

APRIL 1998

MARITIME REPORTER AND ENGINEERING NEWS

External events fail to prevent oil companies from

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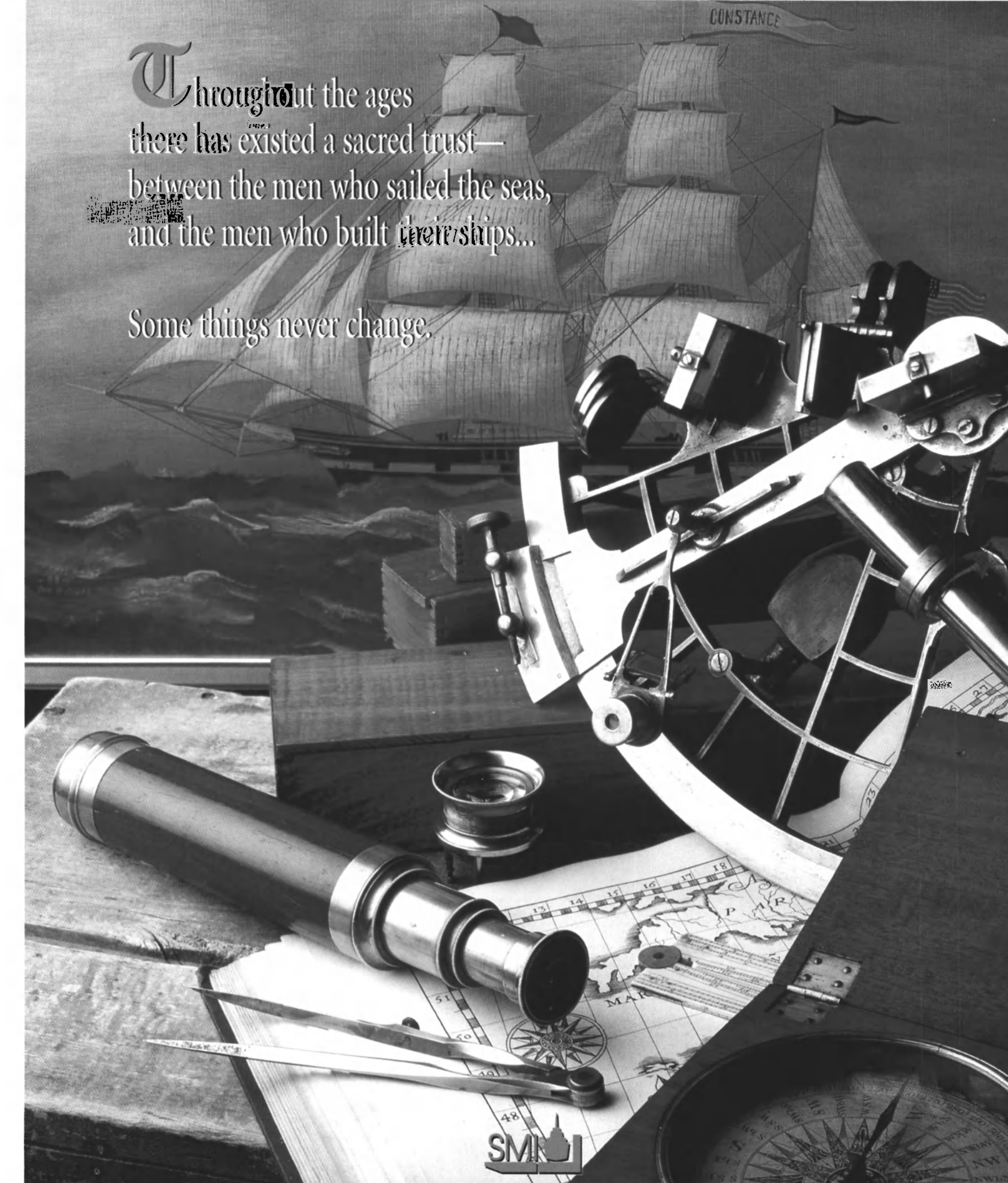
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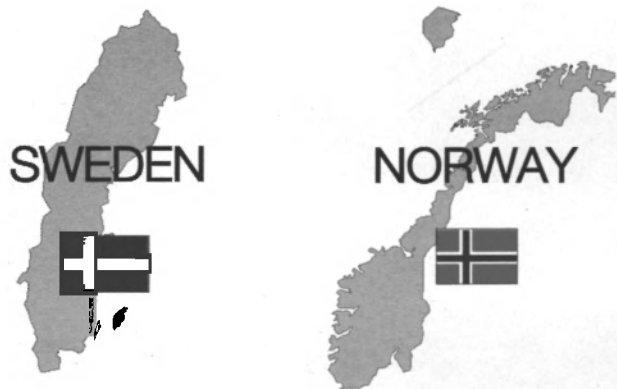
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In This Edition

Pictured on the cover: Offshore activity is booming at Pascagoula, Miss.-based Ingalls Shipbuilding. The company has made quick in-roads on the repair and newbuild side, and has recently signed a licensing agreement to market Zentech's state-of-the-art jack-up design.

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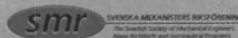
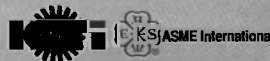
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EDITOR'S NOTE

An important part of the equation

There is a strong undercurrent which is presently pulling all of the maritime industry, and a company's respect of this powerful force could ultimately determine its long-term profitability — and even survivability. The force is the "human element," and while it is certainly not a new concept, it is one which has, nonetheless, picked up considerable strength and visibility in recent months.

Whether a company operates inland tugs and barges, coastal support and supply vessels or oceangoing tankers and bulkers, recognition of the human equation in the successful operations of these vessels is paramount to long-term success. Focus on the human role in maritime operations is partially being force-fed via international, national and regional conventions, rules and regulations. In fact, it's increasingly rare for a speech from William A. O'Neil, Secretary General of the IMO, to not include several references to his organization's activities regarding humans and their role in safety at sea. But it's interesting to note that the tone is changing, as the IMO is increasingly stepping up its efforts to be forward-looking, aggressively seeking ways to ensure safety of life and ship, instead of allowing regulatory policy to be dictated by events, i.e. disasters. In a speech to leaders at the recent Shipping '98 conference, Mr. O'Neil said, "...most of the work in the legislative field has now been taken care of. This means that we are, almost for the first time, in a position to deal with measures to prevent future disasters by taking pro-active rather than reactive action." Companies that adopt this tactic of aggressively searching for ways to improve without being prodded to action by legislation will surely gain an advantage over competitors who do not.

Enter technology.

Technology, which has become a blanket industry buzzword encompassing advanced development of vessel design, building and equipment outfitting, is surely a driving force in the creation of the mega-million dollar vessels of today and tomorrow. But technology alone, for all of its merits, is useless in the hands of an amateur. One of the most exciting technologies to enter the maritime fray in sometime — ECDIS — is featured in this edition, starting on page 58. In a short time, the final standards which a basic ECDIS system must meet to be considered compliant to international standards will be published, meaning that by early autumn, type-approvals for equipment should start flowing, and a vessel owner/operator can finally replace paper charts with an advanced electronics system, designed to enhance safety and operational efficiency. While the ECDIS system represents a breakthrough in maritime operations, it should be noted that the system will be rendered useless without a commitment by top management to ensure that users of the systems are well trained and re-trained to guarantee that they are used to their full capacities. While some may see the cost of training as simply another expense, it is actually a prudent investment given the stakes — lives, ships and the environment — at hand. As Mr. O'Neil summarized in his recent speech: "Technology is complex. It has to be controlled by people who know what they are doing, not by well-meaning novices."



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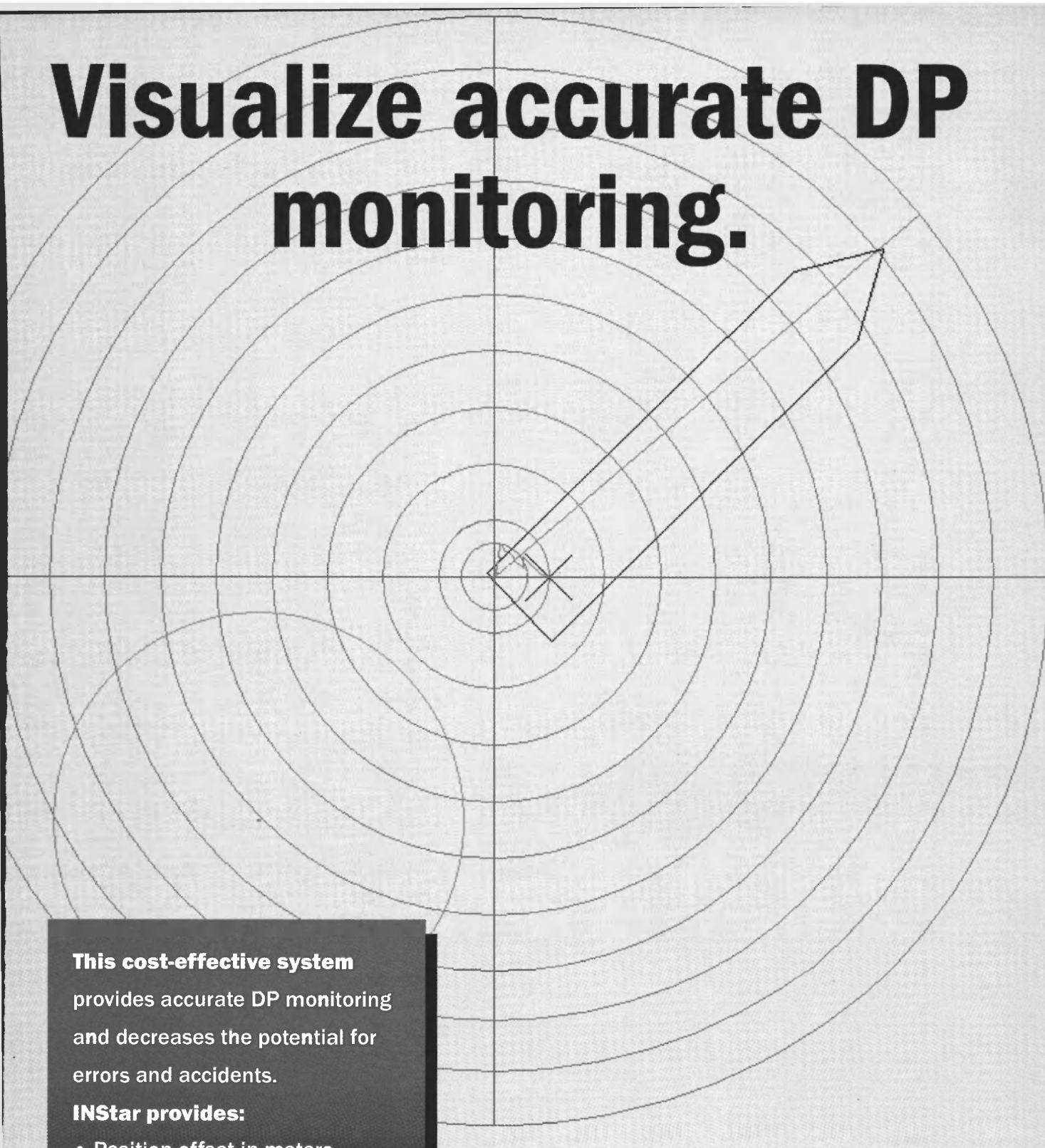
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 SHIP: GP
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 CURSOR: Center Chart
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DEPTH: 7.7fa
 Wind: 4.7mi/h 46.0° TIGI
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 Prop 2: 297 RPM 21% ahead
 Rudder 1: 5.0° Stb
 Rudder 2: 4.0° Stb
 Trg 1: USS Star
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by David Tinsley,
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IHC Digs In

Under-cover construction is one of the strong points of dredge technology specialist IHC, which continues to produce compact designs such as the HAM 312 alongside the new generation of 'mega-trailers'.

In many low-lying Third World areas and countries, equilibrium is still desperately sought between man and water. With every major flood, the fields gain an elixir of fertile silt. But people drown in great numbers and economies suffer through huge damage to property and infrastructural disruption.

Since the greater part of the Netherlands has been reclaimed from inland waters or the sea, and since water control is fundamental to everyday life, the country is distinguished by its considerable know-how in hydraulic engineering.

A way of life has in itself become a source of vibrant industrial activity, still largely concentrated in a region to the immediate east of Rotterdam, where much of the specialized equipment design and production work takes place, and in close proximity to research and

scientific establishments.

Testimony to its continually evolving skills in dredge technology is the commanding share of the global market for vessels and dredge equipment held by IHC Holland, the largest player in the field.

The fact that the world's leading shipbuilding nations have beaten a path to its door for sophisticated new tonnage is further confirmation of its status and competitiveness. Just as the multi-functional, wheel/cutter suction dredger *Samsung New Pioneer* provided an important technological reference for IHC in the South Korean market in 1996, a major project in hand for Penta-Ocean Construction provides an exceptional case of a Japanese company assigning a turnkey shipbuilding package to Europe.

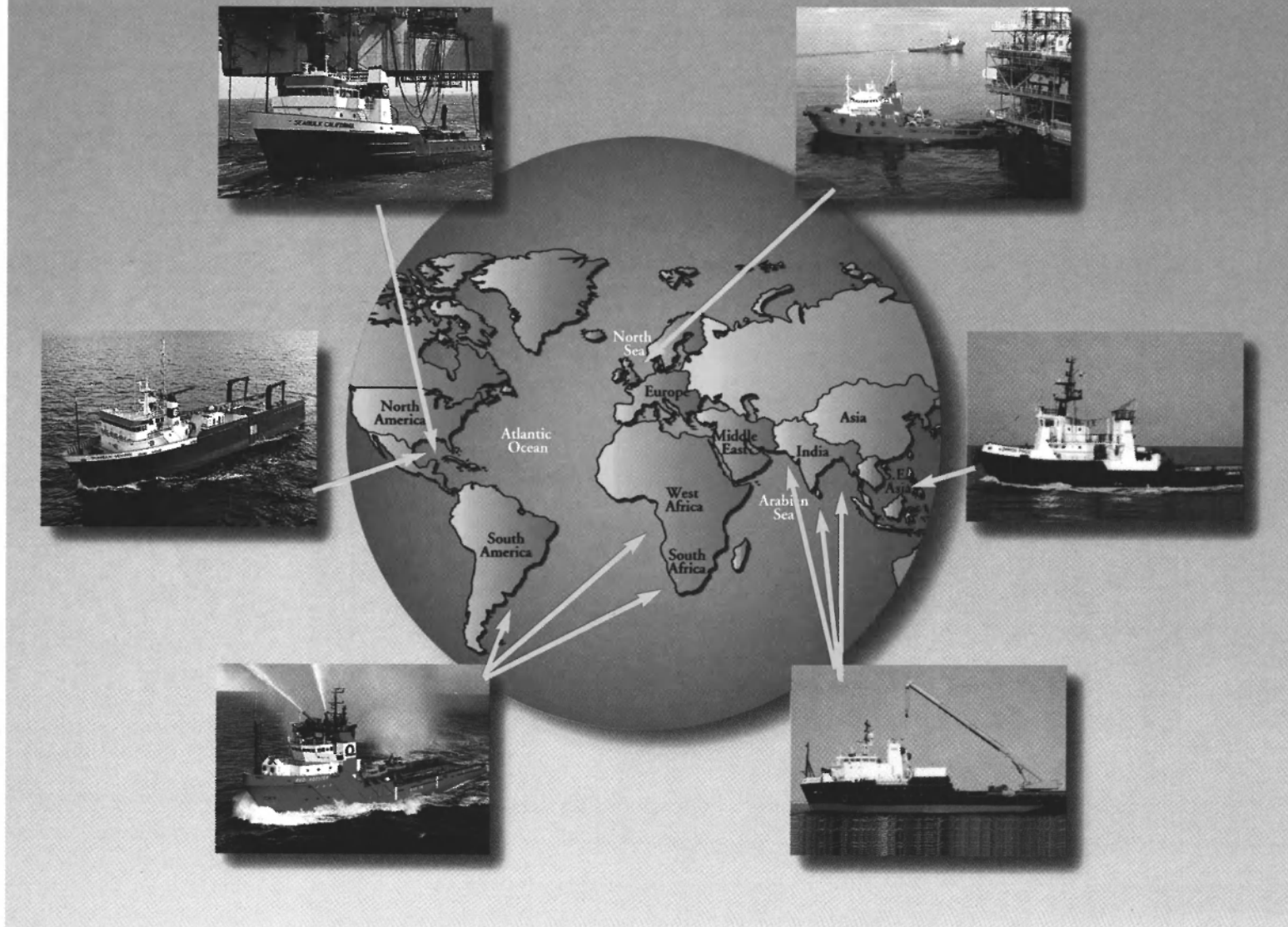
The 20,000-cu.-m. *Queen of Penta-Ocean*, to be built by

the IHC group company Van der Giessen-de Noord, will provide new Japanese muscle in an increasingly rationalized global dredging and land reclamation business.

IHC Holland had taken dredger construction to a new unit scale in 1994 with the delivery to Ballast Nedam of 17,000-cu.-m. *Pearl River*, the first of the so-called mega-trailers.

Before the end of 1998, and in advance of the Japanese newbuilding, the company is scheduled to deliver a 20,000-cu.-m. vessel for Van Oord ACZ, dubbed *Volvox Terranova*. Ongoing commitments to research and development in dredge equipment and dredging methods via the company's Mineral Technological Institute (MTI) and the affiliated Training Institute for Dredging (TID) contribute to the region's fountainhead role in the industry.

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INVESTMENT IN DESIGN

The recent launching of 33,500-dwt *Queen of the Netherlands* at the Verolme Heusden yard on the River Maas further illustrates Dutch strengths in depth. The vessel will be a sister to the 1997-delivered *WD Fairway*, the world's

largest trailer dredger in service. The embodied design is distinguished not only by its 23,425-cu.-m. hopper capacity, but also by a relatively shallow draft which confers considerable operating flexibility in channel dredging and land

reclamation schemes.

Across the border, the Krupp Group's success in attracting the deal for a new titan, a 33,000-cu.-m. trailer dredger for Belgian contractor Jan De Nul, adds a finer edge to international competition

and gives added reason for the entire absence of industrial complacency on the part of the Dutch.

Condensing Time, Expanding Potential

Time and available resources are fundamental considerations influencing every sector of the maritime business of late. Growing expectations as to product standards, technical precision and contractual performance, against a backdrop of reduced lead times, smaller establishment levels and increased project complexity, call for unerring attention to ways of improving working methods.

Recognizing the competitive pressures faced by its client industries, Lloyd's Register (LR) has developed a new software tool which promises to enhance efficiency in ship design and speed up the plan approval process. Known as ShipRight IS, it is an exemplary case of a classification body harnessing new technology to serve practical, commercially related needs while strengthening the society's technical capabilities.

Scheduled to be installed this month in 14 plan approval offices around the world, the system's introduction follows the 1994 launch of the ShipRight package, which addressed ship safety issues at the design and construction stages and throughout a vessel's service life. The new ShipRight IS system provides the market with an integrated software system taking full advantage of the latest IT (information technology) developments. It has been devised to run all the ShipRight procedures from a central database, ranging from structural design and fatigue design assessment to hull condition monitoring. But it will also assist shipbuilders to reduce the time from drawing board to ship launch, and thus to market, saving man-hours and strengthening competitiveness.

Key elements of the new system include a modular software architecture and common database accessible by all calculation modules, allowing closer integration with commercially available ship design systems. Use of the Microsoft Windows operating system makes for a flexible interface.

ShipRightIS is therefore seen as a major step forward in the development of the society's services to owners and builders, offering scope

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It is built around the concept of a ship definition, or product model, rapidly created during the design and construction process and subsequently updated throughout the service life of a ship. Such a facility, which may combine owners' inspections, repair and class surveys, can lead to a more focused maintenance program. The living record can also be established for existing vessels.

LR is involved in an EU-sponsored research program aimed at developing the means for the management and transfer of ship hull data throughout a ship's life cycle. It is also collaborating with leading suppliers of ship design systems with a view to incorporating a ShipRight Rules calculation facility into commercial software.

The message from the society is that "safety and sound operational practice need not exclude sharpened commercial advantage."

Electrical Drives For Offshore Applications

Long favored for applications in research vessels, cable layers and icebreakers, electric propulsion has now become the mode of choice for most of the leading cruise ship operators, while finding increasing favor among specialized sectors of the tanker industry and certain areas of the ferry business.

Electric drive is now raising its profile in the offshore support vessel sector. Wagenborg's innovative breed of ice-breaking supply ship, ordered from Kvaerner Masa-Yards and specified with twin Azipod propulsors, melds the Dutch company's long-standing business and trading links in the Baltic domain with the latest, Finnish-led technology in electric drives. In a new initiative, progressive Norwegian operator Simon Mokster has settled on diesel-electric powering for a versatile new class of support vessel ordered from Dutch builder YVC Ysselwerf.

The Marin Teknikk multi-purpose, platform supply vessel and pipe carrier design selected by Mokster incorporates four main diesel generators covering all energy needs and controlled by a power management system.

Electrical energy will be fed to a pair of frequency-regulated propulsion motors driving contra-rotating thruster propellers.

The two newbuildings have been engineered to the meet the demanding requirements of the prospective Norwegian charterer in regards to fuel consumption and exhaust gas emissions.

Such vessels characteristically spend a high proportion of time in maneuvering and position-holding.

The system adopted will reportedly give total fuel-savings of 10 to 15 percent over conventional arrangements based on diesel-mechanical drives, shaft generators, rudder and auxiliary engines.

The designers also anticipate reductions of harmful exhaust emissions in the order of 35 percent.

Such investment would appear timely given not only the increasingly sophisticated demands of offshore industry in northern waters, but also the Scandinavian emphasis on environmental acceptability, which provides something of a beacon for the rest of Europe.

April, 1998



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Leica Wins GPS Contracts From Spanish Navy

Leica GPS has recently completed the delivery of 20 precise differential GPS navigation receivers for ships and submarines of the Spanish Navy. The vessels are

being fitted with Leica MX 412B, 12-channel GPS navigators with built-in differential beacon receivers and high-gain combined GPS/beacon antennas. The GPS contracts were awarded by the Spanish Navy to Leica's marine distributor in Spain.

Circle 49 on Reader Service Card

Oceaneering Wins Subsea Contract

Oceaneering International, Inc. has been awarded a turnkey contract by Kerr-McGee Oil and Gas Corp. for the tieback of a subsea well in West Cameron Block 638 to

a platform in West Cameron 648. The work will include the supply and installation of a coiled tubing flowline, control umbilical, flowline and umbilical risers, hydraulic control system, chemical injection skid and related interface hook-up hardware. Also, in addition to this, Oceaneering will also perform systems' engineering for the project and supervise the overall systems' integration testing.

MSI Wins U.S. Navy Contract

MarineSafety International (MSI), a wholly owned subsidiary of FlightSafety International, has been awarded a contract to provide simulator services to the U.S. Navy Atlantic Fleet, beginning in the summer of 1998.

The contract is for one year with nine optional years for a total maximum value of approximately \$31 million.

Under the terms of the contract, MSI will install, operate and maintain a four-bridge ship handling simulator complex on the Naval Station in Norfolk, Va. The complex will be used to maintain the ship handling proficiency of officers assigned to ships in the Atlantic Fleet. More than 20 ship-types ranging from aircraft carriers to submarines, and 15 commonly used ports in the U.S., Europe and the Far East will be simulated.

Circle 50 on Reader Service Card

Bath To Construct Six Navy Destroyers

General Dynamics Corp. subsidiary Bath Iron Works (BIW) has won a multi-year contract from the U.S. Navy for the construction of six DDG 51 Arleigh Burke class Aegis guided missile destroyers. This award, with an estimated value of \$2 billion, is part of the Navy's plan to procure 13 Aegis destroyers through a cost-effective, multi-year procurement of the four-year period from FY98 to FY01.

The 13 vessels are to be allocated between BIW and Ingalls Shipbuilding. The keel for the first of the six ships will be laid in the last quarter of 2000, with delivery of the final vessel scheduled for the third quarter of 2006.

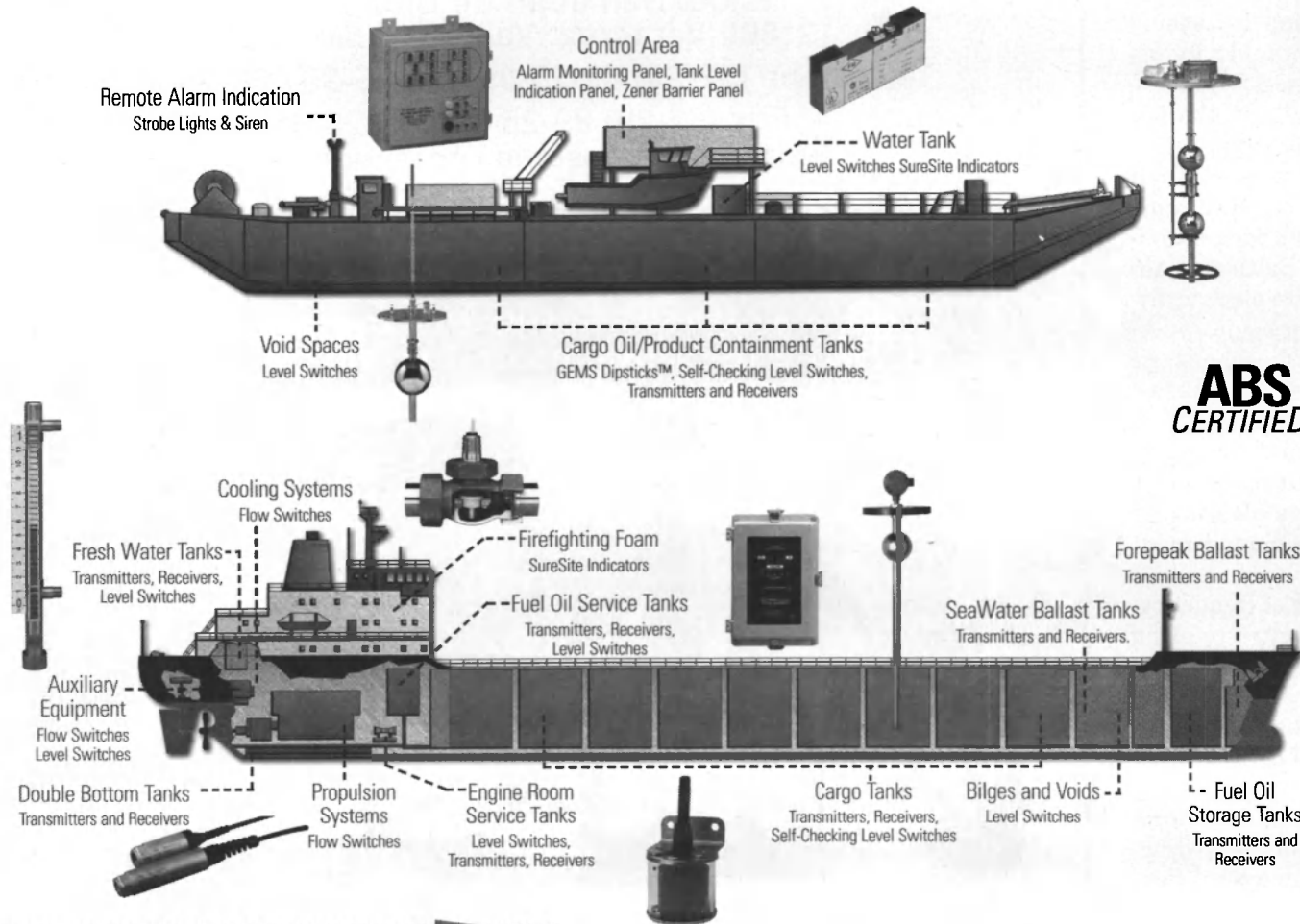
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GE Delivers Gas Turbines For Destroyer

GE Marine & Industrial Engines (M&I) has delivered four LM2500 aeroderivative gas turbines for use on the U.S. Navy's DDG 80 Arleigh Burke class destroyer, built by Ingalls Shipbuilding. In total, GE will provide 228 LM2500 gas turbines and 114 main reduction gears for the 57 DDG 51 through DDG 107 destroyers.

Each DDG ship is powered by four LM2500 gas turbines in a combined gas and gas (COGAG) configuration. Each reduction gear combines the input of two LM2500 engines rated at 26,250 bhp for a total output of 105,000 bhp per vessel.

The medium-speed RoRo Sealift ships measure 950 x 105 ft. (275.8 x 32 m) and cruise at 24 knots. In addition to the LM2500s, GE will also provide the main propulsion gearing and integrated machinery control systems for these gas turbine-powered vessels.

Circle 52 on Reader Service Card

Flender Werft Wins RoRo Contract

Flender Werft recently won a contract from Dutch company Wagenborg Shipping BV for the construction of three RoRos. The vessels will be operated by STORA, within a new transport system between the ports of Gothenburg, Sweden and Zeebrugge, Belgium. The 13,000-dwt ships will have a length of 600 ft. (183 m) and a beam of 82.6 ft. (25.2 m). The total value of the order is approximately \$110.4 million, and will help in keeping the shipyard's order book full until the end of 2000.

Circle 53 on Reader Service Card

Oceanfast Wins Howard Smith Tug Contract

Howard Smith Towage and Oceanfast Marine Pty Ltd. have signed an agreement for a new \$5.6 million tug for service in Melbourne. The new, stern-driven, omni-directional tug will be built at Oceanfast's Commercial division, and will be used mainly for harbor towage, featuring the range and basic equipment to respond to offshore maritime emergencies.

April, 1998

NNS Awarded Contracts

Newport News Shipbuilding has won two contracts from the U. S. Navy totaling more than \$30 million for work to be performed on two nuclear-powered aircraft carriers. The first contract, valued at approximately \$12.7 million, is for

the purchase of equipment and advance planning for an extended overhaul for the aircraft carrier Enterprise (CVN 65). The ship is scheduled to arrive at Newport News Shipbuilding in 1999 and remain until mid-year 2000. The second contract award, valued at approximately \$17.7 million, is for

preparations in advance of the overhaul and refueling of the Dwight D. Eisenhower (CVN 69) scheduled for 2000. This will be the ship's first and only refueling during a service-life expected to span 50 years. The ship is scheduled to arrive at Newport News in late 2000.

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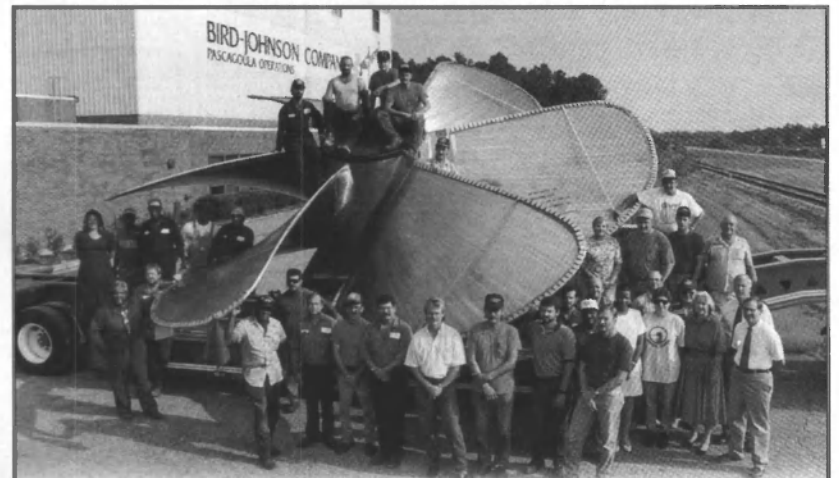
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P&O Nedlloyd Orders Five New Ships

P&O Nedlloyd has announced plans to order five new 5,000 TEU ships for delivery before the end of 2000. According to the Anglo-Dutch container shipping company, the ships will replace older tonnage that will be scrapped to achieve further cost savings. The new ships will reportedly be financed and owned by third parties.

Samsung Wins \$200M In Ship Orders

Samsung Heavy Industries Co. has won \$200 million worth of overseas orders for the construction of five ships. The company reportedly won \$150 million worth of orders from Italy-based Premuda Shipping Co. to build four 73,000-dwt crude-oil tankers. And was also contracted to build a 180,000-dwt bulk carrier for Liberia Shipping Co. for \$50 million. All ships are scheduled for delivery in 2000. The latest contracts will reportedly earn Samsung Heavy a total \$470 million worth of newbuilding orders for the year.

TTE Makes Name Change

The partners in the TTE Tanker pool have agreed to re-name the group Torm Waterfront Tankers. The tanker pool trades predominantly in the clean markets between the Middle East Gulf and Far East. It is complemented by a second seven-vessel pool of Aframax product carriers known as LR-2.

A&P Managing Director Resigns

A&P Group Ltd., one of the U.K.'s largest shiprepairers, recently lost its managing director when **Steve Jervis** resigned to pursue new interests overseas and outside the marine industry. According to A&P officials, Mr. Jervis' role had been split into two regional posts with the appointment of new managing directors of the group's northern and southern operations in anticipation of his departure. **Dennis Scott** will manage A&P's two northern yards on Tyneside, while **Clive Towl** will manage the yards in

Falmouth, Southampton, Chatham and Dover.

Smedvig Wins \$200M Deal

Smedvig ASA has signed a \$200 million, three-year drilling rig deal with an unnamed Norwegian operating company. According to Smedvig, the letter of intent for

the West Alpha rig would mean that it would mainly perform exploration drilling in the Norwegian sector.

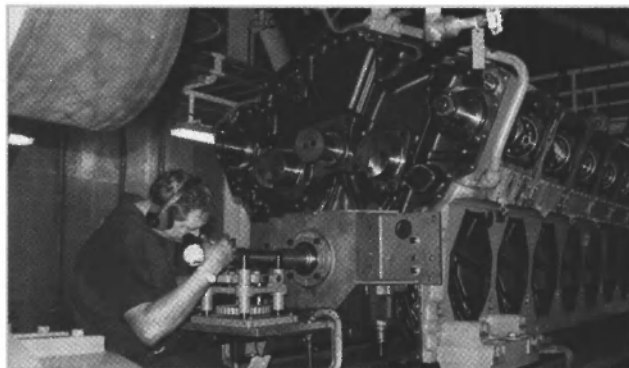
West Alpha is currently being operated by Esso Norge on the Balder field.

The new contract is scheduled to commence at the end of 1998, in direct continuation of the existing contract with Esso.

Masterbulk Extends Konecranes Option

Singapore-based shipowner Masterbulk — a subsidiary of Norwegian Westfal-Larsen — plans to use its option to buy four more Munckloader cranes from Konecranes of Finland, doubling its January \$18 million order.

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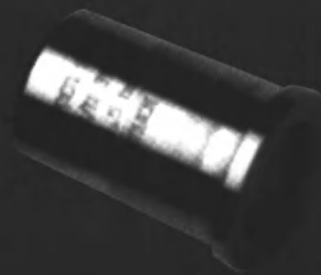
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More Horsepower, More Business

"You can never have too much horsepower in a crewboat," said **Shane Pescay** of Crewboats Inc., Chalmette, La. This belief, coupled with an increase in offshore drilling opportunities in the Gulf of Mexico, drove Crewboats Inc.'s decision to power each of its four new quad-screw crewboats with 3,300 bhp engines — ample power and speed for the vessel's demanding tasks.

Crewboats Inc. rents its boats to major commercial and independent oil companies to haul cargo and personnel to offshore drill rigs and platforms in the Gulf of Mexico.

Throughout the 1980s oil demand in the Gulf of Mexico was low while drilling occurred within 50 miles of the coast. As a result, offshore crewboats were built appropriately in the 100 to 120 ft. (31 to 37 m) range with cargo capacities of approximately 90 tons. In the early 1990s oil demand increased and oil companies began demanding larger crewboats to haul twice as much cargo and personnel to and from offshore platforms. At the same time, rigs were now being situated as far as 100 miles offshore, so maintaining high speeds became just as essential as their increased capacities. Beginning in 1989, Crewboats Inc. responded to

the trend by building 11, 135-ft. (42-m) boats capable of carrying 190 tons of cargo and five, 152-ft. (46-m) boats that are capable of each carrying 235 tons of cargo. Most recently, the company has built *Canyon Runner*, *Samuel P.*, *Gulf Runner III* and *Anna P.*

Mr. Pescay realized that keeping up with the offshore drilling trends meant more than building bigger boats. It also meant equipping them with power plants that could reliably deliver the horsepower needed to maintain a competitive advantage.

"Oil companies demand crewboat service 24 hours a day," Mr. Pescay said. "They don't put up with unreliable vessels, or those with downtime beyond routine maintenance."

Cargo is unloaded via a crane on the rig platform. During the process the boat must be as still as possible. Additionally, the crewboat cannot be tied to the dock or left idling while unloading, as wind and currents can cause the boat to drift into the platform, damaging itself and the platform. The captain steadies the vessel by a process known as 'walking the boat'. To do so, two engines are used to advance forward, while at the same time two are used to reverse with appropriate rudder power, to eliminate



Above: Crewboats Inc.' new crewboat.

Below: Caterpillar engines aboard Crewboat's new vessel means that the company's larger vessels are able to keep up with changing offshore demands.



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"This process requires an enormous amount of power, especially when we're battling high winds, waves and currents," Mr. Pescay said. Another power option for crewboats is to install twin engines with a bow thruster, but, according to Mr. Pescay, a quad-screw design is more efficient.

"It's much easier to walk a boat with four engines. When done with two engines you run the risk of the boat pivoting left or right. Also, if you're out at sea and one of the engines breaks down, you can return to shore faster with three engines than with one." Mr. Pescay adds that a quad-screw vessel is more cost effective on a price-per-horsepower basis, when compared to two high horsepower engines and a bow thruster.

Mr. Pescay specified four Caterpillar 3412 engines from Louisiana Power systems, Belle Chasse, La, for each new vessel. Each engine is rated 825 bhp @ 2,100 rpm and powers a Twin Disc MG 5202 marine gear with a 2:48:1 ratio turning a four blade, Nibrol 42 in. by 38 in. HyTorq propeller. Each boat has a fuel capacity of 10,000 gallons. This fuel and capacity can be used to either pump to the rigs or refuel the boats.

Lasting Power

Mr. Pescay reported that the on-demand horsepower during cargo unloading has been very good with all the boats, even during rough weather or while unloading pipe, which can take several hours. All of the vessels maintain high speeds when loading and unloading. Each 135-ft. (41-m) vessel is capable of hauling approximately 190 tons at 20-21 knots and can reach a maximum speed of 26 knots unloaded.

"There is at least one time I can recall when we won a major bid from an oil company because we offered the highest capacities at the highest speeds - not just because of the price," Mr. Pescay said. For the same job, competitors only offered approximately 90 tons at 14-18 knots. Crewboats Inc. still has a contract with the company today.

As the oil trend continues, Crewboats Inc. is continuing to build seven, 152-ft. (50-m) boats, which will bring its fleet to 36 vessels - 14 large offshore vessels and 22 small crewboats.

Benthos Receives Major Order for ROV System

Benthos, Inc. has received a \$900,000 order from Canyon Offshore, Inc. for an upgraded ver-

sion of the company's Openframe Remotely Operated Vehicle (ROV) system. The new system, dubbed Openframe Manta, will be used for a variety of underwater inspections and light-duty work tasks. This upgraded version will be spe-

cially modified to extend its depth capability to 3,281 ft. (1,000 m) and will be supplemented by a top-side control van as well as a complete launch and recovery system. Production is underway and delivery is scheduled for this summer.



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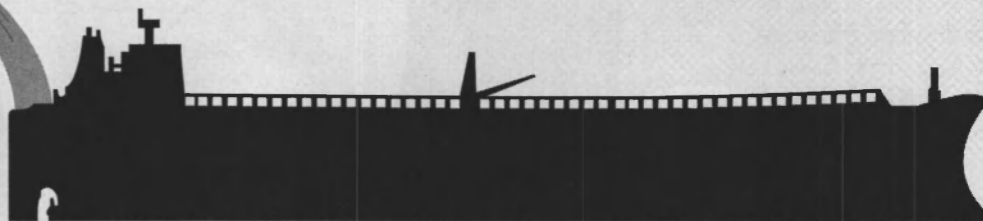
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Global Marine Significantly Extends Its Deepwater Capabilities With Two Newbuilds

Belfast's Harland and Wolff (H&W) recently won a \$300 million order to build an oil and gas drillship for Houston-based Global Marine Inc., with Global holding an option to build a second similar vessel at the yard. The first drillship is scheduled for delivery in the fourth quarter of 1999, and will be chartered by Global Marine to Australia's BHP Petroleum for oil exploration in the Gulf of Mexico. The second drillship is scheduled for delivery in the first quarter of 2000, if the option is exercised. H&W's chief executive said the contract represents a breakthrough for the yard into a new sector of the offshore market. It is

also the first contract awarded by a U.S. company to the yard since it switched its focus from normal shipbuilding to the specialized offshore oil and gas market, he said. H&W is now part of offshore group Fred Olsen Energy.

GLM Contracts For Rig

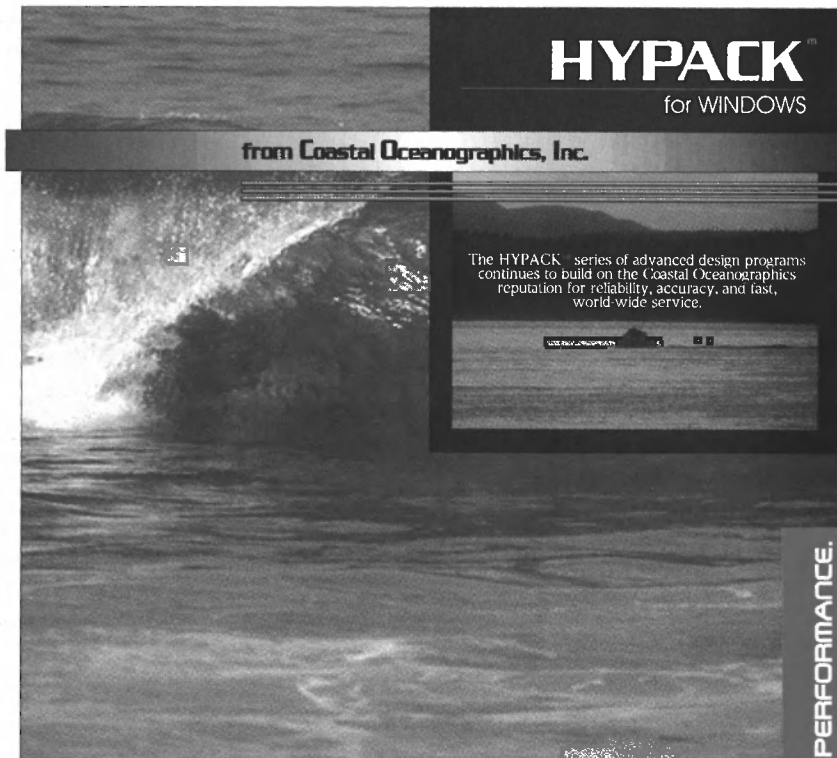
Global Marine Inc. (GLM) will build a second, new ultra-deep-water oil rig, which is expected to bring in \$208 million over three years. The second Glomar 456 class dynamically-positioned drillship was commissioned by Exxon Exploration Group and brings Global Marine's deep-water fleet to 10 rigs. Until the end of June 1998, Exxon could elect to reduce

the contract term to two years, in which case Global Marine would have the right to market the new rig for a one year during the three-year term. The second new

Glomar 456 class drillship is scheduled to be delivered in the first quarter of 2000 and will initially be outfitted to work in up to 8,000 ft. of water.

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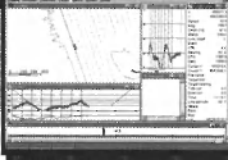
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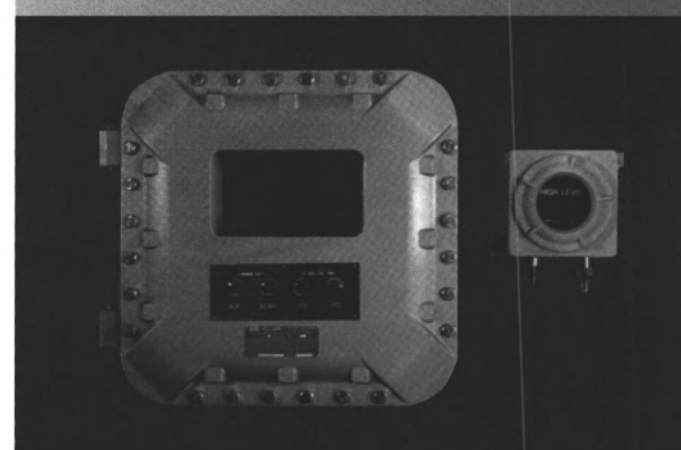
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GULF COAST REPORT

Halter To Build New Training Center

Halter Marine Group Inc. recently broke ground in Moss Point, Miss., for an innovative training center which will serve the company's five shipyards on

the Mississippi Gulf Coast. The 11,500-sq.-ft. facility will provide basic instruction for trainees and continuing education for craftsmen and supervisors working in Halter's shipyards. The training center will focus on instruction for shipbuilding and industry-specific training.

Basin Exploration Reports On Two Wells

Basin Exploration, Inc. recently reported it has drilled a discovery well on East Cameron Block 34 and completed a successful production test of a well on West Delta

Block 78 that was reported as an apparent discovery earlier this year. The #2 well on East Cameron Block 34 logged in excess of 100 net ft. of gas/condensate pay in multiple Miocene-aged sands below a true vertical depth of 10,350 ft. The company plans to proceed with completion operations and then to suspend the well pending installation of production facilities or connection to a nearby third-party platform. First production would be anticipated before the end of the year in either case. Basin operates the property with a 60 percent working interest. The #1 well on West Delta Block 78 was recently completed in a Miocene-aged sand and perforated between true vertical depths of 16,762 ft. and 16,780 ft. On a short duration production test, the well flowed at rates as high as 2,000 barrels of oil per day. The well will be temporarily suspended pending determinations of facilities sizing requirements and availability of third-party facilities for processing.

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Ocean Energy Enters New GOM Pact With Shell

Ocean Energy, Inc. is expanding its aggressive exploration program through an exclusive Gulf of Mexico Exploration Alliance with Shell Offshore Inc. The Alliance calls for 25 initial exploratory prospects, all delineated by 3-D seismic, to be drilled on over 141,000 gross acres across the Gulf of Mexico Shelf. Under the terms of the agreement, Ocean will participate for 25 percent of Shell's working interest in 25 prospects in the Outer Continental Shelf and state waters located off the coast of Louisiana and Texas in water depths up to 1,300 ft. Ocean and Shell, two of the top three most active Gulf of Mexico operators in drilling activity in 1997, plan to coordinate their rig fleets to achieve greater efficiency and economies of scale.

Ocean anticipates the two companies will drill in excess of 50 exploratory wells together over the next three years through the combination of the Gulf of Mexico Exploration Alliance, Delta Exploratory Joint Venture and South Pass Alliance. In addition Ocean intends to fund its share of expenditures associated with the new Alliance from its announced 1998 capital budget.

Maritime Reporter/Engineering News

BMT Aims To Reduce Ship Maintenance Costs

British Maritime Technology Ltd. (BMT) has announced a \$3.5 million development project which will reportedly reduce the cost of maintaining the performance and safety of large vessels throughout their full life cycles. Dubbed OPTIMISE (Optical Maintenance Intervention on Ships in Europe), the new project was scheduled to commence last month under management by BMT, along with a consortium made up of BMT SeaTech Ltd., BP Shipping, British Steel, Kockums Computer Systems, Rontgen Technische Dienst and Verolme Botlek. The project will receive \$2 million through the European Commission's ESPRIT program. OPTIMISE is a multi-end, user driven project with the overall objective of developing new Information Technology tools to manage the high level data which can be obtained through the use of improved and emerging, non-destructive equipment (NDE) technology. The software and hardware will be developed under OPTIMISE, with self-propelled magnetic crawlers to monitor corrosion and weld conditions. The data will be fed to a Ship Model database, which will integrate NDE data with a design and construction database, and form the basis of a defect-model simulation component using models for corrosion, fatigue and crack growth.

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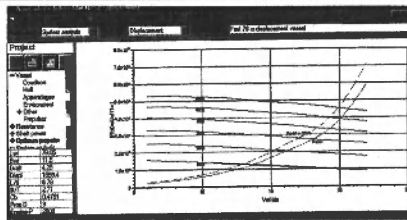
BV, RINA Offer Software For SOLAS Compliance

Bureau Veritas (BV) and Registro Italiano Navale (RINA) have developed a software program designed to help ship operators and naval architects comply with amendments to the SOLAS convention. Dubbed BULK, the software is designed to assess the structural strength of watertight, vertically corrugated, transverse bulkheads and double bottom structures in bulk carriers. It uses a graphic Windows interface to input data and run calculations. Its output will provide a comprehensive view of compliance and the strength criteria admissible in the new Unified Requirements of the IACS for transverse bulkheads and double bottom structures.

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HydroComp Updates NavCad Software

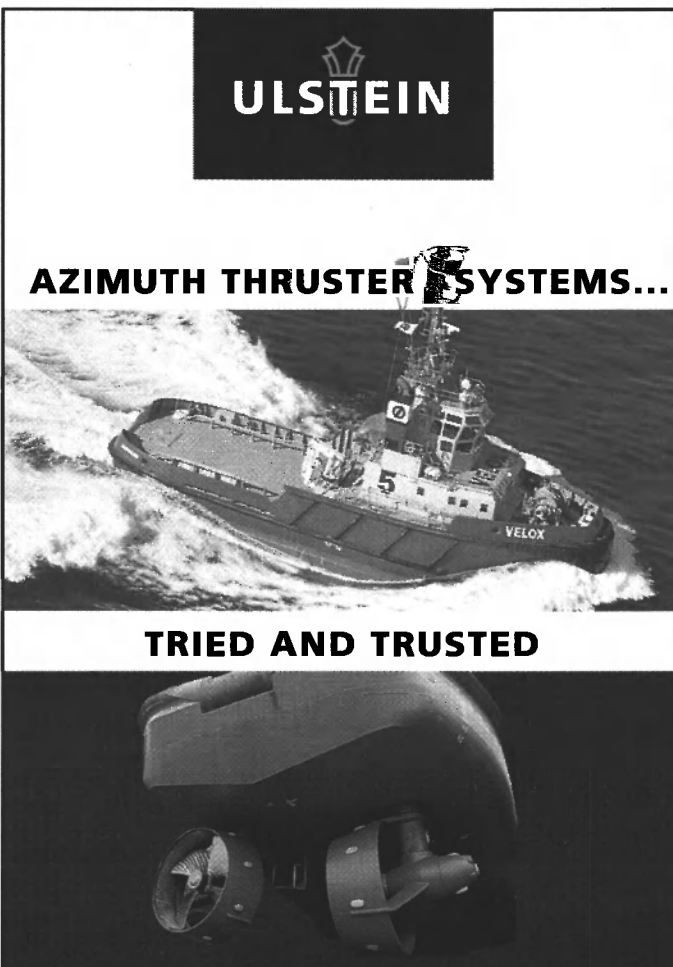
HydroComp, Inc. has released the latest version of its ship propulsion software NavCad. Version 3.6 offers new and enhanced features from its prede-



The HydroComp NavCad 3.6 main screen. The successor (NavCad 3.5), including the capability of analyzing waterjet-

powered vessels. NavCad is a tool for the prediction and analysis of vessel speed and power performance. It also provides for the selection of suitable propulsion system components such as engines, gears and propellers.

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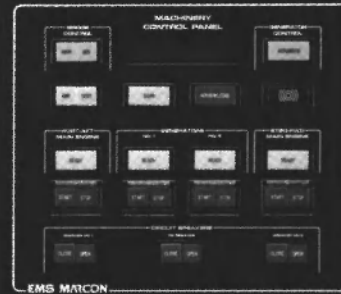


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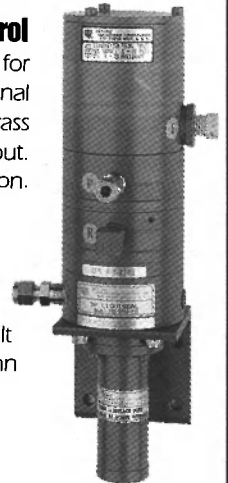


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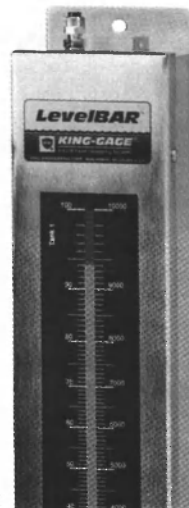
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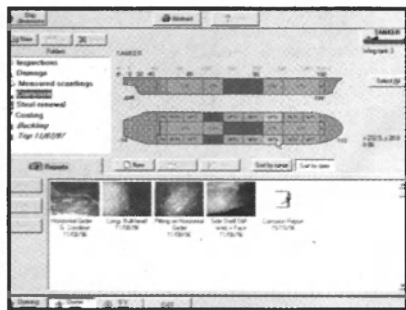
Shipbuilders Team Up With Intergraph

An international consortium of ship design and construction companies led by Newport News Shipbuilding (NNS) has joined forces with Intergraph Corp. to develop an advanced engineering and ship design software products. The goal of the project is to reduce the time and cost of designing ships by 50 percent.

Intergraph expects to install the first versions of the new software at the sites of the shipbuilding participants in early 1999.

Circle 48 on Reader Service Card

BV Upgrades VeriSTAR Monitoring System



Pictured is the owner data screen display of BV's VeriSTAR version 3.

Bureau Veritas (BV) has released version 3 of its lifetime hull condition monitoring system VeriSTAR, making the system available to all of the maritime industry – specifically shipowners and managers.

The VeriSTAR database, which is unique to each vessel, consists of two parts.

The owners' data section enables users to handle and store their own information. This is supplemented by a BV data section, which is used to examine calculations on the ship's structure.

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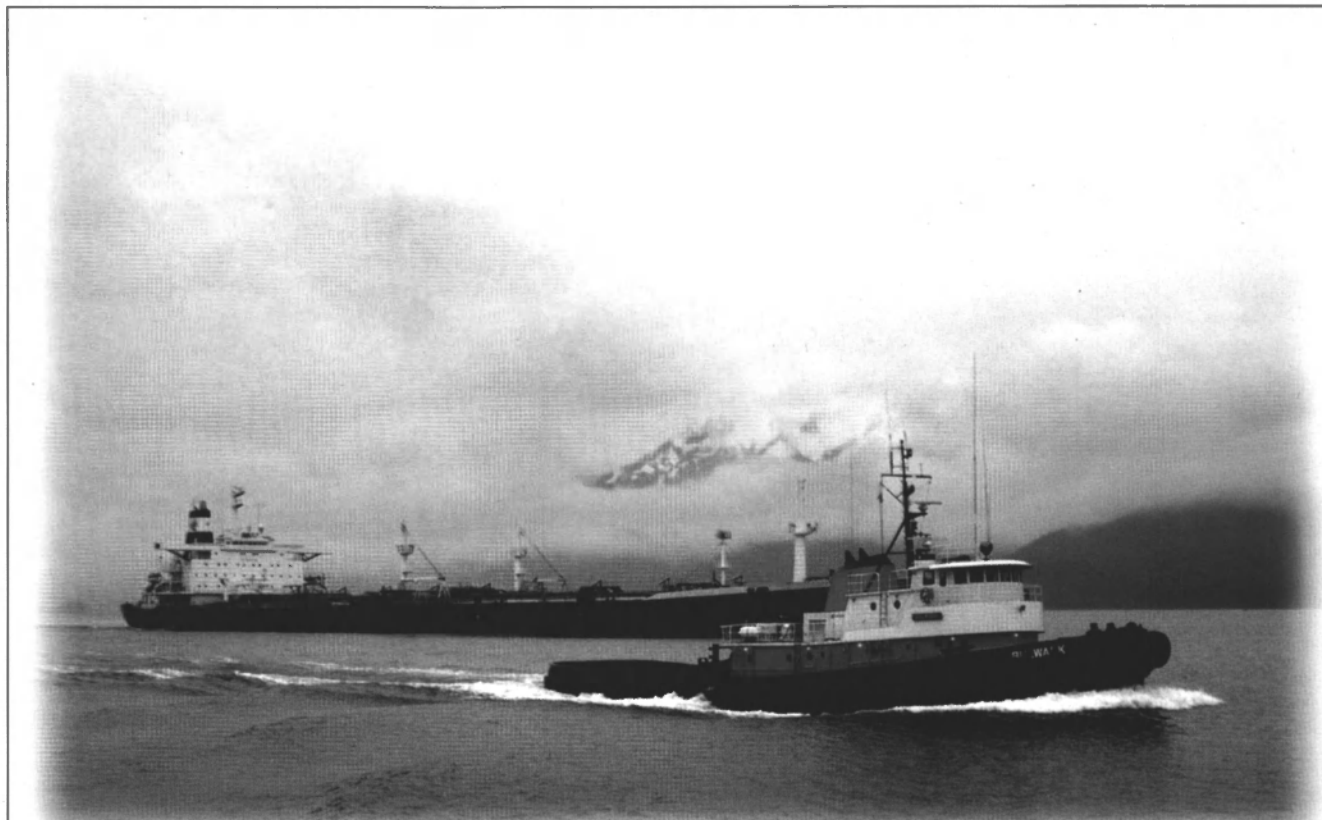
Lloyd's Register ISM Support Package Hits The Web

Lloyd's Register's (LR) International Safety Management (ISM) Code Practical Pack, designed to help shipowners and ship operators achieve certification under the Code, is now available on the Internet. Visitors to the classification society's Web site (www.lr.org) can download in MS Word 6.0 simple, concise explanatory material on the Code, together with draft manuals and plans, intended to give companies a head

start in setting up their safety management systems. They can also order by e-mail the complete LR ISM Practical Pack. Early this year, the free guidance pack was judged joint winner in an independent review of ISM support packages carried out by a panel of ISM

experts. The complete pack consists of draft documentary material, both as booklets and on 3.5 in. disc in MS Word 6.0 format, which individual companies can tailor to build up their own manuals and plans for compliance with the ISM Code. The manuals and plans in

the pack include: Safety Management Manual; Company Procedures Manual; Fleet Instructions Manual; Shore-based Contingency Plan; and Shipboard Contingency Plan. The pack also includes a video which gives an idea of what is expected from a



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For the past year, MSI has been conducting joint, monthly courses for tug and tanker operators who must train together as a team.

Whether aboard a tanker, an escort tug, a response vessel or ashore at a terminal or VTS station, it takes coordinated skills to assure a safe passage. When quick reaction counts, each participant must know his job and understand that of the others.

A full program of joint courses is scheduled for 1998. Even now, MSI is preparing a simulator response model for ARCO's new Millennium Tanker for use in future training.

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company seeking ISM certification and what to expect from the auditor. The disc contains audit notes which are not intended as an audit program, but rather as a guide to the questions an auditor is likely to ask about different vessels.

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People Soft Announces New Software Applications

PeopleSoft, Inc., provider of enterprise application software, recently announced that Monipoint Corp. and Powertel Inc. have completed rapid implementations of

PeopleSoft Financials applications. Omnipoint reportedly implemented four PeopleSoft 7 enterprise applications in less than five months and Powertel implemented five PeopleSoft 6 applications in less than six months.

In addition, 22 new communica-

tions, transportation and utility organizations have recently licensed PeopleSoft applications, including: Crowley Maritime Corp.; and Consolidated Freightways.

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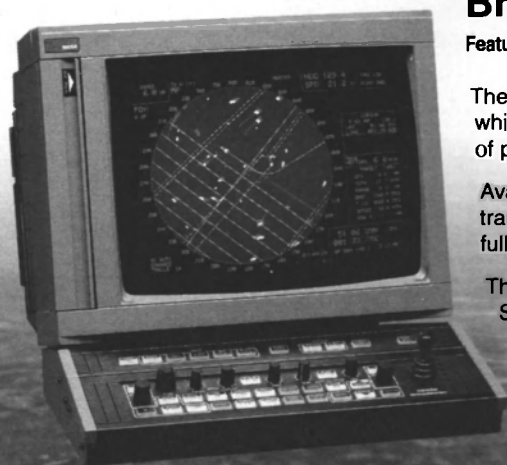
Meteor Wins Order From Washington State Ferries

Meteor Communications Corporation (MCC) has won an order to provide equipment and communications network services to Washington State Ferries for a Fleet Location System. The MCC-545A RF Modem will use MCC's existing communications network to provide position, course and speed, along with other information for all 26 ferries currently in its fleet. Three additional ferries will be added to the Fleet Location System as they are delivered.

MCC's FleetTrak Automatic Information System (AIS) software will be used to provide real-time displays of ferry locations. In addition, FleetTrak will collect the AIS information on ferry transit times, arrival and departure data and vessel operational status. The Washington State Ferries plans to use this data to monitor on-time performance to enhance customer service. The Fleet Location System is expected to be operational by early summer.

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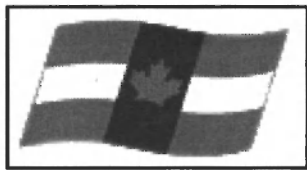
SES Develops Software To Ease Millennium Panic

As the Millennium Bomb ticks away, the IT industry is especially concerned by its foreboding consequences. Achilles N. Vardakis, chairman and CEO of Shipmanagement Expert Systems (SES) commented on this pressing issue. "It is a fact that the majority of the computer experts are spending considerable time and huge amounts of money to conform their programs with the forthcoming change of the century. SES has foreseen this problem and ... has taken appropriate measures to save its clients from the Millennium headache."

SES has developed the Shipmanager Integrated Software the Shipboard Management System and Q-Control for ISM Compliance in an attempt to spare its clients from facing any difficulties regarding the Millennium Bug

Circle 21 on Reader Service Card

Canadian Shipbuilding Wins Fleet Renewal Contract



forebody building on the *J. W. McGiffin* is scheduled to commence in June.

The new hull will be fabricated in the Port Weller assembly shops

and erected in the building dock. When completed, it will be towed to the tie-up wall adjacent to the drydock.

The *J. W. McGiffin* will then be

floated into the dock and the forebody separated from the stern, and floated out of the dock. The new hull will then be brought into the dock and joined to the stern.

Canada Steamship Lines (CSL) Inc. of Montreal is embarking on a major fleet revitalization program, and has awarded a contract valued at approximately \$70.9 million to Canadian Shipbuilding & Engineering Ltd. (CSE), St. Catharines, Ont. for the construction of up to five new forebodies for their existing fleet of Great Lakes vessels. This ship-rebuilding project involves constructing a complete new forward end of each vessel, from forward of the engine room to the bow, and joining the existing aft-end, which includes the engine room and accommodation block. The vessels will be constructed at the Canadian Shipbuilding & Engineering shipyard, Port Weller Dry Docks, St. Catharines, Ont.

The project is a firm contract for three vessels for delivery in the spring of 1999, 2000 and 2001, and will allow for an option for two additional vessels for delivery in 2002 and 2003.

The CSL vessels targeted for replacement forebodies are all self-loaders, the first of which will be the *J. W. McGiffin*.



Describing the \$70.9 million project as one of the most significant investments the 152-year-old com-

pany has ever made, Canada Steamship Lines President **Ray Johnston** said. "CSL's firm commitment to our customers, our employees, and the Great Lakes trade ... We believe that it will give us a competitive edge for the foreseeable future."

All five vessels in the CSL fleet renewal program are 730 ft. (222.5 m) in overall length with a beam of 46 ft. (23.12 m). As part of the restructuring program, the self-loaders will be extended to 740 ft. (225.5 m) long and 78 ft. (23.8 m) wide.

The new forebody was designed by CSE Marine Services, in conjunction with Canal Marine and Port Weller Dry Docks. While design and engineering have been underway for some time, actual

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The new compact console comprises a 250 W/400 W/800 W MF/HF radio station, type STR 2000 with built-in DSC, telex and telephone, duplicated with an INMARSAT-C terminal, type STR 1500 C, and a VHF radio telephone with DSC, type STR 8400. All this equipment together with necessary power supplies, printers and keyboards is mounted in one console for easy and fast installation.

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e-mail: www.raymarine.com

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Consolidated Marine Inc. Formed

Consolidated Marine Inc. draws together selected Irving-based companies involved in shipbuilding, offshore fabrication, ship repair, engineering and quality services to provide one-stop shipping for clients with large and small projects. The companies

affiliated with Consolidated Marine include:

- Saint John Shipbuilding Ltd.
- Halifax Shipyard Ltd.
- Dartmouth Marine Slips
- East Isle Shipyard Ltd.
- Fleetway Inc.
- Atlantic Quality & Technical Services Ltd.

Consolidated Marine Inc.'s product line includes: semi-sub-

mersible and jack-up rigs; topside fabrication/modules; AHTS/PS vessels; tugs and barges; container-ships; product carriers; and drill ships.

Circle 106 on Reader Service Card

Conor Pacific Contracted By Hibernia

Conor Pacific Environmental

Technologies Inc. announced the signing of a contract with the Hibernia Management and Development Company Ltd. Conor Pacific has joined forces with the Risk Management Research Institute of Manchester, U.K. to provide qualitative and quantitative risk assessment services for the Hibernia offshore production platform, approximately 315 km offshore on the Grand Banks of Newfoundland.

Japan Foreign Ship Orders Down 64.1%

Overseas shipbuilding orders received by Japanese shipyards in February totaled 505,060 grt for 12 vessels, down 64.1 percent from a year earlier, according to the Japan Ship Exporters' Association said. The sharp decline could be attributed to Asia's financial turmoil as well as to an ample backlog of orders held by Japanese shipbuilders. The current backlog of orders is expected to keep Japanese shipyards busy at least until the end of 2000.

Laminaria FPSO Ready To Be Fitted Out

Kvaerner ASA reported the hull of the floating production, storage and offloading vessel (FPSO) for the Laminaria oilfield offshore Australia had been floated 12 days ahead of schedule. According to Kvaerner, the Laminaria project, which had been delayed, is now back on course. The hull of the FPSO — the world's largest such vessel — was floated on Feb. 23 from the Samsung shipyard in Korea.

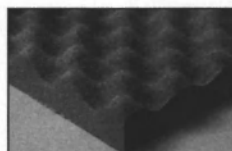
OMI Acquisition Of MTL To Be Completed By May

OMI Corp.'s acquisition of Marine Transport Lines Inc. — and plans to spin off its foreign operations — will reportedly be completed by May. OMI announced plans to merge with Marine Transport last summer, and the deal was originally scheduled for completion in January 1998.

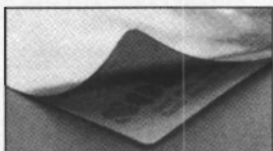
Under the terms of the planned merger, OMI will be spun off to existing shareholders as a subsidiary, owning and operating its non-U.S. flagged shipping fleet. The merged OMI-Marine Transport unit will take on OMI's U.S. flagged ships and operate under the Marine Transport name.

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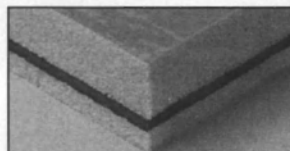
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	115' Dinner/ Cruise	(1)
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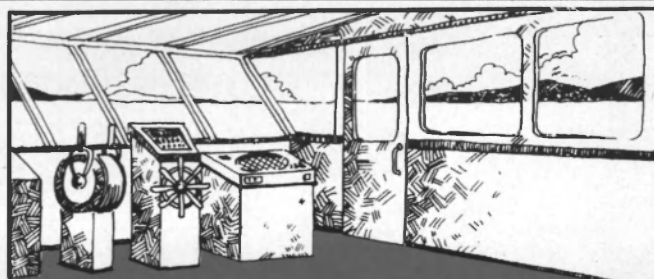
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For over four decades, Ingalls Shipbuilding has offered the offshore industry world-class technology, innovative design techniques, and unmatched manufacturing skills.

Marking its 60th anniversary this year, Ingalls has remained close to its heritage in the offshore market, first building drilling rigs in the 1950s. In the 1980s, Ingalls delivered 13 jackup drilling rigs and four submersible drilling rigs.

And with Ingalls' ongoing commercial facility expansions, which include the addition of an eight-acre production bay specifically designed for commercial projects, our commitment to offering innovative solutions to unique offshore industry needs is stronger now than ever before.

From initial design and construction to long-term repair, overhaul, modification, maintenance and support services, Ingalls stands ready to meet your needs.

Ingalls has in-place a licensing agreement under which Ingalls will now market Zentech's new R-450 state-of-the-art deepwater jackup drilling rig design for future drill rig construction.

During the past year, Ingalls has completed major repair projects on a drillship and a jackup drilling rig. In both efforts, Ingalls utilized its unique floating drydock and wheel-on-rail translation system. This unique vessel launch and recovery process is important not only in repair projects, but in the construction of new vessels, as well.

Ingalls also performed the weldout of two giant cylindrical caissons, which formed a Spar base for a state-of-the-art offshore production platform, FPS Neptune – now operational in the Gulf of Mexico. Two 72-foot diameter cylinders, built in Finland, were joined at Ingalls to complete the 705-foot-long base for the world's first Spar

Floating Production System.

In a related offshore program, Ingalls is building a fleet of high-capacity deepwater offshore supply vessels, in a variety of sizes and configurations, for a Louisiana firm that is a world leader in the marine supply and geophysical services fields.

Located along the Mississippi Sound, Ingalls is freely accessible to the deep waters of the Gulf of Mexico via a 350-foot wide by 38-foot deep, 12-mile channel – with no air draft restrictions.

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For More Information, Contact: Vice President, Business Development, Ingalls Shipbuilding, 1000 Litton Road, P.O. Box 149, Pascagoula, Mississippi, USA 39568-0149 Telephone: 228-935-4703 Fax: 228-935-4611 Internet: <http://www.ingalls.com>

Circle 373 on Reader Service Card

LR: Fewer Class Societies Needed

Lloyd's Register (LR) has called for industry restructuring to create fewer but stronger organizations surveying ships' standards. Speaking at Shipping '98 in Stamford, Conn. last month, Lloyds Register chairman **Patrick OFerrall** said: "The way forward is a program of streamlining, resulting in fewer, but stronger and ultimately more effective,

classification societies." Mr. **OFerrall** said class societies have played a part in improving safety standards over the past 20 years but that improvement is still necessary. He noted that the average age of the world fleet has increased by two thirds over the past 20 years but the loss rate has decreased by the same amount over the period.



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Letter to the Editor

Dear Editor:

Hi, first let me say that we (my co-workers and I) enjoy *the Maritime Reporter and Engineering News!* Each and every issue is thoroughly read from cover to cover and then filed for reference material. The reason that I am writing to you is in response to the article in the February issue. On page 65, the article, "NNS: Working to increase performance and decrease cost of 21st century carriers" states that carriers have always included space for a heavy, expensive machine to bread chicken patties. Now, I have been involved with the US Navy for over 20 years and directly involved with carriers for over 5 years. I have been onboard every Navy Carrier in service in the U.S. Pacific Fleet and two from the Atlantic Fleet and have never seen the equipment that you describe. Have I missed it or was your article just using journalistic license in the description? Our company works closely with the Navy in the area of Galley maintenance and installation. Please clarify this if you would.

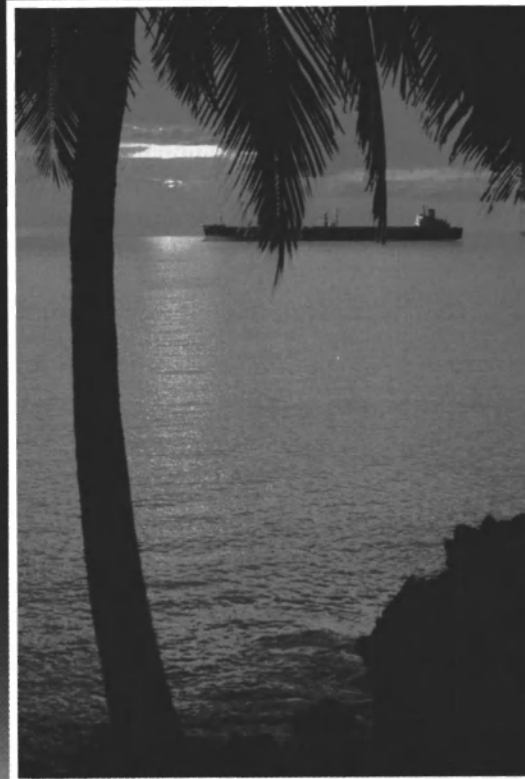
Thank-you very much
Patrick S. Conley
Email: lconley1@san.rr.com



Dear Mr. **Conley**:

Thank you for your recent letter regarding our February 1998 edition. As I, personally, have never laid eyes on the referenced chicken breading machine, I put the question to our contact at Newport News Shipbuilding. With her usual expediency and expertise, my contact sent the photo of the machine to me almost immediately. Thank you for your interest. — **Editor**

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Frederiksen & Kubow Communication

GE Capital, Sea Containers Sign Agreement

GE Capital and Sea Containers Ltd. signed an agreement to establish GE SeaCo SRL, a Barbados Society with Restricted Liability, which will also operate its existing marine container fleet, becoming one of the world's largest container leasing operations.

GE SeaCo will also acquire additional containers for leasing out to both the marine and land intermodal markets.

GE SeaCo will effectively be a 50/50 joint venture with initial capital and member loans totaling approximately \$64 million.

GE Capital will purchase \$25 million of equity in Sea Containers Ltd. and these funds will be dedi-

cated to the joint venture. GE SeaCo will lease-in the existing container fleets of both companies on an operating basis and sublease the units to customers.

Once the containers have reached certain ages they may thereafter be managed by GE SeaCo for the owners, sold at the owner's request or purchased by GE SeaCo.

Montiron Acquires 10% Of Viktor Lenac

Montiron Shipping Corporation has reportedly acquired a 10.5 percent stake in Croatia's repair docks Viktor Lenac. Montiron Shipping Corporation from Monrovia, Liberia, obtained the stake from the former shareholder, Italy's Arsenale Venezia S.p.A which is currently being liquidated. Viktor Lenac repairs and refurbishes vessels and builds platforms for off-shore installations.

TECO Transport Expands Mid-South Towing Fleet

TECO Energy, Inc.'s subsidiary Mid-South Towing Company, the river barge transportation subsidiary of TECO Transport Corporation, has chartered for five years, and entered into a definitive agreement to acquire at the end of the charter term, three towboats and 110 covered river barges from Midwest Marine Management Company. Under the agreement, the towboats and approximately 70 percent of the barges will be absorbed immediately into Mid-South's fleet, with the balance of the barges to follow over the next several months.

EU May Eliminate All Subsidies By 2000

There have been signals lately that European Union ministers may agree — as early as this summer — to end aid to the bloc's shipbuilding sector after 2000.

The European Commission last year proposed to end operating aid to the struggling sector, but industry ministers from the 15 EU nations disagreed on the plan when discussing it for the first time last November.



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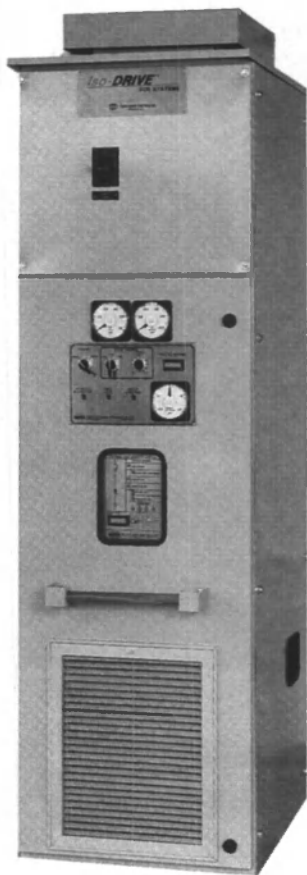


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Marine Materials in May...

next month's edition of *Maritime Reporter & Engineering News* will focus on Marine Materials, and their role in making vessels stronger, lighter and faster.

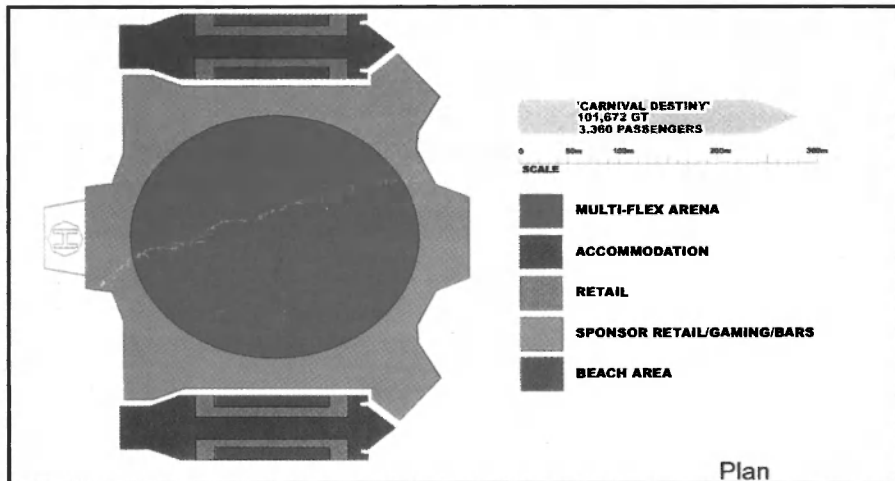
McNeece Unveils Revolutionary Cruise Ship



Comprising a Mothership and two satellites, the McNeece Cruise Bowl will have a total passenger capacity of 12,000.

At the recent Cruise Shipping Convention held in Miami, cruise vessel designer McNeece unveiled the Cruise Bowl – its revolutionary concept for the cruise ship of

the future. The Cruise Bowl is the latest idea to come out of McNeece's Saltire Project, which involves the creation of futuristic designs for the cruise industry. At



500,000 grt, the Cruise Bowl features 12 decks, a passenger capacity of 12,000 and will cost approximately \$1.5 billion.

The Cruise Bowl is designed to feature a 240,000 grt mothership, with two, detachable 130,000 grt satellites each self-contained with accommodation and public rooms. All three vessels would be multi hull for stability and based on the SWATH principle, with propulsion coming from Azipod-type propulsion units.

Resembling a seagoing version of the U.S. Air Force Stealth Bomber, the vessel will reportedly break new ground in the use of lightweight materials and construction techniques. Unlike cruises of today, the Cruise Bowl would not sail to any destination, but would be the destination. Cruises would range from three to four nights.

Circle 26 on Reader Service Card

Cruise Bowl Mothership Main Particulars

Length	1,402.5 ft. (427.5 m)
Beam	1,181 ft. (360 m)
Draft	27 ft. (8.2 m)
Tonnage	240,000 grt

Cruise Bowl Satellites Main Particulars

Length	912 ft. (278 m)
Beam	212 ft. (64.5 m)
Draft	27 ft. (8.2 m)
Tonnage	130,000 grt (each)

Star Clippers To Build World's Largest Sail Vessel

Star Clippers plans to build what, upon completion, will be the world's largest sailing vessel, and the company's third clipper ship. Scheduled to go into service in late 1999, the 439-ft. (133.8-m) vessel has a beam of 54 ft. (16.4 m) and a gross tonnage of approximately 5,000 tons, and will join Star Clipper's existing vessels *Star Flyer* and *Star Clipper*.

The new vessel, as yet unnamed, will be a five-masted, full rigger with 40 sails.

The vessel will reportedly be capable of crossing all oceans with ease and serve in seven and 14-day cruises. The clipper ship will accommodate 224 passengers in double-occupancy luxury cabins and suites.

Time is being saved in construction of the new ship by the use of an unfinished sail ship hull which will form the central portion of the new hull, to which will be added the top, bottom, bow and stern. All aspects of the construction and design of the new ship are being coordinated by Naval Architect **Robert McFarlane**, who took on the same responsibility for *Star Flyer* and *Star Clipper*. Further details on this new vessel are anticipated for availability in June 1998.

Circle 25 on Reader Service Card

Halter Delivers Third AHTS To French Interest

The Halter-Lockport facility of the Halter Marine Group has delivered MV *Ajax*, the third in a series of nearly identical anchor handling/tug supply (AHTS) vessels to French company SURF. The all-steel *Ajax*, like its sister-ships *Artabase* (delivered by Halter in 1994) and *Achilles* (delivered by Halter in 1995) measures 218 x 46 x 18 ft. (66.4 x 14 x 5.4 m). The new vessel is powered by two Caterpillar 3612 diesel engines developing a total of 10,880 hp through Reintjes LAF-555 reverse/reduction gears and turning twin, four-bladed, 126-in. Berg controllible pitch propellers in Kort-type nozzles. Electrical power is provided by

two Caterpillar 3408 diesels driving two 350 kW generators. *Ajax* also features two 250 kW special service generators driven by two Caterpillar 3406 diesel engines and a 65 kW harbor generator powered by a Caterpillar 3304 diesel engine. The new vessel's ability to tow and position anchors and other equipment is made possible by an Ulstein double drum tow winch with a maximum line pull of 115.6 tons, and Ulstein 5 x 8-ft. stern roller, Ulstein tow pins, pennant reels and anchor windlass, two Karmoy shark jaws, two tugger winches and a five-ton capacity pedestal-mounted EBI hydraulic crane. *Ajax*' 3,465 sq. ft. aft deck



will carry up to 800 tons of cargo. Maneuverability and thrust are aided by an EMI electro-hydraulic steering system and a Berg SP-12 bowthruster driven by a Caterpillar 3508 engine.

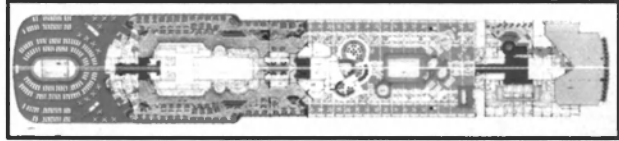
Ajax is reportedly capable of carrying 24,200 gallons of fresh

water, 172,350 gallons of fuel and 266,700 gallons of ballast/drill water. The four-deck vessel has accommodations for up to 24 persons, carries BV classification, is SOLAS certified and French-flagged.

Circle 24 on Reader Service Card

NEW & NOTABLE

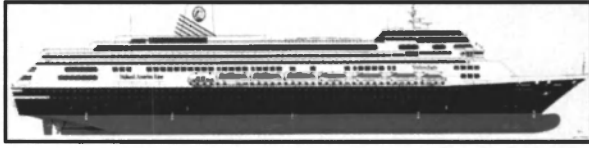
Holland America Introduces New Generation Of Luxury Cruise Ships



Sisterships *MS Volendam* and *MS Zaandam* are the first of a new generation of luxury cruise ships from Holland America Line, scheduled for delivery in May and November 1999, respectively. *Volendam* is currently under construction at Fincantieri shipyard in Marghera, Italy. "These newbuilds are based on the design of the Statendam class ships, and on our new flagship, the *MS Rotterdam*, but will represent a new generation of cruise ships," said Holland America Chairman and CEO **A. Kirk Lanterman**.

Volendam and *Zaandam* Main Particulars

Length	780 ft. (238 m)
Beam	105.8 ft. (32.2 m)
Gross tonnage	63,000 grt
Speed	23 knots
Passenger capacity	1,440
Registry	The Netherlands



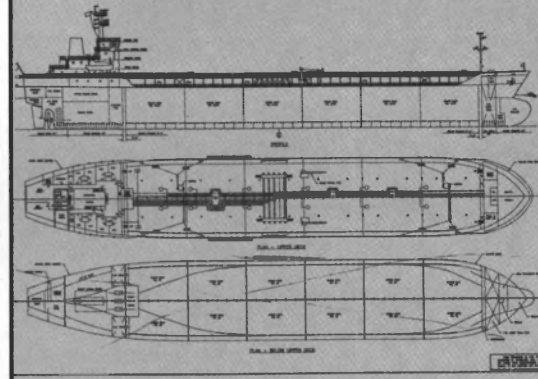
NASSCO, U.S. Military Celebrate Launching Of USNS *Sisler*



National Steel and Shipbuilding Company (NASSCO) has teamed up with the U.S. Army and U.S. Navy to launch the USNS *Sisler*, a sealift new construction being built under the Strategic Sealift Program. The 950-ft. (290-m) sealift ships are reportedly the largest ever to be launched in the U.S. *Sisler* (T-AKR 311) is the second of seven sealift ships awarded to NASSCO. These large, medium-speed RoRo/LoLo vessels (LMSRs) will join the U.S. Navy's Military Sealift Command, carrying U.S. Army equipment, vehicles and supplies. A total of 19 LMSRs, both conversions and new buildings, are planned to be delivered by U.S. shipyards by 2001 under the Strategic Sealift program being managed by the Naval Sea Systems Command.

Circle 27 on Reader Service Card

NEW DESIGN



Florida-based naval architectural firm Richard R. Taubler, Inc. has designed a double-hulled product tanker for an as-yet, undisclosed client.

The vessel features a deadweight capacity of 18,000 long tons, a service speed of 14 knots and a cargo volume of 779,000 cu. ft.

Main Particulars

Length, o.a.	482.2 ft. (147 m)
Length, b.p.	450 ft. (137.2 m)
Beam, molded76 ft. (23.2 m)
Draft	30.5 ft. (9.3 m)

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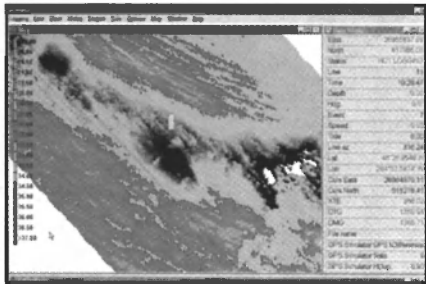
The dedicated Man Overboard Button interfaces with external MOB switches.

to 100 routes, provide tide tables for any location in the world, and operate in nine languages. Best of all, this advanced technology is exceptionally user friendly. In addition to easy-to-read screens and numerous single button features, the MX 400 provides four NMEA input/output ports for interfacing with other on-board electronics. And, it's all protected by a rugged, splash-proof housing. The Leica MX 400 delivers power, sophistication and precision in one easy-to-use DGPS. Now that's an idea whose time has come. For a complimentary brochure or other information, call (310) 791-5300.

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Coastal Releases HYPACK 8.1



Pictured is a survey screen from HYPACK 8.1.

Coastal Oceanographic recently released HYPACK version 8.1. This latest version of the company's hydrographic surveying package provides full function in Windows 3.1x, Windows 95 and Windows NT.

Circle 42 on Reader Service Card

Trimble To Launch New DGPS

Trimble Navigation Ltd. has announced a May release for its NavMariner DGPS charting navigator, a high-performance electronic charting and navigation system offering submeter navigation accuracy and advanced chart plotting. The new product integrates a navigation/charting processor, high-performance GPS/DGPS receiver and an LCD color display. The highly integrated design reportedly minimizes the need for additional electronics and provides a full set of interfaces to equipment such as autopilots, radars, fish finders and remote displays. NavMariner features electronic charting and navigation from Nobeltec and cartography from NOAA/BSB and MapTech.

Circle 43 on Reader Service Card

Chamber of Shipping Releases Guidelines

The Chamber of Shipping of America has released its Master/Pilot Information Exchange Guidelines, which describe in general terms the working relationship between the licensed pilot and a vessel's bridge team during transit in pilotage waters. The Guidelines also contain a list of information items which may be included in the information exchange, based on the characteristics of a particular transit. Copies of the Guidelines are available from the Chamber of Shipping of America, Tel: (202) 775-4399; Fax: (202) 659-3795.

Westfalia Wins P&O Contract

Westfalia Separator has signed a contract with P&O Cruises for the supply of nine C-Generation separators and one B-Generation purifier for cruise ship Project Capricorn.

The 76,000-ton ship, as-yet

unnamed, will be built at Meyer Werft Shipyard, Germany, and is scheduled for delivery in spring 2000.

The new vessel will be equipped with a WSC 25 for bilge water purification which has a throughput of up to 6,000 l/h.

Eight OSC 30s, with UNITROL (Westfalia's automatic desludging system) will handle heavy oil and

lube oil purification.

Diesel oil purification will be handled by one OTB 3.

Additional C-Generation separator cruise line sales include purifiers for P&O Cruises' *Victoria*, Princess Cruises' *Royal Princess* and *Grand Princess*, RCCL's *Nordic Empress* and Crystal Cruises' *Crystal Harmony*.

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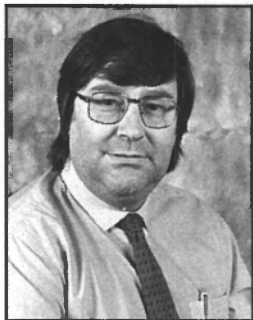
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That Empty Feeling

The Asian financial crisis has turned the Korean shipbuilding market upside down with news of closures, consolidations and cancellations. If the tanker market is over-ordered, as many speculate, more changes are sure to come.

— by Alan Thorpe, international editor



The financial crisis in the Far East has had an immediate effect upon the South Korean shipbuilding industry, especially Halla Engineering & Heavy Industries, which is now court protected. During the early part of this year the yard was dealt a severe blow by the cancellation of an order for four products tankers worth \$130 million.

The 45,000-dwt vessels were contracted by Norway's Benor Tankers and Yukong Line, now known as SK Group. Benor, which was responsible for two vessels, blamed financial problems on Halla. The company has repaid around \$23 million on the vessels. The vessels were intended for a pool to which SK Group was also due to

contribute two vessels. According to Benor, SK had also rescinded its order for two 45,000 dwt products tankers. Earlier this year, both Hyundai Heavy Industries and various Singapore-based shipyards ended speculation

With orders during 1997 of more than 32 million dwt accounting for all of the increase in the total world orderbook, fears have been sparked that the tanker industry is over-ordering, and thus in danger of upsetting the delicate balance of supply and demand.

of a take-over of Halla. South Korea may be moving closer to a significant realignment of its shipbuilding industry. Senior executives of the country's five leading conglomerates have agreed to discuss the exchange of assets as part of a broader restructuring program,

according to a senior adviser to President Elect Kim Dae jung. Hyundai, Samsung, DHI, LG and Sunkyong will discuss "big deals" between the groups, said Kim Won gil, chief policymaker of the national Congress for New Politics, the president elect's party. Despite these problems, South Korea is set to become the world's largest shipbuilding nation, replacing Japan which has held the top position since 1983. South Korean shipbuilders received contracts for the construction of 189 export ships, aggregating 12.2 million grt in this fiscal year's January to November period, while Japanese yards secured orders for 273 exports ships of just over 11 million grt during the same period.

Orders from foreign owners and overseas-registered subsidiaries of Japanese companies soared at Japanese yards last year. The Japanese Ship Exporters' Association (JSEA) put the contract intake for the 1997 calendar

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year at 310 vessels of just under 13 million grt, compared with 234 newbuildings of a total of 7.7 million grt secured in 1996.

JSEA calculates that the export orderbook in its widest sense stood at 19.2 million grt, comprising 472 vessels under construction or in the work backlog of December 31. The large tanker market continues to be dominated by the Far East. On the surface, there can be little doubt that history is repeating itself in this niche.

With orders during 1997 of more than 32 million dwt accounting for all of the increase in the total world orderbook, fears have been sparked that the tanker industry is over-ordering, and thus in danger of upsetting the delicate balance of supply and demand.

This was broadly the motion debated at Seatrade's recent Tanker Convention in London. Pitched against each other were Golden Ocean's **Robert Knutsen**, **Freddie Cheng's** right-hand man whose company has more VLCCs on order than any other — and only two with long-term employment — and **Lars Carlsson** whose company, Concordia, runs 'elderly' supertankers and who has been the most consistent supporter of long-term relationships with oil companies and life extension for older well-maintained vessels. Others in the debate were Citibank's **Michael Parker** and Gibson's **Eric Sawyer** (against history repeating itself) and **Peter Bassoe** and **Paul Slater** (for). However, when the tanker industry's great and good had listened to the various arguments, the vote was surprisingly close — 79 for the motion compared with 67 against.

Mr. **Knutsen** argued that fears of shipyards turning to large-scale VLCC constructions were being exaggerated. But some maintain that the figures are not in his corner: last year there were approximately 44 VLCCs ordered, taking the orderbook from eight million to nearly 21 million dwt.

He pointed to Asian oil demand and, even considering the present downturn, saw no reason for long-term worries. Certainly, recent International Energy Agency analysis which still include bullish news for consumption supports the arguments for new vessels (although IEA has consistently downgraded consumption numbers each of the last few months).

Since most OPEC producers have pumped oil at maximum levels in recent years, those countries with spare production capacity provide the sources of marginal crude.

Saudi Arabia, Kuwait and Abu

Dhabi are all located in the Middle East and are served principally by VLCCs. Any increase in demand for OPEC crude, therefore, results in increased demand for VLCCs. Yet, at a more operational level, there are plenty of

well-maintained older tankers — VLCCs and ULCCs — which are theoretically capable of trading up to their 30th birthdays.

After all, there is now a substantial backlog of orders for new Suezmaxes (about 17 percent of



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FAR EAST UPDATE

the fleet), a sector of trades on which VLCCs have encroached from time to time in the recent past, and Aframaxes (18 percent of the fleet). Weighing these arguments accurately is important for repair yards which specialize in large tankers. Whether or not these vessels continue to trade for two to three or seven to eight years is vital.

For logistical reasons, it is the Middle East repair yards which have the most to lose if old vessels are replaced sooner than later. Owners of large tankers tend to use the ballast trip back to the Gulf to clean tanks, gas-free and prepare for drydockings. And while they'll have plenty of new vessels for relatively minor ongoing repair work, it's in the older vessels where the money lies. Whether or not VLCC owners are repeating the mistakes of the 1970s, VLCC repair yards need to watch the market closely. There are 16 VLCCs scheduled for delivery this year, 33 in 1999 and, already, 22 in 2000.

Italian-owned and Monaco-based Premuda has selected SHI to build a pair of Panamax crude carriers. The 69,100-dwt tankers, contracted at \$32.5 million each, are scheduled to emerge from SHI in early 2000.

The question these yards need to ask, then, is: Will older vessels be needed, or not?

National Iranian Tanker Company (NITC) has committed itself to a further batch of crude carrier new-buildings at Daewoo Heavy Industries (DHI). The order, worth an estimated \$250 million,

calls for the construction of five double-hulled Aframax tankers of 98,000 dwt and adds to an extensive orderbook at Daewoo's Okpo yard, which already encompasses a series of Suezmax tankers ordered by the Iranian company last year. The first of the five NITC ships is expected to emerge from the Okpo shipyard in May 2000, followed at three monthly intervals by the remaining four.


Meanwhile, Daewoo has broken new ground by landing a newbuilding order from the southwest African state of Angola.

The deal with Sonangol, the country's national oil corporation, calls for a 5,400-dwt product carrier. Construction has been assigned to Shin A Shipbuilding at Tongyoung, which has provided a prompt delivery position in early 1999.

Samsung Heavy Industries (SHI) has secured its first conventional merchant ship orders of 1998, winning contracts for seven tankers and bulk carriers. Italian-owned and Monaco-based Premuda has selected SHI to build a pair of Panamax crude carriers. The 69,100-dwt tankers, contracted at \$32.5 million each, are scheduled to emerge from SHI in early 2000. Singapore's Neptune Orient Lines (NOL) has extended its newbuilding program at the yard, placing orders for an additional pair of Aframax newbuildings to match two crude carriers of this

Pictured is Korea's Daewoo shipyard, which has prospered despite the downturn in the region's economy. In fact, National Iranian Tanker Company (NITC) has ordered five double hull Aframax tankers for an estimated \$250 million, adding to an already extensive orderbook at Daewoo's Okpo yard.





size already under construction.

Completing the seven orders, are letters of intent for three Panamax bulk carriers for clients of Anangel Shipping. The 73,105-dwt ships, competitively priced at \$25 million each, are due for delivery in early 2000. Italian specialist offshore shipowner, Saipem, has ordered a new ultra deep-water dynamically positioned drillship at SHI.

Saipem has now disclosed the value of the order, but sources said total investment in the project could be in the region of \$270 million. The drillship, to be delivered in the second quarter of 2000, will be named *Saipem 10,000* and will be able to operate in water depths of 3,000 m.

Nissan Motor Carrier has placed an order with Shin Kurushima Dockyard for the construction of a combi carrier for cars and trucks with a capacity of 3,200 units. The delivery is set for April/May 2000. Nissan has placed the order for the ship ahead of schedule to take advantage of the latest pricing trend for new vessels.

It initially planned to deploy the ship in 2002 for a shuttle run between Japan and the U.S. west coast. Taiwanese carrier, *Uniglory*, the affiliate of Evergreen, expects to place an order for a series of 10 containerships next month.

The vessels, each of 1,420 TEU capacity, are to be built at Evergreen Heavy Industrial Corp.'s Nagasaki shipyard, with deliveries planned on a quarterly basis between July 1999 and October 2001. A new round of investment in car carrying tonnage is believed to be imminent, with Japan's

Mitsui OSK Lines (MOL) poised to place orders for up to five vessels with domestic shipbuilders. The order will involve the construction of four 5,000-unit and one 1,200-unit car carriers, split between two Japanese shipyards. Three of the four 5,000 capacity units will be placed with Imabari Shipbuilding, with delivery dates scheduled for April, June and December 2000. Imabari will also construct the smaller 1,200 capacity unit carrier, and is due for delivery in December 1999. The order for the fourth 5,000 capacity unit, scheduled for delivery in 2000, will be placed with Shin Kurushima Dockyard. MIF Ltd., the Tsakos backed tanker company, has signed a contract with Japan's Imabari Shipyard for a third new Aframax tanker. The vessel – due for delivery in late July – will be a sister to a 107,000-dwt newbuilding the yard delivered to MIF last year and a tanker, named *Athens 2004*, due to be delivered in mid March.

Navy Ships To Feature Armaflex Insulation

Shipbuilder Electric Boat has issued specification EB 4013 for shipboard anti-sweat and refrigeration applications calling for the use of NH Armaflex on U.S. Navy ships. Manufactured by Armstrong World Industries, Inc., NH Armaflex is a non-halogen insulation specially formulated to eliminate harmful chlorines, bromines and PVC during combustion.

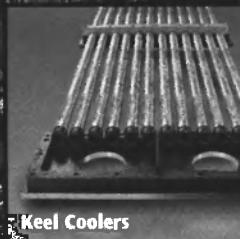
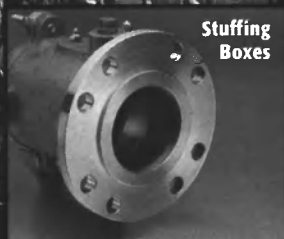
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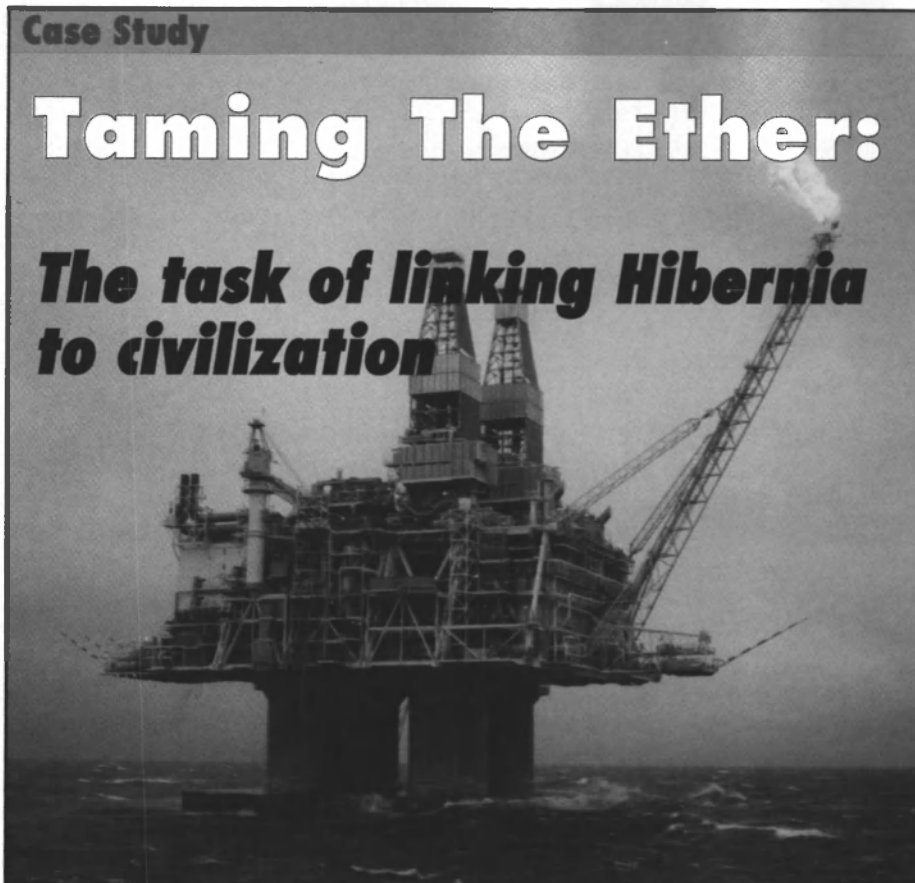


DURAMAX® MARINE

Case Study

Taming The Ether:

The task of linking Hibernia to civilization



Calling the Hibernia platform an offshore installation is like calling El Niño a slight disturbance in the weather. The equivalent of a 10-story building in the middle of the Atlantic Ocean, it is the largest offshore rig of its kind. More than 200 nautical miles off the coast of Newfoundland — a two-hour helicopter flight — Hibernia could have been a model of isolation.

Communication by cellular phones is not an option. There are no islands between the platform and shore that could relay other kinds of transmissions. Not even MSAT, which covers the coastal waters of North and Central America and the Caribbean, is accessible from Hibernia's remote location. Therefore, the only viable option for communication to and from Hibernia was a dedicated satellite link. Satcom signals are uplinked to geostationary satellites. The signals are then redirected back to Earth, providing instant communications to and from previously inaccessible locations.

Integrating the System

What Stratos Mobile Networks — a multi-network operator with offices in Canada, the U.S., the U.K. and Hong Kong — offered Hibernia was adaptability. Stratos owns and manages land earth stations with access to the Inmarsat global satellite network.

Among the challenges for

Stratos was overcoming environmental barriers. This sector of the North Atlantic where Hibernia is located, known as "iceberg alley", is an extremely hostile place. And, according to Stratos Manager of Oil and Gas Projects, **Howard MacIntyre**, whose experience encompasses 20 years in the oil and gas industry, "This region is listed in the Guinness Book of World Records as the foggiest place on the planet."

For Hibernia, owned by The Hibernia Management and Development Company (HMDC), comprised of Mobil Oil, Petro Canada, Chevron, Murphy Oil, CHHC and Norsk Hydro, Stratos achieved economies by building a C-band earth station at Stratos Center, that is dedicated to the North Atlantic offshore industry, and providing a complete turnkey telecommunications solution which includes the main satellite link, vessel and helicopter tracking, and coastal radio station services, along with complete communications system maintenance, 24-hour network monitoring and customer support from highly trained personnel — all of which are essential in keeping this large and communications-intensive facility running smoothly.

"Careful planning was key," said **Joseph Arsenault**, telecommunications engineer for Hibernia. "The team of planners

and coordinators did an outstanding job."

Services From A-Z

HMDC communications requirements were many, including: lots of bandwidth (512 Kbps at present); an infinitely flexible communications network that would make voice communications from the site-to-shore (and back) as easy as using an office phone, with multiple simultaneous uses; voice/fax; data; video conferencing; data analysis and materials management; 24-hour tracking of ships and aircraft; telemetry to onsite tankers; a telemedicine link; intracom and cable distribution service to more than 140 cabins; remote sensing for meteorology, security and emergency services.

The variety and scope of these services has had a strong impact on Hibernia's day-to-day and special event activities. For example, video conferencing has proven to be extremely valuable. "It's quite a production to transport people out to the site for a meeting," Mr. **Arsenault** said. "The helicopters can only carry eight to ten people at a time, and it's a two-hour flight. With video conferencing, on-shore participants meet at the land station, and communicate in real time with the platform."

This aspect was especially evident at the news conference announcing first oil late last year. It would have taken days to transport all of the 200 reporters and industry representatives to the platform via helicopter.

Instead, the conference was staged from the HMDC headquarters at St. John's, and teleconferenced via the Stratos satellite link using Hibernia's teleconferencing facilities at the offshore location and at its St. John's office.

NewTel Communications supplied terrestrial communications-PBX with voice and fax to St. John's and direct-dial long distance access worldwide, LAN and WAN-both at the HMDC building and on the offshore installation.

All of the phones are local extensions of the central phone number, much like a land-based Centrex system, and dozens of outgoing and incoming calls can be made simultaneously on the Hibernia platform via the C-Band satellite link. In addition to voice communications, real-time data flow is

critical to Hibernia's offshore drilling and production operation. Materials management and production processes require monitoring and continuous updating.

Hibernia also required computer connectivity. Its computer network, including Internet access and e-mail, is connected to the HMDC headquarters in real-time via the Stratos satellite link.

Preparing For The Worst

The physical isolation of the platform presents implications beyond the intricacies of everyday communications. Stratos' marine vessel and helicopter tracking system identifies and continuously tracks the ships and aircraft that support the Hibernia offshore installation. The critical need for emergency communications was demonstrated not long after tow-out. A sensor in a storage tank alerted Hibernia offshore operations personnel of a potential gas leak. Normally, vent fans in the oil tanks exhaust gas-laden air when oil is moving into the tanks, but, in this case, the fans did not engage immediately. Hibernia offshore managers launched the emergency evacuation procedure, while simultaneously investigating the origin and seriousness of the detected gas. In very short order, Cougar Helicopters "down-manned" more than 90 people to the drill rig *Bill Shoemaker*, located about 30 miles from the Hibernia platform. The problem was corrected and the evacuated Hibernia crew members were returned to the platform. All of this activity took place in a brief eight hours.

Looking Into The Future

Mr. **Arsenault** looks puzzled when queried about future needs for expanded services. "This network of communications services was comprehensively planned," he explained. "We may need more bandwidth as production increases, and that will be easy to do [Stratos can provide bandwidth up to dual T1; Hibernia is currently using only 1/6th of that capacity]. But I can't foresee needing additional services for years."

Lissa D. Hurwitz is a writer based in Silver Spring, Md.

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Stratos And Software Kinetics Provide VTS To Canadian Coast Guard

Stratos Mobile Networks, Racal and Software Kinetics Ltd. have reached an agreement with the

Canadian Coast Guard to supply a Flag II Vessel Tracking System (VTS) for its fleet of 125 vessels. The \$2.1 million contract, building on a \$300,000 pilot project from 1997, provides the Canadian Coast Guard with vessel information through six Locator VTS control



FLAG II satellite vessel tracking from Stratos Mobile Networks provides fleet location information for the Canadian Coast Guard.

centers supplied by Racal.

Flag II is a distributed information systems designed to work with many communications systems, and currently uses the North American MSAT mobile satellite system to serve the Canadian Coast Guard. For the initial two-year period, the data will be sent from the vessel to the control centers via the Stratos operations center, where the vessels will be tracked and all locations updated regularly. Forty-one units have already been installed, and the remaining 84 satellite terminals along with the complete FLAG II systems will be operational by July 1998.

Circle 1 on Reader Service Card

CSSI Offers New Inmarsat Terminal

The new SPD2000M Maritime Inmarsat Terminal for voice, fax and data communications is now available from Commercial Satellite Systems, Inc. (CSSI). The new terminal operates through the worldwide Inmarsat system of new Generation III satellites. Users can reportedly dial the number of any phone in the international telecommunications network and the connection is established through the satellite to a land earth station (LES) and then automatically routed to the end user via the network.

Circle 2 on Reader Service Card

COMSAT Offers Daily News Service to Mobile Satellite Users Worldwide

COMSAT Mobile Communications, worldwide provider of mobile satellite communications, recently announced the availability of COMSAT C-News, a free news service for mobile satellite users. Customers located virtually anywhere in the world can reportedly have daily access to the latest news from around the globe at no cost via a small, inexpensive Inmarsat-C satellite terminal.

"COMSAT now offers mobile satellite users a simple, convenient way to stay abreast of the latest events happening around the world," said **Kathryn Holman**, vice president of sales and marketing for COMSAT



All the boats in the Whitbread Around the World Race 1997/98 have chosen Inmarsat terminals from Nera to keep in touch with the rest of the world during this extremely tough regatta.

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During the autumn of 1997, Nera introduced a new satellite station which is well suited for small crafts and pleasure boats, but also ideal as



relief or back-up for larger commercial vessels or passenger ships. The Nera WorldPhone Marine is small, light, easy to use and install, and above all, affordable.

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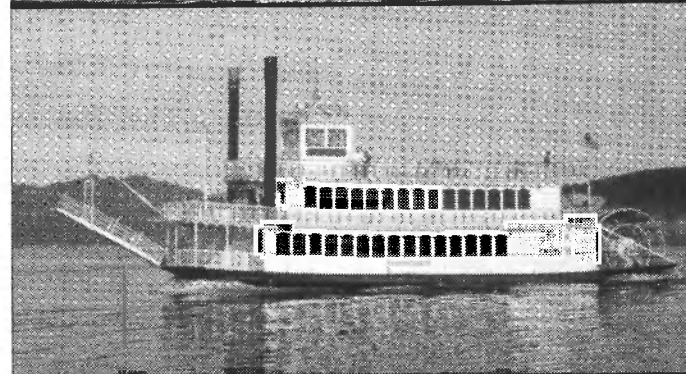
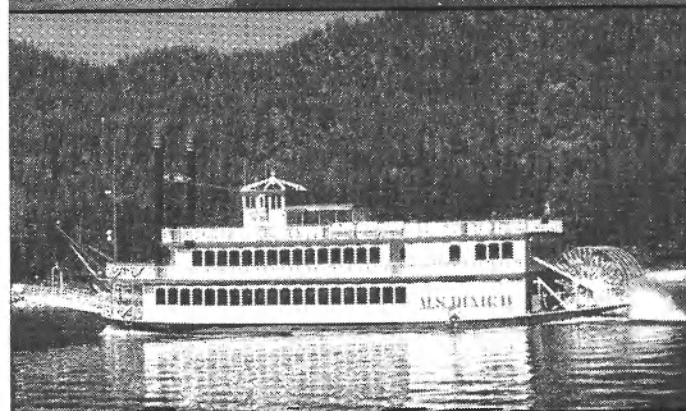
(Top) SkipperLiner luxury vessels rank among the finest and strongest, and earn profits in a variety of configurations. 30' to 160' lengths. 14' to 60' beams. We have excellent custom design/build abilities.

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Circle 3 on Reader Service Card

ORBCOMM Launches Two More Satellites

ORBCOMM Global, L.P. (ORBCOMM), the worldwide provider of commercial low-Earth orbit (LEO) satellite data and messaging com-

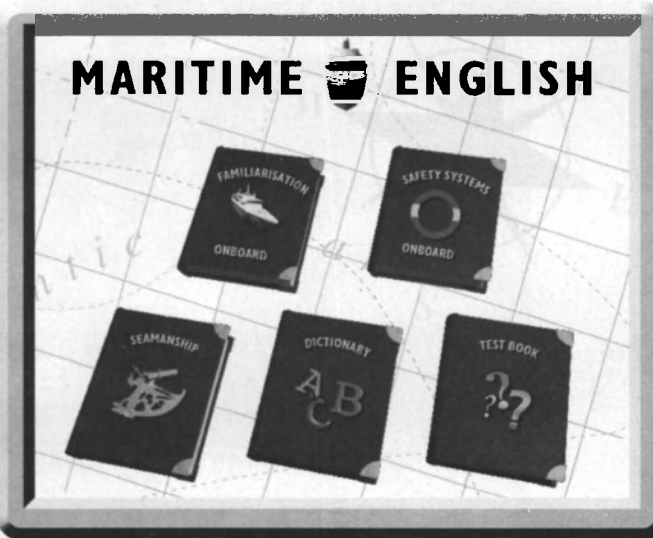
munications services, has successfully launched two additional satellites into its targeted near-polar orbit, approximately 500 miles above the Earth. This launch marks the sixth step in ORBCOMM's 10-stage Countdown to Global Service.

"The addition of two satellites to our constellation brings us a big step closer to our goal of providing affordable, portable, near real-time communications everywhere on the planet," said Alan Parker, ORBCOMM president and CEO.

When the two new satellites are operational, ORBCOMM's communications availability in the U.S. will increase to more than 50 percent, with satellites in view more than 12 hours per day.

In addition, ORBCOMM plans to launch 16 more satellites by mid-1998, further increasing communications availability worldwide.

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Fifth Inmarsat-3 Launch A Success

The fifth and final satellite in the Inmarsat-3 series (F5) was launched successfully in February, on an Ariane 4 rocket from Kourou, French Guiana.

The satellite will serve as a fully functional spare for the series which already comprises four successful satellites.

It will also carry commercial communications, providing additional capacity for maritime, aeronautical and land mobile communications in the Indian Ocean and Atlantic Ocean East regions.

A key feature of the Inmarsat-3 satellites is their ability to concentrate power on particular areas of high traffic.

Each satellite utilizes up to a maximum of seven spot beams, depending on traffic demands, and one global beam. Inmarsat-3 is reportedly eight times more powerful than the previous generation of Inmarsat-2 satellites.

The complete Inmarsat-3 constellation also includes F1, covering the Indian Ocean region, F2, covering the Atlantic Ocean East region, F3, over the Pacific Ocean region and F4, providing Atlantic Ocean West coverage.

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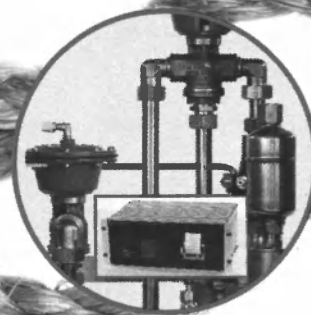
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SingTel Unveils New Services At Boat Asia '98

Singapore Telecom (SingTel) was scheduled to introduce its latest Inmarsat Marine satellite communications services – the InTouch Card, MPLUS Marine Satellite Phone and Inmarsat-C/CPLUS – at Boat Asia '98. These services are designed for small and private ship owners who rely on radio and cellular phone services for communications to and from vessels. By using the latest technology, these new satellite services reportedly offer enhanced security by incorporating encryption of information transmitted over the satellite link.

Circle 7 on Reader Service Card

MTN Provides Telecommunications Service To Princess Cruises

ICG Satellite Services, Inc. subsidiary Maritime Telecommunications Network (MTN) has signed a multi-year, multi-million dollar agreement with Princess Cruises to provide the communications for the cruise line's fleet, including the new *Grand Princess*, the largest cruise ship in the world. *Grand Princess* features MTN C-Band communications equipment, as well as live video broadcast capability.

"We chose to expand our relationship with MTN because *Grand Princess* requires advanced communications technology. The MTN system meets both our technological requirements today, as well as our anticipated requirements as we grow and demand more voice, data and video broadcast capabilities," said **Rick James**, senior vice president of Sales and Corporate Relations, Princess Cruises.

Circle 8 on Reader Service Card

Inmarsat Sets Sights On Exploring New Territory

Inmarsat is reportedly ready to seek strategic commercial investors before seeking a flotation. Director General **Warren Grace** said that the current investors, comprising one communications company from each of Inmarsat's 81 member states, will have the ability to sell stakes to outside investors in the period between setting up a commercial structure at the beginning of 1999 and flotation two years later.

Inmarsat reportedly wants to develop the range of its communications systems, particularly the Horizons project for high speed data transmission to handheld personal computers. Strategic investors could come from the companies bidding to develop space technology for the \$2 billion project due to be operational by 2002. It will provide data at rates of 144KB/ second to lap top PCs and video conferencing; file downloading and Internet connections will be possible in remote areas.

According to Mr. **Grace**, there will be a 15 percent ceiling on share holdings and an

BOATRACS Offers Two-Way Satellite Communications

BOATRACS offers a two-way, satellite-based data communications and positioning system which reportedly allows users to reach vessels hundreds of miles away at all times. Designed and manufactured by wireless communications provider QUALCOMM, the BOATRACS system provides software for use both on vessels and onshore. Message composition, automatic message forwarding and retrieval and fast access to message and position history information are supported by the office software, QTRACS.

Circle 9 on Reader Service Card

Station 12

Station 12 satellite telecommunications network utilizes a series of satellites which allow customers to transmit data, voice, fax and telex through a series of different services, specifically designed for maritime application and substantial data. Services available from Station 12 include Inmarsat-A, B, C, M and mini-M.

Circle 10 on Reader Service Card

TRW Acquires ICO Shares

TRW Inc. has acquired an equity interest in ICO Global Communications, under which TRW received 1.5 million ICO shares, or approximately seven percent of ICO's current outstanding shares, with a face value of \$150 million. The two companies will grant each other

cross licenses for their respective patents relating to global telecommunications systems. In addition, TRW will receive certain distribution rights in the U.S. for ICO products and services. These agreements will reportedly allow for a merging of both companies in implementing a medium-earth-orbit satellite system.

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Low Noise Mechanical Drive Propulsion System Alternatives

For more than 80 years, mechanical drive propulsion systems consisting of reduction gears and various prime movers have proven their reliability and performance onboard numerous commercial and navy ships. GE has more

than 40 years of continuous experience in the design, manufacture and performance/noise testing of SSN, SSBN, CVN and DDG main propulsion reduction gears, and has reportedly accumulated the largest industrial database of

Naval propulsion system noise performance. This database was used extensively in the development of the DDG 51 main reduction gears (MRGs), and yielded a system with noise performance at least 18 dB below specification. Based on this

extensive experience, GE believes that mechanical drive propulsion systems can deliver the low noise, high power density, operational flexibility, reliability and performance needed to satisfy 21st century Naval ship mission requirements. Currently, GE has approximately 240 MRGs in service on over 170 U.S. Navy surface ships and submarines. These MRGs combine high reliability with high availability (approx. 99 percent), high efficiency (greater than 98 percent), high power density (generally less than 0.1 lb./ft.-lb. output torque), and very low maintenance designs. GE's low noise propulsion gearing satisfies the operational and noise requirements of these ships.

Propulsion System Noise Sources

The first step in developing a low noise propulsion system is to identify and characterize the noise sources. In general, a propulsion system consists of one or more prime movers (gas turbines, steam turbines, electric motors, diesel engines), reduction gears, and isolation systems; a ship foundation; and various auxiliary systems. The noise generated by the propulsion system includes contributions from all of these components.

Table 1 (page 40) presents a list of the typical noise sources associated with the principle propulsion system components and identifies general approaches to control these sources. Note that the mounting system (isolation system plus ship foundation) is a control mechanism for all propulsion system noise sources.

Design Approach And Features Of Low Noise Gearing

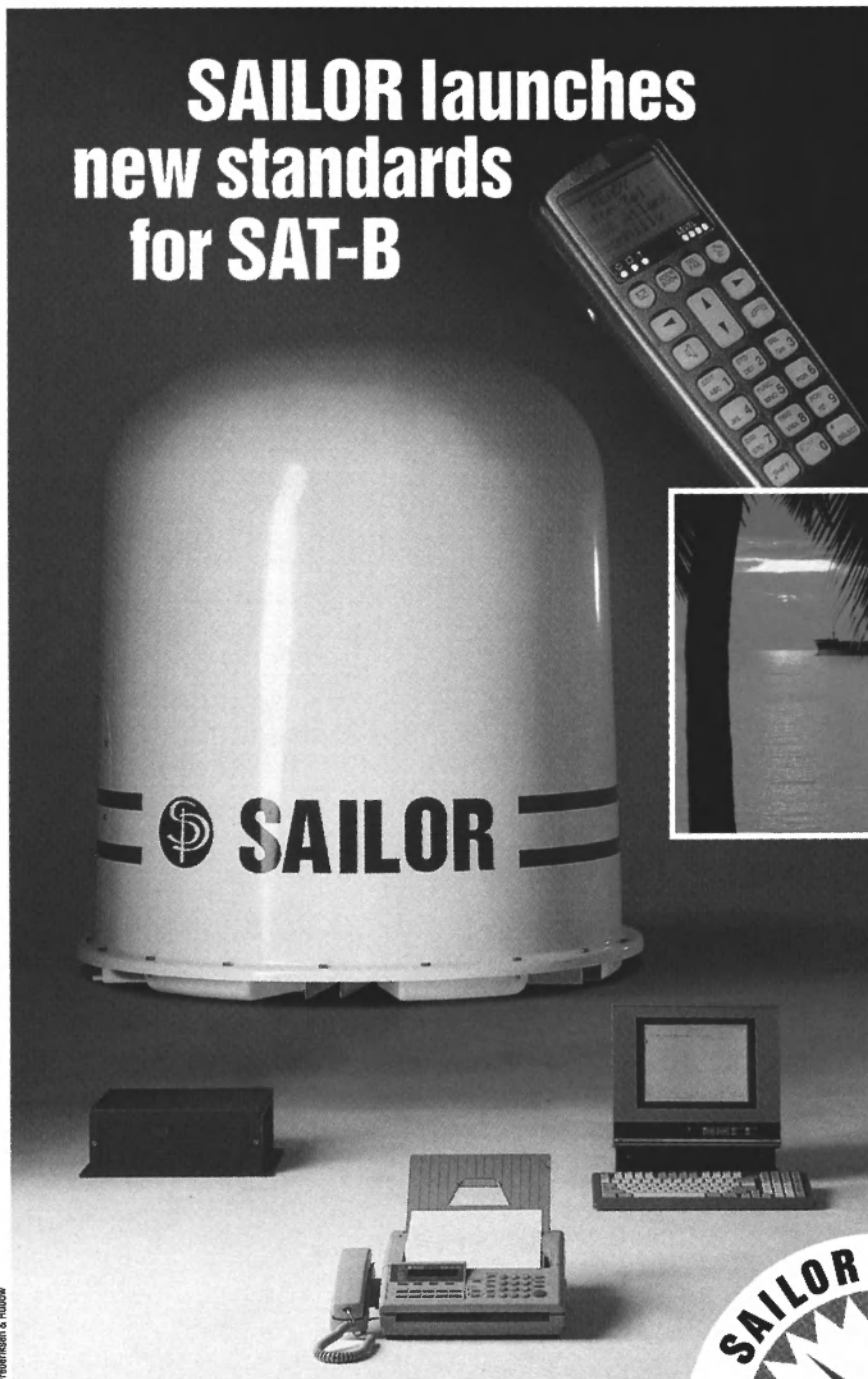
The development of low noise propulsion gearing requires a total system approach. Once the noise sources are identified and characterized, the design of the reduction gear system progresses along three fronts:

Design and manufacture the gear casing and rotating elements to minimize the amplitude of the stimuli;

Design the mounting system to isolate gear-based vibration from the ship foundation; and

Estimate the overall noise performance to ensure that the reduc-

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The new SAILOR SAT-B with the "Rotary Joint" provides full freedom of rotation for the antenna and avoids the need for "cable unwrap". This ensures constant, unbroken contact with the satellite. The installation is much easier and the servicing accessibility has been considerably improved. System software modifications and service diagnostic tests can be carried out from a personal computer connected to the main transceiver unit.

The SAILOR SAT-B is supplied in different versions to meet the communication requirements of users as well as the statutory requirements concerning voice, fax, data and HSD (High Speed Data).



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tion gear vibration requirements will be met.

The design phase of low noise gearing focuses on the five areas noted below. In all cases, the basic design objective is to minimize vibration stimuli.

- Rotating Elements - maximize balance, roundness, concentricity;
- Gear Casing - ensure rotating element

support and parallelism;

- Bearings - optimize stability;
- Couplings - optimize arrangement and shafting system dynamics; and
- Mesh Design - maximize uniformity of load transfer.

The benefits of these low noise gearing design features are realized through manufac-

turing processes which are highly accurate, consistent and controllable.

Mounting System Design and Performance

The ultimate objective of the mounting system design is to minimize the overboard radiated noise attributable to the reduction gearing. This is achieved by isolating the reduction gear from the ship foundation. Consider three typical mounting system configurations – hard mounted, metallic isolation and elastomeric isolation. Each of these configurations is shown schematically in Table 2, along with some of their performance comparisons.

The mounting system selection must consider the following:

Ship mission requirements; Performance comparison trade-offs; and level of isolation needed to satisfy the system noise performance (determined from noise performance evaluations).

System noise performance evaluations should be conducted throughout the reduction gear design phase to ensure that noise performance requirements are satisfied.

(Continued on page 54)



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Table 1

Table 1 Typical Propulsion System Noise Sources and Control Approaches		
Prime Movers	Reduction Gears	System Resonance
Sources - Rotationals & Harmonics - Blade Passing, Fluid Stream - Crank Effort Pulsations - Electrical Tones, Power Converter, Pole/Slot Passing Control - Dynamic Balance - Rotor / Stator / Casing Design - Couplings / Bearings - Isolation System - Ship Foundation	Sources - Shaft Rotationals & Harmonics - Mesh Tones - Undulation Tones Control - Dynamic Balance - Roundness & Concentricity - Couplings / Bearings - Mesh Design - Manufacturing Accuracy - Isolation System - Ship Foundation	Sources - Casing & Support Structures - Shafting System - Isolation System Control - Resonance Frequency Tuning - Stimulus Frequency Avoidance - Component & System Damping - Isolation System - Ship Foundation

Table 2

Table 2 Mounting System Comparisons		
Hard Mounted	Compound Metallic	Single Elastomeric
System Complexity Low Complexity - Gear Casing Bolted Directly to Ship Foundation - No Shock Snubbers	Moderate Complexity - Several Isolators Required - Shock Snubbers Required	Higher Complexity - Numerous Mounts Required - Shock Snubbers Required - Periodic Mount Replacement
Noise Performance - Foundation Vibration Higher Overall - No Gear-to-Foundation Isolation - Non-Tunable Design for Given Ship Foundation	Lower Overall - Tunable Design - Can Optimize to Foundation and Ship Mission - Significant Attenuation Above Isolator Resonances (Limited by High Frequency Modes)	Lowest Overall - Vibration - Non-Tunable Design - Standard Application Mounting Frequency Significant - Attenuation Above Mounting Frequency (Limited by High Frequency Wave Modes)



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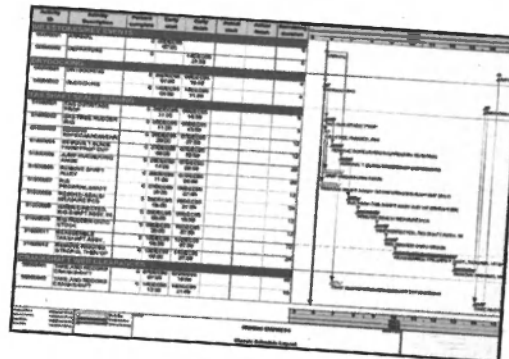
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Oil Price Instability Slows Offshore Euphoria

A series of unrelated but critical world events have conspired to prove that the offshore oil market does indeed ascribe to the laws of nature, particularly the "what goes up must come down" part. But troubles in Iraq, leaping OPEC quotas and diving Asian financial markets aside, there aren't many participants in the offshore boom who haven't felt the sting of the roller-coaster-like swings which define the market.

The price of oil has dropped nearly 40 percent since October 1997, dipping below \$13 and hovering in the \$14 range.

On top of this, the recent monthly report from the International Energy Agency (IEA) comes with a bearish tone, even though it still projects oil usage to rise 1.6 million b/d in 1998. IEA notes that a high level of oil inventory; slipping Asian demand; a less than receptive market for OPEC oil; and there is the prospect of major increases in Iraqi exports have conspired to drag down the previous month's projections. IEA noted that Asia (with the excep-

tion of India and China) is expected to see little growth, and has again downgraded its demand figures this month (since November, projected Asian oil demand has been reduced 500 kb/d by IEA).

While the offshore business is oil price dependent, there are some different dynamics of this particular boom which are showing through. In a word, technology — the ability to more economically and efficiently find, tap and recover resources — has played a huge role in calming nerves around the industry. The oil boom, particularly in the Gulf of Mexico continues to be driven by deepwater exploration. Seismic, drilling and platform construction technologies, combined with financial incentives, have made it far more attractive for companies to initiate and stay with deepwater developments.

The ensuing editorial section highlights some of the recent projects from oil and offshore majors which are engineered to bring oil to market more cost effectively.

Forecast Calls for Continuing Flow of Orders for Floating Production Systems

by
James R. McCaul, President
International Maritime Associates, Inc.

Offshore fields in the Gulf of Mexico, West Africa, Brazil, North Sea, Western Australia and Southeast Asia are alive with development activity. Much of the undiscovered, economically recoverable oil and gas reserves are believed to lie in these fields — and both majors and independents are earmarking large capital expenditures to tap their resources.

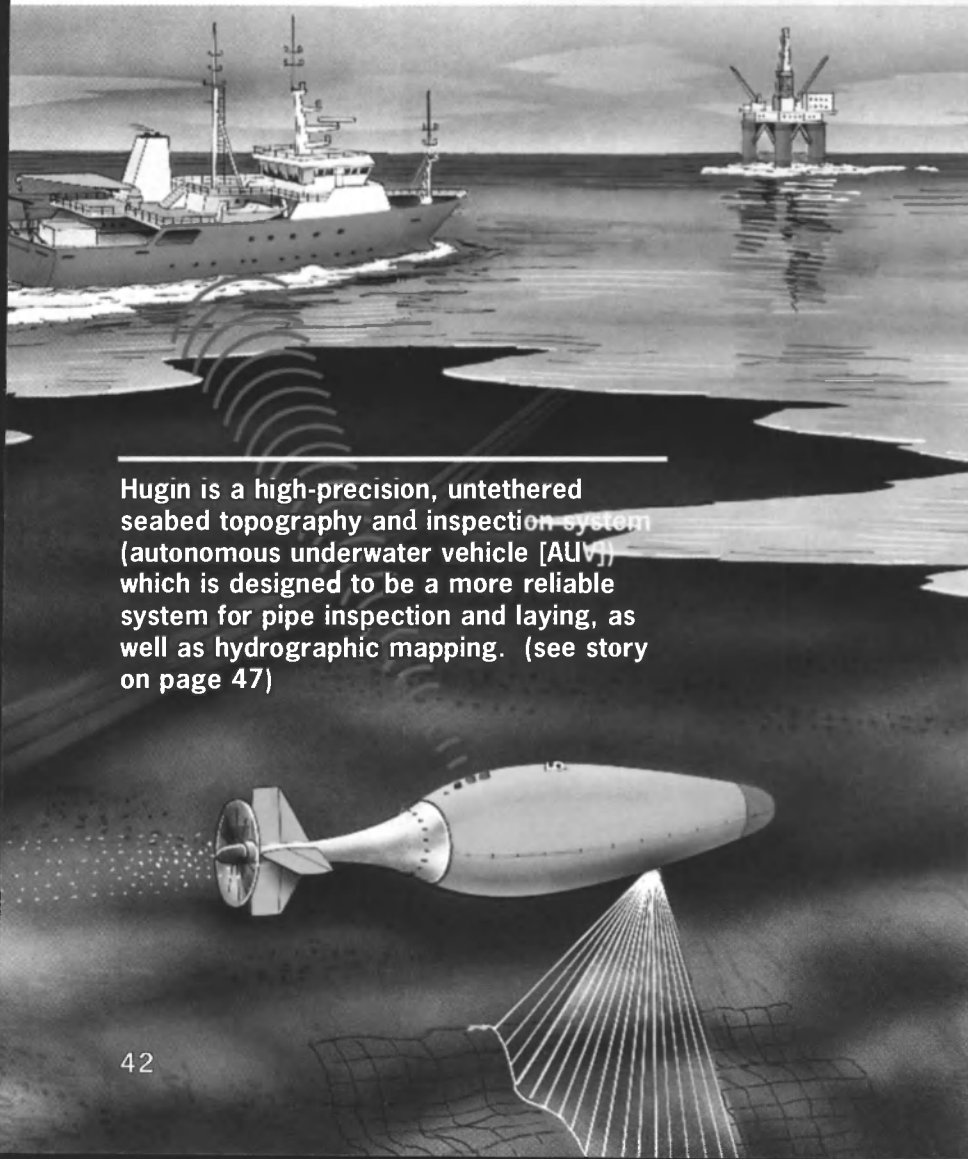
It is widely expected that demand for oil will continue to grow at a rapid clip. Industry forecasts call for crude demand to grow at 2 to 2.5 percent annually over the foreseeable future. New sources of crude need to be found to accommodate this long-term growth — and this need is driving oil companies into exploration and development of offshore fields in areas previously considered uneconomic or inaccessible.

Most oil majors and large independents plan significant investments in offshore exploration and development over the next several years. A recent survey of more than 90 oil and gas companies indicates that capital spending will increase almost 10 percent in 1998 and two-thirds of the major oil companies said they plan to increase offshore drilling expenditures this year. In another industry survey, respondents said that the most attractive investment at this time is deepwater exploration and development in the Gulf of Mexico. This interest is evident in Gulf of Mexico leasing activity. About 75 percent of the bids in the last government auction for leases in the Gulf of Mexico were in water depths over 900 m. One bid was for a block in water depth of 3,118 m. Drill ships are now on order that are capable of drilling in water depths of 3,000 to 3,600 m.

Despite the recent drop in spot prices, there have been few, if any indications that oil companies have shelved major offshore projects — particularly those involving large deepwater fields. These deepwater projects are the crown jewels in the exploration programs of oil majors and large inde-

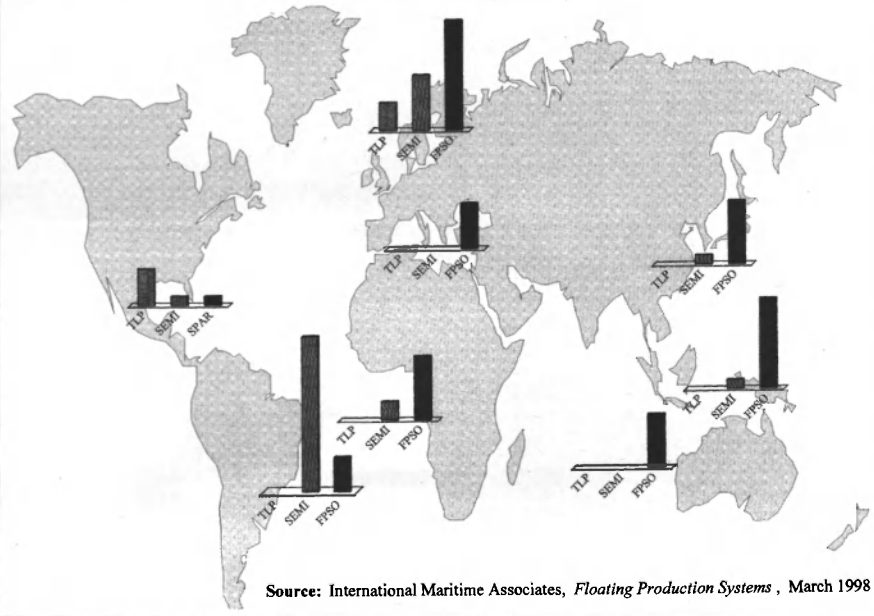
Radical technology changes have taken place in the offshore sector that have reduced the cost of finding and lifting oil by 40 percent since the early 1990s

(Continued on page 43)



Hugin is a high-precision, untethered seabed topography and inspection system (autonomous underwater vehicle [AUV]) which is designed to be a more reliable system for pipe inspection and laying, as well as hydrographic mapping. (see story on page 47)

88 Floating Production Systems are in Operation as of March 1998



Source: International Maritime Associates, *Floating Production Systems*, March 1998

pendents. They see deepwater as the key to new sources of oil.

Role of Floating Production

Radical technology changes have taken place in the offshore sector that have reduced the cost of finding and lifting oil by 40 percent since the early 1990s. Of particular importance is the growing role of floating production systems. These systems have proven to be a cost effective way to access deepwater fields, open marginal fields to production, gain access to remote locations, minimize time to first oil and reduce cost of field abandonment. One study has found that the marginal development cost in the North Sea has decreased from \$5.46 per barrel in the early 1990s to \$3.58 per barrel for projects starting up in 1995/1998 — and will fall to \$3.10 per barrel for projects starting over the next two years.

Types of Systems

There are four basic types of floating production systems, each of which has advantages in particular types of fields and geographical areas.

FPSO Vessels — Ship shapes have become the clear choice for production in fields offshore West Africa, Southeast Asia and Australia. Process plant carrying capacity, storage capability, relatively short lead time to start production, wide availability of secondhand tanker hulls and relatively low prices on new hulls from Asian yards have contributed to this preference. FPSO vessels have also been increasingly substituting for production semis offshore Brazil and account for more than half the production units on order for the North Sea. A major exception to this trend is, the Gulf of Mexico — where there is access to pipeline infrastructure, which eliminates the need for field storage.

Production Semisubmersibles

— New, purpose-built production semis continue to be an attractive option in the North Sea. They can be fabricated locally and there is considerable experience utilizing such units in North Sea fields. Converted semis continue to be attractive to Petrobras for use offshore Brazil, provided there are

suitable hulls for conversion. Converted semis have also been an option for production offshore West Africa.

Tension Leg Platforms — TLPs come in two versions — full size and mini. A major advantage to

the TLP is the ability to utilize dry trees, which is particularly important in fields with high paraffin content. Full size TLPs have large topside weight carrying capability and are intended for use on multi-well, complex fields with high production

throughput. Mini-TLPs are a cost-effective solution in smaller deepwater fields with lower throughput requirement. Both full size and mini-TLPs lack storage and are best used in areas where pipeline infrastructure can be accessed.

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- ◆ describe floating systems planned, on order and recently delivered
- ◆ assess recent developments impacting technology and companies

The March 1998 report is now available — and includes a long-term forecast of floating production system requirements through 2002.

Contents of the March 1998 Report

<p>I. CURRENT AND PLANNED FLOATING PRODUCTION SYSTEMS</p> <ul style="list-style-type: none"> • Existing Floating Production Systems • Systems Recently Installed • Floating Systems Now on Order • Shipyards Currently Building or Converting Floaters • Floating Production Systems Planned or Being Studied 	<p>III. LONG TERM FORECAST OF CAPITAL EXPENDITURES FOR FLOATING PRODUCTION SYSTEMS</p> <ul style="list-style-type: none"> • FPSO Vessels • Production Semisubmersibles • Tension Leg Platforms • Production Spars
<p>II. UNDERLYING MARKET DRIVERS</p> <ul style="list-style-type: none"> • Long Term Oil Supply and Demand • Growing Role of Offshore Production • Recent Drop in Spot Prices • When Will Crude Prices Rebound? • Has the Drop in Crude Prices Impacted Offshore E&P 	<p>IV. RECENT DEVELOPMENTS</p> <ul style="list-style-type: none"> • Projects Planned or in Design • Floating Systems on Order • Systems Recently Installed • Older Systems
<p>V. TECHNOLOGY AND COMPANIES</p> <ul style="list-style-type: none"> • Multi-Phase Pump • Subsea Problems • Steel Fracturing in FPSO Vessels • Trend Toward Industry Consolidation 	

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INTERNATIONAL OFFSHORE TECHNOLOGY

Production Spars — Spars are particularly suited to deepwater, mid-size fields with access to pipeline infrastructure. Like TLPs, dry trees can be used on a spar — which is a major feature for fields with high paraffin content. However, spars lack the

variable deckload capability of a full size TLP. Spars can incorporate storage, though to date this has not been incorporated into any of the three systems delivered or on order. Capex is in the same range as a mini-TLP, which is the closest market substitute.

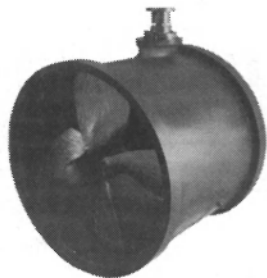
There are 88 floating production systems in operation worldwide. About 60 percent are FPSO vessels, 30 percent production semisubmersibles and the remaining 10 percent tension leg platforms or spars. Another 35 systems are on order, represent-

ing capital expenditures of about \$12 billion. Most importantly, almost 150 projects are under study that potentially involve use of a floating production solution.

A report published in March analyzes developments taking place in the floating production sector, lists projects under study involving floating production and forecasts types of equipment to be ordered over the next three to five years. The report is the first in a series of four quarterly business reports on construction and conversion activity involving floating production systems.

The 1998/99 quarterly series is available for \$1,400. To order, please contact International Maritime Associates (700 New Hampshire Ave., NW, Suite 118, Washington, D.C. 20037 USA, tel: (202) 333-8501; fax: (202) 333-8504.

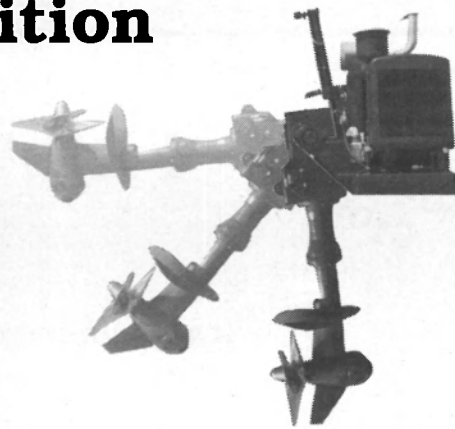
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TECHNOLOGY

Designing A Revolutionary Pipeline Pig

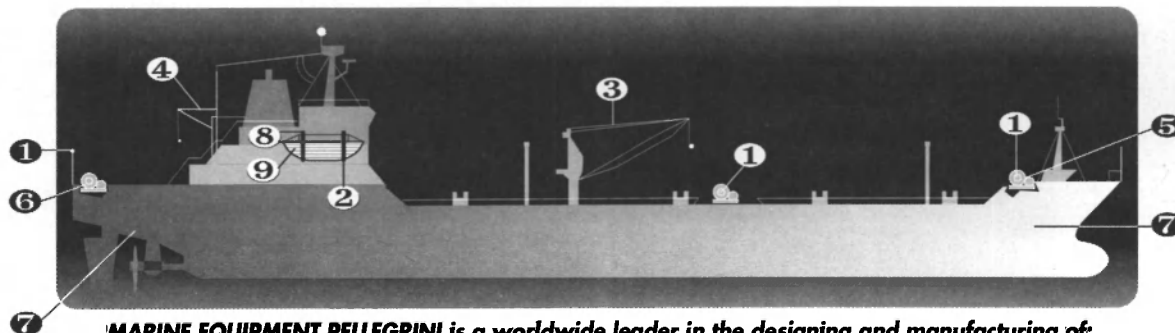
A pig developed by Statoil for inspection and maintenance of pipelines with varying dimensions is designed to provide far greater flexibility in construction and operation of such facilities. The first of these units will be designed and built for Asgard Transport by Germany's Pipetronix. This order has been placed by Statoil as operator for the new pipeline, which will carry gas from Asgard off mid-Norway to the group's Kårstø treatment plant north of Stavanger. Due to be built at the German company's Canadian subsidiary in Toronto for delivery in 2000, the pig comprises a flexible multi-diameter device about 10 m long and weighing almost five tons. One special feature will be the ability to start inspection in the 28-in. section of the line and then expand to the maximum 42-in. diameter of Asgard Transport. This approach has reportedly not been used before in a major pipeline project. Tests with the pig at Kårstø's K-Lab facility prompted the Asgard licensees to back plans for a simplified 28-in. subsea export riser to tie the pipeline to the Asgard B gas platform, rather than a big seabed unit and a 40-in. line. The chosen solution will provide greater flexibility in both development and operation.



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Shell: A Ram-Powell Update

Shell Exploration & Production Co. and its partners, Amoco Corp. and Exxon Corp., have installed a tension leg platform (TLP) in 3,214 ft. of water. Ram-Powell established a new world's water depth record for an oil and gas production platform — a record previously held by Shell's Mars TLP in 2,940 ft. of water.

"Ram-Powell is our third tension leg platform to be installed in the Gulf of Mexico in a little over three years," said **Rich Pattarozzi**, president and CEO of Shell Deepwater Development Inc. "This is a significant accomplishment of which we are very proud. By applying our learnings from previous deepwater TLP designs, construction and installations, we have been able to continue to reduce the time required to bring these projects on line and to lower total project costs."

Production began in September 1997. Daily production is expected to climb to design capacity of 60,000 barrels of oil and 200 million cubic ft. of gas per day by early 1998. Estimated ultimate recovery from the development is about 250 million barrels of oil equivalent.

Shell is operator of the Ram-Powell project and holds a 38 percent interest in the project. Amoco and Exxon each have a 31 percent interest.

Exploration & Discovery

The Ram-Powell Unit encompasses eight OCS leases in the Viosca Knoll Area, located in the Gulf of Mexico approximately 125 miles east/southeast of New Orleans and approximately 80 miles south of Mobile, Ala. in water depths ranging from 2,000 to 4,000 ft. The leases were acquired for a total bonus of \$16,169,000. Shell is the operator and has a 38 percent interest in the project.

In January 1995 Shell announced the partners' plans to develop Ram-Powell utilizing a tension leg platform (TLP) to be installed on Block 956 in 3,214 ft. of water. Estimated gross recovery from the planned development is about 250 million barrels of oil equivalent, with a 50/50 oil/gas ratio. The total project cost is expected to be approximately \$1

billion, excluding lease costs.

Production began in September 1997, and the facilities are designed for peak gross production of about 60,000 bpd and 200 mil-

lion cu. ft. of natural gas per day. Production from the platform will be transported approximately 25 miles via a 12-in. diameter oil pipeline to Main Pass 289C and a

14-in. gas pipeline to Viosca Knoll 817.

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designed and engineered by a team made up of personnel from Shell, Amoco and Exxon, with support from outside contractors. Completely assembled, the TLP is 3,570 ft. high, from seafloor to the crown block of the drilling rig. The steel weight of the TLP is approxi-

mately 41,000 tons.

The TLP was designed to simultaneously withstand hurricane force waves and winds.

The hull — which weighs approximately 15,000 tons — is comprised of four circular steel columns, 66.5 ft. in diameter and

165 ft. high, and a rectangular cross section ring pontoon 27 ft. wide and 24.5 ft. high.

Fabrication of the hull was completed in October 1996 by Belleli S.p.A. in Taranto, Italy and the hull arrived in the Aker Gulf Marine yard near Corpus Christi,

Texas in November 1996.

The deck is composed of five modules: wellbay, quarters, process, power and drilling.

The deck is an open truss/deep girder design, 245 x 245 x 40 ft. high, and weighs approximately 8,100 tons.

McDermott International, Inc. in Morgan City, La. built the modules. There are 12 tendons, three connected to each corner of the platform, each with a diameter of 28 in. and a wall thickness of 1.2 in. Each tendon is approximately 3,145 ft. long, and the total weight for the 12 tendons is approximately 10,000 tons.

The TLP foundation system is comprised of 12 piles driven into the sea floor to which the tendons are attached by means of tendon receptacles. Aker Gulf Marine built the tendons and piles in Corpus Christi.

There are 20 well slots, and the well layout on the seafloor is arranged in a rectangular pattern approximately 60 x 80 ft. The TLP supports a single modified API platform-type drilling rig (leased) equipped with a surface BOP and high pressure drilling riser. There is complete separation, dehydration and treatment facilities designed to process 60,000 barrels of oil and condensate per day, plus 200 million cu. ft. of gas per day and 30,000 barrels of produced water per day.

The total platform height from the keel bottom to the top of the drilling derrick is 467 ft. and the drilling rig can drill to depths of 19,000 ft. below the sea floor.



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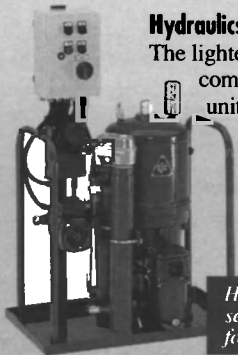
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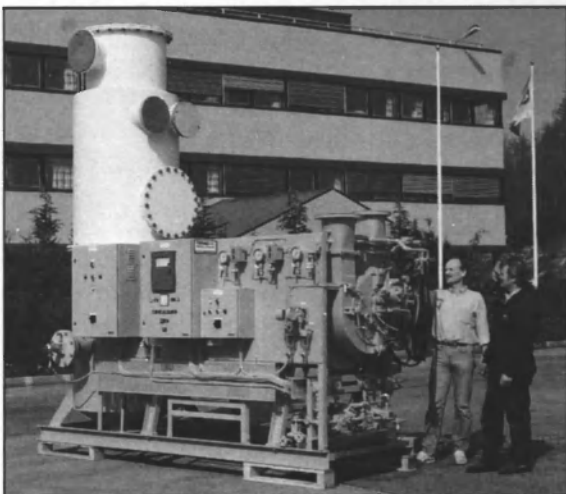


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Applying Arctic Technology in Russia

Each year, Exxon invests more than \$500 million in R&D.

Exxon technology that was first developed for projects in Canada and the Alaskan Arctic is now at work in far eastern Russia. Operations offshore Sakhalin Island can encounter earthquakes and moving ice ridges.

Plans for the Sakhalin I fields include innovative structural designs that can withstand these conditions.

This would make the Sakhalin I area the world's first year-round drilling, production and oil transport system in offshore arctic regions.

Powerful Underwater Survey Vessel To Come On Line

Hugin is a high-precision, untethered seabed topography and inspection system (autonomous underwater vehicle [AUV]) which is designed to be a more reliable system for pipe inspection and laying, as well as hydrographic mapping. (Its name is derived from Norse mythology: Odin, the king of gods, was known for his wisdom and cunning. The ravens, Hugin and Munin, flew around gathering knowledge for him.)

The fact that the unit works without a tether, combined with other technological advances, allows the vessel to work in very deep waters, controlled via acoustics. According to officials at Kongsberg Simrad, which is a major participant in the development project, the prototype vessel currently can operate in depths to 1,968 ft. (600 m), and will eventually be able to work in depths to 6,561 ft. (2,000 m).

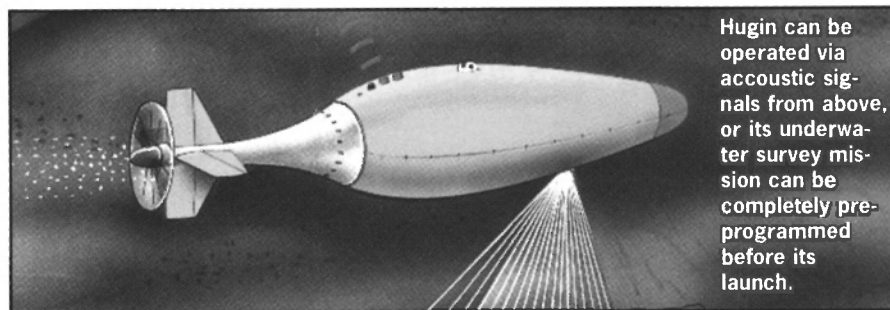
As with many other Norwegian maritime innovations, the development of Hugin is a collaborative effort which includes: the Norwegian Defence Research Establishment; Kongsberg Simrad; Nutec; Statoil; and the Norwegian Industrial and Regional Development Fund.

The streamlined vessel measures 15.7 ft. (4.8 m) long and weighs 700 kg. It features a high, four-knot operational speed at all depths, and it will be outfitted with multibeam echosounder for underwater surveys to depths of 600 m. With the latest battery technology, the unit can work for 36 hours at any depth, and the unit stores complete data sets and transmits real-time summaries to the surface for purposes of quality assurance.

Hugin's advanced systems

allows a complete survey mission to be programmed in advance, or it can be controlled in real time.

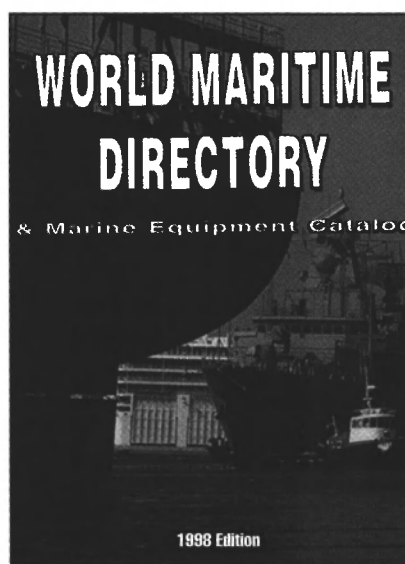
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Hugin can be operated via acoustic signals from above, or its underwater survey mission can be completely pre-programmed before its launch.

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Start To Åsgard B Construction

Construction of the topsides for Statoil's Åsgard B semi-submersible gas platform kicked off as planned on March 2 at the Kværner Rosenberg yard in Stavanger. Due to measure about 328 x 328 ft. (100 x 100 m), the topsides will have a dry weight of roughly 30,000 tons. Construction of the living quarters has begun at Emtunga in Sweden. The B installation is due to start producing gas from the field in the last quarter of 2000.

Offshore Studies CO2 Emission Reductions

A joint industry project organized by the Norwegian Oil Industry Association will be submitting a report on offshore power supplies this summer. The overall

aim is to identify cost-effective ways of reducing carbon dioxide emissions from offshore installations. Statoil is cooperating with Norsk Hydro and Saga. Possibilities being studied include taking electricity from land or from centralized offshore power sta-

tions, reports Vice President **Anne Therese Hestenes** in the production technology unit. Other concepts are an electricity grid in and between offshore regions as well as available technology and the development of new technical solutions. "The end product will be a refer-

ence document for further work on the energy and environmental consequences of different technological approaches," said Ms. **Hestenes**.

Cegelec, Kamewa Team To Supply Propulsion Systems

Sedco Forex (Schlumberger Group) has placed an order with Cegelec and Kamewa for the delivery of Pod propulsion systems for two 6,000 ton semi-submersible vessels. Each vessel will be fitted with four Pod systems, each composed of one 7,000 kW, double-wound synchronous motor at a speed of 144 rpm. The Pods are underwater mountable/demountable, with facilities to replace the propeller blade and seal while underwater.

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GE Gas Turbine Makes Splash In North Sea

The commercial start up of the first Dry Low Emissions (DLE) equipped LM aeroderivative gas turbine in the North Sea recently took place. The GE LM2500 DLE unit was sold, packaged, commissioned and started up by Kvaerner Energy, Oslo. Two DLE gas turbines will replace two non-DLE LM2500s, which were also sold and packaged by Kvaerner Energy. The DLE units will provide mechanical drive service on the Nome FPSO, which is operated by Statoil. The gas-fired LM2500s, which were manufactured at GE Marine & Industrial Engines plant in Evendale, Ohio, provide 31,200 shp at ISO ratings.


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Partnership Forged To Offer Unprecedented Fire Protection

National Foam — which manufactures fire fighting foam concentrates — has joined forces with Boots & Coots International Well Control Inc. to create a comprehensive emergency response package for the hydrocarbon processing industry. Boots & Coots, based in Houston, is a global emergency response company that specializes in responding to and controlling all types of emergencies, both on and offshore, for the oil, gas and petrochemical industries.

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The VOLKS Tank

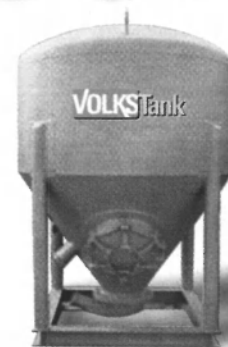
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INTERNATIONAL OFFSHORE TECHNOLOGY

The Second Time Around

Norwegian Maritime Equipment now delivers second-hand, reconditioned equipment for a new, permanent offshore installation.

Kvaerner Oil & Gas recently

ordered used rescue equipment for installation on the Siri Field to be built for Statoil.

The company started offering the second-hand equipment as it noticed growing demand for such equipment.

It cites new certification

schemes for used equipment — one that guarantees the customer high quality, certified according to NS/ISO 9002 with documentation and certificates by DnV — as a major driving force for the second-hand equipment market.

Circle 62 on Reader Service Card

Sagar Vijay Sets Sail After Upgrade

Mobile Offshore Drilling Unit (MODU) *Sagar Vijay* set sail for deepwater drilling operation in Godavari basin. The unit was upgraded at the Cochin Shipyard for Oil and Natural Gas Corp. (ONGC). The vessel arrived at India's Cochin yard for major damage repairs. While laid up, the owner decided to upgrade the capability of the vessel so that it could drill in waters as deep as 2,952 ft.

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Spanish-Built MOT To Get Cegelec Power

Astilleros Espanoles' Puerto Real yard has awarded Cegelec Projects a contract for an electric power and propulsion system for a new multi-purpose tanker (MOT). The vessel combines FPSO, shuttle and drilling capabilities. Cegelec's system engineering will provide all of the main propulsion system equipment, including auxiliary and main generators, HV switchboards, synchroconvertor main propulsion drive, synchroconvertor thruster drives, AC sectional drives and ballast pump and cargo motors. The vessel will be based in the Gulf of Mexico and operated by Statoil, Rasmussen, Smedvig and Navion.

Circle 60 on Reader Service Card

Drilling Deeper While Maintaining Costs

While drilling and well construction operations represent a substantial proportion of offshore field development costs, especially in deepwater areas like the Atlantic Margin, a new joint industry project is investigating a system to help control costs.

Coiled tubing (CT) technology is increasingly seen as a cost-effective means of putting a drill bit in the reservoir, and its capabilities are developing rapidly, particularly on sidetrack and deepening operations.

The U.K.'s Center for Marine and Petroleum Technology has developed a Joint Industry Project which proposes the development of the concept of Drilling Independent of Depth (DIODE), the basis of which is to adapt coiled tubing technology for seabed well construction and intervention operations. The DIODE project is a concept for an entirely new method of drilling and well servicing operations, and has evolved to save costs as well as initiate new thinking about the entire process of how offshore drilling operations are undertaken.

DIODE is perceived as a mobile unit capable of being easily moved from one seabed location to another, with minimal surface facilities and perhaps, ultimately no surface facilities at all. Using remote control technology that is already understood (for example, the man-

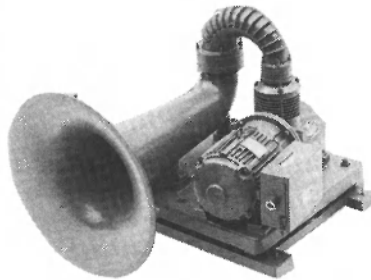
ufacturers of ROVs) the system will be controlled via an umbilical to a surface support vessel. The same umbilical will be used to supply DIODE with power, drilling flu-

ids and other consumables, possibly using the closed loop drilling fluid systems developed for under-balanced drilling.

For further information on

opportunities regarding the project, contact Jane Kennedy of the CMPT at tel: +44 1224 853400; fax: +44 1224 706601; e-mail: j.kennedy@cmpt.co.uk

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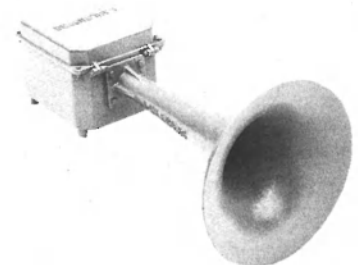
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Model S-203C S-203 CHT

For vessels over 75 meters in length, this design allows both whistles to exceed 143 dB (1/3 octave band). The S-2036 and S-203 CHT are virtually maintenance free. Durability is ensured by the use of bronze and marine aluminum construction materials through out. For the most extreme cold weather operation, Model S-203 CHT (shown) includes a thermostatically controlled, heated enclosure for both the combination manual/electric valve, and the horn sounding body.

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ABS SafeHull Developed For FPSOs

As the Floating Production Storage and Offloading units market continues to grow, so too do the business opportunities for related product and service suppliers. The American Bureau of Shipping has responded to the challenge by developing its advanced SafeHull, dynamic-based design evaluation system for application to FPSOs. Engineers at ABS have extended the SafeHull system so that it can be used to evaluate ship-shaped FPSOs with bow or stern turrets, and for those stationed with spread moorings. It is also available for the assessment of purpose-built designs and FPSO conversions.

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Cooling The Fire

The Norwegian economy is hot — too hot, some say. In an attempt to avoid the pitfalls inherent in an overheated economy, the government has decided to take action, including trimming offshore oil and gas projects.

Norway, which is enjoying one of the best economies in the world, has decided to take unprecedented action in order to maintain a healthy growth for the long term, and avoid some of the economic potholes inherent in an overheated economy.

Specifically, the country's petroleum and energy minister, **Marit Arnstad**, has issued a proposal to delay 12 specific oil and gas projects to dampen offshore activity in Norway. "There are big dangers that the economy will overheat," **Arnstad** reported to the Norwegian parliament, adding that the delays would cool the economy. While some may deem the move unusual, it has received the blessings, at least publicly, of Statoil. Statoil's approval came from executive Vice President **Stig Bergseth** after the government made it clear that it wants to postpone investment in all fields under development from 1998 to 1999.

The Norwegian authorities are reportedly acting because spending estimates for the current year — based on operator plans — total approximately \$8.8 billion — an increase of more than \$1.7 billion.

Given the heavy pressures on the Norwegian economy at present, the centrist coalition takes a serious view of this expansion, and the postponement is designed to significantly reduce capital spending both this year and next. Mr. **Bergseth** said that Statoil as operator and commercial player has also noted pressure on costs and capacity constraints in the supplies industry. "The proposed delay will give us more time to work on costs and find the best solutions. We'll be reducing investment in projects to a minimum during 1998 while seeking to continue building on the planning and tendering work done so far."

Postponements have been proposed by the petroleum ministry for Statoil's Gullfaks satellites phase II, Huldra and Heidrun North as well as Yme Beta West and Epsilon. In addition comes Sygna, which straddles Statoil-operated PL 037 and Saga's PL 089 in the North Sea. Negotiations are under way on a unitized development, and the operatorship will not be clarified until a deal has been struck and the authorities have approved a plan for development and operation. The ministry's proposals also affect Saga's Snorre B, H-Central and Southern Triangle Upper Jurassic (Stuj) pro-

Maritime Reporter/Engineering News

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jects, Hydro's Fram and Grane fields, Amoco's Valhall water injection scheme and BP's Ula Triassic.

Statoil To Inject Life Into Norwegian Northern Sea

Statoil plans to use new technology to improve oil recovery on the Norwegian continental shelf (NCS). As reported in *Maritime Week* (sister publication to *Maritime Reporter & Engineering News*), the company believes the campaign could lift NCS recoverable oil reserves by around five billion barrels by 2005.

"We have set ambitious goals but we believe they are achievable," said **Sigve Haaland**, sector manager of major petroleum technology projects. "In the 1980s people said it was impossible to drill wells at more than 60 degrees (from the vertical), now we're at 90 degrees (horizontal)."

The Norwegian Petroleum Directorate has set a goal for recovery rates of 50 percent for oil and 75 percent for gas, far above typical world rates for oil of between 20 and 40 percent. Mr. **Haaland** said "smart wells" and increased water and gas injection would account for a large part of the gains.

Smart wells include horizontal drilling, which can now extend up to almost 10 km, branched wells — when the well splits into branches producing from different parts of a reservoir, and side-tracking.

The company has reportedly already used branched wells — a technique designed for draining the last drops from mature wells — at the Statfjord and Yme fields and plans to drill one at Gullfaks, three at Statfjord, two at Sleipner West and one at Heidrun in 1998.

Another technique Statoil will apply at Gullfaks, Statfjord and Yme is re-entry, or sidetracking, where coil-tubing is fed into an already-spudded well, which is then drilled out of the well wall and into new areas of the reservoir. One advantage to side-tracking is that it avoids the cost of drilling new wells and revitalizes "dead" wells. It also avoids problems of slot capacity on the platform. Statoil will also attempt to improve reservoir management via remotely-operated wells, which requires installing a "sleeve" in the well, which can be controlled from the platform. The "sleeve" can be opened and closed at different

junctions to maximize flow and drainage from the reservoir.

San Diego Welcomes 1998 SNAME Annual Meeting

The San Diego Concourse will host the Society of Naval Architects

and Marine Engineers (SNAME) 1998 Annual Meeting and International Marine Exposition from November 11-14, 1998. The event includes participation in the Year of the Ocean, as part of the United Nation's year-long effort to raise global awareness of the ocean's role in the world today, as

well as tomorrow. A full conference program and exposition will focus on all aspects of research, design, production, maintenance and operation of ships, submersibles, yachts, boats, offshore and ocean bottom structures, hydrofoils and surface effect ships.

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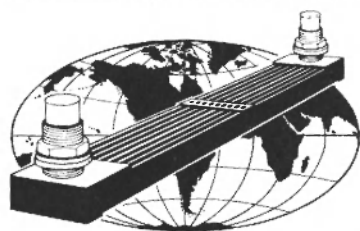


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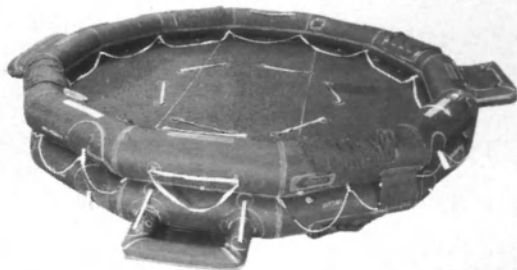
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PROPULSION UPDATE

(Continued from page 40)

Noise Performance Comparison - DDG 51

All GE MRG's are factory-tested by GE to help ensure that performance and noise requirements are met. DDG 51 MRG testing is performed in a back-to-back configuration with hydraulic torque applicers. The test configuration includes the actual shipboard isolation system attached to a test foundation which represents the specified reference foundation. The estimated noise performance of the DDG 51 MRG was obtained by applying adjustment factors to measured noise performance data obtained from GE's extensive noise database. Figure 1 presents the estimated hard-mounted performance of the DDG 51 MRG for one of the specified test points. These estimates were made early in the DDG 51 design phase, and indicated that an isolation system would be required to satisfy the noise criteria. With consideration to the ship mission requirements and the mounting system trade-offs presented in Table 2, a metallic isolation system was selected.

Figure 2 presents estimated DDG 51 foundation vibration levels for the isolated system. Also presented in the figure are the average vibration levels measured directly above and below the isolation system. These curves illustrate that:

Excellent agreement exists between the estimated and measured vibration levels, yielding confidence in the noise estimation process; The isolation system has excellent overall attenuation characteristics; and The average foundation vibration levels measured during factory testing were at least 18 dB below the criteria, with levels of approx. 60 AdB or less throughout the entire frequency range.

Based on these results and extensive experience in the design, manufacture and testing of naval propulsion gearing, GE will produce at minimum program risk the low noise, high power density, operational flexibility, reliability and performance needed to satisfy 21st century Naval ship mission requirements.

The preceding was excerpted from a paper presented by **James J. Luz and Douglas A. Boyle** — both senior engineers — Advanced Gear Technology for GE - Marine Products Department.

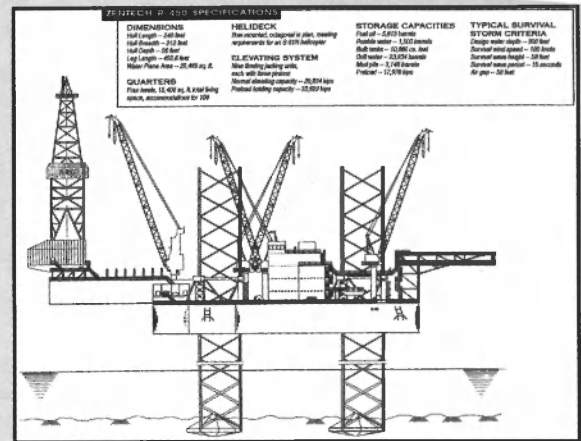
Ingalls To Market Zentech Rig Design

Ingalls Shipbuilding has signed a licensing agreement with Zentech, Inc. under which Ingalls will market Zentech's design for a new, state-of-the-art deepwater jack-up drilling rig.

"This agreement allows Ingalls to market and build rigs of the Zentech R-450 design. We are doing this because we

forecast a market in the construction of new jack-up drilling rigs, and this licensing agreement will give Ingalls a highly competitive design which will immediately improve our position in the market," said **Dave Wright**, vice president, Program Operations.

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OMI To Complete MTL Acquisition; Places Order With Daewoo

U.S. tanker company OMI Corp. expects its planned acquisition of Marine Transport Lines Inc. (MTL) and efforts to spin off its foreign operations to be completed next month. Under the terms of the planned merger, OMI will be spun off to existing shareholders as a subsidiary, owning and operating its non U.S.-flagged shipping fleet. The merged OMI-Marine Transport unit will take on OMI's U.S.-flagged ships and operate under the Marine Transport name. Following completion of the Marine Transport merger, OMI will move its corporate headquarters from New York to Stamford, Conn. In addition, OMI has ordered two 35,000-dwt product carriers from South Korea's Daewoo, which are due for delivery in 1999, and have already been chartered out for two years to unidentified charterers. OMI has also agreed to sell a 1992-built Suezmax tanker and is negotiating to construct a replacement. The company also has four new 156,000 deadweight tankers scheduled for delivery between the summer of 1998 and January 1999.

Canadian Pacific To Acquire Ivarans Lines

Canadian Pacific Ltd. has agreed to acquire the container shipping business of Ivarans Lines from Norway's Ivarans Rederi ASA. Ivarans will become part of its Canadian Pacific's CP Ships unit and is expected to increase the subsidiary's revenue and container volume by 10 percent. Completion of the deal was scheduled for this month. The transaction includes Ivarans services from the U.S. East Coast and U.S. Gulf to the east coast of South America and Central America and the Caribbean, plus a fleet of 10 chartered container ships.

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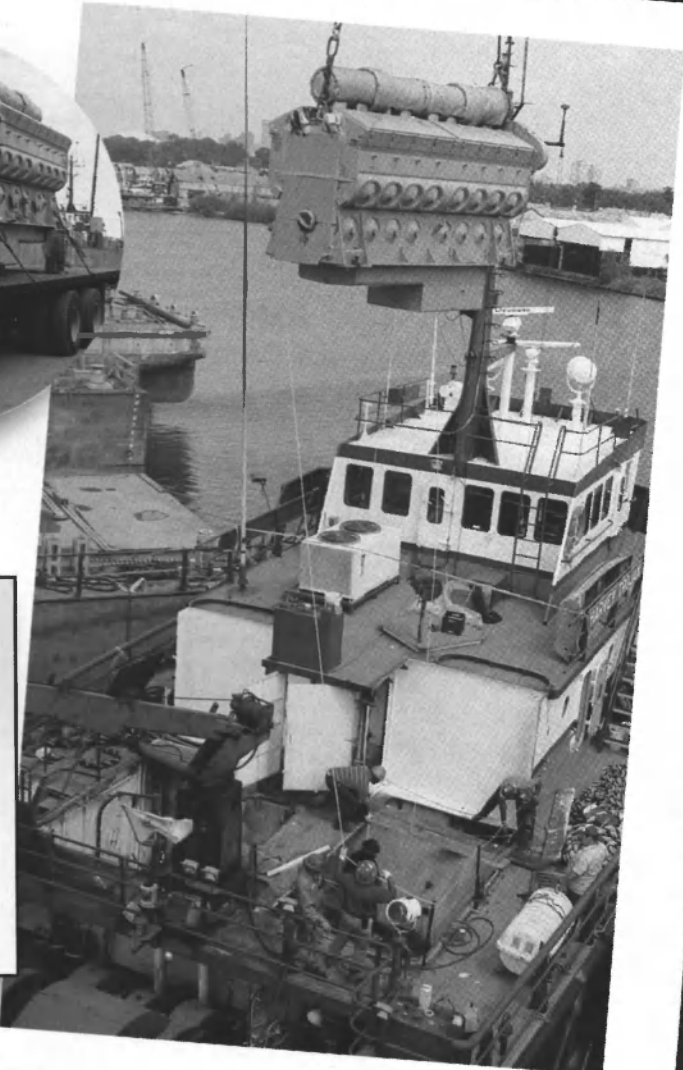
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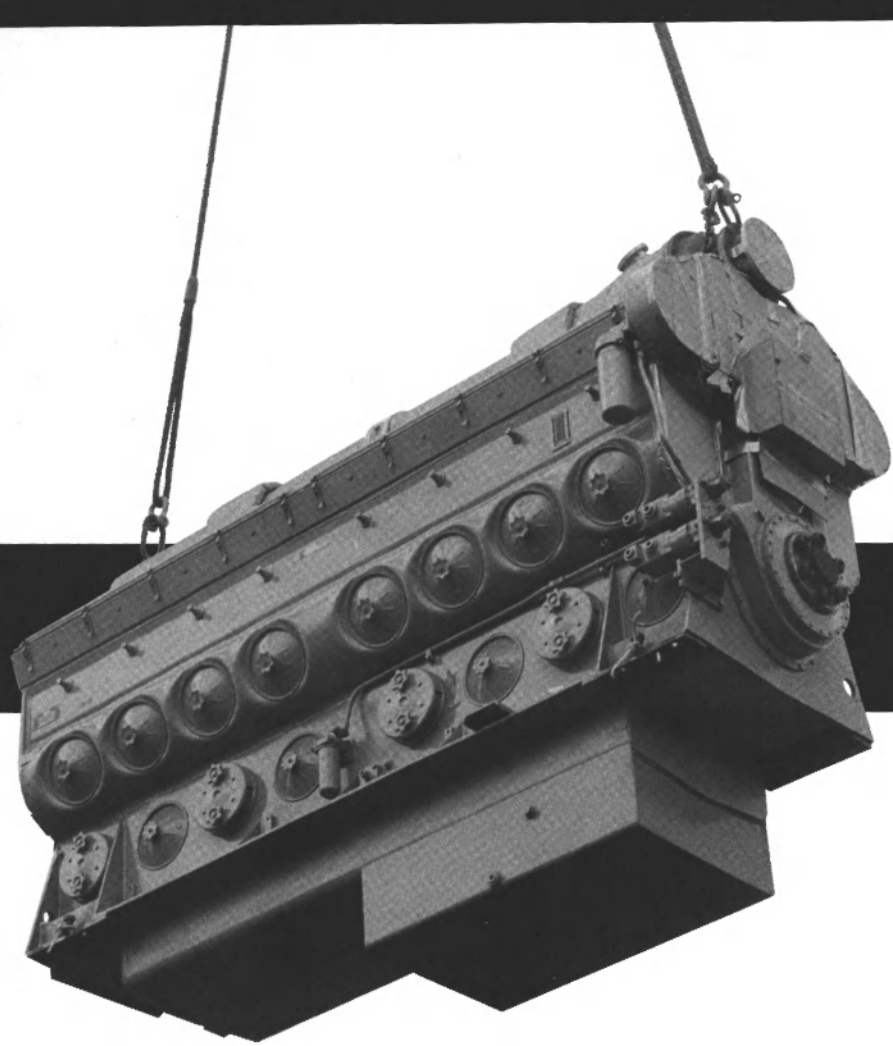
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"Harvey Trojan"

- 126 feet long x 37 feet wide
- Halter Marine, LA, USA
- Built 1976
- Current Owner: Harvey Gulf International Marine, Inc., Harvey, Louisiana, USA





The Harvey Trojan

was built by Halter Marine in 1976 under another name, and was originally powered by two 2400 HP German engines, until business and equipment problems laid her up.

Purchased by Harvey Gulf Marine of Louisiana in 1985, she was repowered with a pair of Dutch Stork Workspoor (now Wartsila) 2160 HP engines. She worked for 12 years until a crankshaft failed. The price for a replacement crank? **Over \$250,000.**

Harvey Gulf decided to repower her, selecting a pair of remanufactured Electro-Motive Division of General Motors (EMD) sixteen cylinder engines from Stewart & Stevenson. EMD is by far *the* engine of choice for tugs and push-boats in this horsepower class. S&S delivered the replacement engines in less than 4 weeks. With her two 3070 HP engines, the tug pulled a whopping 127 tons bollard pull in her ABS certification tests.

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ECDIS

Breaking New Ground; Creating New Opportunities



The ECHO project has developed a seamless system to create and deliver top quality ENC's quickly and cost-effectively using standard shipboard communication systems.

The Finnish icebreaker *Fennica* is the testbed for the ECHO project, an initiative to develop and deliver a commercially viable ECDIS system. The photo was taken during an icebreaking cruise — on which MR/EN was invited to participate — in late February in the Northern Gulf of Bothnia to demonstrate the system.

by Greg Trauthwein, editorial director

The advancement of electronic solutions to traditional maritime problems has, without dispute, picked up speed considerably in recent years. Driven directly by advances in computer and communications technology — particularly in regard to speed — the level of immediate information available to ship and shoreside personnel is unprecedented, and guaranteed to grow.

While this “technological transition” of the maritime world has been fostered and pushed by a horde of interested organizations and manufacturers, shipping companies seeking the obvious benefits of these new products and processes must proceed with caution, in order to ensure that a solid foundation of training and information infrastructure is laid from the start. If not, the crush of new information will quickly inundate and confuse, resulting in the reverse of the intended effect.

Electronic Charts: Plotting the Future of Maritime Navigation

The advent of electronic charts is one of the true revolutions sweeping the maritime world at the moment. (To keep things in perspective, and to

illustrate the conservatism of the market, “sweeping” for the maritime world means under development for the last six years!).

While the prevailing thought may be “why replace/supplement paper charts ... they’ve worked fine for years?,” there are many compelling arguments for a dual or electronic-only system, the lead among them being increased safety of vessel and crew. Electronic charting, whether raster or vector data-based, allows the crew to chart the safest, most fuel-efficient course based on the latest data available.



The small chemical carrier which *Fennica* was escorting out of the port of Oulu became stuck in the ice in the wee hours of the morning. *Fennica*, utilizing its unique hull and 15,000 kW propulsion system (consisting of Wartsila, ABB and Aquamaster Rauma equipment) quickly helped the tanker out of the jam.

Users of the systems have largely credited them with helping to save time and money, precious commodities to any vessel owner/operator.

A perfect example of how electronic charting can boost the bottom line is the U.S. Electronic Navigational Chart program at the U.S. National Oceanic and Atmospheric Administration (NOAA).

NOAA has undertaken an ambitious program to create a digital, vector database of nautical chart features. The database will be used to create Electronic Navigational Charts (ENC) for use in Electronic Chart Display and Information Systems (ECDIS) in 38 major U.S. commercial ports. The ENC data will be provided to the International Hydrographic Organization (IHO) Transfer Standard for Digital Hydrographic Data, Publication S-57, Version 3.0 format, which will allow U.S. ENC's to be used in commercially available ECDIS systems meeting IMO standards.

According to NOAA's **Howard P. Danley**, the organization went back to original sources and surveys in devising its vector charts. He said charts are currently under development for a major lock on the St. Marys River (and

indicated that information on all 38 ports is scheduled to be on-line by next year). Mr. Danley said ECDIS will prove invaluable in keeping the shipping lanes open, pointing out that when visibility is traditionally poor around the Great Lakes during the autumn, an ECDIS system can be used to successfully navigate through the bad weather and through the locks.

One test data set has been provided to the Lake Carriers Association in the Great Lakes. The data set covers the St. Marys River from DeTour Passage to Sault Ste. Marie, and will be used this spring by lake carriers transiting the St. Marys River.

ECDIS: Setting the Standard

While there are many valuable electronic charting products and systems available to the market, ECDIS is the only system which will allow for the complete replacement of paper charts, thus elimi-

nating a costly and time-consuming chore. Of all of the electronic systems available, ECDIS is widely considered the most advanced, and hence, costliest. For a system to have the designation of ECDIS, it must fulfill all of the requirements laid down by the IMO's

"IMO Performance Standards for ECDIS."

To date, the Electronic Chart Display and Information System (ECDIS) is the only type of electronic charting system approved by the International Maritime Organization (IMO) for the

replacement of paper charts, which is an important distinction. (Final approval is due in the spring by IMO and IHO of S57, version 3.0; equipment type approvals are expected in the fall).

(Continued on page 62)

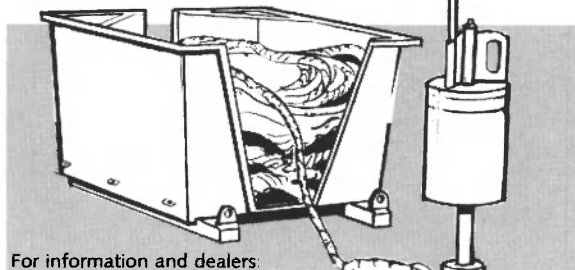
Terms

ECDIS	Electronic Chart Display and Information System
ECHO	European Chart Hub Operations
RCDS	Raster Chart Display System
GRT	Gross Registered Tonnage
GPS	Global Positioning System
DGPS	Differential Global Positioning System
IHO	International Hydrographic Organization
S57	IHO's transfer standard for digital hydrographic data
DX90	Exchange format for S57
IEC	International Electrotechnical Committee
IMO	International Maritime Organization
SOLAS	International Convention of the Safety of Life at Sea
ARCS	Admiralty Raster Chart Service
RENC Regional	Electronic Navigational Chart Coordinating Center

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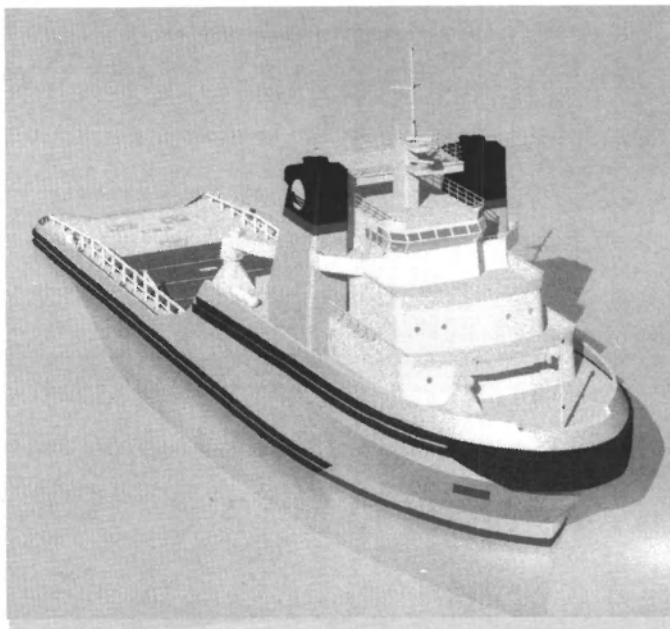
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International Standards for ECDIS: Current Status

IMO Performance Standards
Performance Standards for ECDIS were formally adopted by the International Maritime

Organization (IMO) on November 23, 1995 and issued as IMO Resolution A19/Res.817. These Performance Standards are the

same as those first approved in draft form by the Maritime Safety Committee of IMO in May 1994. Back-up arrangements for ECDIS

were adopted by IMO in November 1996 and became Appendix 6 to the Performance Standards. The IMO Performance Standards permit National Maritime Safety Administrations to consider ECDIS as the legal equivalent to the charts required by regulation V/20 of the 1974 SOLAS Convention. IMO has specifically requested that Member Governments have their National Hydrographic Offices produce electronic navigational charts (ENCs) and the associated updating service as soon as possible, and to ensure that manufacturers conform to the performance standards when designing and producing ECDIS.

IHO Data Standards and Display Specifications

In conjunction with the IMO Performance Standards for ECDIS, the International Hydrographic Organization (IHO) developed technical standards for the digital data format and display. IHO Special Publication 52 (IHO S-52) is the IHO Specification for Chart Content and Display of ECDIS.

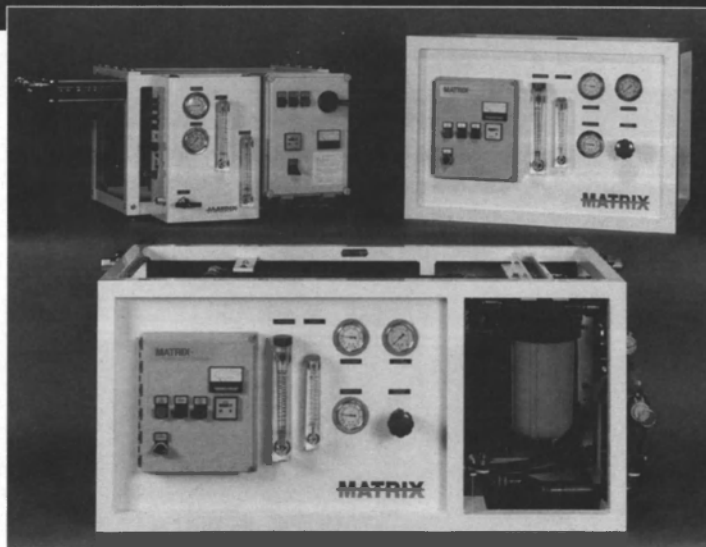
It includes appendices describing the means/process for updating, color and symbol specifications, and a glossary of ECDIS-related terms. The fourth edition of IHO S-52 was issued in December 1996. IHO Special Publication 57 (IHO S-57) is the IHO Transfer Standard for Digital Hydrographic Data that was formally adopted as the official IHO standard at the XIV International Hydrographic Conference, Monaco, May 4-15, 1992. It includes an object catalog, DX-90 format, an ENC Product Specification, and ENC updating profile. The current edition (Edition 3.0) was released in November 1996, and will be "frozen" for three years. Both IHO S-57 and S-52 are specified in the IMO Performance Standards for ECDIS.

IEC Testing Standards

The International Electrotechnical Commission (IEC) developed an ECDIS Performance Standard that identifies and describes the necessary performance tests and checks for

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an IMO-compliant ECDIS. In September 1997, a Draft IEC publication was completed based on comments received during a six-month review period. Upon formal adoption by IEC (likely to occur sometime this month), IEC Publication 61174 will become the basis for type-approval specifications related to operational methods of testing and required test results for an IMO-compliant ECDIS.

Other Electronic Chart-Related Standards

In 1996, IMO requested that the IMO/IHO Harmonization Group on ECDIS (HGE) study two additional matters related to electronic charts:

- 1) Performance Standards for Raster Chart Display Systems (RCDS)
- 2) Guidelines for non-equivalent Electronic Chart Systems (ECS)

Draft Recommendations on Performance Standards for RCDS and Draft Guidelines for Electronic Chart Systems were developed in September 1997. Depending on the results of further refinements, these documents will likely be submitted to IMO for consideration at the IMO Sub-Committee on Safety of Navigation meeting in July 1998. HGE has also prepared a Draft IMO Safety of Navigation (SN) Circular that advises mariners on the "Differences Between RCDS and ECDIS."

Model ECDIS Training Course

A standardized, international ECDIS Training Course for Mariners was developed in December 1997 by the Institute of Ship Operation, Sea Transport and Simulation (ISSUS) in Hamburg, Germany.

The primary objective is to ensure proper use and operation of ECDIS in terms of a thorough understanding and appreciation of its capabilities and limitations. As presently envisioned, the proposed one-week course includes classroom lecture, hands-on training, and exercise scenarios in a bridge simulator facility.

Germany intends to submit the Course Syllabus to IMO for consideration by the Committee on

Standards for Training, Certification and Watch-keeping (STCW) and to the Sub-Committee on Safety of Navigation that will meet in July 1998.

The preceding was excerpted from a paper presented by Dr. Lee Alexander, the Technical Advisor for Offshore Systems International. He regularly attends IMO meet-

ings, and serves as secretary to the IMO/IHO HGE and is chairman of the IEC Working Group that developed the IEC Testing Standards for ECDIS.

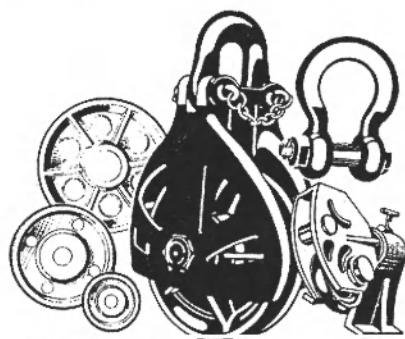
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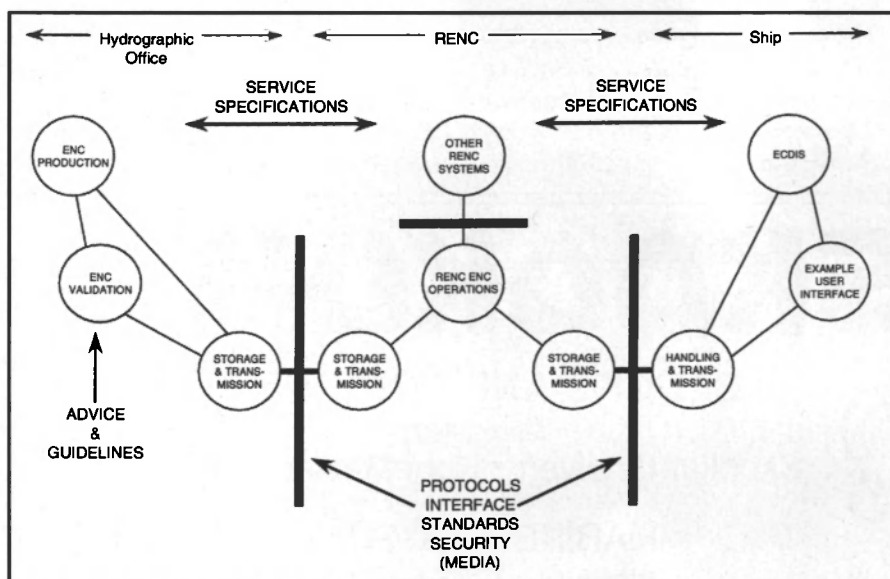
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ECHO Prototype System



(Continued from page 59)

A leader in developing the international standard for ECDIS has been the consortium of companies and organizations which comprise the ECHO (European Chart Hub Operations) project. The 23-month, 3.3 million ECU ECHO project began in April 1996 with the aim of producing a prototype commercial service for the storage and distribution of ENCs. Led by Norway's Electronic Chart Center (ECC), the project is partially funded by the EU and includes many international organizations and manufacturers, including the Finnish Maritime Administration, Sysdeco Dikas AS, ASPO, Telenor, the U.K. Hydrographic Office, Inmarsat, IONA Technologies, Norway's Electronic Chart Center and Sintef.

While the technical specifications surrounding the ECHO project consume volumes, the main thrust of the project revolves around the timely, efficient and

cost-effective creation, distribution and use of the ENCs. Crucial to the project's commercial prospects is the ability of an owner/operator — onboard the vessel or shoreside — to easily update a given chart using high-speed data links. The ECHO project has addressed this need with a streamlined system of getting new and updated charts funneled quickly to the user, while maintaining the highest level of security and data integrity (please see graphic above).

Within the ECHO system, Hydrographic Offices (HOs) are providers of verified ENC data (both charts and updates) to the central Regional Electronic Navigational Chart Coordinating Center (RENC). For the ECHO project, the ECC in Stavanger, Norway, served as the RENC.

Typically, the users will be ships at sea, and the transmission interface will be directly to their ECDIS equipment. However, users could be shore-based installations, such as ship operators or agents.

For communications between the HO and the RENC, the project elected to standardize on ISDN using the TCP/IP protocol. Distribution of large masses of data will be taken care of using CDs. To get the information from the RENC to the end user, the transmission methods using the TCP/IP protocol will be: Inmarsat B high speed option; GSM; and ISDN (for shipowners or ships in port).

The project has decided not to use the Internet for ENC transmission because of current technology and security deficiencies. However, ongoing investigations will continue to evaluate this mode of delivery.

While the members of the

ECHO project obviously have their own commercial agendas regarding the development and use of the resultant system, it is worthy to note that the driving force guiding the team through the last two years has been the mandate set down by IMO to advance safety at sea. The system was tested and continues to be refined aboard the Finnish icebreaker *Fennica*, which operates in some of the more rigorous maritime conditions in existence — breaking ice between Finland and Sweden in the winter, laying pipelines in the North Sea the remainder of the year. Also, Scandinavians (which represent the majority of the team) have a great reverence for the sea and maritime matters. The guidelines, standards and recommendations will be collected in two handbooks, one for HOs and one for ECDIS equipment manufacturers.

Magellan Innovates Chartplotter

Magellan's NAV 6500 chartplotter with C-MAP NT electronic sea chart technology has been updated with a new AllView 12 GPS feature, which tracks 12 satellites simultaneously. The new chartplotter reportedly offers mariners the fastest chartplotting experience available. Dual processors that allow two cartridges to be accessed at the same time now are standard for more rapid drawing. Up to 500 user-defined waypoints, 25 reversible routes with 50 legs each can be stored in its internal memory. Descriptions of up to 20 characters can be added for more easily recognizable routes. NAV 6500 comes with a high-resolution, four-level, gray scale in a 4.75 x 3.5-in., glare-free screen.

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Hydrographic Offices Sponsoring Conference

The Hydrographic Offices of the Maritime and Port Authority (MPA) of Singapore and the U.K. are jointly organizing an International ECDIS (Electronic Chart Display and Information System) Conference to promote the use of official data within the ECDIS.

The conference in Singapore is scheduled from October 26 to 28, 1998.

For more information, e-mail: iec98@mpa.gov.sg.

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Nautical Software Launches New Product

The ChartView Planner from Nautical Software offers many features such as PerfectaView, which allows for easy viewing of the electronic charts and is useful while the charts are in the zoom out mode. The ChartView Planner also gives access to one full year of past tide and current data. An estimated time of arrival (ETA) calculator installed within the system allows for tidal current strengths and direction while assessing the vessels' ETA.

There are unlimited chart rotation capabilities, a float planner and 100 planning and index cards. This ECDIS comes with a transfer wizard which can be used to uplink data to a GPS receiver and then it can be downloaded as information pertaining to positions and routes recently taken, which will appear on the users interface in their own newly created charts. Nautical Software's Planner will reportedly print out these new electronic charts and data with high quality resolution.

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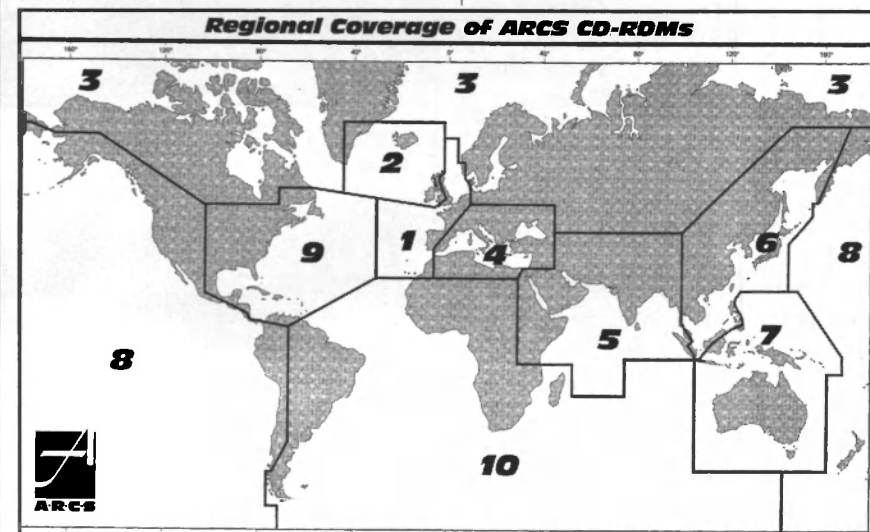
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NOAA 1116A	1: 458,598	Mississippi River to Galveston (Offshore Mineral Leasing Areas)
NOAA 1116A	1: 458,598	Mississippi River to Galveston (Offshore Mineral Leasing Areas)
NOAA 1117A	1: 460,732	Galveston to Rio Grande (Offshore Mineral Leasing Areas)

C-Map has set the pace in electronic chart development. Pictured is a sample of the company's Gulf of Mexico coverage chart.



The U.K. Hydrographic office provides vast coverage with its Admiralty Charts on CD ROM. ARCS provides weekly Notices to Mariners corrections which are supplied on Updated CDs.

ECDIS Training Offered To Shipowners

The first of this year's series of six-day BRM-ECDIS training courses, given by Marine Safety International (MSI), was recently completed.

The 12-person course combined detailed instruction and practice with the Transas ECDIS system with classroom seminars and simulator exercises in Bridge Resource Management (BRM). The second opportunity for mariners this year will be to utilize both Transas and OSL ECDIS units in the classroom and later on simulator bridges.

MSI also offers training expeditions available for shipowners, masters and mates. A shiphandling and seaway pilotage course was given in March and last month an Engine room Resource Management (ERM) course was offered to engineers. MSI and the Georgian College in Owen Sound are working together to develop a more inclusive five-day ERM course for the Canadian Marine Industry. These courses, held in Ontario, are intended for both Canadian and U.S. Coast Guard officers.

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Raytheon Releases FLIR For Night Vision

Raytheon Systems Co. has made available forward looking infrared (FLIR) technology for mariners. Typical detection of a human-sized object with the thermal vision equipment is 2,400 ft. (730 m), while larger objects such as ships can be visible at far greater distances.

The system can be mounted on the roof of a vessel and comes with a wiper and a de-icer. Raytheon's Nightsight family of thermal vision equipment offers two FLIRs for marine applications. M200 is most suited for mobile and marine vessel mounted search-and-rescue operations and navigation, while the 1000 series offers portability and ease of use for long-range detections.

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Raytheon Introduces Pathfinder Radars

Raytheon Marine has introduced a series of radars for the commercial high-seas market.

The Pathfinder/ST MK2 radar represents newly developed antennas and a low-noise logarithmic receiver with a dynamic range of 130 db, as well as multi-band transceivers with 25 kW power output in X-Band and 30 kW power in the S-Band.

The X-Band can be used with seven, nine and 12-ft. antennas, while the S-Band comes with a 12-ft. antenna.

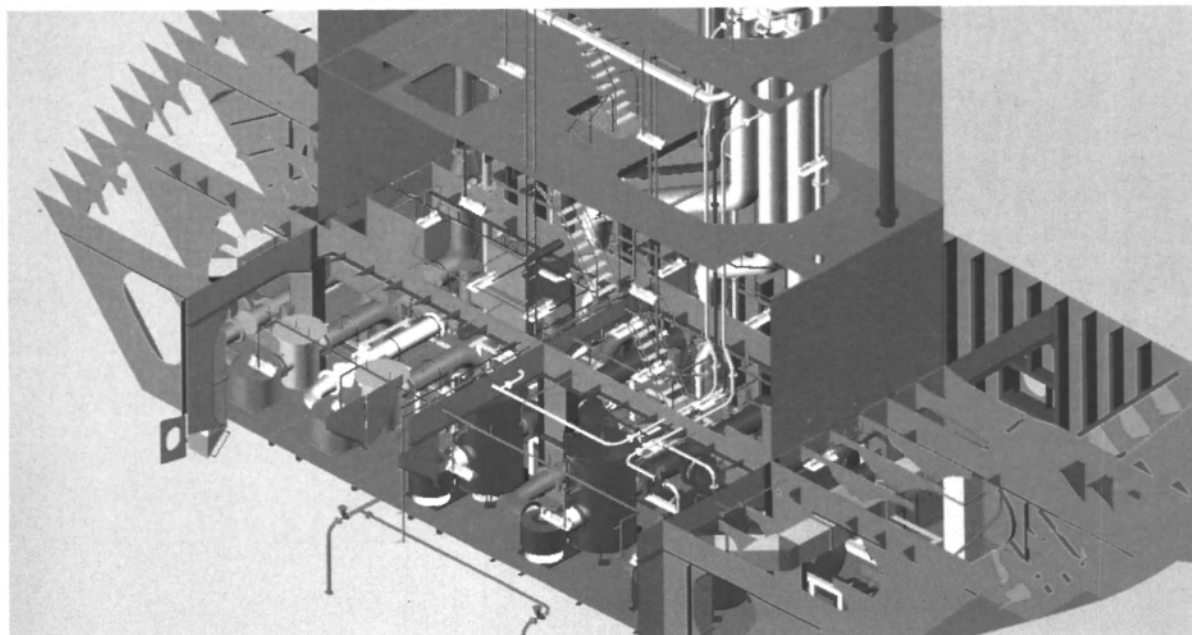
All systems are available in the up-mast and down-mast versions. The Pathfinder/ST MK2 ATA automatically tracks 15 close targets

and has the capacity to track up to 40 targets at a time. Interswitching of display screens allows the user to view up to four screens in rapid succession. The system is Ethernet compatible for network use.

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Radisson, V. Ships To Build Cruise Ship

Radisson Seven Seas Cruises has finalized a joint venture agreement with V. Ships to build a 490-passenger luxury cruise ship at an estimated cost of \$200 million, and scheduled for delivery in July 1999. The new build contract has been awarded to the T. Mariotti shipyard in Genoa, Italy, where the new vessel is under construction. Radisson will charter and operate the ship as part of its five-vessel fleet and has hired V. Ships as the vessel's technical manager.

Carnival To Order Two Cruise Ships

Carnival Corp. plans to announce orders for two new ships at a combined cost of about \$750 million for its Holland America line, according to CFO Gerald Cahill.

The Holland America ships will be of a new type for Carnival, which is building some \$4.4 billion worth of ships for delivery to its various cruise lines over the next several years.

Alstom Nabs Contract For Four Luxury Liners

Anglo-French GEC Alstom has won an order from Royal Caribbean Cruises Ltd (RCCL) for up to four luxury liners worth over \$300 million per ship. Two of the liners to be built in western France are firm orders and the other two are options.

The 965-ft. (294-m) Millennium class vessels, each of 85,000 tons, will be the largest cruise ships ever built in France. Designed with 975 cabins, the ships will be delivered by GEC Alstom subsidiary Chantiers de l'Atlantique between 2000 and 2002.

In addition to the maximum of four ships ordered in France, the Miami-based cruise firm has ordered up to two at Meyer Werft in Germany and a further vessel at Kvaerner Masa-Yards in Finland.

Kirby Sells Tankers And Harbor Service

In accordance with a definitive purchase agreement dated January 28, 1998, Kirby Corp. has completed the sale of two of its U.S. flag tankers and harbor service operations to Hvide Marine Corp., and five tankers to an affiliate of August Trading Inc. for a combined price of \$38.6 million in cash.

Proceeds from the sale of the tanker and harbor service operations will be used to partially fund Kirby's recently announced Dutch Auction tender offer to repurchase up to 3,000,000 shares of Kirby common stock.

Laminaria FPSO Ready For Fitting-Out

Kvaerner ASA reported the hull of the floating production, storage and offloading vessel (FPSO) for the Laminaria oilfield offshore

Maritime Reporter/Engineering News

Mooring Master Ropes.



Mooring Master D-7: Braided core strength members produced from Dyneema® fiber covered by a braided nylon chafe protection cover. This product floats and has strengths higher than wire rope while being flexible and hand spliceable. The lowest stretch, highest strength floating rope.

MOORING MASTER D-7					
SIZE (Dia.)		WEIGHT		AVERAGE STRENGTH	
Inch	mm	Lbs/100 Ft.	Kg/100M	Lbs	Kg
1"	24	19.30	28.72	112,600	51,075
1-1/8"	28	24.18	35.98	140,800	63,867
1-1/4"	30	28.88	42.98	169,000	76,658
1-1/2"	36	38.65	57.52	225,300	102,196
1-5/8"	40	43.51	64.75	253,400	114,942
1-3/4"	44	50.67	75.41	295,600	134,084
1-7/8"	45	59.21	88.12	344,900	156,447
2"	48	67.61	100.62	394,200	178,809
2-1/8"	52	76.08	113.22	443,500	201,172
2-1/4"	56	86.93	129.37	506,800	229,884
2-3/8"	57	96.64	143.82	563,100	255,422
2-1/2"	60	106.26	158.14	619,500	281,005
2-5/8"	64	115.96	172.57	675,800	306,543
2-3/4"	68	126.82	188.73	739,100	335,256
2-7/8"	69	137.68	204.90	802,500	364,014
3"	72	152.23	226.55	886,900	402,298



Mooring Master P-7: High tenacity polyester fiber is used for the seven braided strength cores as well as the braided chafe protection cover. Its extremely high strength allows down-sizing from standard polyester constructions thereby minimizing weight; it also provides an excellent deep water mooring profile or higher shock mitigation than high molecular weight polyethylene ropes.

MOORING MASTER P-7					
SIZE (Dia.)		WEIGHT		AVERAGE STRENGTH	
Inch	mm	Lbs/100 Ft.	Kg/100M	Lbs	Kg
1-1/2"	36	54.82	81.58	100,580	45,623
1-5/8"	40	63.91	95.11	117,340	53,225
1-3/4"	44	74.46	110.81	136,900	62,098
1-7/8"	45	85.09	126.63	156,460	70,970
2"	48	91.25	135.80	167,630	76,037
2-1/8"	52	109.42	162.84	201,160	91,246
2-1/4"	56	123.12	183.23	226,300	102,650
2-3/8"	57	136.91	203.75	251,450	114,058
2-1/2"	60	152.08	226.33	279,380	126,727
2-5/8"	64	167.24	248.89	307,320	139,400
2-3/4"	68	182.49	271.58	335,260	152,074
2-7/8"	69	197.74	294.28	363,200	164,748
3"	72	216.68	322.46	398,120	180,587
4"	96	460.00	684.57	620,000	281,232
5"	120	611.80	910.48	1,021,900	463,534
5-1/4"	128	696.60	1,036.68	1,165,780	528,798
5-1/2"	136	774.50	1,152.61	1,294,480	587,176
6"	144	883.10	1,314.23	1,475,980	669,505
6-5/8"	160	1,086.10	1,616.33	1,816,760	824,082
7"	168	1,195.80	1,779.59	1,998,260	906,411
7-3/8"	176	1,303.80	1,940.32	2,179,980	988,839
7-5/8"	184	1,426.80	2,123.36	2,384,360	1,081,546
8"	192	1,546.60	2,301.65	2,588,740	1,174,252



Mooring Master N-7: Seven braided nylon cores contained within a braided nylon chafe protection cover. Designed for use in offshore applications requiring an energy absorbing capability, such as single point mooring.

MOORING MASTER N-7					
SIZE (Dia.)		WEIGHT		MINIMUM STRENGTH	
Inch	mm	Lbs/100 Ft.	Kg/100M	Lbs	Kg
4"	96	423.48	630.22	551,124	249,990
4-1/4"	104	489.36	728.27	636,854	288,877
4-5/8"	112	571.62	850.68	744,017	337,484
5"	120	649.22	966.17	845,057	383,318
5-1/4"	128	722.88	1,075.79	964,467	437,482
5-1/2"	136	846.86	1,260.30	1,102,248	499,980
6"	144	952.73	1,414.85	1,240,029	562,877
6-3/8"	152	1,048.08	1,559.75	1,364,032	618,725
6-5/8"	160	1,164.47	1,732.77	1,513,391	687,472
7"	168	1,280.95	1,906.31	1,667,150	756,219

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The rope construction consists of seven braided core strength members contained within a thick, durable, braided chafe protection cover. The braids contained in a braid create cross-sectional firmness but allow good bending flexibility. The Mooring Master construction lets the strength cores do their work without being exposed to external wear surfaces.

All Mooring Master ropes are hand spliceable and all stated strengths are for spliced ropes.

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Australia has been floated 12 days ahead of schedule. The hull of the FPSO was floated on February 23 from the Samsung shipyard in Korea. It is currently ready for installation of production and process facilities in Singapore and Perth, Australia. The ship is scheduled for delivery in August 1999, when it will operate on the Laminaria and Corallina fields off

western Australia for Woodside Offshore Petroleum Pty Ltd.

Daewoo Wins \$100M Warship Order

Daewoo Corp. has won a \$100 million contract from the government of Bangladesh to build a frigate warship. Daewoo Heavy

Industries Ltd., which also signed the contract, will be responsible for building the ship. The ship will reportedly be a 2,300-dwt frigate built in South Korea for export.

Protexa Wins Contracts

Mexican builder Protexa SA de CV affiliate Condux won a public

auction for a \$104 million contract to build offshore platforms for oil monopoly Petroleos Mexicanos (Pemex). According to the builder, the time period for the construction will be 656 calendar days, and the amount of the contract is for \$104 million. The construction will take place in the Campeche Sound, about 100 km from Ciudad del Carmen in the Gulf of Mexico.

New Company Aims To Reduce Bottom Line Costs

A new company has been established in Houston, dedicated to reduction of bottom line costs of internal combustion engines and hydraulic systems through state-of-the-art lubricant filtration. According to the new company, dubbed Engine Technologies, Ltd., engine and hydraulic oils and their associated costs can be reduced by 35 to 65 percent, and the company's filtration system can reportedly reduce oil purchases by up to 90 percent.

Circle 97 on Reader Service Card

3.MAJ Appoints New GM

Sanjin Kajba has been appointed general manager of 3.MAJ shipyard. Mr. Kajba joined the company in 1972, and has since then gathered much experience in ship fitting-out operations.

SSC To Sponsor Fatigue And Fracture Course

The Ship Structure Committee (SSC) will sponsor a four-day course on Fatigue and Fracture Analysis of Ship Structures, to be held at the Management Education Center at Michigan State University from August 18-21, 1998. Quantitative fatigue and fracture assessment procedures to make safe and cost effective decisions in ship design, material specification and in-service maintenance have been developed in recent years as part of many SSC projects. This course will tie together the findings of these projects in order to allow practicing naval architects and engineers responsible for maintenance and safety decisions and for design optimization to benefit from the findings and to put them into practical use.

Course details can be obtained from Karen Scrimshaw, tel: (613) 592-2830, ext. 230; fax: (613) 592-4950; e-mail: ffeet@fleetch.com.

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It Is Big

Virtual Ocean Simulates Action of World's Largest Floating Structure

Engineers working on a project for the U.S. Navy at an advanced simulation-based design center are using a mathematical "virtual ocean" to test a computer-generated prototype of the largest floating structure ever envisioned: A self-propelled military base bigger than 10 aircraft carriers.

Consisting of five separate modules joined by a series of hinged connectors, the proposed mobile offshore base (MOB) would provide the U.S. with a mobile, sea-based alternative to fixed landbases on foreign soil. Operating on high seas, it would partially submerge when on location, providing a stable platform for launching and logistical support of troop deployments, command and control operations and humanitarian efforts such as disaster relief and evacuation.

Over a mile long, the structure has a width of 500 ft. (153 m) and a height of 250 ft. (73 m) and includes a runway long enough to land fully loaded C-130 and C-17 cargo planes, interior quarters for up to 20,000 troops and 85 acres of storage space for up to 150 aircraft, 5,000 cargo containers and 3,500 trucks, tanks and other vehicles.

Studies of the feasibility of the MOB are being performed by McDermott Technology Inc., a supplier and operator of semi-submersible vessels for the offshore oil industry. Simulations, visualiza-

tions and analyses for these studies are being performed at the simulation-based design office of the Gulf Coast Regional Maritime Technology Center established by the University of New Orleans in cooperation with the office of Naval Research.

Because construction of such a large, complex structure has never been attempted before, engineers at the Technology Center are using computer simulation to determine how the MOB will operate in various sea states. Given its primary mission of logistical supply, operations of the MOB's cargo systems are of particular interest, especially during heavy wave action which could limit the ability to transfer cargo to and from adjacent supply ships.

As cargo ships react to wave action differently than the comparatively stable MOB, knowledge of their relative motion is critical in determining if cranes on the MOB can lift cargo containers from the ships without too much swaying. This information is also integral in determining if vehicles can be driven safely over ramps between ships and the MOB.

Using ADAMS mechanical simulation software from Mechanical Dynamics Inc., engineers verified that these operations could be performed normally during Sea State four, corresponding to significant wave heights of up to six ft. Simulations also revealed that the

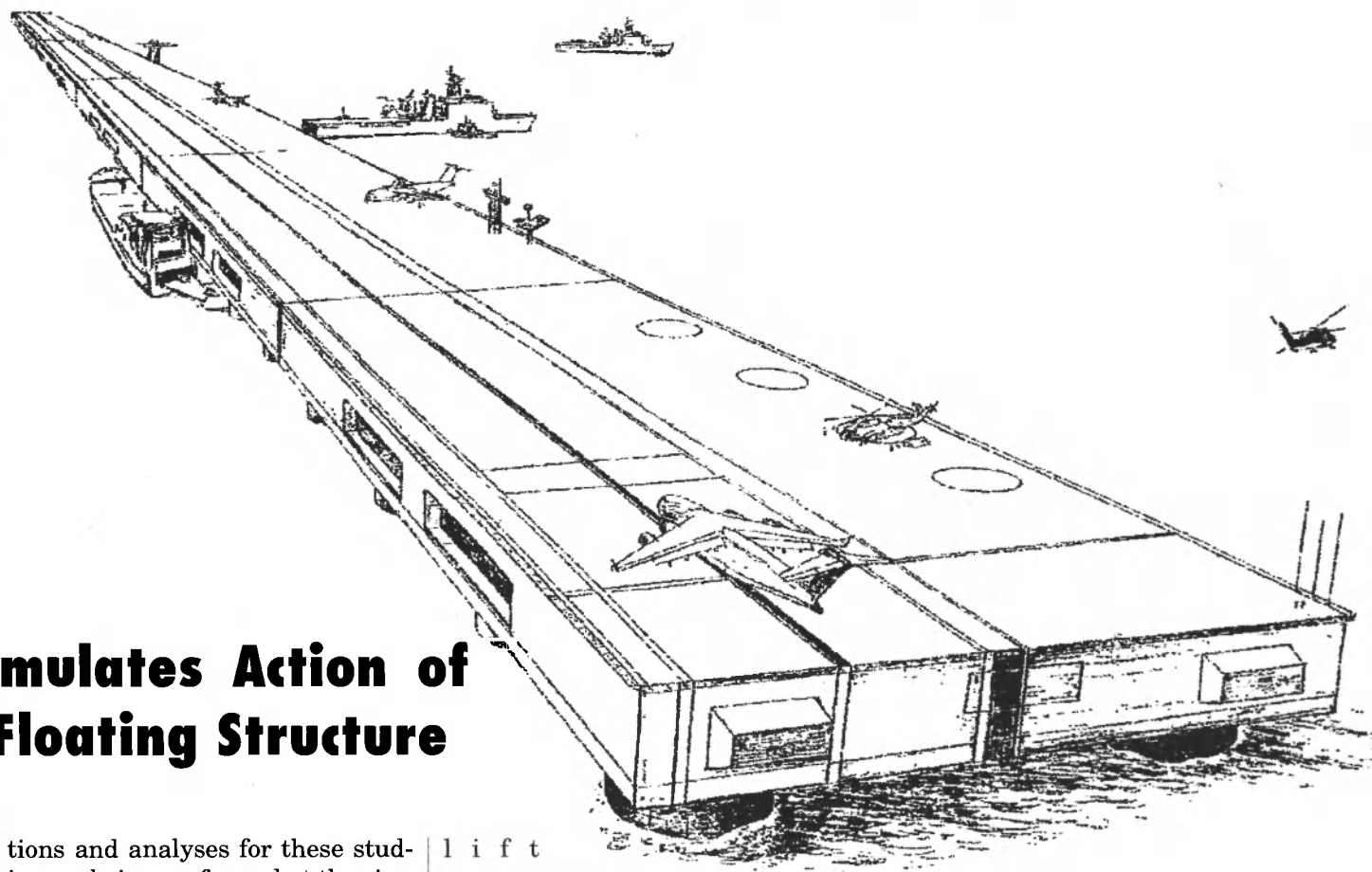
lift cranes could continue to move cargo in the nine-ft. waves of Sea State five.

According to **Dave Johnson**, coordinator of Digital Media at the Technology Center, computer simulation was necessary because building a physical model of such an enormous structure is impractical, testing it on the open sea would be dangerous and wave-tank scale models would not be sufficiently accurate.

"Simulation-based design provides accurate predications quickly so we can run 'what-if' scenarios and make corrections in the early stages of development," Mr. **Johnson** said. "Lowering the number of late engineering changes reduces costs, shortens cycle time and improves the overall design. Physical scale models will still be used for a project of this magnitude. But they will be used to validate the design before fabrication begins rather than prove the design will work."

Physics-Based Simulation

Cargo transfer simulations were performed on the Technology Center's Silicon Graphics Onyx supercomputer. With eight 200-MHz processors, four gigabytes of RAM and three graphics engines, the SGI machine is used for its processing speed, graphics capabilities and memory capacity in



handling large engineering problems and displaying complex 3-D images.

CAD data defining the geometry of the MOB and cargo vessels are imported into the Onyx in the form of DXF and IGES files from Sener's FORAN naval design and modeling system. Simplified forms of the geometry are used to create response amplitude operators (RAO) in all six degrees of freedom (for the ship's roll, pitch, heave, surge and sway) in WAMIT, a wave-body interaction program from the Massachusetts Institute of Technology.

The motions and geometries all come together in ADAMS, where cargo transfer operations are analyzed for displacements, forces, accelerations and loads on various components and subsystems. This data can be displayed as plots for evaluating the various parameters. Also, output from ADAMS goes into the Easy Scene visualization package from Coryphaeus Inc. to create a realistic animated motion picture of the action that can be viewed to understand overall motion. Areas can reportedly be magnified or cross-sectioned for closer examination. Because the simulation is physics-driven and the action is based on mathemati-

(Continued on page 78)

Trimble Changes Focus

In an effort to spur growth, Trimble Navigation Ltd. announced plans to shift corporate functions, creating a system integration business and diverting its land survey unit to a stand-alone business entity. With the changes Trimble announced that **Dennis**

Ing will become executive vice president and CFO and will manage Trimble's corporate functions. **Mary Ellen Genovese** will be appointed vice president of finance and corporate controller. **Bruce Peetz** will head the new systems integration group. Dr. **Joseph Paiva** will be named vice presi-

dent and general manager of the land survey research group.

OTECH Delivers RHIB

Ocean Technical Services, Inc. (OTECH) recently delivered a 16 ft. (4.8 m) rescue RHIB to ENSCO Marine, Inc. The Ocean Sprint reportedly meets U.S. Coast Guard

and SOLAS safety requirements. The hull and deck of the rescue boat were manufactured by OTECH using the Seamann Composites Resin Infusion Molding Process (SCRIMP). The vessel is equipped with a 27-hp. outboard diesel and required safety equipment.

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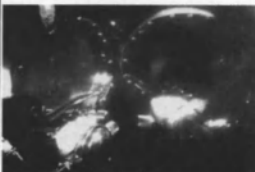
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McIntosh Joins Polaris

Steve McIntosh has been appointed marketing manager of Polaris International Ltd. U.K.



In this position he will be responsible for marketing the company's wide range of products for the seismic industry, initially concentrating on Fairfield Technologies' BOX planning software for Very Large Channel Count seismic crews.

Rice, Unruh, Reynolds Co.

Get ISO Certification

John Reynolds, chairman of Rice, Unruh, Reynolds Co., Ship Agents announced that it has received DNV Quality Certification under ISO 9002 for all 10 of the company's offices.

MAN B&W Increases

Ownership Of SEMT

Pielstick

After approval of shareholders and cartel authorities, MAN B&W and MTU Friedrichshafen GmbH announced that MAN B&W will assume 66.6 percent control and will receive 33.6 percent control over the French Diesel Manufacturing Company, SEMT Pielstick.

The two companies previously owned 50 percent each.

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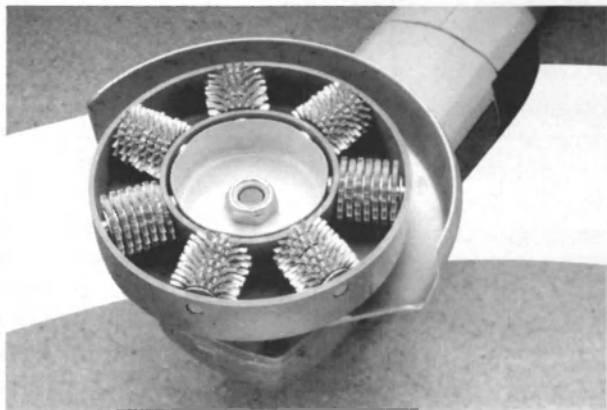
LR Certifies Lightpartner's

3L System

Lightpartner Lichtsysteme GmbH has received certification from Lloyd's Register (LR) for a low location lighting (3L) system for the marking of escape routes as prescribed for passenger ships. The system was designed in cooperation with LR and Meyer Yard in Papenburg and is reportedly fully watertight, seawater-corrosion proof and operates with or without batteries.

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Barnacle Remover



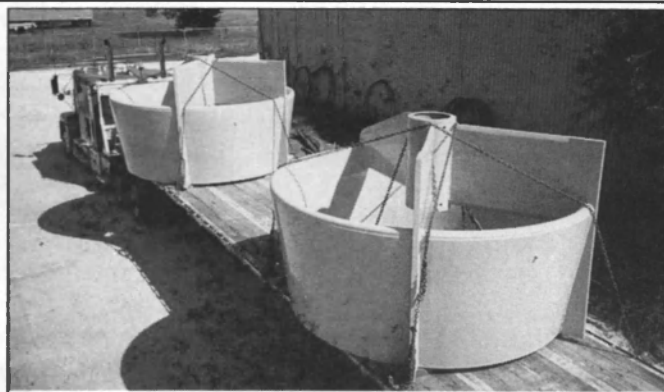
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First U.S. Training Center Earns DNV Certification

The Maritime Institute of Technology and Graduate Studies (MITAGS) has become the first U.S. maritime training and simulator center to receive certification of its quality standards system under DNV's Rules for Maritime Training and Simulators Centers. MITAGS is the organization for international training of masters, mates and pilots, plus both foreign and domestic merchant marines

Baltek To Handle Prisma Sales And Marketing

Baltek Corporation has made an agreement with Compsys, Inc. for the sales and marketing responsibilities of Prisma Composite Preforms.

The agreement expands Baltek's boat and shipbuilding product line.

Purpura Welcomed At PCCI

Carolynn Purpura, formerly of ROH Inc., has joined the PCCI staff to provide ocean engineering, salvage, diving, underwater ship husbandry and pollution support services on behalf of the U.S. Navy's Emergency Ship Salvage Material (ESSM) operations.



Sea Containers Acquires Holyman Sally

Sea Containers, Ltd. subsidiary Hoverspeed has acquired 50 percent of Holyman Sally in an effort to take over management of the company's passenger and car ferry services from Belgium to Britain.

Collins And Mackay Combine To Form Joint Sales And Service Forces

Mackay Communications, Inc. and Collins Marine Corp. have combined to form a joint sales and service venture in San Francisco, Calif.

Together, the two companies will specialize in Furuno equipment, fire safety equipment, navigational equipment, satcoms, radars, GMDSS and shipboard electronics.

Circle 38 on Reader Service Card

Portuguese Shipyards Install Autoship

Two of Portugal's largest ports, Estaleriois Navais De Viana Do Castelo (ENVC) of Viana Do Castelo and Estaleriois Navais Do Montego (ENDM) of Figueira Da

Foz, have installed Autoship systems full naval architecture programs. The two shipyards are reportedly using Autoship for hull design, Autohydro for intact and damage stability, Autobuild for structural design.

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London Club Gains On 1998 Renewal

The London P&I Club gained two million gt at the 1998 renewal. Overall tonnage, including charterers' entries and reinsured tonnage, is now 33 million gt.

HAVEN FOR SICK SHIPS

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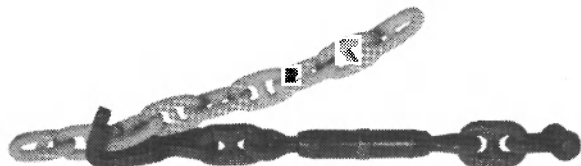
The tractor tug DELTA LINDA, now in service in San Francisco: 4,400 HP with twin Z-drives: 105' x 34' x 16.5' (32 x 10.4 x 5m).

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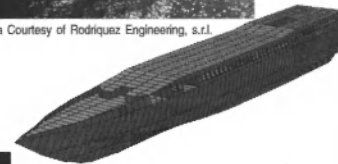
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PEOPLE & COMPANY NEWS

Baier Promotes Powers

Baier Hatch Co., Inc. has promoted **Cindy Powers** to director of Sales and Marketing. Her responsibilities will include overseeing all domestic and international sales



as well as being responsible for trade shows, advertising and the company's website.

Orbcomm Expands Executive Team

Orbcomm Global has announced

the addition of four new executives in anticipation of operating at full-service by mid-1998. **Scott Webster** has been named chairman of the Partner Board and CEO, **Alan Parker** joins Orbcomm as president of Global Development, **Robert Latham** becomes president and COO and

William Meder has been selected as vice-chairman. These changes come as the company is growing and preparing to launch 16 new low earth orbiting (LEO) satellites this year.

Southwest Retains Spectrum

The Spectrum Group (TSG) was retained by Southwest Marine Inc. and will serve as the principal liaison between the U.S. Navy and Southwest Marine's Washington, D.C., office. TSG will coordinate contacts and briefings between the Department of Defense, Navy Officials and members of Congress.

Hydrographic Society Elects President

Sir **Anthony Laughton** has been elected president of The Hydrographic Society in succession to **Ross Douglas**. Mr. **Laughton** is currently chairman of two National Environment Research Councils steering and review groups, and also chairs the joint International Oceanographic Commission/International Hydrographic Organization Guiding Committee for the General Bathymetric Chart of the Oceans.

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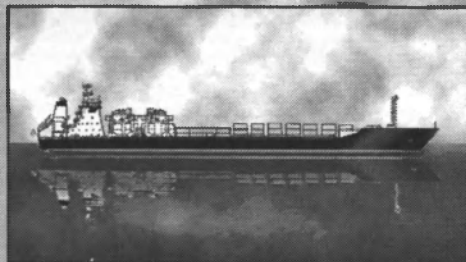
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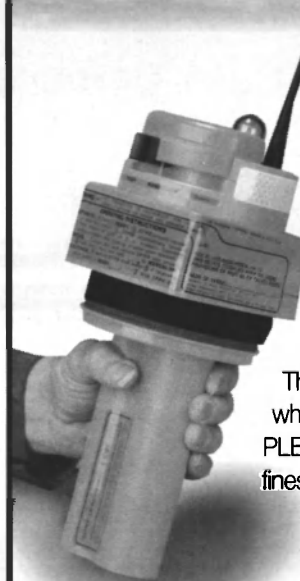
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NASSCO Announces Organizational Changes

The National Steel and Shipbuilding Company (NASSCO) announced that two of its senior officers were retiring and resultant realignments to the management structure and core would be made. **Al Lutter**, senior vice president of Marketing, and **Sam Timmons**, vice president and legal counsel will both retire on June 30, 1998. **Jim Scott** and **Jim Temenak** will divide the newly expanded marketing position responsibilities. **Fred Hallett** will take over as legal counsel. **Eric Murray** has been elected vice president, Finance. **Steve Streifer** has been elected vice president, Engineering. **Martin Stoops** was also elected vice president, Contract Administration.

HSBC Gibbs Moves Into Former Soviet Union

International insurance broker HSBC Gibbs moved several offices into Moscow, Russia, the CIS and the Baltic States Division in order to cater to increasing demands for insurance products and their derivatives emanating from the former Soviet Union. Heading the new division will be **Mike North** from London, with **Mike Makowski** assisting him.

CAS Offers Three HFO Viscosity Control Systems

Cambridge Applied Systems (CAS) released three new viscosity measurement and control systems for the maritime industry. ViscoMarine 500, 1000 and 2000 each utilize the same technology to measure fuel oil viscosity but in different electronic packages to interface with new or existing fuel oil systems. Each of the systems uses only one moving part, a piston, to measure viscosity.

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ICO Appoints New North American Director

Joseph Tedino has been named by ICO Global Communications as director of its Communications division for North America. He will be responsible for developing and managing ICO activities in the region including advertising, marketing and media and public affairs.

Hellenic Approves Agents

Hellenic Shipyards Co. announced the approval of Peter Gast Shipping, GmbH of Germany as its ship repair agent. Peter Gast was formerly an independent ship repair agent before being

retained by Hellenic.

Yeoman Opens U.S. Office

U.K.-based Yeoman, the manufacturer of a computer mouse designed specifically for use on maps, opened an office in

Annapolis, Md.

The general manager for the office will be **Leigh Longenette**. **John Hammer** will be marketing director and provide technical support. **Kimberly Judge** will assist in the marketing and media relations departments.

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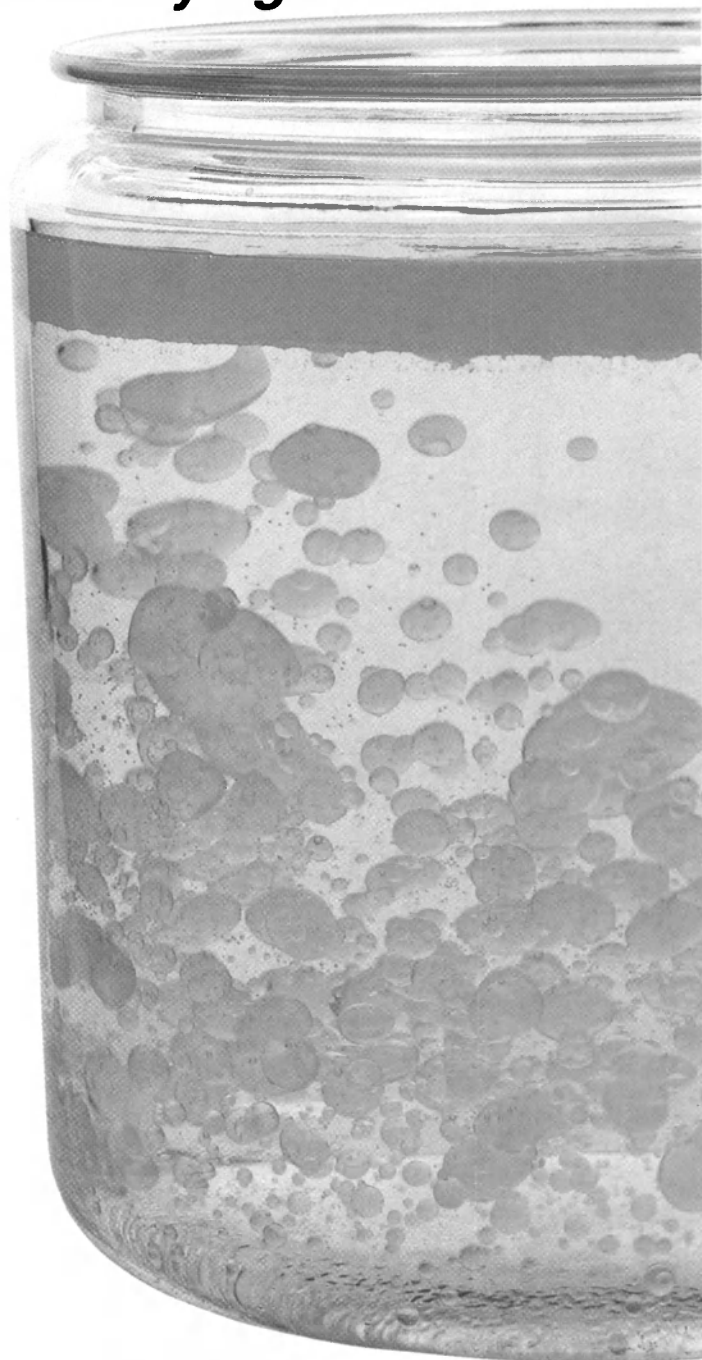
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Variability In Measuring NOx Emissions

The finalization of the text of the diesel engine NOx emission controls to be introduced as part of Annex VI to MARPOL 73/78 will increasingly focus the attention of the many sectors of the marine industry on exactly how the various aspects of these controls are, in practice, to be implemented. One aspect of particular interest to the CIMAC Exhaust Emissions Controls Working Group was the question of the reproducibility of NOx measurements: by just how much may emissions rates from a particular engine or engine design actually vary in practice?

The key factor that shaped the structure of Annex VI NOx controls and the associated verification procedures was the acceptance that the NOx emission rate, under standardized conditions, will not differ between engines of the same design, adjustment and usage. Furthermore, the NOx emissions from a particular engine when in service will not tend to increase; either over time or as a result of poor maintenance. However, it does not follow that by using the same test equipment and procedures that the exact same emission value would be achieved from the testing of a range of engines of identical design or even from the repeated testing of a single engine. Minor differences in any of the 13 measured parameters which go towards determining the brake specific NOx emission rate, together with inaccuracies in the inlet air temperature and humidity correction factors, will inevitably result in some variation in the values obtained.

Such variations are not a problem for engines where the onboard verification procedure was solely to be the *Engine Parameter Check* method. In those cases the actual engine measurement of the NOx emissions would only be required for the parent engine (or a family or group) while operating under highly controlled test bed conditions. Subsequently, it would simply be necessary to demonstrate that the engine had been retained in its original condition and within the allowable range of adjustable settings –the *Engine Parameter Check* method. However, the NOx Technical Code was written to include the option of NOx

Monitoring as an alternative means of onboard verification –with the decision as to which method to be used resting solely with the ship's owner.

Although the broad outline of the

NOx Monitoring option is given within the NOx Technical Code, considerable work is yet to be required to produce a fully workable set of guidelines. While it would be expected that these

guidelines would take the equipment as a starting point, specifications and test procedures are given within the NOx Technical Code for the test bed testing of engines –they will also need to allow for

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the realities of shipboard service, particularly that the analyzers and the associated equipment will need to be robust, reliable and sufficiently simple to operate and maintain without specialist skills or training. Additionally, due to

the variations that will occur between different sets of readings, there will be a need for an allowance over the NOx limit as given in Annex VI, the magnitude of which will need to be taken into account, the probable relaxation in

some of the analyzer and associated equipment specifications as compared to test bed equipment and also the effect of using residual fuel oil in most cases (with an inherent tendency to higher NOx emissions) rather than a distillate

fuel as in the parent engine tests. Nevertheless, it must always be borne in mind that a total reliance on onboard monitoring or associated equipment fail to function correctly, giving either no reading or worse still an anomalous output, the continued service of the ship could be in question until the problem, inevitable occurring at some remote location, could be fully resolved.

So just how much variation in NOx measurements could be expected? Figures 1 and 2, based on measurements undertaken by Working Group members, illustrate two examples of the variability which can be encountered when measuring the brake specific NOx emissions from marine engines. Figure 1 (page 75) shows the emissions from two slow-speed engines as measured at the time of delivery and, in the case of Engine Two, again after 18 months of operation. Figure 2, (page 75) shows the emission from four nominally identical medium-speed engines installed on a ferry under in-service conditions at two different dates some nine months apart. In both cases the emissions bands were between 1.0 - 2.0 g/kWh, which represents up to around +/- eight percent of the actual emission values determined. Since the analytical equipment used and the procedures adopted in both instances were more comparable to those which would normally be used under test bed conditions it is evident that a wider range of emission results would be expected when using the type of equipment and procedures that may eventually be stipulated within the NOx Monitoring Guidelines with a consequent need for a corresponding allowance when monitoring NOx under onboard conditions. The measurement of brake specific NOx emission rates is no different to other analytical procedures, such as those used in oil fuel testing, with a consequent need to allow engines to meet the Annex VI limits and when setting the acceptance criteria for NOx Monitoring as a means of onboard verification.

The NOx emission profile from a particular engine under standardized conditions are set by the design, adjustment and usage of that engine. The NOx emissions do not tend to increase over time. The engine builder should ensure that the Parameter Check method



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Figure 1
Variation in NOx Emission Rates, 2 Slow Speed Engines

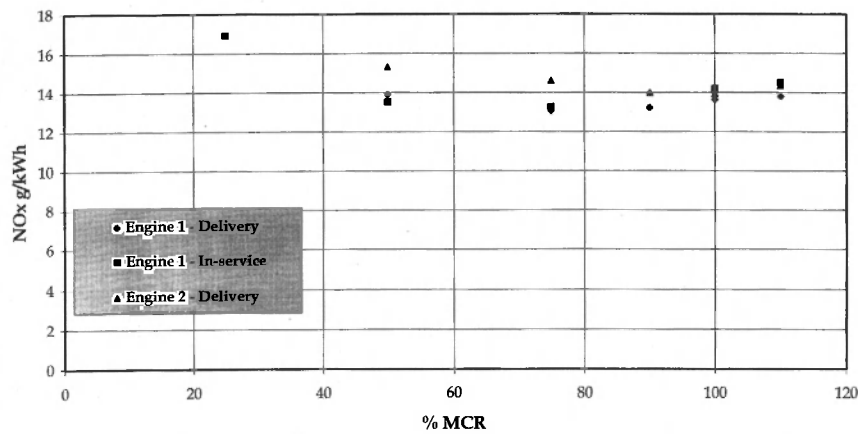


Figure 1

Figure 2
Variation in NOx Emission Rates, 4 Medium Speed Engines

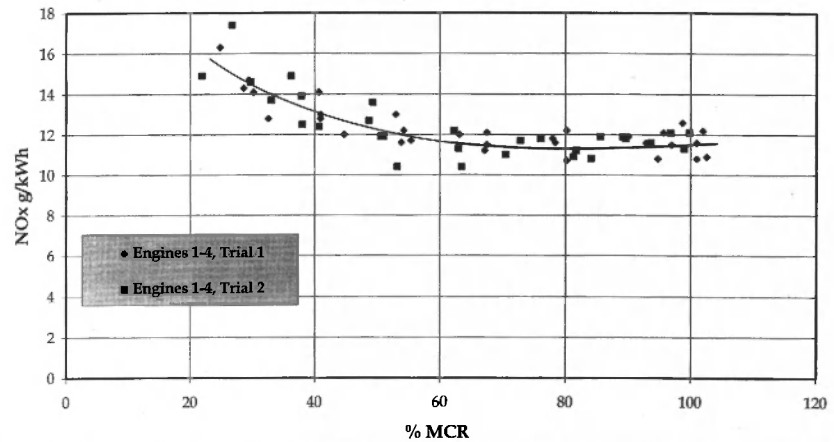


Figure 2

can be readily employed and with the minimum of disruption. NOx Monitoring equipment must be simple, robust and reliable –but may still fail at a crucial moment. All NOx measurements are subject to variation. Engines should be designed to have an adequate margin below the relevant NOx emission limit. The variability allowance must be included within the Monitoring option.

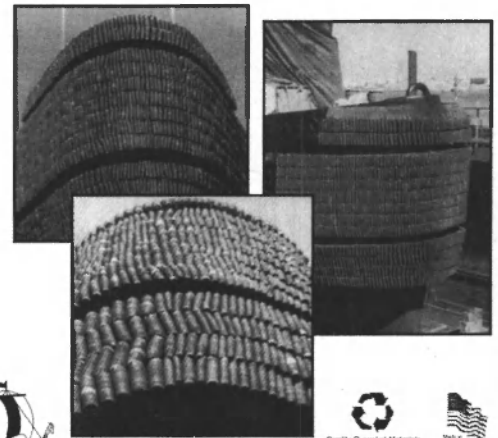
22nd CIMAC Congress in Denmark

The 22nd CIMAC International Congress on Combustion Engines will be held this year in Copenhagen, Denmark from May 18-21. Three panel discussions will highlight the four major themes: The user's view of the requirements for diesel engine manufacturers, engine systems, emissions and the environmental challenge and

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the technological outlook of engine systems and state-of-the-art design- diesel engines and gas turbines.

Some of the papers being discussed during the Congress will be low-speed/large bore engines, high-speed/small bore engines, gas turbines, medium-speed engines, state of the art, design, systems, advanced gas turbine technology,

heavy fuels, service experience and operation, combustion modeling, engineers' education and qualifications, tribology and materials, future demands on operators and engine builders, diesel engines and gas turbines for high-speed craft, engine lubricants, fuel injection, emissions, component design and many others. Excursions within Copenhagen and the surrounding

cities will include visits to the Odense Steel Shipyards, the Research and Development facilities of MAN B&W Diesel A/S, Helsingør Combined Heat and Power Plant and Copenhagen's Viking Ship Museum.

For more information please contact **Paul Russak** or **Thorsten Herdan** at: CIMAC Central Secretariat, c/o VDMA e. V. Lyoner

Strasse 18, 60528 Frankfurt, Germany, tel: +49 696 603 1567; e-mail herdan_krm@vdma.org.

Rolls-Royce And Turbomeca Sign Pact

Rolls-Royce's Allison Engine Company has signed an agreement with Turbomeca of France to build, market and expand Rolls-Royce marine engines' presence in Europe. Turbomeca will perform sales, marketing and packaging duties for Allison Model 501 K-601-K gas turbine engines in the 4,000-12,000 shp range.

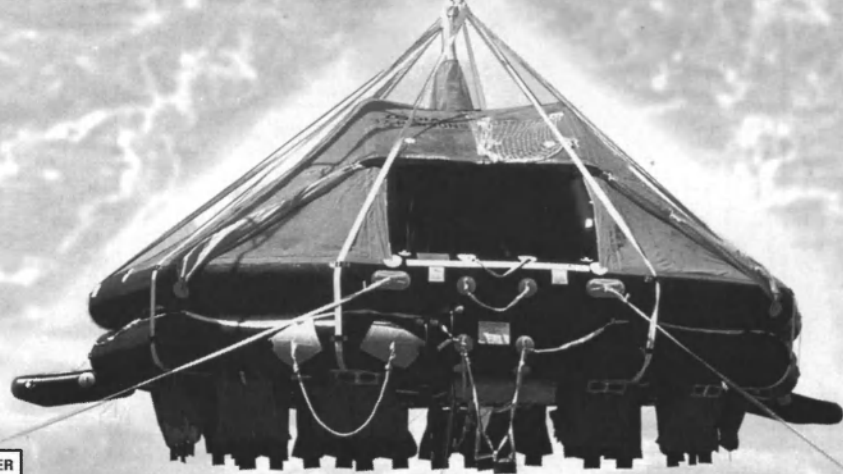
Department Of Defense Evaluates Ship Scrapping Procedures

The Office of the Deputy Under Secretary of Defense for Environmental Security has been leading an inter-agency panel to review the Department of the Navy and U.S. Maritime Administration program to scrap vessels. This practice presents many challenges due to the complexity of ships and the environmental and safety issues associated with scrapping them. The goal of the panel is to ensure that vessels are scrapped in a cost-effective and commercially feasible manner that is fully protective of worker health and safety as well as the environment. The panel of senior environment, safety and occupations health experts was tasked with evaluating the adequacy of the process and, as necessary, making recommendations for its improvement. It will review the processes and procedures in place and in development for scrapping ships, from preparing vessels for scrapping to final closure of contracting actions. The panel was scheduled to present its results to the Under Secretary of Defense for Acquisition and Technology on March 31.

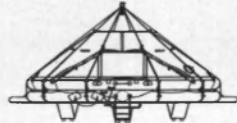
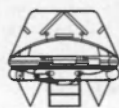
ASTM Seminar To Address Commercial Vessel Fire Safety

The American Society for Testing Materials (ASTM) Committee F-25 on Ships and Marine Technology will sponsor a seminar addressing the fire safety of commercial vessels from May 6-9 at the May Committee Week in Atlanta. The goal of this seminar is to promote better understanding of the fire safety requirements for commercial vessels sailing on domestic

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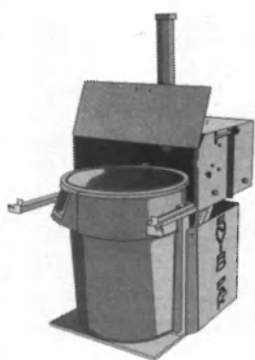


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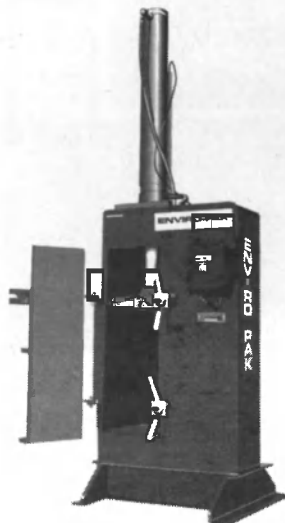
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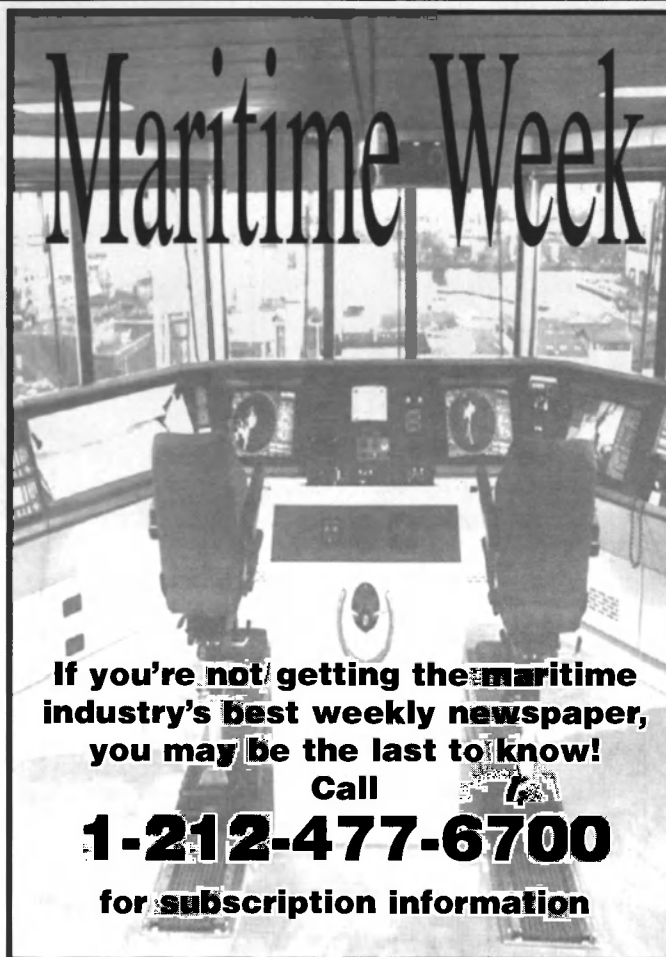
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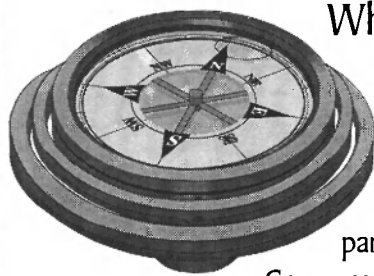
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and international voyages. The discussions will address three areas: shipbuilding issues from the viewpoints of builders, naval architects and designers; the latest trends and issues in domestic and international requirements for their future direction; and the research and application of advanced materials. **Joseph Angelo**, U.S. Coast Guard director

of Standards, is scheduled as the event's key note speaker. Other speakers will include members from the marine industry, domestic and international standards organizations, classification societies, manufacturers and researchers. To register, contact **Barbara Lake** at ASTM, tel: (610) 832-9713; fax: (610) 832-9666; e-mail: blake@astm.org.

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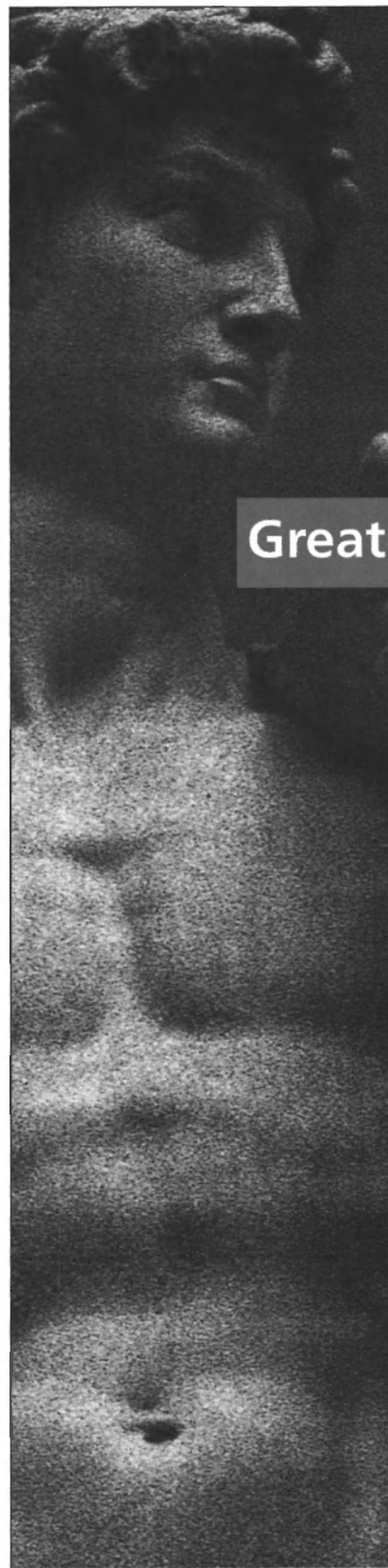
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Virtual Ocean Simulates Action of World's Largest Floating Structure

(Continued from page 67)

cal calculations, the animations closely match actual sea-state motion.

"The key to successfully performing physics-based simulation with multiple software is coupling

the programs so they exchange data accurately and efficiently," explained **John Cardner**, MOB project manager at the Technology Center.

According to Mr. **Cardner**, integrating these high-end programs represents cutting-edge technology

and required engineers at the Technology Center to work in cooperation with consultants at Mechanical Dynamics Inc. and Dynamic Animation Systems in developing specialized routines for linking the geometry and motion data from FORAN and WAMIT

into ADAMS for dynamic analysis and the resulting cargo transfer motion data fed into Easy Scene for visualization.

"Creating a virtual prototype of this scope and fidelity required us to leverage a variety of technologies," explained **Patrick O'Heron**, senior engineering analyst with the Mechanical Dynamics Consulting Services Group.

"To accomplish this goal we developed advanced mathematical models and extensive training courses tailored to the project. The result is a complete simulation-based design system that integrates CAD, simulation and high-end animations."

Studying Cargo Transfer

ADAMS was used to analyze the two primary operations for transferring cargo from adjacent ships to the MOB: vehicles driving over ramps between RoRo ships and the MOB; and cranes lifting 30-ton cargo containers from vessels to automated transports on the MOB.

Mingli He, a mechanical engineer at the Technology Center who ran the ADAMS analysis, said the software determined not only motion paths for the various parts and subsystems but also loads, forces and displacements. Determining these dynamic parameters was important in evaluating critical details of cargo transfer operations.

He further reported that simulation of the cargo lifting crane to determine the magnitude and duration of the container swaying at the end of the 150-ft. hoist cables had to account for momentum imparted to the container by the ship motion as well as the damping coefficient of restraining cables attached to the sides of the container.

In studying the RoRo's ramp from the ship to the MOB, ADAMS provided information on vehicle stability in making the run. The analysis will prove useful to engineers in designing end-rollers needed for the ramp to slide freely on the MOB platform.

Otherwise, heavy vehicles could potentially immobilize the end of the ramp so that ship motions would introduce buckling loads on the ramp and possibly overstress joints connecting the ramp to the ship.

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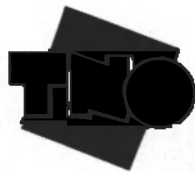
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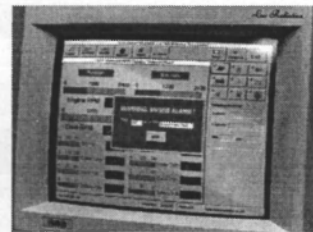
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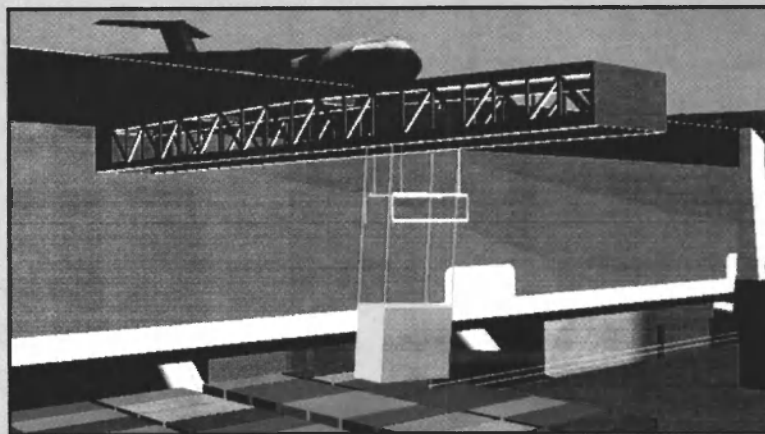
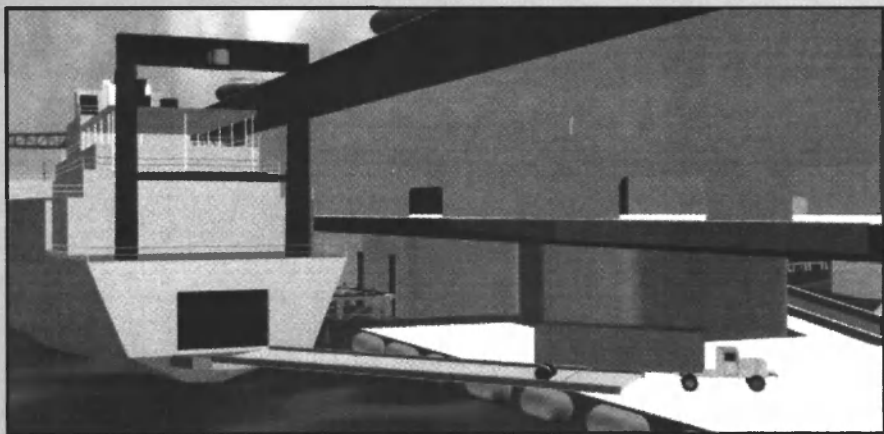
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Top Left: MOB Offloading Simulation.
Top Right: MOB Crane Simulation.

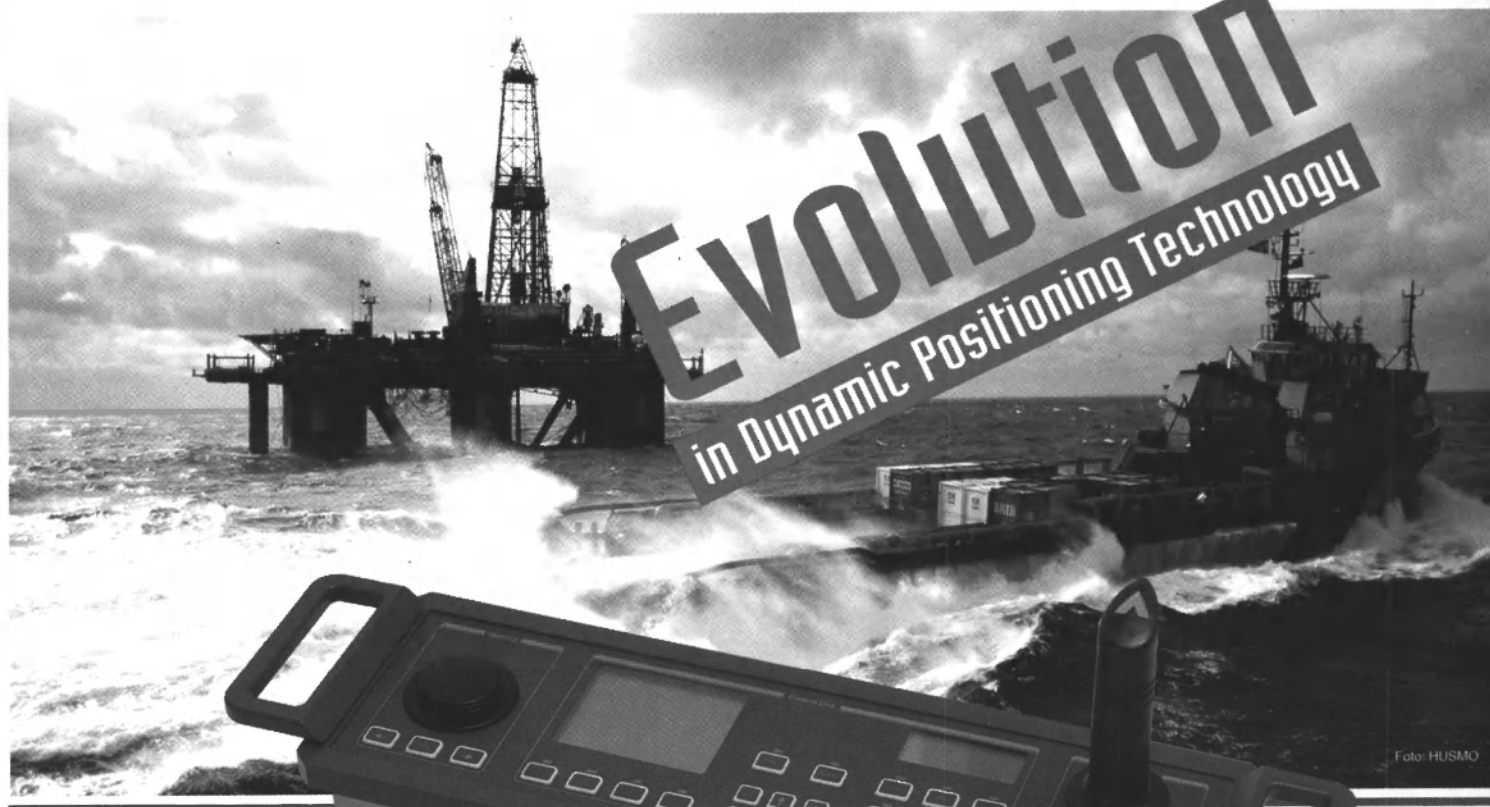
Visualizing Real World Scenarios

Rigorous dynamics gave us the answers we needed quickly," said **Richard Currie**, Technical Program Manager for the MOB project at prime contractor McDermott Technology Inc. "We routinely use dynamic analysis to evaluate sea-going structures for stability, integrity and mission performance. ADAMS provides a unique tool to examine critical mission systems in high-stress situations to insure we are adequately but not over-designing them." ADAMS numerical output and data plots provided engineers with the detailed information on loads, forces and displacements at specific times and locations to identify and correct potential problems anywhere on the entire structure. Moreover, according to **Currie**, coupling dynamic simulation and visualization was particularly important to the success of the project. Realistic animation of the models provided greater details often not readily apparent in tabular printouts.

According to Mr. **Currie**, simulation-based design is critical for successfully completing a project of this magnitude on time and within budget. "I can't overemphasize the importance of the physics-based simulation that drives these visualizations. I always point out to audiences who view these scenes that they are not cartoons but rather realistic representations of expected behaviors, as accurate as we can make them. This is critical in selling a concept as far out as the MOB, particularly to managers overseeing the program and administrators coordinating scheduling and funding." He also said that

"Analysts and visualization tools let us keep track of the program, evaluate various alternatives and continually improve the design faster and more economically than would otherwise be possible.

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Scandinavia

A Region Of Technology Drivers

by
David Tinsley, technical editor

Against a backdrop of contraction in European shipbuilding, the Scandinavian region is characterized by a culture of technological innovation and product quality, making for industrial resilience in pockets of excellence.

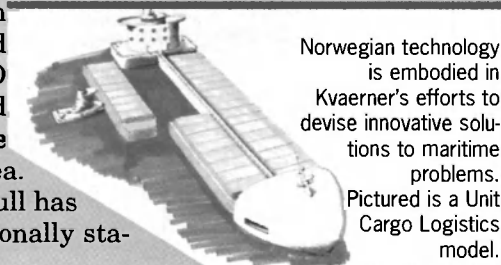
Automation has long been the watchword for Odense Staalskibsvaerft, where a new phase of robotization and introduction of leading-edge steel cutting and welding techniques bodes well for a central element of the Danish maritime infrastructure. Output at Lindo has continued to be dominated by projects for the parent A P Moller shipowning organization, widely acknowledged as one of the most professional undertakings worldwide, with extremely high expectations of its contractors. The 6,600-TEU *Sovereign Maersk*, commissioned into the Europe-eastern Asia mainline traffic toward the end of last year, provided a new showcase for Danish containership technology at the upper end of the post-Panamax range. The vessel was also significant from a production standpoint, in that around 14 percent of its hull was assembled using robot welding machines. Since Odense's competitiveness relative to shipbuilders in the Far East is inextricably tied to an ability to continue to raise output per worker and per unit of cost, its strategy is geared to remaining in the forefront of technology. Development planning at the yard foresees robotized systems handling some 25 percent of the welding of hull and cargo section assemblies by the year 2000, rapidly increasing to 40 percent thereafter. Sophisticated machines able to operate in an ever-greater number of axes will steadily raise the scope of application, including curved surfaces and semi-closed assembly blocks.

In the meantime, new laser cutting and welding techniques have recently been implemented at Lindovaerft, having been used for the first time in the construction of the ninth in the Maersk series of 15 boxships of 6,000/6,500-TEU. Laser technology offers higher accuracy and certain production benefits relative to conventional methods, and has been used for the cargo section and hull of the Lloyd's Register-classed newbuilding.

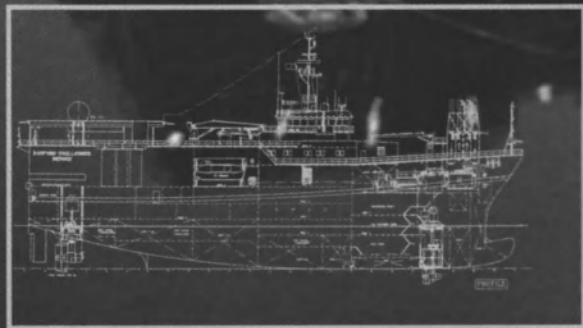
Offshore Innovation

The Scandinavian region has always proved to be a fertile testbed for all types of maritime technology, including the design and development of highly technologically driven solutions.

The Norwegian-developed Ramform hull concept (pictured to the left) will find considerable new application in the offshore industry this year, as a result of its embodiment in two further, highly-sophisticated seismic ships and in the FPSO (floating production, storage and offloading) vessel built for the Banff oilfield in the North Sea. The remarkable delta-shaped hull has already proven to be an exceptionally sta-



Norwegian technology is embodied in Kvaerner's efforts to devise innovative solutions to maritime problems. Pictured is a Unit Cargo Logistics model.



PGS' Ramform vessel has cut a unique profile in maritime circles. Two Ramform type vessels are shown under construction at the Langsten yard.

ble and flexible work platform for cablelaying, underwater research and seismic survey duties. In the case of the series of seismic ships operated and ordered by Norwegian-based oilfield services specialist Petroleum Geo-Services (PGS), the design reaches its maximum beam at the stern, to the extent that the extreme width corresponds to about half the overall length.

PGS holds exclusive licenses for building seismic vessels, FPSOs and drilling/well intervention vessels incorporating the Ramform design conceived by **Roar Ramde**, head of the Horten-domiciled naval architecture firm Ariel. Costing approximately \$80 million apiece, the recently delivered *Ramform Valiant* and *Ramform Viking* are the third and fourth vessels in PGS' series of six seismic vessels encapsulating the innovative concept, all of which have been ordered from Western Norway's Langsten Group.

Technological progression through the class is expressed in the 20-streamer capability offered by each of the latest duo, compared with the 12-streamer array in *Ramform Explorer*, which made its debut in 1995, followed by the 16-

streamer capacity in the 1996-commissioned *Ramform Challenger*.

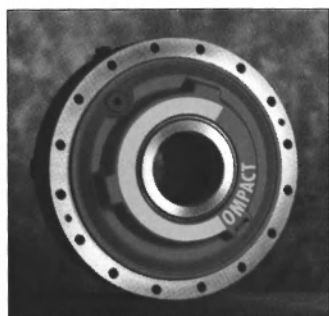
Products of the integrated shipbuilding system used by the Langsten Group, whereby the hull was constructed at the affiliated Tangen Verft's Kragero premises and transferred to the headquar-

ters yard at Tomrefjord for outfitting and completion, *Ramform Valiant* and her sistership are a response to growing demand for 3-D seismic data. The vessel type constitutes an efficient tool which enables the offshore industry to identify and quantify reserves of oil and gas, and to optimize exist-

ing fields. The astonishing form is also embodied in the \$200-million *Ramform Banff* FPSO, scheduled to provide an initial 95,000-bpd crude oil production and processing capacity on the North Sea from mid 1998. Built in South Korea by Hyundai Mipo Dockyard (HMD),

(Continued on page 83)

Compact Power for Marine Applications



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Autronica Launches New Interactive Fire Alarm System

Autronica, which has a penchant for delivering leading edge products, introduced its AutoSafe SelfVerify decentralized fire alarm system recently in Miami. Sporting a stylish new look,

the units entail far more than a cosmetic upgrade, and the manufacturer estimates that they can save up to 30 percent of cabling. A complete new range of interactive detectors and interface units for any application are included, and the SelfVerifying detectors are designed to increase reliability and reduce maintenance dramatically. Every new detector includes both a smoke chamber for detection of smoke and a heat detection unit which can also be used for temperature measurements.

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That's The Way It Is

Norwegian maritime executives have never been shy about addressing industry trends in a blunt, no-nonsense style. MR/EN recently had the opportunity to visit with leaders from several segments of the Norwegian maritime market to discuss everything from the Asian financial crisis to the OECD agreement. — by Greg Trauthwein, editorial director

Norway's love and attachment to the sea and maritime matters are well known. Perhaps unlike any other maritime nation, Norwegians thrive on working in unison to consistently deliver technical solutions to shipbuilding and ship owning/operating problems. This is the only way to explain how a country of little more than five million inhabitants has become such a driving force in an international maritime market.

Norway boasts the world's third largest merchant fleet and the second largest national flag. Norwegians control 10.5 percent of the world's crude oil tankers, 19.1 percent of the world's gas carriers, and 18.9 percent of the world's chemical tankers.

One-third of the Norway fleet flies a foreign flag, and while the powers in charge would prefer 100 percent Norwegian flag, they realize that as long as a ship is Norwegian-controlled, it will equate to quality at sea. The Norwegian Shipowners Association motto: "As many as the Norwegian flag as possible, as many as foreign flag as necessary."

Norwegian shipowners are widely regarded as owning and operating high-specialization, high-value fleets, and for spotting and filling unique transportation niches. The country has led the way in harsh-environment FPSO design and production, as well as a leader in the design and promotion of unique vessel configurations such as the Pick-Up Cat, and the transport of water via large "bladder" bags. Issues driving the shipping Norwegian market now include a new taxation scheme which was adopted in 1996 to cater to the Norwegian maritime cluster. Specifically, it encouraged Norwegian owners to invest in new technology, and to induce Norwegian shipowners to stay in Norway. To date, the initiative seems to have worked, as maritime employment, the Norwegian fleet (in both numbers and value), and the shipbuilding orderbook at Norwegian yards are all up significantly.

OECD: When & If

Norwegians have been and continue to be openly critical of the U.S. for not ratifying the OECD agreement to eliminate shipbuilding subsidies, as the issue of subsidization is becoming critical for the long-term survivability of Norwegian yards. While Norwegian shipyards are awash in orders now, a minority of the Norwegian government has threatened complete elimination of shipbuilding subsidies, OECD agreement in force or not. Also, while subsidy levels have recently dropped in Norway, the subsidization level of its main competitors in Europe has remained

steady at nine percent.

The shipowners are similarly unhappy with the lack of an OECD agreement, reasoning that cheap ships simply throw freight prices further out of whack. They maintain that tonnage could and should be regulated through natural market forces, and that subsidies continue to create an unlevel playing field.

Norway's shipbuilding business has a vested interest in the successful implementation of the OECD agreement, but not in order to compete with the Korea's and Japan's. Norwegian shipbuilding, which was last active in the building of large tankers in the early to mid-70s, is today defined by a tight group of smaller, lean yards which exist building highly specialized vessels, usually in concert with Norwegian buyers. The oil and gas business has been a particular boom to Norwegian shipyards, and perhaps no other development best embodies Norwegian advanced technology in this area than the successful design, development and use of the Ramform vessel (please see related information, page 80). Designed by naval architect **Roar Ramde** and built by Langsten Shipyard, the Ramform's hull strikes a unique profile on the waterway, in both looks and performance. It's pointed bow and wide stern create a hull form with is patented around the world, and which PGS holds the rights to for many applications. The vessel, according to PGS Exploration — which has invested heavily in the design — has advanced the job of seismic operations immeasurably in just a few years, by allowing more streamers to be pulled at once, and providing for a faster, bigger and more economical survey. For example, the triple screw M/V *Ramform Challenger* — powered by four BRG-6 diesel engines — can pull up to 16 6,000-m streamers. "From a shipbuilders standpoint, we had to have a little faith and not be bound by tradition," said **Oddvar Skjegstad**, group managing director, The Langsten Group. "For one thing, not very many yards in Norway have the capability to build a vessel with a 131.2-ft. (40-m) beam. This is a typical type of vessel where a Norwegian yard can be competitive. It is a high-value, special purchase vessel." The unique vessel required a unique shipbuilding solution, considering the width of Langsten's covered building area is only 95 ft. (29 m) wide. The solution: the hull was built to a 29-m maximum and the remainder of the hull was pre-fabricated as "add-ons. Sticking to the unorthodox aura of the vessel, it is interesting to note that it is launched bow first.

Kvaerner is another type of Norwegian

(Continued on page 90)

Unitor: Taking A Systematic Approach To Market Domination

Oslo-based Unitor is parlaying its unusually strong maritime culture, global positioning and keen market insight to capitalize on a very lucrative, but perhaps under-serviced, side of the maritime market. Unitor serves as a virtual "supermarket" for ships, providing a host of products and services which individually may seem small, but cumulatively equate to a multiple millions.



Frode Berg
President & CEO,
Unitor ASA

It was not long ago that Unitor reconfirmed its commitment to the maritime market, jettisoning non-maritime related holdings, in an effort to bring all of its resources and knowledge to expanding its already huge presence in maritime circles. *Maritime Reporter* recently had the opportunity to sit with new managing director, **Frode Berg**, in his Oslo office, to discuss maritime trends in general, and Unitor strategy in particular.

As trite as it may seem, Unitor's strategy largely revolves around listening and responding to the needs of its customers, shipowners. As Mr. **Berg** succinctly points out: "Whatever happens to shipowners, happens to us."

This strategy is exhibited in the company latest major roll-out, its entrance into the shipboard tools market. Following a detailed investigation of the market over a two-year period, Unitor has produced a broad range of more than 1,100 quality hand tools available from port locations worldwide. Its decision to enter the hand tools field has reportedly been driven by an awareness of changing customer needs in today's more financially disciplined environment, a more structured approach to technical ship management functions, and by an evaluation of volume business opportunities. Unitor's descriptive tool catalog lists items ranging in price from little more than \$1 up to \$2,530.

The relatively low unit values of many of the products belies the fact that a deepsea merchant vessel spends an average of around \$7,000 on tools annually, according to the company's research.

The company is currently involved in a large information technology (IT) project, and promises to only back an IT project/platform "when it proves that it will save money." Specifically, Mr. **Berg** notes that for an IT system to be truly effective, "it will take a much higher level of integration than we see today...here again, we will need partnerships with the customers."

Unitor's tactic on IT development and implementation is very symbolic of the company's core strategy. Unitor seeks to buy products in bulk, and sell them direct to shipowners, making the distribution chain as lean and cost effective as possible. However, its commitment to the maritime market affords it time to properly develop and test such a system. Unitor is unique in that it does not have a direct competitor, per se, which provides the breadth of products and services to such a wide geographical area. It is this size and scope which allow Unitor to take its time in engineering the solutions it believes best for its long-term existence.

Unitor's latest offering includes the launching, scheduled for this month, of an agreement to distribute SKF ball bearings to the world.

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the unit is undergoing topsides installation in the U.K. at Aker McNulty's yard on Tyneside.

This year, Langsten formalized a contract with PGS for the construction of a sixth Ramform seismic ship, as further confirmation of the effectiveness of the Norwegian maritime cluster in providing high-technology, efficient solutions to the sophisticated needs of the offshore sector. By melding shipbuilding and offshore industry disciplines, Norwegian designers, yards and equipment producers have opened up new areas of opportunity, broadening their market scope in the process.

An ability to respond to surging demand from a technologically demanding offshore market, coupled with heavy commitments to product development and new investments in the means of production had a signal bearing on the Ulstein Group's financial advance in 1997, featuring a four-fold increase in pre-tax profit and record turnover, order intake and work backlog.

The emergence within the integrated shipbuilding, design, equipment and engineering group of a new company known as Ulstein Ship Technology (UST) signals a further refinement of organizational structure aimed at enhancing the business of developing and supplying vessel designs and ship systems. But it also gives expression to Ulstein's perception of its future as being increasingly delineated by technology-intensive vessel types and associated systems. Larger vessels for well intervention, drilling and production constitute a primary target area. Already this year, UST announced \$49 million worth of contracts to provide designs and equipment for a total of six newbuilding anchor-handlers and platform supply vessels to be built in Denmark, France and at non-Ulstein yards in Norway. Sealed in February, the packages took the new company's workload to \$159 million.

Shipbuilding Tools & Equipment

Scandinavia remains a stronghold of professional know-how in regard to both ship design and shipbuilding production systems, serving the industry worldwide.

Malmö-based Kockums Computer Systems (KCS) has continually refined and embellished its Tribon design and information system tailored specifically to the

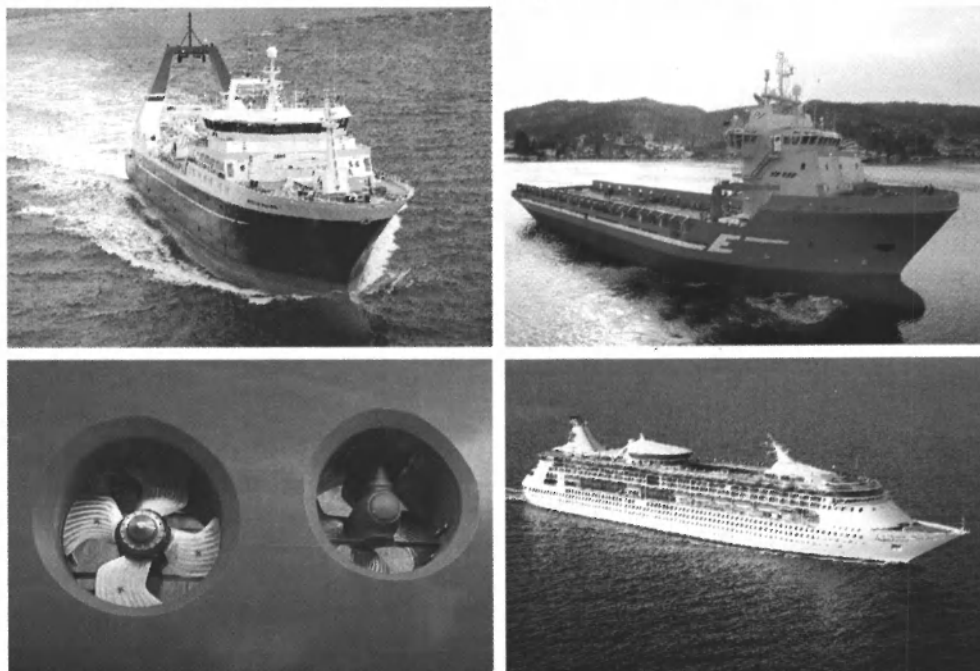
needs of the shipbuilding sector. The latest Tribon 4 software has been formulated to raise productivity and efficiency by ensuring full control over all stages in a newbuilding project from tendering through design to production and delivery. The product information model database incorporated

springs into the system, from a technology which allows multi-user access to the data. It supports concurrent design and production engineering in all disciplines, notably regarding the hull, machinery and outfitting.

One of the latest enhancements to the system is Tribon

Genauigkeit, brought to fruition in collaboration with German shipbuilder Howaldtwerke-Deutsche Werft. As its name implies, the application confers the means of improving accuracy in automated shipbuilding production, by making the alignment of parts in the assembly process easier, without

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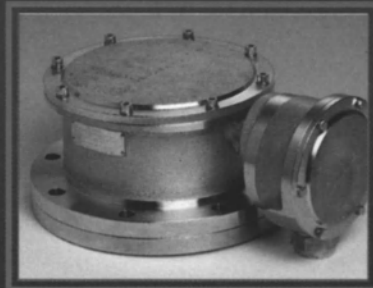
adding to total design hours. The requisite precision is achieved by marking triangles and lines, which are created automatically, with the option of adding more triangles manually. Receptivity to the Finnish-engineered Azipod propulsor design is gaining ground, as demonstrated by the selection of the innovative sys-

tem for two newbuildings which signal Wagenborg Shipping's entry into the offshore support vessel market. Beyond the fact that each will be installed with twin azimuthing units incorporating a podded 1,620-kW electric motor, few technical details have been released as yet concerning the vessels. Booked by



Knud Maersk is pictured at Odense Shipyard

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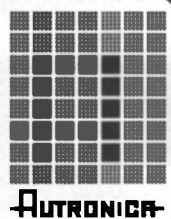
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Kvaerner Masa-Yards (KMY) on the understanding that it will effect delivery from its Helsinki premises in the fall of 1998, the pair is believed to have been assigned duties with Shell.

Adoption of the Azipod propulsion arrangements will bear directly both on the vessels' offshore capabilities and on their ice-navigation performance. The system is well-proven in the worst ice conditions to be found in Europe's northernmost waters, having been retrofitted in 1993 and 1995, respectively, to two 16,000-dwt Arctic products tankers deployed by the Finnish-Russian joint company Nemarco.

It will have a new reference this spring in the 10-MW *Botnica*, the latest in a new generation of Finnish ship design combining a winter role as a Baltic icebreaker with open-season employment in offshore construction work. A key stage in the commercial introduction of Azipod beyond the realms of the ice or otherwise rigorous northern environs was reached last month with the entry of Carnival Cruise Lines' *Elation* into revenue-earning employ.

Extrapolation of results of sea trials conducted during January indicate that the system should give fuel savings of some 40 tons per week, on the basis of an eight percent increase in propulsion efficiency relative to preceding vessels of the same Fantasy-class. Maneuverability, turning circle and slow-speed steerability also showed significant improvement relative to the same class of ship with conventional propellers and rudders. The same system, based on two 14-MW podded Azipods, will be used in the follow-on Carnival newbuilding, *Paradise*.

Royal Caribbean International's recent decision to exercise an option on a third Project Eagle cruise ship of 136,000-gt from KMY holds out the prospect of an order for a further shipset of three 14-MW Azipods and associated, ABB diesel-electric powering arrangements. The first of the newbuilding trio is scheduled to be completed at Turku in 1999. The current contracts are of particular significance as an endorsement of the Azipod concept by the two global market leaders in the cruise shipping domain. Business activities relating to the Azipod electric propulsion system have been vested in a new company, in which Italian shipbuilding and engineering group Fincantieri has obtained a 22.5 percent stake, equivalent to KMY's holding, and leaving ABB Industry as the majority shareholder with a 55 percent interest.

The Finnish Power Play

Fostered to a very large extent by ABB's technological and commercial endeavors drawing on experience from a growing population of diesel-electric ships, the past 12 months have seen increased market penetration by AC propulsion and power plants. While the Cyclo concept, in which a cycloconverter controls a synchronous motor, has attracted further references in the luxury cruise ship and shuttle tanker categories, the company's Megastar Pulse Width Modulation (PWM) frequency converters have demonstrated reliability and flexible performance to secure a growing range of new applications. The PWM system has been found particularly suited for main thruster drives in the offshore dynamic-positioning (DP) sector, and its potential is also being realized in other areas, including propulsion drives in ferries and chemtanker tonnage. The newbuilding train ferry *Aratere*, under construction for Tranz Rail of New Zealand at the AESA Barreras yard in Vïgo, will employ an AC plant based on four 2,600 kW drives using ABB equipment, PWM technology and integrated automation. Italian shipping company Finbeta elected to use Megastar PWM drives on its diesel-electric chemtanker newbuilding *Smeraldo*, under construction at the Mario Morini yard in Ancona, using two 3,300-kW motors. Another leading Finnish advocate of electric propulsion, the design and technical consultancy firm Deltamarin, considers that the diesel-electric mode can offer benefits in a wide range of vessel applications if the most comprehensive view is taken of a newbuilding project and lifetime costs. In addition to its particular suitability for ship operating profiles distinguished by substantial and regular shifts in power requirements, the diesel-electric mode can reduce overall main and auxiliary power needs. It also gives a designer greater flexibility in positioning machinery and ancillary systems, and often entails overall weight savings, affording scope for greater revenue-earning volume within a given hull envelope.

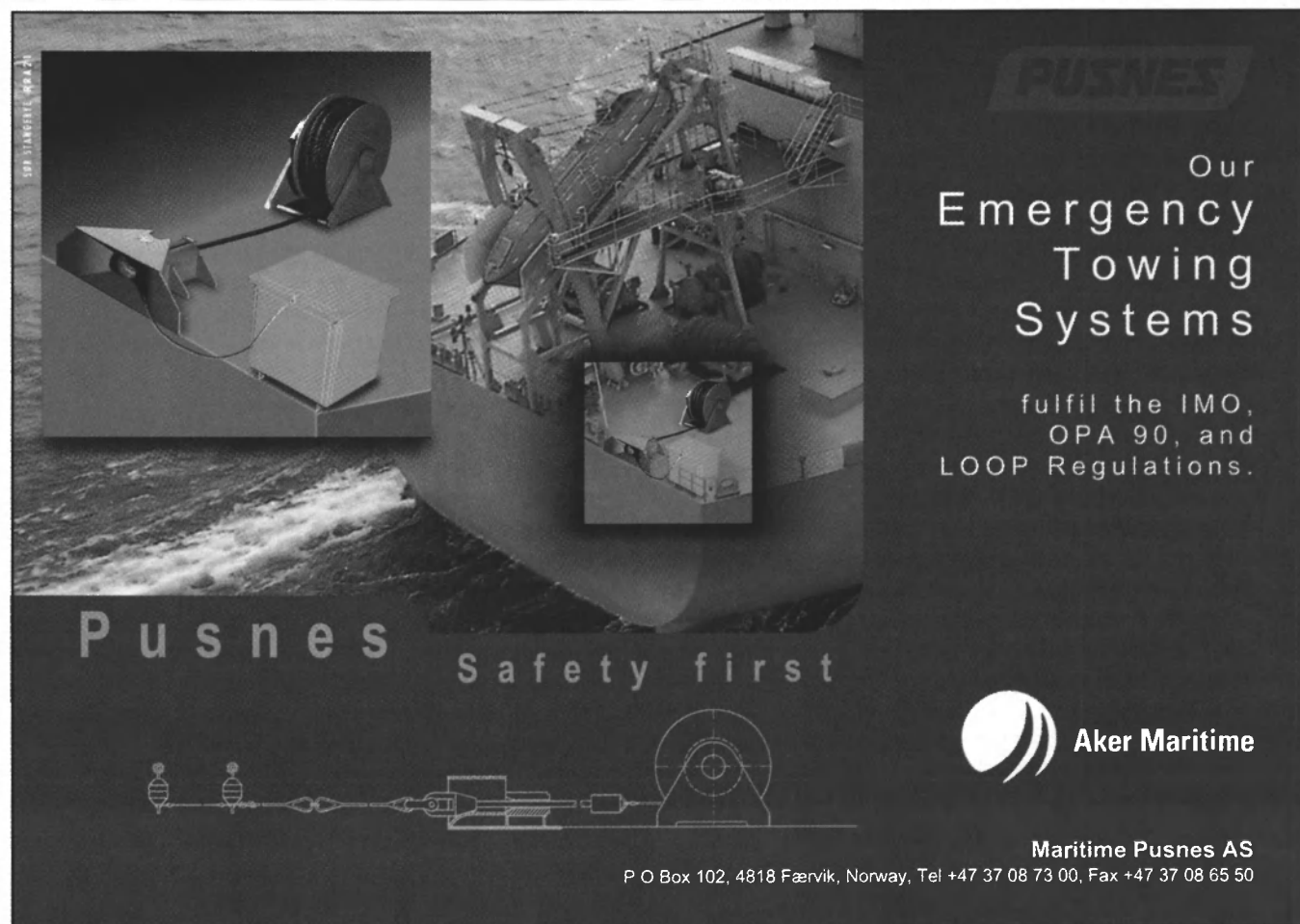
The imminent start of operations with the first V-type Wartsila 64 engine, the world's most powerful class of medium-speed diesel, attests to Finnish in-depth strengths in the field. The com-

compact design offers a remarkable output of around 2-MW per cylinder, with NOx exhaust gas emissions kept below IMO-prescribed levels without penalizing specific fuel consumption. The 12-cylinder version installed at a combined-cycle power station in Vaasa will thereby yield 24-MW.

DNV By The Numbers

DNV employs 4,000, and had a turnover of \$483 million in 1995. The classification society has 14.5 percent of the world fleet under its wing, including 80 percent of the world's fast vessels, 708 tankers and 746 dry cargo vessels. DNV continually updates its product and services offerings to shipowners and builders.


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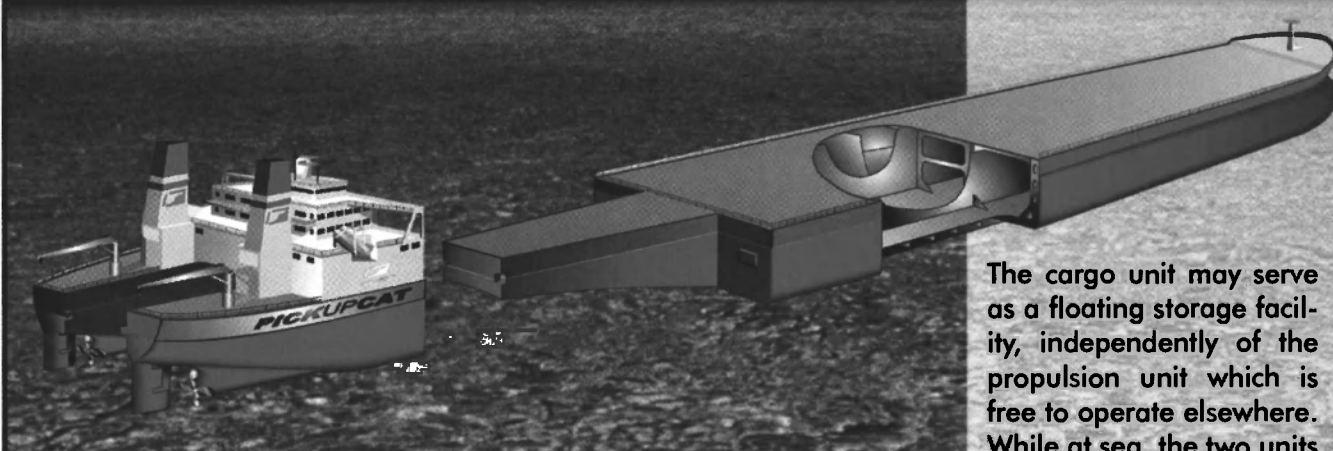
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Controlling Market Thrusts

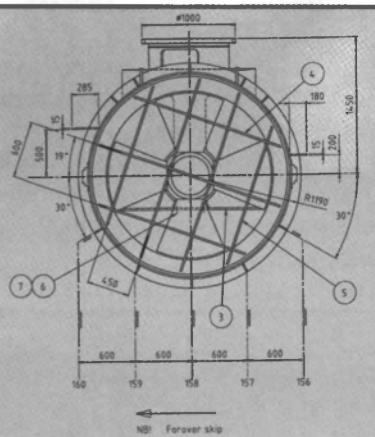
Molde, Norway based Brunvoll, a maker of advanced thruster technology, has dedicated much of its resources to ensuring noise and vibration signatures are kept to a bare minimum, particularly in cruise vessel applications. While exhibiting in Miami at a recent cruise industry event, Brunvoll's marketing director, **Terje Dyrseth**, noted that the cruise market is of particular interest and importance to the company. He said "on the cruise ship side, it's quite simple, because they need the thruster to maneuver...maneuverability is a key issue for cruise liners, and it's important because of the multiple installation configurations aboard a single ship."

An interesting development in the cruise market, however, which is significantly impacting the use and development of thrusters for the cruise market, is the issue of ship anchors' effects on coral reefs. Mr. **Dyrseth** said that most cruise lines have traditionally not been concerned with noisy bowthrusters, because the only time they were used was for maneuvering, at a time when most passengers are on deck. Now, however, with increased sensitivity to the plight of coral reefs in the Caribbean, ships may increasingly have to use thrusters and

propellers to "anchor" the ship, meaning that they will be used continuously for longer periods, making noise and vibration a more significant issue.

While he terms Brunvoll's products "nothing very new," Mr. **Dyrseth** does point out that the lengths Brunvoll has taken to mitigate

noise is new to the cruise market. In particular, Brunvoll helps to minimize noise and vibration by insulating the tunnel which houses the thruster. In essence, the configuration is two tunnels, one resiliently mounted inside the other, so that there is no metal to metal contact directly with the actual thruster and the ship.



Brunvoll bowthruster cross section

Circle 64 on Reader Service Card

Experience gained by the company during the development of its proprietary Low NOx Combustion process provided the basis for a target 50 percent efficiency for the Wartsila 64. The feasibility of the target figure was said to have been confirmed soon after the six-cylinder prototype had been fired-up at the Vaasa research center in September 1996, with turbocharger efficiency having been highlighted as a key contributor to overall performance. Due to specially designed injection arrangements, maximum cylinder temperature is reportedly lower than in a normal Seiliger process, and consequently a factor contributing to a reduction in NOx output. In line with the Finnish company's concept of focused production, commercial manufacture of the Wartsila 64 has been assigned to Grandi Motori Trieste (GMT) in Italy, in which Wartsila NSD has a 40 percent holding following the April 1997 merger of the diesel engine operations of the Metra Group and Fincantieri. The extremely powerful, clean-lined 640-mm bore design in its V configurations is advocated for diesel-electric installations, in particular, in regard to the current field of application and possible new areas, such as large containership propulsion.

The operating loss of \$18.2 million recorded by Wartsila NSD in 1997 reflected non-recurring restructuring costs, year-end difficulties arising from the financial situation in eastern Asia, and higher-than-anticipated outgoings associated with bringing new engine types to market. Higher development and introduction costs in the high-speed diesel sector topped the results for Wartsila France and Cummins Wartsila Engine Co. (CWEC). To enhance performance in this field, a new joint venture company was formed with the U.S. group.

Named Cummins-Wartsila Corp., this will cover the 600 to 4,500 kW output range, and include the high-speed activities of Wartsila France, all CWEC operations in France and the U.K., and part of Cummins PGI. Wartsila NSD has also forged cooperation in the Japanese market by entering into an alliance with Hitachi Zosen. The Wartsila 20 design and Wartsila 32, the

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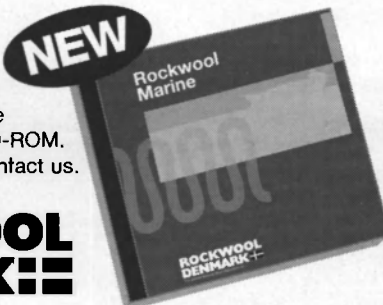
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Oslo Exchange Makes It Mark

The Oslo Stock Exchange (OSE) has emerged as a maritime force in the past year, attracting a host of companies seeking initial and second listings. The Exchange's list of shipping and offshore companies has quickly gained significant stature among the maritime community as providing a bellwether of industry trends. The Exchange's shipping and offshore list has enjoyed such rapid growth — altogether, there are around 60 shipping and offshore companies listed on the OSE, more than 20 with tanker activities, with a total value of about \$7 billion — through careful management and promotion.

Tore J. Fjell, OSE's senior vice president, has been touting the high level of attention shipping and offshore companies receive in Oslo, whereas a company listing on the larger exchange in, for example New York, would be quickly lost due to relatively small capital values.

"We want to be the world leading stock exchange in shipping and offshore, not the largest overall," said Mr. Fjell.

With the realization that it's not going to replace the New York Stock Exchange anytime soon, OSE has successfully sold listing on the shipping and offshore lists based on the outstanding, in-depth coverage and analysis available with such a listing. "Shipping and offshore companies need both the U.S. and Oslo," said Mr. Fjell. "The U.S. capital markets are the largest in the world, so a company needs that market for the money. But Oslo provides high interest, knowledge and analysis." He specifically notes the very strong interest and knowledge of maritime matters in Norway, and pledges that companies will receive no finer exposure elsewhere. OSE has also made it easy for companies to list, lifting bureaucratic tie-ups common in other markets, and allowing for companies with limited histories — providing that the companies meet other qualifying standards — to list. Also, it's worthy to note that shipping and offshore companies listed with OSE raised more than \$2 billion last year.

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Tanker companies listed on the OSE

Awiko	Frontline Ltd.	Nordic Am. Tankers
Benor Tankers	Ganger Rolf	Stolt Nielsen SA
Bergesen d.y.	Jahre Tankers	Storli
Bona Shipholding Ltd.	Laki	Team Shipping
Bonheur	MIF Ltd.	Ugland Nordic Shipping
Borgestad	Mercur Tankers	Waterfront Shipping
First Olsen Tankers Ltd.	Mosvold Shipping Ltd.	Wilh. Wilhelmsen

design follow-up to one of the industry's most successful and progressively enhanced medium-speed types, the Vaasa 32, will be manufactured at an assembly plant to be established at Hitachi's Innoshima works. Under the aegis of the joint production firm Wartsila Diesel Japan Company,

the Innoshima assembly operation will use engine components from Wartsila NSD's sub-suppliers and from the group's Vaasa factory in Finland.

A Concentration Of Building Resources

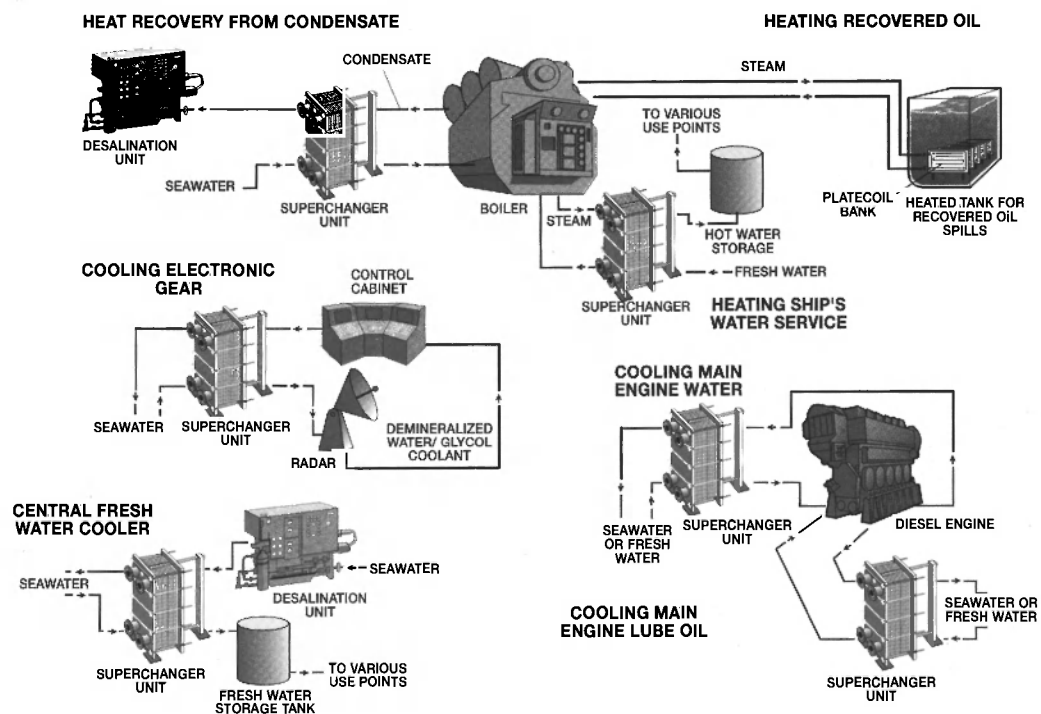
Finnish shipbuilding — now

overwhelmingly concentrated in two Norwegian-owned companies, Kvaerner Masa-Yards (KMY) and Aker Finnyards — has been boosted by a strong order flow in recent months. KMY, as one of the world's most skilled practitioners in sophisticated vessel design and construction, has consolidated its

(Continued on page 90)

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Naval ships, fleet oilers, commercial container-ships, tankers and dredges are successfully finding new ways to operate more efficiently at lower cost, by utilizing Tranter's unsurpassed plate-type heat exchanger technology. Schematics presented here illustrate typical ways they are doing it.

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DnB: Banking On Maritime

In typical banker fashion, Norway's Den Norsk Bank (DnB) professes not to strive to be the largest, rather simply the most profitable financial institution serving the maritime markets.

While trite, their statement carries significant weight given the bank's unique approach to making money in the maritime niche. A staff of 102 services DnB's maritime clients, providing capital and information needs to executives in the shipping and off-shore markets. This staff has impressively amassed a portfolio totaling more than \$9 billion under management. Looking at the big picture, shipping assets account for a hefty 15 percent of the bank's overall yearly take, a fact which further stresses DnB's commitment to the market.

Making The Grade

In evaluating the creditworthiness of its new customers — and in the end, the cost of the loan — DnB developed and employs a unique grading system which is based on both financial and non-financial factors, such as the quality of the management or whether or not the company holds a monopoly. Interestingly, the non-financial factors account for 60 percent of the equation. "It is important 'who' we do business with," said **Eldbjørg Sture**, general manager of DnB's Shipping Division. "The point, though, is not to just grade the customer, but to integrate that [grade] into the pricing of the deal."

The overall grading system fits well into the

(Continued on page 91)

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Nera Helps Vessels Stay In Touch

Nera's well-tested Saturn B and Saturn C terminals were chosen by the boats participating in the high-profile Whitbread Around the World Race to keep in touch with the rest of the world. The units provide for phone connections, as well as fax, e-mail and video recording transmission. The company, by the end of 1997, had delivered more than 2,000 B marine terminals, giving it significant marine market share. To better ensure it stays on top of a quickly evolving market segment, Nera introduced a new satellite station last fall, one which is designed as the primary system for small craft and to serve as a back-up system on large commercial craft.

Circle 103 on Reader Service Card

Globe Wireless Acquires Falcon

Globe Wireless, a maritime telecommunications service provider, has acquired Falcon Vessel Management System and combined it with the company's

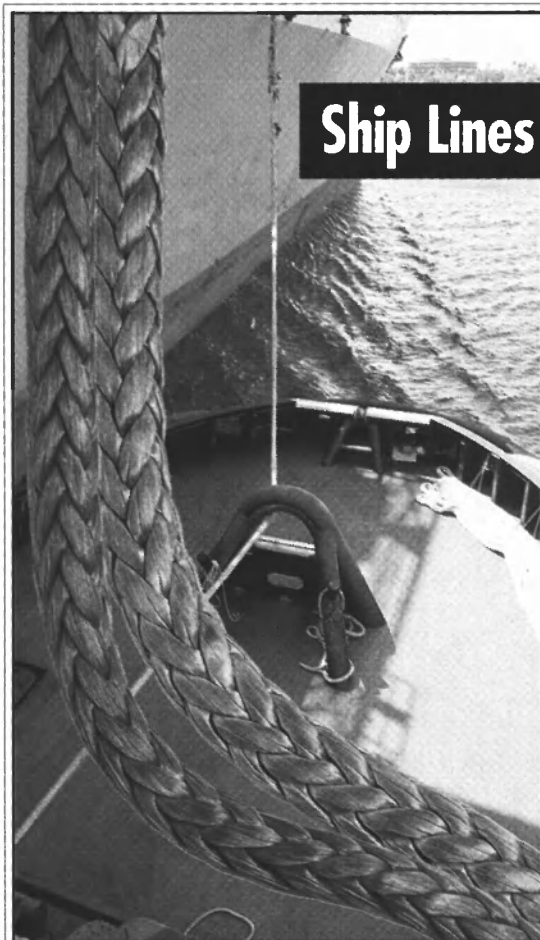
GlobaEmail system.

"Our expanded offering allows workboat operators everywhere to efficiently manage their fleets as

well as to communicate with them at low cost," said **Samir Tuma**, Globe Wireless' vice president. The tracking and management soft-

ware was developed by Seacor-Smit, Inc. as an in-house system originally called Falcon.

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AmSteel® & AmSteel®-Blue Ship Assist Lines

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AmSteel®: A twelve-strand braided rope of tension-set Parallay™ construction HMWPE (high molecular weight polyethylene) fiber with our proprietary Samthane™ urethane coating. It is a non-rotational rope that yields extremely high strength and low stretch equivalent to wire rope with seven times less weight.

AmSteel® Blue: The latest development of UHMWPE (ultra high molecular weight polyethylene) fiber in a twelve-strand braided rope utilizing tension/set Parallay™ design with our proprietary blue Samthane™ urethane coating. AmSteel®-Blue yields the maximum in strength-to-weight ratio and is stronger than wire rope constructions - yet it floats.

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- Vessel Escort
- Barge Lines

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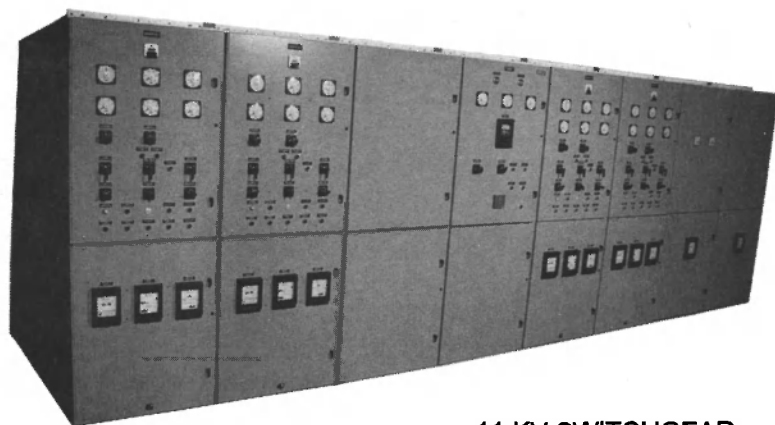
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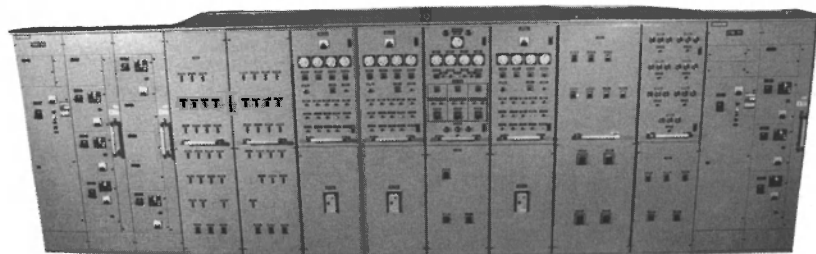
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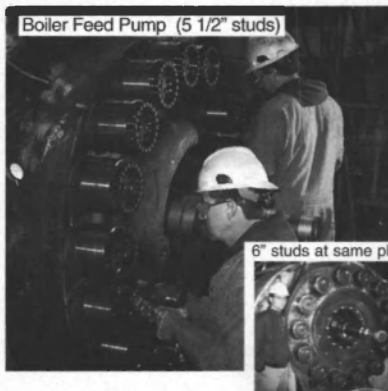
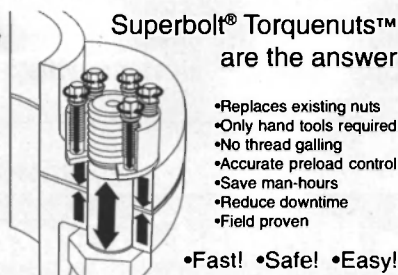
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88B

Fast Moves To Capitalize On Hot Markets

The resurgence of offshore-related marine construction in the Gulf of Mexico is embodied in the fast-pace of development at Ingalls Shipbuilding, based in Pascagoula, Miss. The yard, which is well-known for its high-tech work regarding advanced naval vessels, has dedicated a tremendous amount of resources to capturing significant shares of offshore work.

The company's most recent announcement includes the signing of a licensing agreement with Zentech, which will allow Ingalls to market the Zentech R-450 Design, which is a new, state-of-the-art deepwater jackup drilling rig.

(See related story on page 55.)

Ingalls, which is celebrating its 60th anniversary this year, has a long history in offshore market construction, first building drilling

rigs in the 1950s.

Ingalls returned to barge construction in 1996, as it completed a contract with Parker Towing Co. of Ala. for construction of 40 hopper barges.

That same year, the yard completed the weldout of two giant cylindrical caissons, to form a base for FPS *Neptune*, a state-of-the-art SPAR natural gas production platform now in operation in the Gulf of Mexico.

Last year, Ingalls repaired and refurbished the *Dolphin 110* jack-up rig for Sundowner Offshore Services of Houston, and last month the yard completed a repair project aboard Diamond Offshore's *Ocean Clipper*. The vessel arrived at Ingalls in late February, and was placed in the floating drydock for replacement of a shaft on the forward tunnel bow thruster. In

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fact, all five of the ship's tunnel thrusters were dismantled for inspection, and were re-assembled with new seals and gaskets, under supervision of Kamewa.

Late last year, the Pascagoula yard was the winner of a major commercial contract, as it was the winning bidder to build a series of next-generation deepwater Offshore Supply Vessels (OSVs) in lengths of 240-ft. (73.2-m) and 190-ft. hull lengths for Edison Chouest. Currently, Ingalls has contracts with Edison Chouest valued at \$152 million for 38 vessels.

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PCCI Awarded Contract From Qatar Liquefied Gas Company

PCCI, Inc. was awarded a contract by the Qatar Liquefied Gas Company Limited to develop an integrated Emergency Response Plan covering its shipping emergency response requirements at Ras Laffan — including the port, LNG loading and LNG plant — at sea, and for delivery of its LNG cargo in Japan.

The work includes preparation

of the Emergency Response Plan, and participation in a Table Top Exercise to test the plan in Qatar and Japan. Lessons learned from the exercise will be incorporated into the plan.

Clyde & Co. Opens Piraeus Law Office

British law group Clyde & Co., which specializes in transport, trade and insurance law, has

opened an office in Piraeus.

The company said the office, its 10th worldwide, will be able to give an on-the-spot service to its shipping clients in Greece and the eastern Mediterranean area.

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Shaver Transportation "Deschutes" pushing grain barges on the Columbia River using 1-1/4" diameter Mooring Master™ D-7. Photo by Hugh Ackroyd.

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APPLICATIONS:

- Face and Wing Wires

BENEFITS:

- 85% lighter than wire rope of the same diameter with equal or greater strength
- Flexible and lightweight (floats)
- Fewer crew needed for line handling duties
- Reduced risk of accident or injury

PRODUCT DESCRIPTION

AmSteel® is a twelve-strand braid having similar strength to wire rope in the same diameter and is identified by its steel grey color.

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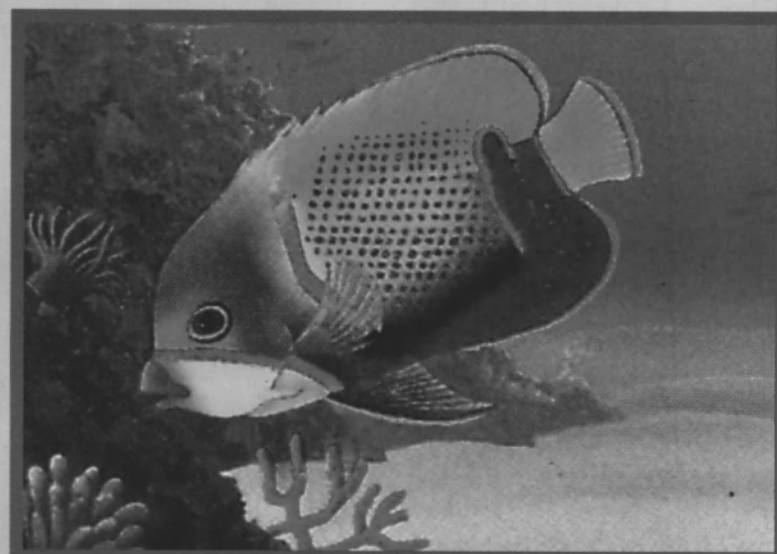
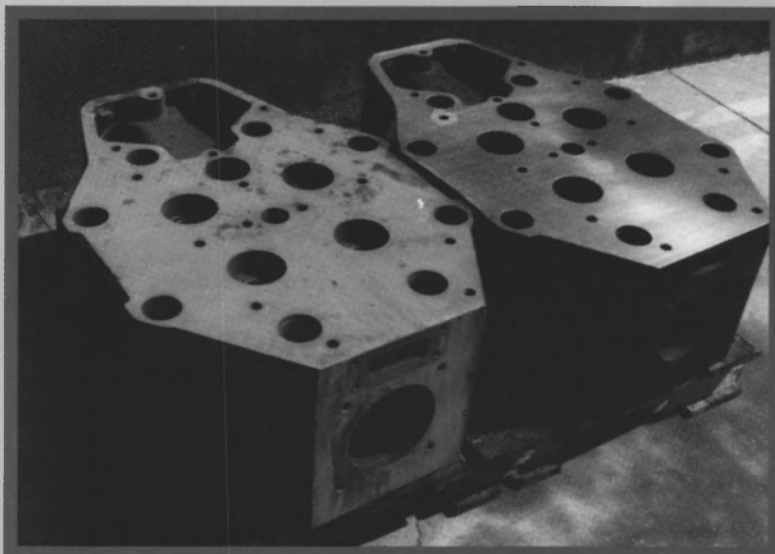
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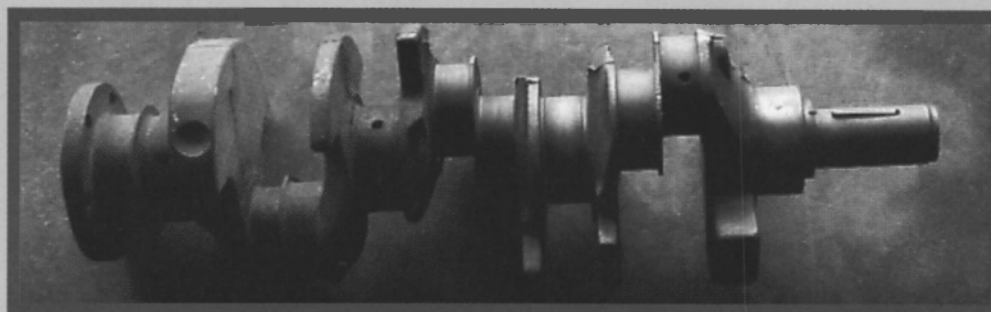


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Kvaerner Yard Wins \$26.3M Ship Deal

Norway's Kvaerner Kleven won a \$26.3 million contract to build an anchor handling tug and supply (AHTS) vessel for Havila Shipping AS of Norway, with an option for a second vessel. The vessel is to be built to Kvaerner Maritime's KMAR 404 design, a specialized design for ships intended to service offshore oil and gas production units in medium-to-deep ocean depths. Work is to commence in June 1998, and delivery is scheduled for June 1999. If the option is exercised, the second vessel will be built at the Kvaerner Leirvik shipyard in Norway, with delivery scheduled for late 1999 or early 2000.

Kvaerner Makes Appointments

There were major personnel changes recently announced for both Kvaerner Masa-Yards and Kvaerner Warnow Werft.

The yard manager at Kvaerner Warnow Werft, **Martin Landtman**, will return to Finland after three years of being away. He was named yard manager at Kvaerner Masa-Yards' Helsinki New Shipyard.

The yard manager at KMY's Turku New Shipyard, **Robert Stenius**, has been named the new yard manager at Kvaerner Warnow Werft. The yard manager at KMY's Helsinki New Shipyard, **Seppo Kuosa**, has been named yard manager at KMY's Turku New Shipyard. At the same time, he is also responsible for the coordination of purchasing at KMY. All appointments take force as of July 1, 1998.

Circle 107 on Reader Service Card

Drew Marine Names Kay New Marketing VP

John P. Kay Sr. was appointed vice president marketing and business development by Ashland Chemical's Drew Marine Division. He will be responsible for Drew's global marketing functions, in addition to the New Business Development teams he managed in his previous role as vice president planning and development. Mr. Kay holds a bache-



lor's degree in marine engineering from the U.S. Merchant Marine Academy in Kings Point, NY. He joined Drew Marine in 1964 and has served in various positions.

Circle 109 on Reader Service Card

Bollinger Promotes Roussel

Craig Roussel has been named

director of business development for Bollinger Shipyards.

He will be involved with expansion programs, infrastructure improvements, workforce development, environmental issues and government relations.


Prior to his position at Bollinger, Mr. Roussel served as CEO of the South Central

Planning and Development Commission (SCPD).

"Bollinger Shipyards has always played an important role in my life. My first part-time job was at Bollinger when I was 16, and now 18 years later I am going back home to Lockport," said Mr. Roussel.

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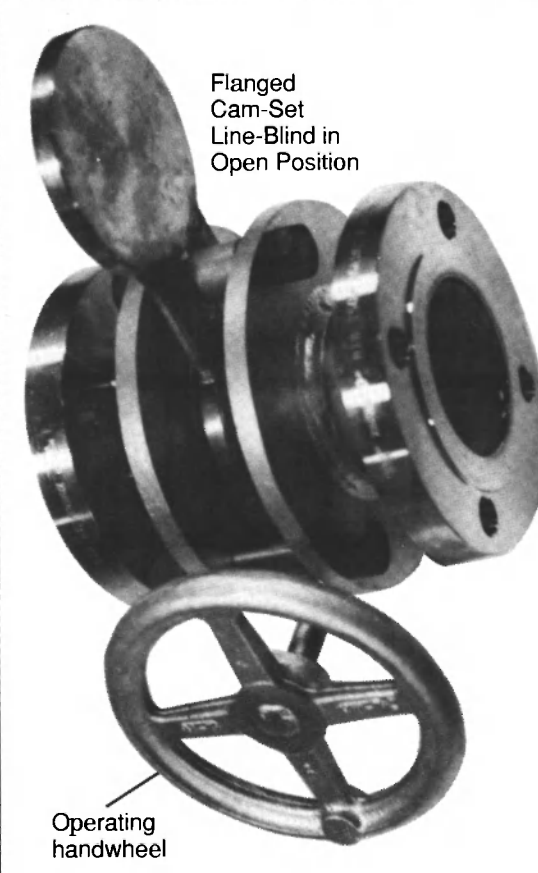
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Circle 371 on Reader Service Card

MaK Presents New Long-Stroke Engine

The release of the M43 marine diesel engine from the German manufacturer MaK marks the fourth series in the engine makers new generation of long-stroke engines.

The engines of the M43 series will cover the power and cylinder ranges from where the M32 series left off and will be available in six, seven, eight and nine-cylinder in-line versions. Also, the 12, 14, 16 and 18-cylinder V configurations will cover output ranges from 10,800 to 16,200 kW. The M43 series features many advances in design principles since the M series was first manufactured in 1992 with the M20, M25 and M32. Among the new features are a high

stroke-bore ratio of 1.4, a 900 kW/cylinder output, fuel consumption of 175 g/kWh at 0.6 g/kWh lubricating oil consumption and long overhaul intervals for wearing parts. In addition, IMO requirements of NOx reduction are met by means of a high-compression ratio and a corresponding firing pressure at attendant low consumption.

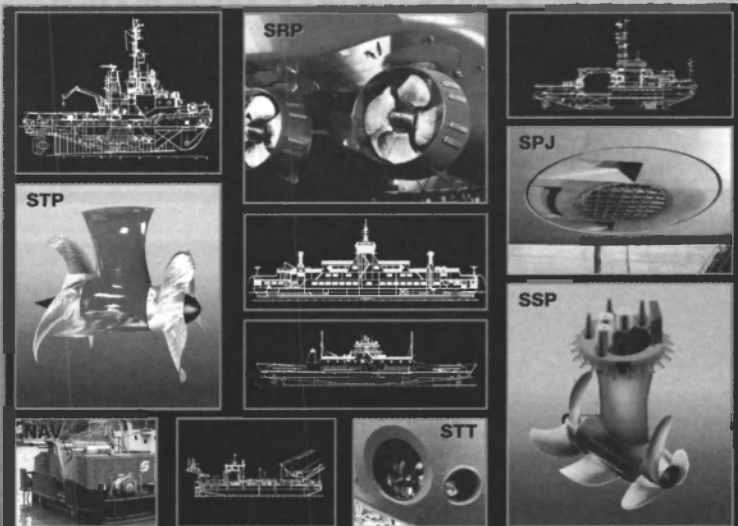
The overall range of application of these new MaK engines is intended to be versatile.

The in-line engines are designed mainly for marine applications, covering all essential ship types from multi-purpose to special-purpose ships; while the V-engine is suited for passenger ships.

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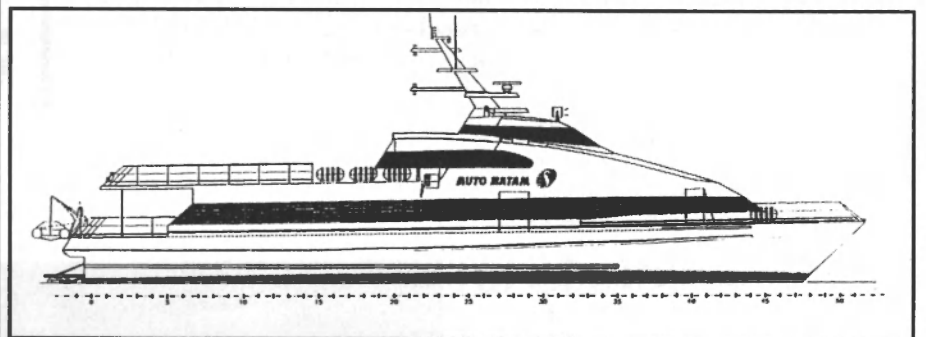
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Circle 372 on Reader Service Card

Cat-Powered Ferry Enters Service For SembFerries



This 131-ft. (40-m), 30-knot ferry recently entered service in Singapore. The vessel's propulsion package includes Caterpillar engines, Kamewa waterjets and ZF gears.

SembFerries Auto Batam took delivery of a new 131-ft. (40-m) catamaran passenger ferry built by Kvaerner Fjellstrand Shipyard in Singapore. The vessel is powered by Caterpillar 3512 Series B electronically controlled diesel engines, and is regarded as a very important contract for Caterpillar's Singapore subsidiary, Caterpillar Asia, as it is the first Singapore-built fast transport vessel to use Cat engines.

The 300-passenger vessel has a service speed of 30 knots and operates out of Singapore in the SembFerries Auto Batam fleet, providing service to the resort island of Tioman in Malaysia and Riau Islands in Indonesia.

The Cat 3512B engines are rated at 1,454 bkW at 1,826 rpm, and drive twin Kamewa waterjets

through ZF reduction gears.

The 3512B units use a micro-processor-based electronic control system, which is designed to accurately control fuel delivery for optimal fuel efficiency.

Circle 111 on Reader Service Card

Hamworthy Expands Services In Singapore

Hamworthy Marine, a manufacturer of marine equipment, has opened a new sales and service center in Singapore to handle its expanding business.

The new center includes a workshop and dock facilities, and is equipped to overhaul all products supplied by the company, including Svanehoj's deepwell cargo pumps.

Circle 112 on Reader Service Card

Business Is Booming At Atlas Marine

Atlas Marine Services, Inc. enjoyed a healthy bottom line last year, and has completed the following catering area renovations: During the two week drydocking of Royal Caribbean *Song of America's* at NORSHIPCO, the renovation of the ship's Veranda Café and the pot wash area in the main galley, replacement of freight elevator doors and frames, and installation of a beverage counter; Renovation of the six main galley and dining room waiter station on *Viking Serenade*; Renovation of the Lido Café on *Crown Princess*; and Emergency Galley renovations on *Rhapsody of the Seas* and *Noordam*.

Circle 46 on Reader Service Card

MHS Increases Support Of Vessels At Sea

Maritime Health Services (MHS), a division of AEA International, USA, has announced an agreement with Heartstream for the distribution of the ForeRunner Automatic External Defibrillator (AED). AEA is a leader in providing medical support to vessels at sea, and will market the ForeRunner through its MHS division. The ForeRunner is used to automatically deliver life saving defibrillation therapy to victims of Sudden Cardiac Arrest (SCA).

Circle 47 on Reader Service Card

Slater Launches Marine Transportation Study Effort

In anticipation of a substantial surge in the demand for marine transportation facilities in the 21st century, U.S. Transportation Secretary **Rodney E. Slater** has announced a new effort to ensure that U.S. waterways, ports and their intermodal connections meet user needs, public expectations and the nation's need for efficient, safe and environmentally sound transportation.

"President **Clinton** is committed to common sense in government that serves our nation's interests," said Secretary **Slater**. "This review will help develop comprehensive strategies to address the dynamic growth in shipping and serve as a means to improve the nation's waterways, ports and their intermodal connections."

A national conference scheduled

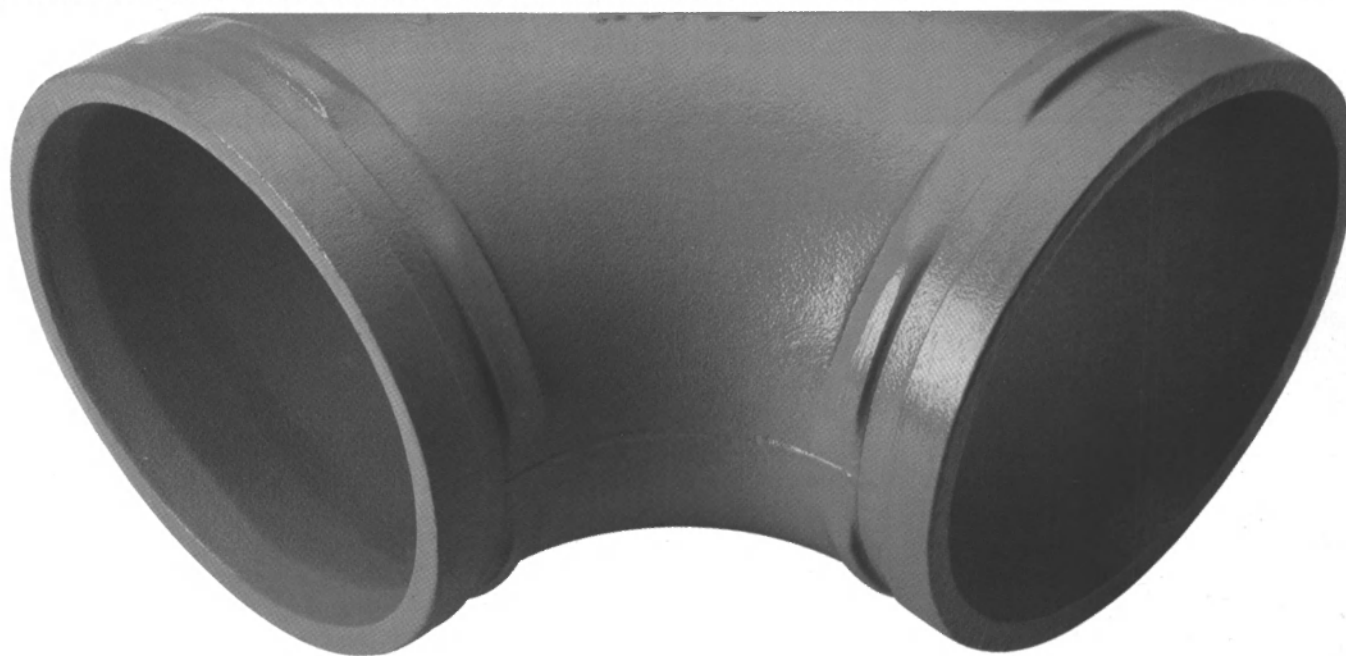
for this fall will address key issues identified in the regional listing sessions, develop solutions and explore potential strategies. The conference will also develop a vision for an improved and more cooperative approach to the delivery of federal services. Marine transportation currently carries 95 percent of U.S. overseas trade, and projections show that U.S. for-

eign ocean borne trade is expected to more than double by 2020.

Joining agencies of the department in the review effort are the Army Corps of Engineers and National Imagery and Mapping Agency from the Department of Defense; the Interior Department's Minerals Management Service; the Commerce Department's National

Oceanic and Atmospheric Administration; and the Environmental Protection Agency.

Participating Transportation Department agencies include the U.S. Coast Guard, Maritime Administration, St. Lawrence Seaway Development Corp. and the department's Offices of Intermodalism and Transportation Policy.



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Circle 320 on Reader Service Card

SCANDINAVIAN REPORT

(Continued from page 82)

shipbuilder, one with many yards strategically positioned around the world, but similar in that they offer a variety of specialized, high value vessels and innovations. Speaking with his Norwegian Shipbuilding Association hat on, **Arnt S. Hana**, vice president, shipbuilding for Kvaerner ASA, said that the challenges facing Norwegian shipbuilders is the

country itself, considering the high cost of doing business here. He maintains that the shipyards, to survive, must stay at the forefront of technology and continue to develop and deliver specialty, niche vessels. The shipowner association's primary concern today is brokering a parallel system to its main competitors, the European yards, in terms of subsidies.

In terms of ship's equipment, it's worthy to reiterate that Norwegian manufacturers continue to develop advanced solutions for all of the

world's fleet. (Or, as a recent example points out, buy a worthy competitor, as Ulstein recently announced its acquisition of Bird Johnson for \$24 million).

The concept of developing advanced technology and marketing it for a variety of applications is embodied in the attached story regarding Brunvoll's marketing of thrusters to the cruise ship market (see story, page 86)

Jan Spilleth of the Norwegian Trade Council points out that one of the biggest challenges to ship

equipment makers remains falling prices, even though development and manufacturing costs remain high. In an effort to remain competitive, Norwegian suppliers are quickly building relationships among yards, owners and equipment suppliers, in an effort to garner help in developing new equipment. As margins continue to tighten, **Mr. Spilleth** said that suppliers might look to extend their markets to, for example, the Far East, a move that would eventually entail local production.

(Continued from page 87)

position in the cruise ship market, extending contractual links with both Carnival Corporation and Royal Caribbean International. In addition to the \$375 million newbuilding of 2,100 passenger-capacity ordered by Carnival this year as the start of a further three-ship program, the Finnish company booked a \$390-million vessel for

Costa Crociere, the Italian affiliate of Carnival, and U.K. firm Airtours.

Aker Finnyards' workload has been bolstered by commitments to new RoRo tonnage by prominent Finnish operators maintaining regular, year-round Baltic links with the U.K. and Continental Europe.

The \$45.5 million contract with

Rederi AB Engship for a 9,300-dwt trailer and freight ferry, followed by a \$91 million deal with Bore Line for two 11,000-dwt, 2,600-lane-meter freight ships, underscores the versatility of the Rauma yard, in which Aker Maritime has secured a 60 percent stake.

The production program this year has otherwise included the latest hybrid icebreaker-cum-offshore construction vessel ordered by the Finnish authorities, and a drilling deck structure for a shuttle tanker adaptation project, in addition to a purpose-designed Baltic bulker and fast surface combatant for the Finnish Navy.

Finnyards design, materials and production know-how in the large, fast ferry field — which assimilated during the R&D for, and construction of, Stena's huge HSS catamarans — provides a technological resource to be tapped

again when market conditions warrant.

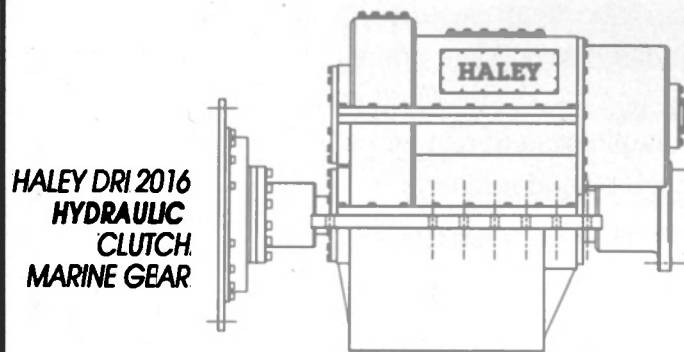
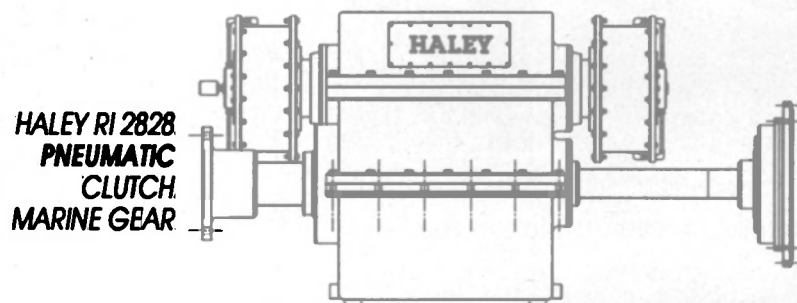
As part of the deal which has taken the Norwegian group into Finland, Aker Maritime has the right and the obligation to acquire the balance of 40 percent in Aker Finnyards over the next three years. At present, that holding is in the lap of FY-Industries, representing the interests of the Finnish forestry products company UPM-Kymmene, investment firm Optiom and the Finnish state.

Possibilities for cooperation with Aker Group shipbuilders in Norway are under evaluation. Two Norwegian yard clusters, the Langsten Group and Brattvaag Industrier, are majority-owned by Aker RGI. Langsten encompasses three shipyards and a fabricator, while Brattvaag also takes in Soviknes Verft, bought from Den Norske Bank in 1996.

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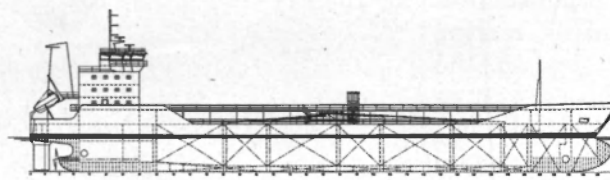
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Circle 300 on Reader Service Card

(Continued from page 88)

bank's strategy of getting and keeping quality customers. "We take care of our existing clients, and strive to be the lead bank for them," said **Sture**. "Some banks are 'in today, out tomorrow.' We have a target list of new potential clients, but we want to be known as a long-term relationship maker."

Diversity Lays Foundation For Future

While helping customers attain the funds needed for expanding and improving will always be a cornerstone of DnB's shipping business, the group is noticing that a larger part of its revenue is coming from non-finance related areas, and it is increasingly relied upon as a provider of information and services. For example, in 1997, 42 percent of DnB's overall income came from non-lending activity (for maritime-specific accounts, the percentage was a bit lower at about 35 percent). "Lending is our core business, but non-lending activity is picking up," said **Sture**.

Circle 101 on Reader Service Card

Delmar To Provide Offshore Mooring Services

Delmar Systems signed a five-year agreement with Shell Deepwater Development to provide the first suction anchor/mooring system in the Gulf of Mexico for use on Shell's Mobile Drilling Unit. The pre-deploying unit will be operational in depths of 8,000 ft. (2,450 m) and will utilize a 3.75 in. USHA Martin Industries mooring wire with a 2,000 ton strength.

LR Wins Amoco Contract

Lloyd's Register (LR) has been awarded the exclusive contract for the preparation and implementation of DCR and PFEER written schemes for all Amoco (U.K.) Exploration Company-operated installations in the North Sea. The contract will run for three years with an option for two more and covers all of Amoco's 23 installation verification schemes.

Circle 154 on Reader Service Card

GPA Completes Deck Expansion

Guido Perla and Associates, Inc. (GPA) recently finished naval architecture and marine engineering work aboard Atlantic Marine's *Kanesville Queen* to expand the Texas deck of the vessel. Among the new additions were 4,000-sq.-ft. of gaming space along with 200 gaming positions, 2,000-sq.-ft. of crew space, surveillance systems and expanded ceiling heights for a more open gaming experience.

Circle 150 on Reader Service Card

Davies Wins ISO Certification

Davies Industries, Inc. has updated its Quality Assurance Program status from its approved NATO-AQAP to the internationally recognized ISO 9001 for the fabrication and conversion of offshore structures, military and commercial shipbuilding and

repair, heavy industrial components and program management and engineering. Davies is the first shipyard in Quebec to receive this certification.

Sharp Unveils New Division

George G. Sharp, Inc. will form a new division dedicated to multi-media development in the areas of internet technology, computer-based training, design and implementation, as well as aiding in integrating several media packages into one media form. The new division, dubbed Sharp Ideas, will have offices in Alexandria, Va, and New York City.

Circle 151 on Reader Service Card

Marine Data Secures Tanker Deal

U.K. navigation equipment supplier Marine Data has secured an order to equip more than 20 Singapore-owned tankers with its MD 76 off-course alarm.

Circle 152 on Reader Service Card

GL Realigns For Asian Expansion

Germanischer Lloyd (GL) opened a newly renovated and expanded office in Sri Lanka in order to serve the South East Asian region with full classification, inspection and technical advisory service. The inauguration was performed by Consul **Rainer Schoendube**, a member of the Executive Board of GL.

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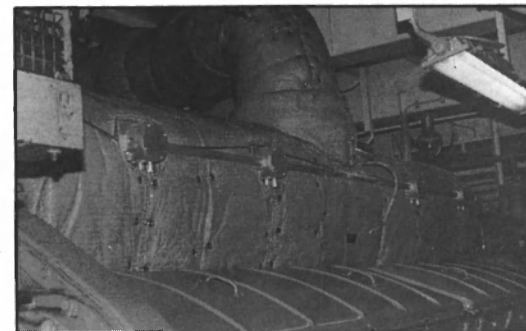
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Bollinger Commences Delivery Of USCG Vessels

Bollinger Shipyards Inc. has begun delivery of a series of eight offshore oilfield utility vessels built under the new U.S. Coast Guard (USCG) Subchapter L regulation. These work boats, for Gilco Supply Boats and Plaisance Marine Inc., remain under 100 gt at 145.6 x 36 x 11.6 ft. (44.3 x 11 x 3.5 m) and are certified to carry methanol.

"The most significant regulation that affected utility vessel design was the damage stability criteria," explained **Dennis Fanguy**, Bollinger technical director of Engineering. To comply with the requirements while meeting those of the offshore oilfield, the new Bollinger design incorporates wing tanks around the engine room. These new utility boats, constructed at Bollinger's Lockport, La., main yard, will operate in the Gulf of Mexico.

MSRC Signs Dispersant Contract With MIRG

Marine Spill Response Corporation (MSRC) has executed a contract with Marine Industry Resources-Gulf (MIRG) for dispersant application services for MSRS customers. Through this contract, MSRC will have access to three dedicated, fixed-wing dispersant application aircraft based in Houma, La., from Airborne Support, Inc. (ASI); an aircraft of opportunity ADDS Pack based in Fort Lauderdale, Fla.; and an inventory of dispersant. MSRC provides oil spill response services throughout the U.S. East, Gulf and West coasts, the U.S. Caribbean, the Hawaiian Islands and internationally to facility and vessel owners and operators.

Austal Wins Second Contract From French Interest

Austal Ships has won its second contract from French maritime group **Compagnie Chambon** for the construction of a 131.2 ft. (40 m), high-speed passenger catamaran. Scheduled for

High Speed Ferry Main Particulars	
Length, o.a.	131.2 ft. (40m)
Beam, molded	35.4 ft. (10.8 m)
Draft	4.6 ft. (1.4 m)

delivery in December, the new aluminum catamaran will operate with Chambon's French Caribbean fast ferry operation L'Express Des Iles, and will join 157.4 ft. (48 m) car ferry Jade Express, currently nearing completion at Austal's Western Australian shipyard.

The new 40-m catamaran is designed to carry 302 passengers and will be powered by twin MTU

16V 396TE74L engines, delivering a fully loaded service speed of 35 knots. The propulsion system will comprise two MTU diesel engines, two Kamewa waterjets and two Reintjes gearboxes. The vessel will provide inter-island links between Guadeloupe, Marie Galante and Les Saintes.

Circle 99 on Reader Service Card

Kvaerner Wins P&O Deal

Kvaerner ASA subsidiary Kvaerner Warnow Werft yard in Germany has won a contract to build three container vessels for P&O Nedlloyd.

The contract reportedly secures the capacity of the yard until 2000.

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Circle 360 on Reader Service Card

DGC Wins Contract

Deep Gulf Contractors (DGC) was awarded a contract by British-Borneo Exploration Inc. for the transport and installation of four completion guide bases and to keel haul four subsea trees to drilling rig Ocean Endeavor for the Morpeth Field development. DGC will perform this work using anchor handling vessels equipped with special A-frames. The 50-ton completion guide bases will be transported to the field on the stern of anchor handling vessel Sea Aker Star. On site, they will be lifted out over the stern using the A-frame and then lowered down and positioned on the seabed. The 25-ton subsea trees will be transported to the field on an anchor handling vessel.

On-Site Approval Speeds Australian Shipbuilding

According to George Spiliotis, principal surveyor for Germanischer Lloyd (GL) (Australia) Pty. Ltd., the approval of vessel plans on-site in the shipyard where they are being built is speeding up the construction of fast ships in Australia.

"On-site plan approvals, decided on a case-by-case basis, greatly reduce the time required for class approvals and facilitate better communications between all parties involved," said Mr. Spiliotis. Normal practice among class societies has been to approve plans at either the society's office in any particular country, or for the plans to be submitted to the society's head office. "Experts from the High Speed Craft (HSC) department at the Head Office of Germanischer Lloyd have already carried out plan approvals on site in the West Australian shipyard of Austal Ships," said Mr. Spiliotis, who added that this had been the case with semi-SWATH catamarans built at Austal, and will also be applied to three fast ships for Turkish and Greek interests to be built at Austal.

Interocean Ugland Purchases MMS Systems For Entire Fleet

Global marine software provider Marine Management Systems, Inc. (MMS) has won a \$500,000 contract from InterOcean Ugland Management AS for Fleet Manager Enterprise systems for InterOcean's fleet of more than 30 vessels. The MMS system manages inventory, ordering, planned maintenance, communications, e-mail, vessel reporting, personnel, payroll, forms, IACS and classification requirements.

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Above: USCG 47MLB - 13 Stidd seats aboard. - photo by Dan Nurney
Right: NY Fast Ferry waterjet catamaran - 3 Stidd Series 500 seats at the helm. - photo by Jack Davis



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April

Intermodal '98: April 14-16, San Paulo, Brazil.

Contact: Grupo Update, tel: +55 11 315 9900; fax: +55 11 816 7446.

China fast ferry and commercial craft show: April 14-17, Shanghai, China.

Contact: Proshow, Simon Connolly, tel: +44 171 376 7777; fax: +44 171 352 0818; e-mail: prospa@compuserve.com.

INEC 98: April 15-17, HMS Sultan.

Contact: ImarE, Anna Evripidou, tel: +44 171 488 2084; fax: +44 171 488 1854; e-mail: ae@imare.org.uk.

Corrosion and the Environment: April 15-17, Bath, UK.

Contact: Colin Britton, NACE, tel: +44 1635 202329; fax: +44 1635 202329; e-mail: cbrit79727@aol.com.

SPE/DOE Improved Oil Recovery Symposium: April 19-22, Tulsa, OK.

Contact: Society of Petroleum Engineers, tel: +44 171 487 4229; fax: +44 171 487 4229.

Metocean Studies in the Atlantic Margin: April 20-21, Dublin Castle, Ireland.

Contact: Marine Institute, 80 Harcourt Street, Dublin 2, Guy Gilbert, fax: +353 1 478 4988; e-mail: guy.gilbert@marine.ie.

Marine Surveying Forum 1998: April 20-21, Park Lane Hotel, Antwerp, UK.

Contact: IBC, Mary Mavrogheni, tel: +44 171 453 2076; fax: +44 171 453 2117; e-mail: mary.mavrogheni@ibcuk.co.uk.

1st Finance and Risk Management in the Oil and Gas Business Conference: April 20-21, The Hyatt Carlton Tower Hotel, London.

Contact: LLP, Andrew Luxton, tel: +44 171 553 1111; fax: +44 171 553 1363; e-mail: conferences@llplimit-ed.com.

National Marine Distributors (NMDA) Partnership Conference: April 20-22, Rosemont, Illinois, USA.

Contact: NMDA, Ms. Elizabeth Kelly, Suite 411, Rittenhouse Square,

Philadelphia, PA, 19103, tel: 215 735 3303; fax: 215 735 3304.

SASMEX '98 - Safety at Sea & Marine Electronics: April 21-22, Brighton Stakis Metropole Hotel, Brighton, UK.

Contact: DMG Business Media Ltd., Lynn Stoddart, tel: +44 1737 855297; fax: +44 1737 855474; e-mail: lstoddart@dmg.co.uk.

The Mediterranean Gas Conference: April 21-22, The Bosphorus Hotel,

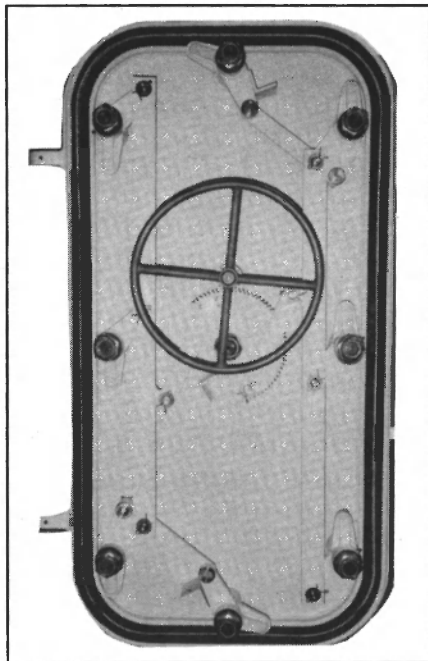
Istanbul, Turkey.

Contact: Overview Gas Conferences, tel: +44 171 613 0087; fax: +44 171 613 0094.

Subsea Controls and Data Acquisition: April 22-23, London,



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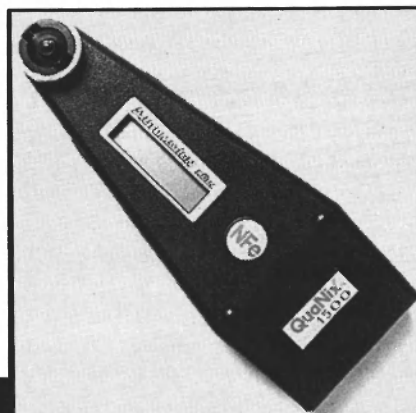
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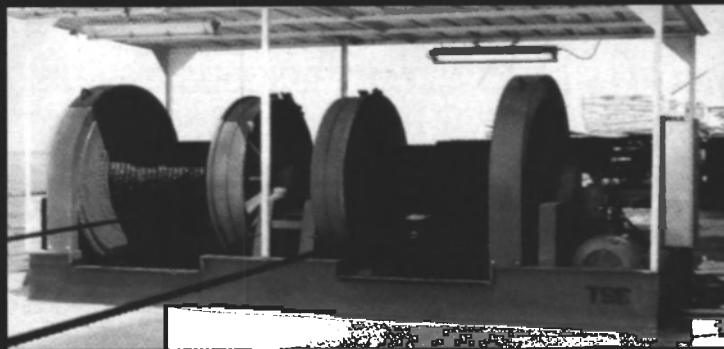
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CALENDAR

UK. Contact: Society for Underwater Technology, Innovation Centre, Exploration Drive, Offshore Technology Park, Bridge of Don, Aberdeen AB23 8GX, UK. tel: +44 1224 823637; fax: +44 1224 820236.

International Oil, Gas & Petrochemical Industries Exhibition and Conference: April 23-26, Tehran, Iran.
Contact: Orient Exhibitions, Kent, UK, Dave Stagg; tel: +44 1732 763344; fax: +44 1732 763606.

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Seafinance 2000: April 29-30, Monte Carlo.

Contact: M.&M.I., Virginie Harris, "Le Gildo Pastor Center," 7, Rue du Gabian, MC98000 Monaco, tel: +377 9777 8321; fax: +377 9777 8323.

Offshore Safety, are you on track?: April 28-29, The Aberdeen Marriott Hotel, Aberdeen, UK.

Contact: IBC, Angela Broadhead, tel: +44 171 453 2058; fax: +44 171 453 6858, e-mail: angela.broadhead@ibcuk.co.uk.

Norway Oil and Gas Industry Export Conference: April 29-30, Selfridge Hotel, London, UK.

Contact: RINA, Amanda Wilkes Brough, tel: +44 171 201 2401; fax: +44 171 259 5912; e-mail: conference@rina.org.uk.

May

Offshore Technology Conference: May 4-7, Houston, TX.

Contact: OTC, Deborah Weaver, tel: 972 952 9494; fax: 972 952 9435; e-mail: dweaver@spelink.spe.org.

LNG (Liquified Natural Gas) 12: May 4-7, Perth, Australia.

Contact: LNG 12 NOC Secretariat, The Australian Gas Association, GPO box 323, Canberra ACT 2601, Australia. tel: +61 6 2473955; fax: +61 6 2471554; e-mail: canberra@ausgas.afn.au.

ASTM Committee: May 6, Atlanta, GA.

Contact: Glenn Ashe, ABS Americas, Government Operations, tel: +1 703 519 0801; fax: +1 703 519 1898.

7th EURASLIC biennial meeting: May 6-8, Athens, Greece.

Contact: EMAP Construct, tel: +44 171 505 6625.

(Continued on page 99)

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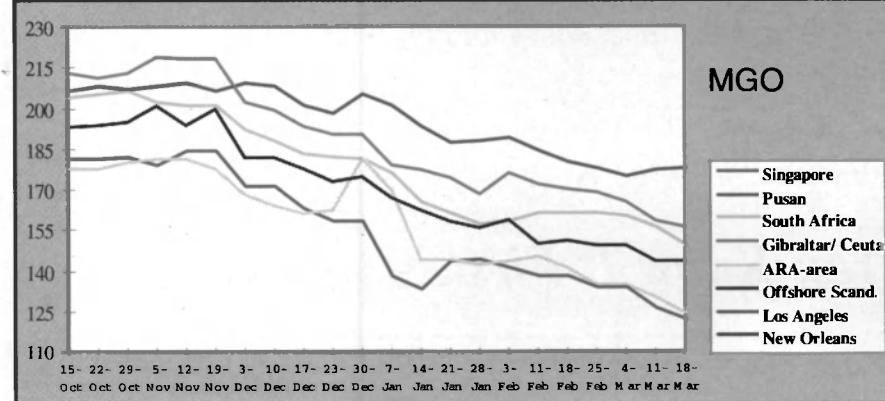
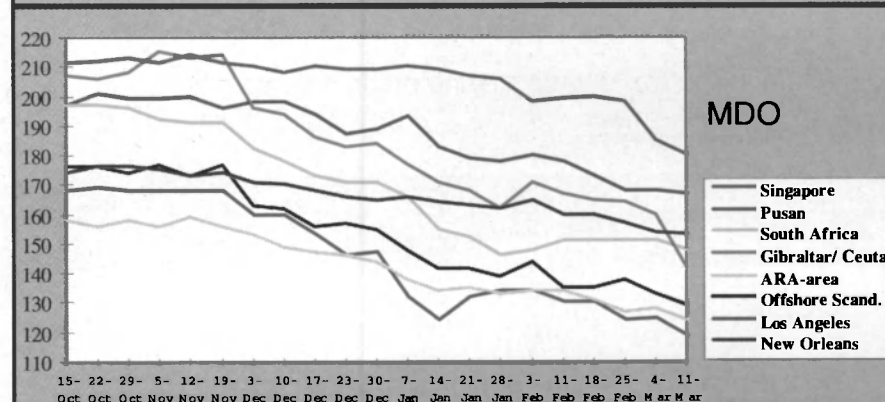
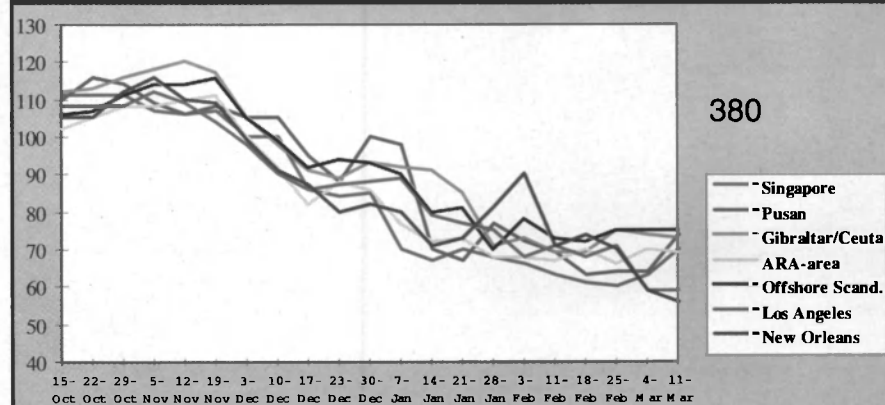
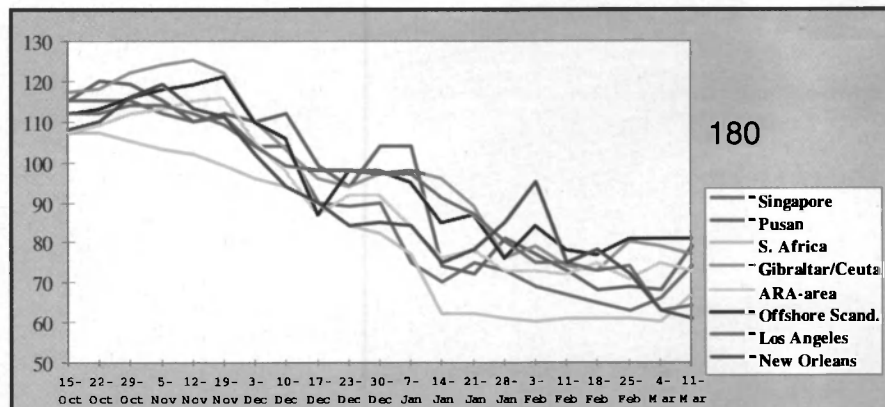
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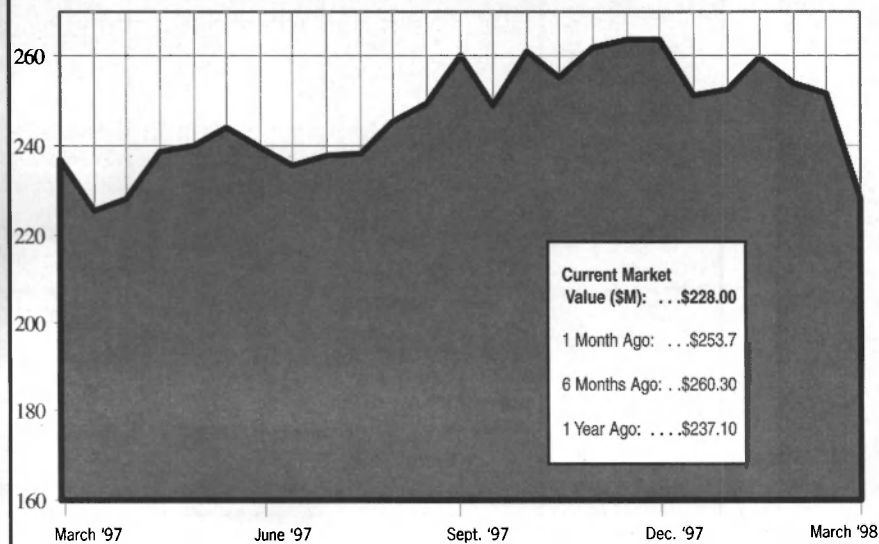
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Recent Ship Sales

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

Date Reported	Vessel Name	Vessel Type	DWT	Year Built	Sale Price (M)
2/13/98	Soya	Bulker	12,048	75	\$1.1
2/27/98	Green Maya	Bulker	19,140	80	\$2.5
2/6/98	Kappa Star	Bulker	19,158	77	\$2.6
2/27/98	Samsun Earnest	Bulker	33,024	86	\$9.6
2/6/98	Matumba	Bulker	35,264	74	\$1.2
2/20/98	Korean Pioneer	Bulker	36,757	83	\$6.2
2/27/98	Naivasha	Bulker	38,406	74	\$1.5
2/20/98	Mary M	Bulker	40,999	75	\$1.4
2/13/98	United Ocean No. 1	Bulker	45,000	98	\$22.7
2/27/98	Mosdeep	Bulker	49,000	81	\$5.6
2/20/98	Astraguillermo	Bulker	64,221	89	\$7
2/20/98	Singapore Ace	Bulker	133,082	82	\$8.5
2/27/98	Nord Sea	Bulker	140,532	85	\$13.2
2/6/98	Shin Ogishima Maru	Bulker	194,109	81	\$10.1
2/20/98	Maritza	Tanker	16,540	76	\$1.1
2/20/98	Nordamerika	Tanker	28,500	98	\$28
2/6/98	Asahi Maru	Tanker	37,282	75	\$3.5
2/6/98	Brahms	Tanker	51,173	72	\$3.8
2/6/98	Seadance	Tanker	81,283	80	\$14
2/27/98	Metsovan	Tanker	87,650	79	\$13
2/20/98	Flores Sea	Tanker	98,930	76	\$5.1
2/13/98	Tanana	Tanker	141,720	92	\$42
2/6/98	Jahre Trader	Tanker	142,031	89	\$44
2/6/98	World Eminence	Tanker	261,785	75	\$11.5

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.

CALENDAR

(Continued from page 96)

TransEastMed '98: May 10-13, Egypt.
Contact: International Trade & Exhibitions, Ms. Doreen Bohnke, Byron House, 112 Shirland Road, London W9 2EQ, tel: +44 171 2869 720; fax: +44 171 2860 177.

Conference of the West European Confederation of Maritime Technology Societies (WEMT): May 12-14, Rotterdam, The Netherlands.
Contact: Netherlands Society of Maritime Technology, J.M. Veltman, tel: +31 10 4361042; fax: +31 10 4364980.

RoRo '98: May 12-14, Gothenburg, Sweden.
Contact: Ronald AB Sim, RoRO Secretariat, 2 Station Road, Rickmansworth, Herts Wd3 1QP, England, tel: +44 1923 776363; fax: +44 1923 777206; e-mail: secretariat@bml.org.uk.

United States Marine Safety Association: May 13-15, Block Island, RI, USA.
Contact: Kim Soldavin, Administrative Director, tel: 215 564 3484; fax: 215 963 9785.

International Conference of Rigid Inflatables/ RIBEX '98: May 14-15, The Pavilion, Weymouth, Dorset, UK.
Contact: RINA, tel: +44 171 235 4622; fax: +44 171 259 5912; e-mail: RINARCH@AOL.COM.

First International Conference on Maritime Technology, issues in communication and translation: May 15-16, Brussels, Belgium.
Contact: Institut superieur de traducteurs at interpretes, ISTI, Daniel L. Newman, tel: +32 2 345 9870; fax: +32 2 346 2134.

22nd CIMAC - International Congress on Combustion Engines: May 18-22, Copenhagen, Denmark.
Contact: CIMAC, Thorsten Herdan, tel: +49 69 6603 1567; fax: +49 60 6603 1566; e-mail: herdan_krn@vdma.org.

Asia Ports '98: May 19-20; Kowloon Shangri-La Hotel, Hong Kong.
Contact: IIR Ltd., tel: +852 2586

1777; fax: +852 2507 5666.
Lisbon Expo '98: May 22 - September 30, Lisbon, Spain.
Contact: FCO, Denis Healy, tel: +44 171 210 3823; fax: +44 171 210 3754.

ISOPE 98 (Offshore and Polar Engineering): May 24-29, Montreal, Canada.
Contact: ISOPE, Prof. Jin S. Chung, tel: 303 273 3673; fax: 303 420 3760.

International Harbour Masters' Association: May 24-30, Amsterdam, The Netherlands.
Contact: Congrex Holland bv, tel: +31 20 5040 203; fax: 31 20 5040 225; e-mail: ihma98@congrex.nl.

(Continued on page 101)

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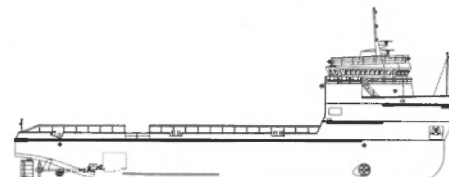
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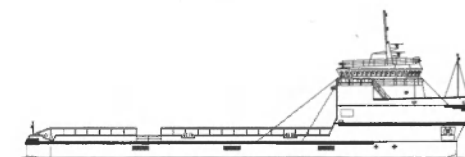
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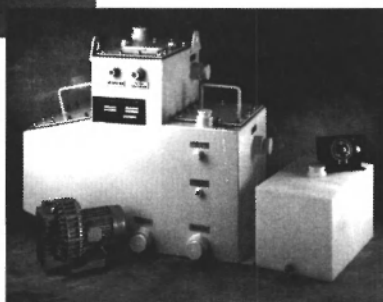
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Ferlship's New Contracts

Orders are listed alphabetically, by vessel type. Publisher is not responsible for errors or omissions. For additional information on this, or other ship market information, contact: Ferlship, Paseo De San Francisco De Sales, 8, 28003 Madrid, Spain, tel: +341 441 4138; fax: +341 441 4138.

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MATSUSHIMA KAIUN	JAPAN	IMABARI SHIPBUILDING	JAPAN	BULK CARRIER	1	28,000	98	—
EGON OLDENDORFF	GERMANY	SHANGAI SHIPYARD	CHINA	BULK CARRIER	1	48,000	00	\$23.5
EGON OLDENDORFF	GERMANY	CHINA SHANGHAI	CHINA	BULK CARRIER	1	48,000	99	\$24
HACHIUMA KISEN	JAPAN	SANOYAS	JAPAN	BULK CARRIER	1	45,000	98	—
N.Y.K. (NIPPON YUSEN KAISHA)	JAPAN	OSHIMA SHIPBUILDING	JAPAN	BULK CARRIER	1	47,000	99	\$20.6
K LINE	JAPAN	OSHIMA SHIPBUILDING	JAPAN	BULK CARRIER	1	47,000	99	\$20.6
MEIWA KAIUN	JAPAN	IMABARI SHIPBUILDING	JAPAN	BULK CARRIER	1	28,000	00	—
NAVIX LINE	JAPAN	ITSUI	JAPAN	BULK CARRIER	1	50,000	99	\$21
MO SHIP MANAGEMENT	JAPAN	SANOYAS	JAPAN	BULK CARRIER	1	35,000	99	—
UNKNOWN	—	TSUNEISHI	JAPAN	BULK CARRIER	1	45,000	99	—
NISSHO KISEN	JAPAN	IMABARI SHIPBUILDING	JAPAN	BULK CARRIER	1	28,000	00	\$15.9
K LINE	JAPAN	OSHIMA SHIPBUILDING	JAPAN	BULK CARRIER	1	36,000	99	—
ITOCHU CORP.	JAPAN	NAIKAI	JAPAN	BULK CARRIER	1	28,000	00	\$15.9
OLDENDORFF ASIA	SINGAPORE	SHANGAI SHIPYARD	CHINA	BULK CARRIER	1	48,000	00	—
NTT	JAPAN	mitsubishi H.I.	JAPAN	CABLE SHIP	1	—	99	—
MATHIES	GERMANY	J.J. SIETAS	GERMANY	CONTAINER	1	6,650	98	—
UNKNOWN	—	THYSSEN NORDSEWERKE	GERMANY	CONTAINER	2	—	99	—
HEINRICH	GERMANY	J.J. SIETAS	GERMANY	CONTAINER	1	6,650	98	—
ERNST RUSS	GERMANY	J.J. SIETAS	GERMANY	CONTAINER	1	6,650	98	—
CLAUS-PETER OFFEN	GERMANY	FLENDER WERFT	GERMANY	CONTAINER	1	—	98	—
NATIONAL IRANIAN TANKER CO (NITC)	IRAN	DAEWOO	KOREA	CRUDE OIL TANKER	2	98,000	01	\$100
NATIONAL IRANIAN TANKER CO (NITC)	IRAN	DAEWOO	KOREA	CRUDE OIL TANKER	3	98,000	00	\$150
NAVIX LINE	JAPAN	mitsubishi H.I.	JAPAN	CRUDE OIL TANKER	1	259,999	00	—
SHOEI KISEN	JAPAN	KOYO DOCK	JAPAN	CRUDE OIL TANKER	1	107,000	98	—
COSTA CROCIERE	ITALY	KVAERNER MASA-YARDS INC	FINLAND	CRUISE	1	—	00	\$390
ROYAL CARIBBEAN INTERNATIONAL	U.S.	MEYER WERFT	GERMANY	CRUISE	1	—	01	\$350
ROYAL CARIBBEAN	U.S.	CHANTIERS DE L'ATLANTIQUE	FRANCE	CRUISE	2	—	00/01	\$680
ROYAL CARIBBEAN INTERNATIONAL	U.S.	KVAERNER MASA-YARDS INC	FINLAND	CRUISE	1	—	02	\$500
CARNIVAL CORPORATION	U.S.	KVAERNER MASA-YARDS INC	FINLAND	CRUISE	1	—	00	\$375
HOLLAND AMERICA LINE -CARNIVAL	U.S.	FINCANTIERI	ITALY	CRUISE SHIP	1	—	00	\$300
NISSHO Iwai	JAPAN	MURAKAMI HIDE	JAPAN	CHEMICAL TANKER	1	8,550	99	—
STENERSEN	NORWAY	JIANGNAN	CHINA	CHEMICAL TANKER	1	13,700	99	\$22
CHANGJIANG OIL TRANSPORT	CHINA	LINDENAU	GERMANY	CHEMICAL/ OIL TANKER	2	13,000	99	—
FINBETA	ITALY	CANTIERE NAVALE MARIO MORINI	ITALY	CHEMICAL/ OIL TANKER	1	12,000	99	—
VAN DORD ACZ	NETHERLANDS	IHC HOLLAND	NETHERLANDS	DREDGER	1	—	98	—
SAIPEM	PORTUGAL	SAMSUNG	KOREA	DRILLSHIP	1	—	00	—
TRANSOCEAN OFFSHORE	U.S.	AESA (ASTANO)	SPAIN	DRILLSHIP	2	—	00	\$640
ULSUND, BERT	NORWAY	WESTCON	NORWAY	FISHING	1	—	99	—
VAN DER ZWAN	—	C.N.P. FREIRE	SPAIN	FISHING	1	—	99	—
AARSETH PM	—	SOLSTRAND	NORWAY	FISHING	1	—	99	—
UK INTEREST	U.K.	FITJAR	—	FISHING	1	—	98	—
IRVING & JOHNSON	SOUTH AFRICA	ARMON	SPAIN	FRESH FISH	2	—	99	—
VEGA-REEDEREI	GERMANY	BARKMEIJER-STROOB.	NETHERLANDS	GENERAL CARGO	1	3,280	98	—
HEINRICH	GERMANY	J.J. SIETAS	GERMANY	GENERAL CARGO	2	—	99	\$90
WAGENBORG SHIPPING BV	NETHERLANDS	BARKMEIJER-STROOB.	NETHERLANDS	GENERAL CARGO	1	3,210	98	—
HOLLAND SHIP SERVICE	NETHERLANDS	SHELDE MARINE	NETHERLANDS	HEAVY-LIFT CARGO	1	—	99	—
OFFSHORE HEAVY TRANSPORT	NORWAY	CHINA SHIPBUILDING CORP.	TAIWAN	HEAVY-LIFT CARGO	2	56,500	99	\$94
MOROCCO GOVERNMENT	MOROCCO	SLOB	NETHERLANDS	HOPPER DREDGER	1	—	99	—
UNKNOWN	—	SHITANOE	JAPAN	LPG	1	3,300	98	—
KOTOKU KISEN	JAPAN	MIURA	JAPAN	LPG	1	1,500	98	—
SINOTRANS	CHINA	BOHAI SHIPYARD	CHINA	MULTIPURPOSE	2	29,000	99	\$40
WAGENBORG SHIPPING BV	NETHERLANDS	VAN DIEPEN	NETHERLANDS	MULTI-PURPOSE CARGO	2	9,000	99	—
BYLOCK & NORDSJOFRAKT	SWEDEN	BODEWES BV	NETHERLANDS	MULTI-PURPOSE CARGO	3	—	—	—
WORKSHIPS CONTRACTORS	NETHERLANDS	DCAN	FRANCE	OFFSHORE DRILLING	1	—	99	—
ATLAS	CROATIA	RODRIGUEZ CANTIERI NAVALI	ITALY	PASSENGER	1	—	98	\$5
UNKNOWN	—	SHELDE MARINE	NETHERLANDS	PRODUCT TANKER	1	8,000	99	—
HEIWA KISEN	JAPAN	MIURA	JAPAN	PRODUCT TANKER	1	5,000	98	—
NICHIMEN	JAPAN	HYUNDAI	KOREA	PURE CAR/TRUCK CARRIER	1	—	99	\$58
mitsuhama KISEN	JAPAN	SHIN KOCHI JUKO	JAPAN	REEFER	2	9,500	99	—
US NAVY	U.S.	AVONDALE SHIPYARD	U.S.	RORO	1	28,525	01	\$228.2
TRICO MARINE	U.S.	EASTERN SHIPYARDS	U.S.	SUPPLY	2	—	98/99	—
AP MOLLER	DENMARK	VOLKSWERFT STRALSUND	GERMANY	SUPPLY	2	—	99	—
SANAGOL	ANGOLA	DAEWOO	KOREA	TANKER	1	5,400	99	—
MITSUI O.S.K. LINES (MOL)	JAPAN	mitsubishi H.I.	JAPAN	TANKER	1	259,999	00	\$83
PAKHOD SHIPPING	NETHERLANDS	SHELDE MARINE	NETHERLANDS	TANKER	1	—	02	\$24.4
GOLDEN OCEAN GROUP	HONG KONG	KAWASAKI H.I.	JAPAN	TANKER	1	300,000	00	\$83
SMIT INTERNATIONAL ANTILLES	ANTILLES	DAMEN SHIPYARDS	NETHERLANDS	TUG	1	—	99	—
CALCUTA PORT TRUST	INDIA	BHARATI	INDIA	TUG	1	—	99	—
REMOLQUES GJONESES	SPAIN	ARMON	SPAIN	TUG	1	—	98	—
FUJAIHRAH PORT AUTHORITY	UNITED ARAB EMIRATES	DAMEN SHIPYARDS	NETHERLANDS	TUG	1	—	98	—
NYK LINE	JAPAN	TSUNEISHI	JAPAN	VEHICLE CARRIER	1	13,000	99	—
MITSUI O.S.K. LINES (MOL)	JAPAN	IMABARI SHIPBUILDING	JAPAN	VEHICLE CARRIER	1	5,250	99	—
MITSUI O.S.K. LINES (MOL)	JAPAN	SHIN KURUSHIMA	JAPAN	VEHICLE CARRIER	1	15,000	00	—
MITSUI O.S.K. LINES (MOL)	JAPAN	IMABARI SHIPBUILDING	JAPAN	VEHICLE CARRIER	3	15,000	00	—

CALENDAR

(Continued from page 99)

Marichem Asia '98: May 26-27, Singapore.
Contact: Julie Barrett, Conference Manager, Turret RAI, tel: +44 1895 454545; fax: +44 1895 454647; e-mail: 100730.1313@compuserve.com.

Terminal Operations - TOC '98: May 26-28, Bouwentrum, Antwerp, Belgium.
Contact: Conference Department, tel: +44 171 453 5309; fax: +44 171 453 5306; e-mail: helenwhalley@compuserve.com.

3rd International Forum for Aluminum Ships: May 27-28, Haugesund, Norway.
Contact: Hydro Aluminum Maritime, Helge Grini Johansen, tel: +47 52 845 017; fax: +47 52 845001; e-mail: helge.grini.johansen@nst.hal.hydro.com.

June

Posidonia '98: June 1-5, Piraeus, Greece.
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5th International Caspian Oil and Gas Exhibition: June 2-5, Baku.
Contact: EIC, Tracey Edwards or Melanie Castle, tel: +44 171 221 2043; fax: +44 171 221 8813.

SPE International Conference on Health, Safety and Environment in Oil and Gas Exploration and Production: 7-10 June, Caracas, Spain.
Contact: SPE, tel: +44 171 487 4250; fax: +44 171 487 4229.

AUSVI (Association for Unmanned Vehicle Systems International) '98: June 8-12, Huntsville, AL.
Contact: AUSVI, 12000 19th Street, N.W., Suite 300, Washington, D.C., 20036, tel: 202 857 1889; fax: 202 223 4579; e-mail: ausvi@dc.sba.com.

Seawork '98: June 16-18, Port of Southampton, UK.
Contact: Kathryn Robbie or Jacqueline Blunden, Seawork '98 Secretariat, The Old Mill, Lower Quay, Fareham, Hampshire, PO16 ORA ENGLAND, tel: +44 1329 825335; fax: +44 1329 825330; e-mail: 100657.201@compuserve.com.

Euronav '98: June 17-19, Hannover, Germany.
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Mari-Tech '98: June 17-19, Ottawa, Ontario.
Contact: The Canadian Institute of Marine Engineering, Gerry Lanigan, tel: 613 828 7907; fax: 613 828 1319; e-mail: services@milsystems.com.

The 1998 Tanker Conference: June 22-23, La Jolla, CA.
Contact: American Petroleum Institute, 1220 L Street NW, Washington, D.C., 20005.

The 9th Annual Ship Finance Forum: June 23-24, New York, NY.
Contact: Institute for International Research, Lori Medlen, tel: 1 888 670 8200 (priority code U1045/FX).

Petrotech Phillipines '98: June 24-27, Manila, Philippines.
Contact: Overseas Exhibition Services Ltd., tel: +44 171 486 1951; fax: +44 171 486 8773; e-mail: oes@montnet.com.

2nd Conference for New Ship and Marine Technology into the 21st Century: June 25-7, Hong Kong. Contact: The Hong Kong Institute of Engineers, Michael K.F. Lee, fax: +852 2573 6966; e-mail: leemk@netvigator.com.

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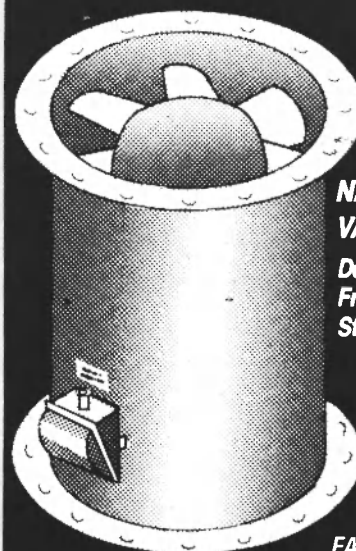
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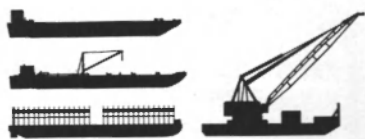
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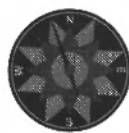
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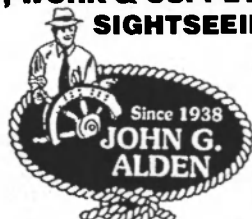
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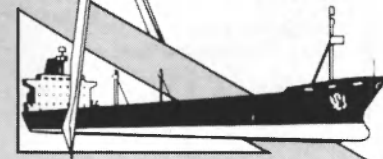
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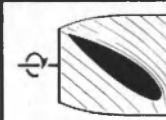


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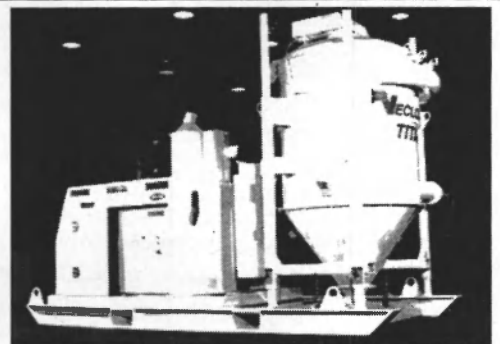
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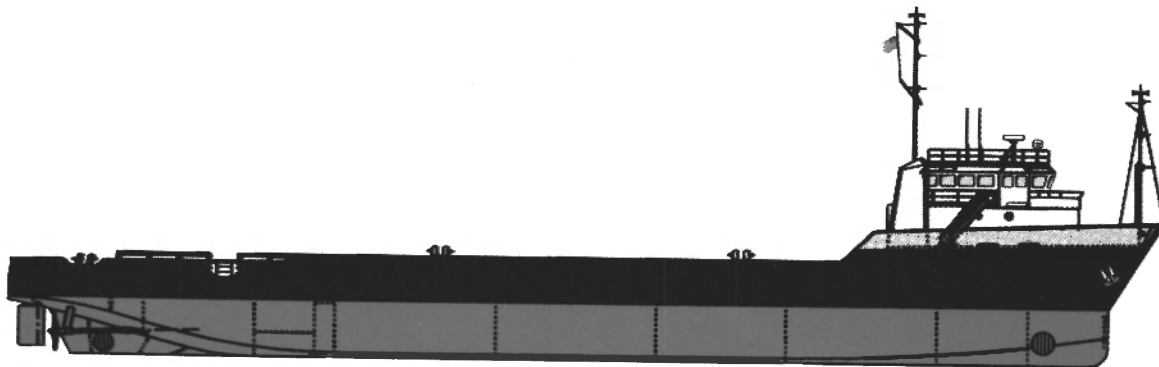
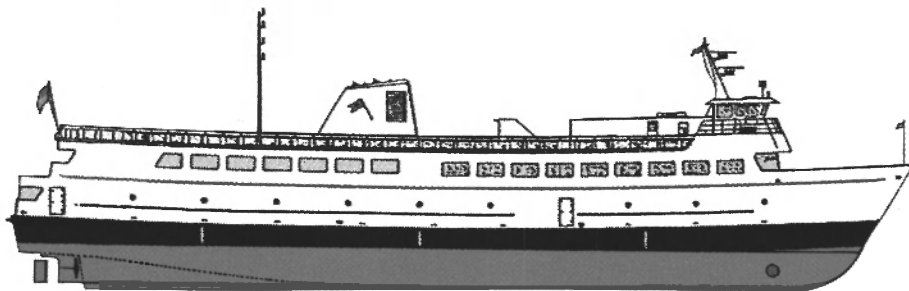
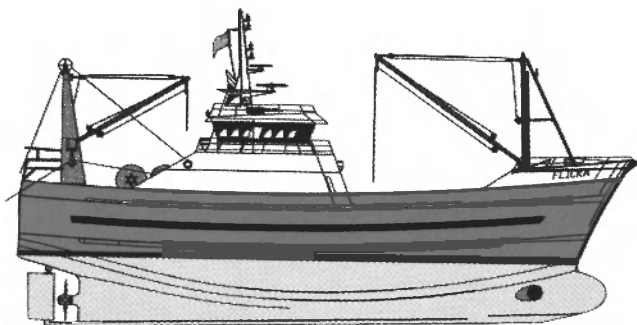
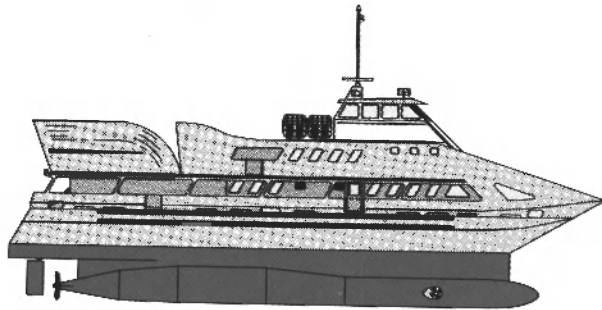
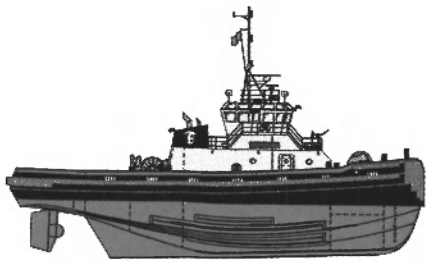
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