proved their reliability over many years of use by mariners and others. The use of geostationary satellites greatly increases the speed at which a distress alert can be delivered, as no time is lost waiting for a satellite to appear over the horizon.

The system features both float free buoy type EPIRBs (emergency position indicating radio beacons) for use onboard larger vessels as well as hand portable versions for yachts, lifeboats and similar applications.

Both types of terminal include a built in GPS receiver so that the position of the unit is constantly updated to an accuracy of better than 61 ft. (200 m). This compares with an accuracy of about five kilometers for the best of the current emergency alerting systems. The terminals also include an Inmarsat satellite communications transmitter which automatically transmits the coded distress alert to all accessible inmarsat satellites.

Inmarsat transmitters use the L band range of frequencies, specifically allocated for search and rescue (SAR) maritime communications because they are virtually unaffected by adverse meteorological conditions and interference from other L band spectrum users.

Improved power budget, made possible through the three new Inmarsat E satellites launched last year, leads to a much better transfer of distress messages through the satellite. A distress signal can be triggered manually or automatically when a float free terminal is submerged. As a minimum the message will contain the identity of the terminal and its position at the time of the alert. This information

will be transmitted via an Inmarsat satellite to an LES where it will trigger an alarm while being automatically relayed via a fixed landline connection, to a Rescue Coordination Center (RCC). Many vessels will carry an on bridge display showing the status and position reading from the EPIRB. In an emergency, crew members will have the option of triggering an alert transmission and including, via a short code keyboard, additional information on the nature of the emergency. Similar information can be input by the user of a portable terminal. Once triggered, terminals will continue transmitting for 48 hours unless de-activated manually. Some models will also feature a search and rescue radar transponder (SART) beacon to enable rescuers to home-in using radar once they reach the area of the transmitted position. Land earth stations (LESs) operating with the

(Continued on page 133)



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Danyard To Cut Workforce

Due to decreasing workloads and a need to make production more efficient, Danyard Shipbuilding has announced plans to fire 235 employees. Work on three chemical tankers for the Stolt group is nearing completion, and thus is demanding less labor. Parent company Lauritzen cites Danyard as a main reason for the group's 1996 loss of 259 million crowns, along with currency losses and weak productivity. Last April, Lauritzen contracted to sell 48 percent of the yard to Malaysia's Penang Shipbuilding and Construction (PSC) for \$100 million, but has so far received only a \$1 million deposit.

Southwest Marine Wins \$26M Contract

The U.S. Navy's Military Sealift Command (MSC) has awarded Southwest Marine, Inc. (SWM) a \$26 million, cost-plus-award-fee contract for the repair, overhaul, dry-docking and upgrade of the U.S. Navy ammunition ship USNS KISKA (T-AE 35). With options, the total value of the contract could exceed \$30 million. The work is scheduled to begin December 1, 1997 and will be completed on October 26, 1998. Between 300 and 400 workers per day are assigned to the job. "Winning this contract is a real tribute to our employees and a much-deserved reward for the great work they do every day," commented Ed Ewing, SWM's president and COO. While at SWM, the habitability spaces currently configured to U.S. Navy standards will be re-outfitted to meet the requirements of MSC's civilian crew.

Recent Ship Sales

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

Date Reported	Vessel Name	Vessel Type	DWT	Year Built	Sale Price (M)
7/25/97	Capo Mele Secondo	Bulker	16,324	78	\$3
7/25/97	Aditya Usho	Bulker	18,720	81	\$4
7/25/97	Trade Wealth	Bulker	24,900	83	\$7.8
7/4/97	Hua Peng	Bulker	34,698	83	\$7.8
7/18/97	Prosperus	Bulker	35,676	83	\$8.7
7/11/97	Iowa Trader	Bulker	37,061	82	\$4.5
7/11/97	Ponderosa	Bulker	38,862	75	\$4.3
7/18/97	Sibenik	Bulker	48,320	89	\$16.8
7/25/97	Li Xin	Bulker	54,540	80	\$3.1
7/25/97	Big Angel	Bulker	61,059	75	\$3.7
7/18/97	Nol Canopus	Bulker	64,711	83	\$8.3
7/25/97	Pernas Arang	Bulker	64,871	82	\$8
7/25/97	Bacesti	Bulker	65,456	85	\$7.5
7/11/97	Alessandra D'amato	Bulker	69,171	84	\$12.5
7/25/97	Cielo Esta	Bulker	70,227	88	\$17.4
7/18/97	Iron Master	Bulker	127,774	82	\$12.1
7/11/97	Thalassini Avra	Bulker	129,237	81	\$12.4
7/18/97	Tai Shan	Bulker	149,516	90	\$26.7
7/25/97	China Transport	Bulker	151,688	95	\$36.7
7/25/97	Excel	Tanker	38,565	81	\$13.5
7/4/97	Plate Princess	Tanker	57,372	79	\$6.2
7/4/97	Ace Trader	Tanker	60,961	87	\$21.6
7/25/97	Protank Orinoco	Tanker	69,128	80	\$13.5
7/18/97	Bt Stream	Tanker	88,728	80	\$13.5
7/25/97	Artois	Tanker	102,262	92	\$36
7/18/97	Nausicaa	Tanker	135,973	89	\$35

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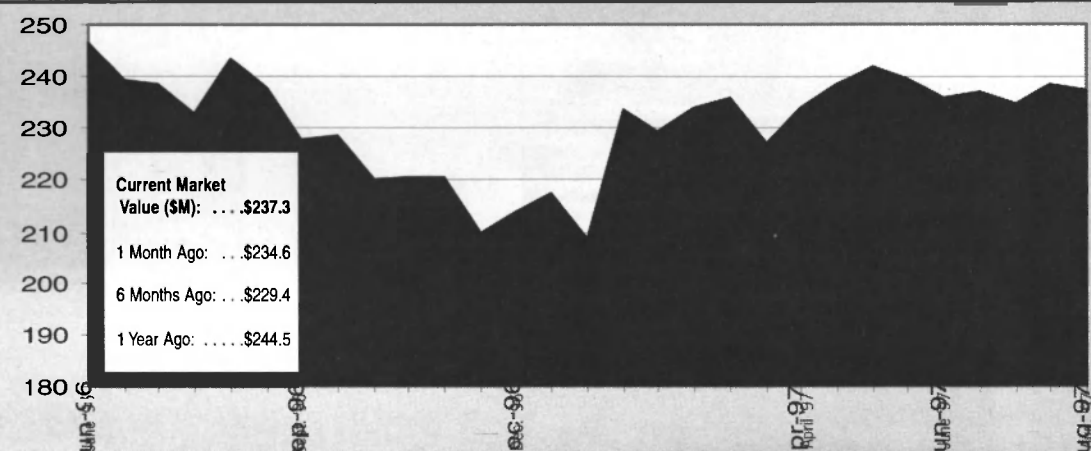
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Index Fleet Valuation



The Index Fleet Valuation is representative of the resale market for Bulk Carriers and Tankers as a whole. The Index Fleet consists of 15 vessels, nine Bulk Carriers and six Tankers, of various sizes and ages. Fluctuations in the value of the world fleet are mirrored in the Index Fleet. This report, compiled by Shipping Intelligence, Inc., a New York maritime consulting firm, tracks sale prices of secondhand bulk carriers and tankers. For more information, call tel: (212) 997-0966.

(Continued from page 131)

Inmarsat E system are: Raisting (Germany), which covers the Atlantic Ocean East and Indian Ocean region satellites; Perth (Australia) which covers the Indian Ocean and Pacific Ocean satellites; and Niles Canyon (U.S.) serving the Pacific and Atlantic Ocean West regions. Inmarsat is currently negotiating for a fourth LES installation to provide duplicated cover in the Atlantic East and West regions.

"This will give the system the added security of double coverage in every region," said Mr. Fuller. "But in fact, even now with three stations operating, there is only one small section of the Pacific without double coverage."

Like Inmarsat, the LES operators — Deutsche Telekom in Germany, Telstra in Australia and IDB in the U.S. — are all providing their Inmarsat E services free of charge.

Each LES is connected to its national rescue authority via a dedicated link. In Germany this is the Bremen rescue coordination center; in Australia it is a similar RCC in Canberra and in the U.S. it is the U.S. Coast Guard data network. These authorities will deal with an emergency themselves or pass the information on to an appropriate RCC, usually the one nearest the source of the distress alert and therefore in the best

position to coordinate rescue efforts. A range of Inmarsat E float free and personal portable EPIRBs is being marketed by four manufacturers: Nortel Dasa GmbH; OHB System GmbH; Nokia; and Kreiger Gesellschaft GmbH. As an affirmation of Inmarsat's commitment to safety services, the Inmarsat E EPIRB has "real benefits over those that we've seen up till now," said **Peter Goldsmith**, Inmarsat's market manager for merchant shipping. "It's much faster than previous systems ... as soon as the button is pressed, there's a record of that in the RCC, rather than the ship in distress having to wait for a satellite pass, which could mean up to a couple of hours. So speed of response is dramatically enhanced."

In tests carried out shortly before its introduction, Inmarsat E proved to be 100 per cent reliable in delivering a comprehensive distress message to LESs, typically within two minutes of an initial alert.

"This is a great improvement on current satellite and radio systems, which can take hours to deliver an alert," said **Goldsmith**. "As we have seen recently, if such alerts are not sufficiently comprehensive they often raise as many questions for rescuers as they provide answers."

Goldsmith also stresses the

a news conference. The European Commission has given the International Group of P&I Clubs until September 16 to respond to its call for greater competition. Under the February 20 Agreement, P&I Clubs work together to provide high levels of liability cover in the event of marine pollution and other claims on shipowners. They represent 90 percent of world shipping.

The agreement also means that a shipowner must pay the same level of premium for the first year after moving from one club to another, a clause which has attracted particular criticism from Brussels.

The London Club and its managers do not expect the International Group of P&I Clubs to split over this issue because of the benefits to their owners, the shipping industry.

One P&I source said reinsurers had received few P&I claims in recent years and could afford to see the premium cut to \$150 million.

accuracy of the position reporting. "It's much, much higher," he said. "Earlier alerting systems were accurate only to within four or five kilometers; Inmarsat E is accurate to within 200 meters. If an aircraft is looking for a person in the water, it's like looking for a needle in a haystack. "After all, just three weeks before we launched Inmarsat E, the British yachtsman **Tony Bullimore** was lost in the Southern Ocean for five days during the Vendee Globe race. It's very difficult to find a hull 60 feet long in the sea, especially if it's upside down as his was ... an aircraft's pilot would be lucky to see it. When you're searching for someone lost in the sea and you have Inmarsat E, you can home right in on that person and check the accuracy of the position reporting."



Siemens makes Inmarsat E Beacon.

Bethlehem Steel To Sell Shipyard

Bethlehem Steel Corp. reportedly agreed to sell BethShip Inc.'s Sparrows Point Yard in Baltimore to the private investment firm Veritas Capital Inc. of New York.

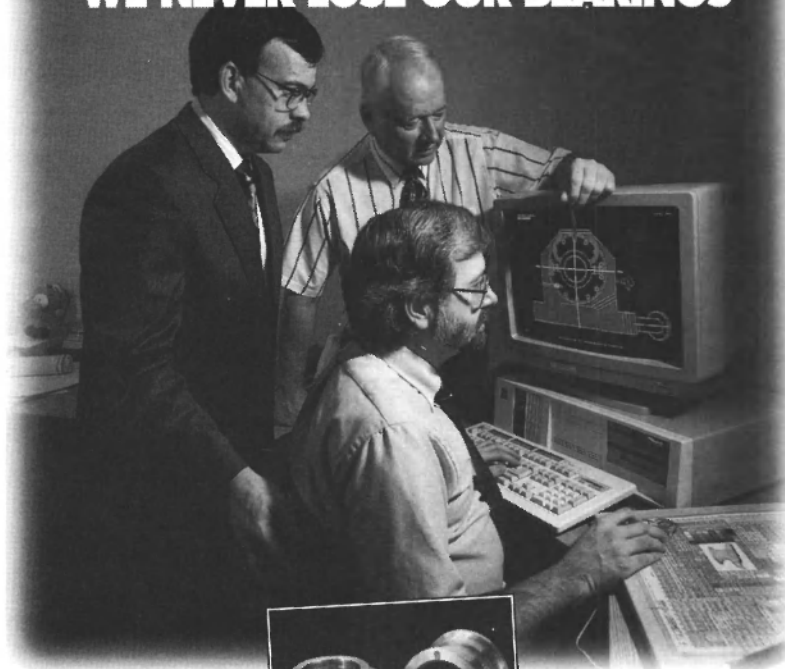
The deal is reportedly subject to Veritas completing a revolving credit agreement, but Bethlehem said it expected to close the sale before September 30.

P&I Insurers Confident Of Countering EU Objections

The London P&I Club says it is confident that marine Protection and Indemnity insurers can overcome EC objections to the sector's current liability pooling agreement. "The (Commission's) statement of Objections was written by a middle-ranking bureaucrat who had not fully considered the February 20 agreement," **Graham Edmiston**, chairman of the London Club's managers, told

September, 1997

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(Continued on page 80)

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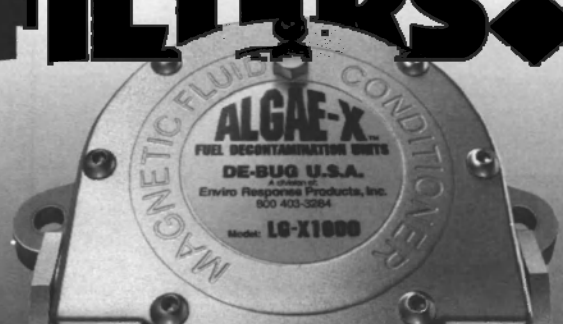
Star Buys Ship For \$30M

Singapore's Star Cruises agreed to buy the 800-berth passenger cruise ship *Sun Viking* for \$30 million from Royal Caribbean Cruise Ltd.

Indian Firm Orders Oil Tankers

Hyundai Corp. won an \$85 million order to build four oil tankers for four Indonesian firms, including Silverstone Development Inc. The tankers, including two 35,000-dwt vessels, would be built by Hyundai Mipo Dockyard and Halla Heavy Industries Co.

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Commercial Products, 3924 Forest Drive, Ste. 11, Columbia, SC 29204-4148
Cospolch Refrigerator Co., 949 Industry Rd., Kenner LA 70062
Jamestown Metal Marine Sales, Inc., 4710 Northwest Second Ave., Boca Raton, FL 33431
Lang Manufacturing, P.O. B. 905, Redmond, WA 98073
Marine Accommodations, 8535-3 Baymeadows Rd., Jacksonville, FL 32256

ANQWAYS, LADDERS
ACL Industries, 177 Gay St., Manchester, N.H. 03103
SlipNot Safety Flooring, 2545 Beaufait St., Detroit, MI 48207
Wooster Products Inc., 1000 Spruce St., P.O. Box 896, Wooster, OH 44691

EAR REPAIR
Haley Marine Gears International, Inc., 2600 N. Concord Belle Chasse, LA 70037

ENERATOR
Alaska Diesel, 4420 14th Ave., NW, Seattle, WA 98107
Baylor Co., 500 Industrial Blvd., Sugarland, TX 77478

ATCH COVER SEAL RENOVATION
Baywood Inc., 3841 Soundway, Bellingham, WA 982263

EAT EXCHANGERS
Alfa-Laval Separation Inc., 955 Mearns Rd., Warminster, PA 18974
Beaird Industries Inc., P.O. Box 31115, Shreveport, LA 71130
Crane Heatex, 17 Grandview Ave., West Orange, NJ 07052

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

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

OSES
Apollo International, 78 Degraw St., Brooklyn, NY 11231

YDRAULICS
Cunningham Marine Hydraulics Co., 201 Harrison St., Hoboken, NJ 07030
Engine Monitor, Inc., 179 Hickory Ave. Harahan, LA 70123
Hamilton Jet, P.O. Box 709, Christchurch, NEW ZEALAND
Ultra Hydraulics Limited, Cheltenham Road East, Gloucester, GL2 9QN, ENGLAND

FORMATION TECHNOLOGIES
Marine Management Systems, 470 West Ave., Stamford, CT 06902

NSTRUMENTATION
Instruments East, Inc., 1037 West 45th St., Norfolk, VA 23508

NSULATION
Blohm & Voss Light Insulation, Bartels & Laders GmbH, Nordereibstrasse 1S, 20457 Hamburg GERMANY
Panel Specialists, Inc./Thermax, 3115 Range Rd., Temple, TX 76501
Insulations, Inc., 1101 Edwards Ave., Harahan, LA 70123
Superior Energies Inc., P.O. Drawer 386, Grovas, TX 77619

NTERIORS
Custom Ship Interiors, Inc., P.O. Box 237, Lusby, MD 20657
Hopeman Brothers, P.O. Box 820, 435 Essex Ave., Waynesboro, VA 22980
Insulations, Inc., Rt. 5, 12360 Leisure Rd, Baton Rouge, LA 70807
Jamestown Metal Marine Sales, Inc., 4710 NW Second Ave., Boca Raton, FL 33431
Marine Accommodations, 8535-3 Baymeadows Rd., Jacksonville, FL 32256
TODCO, Inc., P.O. Box 1087, Marion, OH 43302

JOINER—Watertight Door—Paneling—Ceiling System—Decking
All Alpha Int'l., Inc. P.O. Box 498985, Cincinnati, OH 45249
Branton Ind., 1101 Edwards Ave., Jefferson, LA 70181
Commercial Products, 3924 Forest Drive, Ste. 11, Columbia, SC 29204-4148
CustomShip Interiors, Inc. P.O. Box 237, Lusby, MD 20657
Hopeman Brothers, Inc., P.O. Box 820, Waynesboro, VA 22980
Insulations, Inc., 1101 Edwards Ave., Harahan, LA 70123
Marine Accommodations, 3830 Williamsburg Park, Suite7 Jacksonville, FL 32257
Panel Specialists, Inc./Thermax, 3115 Range Rd., Temple, TX 76501
Walz & Krenzer, Inc., 90 Forest Ave. Locust Valley N.Y. 11560

KEEL COOLERS
R.W. Fernstrum & Co., 1716 Eleventh Ave., Menominee, MI 49858
Kahlenberg Bros. Co., P.O. Box 358, Two Rivers, WI 54241
The Walter Machine Co., Inc., 84-98 Cambridge Avenue, Jersey City, NJ 07307

LASER ALIGNMENT
Boland Industrial & Consulting Services, P.O.B. 91360, Mobile, AL 36691

LIFEBOATS/RAFTS
American Eagle Mfg., Inc., 780 Pearle Jensen Way, LaConner, WA 98257
DBC Marine Safety Systems, 12351 Bridgeport Rd., Richmond, B.C. CANADA V6V1J4
Norsafe AS, P.O. Box 115, N-4818 Faervik, Norway
Viking Life Saving Equipment, 1625 N. Miami Ave., Miami, FL 33136
Willard Marine Co., Inc., 1250 N. Grove St., Anaheim, CA 92806
Zodiac of North America, P.O. Box 400, Stevensville, MD 21666

LIFESAVING EQUIPMENT
MGI International, 119-225 West 1st St., North Vancouver, B.C. CANADA
Steam 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

Golden Marine, 160 Van Brunt St., Brooklyn, NY 11231
Kockum Sonics, Inc., 819 Veterans Blvd., Suite 201, Kenner, LA 70068
Pauluhn Electric Mfg. Co., Inc. 1616 N. Main, P.O. Box 53, Pearland, TX 77581
Francis Searchlights/Stam Supply Co., 4415 6th N.W., Seattle, WA 98107

LIQUID LEVEL GAUGES
King Engineering Corp., P.O. Box 1228, Ann Arbor, MI 48106

LIQUID OVERFILL PROTECTION SYSTEMS
E.R.L. Marine Products, P.O.Box 1026, New Albany, IN 47151-1026
Metritape, Inc., 59 Porter Rd., Littleton, MA 01460

LOGISTICS
VL Logistics Consultants, Inc., 3420 Bienville Blvd., Ocean Springs, MS 39564

LUBRICANTS
Royal Lubricants, P.O. Box 518, East Hanover, NJ 07936

MACHINERY MAINTENANCE, REPAIR, OVERHAUL, AND TESTING
Golden Marine Company Inc., 160 Van Brunt Street, Brooklyn, NY 11231
Maritime Power 200 Henderson St., Jersey City, NJ 07302
New England Trawler Equipment Co., 291 Eastern Avenue, Chelsea, MA 02150
Wallace Coast Machining, 1920 Waukegan Rd., Glenview, IL 60025

MARINE CALIBRATION DEVICES
Hermont Marine, Inc., 3528 Griffith, St-Laurent, QUEBEC CANADA H4T 1A7

MARINE CEILINGNS
Hydro-Aluminium, Vik Verk, N-5880 VIK I SOGN, Norway
Insulations, Inc., Rt. 5, 12360 Leisure Road, Baton Rouge, LA 70807

MARINE DECKING
E.H. O'Neill Co., 1405 Chippendale Rd., Lutherville, MD 21093
Hopeman Brothers, Inc., P.O. Box 820, Waynesboro, VA 22980

Insulations, Inc., Rt. 5, 12360 Leisure Road, Baton Rouge, LA 70807

Selby, P.O.Box 1600, Sapulpa, OK 74067

MARINE DRILLING & BLASTING
Marine Drilling & Blasting, Inc., P.O. Box 18098, Beverly Hills, CA 90209-4098

MARINE ELECTRONICS
Frank L. Beier Radio, 2001 Ridgeway Drive, Metairie, LA 70001
Kockum Sonics, Inc., 819 Veterans Blvd., Suite 201, Kenner, LA 70068

Saab Marine Electronics AB, Box 13045, 402 51 Goteborg, SWEDEN

Scientific Marine Services, Inc., 101 State Pl., Suite F, Escondido, CA 92029

MARINE ELEVATORS
McElroy Machine, 1101 Lorraine Rd., Biloxi, MI 39535-4454

MARINE EQUIPMENT
Bohnet & Associates, 1150 Rule Rochelle, Sidell, VA 70458
McElroy Machine, P.O. Box 4454, Biloxi, MS 39535-4454

MARINE FINANCING
Safeco Credit Co. Inc. 4909 156th Ave. NE, Redmond, WA 98052

MARINE FIRE PROTECTION
Insulations, Inc., Rt. 5, 12360 Leisure Road, Baton Rouge, LA 70807
Unitor Ship Service Inc., 2375 West Esther Street, Long Beach, CA 90813

MARINE GEARS
The Falk Corp., PO Box 492, Milwaukee, WI 53201-0492
Haley Marine Gears, Inc. P.O. Box 689, Greenville, MS 38702
Marine Gears, P.O. Box 689, Greenville, MI 38701

MARINE INSURANCE
John G. Alden, 1300 SE 17th St., Fort Lauderdale, FL 33316

MARINE PUMPS
Giles Inc., P.O. Box 628, Seabrook, TX 77586

MARINE SURPLUS SALES
Defense Reutilization & Marketing Service, 2163 Airways Blvd., Memphis, TN 38114

MARINE SYSTEMS SIMULATION
Applied High Technology, 4 Place Dee Commerce Brossard, Suite 201 Quebec Canada J4W-3B3

MARITIME ARTWORK
Sarba Art Studio, 6 Ridge Drive, Old Saybrook, CT 06475

METERS
Selco USA, 2508 Lakebrook Ct., Atlanta, GA 30360

MOORING LINES
Phillystran, Inc., 151 Commerce Drive, Montgomeryville, PA 18936-9628

MOTOR PROTECTION EQUIPMENT
Marine Safe Electronics, 37 Staffern Dr., Concord, Ontario L4K CANADA

NAVAL ARCHITECTS, MARINE ENGINEERS, SURVEYORS
Advanced Marine Enterprises, Inc., 1725 Jefferson Davis Hwy., Arlington, VA 22202
Bay Engineering, 253 N. First Ave., Sturgeon Bay, WI 54235
Donald L. Blount, 2550 Ellsmere Ave., Ste. K, Norfolk, VA 23513
C. Baxter & Associates, P.O. Box 9006, Mobile, AL 36609
CDI Marine Co., 4040 Woodcock Dr., Suite 200, Jacksonville, FL 32207
Childs Engineering Corp., Box 333, Medfield, MA 02052
Crandall Dry Dock Engrs., Inc., P.O. Box 505804, Chelsea, MA 02150
Crane Consultants, 15301 First Ave S., Seattle WA 98148
C.R. Cushing, 18 Vesey St., New York, NY 10007
CT Marine, 56 Crooked Trail, Rowayton, CT 06853
Cunningham & Walker, 1762 Providence Hollow Lane, Jacksonville, FL 32223
Arthur D. Darden, 3200 Ridgeway Dr., Suite 403, Metairie LA 70002
DeJong & Lebet, Inc., 1734 Emerson Street, Jacksonville, FL 32207
Design Associates Inc., 14360 Chef Mentour Highway, New Orleans, LA 70129
Designers & Planners, 2120 Washington Blvd. Ste.200, Arlington, VA 22204
Elliott Bay Design Group 5301 Shilshole Ave. N.W. Ste. 200, Seattle, WA 98107
Encon Mgmt. & Engineering Consultant Services, P.O. Box 7760,

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
Heger Dry Dock Engineers, Inc., P.O.B. 6605, Holliston, MA 01746
J.J. McMullen, 2341 Jefferson Davis Hwy, Arlington, VA 22202
John W. Gilbert & Assoc., Inc., 199 State St., Boston, MA 02109
The Glisten Assoc. Inc., 600 Mutual Life Bldg., 605 First Ave., Seattle, WA 98104
Guido Perla & Assoc., 720 3rd Ave., Ste. 1200, Seattle, WA 98104
Morris Guralnick Associates, Inc., 130 Sutter St., Ste. 400, San Francisco, CA 94104
C. Raymond Hunt Associates, 69 Long Wharf, Boston MA 02110

JH 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. Kroger, 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, NY, 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., 470 West Ave., Stamford, CT 06902

Marine Power Associates, 1010 Turquoise St., Ste 217, San Diego, CA 92109

Maritech, Seadlif, 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, IL 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 Fulson St., Ste. 301, San Francisco, CA 94107

Sargent & Herkes, 225 Baronne St., Suite 1405, New Orleans LA 70112

Scientific Marine Services, Inc., 101 State Pl., Suite F, Escondido, CA 92029

Sea Schoof, 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, Barneget Light, NJ 08006; 2001 N. Beauregard Street, Alexandria, VA 22311; 50 Vashell Way, Orinda, CA 94563

George G. Sharp, Inc., 100 Church St., New York, NY 10007

R.A. Steam, 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 Sussex, UK

KVH Industries, Inc., 110 Enterprise Center, Middletown, RI 02842-5268

Mackay Communications, 300 Columbus Circle, Edison, NJ 08837

Negron Marine Consultants, 840 Bond Street, Elizabeth, NJ 07201

Offshore Systems, 930 West 1st Street, North Vancouver BRITISH COLUMBIA

Radio-Holland USA, 8943 Gulf Freeway, Houston, TX 77017

Scandinavian Micro Systems P.O. Box 155, N-1411, Kolbotn, NORWAY

Sea, Inc., 7030 220th S.W., Mountlake Terrace, WA 98043

Simrad, 19210 33rd Avenue West, Lynnwood, WA 98036

Simrad Robertson, 10801 Hamnerly, Suite 100, Houston, TX 77043-1923

Standard Communications, P.O. Box 92151, Los Angeles, CA 90009

Transas Marine, 19105 36th Ave. West, Bldg.#2, Suite 101, Lynnwood, WA 98036

Trimble Navigation, 585 North Mary Avenue, P.O. Box 3642, Sunnyvale, CA 94086

Waterway Communications System, Inc. 453 E. Park Pl., Jeffersonville, IN 47130

Nelson Industries, Highway 51 West, Stoughton, WI 53589

RGF Marine, 3875 Fiscal Ct., W. Palm Beach, FL 33404

PAINT—COATING—CORROSION CONTROL

Ashland Chemical Co., Drew Marine Co., One Drew Plaza, Bonton, NJ 07005

Corroscel, Inc., 1045 12th Ave. NW-F5A, Issaquah, WA 98027

Esgard, Inc., P.O. Drawer 2698, Lafayette, LA 70502

Ferro Corp., 1301 North Flora St., Plymouth, IN 46563

Jamestown Distrib., 28 Narragansett Ave., P.O. Box 348, Jamestown, RI 02835

Hempel Coatings, 6901 Cavalcade St., Houston, TX 77028

Microphor, Inc., Marine Div., 452 E. Hill Rd., P.O. Box 1460, Willits, CA 95490

Royal Chemical, 2705 Concord Road, Belle Chasse, LA 70037

Sigma Coatings, 8979 Market St., Houston, TX 77029, 330 Rover Rd.,Harvey, LA 70059,

1100 Adams St., Hoboken, NJ 07030

TNO Institute of Industrial Technology, P.O.B. 3, 2600 AA Delft, Netherlands

Unitor Ship Services Inc., 2375 West Esther Street, Long Beach, CA 90813

PIPE FITTINGS/CUTTINGS/CONNECTING SYSTEMS

Georg Fischer DISA Pipe Tools Division, 407 Hadley St., Holly, MI 48442

Lokring Corp., 396 Hatch Drive, Foster City, CA 94404

Victaulic Co., 4901 Kesslersville Rd., Easton, PA 18042

PNEUMATIC HOISTS

J.D. Neuhaus, 9 Loveton Circle, Sparks, MD 21152

POLLUTION CONTROL/ PRODUCTS/MARINE SERVICES

Oil Mop, Inc., 221 Rue De Jean, Lafayette, LA 70508

Ports

Port of Olympia, 915 Washington NE, Olympia WA 98501

PRECISION ANALYZER

FCS, Inc., 22 Main St., Centerbrook, CT 06409

PROPELLERS

Associated Marine Technologies, 4016 Seaboard St., Portsmouth, VA 23701

Holland Roar Propellers, 2273 Barataria Blvd, New Orleans LA, 70072

Rice Propellers, Av. Rios Espinoza #88, Mazatlan, MEXICO 82180

Rolla SP Propellers SA, P.O. Box 251, Via Silva 5, 6828 Balerna, SWITZERLAND

S&S Propellers, 26-15 123rd St., Flushing, N.Y. 11354

Sound Propeller, 1608 Fairview Avenue E., Seattle, WA 98102

General Thermodynamics, 210 South Meadow Rd., Plymouth, MA 02360

PROPULSION EQUIPMENT

—Bowthrusters, Diesel Engines, Gears, Propellers, Shafts, Turbines

Avondale Industries, Harvey Quick Repair, P.O. Box 116, Harvey, LA 70058

American Air Filter, P.O. Box 35690, Louisville, KY 40432

ABB Drives Inc., P.O. Box 372, Milwaukee, WI 53201-0372, USA

ABB Industry Oy, P.O. Box 185, 00381 Helsinki, FINLAND

ABB TURBOCHARGER, INC., 1460 Livingston Avenue, N. Brunswick, NJ 08902

Aquamaster-Rauma Ltd., Box 220, SF-26101, Rauma, FINLAND

Aquamaster-Rauma Inc., 2315 North Woodlawn Ave., Ste. 103, Metarie, LA 70001

Brunvoll A/S, P.O. Box 370, N-6401, Molde, Norway

Caterpillar, 100 NE Adams Street, Peoria, IL 61629-2320

Centa Corp., 8185 Cass Ave., Darien, IL 60561

Cincinnati Gear Co., 5657 Wooster Pike, Cincinnati, OH 45227

The Falk Corp., PO Box 492, Milwaukee, WI 53201-0492

Fincantieri, Diesel Engines Div—GMT, Bagnoli della Rosandra 334, Trieste, ITALY

GE Naval & Drive Turbine Systems, 166 Boulder Dr., Fitchburg MA 01420

GEC ALSTHOM Diesels Inc., 10801 Kempwood Dr. Ste 1, Houston, TX 77043-1412

Goltens Worldwide, 160 VanBrunt St., Brooklyn, NY 11231

Harbormaster Marine Inc., 31777 Industrial Rd., Livonia, MI 48150

Harrington Metal, 6720 124th Ave. Lennville, MI 49408

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

LIPS B.V., P.O. Box 6, 5

LA 70059-0008
Thrustmaster of Texas, P.O. Box 840189-12227 IFM 529,
Houston, TX 77284-0189
Ulstein Bergen Diesel A/S, P.O. Box 924, N-5002, Bergen,
NORWAY
Ultra Hydraulics Limited, Cheltenham Road East, Gloucester,
GL2 9QN, ENGLAND
Voith Hydro Marine Technology, P.O.B. 1125, D89509,
Heidenheim, GERMANY
U.S. Rep: Voith Schneider America Inc., 121 Susquehanna
Ave., Great Neck, NY 11021

PUMP—Repair—Drives
Gilkes, Inc., PO Box 628, Seabrook, TX 77586
Hamworthy Marine, Inc., 1129 Hospital Dr. Ste 3C,
Stockbridge, GA 30281
Kraissl Company, 299 Williams Ave., Hackensack, N.J.
07601-5225
Vita Motivator, 566 Parker St., Newark, NJ 07104

RADARS —ARFAS
Furuno USA, Inc., 271 Harbor Way, S. San Francisco, CA
94080
Radio-Holland USA, 8943 Gull Freeway, Houston, TX 77017

REFRIGERATION EQUIPMENT/SERVICES
Ardick Marine, 81 Mahan St., West Babylon, N.Y. 11704
Ashland Chemical Co., Drew Marine Co., One Drew Plaza,
Boonton, NJ 07005
RTF Mfg., RD #1 Route 66, Hudson, NY 12534
Unitor Ship Service Inc., 2375 West Esther Street, Long
Beach, CA 90813

REMOTE VALVE OPERATORS
American United Marine Corp., 5 Broadway, Rt 1, Saugus,
MA 01906
Elliott Manufacturing, P.O. Box 773, Binghamton, NY 13902
Triumph Controls, 205 Church St., North Wales, PA 19454

RH PROPULSION
Boll Filler, 15 International Dr., East Granby, Ct., 06206
Gotens, 160 Van Brunt St., Brooklyn, NY 11231

RIGID INFLATABLE BOATS
American Eagle, 780 E. Pearle Jensen Way, LaConner, WA
98257
Willard Marine, Inc. 1250 N. Grove St., Anaheim, CA 92806
Zodiac of N. America Thompson Creek, P.O. Box 400,
Stevensville, MD 21666

ROPE—Manila—Nylon—Hawser—Fibers
American Mfg. Co., 200 Southpark Rd., Lafayette, LA 70508-
3609
Bayer AG, D-41538, Dormagen, GERMANY
Phillystran, Inc., 151 Commerce Drive, Montgomeryville, PA
18936-9628
Pugel Sound Rope, 1012 Second St., Anacortes, WA 98221
Wellington, P.O.B. 244, Madison, GA 30650

RUDDER BUSHES
Vesco Plastics, P.O. Box 40647, Cleveland 2022, South
Africa

SAFETY DECKING
SlipNot Safety Flooring, 2545 Beaufait St., Detroit, MI 48207
Datex, Inc., P.O. Box 1150, Kinder, LA 70648-1150

SAFETY LIGHTING
Datex, Inc., P.O. Box 1150, Kinder, LA 70648-1150

SANITATION DEVICE—Pollution Control
Byme, Rice & Turner, Inc., 1172 Camp Street, New Orleans,
LA 70130
Exceltech International Corp., 1110 Industrial
Blvd., Sugarland, TX 77478
Envirovac Inc., 1260 Turret Dr., Rockford, IL 61111
Fast Systems, 3240 North Broadway, St. Louis, MO 63147
Headhunter Inc., 214 SW 21st Terrace, Fort Lauderdale, FL 33312
Micropher, 452 East Hill Road, Willis, CO, 95480
Owens Mfg., Hwy 92, Youngsville, LA 70592
Research Products Blankenship, 2639 Andjon Dallas, TX
75220

SATELLITE COMMUNICATIONS
American Mobile Satellite Corp., 10802 Parkridge Blvd.,
Reston, VA 22091
Boatrac, Inc., 6440 Lusk Blvd. #D-201, San Diego, CA
92121-2758
Furuno USA, Inc., 271 Harbor Way, S. San Francisco, CA
94080
KVH Industries, Inc., 110 Enterprise Center, Middleton, R.I.
02842-5268
ICG Satellite Communications, 8400 NW 52nd St., Suite 110,
Miami, FL 33166
Mackay Communications, 2721 Discovery Dr., Raleigh, N.C.
27604-1851
Norwegian Telecom, Postboks 6701 St. Olavs Plass, N-0130,
Oslo, Norway
PTT Telecom, Station 12, P.O. Box 30150-2500 JD The
Hague, NETHERLANDS
Radio-Holland USA, 8943 Gull Freeway, Houston, TX 77017
Singapore Telecom, 15 Hill Street, Telephone House, 2nd
Storey, Singapore 0617
Telstra Mobile Satellite & Radio Services, 79 St. Hilliers Rd.,
Auburn NSW 2144, AUSTRALIA
Westinghouse Wireless Solutions Co., 930 International Dr.,
Linthicum, MD 21090

SCALE MODELS
Markitect, PO Box 225, Oconomowoc, WI 53066
Scale Reproductions, 16346 County Road 13, Fairhope, AL
36532
Sturgeon Bay Model Shop, 187 N Ninth Ave., Sturgeon Bay
WI 54235

SCARIFIERS
Desmond-Stephan, P.O.B. 30, Urbana, OH 43078

SEALS
Blohm & Voss Industrie GmbH, P.O. Box 10 07 20, D-20457
Hamburg, GERMANY
U.S.A. Reprs: Simplex-Turmar Inc, P.O. Box 168, Little Neck,
NY 11363-0168
John Crane Marine, 1536 Barclay Blvd., Buffalo Grove, IL
60089

SENSORS
Gems Sensors, One Cowles Rd., Plainville CT 06062

SHAFT HORSEPOWER MEASURING SYSTEM
Instruments Computers & Controls, 70 South Bow Rd.,
Hooksett, N.H. 03106

SHIP CERTIFICATION
American Bureau of Shipping, 2 World Trade Center, 106th
Fl., New York, NY 10048

SHIP EQUIPMENT
Metric Systems Corp., 645 Anchors St., Ft. Walton Beach,
FL 32548

SHIP LIFTS
Synchrolift Inc., Two Dairn Center, 9130 S. Dadeland Blvd.,
Miami, FL 33156-7850

SHIP REPAIR
Gotens Worldwide, 160 Van Brunt St., Brooklyn, NY 11231

SHIP VALUATION
Capt. E.S. Geary, P.O. Box 1246, Fajardo, P.R. 00738

SHIPBOARD FURNITURE / SWITCHING SYSTEMS
Metric System Corp., 645 Anchors St., Ft. Walton Beach, FL
32548

SHIPBUILDING—Repairs, Maintenance, Drydocking
American Eagle Mfg., 780 Pearle Jensen Way, La Conner
WA 98257
Amfels, Inc., P.O. Box 3107, Brownsville, TX 78523
Astilleros Espanoles, S.A. Ochandiano, 14-16 28023 El Planbio
SPAIN
Atlantic Marine, Inc., P.O. Box 3202, Mobile, AL 36652
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
Blount Marine, 461 Water St., Warren, R.I. 02885
Bollinger Lockport & Larose, P.O. Box 250, Lockport, LA 70374-
0250
Cardoc, P.O. Box 1147 Port Of Spain, Trinidad, W.I.
Chris-Marine AB, P.O. Box 9025, S-2000 39, Malmo, SWEDEN
Conrad Industries, 1501 Front Street, P.O. Box 790, Morgan City,
LA 70381
Fincantieri SpA Cantieri Navali Italiani, Via Cipro 11, 16129 Genoa
ITALY
Gotens Worldwide, 160 Van Brunt St., Brooklyn, NY 11231
Gulf Coast Fabrication, Inc., P.O. Box 539, Lakeshore, MS 39558
HDW, Kiel, Germany, USA Rep.; Roland Marine Inc., 90 Broad St.,
NY, NY 10004
Halter Marine Group, Inc., 13085 Industrial Seaway Rd, Gulfport,
MS 39503
Hitachi Zosen, Hitachi Shipbuilding & Engineering Co., 1-1-1
Hitatsubashi
Chiyoda-Ku Tokyo 100 Japan
In-Place Machining Co., Inc. 929 North Butlum Street, Milwaukee,
WI 53212-3793
Jacksonville Shipyards, 750 E. Bay St., Jacksonville, FL 32202
Jeffboat, Inc., P.O. Box 610, Jeffersonville IN 47130
Kvaerner Masa-Yards Oy, Box 132, SF-00151, Helsinki, FINLAND
Kvichak, 615 N. 34 St., Seattle, WA 98103
Leevac Shipyards, P.O. Box 1190, HWY 90 East, Jennings, LA
70546
Lindenau GmbH, Skagerakrufer 10, Postfach 9093 D-2300 Kiel,
Friedrichsort GERMANY
Motor-Service AB, Box 2115, 144 04 Ronninge, SWEDEN
Munson Hammerhead, 780 Pearle Jensen Way, La Conner WA
98257
Newport News, 4101 Washington Ave., Newport News, VA
23607
Peterson Builders, Inc., 101 Pennsylvania Ave., Sturgeon Bay, WI
54235-0650
Thomas Marine, 37 Bransford Street, Patchogue, NY 11772
Samsung Heavy Ind., 25, 1-ka, Bongrae-dong, Chung-ku, Seoul,
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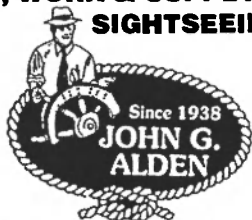
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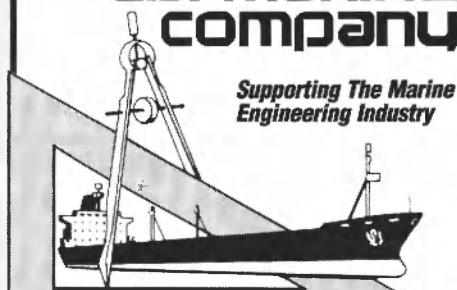
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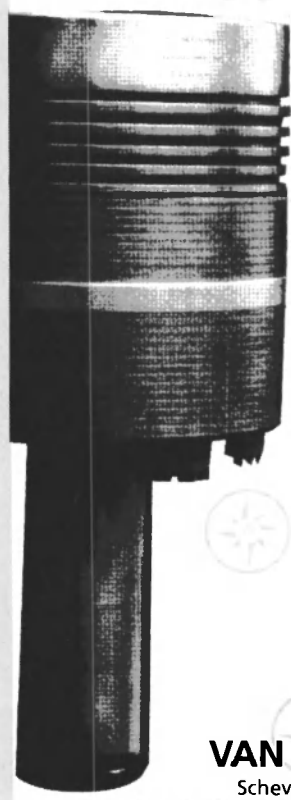
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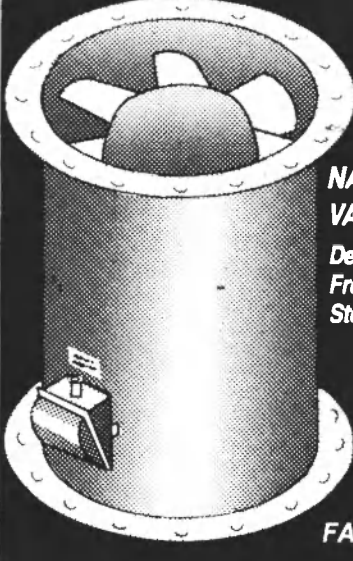


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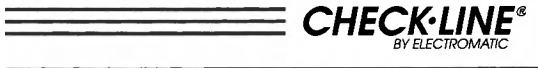
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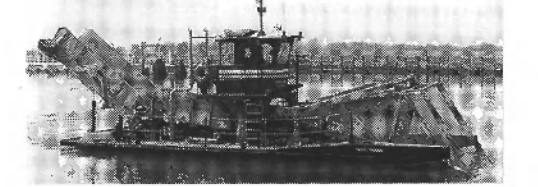


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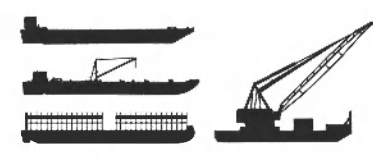
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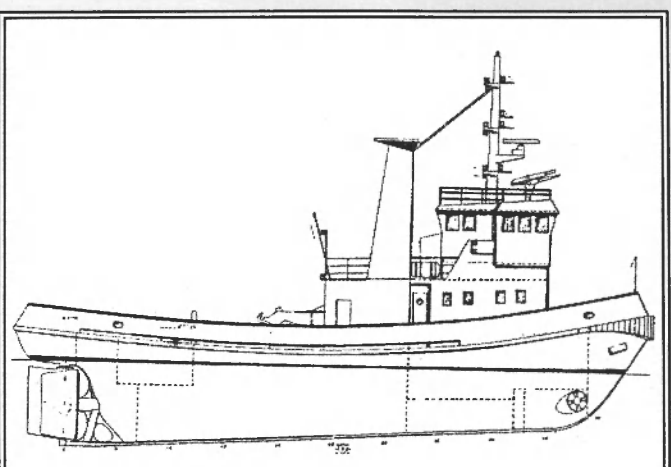


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