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Pictured on this month's cover is the Incat-built *Catalonia*. The vessel, owned by Buquebus, set a new trans-Atlantic speed record in a 3,125 dash from New York to Spain. The vessel averaged 36.65 knots, powered by four Caterpillar 3618 diesel engines generating 28,800 kW and driving four Lips jet propulsion units through Renk gears. This edition of MR/EN includes a feature on *Catalonia's* record-breaking run on page 20, in addition to a full run-down of Diesel Engine Manufacturer's latest product range, starting on page 69.

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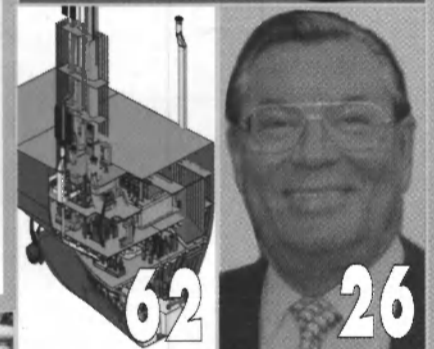
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EDITOR'S NOTE

Getting Creative

There is little doubt that the process of building and maintaining a fleet gets more and more complicated and capital-intensive with each passing year. Perhaps it can best be categorized as keeping up with overall business trends, but the maritime industry is in the grips of a very fundamental change concerning the way in which business is run.

Everything from the manner in which ships are financed to the way they are outfitted is continually changing. Phrases such as "high-yield bonds," "stock floats," and "double listings" were once foreign to an industry which was largely built on a "your handshake is as good as your signature" mentality. And while there has been a recent shake-out of these new types of deals, most analysts agree that a quality shipowners' fleet finance options will continue to expand.

"As the current growth of bond issues increases, so too does the possibility of failures," said Captain John Dalby of Marine Risk Management, speaking at a ship finance conference held recently in New York City. "Unscrupulous and desperate owners are particular risks."

Central to this industry metamorphosis is the continuing trend toward consolidation. Simply put, many owners have found that bigger is indeed better, and hardly a day now passes without news of another small owner being consumed for someone's greater corporate good.

While many may choose to lament the current tide of change, it is — in a broader perspective — simply following

a natural course of progression in which "only the strong survive."

Energy spent fighting the trend might be more wisely utilized to investigate ways in which your company can be repositioned and/or strategically aligned to be more profitable than ever.

Those who believe that the consolidation trend is a passing fad should heed the words of Barton Jones, partner, Winthrop, Stimson, Putnam and Roberts. Mr. Jones, speaking at the same ship finance conference said: "I think the high level of mergers and acquisitions will continue." Central to his reasoning is the increasingly global nature of business, as well as the fact that larger organizations can get "cheaper money," i.e. exert more leverage to negotiate more favorable financing terms. In turn, a savings of, for example, a few percentage points can have a dramatic effect on a company's return on equity.

In the end analysis, improved access to cash in a business which demands so much of it will be central to long-term survival. As shipowners are continually challenged by new rules and regulations — ISM being a prime example — and improved competition, the need to formulate and successfully execute a well-thought out business and investment strategy will only grow in importance.



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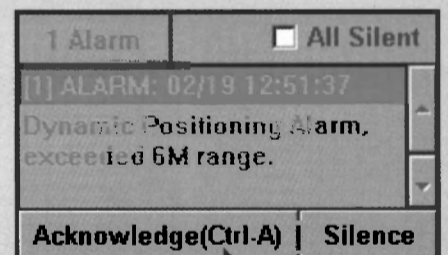
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Advanced Marine Technology

The Pacific Adventure



by David Tinsley,
technical editor

In a move to meld innovative maritime design and the latest shipbuilding techniques with space engineering technology, two remarkable vessels that will form the basis of a sea-borne satellite launching system are scheduled to be delivered to their Long Beach homeport in July and August.

The 46,000-ton displacement launch platform *Odyssey* and 50,000-gt assembly and command ship (ACS) *Sea Launch Commander* comprise the marine infrastructure of Sea Launch, the multinational consortium which plans to undertake the first-ever ocean launch of a commercial satellite on October 30, 1998.

Launches into geostationary orbit will take place from an equatorial location some 240 miles east of the Kiribati Islands, with rockets following an eastward trajectory. The entire program has been conceived as a competitive alternative to operations from established ground launch sites, providing a more affordable as well as reliable and convenient service to meet growing demand from manufacturers of telecommunications satellites.

An equatorial launch location enables the earth's rotational forces to be used to optimum effect, permitting higher payloads to be carried for a given rocket size, while an ocean platform brings the added advantage of permitting a launch into any orbit from the same mobile pad.

Sea Launch place itself at the competitive end of the market where launch prices for satellites of around 5,000 kg destined for geostationary orbit tend to be in the range of \$70-\$100 million. With market analysts having gauged some \$50 billion in projected satellite manufacturing and launch activity through the turn of the century, the founders of Sea Launch saw significant opportunity for a cost-efficient new launch system that could be brought to market rapidly, and offer customers more flexibility, capability and convenience than existing arrangements.

Full-scale preparations for the initial launch are in hand at Long Beach, where a 16-acre site previously used by the U.S. Navy has been adapted as a state-of-the-art satellite processing center in



which spacecraft will be tested, fueled and encapsulated in the Boeing-built fairings. Four shipyards in Scotland, Norway and Russia — three wholly or majority-owned by the Kvaerner Group — have brought the project for the unique vessels to fruition, as key elements in a program involving U.S., Norwegian, Russian and Ukrainian co-venturers.

The scheme breaks new ground in both marine and commercial space technology, entailing the construction of the ACS mother-ship at the Kvaerner Govan yard on the Clyde, and the reconstruction of the launch unit *Odyssey* from a former North Sea drill rig at the Stavanger premises of Kvaerner Rosenberg.

Subsequent installation of some 3,000-tons of rocket handling gear on *Odyssey* was carried out at the Kvaerner Vyborg yard in Russia. Under the contractual arrangements, *Sea Launch Commander* also transferred to Russia for more than 600-tons of electronics and communications equipment to be fitted at the Kanonerskiy Shipyard in St. Petersburg. The ACS has the dual role of a floating

factory for rocket assembly and payload integration while in port, and as an accommodation and mission control ship for commanding launches at sea.

All vessel design work was handled by the diversified technical consultancy firm Kvaerner Maritime, with offices at Lysaker, near Oslo.

Kvaerner Group, Europe's largest shipbuilding organization, with extensive interests also in engineering and construction, has a 20 percent stake in Sea Launch. In addition to undertaking the design and construction of *Sea Launch Commander*, and the adaptation of *Odyssey*, it has also been entrusted with all maritime operations. It has linked-up with Barber Ship Management to create Kvaerner Barber in Oslo, specifically for the crewing and husbandry of the two vessels.

With its 40 percent equity involvement, The Boeing Company has the largest shareholding in the venture, to which it is providing first-line marketing and support, handling mission operations, and producing the payload fairings and interface struc-



INVESTMENT IN DESIGN

ture. The Seattle-based organization also has responsibility for establishing the homeport facilities in Long Beach, where close proximity to major U.S. satellite manufacturers facilitates transportation and encapsulation operations for customers.

RSC-Energia, responsible for Russia's space program, has a 25 percent holding in Sea Launch. The Moscow-domiciled enterprise supplies the Block DM component of the system, the final stage of the rocket which positions the satellite in its final orbit, and is also responsible for mission launch support. The Ukrainian co-venturer KB Yuzhnoye/PO Yuzhmash, with a 15 percent stake, is the source of the Zenit rocket forming the first two stages of the launch vehicle.

The partnership has a substantial forward workload, through commitments from U.S. companies to 18 launches, plus a number of options. The opening dispatch from the Pacific into geostationary transfer orbit will be of a Hughes HS702 communications satellite. Designated Galaxy XI, the satellite will become part of the PanAmSat constellation, serving customers throughout the western hemisphere. Galaxy XI is the first of 13 launches booked by Hughes Space & Communications of Los Angeles, while five have been contracted by another Californian firm, Space Systems/Loral of Palo Alto.

The precise cost of the Sea Launch program has not been disclosed, the joint venture company conceding only that it is in excess of \$500 million.

In addition to the funding inputs from the partners, debt financing for the scheme has been arranged by Chase bank, with the participation of the World Bank. Sea Launch Co. has been registered in the Cayman Islands as a limited duration corporation, with offices in Oslo and Seattle, plus the Long Beach marine base.

Sea Launch Commander was expected to sail from St. Petersburg on June 10 for Long Beach, its 105-ft. (32-m) beam, one of the design parameters, permitting access through the Panama Canal.

Due to put out of Vyborg and into the Gulf of Finland on June 15, the platform will make the entire transit to California under its own power, using a multi-thruster installation permitting speeds of up to 12 knots. Depending on anticipated southern hemisphere weather conditions, and on comparative costs, the voyage options were via the Suez Canal, or by way

of the Cape of Good Hope or Cape Horn, with envisaged homeport arrival in August.

First and second stages of the Zenit rockets are being manufactured in the Ukraine at Dnepropetrovsk, with the third, or upper stage, known as the Block DM, coming from Moscow, while payload fairing and interstage structure is supplied from Seattle.

An initial inventory of inert, unfueled rocket components will be transported to Long Beach aboard the ACS on its positioning voyage. Subsequently, componentry transferred to the homeport in California will be made using an adapted, German-owned RoRo vessel.

From buffer storage at the Long Beach terminal, rocket components will be moved aboard the

ACS as needed, for assembly in the vessel's cavernous, below-decks factory area.

The launch customers' satellites will be processed in the purpose-built payload handling facility at Long Beach. The craft will be loaded with hypergolic fuels, encapsulated within a payload fairing made of advanced aerospace composites, and prepared for

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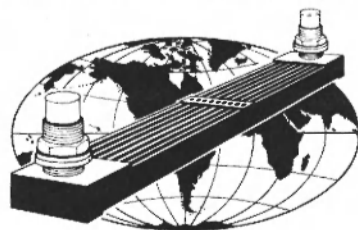


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INVESTMENT IN DESIGN

mating with the Sea Launch rocket.

In a system which differs from conventional practice by effecting integration in a horizontal rather than a vertical position, the encapsulated payload will subsequently be rolled-out to the ACS, and combined with the launch vehicle on the ship. Subsequently, the ACS will be moved around the finger

pier and stern to the launch platform, and the complete, integrated unit will be transferred from the command vessel by means of an onboard crane. The convoy will put out for the ocean launch location with the rocket and satellite housed during transit in the platform's large, environmentally-controlled hangar. A mobile transporter and erector system will be

employed to roll-out and hoist the rocket into launch position prior to fueling and dispatch. Storage capacity and system design aboard the *Odyssey* is such as to ensure sufficient rocket fuel and oxidizer for two launches, such that each mission will have fuel enough for a second attempt in the event of a launch having to be aborted. The designers of the system say that

the semi-submersible will allow for launches in wave heights up to 10 ft. (3m), and that studies indicate a weather availability for the launching of 95 percent-plus for the area concerned. Environmental data is continuously being gathered from a weather buoy positioned in the launch area.

The multifunctional ACS, which will take personnel off the *Odyssey* in the period immediately preceding the launch, incorporates a state-of-the-art mission command room equipped for remote control of the rocket launching procedure and for mission monitoring. Such is the colossal rate of dispatch that the rocket will be in orbit over South America only 32 seconds after lift-off on the Equatorial belt in the Kiribati region.

Kvaerner Maritime had initially considered a Norwegian-built 42,000-gt RoRo vessel type as the possible basis for the *Sea Launch Commander*, but subsequently opted for a tailor-made, entirely original design in the light of the specific and unique needs of the project. One of the most astonishing aspects of the resulting, 667-ft. (203-m) ACS is its huge internal volume used as a hangar and mating point for rockets and satellites, subdivided by partial transverse bulkheads and sliding doors into four compartments, for rocket assembly, spacecraft handling, third stage processing and fuelling. The hangar hold has been dimensioned for secure storage of three rockets, accessed via a 157.5-ft. (48-m) long stern ramp and watertight door, both supplied by Kvaerner Ships Equipment. The ramp can be adjusted to suit varying wharf heights and has a minimum 26.2 ft. (8 m) driveway width to accommodate a 190-ton load. The fine hull form, with a block coefficient of 0.57, and main machinery comprised of two eight-cylinder Wartsila 46 engines delivering a total of some 21,000-bhp through reduction gearing to a single controllable pitch propeller, should ensure speeds up to 21-knots. For station-keeping, two Kamewa bow thrusters and a retractable compass thruster are operated by electronic signals through the dynamic positioning system, while manoeuvrability is also considerably enhanced through the adoption of a Becker rudder. Two independent, high-speed digital radio communication link systems are installed for remote launch operations from the ACS, potentially with the mother-ship at a distance of 20-km from the platform.

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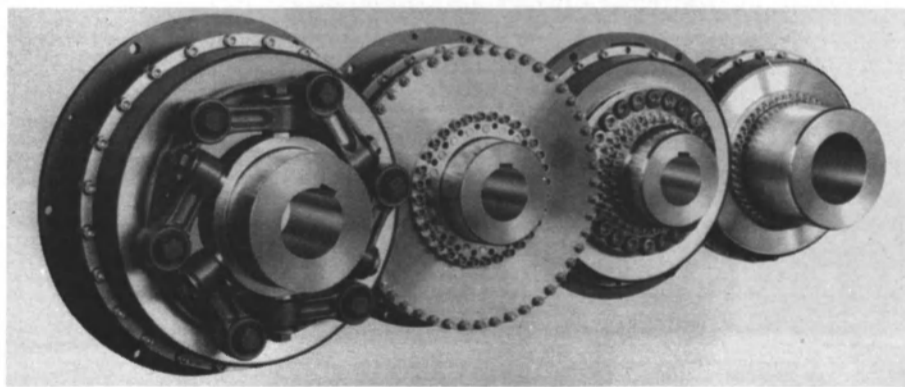


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Brown & Root Wins Chevron Contract

Brown & Root Energy Services has won a 10-year contract to provide Chevron Corp. with drilling products and services in the Gulf of Mexico. Under Chevron's Deep Water Alliance, Brown & Root joins Aker Maritime Inc., Saipem Inc., and Han-Padron Associates in providing engineering, construction, and project management at Chevron deepwater fields.

Litton Marine Wins Contract From Taiwan Navy

Litton Marine System was awarded a contract from the Taiwan Navy to provide ring laser gyrocompasses, navigation radars and other onboard systems for 11 new offshore patrol vessels.

The Decca BridgeMaster radars will utilize a new design operator console which provides easy trackball or keyboard operation. The 11 patrol vessels are being built at China Shipbuilding in Koashung and are scheduled for delivery beginning in 1999.

A.P. Moeller Orders Six Ships

Danish shipping and oil group A.P. Moeller ordered six 3,700-TEU containerships from its wholly-owned Odense shipyard in central Denmark. According to Moeller, which owns Maersk Line, the vessels will be delivered starting in 2000.

Litton Marine Systems Installs VTS In Egypt

Litton Marine Systems has completed the installation of a vessel traffic monitoring system for the Port of Damietta, Egypt.

The system was developed and installed by Litton's INA Division of Rotterdam. It is based on INA's unique VTS-Master technology, which permits remote display of raw video data from shore-based surveillance radars superimposed on geographical maps of the harbor. The VTS provides shoreside detection and tracking of vessels sailing in the area under control by the Damietta Port authorities.

Chevron Announces First Oil From Dibi Field Onshore Nigeria

Chevron has started production from the Dibi oil field in the west-

ern Niger Delta. Dibi is the latest in a series of successful projects brought onto production this year by the Chevron/Nigerian National Petroleum Corp. (NNPC) joint venture. To maximize efficiency, the field will initially utilize facilities previously employed in the Benin River field.

Installation of full production

facilities will be completed in 1999.

Bergesen Sells Gas Carrier

Norway's largest shipping group, Bergesen d.y. ASA, sold gas carrier *Hemera* to Indian interests for approximately \$16 million.

The 52,648-cu.-m. vessel, built in 1974, was expected to be delivered this month.

Saferoute Acquires Barbican Trade

Saferoute, a unit of SCL — the container shipping joint venture between South Africa's Safmarine and Rennies Holdings Ltd. and Belgium's CMBT Lines, will take over Barbican Lines' trade between European and South Africa.

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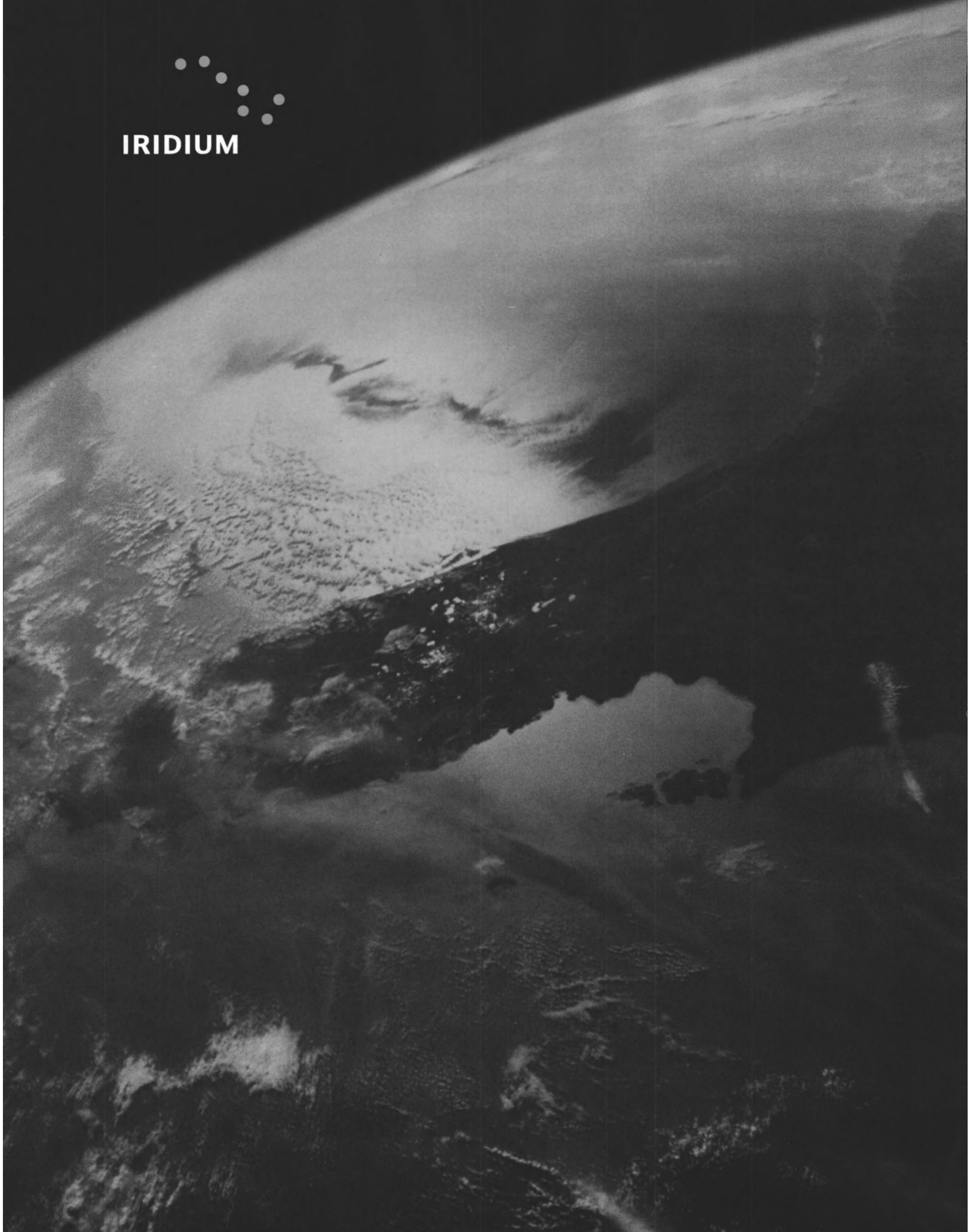
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MARINE FINANCE

Atlantic Marine To Upgrade R&B Falcon Drilling Rig

Atlantic Marine, Inc. — Mobile has been awarded a contract to perform upgrades to R&B Falcon's 300-ft. (91.4-m) L-780 jack-up drilling rig — *G.H. Galloway*.

Atlantic Marine expects the project to take 90 days and to encompass work throughout the rig. The project will include rack chock removal and overhaul; pinion removal and overhaul; 300 tons of steel; high pressure mud and cement pipes; replacement of the existing ballast system; gallery and quarters refurbishments, including joiner work; tank coating removal and renewal and fire main renewal.

Circle 59 on Reader Service Card

Niestern Sander Contracted To Build Tanker

Niestern Sander B.V. was awarded a contract by French shipowner Petromarine to build a tanker. The vessel will have a carry-capacity of 10,000-dwt and upon completion

will reportedly the largest ship ever built in the Province of Groningen, Netherlands. The double hull tanker will be built under the survey of BV. Delivery is scheduled for December 1999.

Circle 55 on Reader Service Card

FGI Awarded \$135M Contract

Friede Goldman International Inc. (FGI) was awarded a \$135 million contract from Ocean Rig ASA of Norway to outfit *Bingo 9000-2*, a fifth-generation, dynamically positioned, deep-water semisubmersible.

The *Bingo 9000-2* is scheduled to arrive at FGI at the end of this year with a targeted completion of fourth quarter 1999. Both bare-deck hulls will be transported from China, where they are being constructed, to Pascagoula, Miss., for complete outfitting.

Circle 60 on Reader Service Card

3.Maj Wins Contracts

Croatia's 3.Maj Brodogradiliste, d.d. shipyard was awarded two

new contracts from Ferens Shipping Co. of Malta and Lerici Shipping Co. of Liberia, calling for one 81,500/63,000 dwt oil tanker each, for deliveries scheduled in the year 2001.

Mr. **Glauco Lolli-Ghetti**, representing the two ordering companies, and Mr. **Sanjin Kajba**, general manager of the yard, finalized the deal last month.

The contract represents an addition to a deal involving orders for four oil tankers for Mr. **Glauco Lolli-Ghetti** controlled shipping companies, concluded last year, with deliveries scheduled in the course of 1999 and 2000.

Circle 61 on Reader Service Card

Litton Marine Installs VTS

Litton Marine Systems has completed the installation of a vessel traffic monitoring system (VTS) for the Port of Damietta, Egypt.

The system was developed and installed by Litton's INA Division of Rotterdam, and is based on INA's unique VTS-Master technology, which permits remote display of raw video data from shore-based

surveillance radars superimposed on geographical maps of the harbor.

The VTS reportedly provides shoreside detection and tracking of vessels sailing in the area under control by the Damietta Port authorities. The coverage area includes the harbor entrance and approaches, as well as the inner harbor.

Circle 62 on Reader Service Card

Bardex Chosen For Ensco Rig Upgrade

Bardex Corp. was awarded a contract by Ensco International, Inc. through Ensco Offshore Co. for an upgrade transverse skidding system for the *Ensco 50* cantilever jack-up drilling rig which is currently at the Keppel FELS Ltd. yard in Singapore.

The transverse skidding system, which will replace a pinclaw jacking system, will consist of two hydraulic piston gripper assemblies each rated at 200 ton push-pull capacity and operating pressure of 3000 psi.

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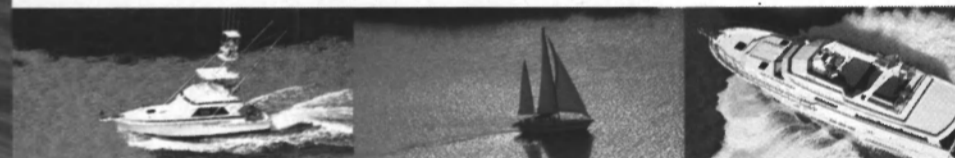


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MARINE FINANCE

Yangming Goes On \$500M Containership Spending Spree

Taiwan's Yangming Marine Corp. appeared likely to sign a letter of intent with a unit of South Korea's Hyundai Group to order five containerships worth \$292 million. Yangming had apparently planned to buy the five ships in 1997, but delayed the deal out of concern for Asia's financial crisis — saving significant costs in the process.

Separately, Yangming said in May it would order 10 smaller vessels in the 1,100-1,500 TEU range for a total of \$204 million over the next three to five years.

KCS To Change Gdynia Shipbuilding System

Kockums Computer Systems (KCS) finalized a long-term cooperative agreement with Gdynia Shipyard (Stocznia Gdynia S.A.) to change the shipyard's shipbuilding system. Gdynia Shipyard will implement and utilize the entire TRIBON 4 Shipbuilding system for design and production of ships.

Circle 63 on Reader Service Card

C. Plath Provides Equipment To Grand Princess

C. Plath, the business unit of Litton Marine Systems, has supplied the steering and navigation systems for the new P&O cruise ship *Grand Princess*, recently delivered by Fincantieri. Equipment provided by C. Plath includes a Navipilot ADII adaptive autopilot system with four steering positions and emergency steering stations, as well as two Navigat X gyrocompasses, a Navitwin control unit and multiple Navidata displays.

Circle 64 on Reader Service Card

Wilcoxon Awarded High-Tech Contract

Wilcoxon Research, Inc., a designer and manufacturer of vibration sensors and accessories, received a multi-year contract with the U.S. Navy to research and develop an advanced low-noise sensing design, which reportedly allows for vibrations sensing in extremely low-noising applications such as earthquake detection, bridge structure analysis, motion studies, and optical stability monitoring.

July, 1998

For Sale: Bulgarian Shipyard In Black Sea Port

Spanish consultancy DFC S.A. will accept offers from potential buyers for a 58-percent stake in a shipyard in Bulgaria's Black Sea port of Varna.

The sale will be carried out after

negotiations with potential buyers which can receive information on conditions for the sale from the DFC's Sofia office as of June 22. Offers will be accepted until August 3.

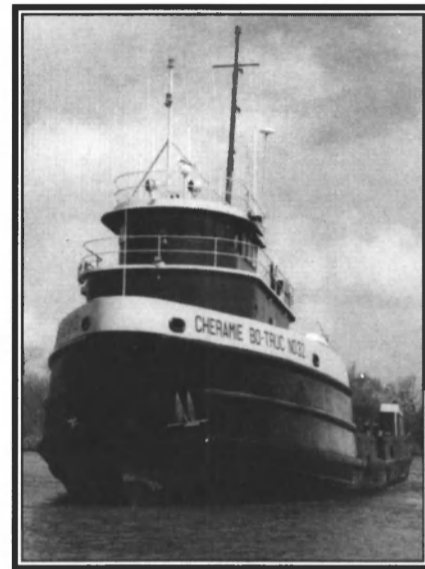
Bulgaria's government chose DFC in October 1997 as a consultant for the sale of Bulgaria's three

shipyards, in the Black Sea ports of Varna and Bourgas and the Danube River port of Rousse, against a success fee \$828,000.

Twenty-five percent of the Varna Shipyard was sold through the country's voucher privatization program and around 15 percent will be offered to employees.

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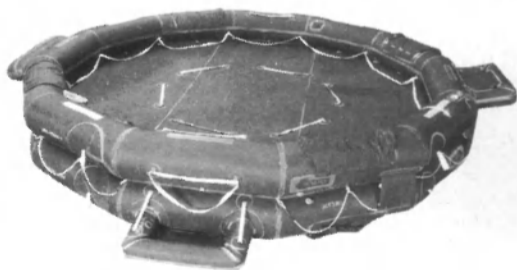
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MARINE FINANCE

V. Ships Gets Five-Year Contract

V. Ships Marine, Ltd., a full-service international marine transportation management and operations organization, recently won a five-year contract to provide ship management and technical services on behalf of PLM Transportation Equipment Corporation of San Francisco, Calif., a major U.S. ship leasing company.

According to **Bob Wellner**, president of V. Ships Marine, the company will be providing technical services for all of the vessels in the PLM fleet. Currently, V. Ships is providing services to 12 vessels, including tankers and bulk carriers trading worldwide.

ABB Nabs \$100M Propulsion Package Contract

ABB won contracts for propulsion systems for cruise liners being built by

Norwegian Kvaerner's Masa-Yards in Finland and German shipyard Meyer Werft.

ABB will supply innovative electric propulsion systems for three new luxury cruise vessels, with provisional orders on a further three ships. The total value of all the orders is about \$100 million. The cruise liners are being built for Carnival Cruise Lines and Royal Caribbean International, and Italian Costa Crociere. The ships are expected to be delivered between 2000 and 2003.

Costamare Orders Five Ships For \$300M

Greek ship managing company Costamare Shipping Co. has reportedly placed a \$300 million order for five post-Panamax container ships from Korean yards.

The company has apparently ordered the 5,500-TEU ships from South Korea's Hyundai Heavy Industries for delivery in 2000.

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Astilleros Españoles Delivers Chem Tankers To JO Tankers

Astilleros Espanoles' Juliana yard in Gijon has delivered to JO Tankers a pair of stainless steel chemical parcel tankers, dubbed *JO Ask* and *JO Eik*, the former delivered in November 1997, the latter in March 1998.

Both tankers, like sisterships *Botany Triumph* and *Botany Bay* (both delivered in 1997) are of an Astilleros Espanoles design and feature a double hull which surrounds a cargo tank space built mainly of vertically corrugated transverse and longitudinal bulkheads using duplex-type stainless steel.

Five of the nine transverse divisions are of plain sandwich construction, forming cofferdams connected to the side ballast tanks. This arrangement reportedly enhances versatility and enables cargoes of different temperatures to be carried in adjacent spaces.

The ships are each powered by a Manises-MAN B&W 5S50MC main engine, which produces 9,700 bhp at 127 rpm. Driving a CP propeller, the ship has a 14.75-knot service speed at 90 percent MCR and a sea margin of 15 percent. It's well-thought-out hull allows for a fuel consumption of 19 tons/day, a considerable achievement given the ships size, type and speed. Maneuvering of the vessel is assisted by a CP 635-kW bowthruster and Becker flap-type rudder.

There are a total of 34 tanks of varying capacities: 14 central tanks for IMO I cargoes; and 20 side tanks for IMO II grades.

In all, 800 products with densities up to 2.15 tons/cu.-m. and requiring heating temperatures between 65 and 90 degrees Celcius

can be loaded.

The ship has a liquid cargo capacity of 19,821-cu.-m.

For discharging cargo, each tank is fitted with a Framo 230-cu.-m./hr. hydraulic submerged pump,

seven of which can operate simultaneously for a collective flow of 1,610-cu.-m./hr.


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Pictured is stainless steel chem/parcel tanker *JO Ask*.



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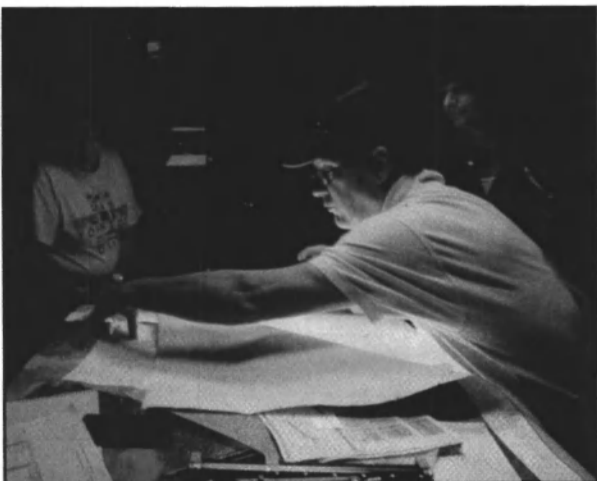
Length, o.a.	486.8 ft. (148.4 m)
Length, b.p.	457 ft. (139.3 m)
Breadth, molded	75.4 ft (23 m)
Depth, molded to main deck	45.6 ft. (13.9 m)
Width of double skin side bottom	4.7 ft. (1.45 m)
bottom	5.8 ft. (1.79 m)
DWT, design	16,159
DWT, scantling	19,299
Tonnage	12,145
Speed, service, 90% MCR	14.75 kt.
Cargo capacity (liquid volume)	19,821-cu.-m.
Classification	Lloyd's Register

Recent Discovery Puts Battle Of Midway Back On The Map

As announced 56 years to the day of the June 4, 1942 battle which led to its demise, USS *Yorktown* was recently discovered, more than three miles under the sea, off the island of Midway in the middle of the Pacific. Sponsored by the National Geographic Society, the team led by famed explorer **Dr. Robert Ballard** discovered the wreck as a result of a mission to find, map, photograph and explore the lost ships of the WWII Battle of Midway (see map).

Yorktown was built by Newport News Shipbuilding, its keel laid in 1934, launched in 1936 and commissioned in 1937. Three days after the start of the Battle of Midway, on June 7, 1942, *Yorktown*, badly damaged by dive bomber attacks, attempted to make its way home to Hawaii, only to be torpedoed by a Japanese submarine and sunk 16,650 ft. (5,075 m) to the bottom of the sea. Most of the ship's crew were rescued, including **Bill Surgi**, who took part in the search.

Setting sail on May 1 on U.S. Naval deep submergence support ship *Laney Chouest* and towing the University of Hawaii's MR1 sonar vehicle, **Dr. Ballard** and crew used the U.S. Navy's



Advanced Tethered Vehicle (ATV), to look for *Yorktown* and other ships lost in the Battle including destroyer USS *Hammann* and Japanese carriers *Kaga* and *Akagi*. After only 18 days of searching, the team discovered *Yorktown*, identified by **Dr. Ballard** with the help of survivor Mr. **Surgi**. "The first thing I saw was a mud clot ... and a smile crossed my face," said **Dr. Ballard**. He was certain he had discovered the *Yorktown* because the view was identical to the first images he saw when he found the wreck of HMS *Titanic* in 1985. According to **Dr. Ballard**, when a giant sinking ship slams into the ocean it blasts mud in all directions. Piles appear hundreds of yards from the wreckage.

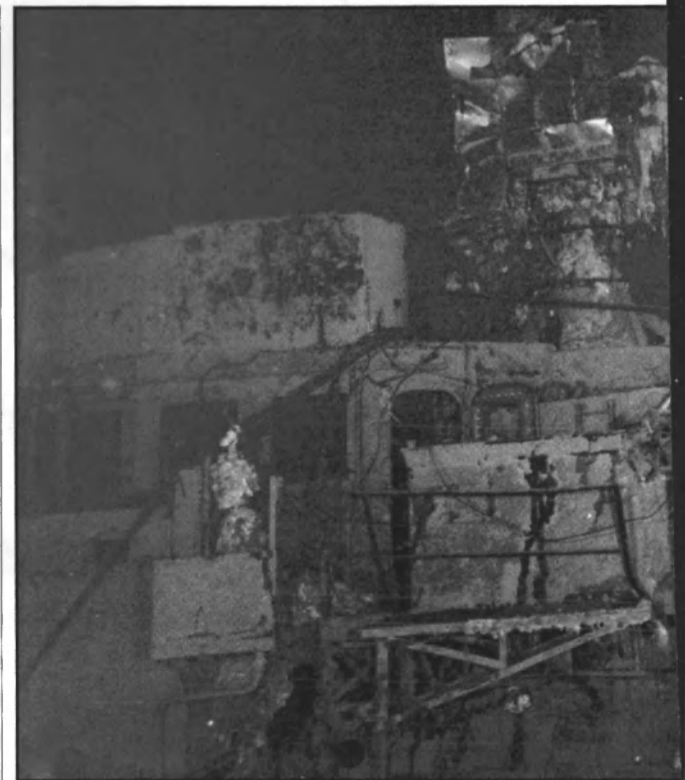
"That (ship) was my home, so I was home again. I was glad to see it," said Mr. **Surgi** of

Left: Deepsea explorer **Dr. Robert Ballard**, famous for discovering *Titanic*, studies sonar charts during the National Geographic Midway Expedition.

Right: A sonar scan of the wreck of USS *Yorktown*.

his first view of the wreck. He recalled being on a catwalk amidships when a torpedo exploded beneath him. He had to climb back on deck through wreckage before he could cross to the other side of the vessel and abandon ship.

While *Yorktown* was the only ship found on this expedition, the discovery is a monumental one. Video footage from the expedition shows stainless steel work on the vessel still shiny, as well as the bomb hole, cables, the airplane elevator and other equipment. "There was absolutely no biological growth on it [*Yorktown*]. It was the most sterile water environment I've ever seen. You could see all the way across the flight deck. The USS *Yorktown* is in the best shape of all



Deepsea Diving

The Hawaii MRI is a portable side-scanning sonar system that simultaneously collects digital bathymetry and acoustic imagery over a wide section of seafloor.

The sonar itself is housed in a 16.4 ft. (5 m) long "towfish" which weighs 3,500 lbs. in air. In water, the towfish is towed behind the ship at a depth of 328 ft. (100 m) using a 2,200 lb. depressor weight. The towing configuration allows the MRI sonar to operate far from the noisy ship and below the surface mixed layer

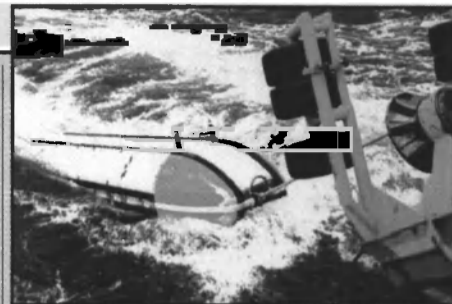
where the water temperature gradient causes acoustic rays to bend. In this quiet environment, MRI transmits a "ping" every nine seconds, records the returning echo and sends the digital data up to the ship through the tow cable.

On the survey vessel, the acoustic data is processed to yield water depth and echo strength for each ping. The images are displayed on computer monitors in real time, and combined with the ship's GPS navigation, generate precise charts of the seafloor.

To hunt for USS *Yorktown*, MRI's acoustic imagery

was analyzed in search of the high-amplitude echoes indicative of the carrier's steel hull. The search area was centered on an area of sedimented abyssal plain, where the strong echoes from the ship were in contrast to the weak echoes of the surrounding sediment. Operated by the Hawaii Mapping Research Group at the School of Ocean and Earth Science and Technology (SOEST) at the University of Hawaii, the MRI was designed for exploration of the deep ocean.

It was selected as the reconnaissance tool in the initial search for *Yorktown* due to its ability to rapidly



scan for strong echoes over wide areas of seafloor, which allowed for the seafloor battlefield to be rapidly assessed for evidence of the sunken destroyer.



World War II veteran and USS *Yorktown* survivor **Bill Surgi** helped the expedition to identify the wreck from video images relayed from the ocean floor.

the ships I've ever seen on the ocean floor," said **Dr. Ballard**, who hopes to one day create an underwater sea museum which can be accessed from the information highway, and is always on the look out for the perfect specimen to demonstrate how well the seas can preserve sunken ships. "With this expedition we've gone deeper than ever before and we've searched a greater area than ever before. It's a thrill to come back with images of this great American warrior."

The USS Yorktown expedition can be seen as part of the National Geographic Explorer series, to be called Battle for Midway, and is scheduled to air on TBS in the first part of 1999.



July, 1998





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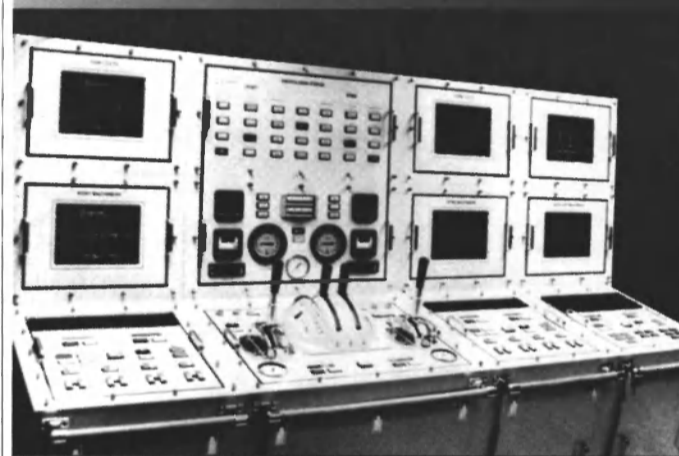
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OMNIPURE'S process modules are designed to be retrofitted utilizing existing shipboard tanks and are configurable to meet existing space and piping requirements.
-  • **User Friendly**
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NEW & NOTABLE

Record Breaking Run

Incat-built, Cat-powered fast ferry breaks Atlantic speed record

A sleek high-speed ferry set a new trans-Atlantic speed record last month after finishing a dash from New York to Spain. The *Catalonia*, a futuristic Caterpillar diesel-powered catamaran, made the New York to Tarifa crossing at an average speed of 38.7 knots, said **Robert Copeland**, a spokesman for Caterpillar Inc., which built the ferry's four diesel engines.

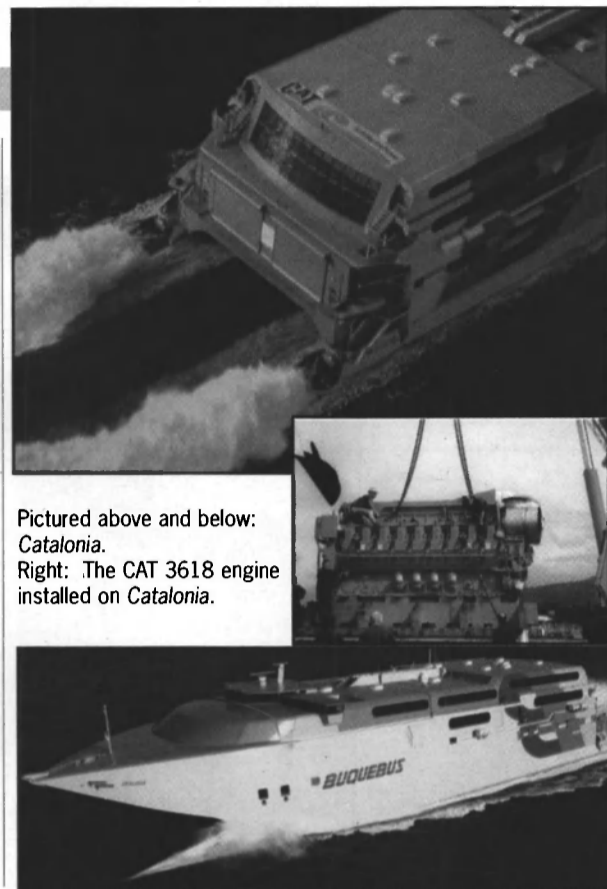
The ferry is owned by an Argentina-based transport company. The former speed record for a commercial vehicle crossing the Atlantic Ocean was set eight years ago by Hoverspeed Great Britain at an average speed of 36.65 knots. The *Catalonia* also became the first passenger ship ever to travel more than 1,000 miles (1,600 km) in a 24-hour period. The ferry left New York on the morning of June 6 and

completed the 3,125-mile (5,000 km) journey at approximately 3:00 p.m. EDT on June 9. The ferry can travel at up to 45 knots.

The \$45 million, 298-ft. (91-m) vessel, made almost entirely of aluminum and steered with an intricate system of water jets, was built at Incat in Tasmania, Australia. The ferry's record crossing should entitle it to the Hales Trophy, established in 1935 by **Harold Hales** to encourage innovation in the passenger transport industry. Past winners have included *Lusitania* and *Queen Mary*.

To be declared the official record holder, *Catalonia* must turn over its technical logs and navigational records to the Hales Trophy technical review committee, which will render a decision in 30 days. **Juan Carlos Lopez-Mena**, head of Buquebus, the Buenos Aires-based transport company that owns *Catalonia*, was on board for the crossing, along with a crew of about two dozen. The ship is slated to go into commercial service operating as a ferry between Barcelona and Palma de Mallorca.

Circle 35 on Reader Service Card



Pictured above and below: *Catalonia*. Right: The CAT 3618 engine installed on *Catalonia*.

Catalonia Main Particulars

Shipbuilder:	Incat Australia
Vessel Type:	Wave Piercing Catamaran
Owner/Operator:	Buquebus
Designer:	Incat Australia
Flag:	Uruguay
Classification:	Det Norske Veritas + IAT HSLC R1
Number of sister ships(already built/on order):	2/1
Contract Date:	26 March 1997
Float out Date:	25 April 1998
Delivery Date:	16 May 1998
Length, o.a.:	300 ft. (91.3 m)
Breadth, molded:	85.3 ft. (26 m)
Gross Tonnage:	5,617
DWT:	450
Draft, design:	3.734m
Speed, service:	43 knots
Speed, lightship:	48 knots
Complement:	23

Cargo capacity:	900 pax, 225 cars
Bunker:	MDO 56 tons (normal) + 423 tons (long range)
Fuel consumption:	5.82 tons/hr. @ 100% mcr
% High tensile steel:	1-2%

Main engine:	Caterpillar
Main engine Type:	4 x Caterpillar 3618
Total hp:	28,800 kW
Auxiliary engines:	Refer Generators
Jet propulsion units:	4 x Lips LJ145D
Generator engines:	4 x Caterpillar 3406
Generators:	2 x Caterpillar 3406
Emergency generator:	2 x Caterpillar 3406
Motor starters:	Ingersoll Rand
Stabilizers:	Maritime Dynamics
Couplings:	Vulcan Rato - Flexible rubber mounted
Reduction gears:	4 x Renk ASL60
Engine controls:	Lips Remote Control Steering
Steering controls:	Lips Remote Control Steering
Deck machinery:	Incat Design and Manufacture

Shafting:	Forged steel
Bearings:	Cooper
Coatings:	Painted
VHF radio:	Skanti VHF 3000
SSB radio:	Skanti
Radar:	2 x Racal Decca (1 x ARPA, 1 x SBand)
Compass:	Gyro (Anschutz STD 20), Magnetic (C Plath, 180mm)
GPS:	DGPS (Decca, GR X4068B)
Autopilot:	Lips Integrated with Propulsion Control
Collision avoidance:	ARPA radar
SATNAV:	Decca DGPS GR X406B
Pumps:	Grundfos
A/C:	Sanyo Heat Pump (SPW - X4836H56)
Lifeboats:	2 x ML Lifeguard inflatable rescue boat
Liferafts:	Liferaft Systems Australia (100 man MES)
Davits:	Incat Design / RIMS Manufacture
Firefighting system:	Chubb (Extinguishers), Thorn (Detection), Incat (Drencher System)
Doors/Ramps/Cargo Lifts:	Stern Door, Fixed Fwd Ramps
Computers on the Ship:	4 Personal Computers, 11 Computer Systems

Elizabeth Turecamo Commences Service

Elizabeth Turecamo, White Stack Maritime Corp.'s newest tractor tug, has begun its long-term charter handling ships calling on the Port of Charleston, S.C. This state-of-the-art vessel was

specifically selected for handling Panamax and post-Panamax ships. The tug is reportedly the largest and most powerful in Charleston, and offers advanced technology for ship handling and escort services. At 110 x 40 x 20-ft. (33.5 x 12.2 x 6.1-m) *Elizabeth Turecamo* was constructed by Eastern Shipbuilding Group and

is powered by a pair of EMD 16-645E7B marine engines rated at 3,070 hp each at 900 rpm. The tug's propulsion system is made up of Kamewa Aquamaster Type US 3001/3600 units, capable of producing a static bollard pull in excess of 150,000 lbs. with 106-ft. stainless steel propellers. The main propulsion shafting leads port and starboard from the main engines aft through a series of heavy duty universal joints and bearing to the aft machinery flat in the stern which houses two Aquamaster 360 degree rotatable Z-drive units. Control of each Z-drive is through Aquamaster's single lever Aquapilot Control System which provides control of all functions for each unit.

In addition to the main engines, the engine room houses two Detroit Diesel 8V-71 generator

sets rated at 99 kW at 1,200 rpm, one equipped with a PTO to provide power to a Goulds Model 3410 2,000 gpm fire monitor pump and 1,000 gpm Skum Model MK 100/VR100 fire monitor for offship firefighting capability.

Elizabeth Turecamo's double chine hull is built to ABS rules and the vessel is classed ABS A1-AMS Maltese Cross Ocean Towing. Its ship handling bow winch and capstan were manufactured by New England Trawlers. The bow winch has a total capacity of 600 ft. of 12-in. circumference synthetic line with a brake holding force of 450,000 lbs. The tug's pilothouse has been specifically designed to provide the operator with exceptional visibility from any location on the bridge with 360 degree visibility horizontally and upward of 90 degree vertically through the



Pictured below is the wheelhouse of *Elizabeth Turecamo*, shown left during sea trials.



NEW & NOTABLE

use of overhead windows. *Elizabeth Turecamo's* electronics package, which was furnished and installed by Maricom electronics, Inc., includes two Furuno FM 8500 VHF radios, one Furuno Model FR7111/6 72 mile radar, Furuno Model 2610 single side-band radio, JRC GPS Sensor, Datamarine depth sounder with wind speed and direction indicator, BETA-4 gyro compass and DSV 1500 Pinpoint computerized chart system.

Circle 36 on Reader Service Card

Elizabeth Turecamo Main Particulars

Length	110 ft.
Beam	40 ft.
Depth	20 ft.
Main engines	EMD 16-645-E7B
Z-drives	Kamewa Model US 3001/3600
Generators	(2) Detroit Diesel Model 8V-71 99 kW
Bow winch	New England Trawler X-2460
Pumps	Brownlee Morrow
Fenders	Schuyler Rubber, Co.
Windows	Cornell-Carr.
Electronics	Maricom Electronics
Alarms and monitoring	Engine Motor, Inc.
Fire monitor	Skum
Fuel	97,900 gal.
Fresh water	12,800 gal.
Hydraulic oil	1,800 gal.
Lube oil	1,800 gal.
Classification	.ABS

Austal Debuts

Third-Generation Cat

Adnan Menderes, the first of Austal Ships' 232-ft. (86-m) Auto Express catamarans, recently made its debut, achieving a speed of 42 knots at 340 DWT. With a maximum DWT of 400 tons and the ability to carry up to 10 buses or trucks, the new vessel reportedly provides the largest freight carrying capacity available in its class — under 100 m LOA.

Representing the third generation in Austal's range of Auto Express vehicle/passenger catamarans, *Adnan Menderes* is the first of two vessels to be built for Eastern Mediterranean operator Istanbul Deniz Otobusleri. The new vessel, scheduled for delivery last month, is fitted with four MTU 20V 1163 TB74L engines generating 26,000 kW, as well as the Austal Ocean Leveller ride control system.

Circle 37 on Reader Service Card

Adnan Menderes Main Particulars

Length, o.a.	232 ft. (86 m)
Beam, molded	78 ft. (24 m)
Depth, molded	24 ft. (7.3 m)
DWT	400
Main engines	(4) MTU 20V 1163 TB73L
Gearboxes	(4) Reintjes VLJ 4431
Waterjets	(4) Kamewa 112 SII
Service speed	40 knots
Fuel consumption	.5 tons/hr.

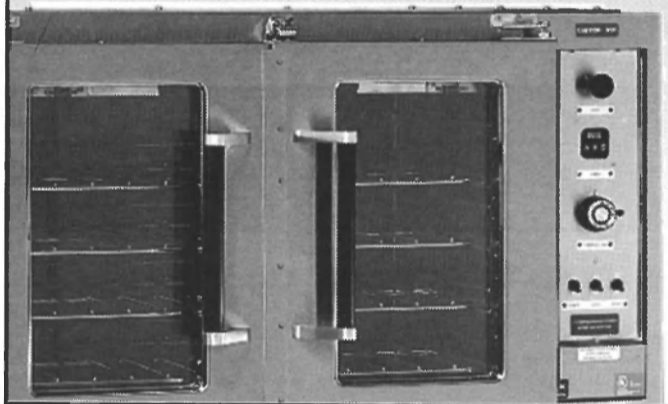
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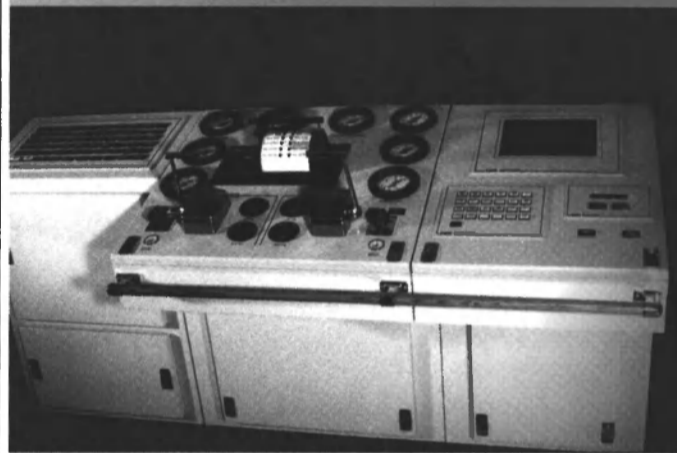
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GULF REPORT

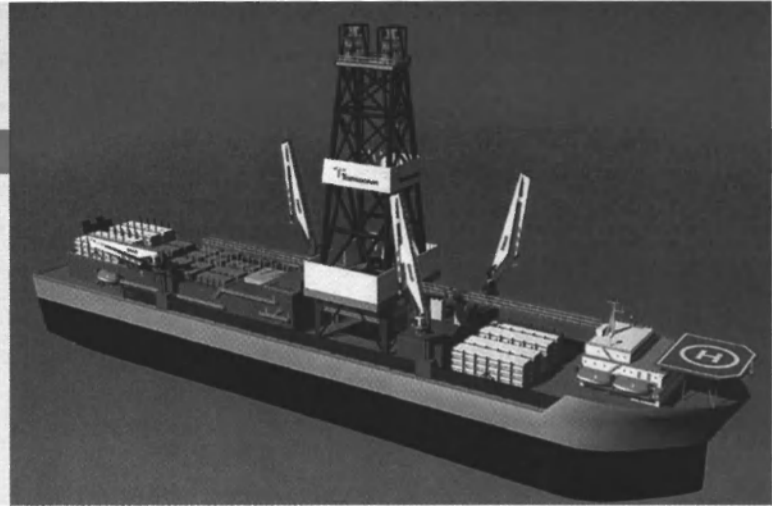
Ingalls To Outfit Drillship For Transocean

Ingalls Shipbuilding has signed a contract to outfit the new drillship *Discoverer Enterprise*, for Transocean Offshore Inc. The contract, worth approximately \$3.6 million, calls for Ingalls to load and integrate the final major components aboard the ship, including the substructure and derrick, as well as completing final outfitting.

Discoverer Enterprise is a technologically advanced drillship, capable of drilling in waters up to 10,000 ft. (3,048 m) deep. The vessel is being built at Astilleros Espanoles Astana shipyard, and

will be contracted to Amoco Corp. The Ingalls team involved in the program will include a core group of shipbuilders, test engineers, naval architects and reliability engineers.

Circle 56 on Reader Service Card



Halter Delivers Third New Generation OSV To Futuristic Boats

Halter Marine Group, Inc. has delivered OSV *Kristin Fagan*, the third vessel of Halter's new generation of 205-ft. (62.5-m) OSVs from Halter Marine, Lockport, La., to her owners, Futuristic Boats. *Kristin Fagan* follows *Admiral Tide* built for Tidewater, Inc., and *Seabulk Oklahoma* built for Seabulk Offshore, Ltd.

The all-steel vessel is powered by two EMD 16-645-E6 diesel engines developing a total of 3,900 hp through Reintjes WAF-1941 gears. Maneuverability and thrust is aided by an SMI 460 bowthruster. Navigation equipment was provided by Furuno, communications equipment by Hose-McCann, and pollution control equipment provided by Alfa-Laval. Deck equipment includes a McElroy 1.25-in. anchor windlass. The three deck ship has accommodations for 16 persons. More than 12 tons of Carrier air conditioning and heating provide comfort in all accommodation areas.

Friede Goldman Names Melton CFO

Friede Goldman International Inc. recently announced the election of **Jobie T. Melton Jr.** as CFO, as of July 1. With more than 27 years of accounting experience, Mr. Melton previously served as the managing partner of the Jackson office of Arthur Andersen LLP.

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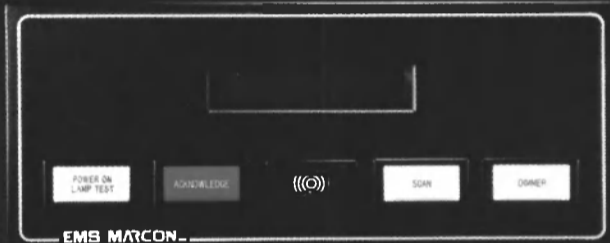
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GULF REPORT

E.N. Bisso & Son To Build New Tug Series

E.N. Bisso & Son requested 18 shipyards to submit bids for construction of up to four tugboats, of a newly designed class.

Primary function of these vessels

will be docking and ship assist operations on the Mississippi River. The new tugs will be 105 x 40 ft. (32 x 12 m). Each tug is designed to generate 66 tons of bollard pull. Main propulsion will be two EMD engines, with two Falk 6.1:1 reduction gears and twin 138 in. propellers, encased in Kort noz-

zles. Each propeller/nozzle arrangement will have main and flanking rudders, each capable of being independently controlled, allowing the tug's Master to select the mode best suited to the current assignment. Design Associates, of New Orleans, is the naval architect on the project.

Kamewa America Relocates

Kamewa America, Inc. has relocated and opened a worldwide hub accenting service, administrative, design and sales to enhance its commitment to customers. The company's new address is 106 Park Place, Ste. 200, Covington, La. 70433, tel: 504-871-3900; fax: 504-871-3939. The location will be one of four global hubs for warehouse parts and inventory of Kamewa products.

Danos & Curole Orders Two New Vessels

Danos & Curole has signed a contract with Conrad Industries to build two state-of-the-art liftboats. The newbuilds will comply with Sub Charter L regulations and SOLAS regulations, which are the latest safety rules and regulations. The vessels will be all electric with Ulstein Z Drives driven by 500 hp AC motors. The boat will have an electrical generating capacity of 1 MW. Four Caterpillar diesel engines will provide the power to drive the generators.

Bollinger Takes On Conversion Project

Bollinger Quick Repair (BQR) has taken on one of the most comprehensive inland conversion projects of its kind with the repowering of M/V *Harriet Ann*, a 198 x 50 ft. (60 x 164 m), fourdeck, triple screw inland river towboat. The repowering project will consist of the installation of three new engines with three reduction gear units, three new Kort-nozzles, and three new Bollinger-manufactured propellers.

The project will also include the redesign of the vessel's engine-cooling system. BQR will also replace the vessel's outdated wooden tow-knee pads with rubber tow-knee pads. The vessel will be repowered with three EMD 12-710G-7B engines cooled by Fernstrum grid coolers coupled to Lufkin RSQ 3626 reduction gear units with a ratio of 4.341:1. The strut bearing assembly, which is currently oil-lubricated, will be converted to water-lubricated.

Halter's Panama City Shipyard Launches Drill Barge

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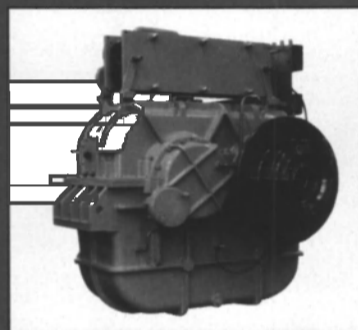


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WELIN LAMBIE



GULF REPORT

launched its first vessel recently – a French-flagged drilling barge that will be used to drill in oil fields under Lake Maracaibo, Venezuela. Drill barge *Prisa 103* is 180 ft. (54.8 m) long, with a beam of 75 ft. (22.8 m), and a normal operating draft of 10 ft.

The three-deck, all-steel integrated barge has four liquid mud tanks, three dry mud tanks and can carry 75,768 gal. of fuel, 50,765 gal. of oil and 50,765 gal. of fresh water.

Electrical power is supplied by two Caterpillar 3516 units generating a total of 300 kW. It is the first of a series of three nearly identical barges for Sedco Forex of Montrouge-Cedex, France, which is owned by Schlumberger.

The barge rigs will be outfitted with a centralized control cabin, a 35 metric ton capacity AmClyde model 10000 pedestal-mounted deck crane, AmClyde deck winches, a helideck for a Bell 212 helicopter and accommodations for 36 persons. The rigs were designed by Sedco-Forex, and TDI-Halter and Zentech, Inc. handled all detailed engineering to accommodate new technology and equipment which may be available in the future.

First Wave Marine Wins Project

First Wave Marine, Inc., parent company of Newpark Marine Fabricators, Inc., was contracted by Reading & Bates Drilling Company to perform modifications and upgrades to semi-submersible rig *M.G. Hulme Jr.*

According to Francis Fair, executive vice-president of First Wave's Offshore Division, the job was performed at the East Pelican Island facility in Galveston. In addition, First Wave Marine has acquired Galveston Shipbuilding Company (GSC), a 33-year old company located on 30 acres. First Wave has hired more than 100 of GSC's craftsmen and welders.

Ingalls Delivers USCG Integrated Deepwater Proposal

Ingalls Shipbuilding and Lockheed Martin has delivered a written proposal to participate in the U.S. Coast Guard's (USCG) Integrated Deepwater System (IDS) program, for replacement of their ships, aircraft and command and control network. Ingalls is also

teamed with M. Rosenblatt & Son, Inc., Bell Helicopter Textron and several Litton Divisions, including PRC, Data Systems and Sperry Marine. The USCG's current deep-water fleet of Cutters and Patrol Boats is facing retirement in the near future. In the first two phases of the IDS program, in-depth trade

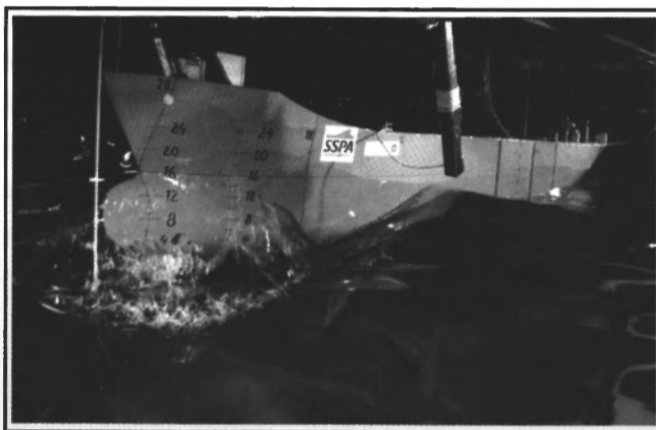
studies will be performed by industry teams that will assist the USCG in making decisions on how many, and what type of, new ships and aircraft are to be built and what type of Command and Control network will be used to replace these retiring assets.

Starting in 2002, the USCG

plans on implementing these decisions by awarding a contract to build new ships, modernize some of their existing assets, and provide a fully integrated "System of Systems." Awards to three industry teams for initial study efforts are expected to be made later this summer.



DESIGN FOR NEXT MILLENNIUM

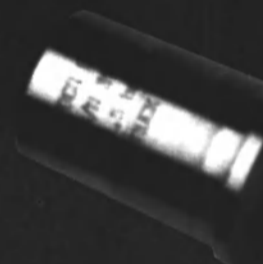


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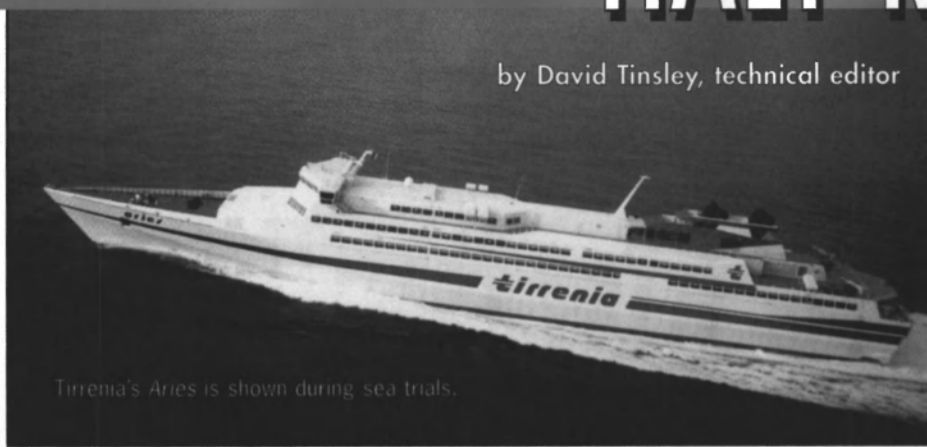
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ITALY REPORT

by David Tinsley, technical editor



Tirrenia's Ariès is shown during sea trials.

Fincantieri — Momentum In Niche Markets

Astonishing in its scale and technological standard, the cruise ship newbuilding workload nurtured by Fincantieri is a powerful reminder of Italian success in re-orientating skills and resources in a traditional industry to a new area of market demand.

A delayed delivery is a curse to cruise fleet operators, as it is to other areas of business where the day-to-day financial stakes are exceptionally high, not least in the offshore industry. But problems encountered in recent months by Fincantieri should be seen in a wider perspective.

Commercial shipbuilders today operate with considerably rationalized structures, compared with the situation 10 to 20 years ago, to the extent that spare capacity in terms of resources and employees is virtually non-existent. At the same time, the greater complexity of large-scale newbuild schemes and increased reliance on subcontractors commensurate with the slimming-down in yard establishment levels places new demands on project management capabilities and

organizational efficiency.

Whether recent delays with high-profile contracts will have a long-term negative effect on Fincantieri's market position remains to be seen, but is unlikely. If there have been aberrations in performance, these cannot diminish the achievement in building three major new types of vessel in rapid succession.

How many shipbuilders in recent times can lay claim to the kind of production activity witnessed in a concentrated period since last fall? The remarkable succession of deliveries saw the November hand-over of the *Rotterdam*, incorporating 50 percent more power than its predecessors in the Holland America Line (HAL) fleet to give a speed of 25 knots, followed by the completion this year of the *Disney Magic*, encapsulating a unique concept, and the 109,000-gt *Grand Princess*, giving new scale to the luxury end of the high-volume cruise market.

While *Disney Magic* has captured the imagination of the public and industry alike, *Rotterdam* and *Grand Princess* contribute no less to Fincantieri's emergence as a dri-

ving force among the elite in cruise ship technology. Its current status in this regard must at least parallel its standing in former years as a leading light in ocean passenger liner construction.

HAL's two follow-on vessels from Fincantieri's Marghera yard will employ a similar hull form and engineering concept to that embodied in *Rotterdam*, although each will have a smaller power installation for a lesser speed requirement of 23 knots.

Thus, while each diesel-electric vessel has again been specified with the well-proven Sulzer ZA40S medium-speed engine, the plant will be based on 12-cylinder models rather than 16-cylinder units as used in the *Rotterdam*. Propulsive drives in the 63,000-gt newbuilds *Volendam* and *Zaandam* will be from two 13 MW electric motors acting on twin shafts, drawing energy from the 43,200 kW central power installation. By comparison, *Rotterdam* has a power concentration of 57,600 kW and two 18.75 MW propulsion motors.

Scheduled for completion in May and November next year, the HAL sisters will combine features of the flagship *Rotterdam* with those from the popular Statendam class.

Maintaining a considerable business momentum, Fincantieri sealed a contract in February for its 24th purpose-designed cruise ship, in the form of a repeat of the 62,000-gt *Rotterdam* for HAL. The concentration of luxury passenger-ship work features Disney Cruise Line's second-of-class *Disney Wonder*, two sisters to *Grand Princess* plus two further examples of 77,400-gt Sun Princess-class for P&O Princess Cruises, Carnival Corp.'s 101,700-gt *Carnival*

Triumph and *Carnival Victory*, and the three HAL newbuild commitments. The program ensures production at the Monfalcone and Marghera yards through 2001.

Through the collaborative approach characteristic of the Italian organization, Fincantieri has sowed the seeds for involvement in targeted sectors of the U.S. and Chinese shipbuilding markets.

An agreement with Avondale Industries covering the supply of technology to assist the U.S. group's drive for domestic cruise ship newbuilding projects has been followed by a cooperative deal with Dalian New Shipyard.

The jewel in the crown of China's state shipbuilding corporation, Dalian has a growing reputation in the international market. The industrial agreement is specific to the construction of vessels described by the Italian group as of "medium technology complexity."

The link-up offers Fincantieri improved access to the considerable Chinese market, while helping Dalian to raise its international commercial and technical profile still further. The objective is to draw on the strengths of the two signatories to competitive advantage, given the depth of project management, construction and design technological know-how represented in Fincantieri, and given Dalian New Shipyard's production skills, capacious facilities

Right: Corrado Antonini, Fincantieri chairman and CEO.



Below: SES Viareggio shipyard.



Visentini — Bastion Of RoRo Know-How

Two high-performance freight RoRos phased into the Irish Sea traffic since last summer provide new showcases for the endeavors of Cantiere Navale Visentini, operating from modern, albeit modest facilities on the lower River Po in north-eastern Italy. The 21,500-gt *Mersey Viking* and *Norse Viking* have boosted freight and passenger service levels offered by Norse Irish Ferries on the Liverpool/Belfast route in a hotly competitive operating scenario.

With a length overall of 610.2-ft. (186-m) and breadth of 84-ft. (25.6-m), *Mersey Viking* and its consort are close to the physical limits of the Visentini premises at Donada and also for navigation down the Po to the Adriatic. The Ro/Pax concept as applied in the two ships, long-term chartered to Norse Irish by the yard's own associate, Levantina Trasporti, embraces accommodation for 330 passengers and garaging for up to 2,300-lane m of freight

on three decks, plus up to 100 cars.

The combination of twin Wärtsilä 8R46 main engines and a fine, twin-skeg hull form with a relatively low block coefficient enabled *Mersey Viking* to achieve a trials speed of 24-knots.

The family-controlled Visentini group, meanwhile, has augmented its build program at Donada by initiating a further ro-pax contract to the account of Levantina Trasporti, entailing a vessel of around 21,000-gt and configured for up to 400 passengers. It is understood that the ship will have a speed in excess of that of *Mersey Viking*.

Current commitments otherwise concern two RoRo freight ferries of 639.7 x 83-ft. (195 x 25.2-m) principal dimensions, offering 2,550-lane m of revenue-earning deck space. Visentini built the hulls of the 16,900-gt *Silver Cloud* and *Silver Wind*, fitted out and delivered by the T Mariotti yard in Genoa in 1994, and is negotiating for other such projects. Materialization of a deal could well open the way to further project collaboration with Mariotti.

and competitive labor costs.

RINA — Contributor To High-Speed Technology

Buoyed by the Italian shipbuilding industry's sustained success in both cruise ship construction and high-speed ferry production, classification society Registro Italiano Navale (RINA) has emerged as a

key contributor to technological development in disparate sectors of the passenger vessel market.

As a mirror of the Italian maritime industries' longstanding involvement in fast waterborne transportation, RINA's presence in the high-speed field dates from its classification of the first hydrofoils

in the 1950s.

Over the ensuing 40 years, the society entered more than 70 hydrofoils into its books along with about 40 other light, fast ferries.

Further to the adoption of the HSC Code, RINA has strengthened its position in the market with around 30 subject vessels in class

or under construction, including 13 newbuildings at domestic yards. The most recent fleet entrant, Tirrenia's 475-ft. (145-m) monohull *Aries*, represents a new milestone in the development of the high-speed mode, and also in the design, build and classification of fast ships to new international rules.

Orlando — Resurgent Force In Livorno

Last year's profit at Cantiere Navale Orlando, following the breakeven result in 1996, vindicated the decision of a management-led employees' cooperative to buy the Livorno yard from Fincantieri in 1995.

The stream of orders for petrochemical tankers since privatization has moreover provided a solid business platform for an investment program set to reach a major new stage later this summer with the reactivation and renovation of a slipway from which a vessel was last launched three decades ago.

The completion of the scheme to bring the Morosini slipway back into operation, offering a working length of 873-ft. (266-m), will enable the yard to set its sights on vessels nominally of up to 50,000-dwt and panamax beam. Construction has previously been concentrated on the 459 x 69-ft. (140 x 21-m) berth in the harbor's inner dock, which has been optimized by the new proprietors for smaller classes of stainless steel tanker.

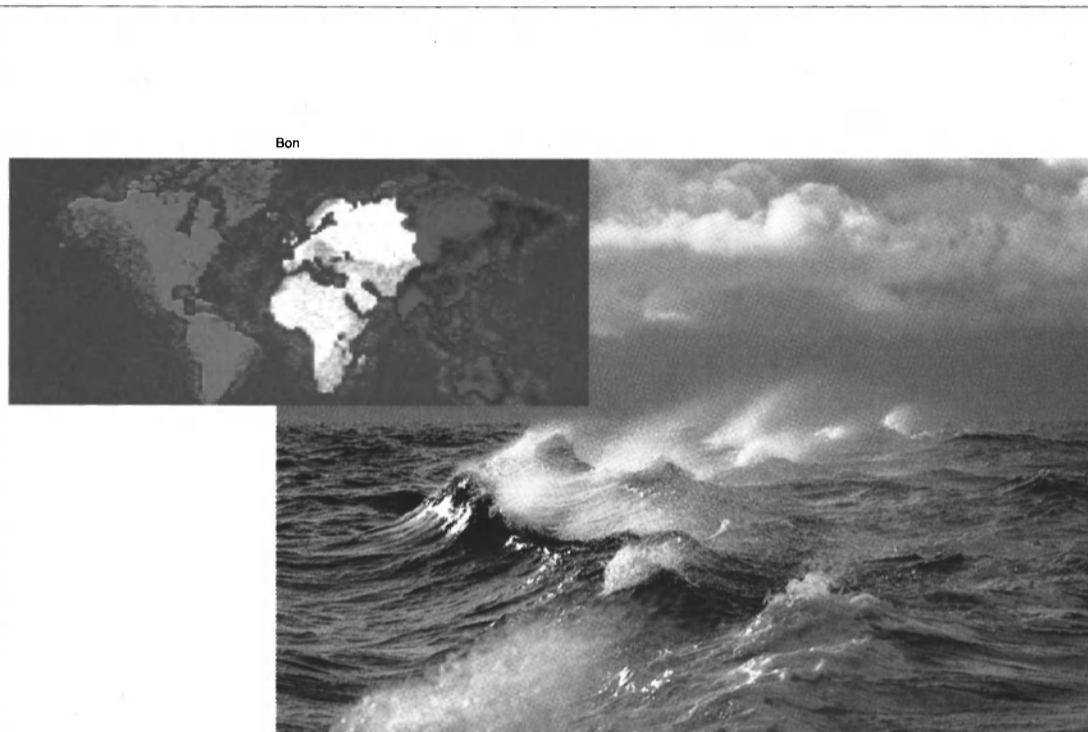
Contracts in hand ensure production continuity through 1998 and 1999, and the realization of the Morosini development will allow the Orlando yard to activate a domestic project for oil/chemical tankers of 36,000-dwt and 45,000-cu.-m. Served by a newly-purchased gantry crane of 360-ton capacity, the slip will also provide the yard with the means of engaging in other value-added sectors of the new-build business, including the cruiseship market.

Recently accorded ISO 9002 certification, CNO's newbuild productivity advance under private ownership has been impressive, rising rapidly from one vessel per annum under Fincantieri control to around 2.2 ships per year, and set now to reach an early target of four vessels per year. The transition from the public domain has also been attended by a near-25 percent reduction in the workforce.

The 1998 delivery program was opened by the commissioning of the 9,550-dwt *Giovanni Fagioli*, a sophisticated, double-hulled chemical and oil tanker embodying 22 integral cargo tanks fabricated using Avesta 2205 stainless steel, plus two deck tanks encased with the same material. Contractual owner Finaval has assigned her to the Novamar pool, to which tonnage is also ascribed by another independent Italian operator, Marnavi.

An additional 9,550-tons, plus two fully-stainless tankers of 10,000-dwt, all ordered by the Novamar partners, are scheduled to complete the 1998 output from Livorno.

Ship repair provides an income stream contributing to around 30 percent of the company's income, and employing a major asset in the shape of a 300,000-dwt capacity graving dock plus other facilities.



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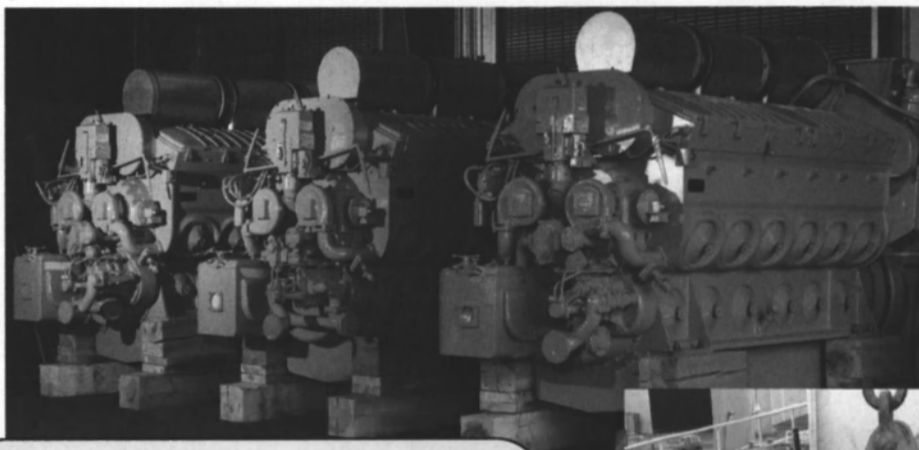
Advanced design and production technologies, and a more than two centuries' long tradition behind: Fincantieri is the heir to the Italian oldest and most illustrious companies in the field, and has thus been able of consolidating and continuously updating a unique wealth of experience through the construction of more than 7,000 vessels. Fincantieri, which is today the largest shipbuilding group in the Mediterranean and one of the largest in Europe, is capable of giving innovative and customer-tailored answers to all the needs of those who work for the sea: Merchant vessels of all types, shipconversions, floating offshore units, naval vessels and submarines, large and medium size diesel engines.

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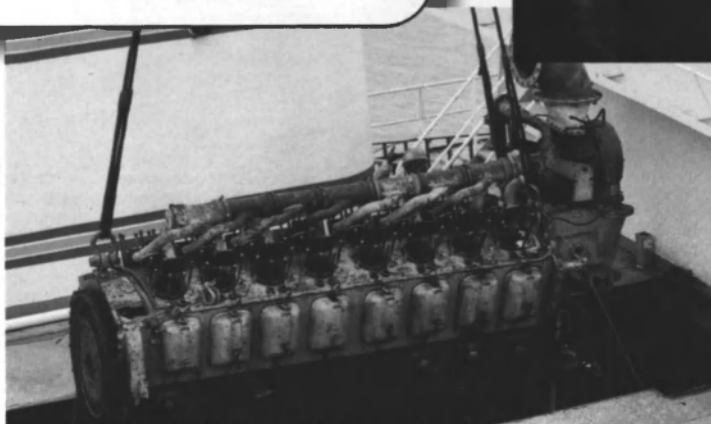
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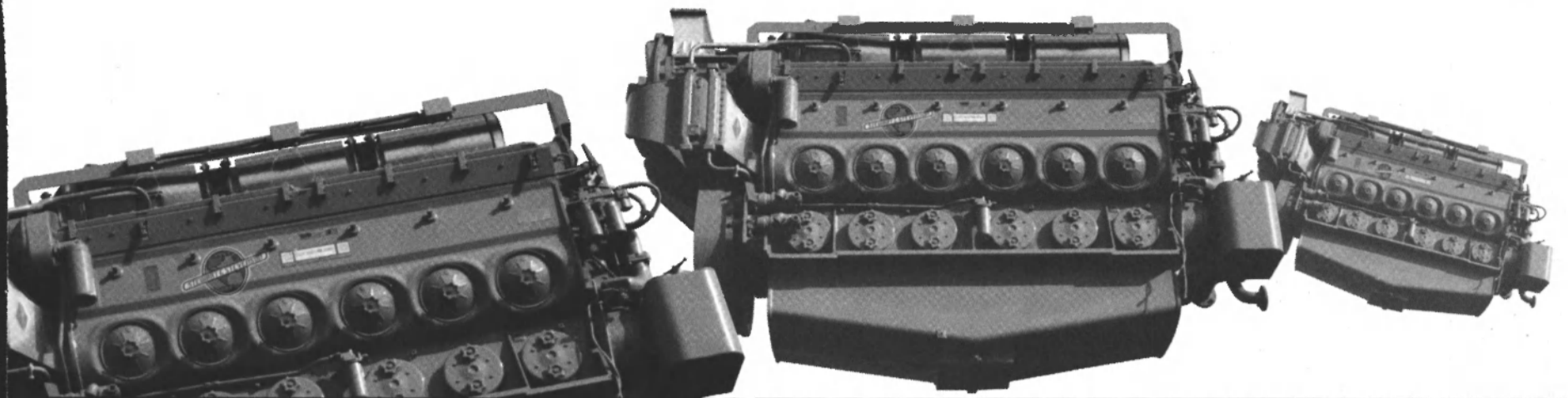
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In today's challenging business environment, RINA has sought to embellish its role as a clas-

sification body, with the objective of being perceived as a reliable and active partner for designers, shipyards and shipowners.

Thus, in addition to day-to-day service support for design approval and construction survey, the society's technicians cooperate with builders and naval architects to evaluate the impact of innovative proposals and solutions, including developments in materials technology, on both the structural and global safety of vessels.

In its comprehensive approach to the sector, to enhance RINA's classification of high-speed craft, a range of advanced analytical tools are employed to meet the industry's needs, expressed in the following services: Guide to failure mode and effect analysis (FMEA); Rules for the evaluation of noise and vibration; Preliminary Design Appraisal (PDA), entailing definition, at an early stage in the design process, of the most appropriate framework of rules, based on critical analysis of the main drawings and characteristics of the vessel, not least in regard to midship section, damage stability and structural fire protection; Structural Analysis Services (SAS), employing finite element analysis of pre-defined structural parts; and Hull Construction Optimisation (HCO), for optimization of scantlings and details, so as to achieve weight reductions and improvements in production engineering.

On the basis of its experience with passenger ships, the society is now also geared up to undertake evacuation analyses of an order to evaluate high-speed vessel designs with regard to req-

Rodriguez — Building On Aquastrada Concept

One of Europe's most skilled practitioners in fast monohull design and construction, resurgent Rodriguez Cantieri Navali is hoping to augment its orderbook shortly by bringing negotiations for two Aquastrada TMV114-class vessels to a successful conclusion.

The 370-ft. (113.5-m) design, offering capacity for 800 passengers and 218 cars at a cruising speed of 38 knots, is one of the latest derivatives of the concept first applied in Tirrenia's 335-ft. (102-m) sisters *Guizzo* and *Scatto* of 1993-94.

Employing an all-diesel configuration developing 24,000-kW, in its standard specification, and driving two steerable waterjets and one booster unit, the TMV114 is the subject of interest by an Italian regional operator.

Five Aquastrada ferries in the 328-ft. (100-m) category are already in service on Mediterranean routes, and Rodriguez has developed its offering with a host of versions upwards of 65-m, including more recent proposals in the 100 to 150-m range. Like the TMV114, the TMV145 is being actively promoted, as a versatile breed of vessel arranged for 1,500 passengers plus 425 cars, or 30 trucks plus 171 cars, with varying propulsion permutations offering economic cruising speeds from 26.5 to 37.5-knots.

A quartet of 230-ft. (70-m) ferries based on the Aquastrada philosophy is in hand at Rodriguez' northern yard in Pietra Ligure for regional fleet operators.

The first of the 28.5-knot series is due to be phased into service this summer with Campania Regionale Marittima (Caremar), taking 550 passengers and handling 50 cars on to two deck levels via a stern door.

The Messina headquarters yard in Sicily, meanwhile, is busy with the construction of three 164 ft. (50 m) monohull ferries for Italian State Railways, employing a design promising 29-knot crossings of the Strait for 500 passengers at a time. The Sicilian premises are also occupied with a second 118 ft. (36-m) Foilmaster hydrofoil for Ustica Lines, and a 34-knot, 400-passenger, proprietary stabilized monohull (Monostab) ordered by Dubrovnik-based Atlas for operation between Croatia and Venice.

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Maritime Reporter/Engineering News

uisite evacuation times.

With the commissioning of the MDV3000 Jupiter-class *Aries* and *Taurus*, RINA's present classification activities in high-speed domain at Fincantieri's naval division concern third and fourth newbuilds of the type for Tirrenia, plus two further 100 m SuperSeaCat monohull RoRo ferries for Sea Containers. All four vessels will be to HSC-B categorization covering international deployment.

The current program of HSC-B categorized newbuilds to RINA class also spans four stern-ramped monohull ferries on order at Rodriquez Cantieri Navali to the account of regional Italian operators. Incorporating the Aquastrada concept, the quartet of 70.7 m vessels has been designed for a cruising speed of 28.5 knots with a full load of around 50 cars plus 550 passengers. The first-of-class is scheduled to enter service this season with Campania Regionale Marittima (Caremar).

Classification for new construction otherwise includes a 30-knot car and passenger-carrying monohull ferry of 3,800-gt booked with the De Poli yard in the Venice lagoon by Sicilia Regionale

Marittima (Siremar). The Sicilian operator is additionally the contractual owner of the fourth TMV70 Aquastrada vessel in hand at the Rodriquez yard in Petra Ligure. RINA's current obligations on the newbuilding front also span the trio of 29-knot monohull car-passenger ferries in hand at the Rodriquez establishment in Messina for Italian State Railways' mainland-Sicily short crossings.

Tirrenia — New Chapter In Sardinian Traffic

A still finer edge will be given to competition on the sea routes


between Sardinia and the Italian mainland this summer through the introduction of two 40 knot-plus vehicle and passenger ferries, deemed state-of-the-art in high-speed commercial vessel technology.

At 476-ft. (145-m) in length, *Aries* and *Taurus* rank as the world's largest monohull fast ferries, and have been conceived as viable year-round sustainers of a near-sea trade characterized by considerable seasonal fluctuations in traffic mix and volume. Initially assigned from June to the link between Olbia and Civitavecchia, the out-

port for Rome, the pair forms the opening stage in Tirrenia di Navigazione's strategy of fleet investment directed at consolidating its position in a vital market while raising its unit cost efficiency.

Official sea trials with *Aries* in the Gulf of Genoa during April demonstrated particular attributes of the MDV3000 Jupiter design in regard to course keeping, maneuverability and seakeeping, the latter reflecting the shape and geometry of the hull, plus the ride control arrangements. System relia-

(Continued on page 82)



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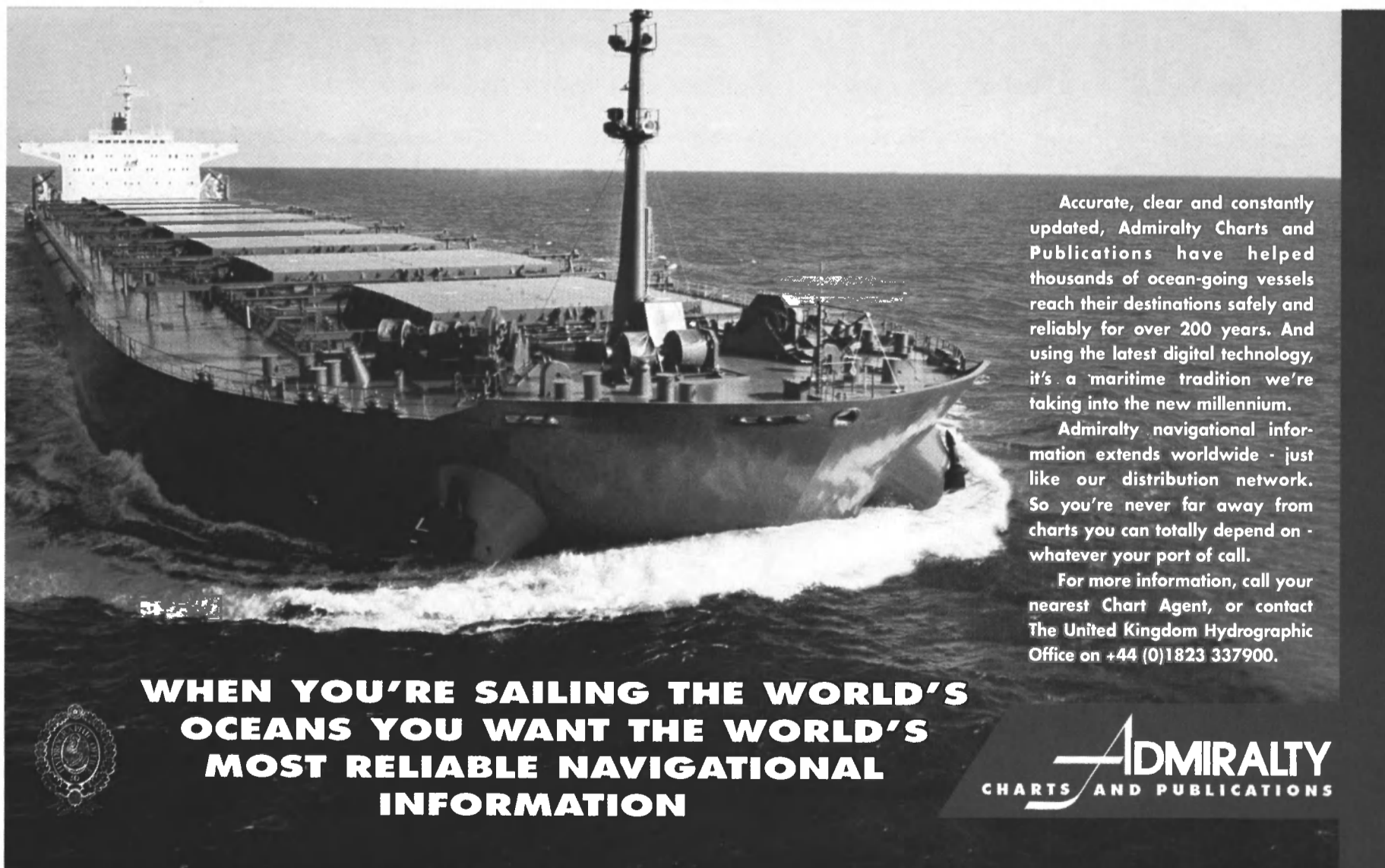
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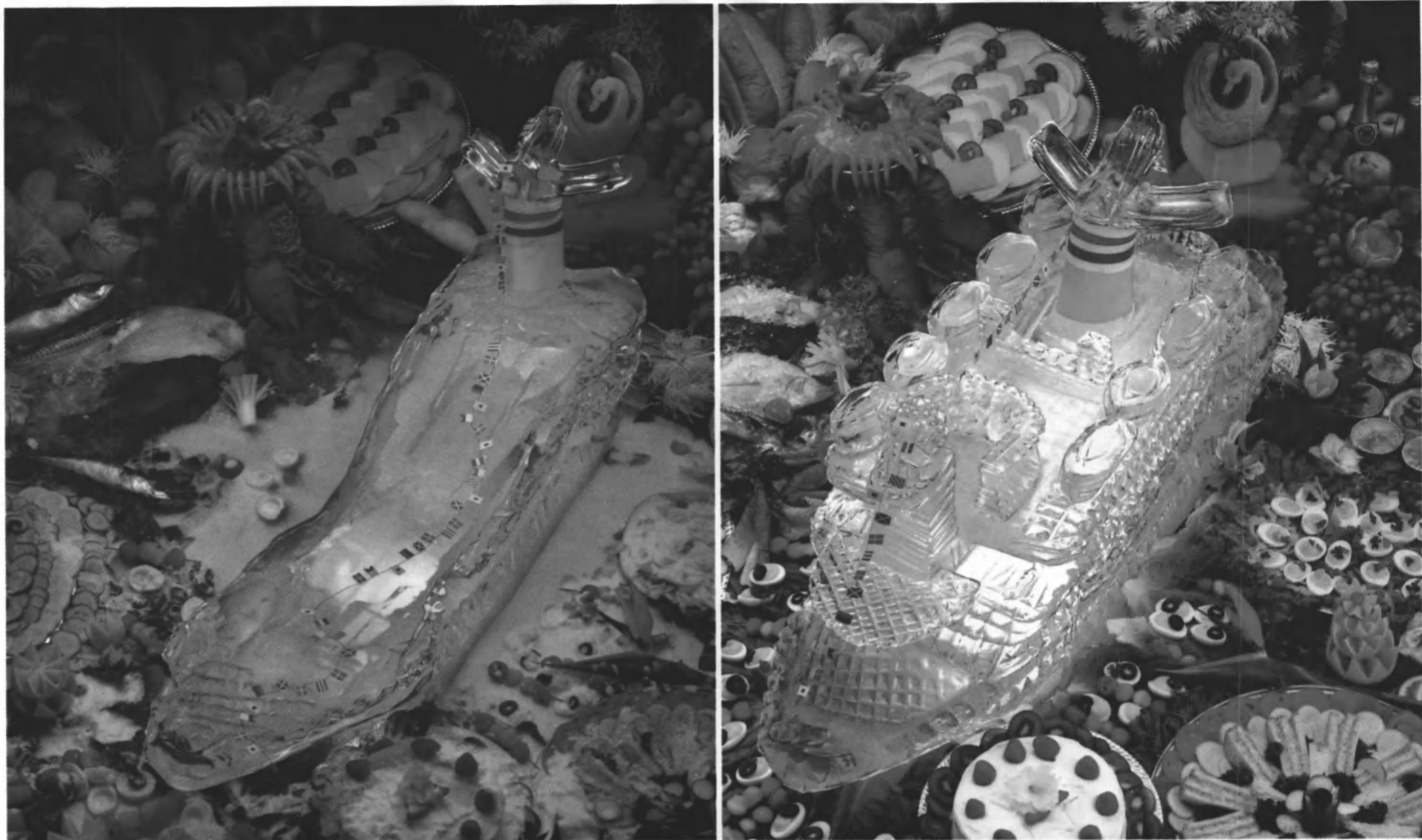
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Royal Caribbean's Nordic Empress is shown in drydock at Atlantic Marine.

Maintaining A New Course

The cruise industry continues to add exponentially to its capacity with new, meticulously outfitted tonnage in order to stay a step ahead of legislation, consumer demand and the competition.

Spurred by the need to fill their fleets with state-of-the-art ships with the latest amenities, cruise shipping companies large and small, old and new, have embarked on an unprecedented buying binge and seeming onepismanship which has filled shipyard orderbooks and created considerable business opportunities for suppliers which offer advanced products and systems.

The past six months have been active, punctuated by an order for

the world's largest (136,000-ton) cruise ship, and a contract for a ship that will serve for a home at sea, at least for those willing and able to fork over between \$1.5 to \$6 million per living space.

More recently, Cunard Lines — sold by Kvaerner to Carnival — announced its plans to re-establish itself as a defining force in the cruise market with, what it dubs, the Grandest Liner ever.

The litmus test of success is evident in the considerable coverage

given to the market in U.S. consumer publications such as *The Wall Street Journal*, *Time* and *Business Week*. As is the practice of publications not schooled in the intricacies of a particular market (and in the effort to create a juicy story), many of the reports have harped what it perceives as "overbuilding," or on the few problems which have cropped up of late in some of the yards. Most recently a report in *WSJ* detailing the difficulties encountered at Fincantieri

in getting the Disney ships out the door to the specification of the notoriously selective buyer.

While it is true that the shipyards' cruise orderbooks are brimming, with more than 38 ships totaling more than 2.21 million GT on order according to Lloyd's Register statistics of a few months ago (see chart below), it is also true that the cruise potential in the U.S. — the world's largest market — has barely been scratched. Statistics show that just eight per-

Builder	Country	Ship Name	GT	Year	Builder	Country	Ship Name	GT	Year
Admiralteiskiy Shipyard	RUS	BLUE SEA	25 000	1999	Fincantieri Cant. Nav. Italian	ITL	ZAANDAM	62 000	1999
Astilleros Gondan S.A.	SPN	GONDAN 405	5 000	1999	Fincantieri Cant. Nav. Italian	ITL	OCEAN PRINCESS	75 000	1999
Blohm + Voss AG	GEU	BLOHM & VOSS 96	25 000	2000	Fincantieri Cant. Nav. Italian	ITL	FINCANTIERI 8153	61 000	2000
Blohm + Voss AG	GEU	BLOHM & VOSS 962	25 000	2001	Fincantieri Cant. Nav. Italian	ITL	CARNIVAL VICTORY	101 300	2000
Bremer Vulkan Werft und Masch.	GEU	NORWEGIAN SKY	78 200	1999	Howaldtswerke?Deutsche Werft	GEU	DEUTSCHLAND	22 400	1998
Cant. Nav. S.M.E.B. S.p.A.	ITL	GI-AL	1 800	1998	Jos. L. Meyer GmbH & Co.	GEU	SUPERSTAR LEO	75 000	1998
Chantiers de l'Atlantique	FRA	VISION OF THE SEAS	76 000	1998	Jos. L. Meyer GmbH & Co.	GEU	SUPERSTAR VIRGO	75 000	1999
Chantiers de l'Atlantique	FRA	RENAISSANCE ONE	30 200	1998	Jos. L. Meyer GmbH & Co.	GEU	MEYER 640	76 000	2000
Chantiers de l'Atlantique	FRA	RENAISSANCE TWO	30 200	1998	Kvaerner Masa Yards Inc.	FIN	PARADISE	70 367	1998
Chantiers de l'Atlantique	FRA	L'ATLANTIQUE J31	47 900	1999	Kvaerner Masa Yards Inc.	FIN	KVAERNER MASA HELSINKI 495	28 000	1999
Chantiers de l'Atlantique	FRA	RENAISSANCE THREE	30 200	1999	Kvaerner Masa Yards Inc.	FIN	RCCL EAGLE 1	136 000	1999
Chantiers de l'Atlantique	FRA	RENAISSANCE FOUR	30 200	1999	Kvaerner Masa Yards Inc.	FIN	KVAERNER MASA HELSINKI 499	82 000	2000
Damen Oranjewerf	NTH	STAD AMSTERDAM	698	2000	Kvaerner Masa Yards Inc.	IN	KVAERNER MASA HELSINKI 498	82 000	2000
Fincantieri Cant. Nav. Italian	ITL	DISNEY MAGIC	85 000	1998	Kvaerner Masa Yards Inc.	FIN	RCCL EAGLE 2	136 000	2000
Fincantieri Cant. Nav. Italian	ITL	DISNEY WONDER	85 000	1998	Kvaerner Masa Yards Inc.	FIN	RCCL EAGLE 3	136 000	2002
Fincantieri Cant. Nav. Italian	ITL	SEA PRINCESS	75 000	1998	Saint Malo Navale	FRA	LE LEVANT	1 600	1998
Fincantieri Cant. Nav. Italian	ITL	GRAND PRINCESS	104 000	1998	Stocznia Gdanska S.A.	POL	REGENT SKY	50 000	1998
Fincantieri Cant. Nav. Italian	ITL	CARNIVAL TRIUMPH	101 672	1998	Stocznia Gdanska S.A.	POL	GWAREK	4 600	1999
Fincantieri Cant. Nav. Italian	ITL	VOLENDAM	62 000	1999					

TOTAL = 2.21 million

cent of North American residents (the world's largest cruise market) have actually taken a cruise.

"Our commitment to continued expansion of our core brands through newbuildings demonstrates our confidence in the future of the cruise industry," said Carnival chairman **Micky Arison** in a statement. "Although cruising is becoming an increasingly popu-

lar vacation option, still only eight percent of the vacationing North American public has ever taken a cruise, and the market for cruising in Europe is just beginning to develop. We are very bullish on the future; the growth potential is tremendous."

Also, statistics touted by the major lines and generated by the Cruise Line International

Association (CLIA) an impressive 8.6 percent increase in passengers in the North American market in 1997, as more than 5.05 million passengers took to the seas last year. Similar good news, particularly for industry skeptics who have taken to the soap box to deride the continued addition of new tonnage, capacity was also at an all-time record or 90.8 percent.

In the next five years, the market will absorb an astounding 51 percent increase in capacity

Combined with strong market prospects, legislative matters are also playing a hand in keeping cruise ship orderbooks full. Ever-restrictive safety codes and standards have made it more attractive for shipowners to opt for new ships with endless amenities, rather than upgrading older tonnage for tens of millions of dollars. While cruise ship newbuildings generally fall in the \$300 to \$500 range, this end of the maritime market is by far the most image conscious, and long-term success demands substantial capital investment.

While it is no doubt that the size and content of these new floating palaces are pushing shipbuilders as well as equipment and service providers to the edge, it has also been a continuing exercise in the development of superior solutions in terms of maritime safety and performance. While a debate could long rage as to which areas onboard cruise ships have experienced the most significant technological advances, a strong case could be made for machinery.

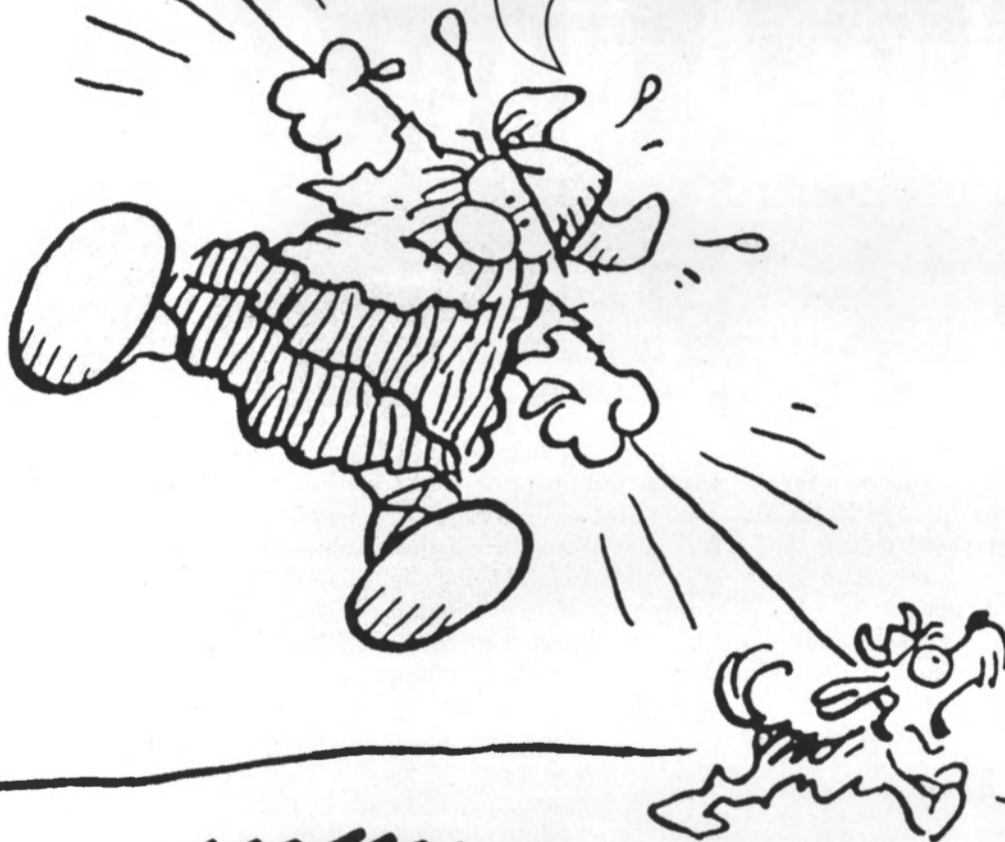
Power to spare

The diesel electric arrangement has been whole-heartedly embraced by the cruise market, as ship designers and owners alike enjoy the flexibility and ability to squeeze in additional passenger cabins which it provides.

The innovation advanced a step further with the installation of the diesel electric powerplant control technology found aboard Princess Cruise Line's *Grand Princess*. Woodward Governor Co. worked in



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A Bigger Piece Of The Pie

While the North American cruise market is by far the world's largest, markets outside the States are quickly emerging as lucrative business potential for major cruise operators. For example, the European cruise market, in terms of passenger capacity has grown an astounding 98 percent between 1992 and 1997. The following chart highlights the growth.

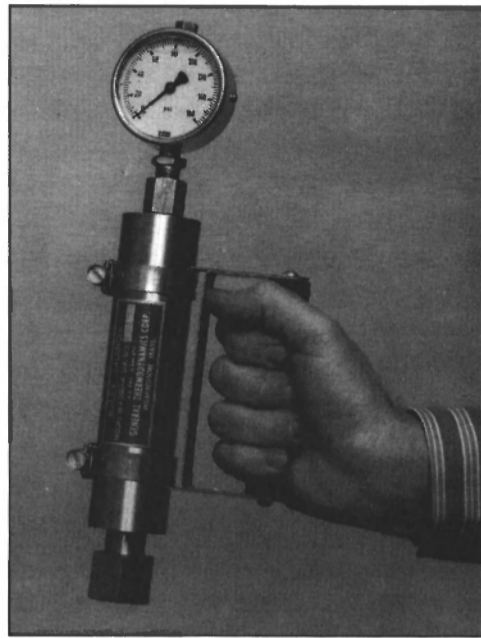
Country	(thousands of passengers)						% Growth
	'92	'93	'94	'95	'96	'97	
U.K.	219	254	270	340	429	510	+133
Germany	165	173	210	220	255	283	+72
Italy	80	90	120	151	183	202	+153
France	113	118	130	135	154	160	+42
Spain	18	18	20	25	31	40	+122
Switzerland	19	21	24	25	29	30	+58
Others	68	80	91	106	117	123	+81
TOTAL	682	754	865	1002	1198	1348	+98

concert with shipbuilder Fincantieri to fulfill the stringent safety brief issued by owners P&O by providing a diesel electric plant supplying an electrical grid control system. The system is designed to put the ship on top of power availability within the cruise industry, a strong statement given the propulsion and hotel power needs. Six Sulzer engines drive generators which supply the grid with 11.2 MW each. Thanks to four independent busbars, the entire grid is divisible, which allows the complete electrical system of the ship to be divided into four areas, which can be run together or independently.

ABB is another name which has made significant waves in the cruise market, with its innovative Azipod propulsion offering. The company recently nabbed a \$100 million propulsion package contracts for cruise liners being built by Kvaerner Masa-Yards and Meyer Werft.

"ABB has been awarded contracts to supply innovative electric propulsion systems for three new luxury cruise vessels, with provisional orders on a further three ships. The total value of all the orders is about \$100 million," the company said. The cruise liners are being built for

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Carnival Cruise Lines and Royal Caribbean International of the U.S., as well as Italian Costa Crociere. All of the ships are expected to be delivered between 2000 and 2003.

ABB's Azipod has gained considerable favor among cruise companies of late, as the system replaces the propeller drive shafts, rudders, reduction gears and other propulsion components found on conventional vessels with a single pod and propeller capable of turning 360 degrees. The propulsion system is designed to reduce fuel consumption and emissions. It also can allow for more passenger and cargo space by eliminating the need for long shaft lines and other equipment.

While the Azipod system is becoming a regular among cruise liners, the gas turbine has tried for years, unsuccessfully, to work its way aboard cruise ship's spec lists...until recently.

Keeping with its industry-leading stature, Royal Caribbean has become the first cruise ship operator to incorporate gas turbine propulsion on a large cruise ship. Until now, the use of gas turbine propulsion has been limited to naval vessels and smaller fast craft. However, the ever pioneering Royal Caribbean believes the GE units will help its ship reduce exhaust emissions from 80 to 98 percent, while simultaneously providing lower levels of noise and vibration.

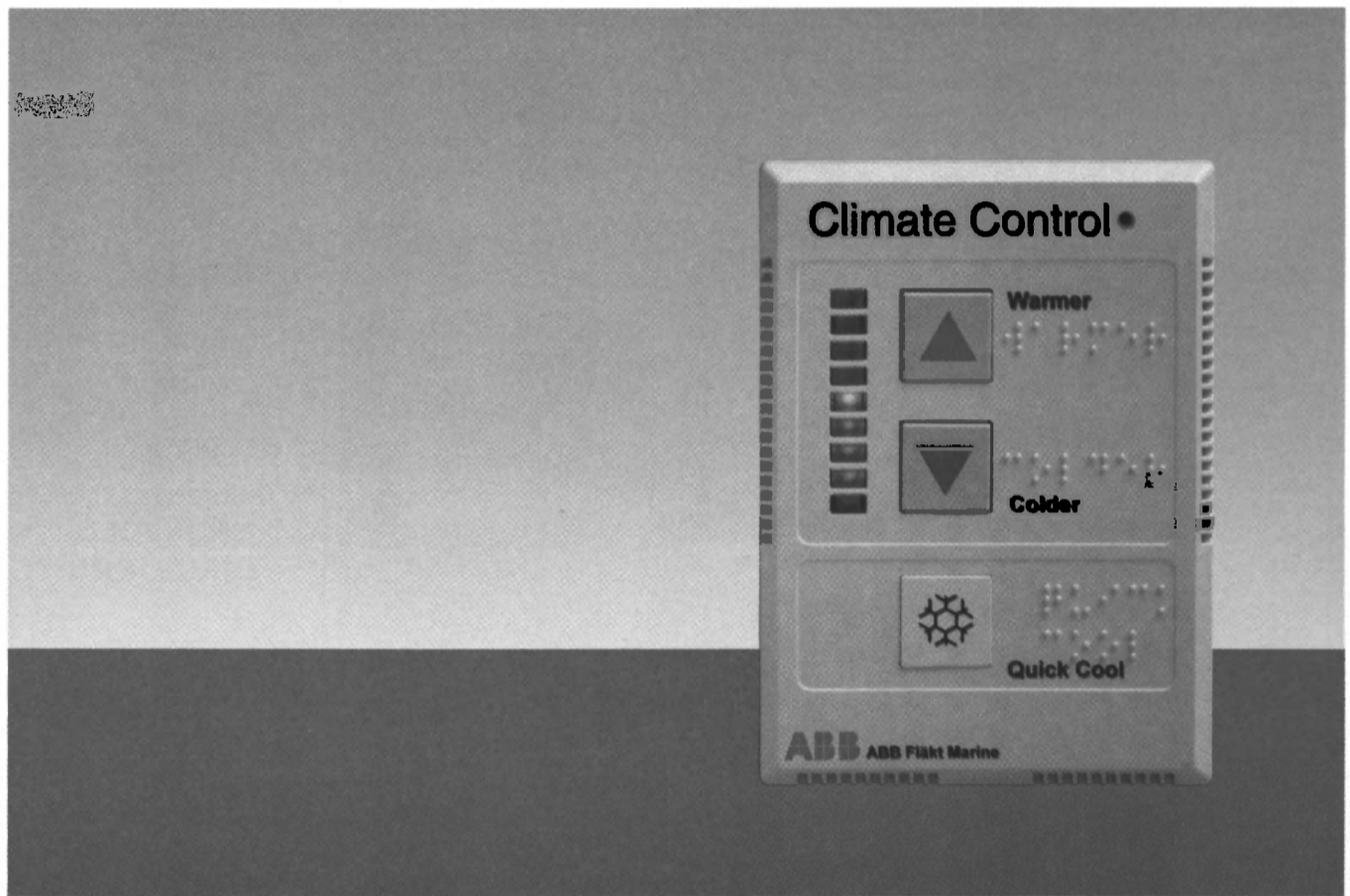
Up to six of the company's Voyager and Millennium-class vessels will be the first cruise ships ever powered by General Electric's gas and steam turbines instead of diesel engines. Each of the 85,000-ton ships, being constructed in

France and Germany, will be equipped with a pair of GE Marine Engines' LM2500+ aeroderivative gas turbines and a single steam turbine instead of the four or five diesel engines used on modern cruise ships. On each cruise ship, gas turbines will drive generators which, in turn, provide electricity to propeller motors. Then a steam

turbine recovers heat from the exhaust, providing energy for heating water and other electrical needs such as lighting. The first two Millennium ships for Celebrity Cruises are due in June 2000 and January 2001, and the first Voyager ship for Royal Caribbean International is due in February 2001. The company has options to

build an additional three ships by 2003. GE Power Systems will install the power plants and will provide service under a 10-year agreement.

Harri Kulovaara, Royal Caribbean's senior vice president of Marine Operations, said the technology has several other advantages for cruise ships. "By



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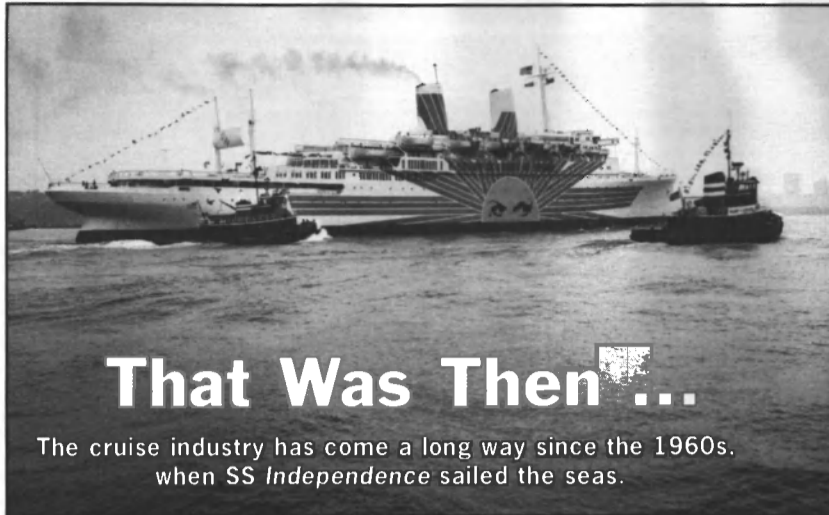
Fashionably Early

With all of the emphasis on ships coming in late, Kvaerner pleased Carnival with the early delivery of *Elation*.

Carnival Cruise Lines took delivery of the 2,040-passenger *Elation*, from Finland's Kvaerner Masa-Yards nearly two weeks early.

The 70,000-grt ship is the first cruise ship to feature the innovative electric azimuthing Azipod propulsion which, unlike conventional systems, pulls a ship through the water rather than pushes it. Azipod eliminates the need for traditional propeller shafts, rudders and stern thrusters thus occupying less space on board.

The units are touted for making a ship easier to steer and maneuver, and also for its role in reducing propulsion noise and vibration, as well as saving fuel. According to **Jukka Jaatinen**, Kvaerner Masa's project manager, "The change to Azipod propulsion is as significant as the change from the paddle wheel to the propeller."



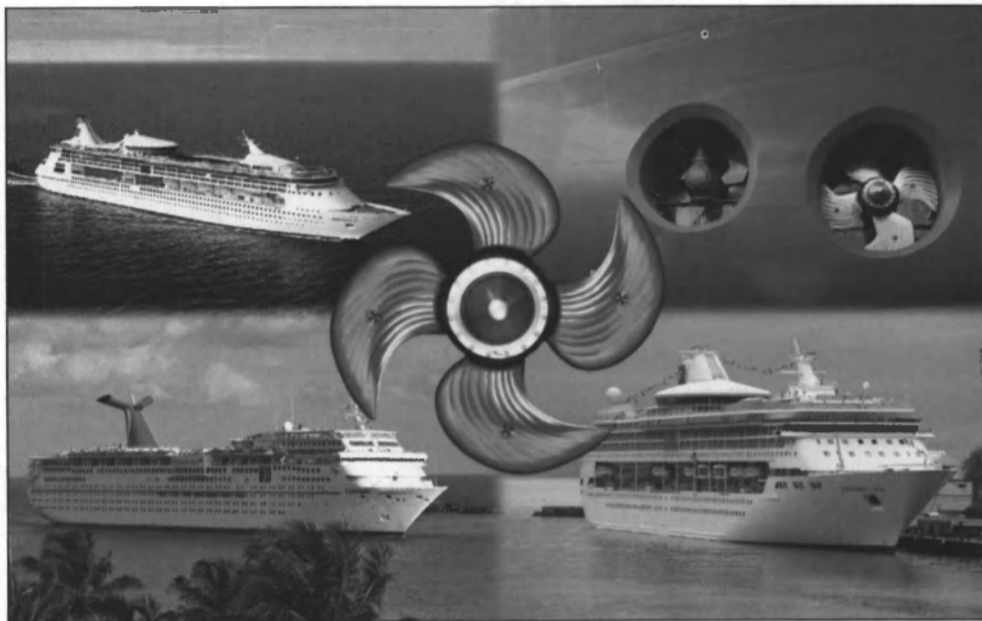
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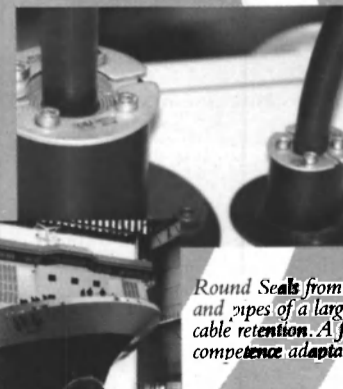
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utilizing the waste heat from the turbine's exhaust, we're able to produce a major portion of the electricity for ship services, from heating water to air-conditioning, and it eliminates the need for additional energy-depleting machinery."

Top of the class

While legislation has played its fair share in helping to create the latest classes of ships (see related story page 39), old-fashioned competition and the need to consistently exceed consumer expectations has played a larger role in determining the size, shape and outfitting of today's floating palaces.

One of the more surprising projects is perhaps the *World of Residensea* project, a ship which will offer 286 apartments and suites for sale. The spaces vary from a minimum of 62 sq. ft. at about \$800,000, ranging to the top-of-the-line apartment price at more than \$6.5 million. The brainchild of **Knut Kloster Jr.**, the Residensea project has raised many eyebrows and interest among industry executives, who are anxious to see if this daring expansion on the traditional market will be economically feasible in the long run. Germany's HDW shipyard was the winning yard for the initial \$545 million ship, a yard which is renowned for its innovative shipbuilding projects, including the building of a new type of open-top containership.

The new Disney ships continue to generate significant buzz among industry executives, although now the majority of the talk surrounds the months of delays the ships have endured. The inaugural cruise is now set for the end of this month, and it is a sure bet that Disney's cruise line venture will launch a new era in cruise line spectacles. Built in Italy by Fincantieri, the Disney ships feature a wealth of innovation never before seen on the seas. While the ships are bound to comply with international standards of safety and performance, and Disney has

Legal Aids

A large plank in the newbuild buying spree was the 1992 SOLAS Retroactive Fire Safety Amendments. The far-reaching international fire safety requirements, for the first time, applied to all existing as well as new passenger vessels, and include provisions for smoke detection in virtually all spaces where fire could originate, the elimination of combustible materials in construction, improved fire door closure monitoring and additional automatic fire safety features, which can be controlled from the vessel's bridge. Additionally, vessels must have

low location lighting installed throughout to identify all routes of escape and readily identify exit doors. The lighting must work when all electrical power has been lost and must be bright enough to lead a person to safety through a smoke-filled passageway. The most significant change, however, was the requirement for the installation of automatic sprinkler systems in all accommodation and service spaces, stairway enclosures and corridors, virtually throughout the vessel. — (The preceding was excerpted from *Even Keel*, a publication of the International Council of Cruise Lines.)

surely stayed to its course of incorporating not cutting-edge, rather tried-and-true technologies in presenting its entertainment products, the key difference is the maritime-ization of the Disney brand. These two ships are uniquely positioned to appeal to three distinctive groups simultaneously: families, kids and adults. The vessels are smartly separated in terms of attractions and amenities, so that each group can attain full enjoyment at once. While the hallmark Disney call for quality has undoubtedly added more than a few days to the shipyard over-run, it can be safely said that the ship will be precisely to spec, and perhaps the experience will have upside effects on other cruise newbuilds.

With its ships, Disney has already ruffled some industry norms by opting for a retro, distinctive slender hull, which has great aesthetic value yet a penalty in terms of the number of cabins. Also, a major cruise revenue source — the onboard casino — was omitted from the Disney ship. While some analysts see this as a strategic misfire, Disney has the unparalleled allure of a combination cruise/theme park vacation package which is not available to the others.

In a quick attempt to capture some lost stature, Cunard Line — which was recently acquired by Carnival — last month unveiled plans to build a giant new superliner, Project Queen Mary, that would "invoke the spirit of a bygone era of seagoing luxury." Cunard Line's president **Larry Pimentel** said the project would lead to the development of "the grandest and largest liner ever built — the epitome of elegance, style and grace."

"Our goal is nothing less than to create a new Golden Age of sea travel for those who missed the first," Pimentel said. Details of the size, guest capacity and deployment are still under planning, but the company said the concept would develop "into the next evolution of a true ocean liner" and not be a substitute for Cunard's top liner, *Queen Elizabeth 2*.

Cunard Lines operates two cruise brands, Cunard and Seabourn, which is the result of the \$500 million Carnival acquisition of Cunard from Kvaerner and a subsequent merger with the Carnival-owned Seabourn. The fleet includes three Seabourn vessels — the

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It's the competitive law of the jungle...



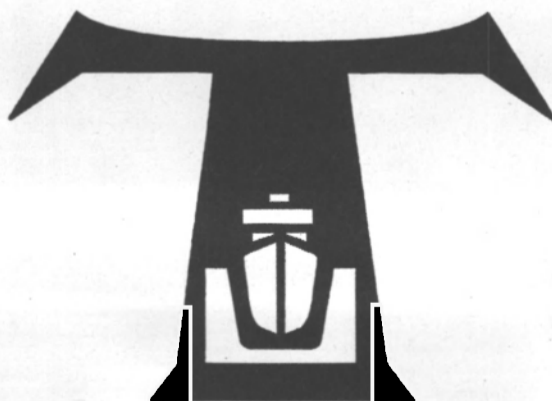
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Pride, Spirit and Legend — and five Cunard ships — *Queen Elizabeth 2, Vistafjord, Royal Viking Sun* and the *Sea Goddess I and II* — and commands almost 50 percent of the luxury cruise market worldwide.

Accurately tracking the industry's newbuild activity often requires a scorecard. Next to the list in this multi-billion dollar game is Norwegian Cruise Lines, which recently announced an aggressive plans to add four ships worth more than \$1 billion to its

existing fleet of 10 ships. NCL signed a letter of intent with the Lloyd Werft shipyard to build a 76,000-ton ship which will be a sister ship to NCL's eleventh vessel, *M/S Norwegian Sky*, now under construction at the yard. The vessel will carry 2,000 passengers and will be delivered in the summer of 2000.

The letter of intent includes an

option to build three additional ships, all in the range of 2,000 passengers, at Lloyd Werft. These vessels will be delivered one a year in 2001, 2002 and 2003. The average price of each new build is reportedly \$332 million.

Saving not necessarily the best, but definitely the biggest for last, Royal Caribbean has culminated the quest for the biggest ship afloat

with its order for a 136,000-ton unit, dubbed *Voyager of the Seas*, to be built by Kvaerner's Turku Shipyard.

The ship will be the largest cruise ship in the world, and is scheduled for its maiden voyage Nov. 7, 1999. *Voyager of the Seas* is the first of three 3,114-passenger Eagle-class ships, each with a contract price of around \$500 million.

Cruise News & Notes

"Virtual ER" Found Aboard Grand Princess

Touted as an industry first, Princess is offering a "virtual emergency room" aboard the *Grand Princess*. Know as SeaMed, it is on trial on the world's biggest cruise ship and will directly link the ship's medical staff with the Emergency Department physicians and specializes at Cedars-Sinai Medical Center in Las Angeles. In addition to providing a live, two-way video link, this virtual ER visit also allows radiographs, ECG's and other physiologic signals to be transmitted to the hospital by satellite.

Hopeman Changes With The Times

Founded by **Arendt W. Hopeman**, a native of Holland, Hopeman Bros. has built a rich history in providing ship's interior design solutions and joiner work since 1916. The company has changed with the times, however, and today is a highly flexible company which provides traditional joiner turnkey packages as well as management services and material supply. The company's long reference list includes renovation work on the *Viking Serenade*, *Disney Magic* as well as aircraft carriers and Sealift ships.

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Marine Accommodations "Turnkey" Services Attract Repeat Customers

Marine Accommodations has made an impressive showing with its interior division. M.A. Interiors provides turnkey services comprised of structural steel, piping, plumbing, electrical and joiner outfitting. In the last few years, it has successfully completed a diversity of projects both at home and abroad. A prime example of its capabilities was the award to M.A. Interiors in 1997 of the contract for the refurbishment of public spaces aboard *Royal Caribbean's Song of America*.

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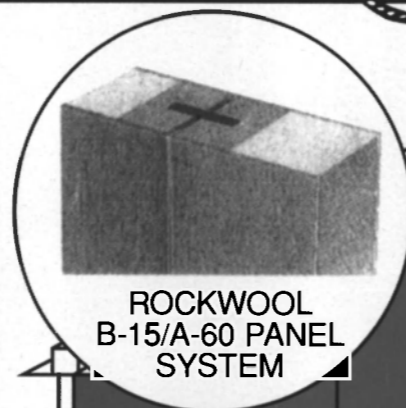
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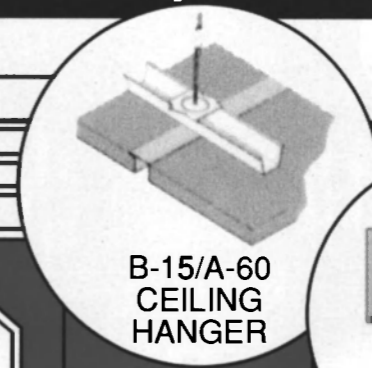
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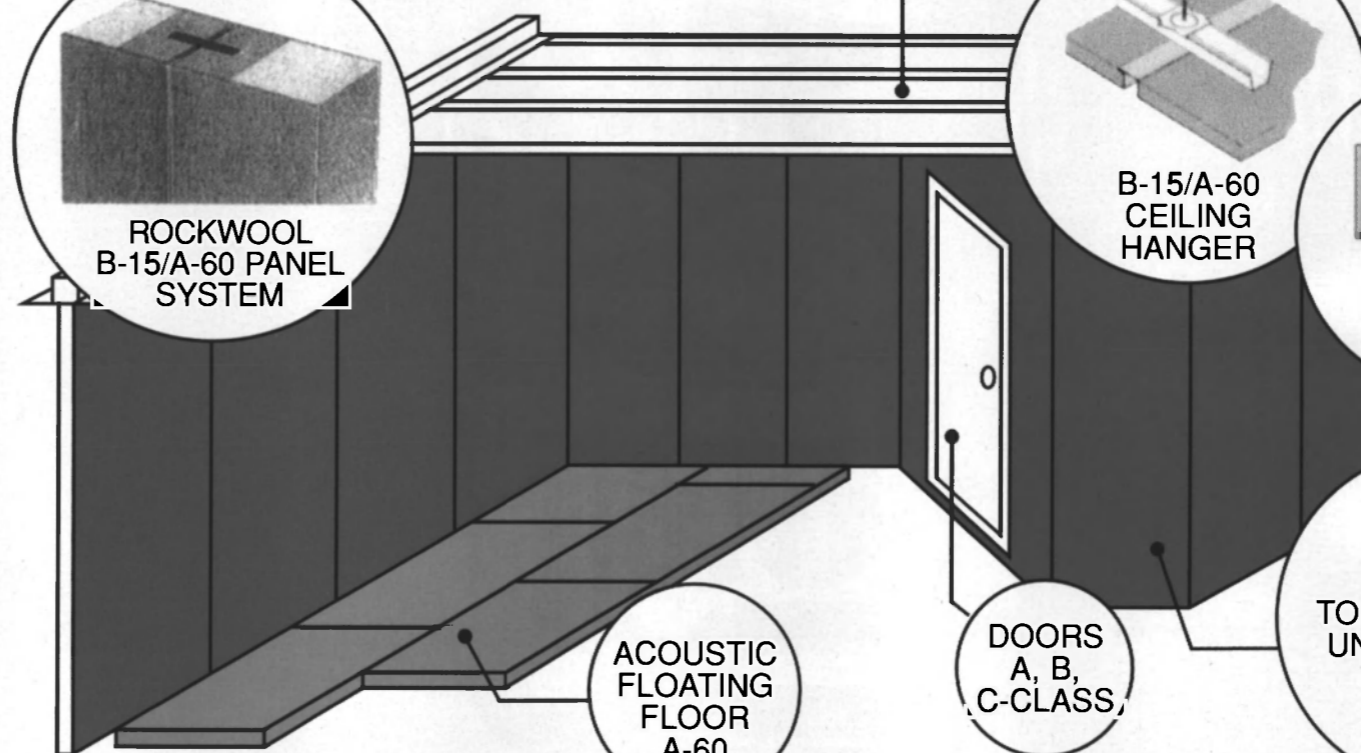
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CORPORATE HEADQUARTERS

Litton Wins Renaissance Cruise Order

Litton Marine Systems won orders from France's Chantiers d'Atlantique to supply integrated bridge systems for two new cruise ships being built for Renaissance Cruises.

There are options for four additional 32,000-grt ships. The vessel will

be fitted with the Sperry Vision 2100 IBS.

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Teak Tech

Denmark's A/S Henning Frojaer offers a wide variety of teak wood product solutions, including decking and a host of interior outfitting options, including interiors and turn-key delivery.

It's long reference list starts in 1981 with M/S *Abdul Assis*, and includes more recent ships such as both Disney ships, *Rotterdam VI*, *Carnival Destiny* and the yet to be built M/S *Sea Princess*.

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Fireproof Materials Solutions

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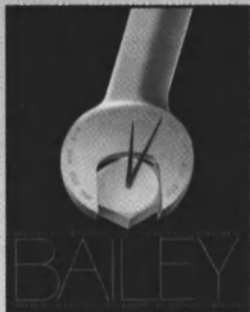
to developing custom solutions for unique situations.

It offers a variety of firefighting materials designed to enhance the flammability and toxicity qualities of most any product.

The Sandel end-product list includes mattress ticking, covers, pillows tickings, tarpaulins, upholstery, curtains, etc.

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Company Profile



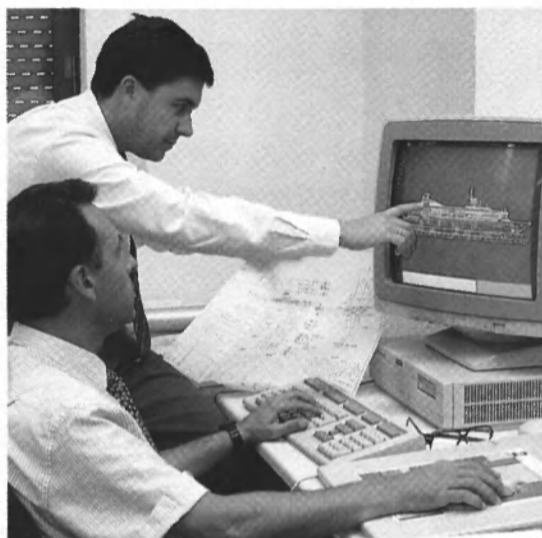
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In an effort to stay competitive, the company has exhibited a keen adherence to incorporating technological innovation. It offers a computer monitoring and control systems for HVAC-R with full graphics (Windows based). It also has been very active in the refrigerant conversion market, including 134a, azeotropes and blends. On the service side, company president *Benjamin A. Bailey* attributes the company's success to maintenance of the staff's technical knowledge, in terms of new refrigerants, new oils, electronics and screw compressors.

In terms of market expansion, while Mr. **Bailey** notes that there has been an erosion of the maritime market, he expects business to be driven by several factors, including the CFC phase-out; new, integrated electronics with new equipment; and the development of a new cargo preservation system for Military Sealift Capability. He is also eyeing the new Kvaerner development of the Philadelphia Naval Shipyard for commercial purposes, and anticipating Kvaerner's reliance on his team's deep experience and technical know-how.

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C. Plath Provides Steering and Nav Equipment to Grand Princess

C. Plath, the business unit of Litton Marine Systems, has supplied the steering and navigation systems for the new P&O cruise ship *Grand Princess*, built by Fincantieri.

Equipment provided by C. Plath includes a Navipilot ADII adaptive autopilot system with four steering positions and emergency steering stations, as well as two Navigat X gyrocompass, Navitwin control unit and multiple Navidata displays. The order was placed with C. Plath's Italian representative, Telecom

Italia, which also oversaw the installation aboard the ship.

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STN Atlas Helps Outfit World's Largest Cruise Ship

STN Atlas Marine Electronics has delivered what it dubs the most

extensive and "safest" navigation system ever to be installed on a passenger vessel. The system, the dual Navigation and command System Atlas Nacos 65-3D, was placed on the 109,000-grt *Grand Princess*, a ship built by Fincantieri that cost more than \$450 million.

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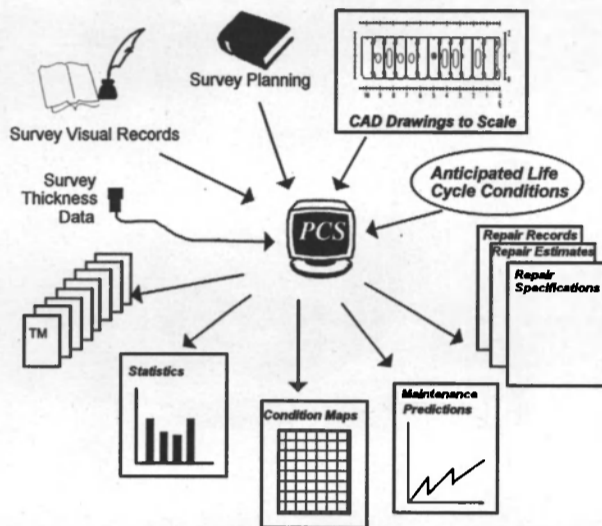
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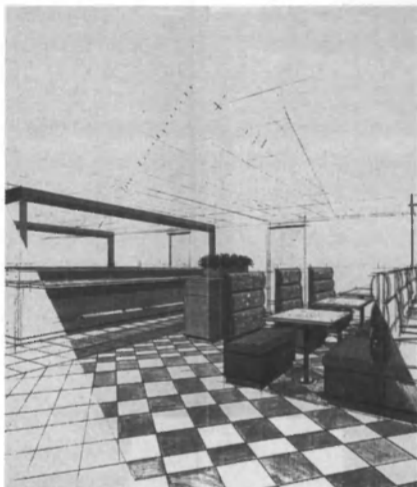
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EBDG Offers New Design

Elliott Bay Design Group (EBDG) of Seattle has developed a new design for a 300-passenger cruise ship designed to SOLAS standards for "go-anywhere" use. EBDG envisions the concept as a U.S.-built vessel for coastal cruising, convention and destination-based markets.

The twin-screw ship would measure 365 x 64 ft. (111 x 19.5 m) with a gross tonnage of 9,000 tons. A variety of propulsion options is considered, including medium speed diesels and steerable Z-drives with FP propellers, generating a cruising speed of about 17 knots. "Our idea is to bring many of the traditional cruise ship features into a smaller-scale vessel," said EBDG president John Waterhouse.

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Maritime Reporter/Engineering News



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Illustrated here it is protecting the carpets and finished surfaces aboard the newbuilding E31 Rhapsody of the Seas for Royal Caribbean Cruise Lines at the Chantiers De L'Atlantique, courtesy of the French outfitters Erbos located in Nantes.

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SHIP REPAIR & CONVERSION

by Alan Thorpe, international editor



The latest FPSO contract to be placed involves Singapore's Keppel Shipyard, which will convert the

140,905-dwt conventional tanker *Ruby Princess* to a FPSO. Operated by Nortrans Offshore Vietnam Ltd. (Nortrans), this is the third FPSO contract which Nortrans, one of the major offshore and engineering consultants in the region, has awarded to Keppel Shipyard over the past year. The previous two vessels were *Endeavour*, delivered April, 1997, and *Petroleo Nautipa* (ex *Knock Buie*), which was completed in April.

Due to be completed this September, *Ruby Princess* is to be operated by Nortrans for Petronas Carigali (Vietnam) Sdn Bhd on the Ruby Field, South East of Vung Tau in Vietnam, as a base for processing and storing crude oil and mooring/loading terminal for export tankers. The yard will install equipment including process, flare drum and metering skids. Other equipment to be installed includes a 1,500-kW turbo alternator, fresh water generator, communications and navigational devices and safety and fire fighting gadgets. Keppel Shipyard will also design, fabricate, construct and install a flare tower and helideck. A turret single point mooring system complete with structural reinforcement will also be put up at the vessel's bow.

Keppel has also been involved in the conversion of Teekay Canada's 106,668-dwt tanker *Dampier Spirit* (*Frontier Spirit*), which is being converted to a FSU. An import and export system, a hydraulic system for valves and a forward and aft spread mooring system were installed besides a 10-ton deck crane, helideck and fire-fighting and navigational equipment. The accommodations and cargo control rooms were also modified. The vessel's cargo tanks were blasted and recoated while the external hull was similarly treated for an on-location life of at least eight years.

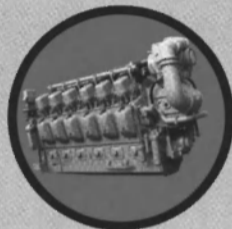
The consolidation in the Singapore repair industry continues with the latest move being

that Sembawang Corp. has been swallowed up by the giant conglomerate, Singapore Technologies. This follows Sembawang's earlier decision to merge with Jurong Shipyard

Limited (JSL) and Keppel's decision to merge with Hitachi Zosen (Singapore).

Belgium's Dockwise, a leading heavy-lift shipping specialist, is to convert one of its 1983-built ves-

sels into what it claims will be the world's largest heavy-lift semi-submersible ship. In August, the 23,473-dwt Antiguan-registered *Mighty Servant 1* will arrive at Hyundai Mipo Dockyard (HMD) to



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SHIP REPAIR & CONVERSION

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The project will involve inserting a new 98-ft. (30-m) mid-body section and increasing the beam from its present 131 ft. (40 m) to 164 ft. (50 m) in a contract expected to last 65 days. The conversion will result in a 120 percent increase in

carrying capacity to 47,000 tons, while the unobstructed deck area, measuring 7,500-sq.-m., an increase of more than 50 percent. Following the completion of the conversion of *American Champion* from trawler to seismic vessel, Tyne Tees Dockyard has been awarded a second such project, the

conversion of a deepsea fishing vessel into a new seismic survey vessel to be renamed *Atlantic Horizon*. The contract, which was awarded by Horizon Exploration Ltd, will include the installation of 500 tons of steel, new main engines, new generators and new thrusters as well as total refur-



Above: Western Ship Repair Yard --- under privatization.



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bishment of the accommodation and the complete seismic outfit package. In what is believed to be the largest ever repair contract carried out by Panama's Astilleros Braswell International SA, the yard has renewed some 600 tons of steel onboard the 62,153-dwt tanker *Golden Eagle*, which is owned by Greece's Aran Shipping & Trading. The vessel ran aground during early March this year, with initial estimates showing that some 150 tons of steel renewal was required along the bilge strake and associated internals. The ships arrived in the drydock on March 11, and inspection showed that some 580 tons of steel were needed to be replaced. Contracts were signed on a basis of seven to eight tons per day, with the complete project estimated to take some 80 days to complete. However, the yard maintained a higher than estimated level of work and the actual contract was complete in 75 days.

In what it is believed to be one of the world's first "fifth survey", Bergesen's 284,522-dwt, 1973-built VLCC *Berge Prince* entered Dubai Drydocks for a four week period beginning May 6th. There is a great number of large tankers expected to go through fifth special survey work over the coming few years, the latest OPA regulations allowing for tankers to be in service for up to 30 years. Dubai Drydocks also recently carried out guarantee repairs to the first in a series of large lng carriers built by Finland's Kvaerner Masa for Abu Dhabi National Oil Co (ADNOC). The 116,703-gt Moss-Rosenburg type LNG carrier *Mubaraz* has already been completed and the second ships, the *Mraweh* was due last month. Following a low work period during January and February this year, March has resulted in the highest sales figures for over a year for Bahrain's ASRY, which has experienced an overall increased demand throughout the first quarter 1998. March

(Continued on page 85)

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When the clock strikes midnight on December 31, 1999, many date-dependent devices could fail to recognize the year 2000. Even long before that, some systems will already be in difficulties. The problem is quite unique in that it has a totally immovable deadline: every company will need to ensure that its systems are corrected and operating by that time.

The problem is hardly a new one for anyone in business, and many progressive, forward-thinking organizations have surely started addressing the matter. Many computers and software applications in use today, around the world and in all industries, will report date information incorrectly from January 1, 2000.

The problem is quite extensive in scope and can be present at any level within a system, e.g., hardware; built-in operating system (BIOS) in PCs, with machine date; operating system; development tools and languages; application software; third party packages and development; data interfaces; and embedded chips.

Inmarsat Takes Action

The management and staff at Inmarsat are all well aware of the pending problem, and it is a problem that may not only affect the functions within Inmarsat, but much more seriously, the ability to communicate and to utilize the more than 100,000

Inmarsat terminals that are in use worldwide — at sea, on land and in the air. Considering that several Inmarsat systems form major elements in the Global Maritime Distress and Safety System (GMDSS), the issue may easily also become a matter of life and death for those dependent on the services provided.

The initial steps to handle this major issue were taken in late 1996 and in April 1997, Inmarsat established a project with the objective of ensuring that all its key systems are compliant with the Year 2000 date change. The main purpose is to ensure that all systems are able to handle date information before, during and after January 1, 2000, including, but not limited to, accepting date input and performing calculations on dates or portions of dates.

All systems must function accurately and without interruption before, during and after January 1, 2000 without changes in operation associated with the advent of the new century;

They shall respond to two-digit year date input in a way that resolves the ambiguity as to the century in a disclosed, defined and pre-determined manner; and

They shall store and provide output of date information in ways that are unambiguous as to century. They will also man-

Success Model

As part of the Year 2000 Project, Inmarsat is using the following 5-Level Compliance Matrix to help determine overall compliance of both internally-produced products and services as well as those supplied by third-parties:

Level 5

All business critical systems are compliant. They have been tested and compliance can be demonstrated.

Test: Show me a list of your business critical systems and I'll choose some for you to demonstrate to me.

Level 4

All business critical systems are believed to be compliant.

They have been partially tested but compliance cannot yet be demonstrated.

Note: Even if an organization's applications are fully compliant, if the underlying hardware/software is non-compliant it cannot be demonstrated.

Test: Must show Level 3 compliance plus application test results.

Level 3

All business critical systems are being made compliant and a detailed plan showing that no business critical systems will fail on or before 1/1/2000 is available for review.

Test: Let us review/audit your plans.

Level 2

All business critical systems have been identified and plans are being produced

to make them compliant.

Test: You should be able to show us the results of your audit and first-cut plans. You should have a budgetary estimate of compliance costs exclusive of legal recovery.

Level 1

Business critical systems have not been identified.

Test: Not at level 2 or higher.

Two years ago, with a couple of colleagues, Lars Brödje formed Satpool in Gothenburg, Sweden. Satpool is a leading provider of maritime communication and IT-solutions to the international shipping industry. Tel: +46 31 709 15 50. Fax +46 31 709 40 02.

SatCom Review

age the leap year occurring in the Year 2000 by following the quad centennial rule.

The project also includes actions regarding all GPS receivers engaged by Inmarsat to ensure that they will be able to manage

the roll-over occurring in the GPS system at midnight on August 21, 1999.

Timetable For Year 2000

The broad timetable followed by the project manager of Inmarsat's

Year 2000 project, **Gill Govier**, and her team, pays particular attention to all technical and business-critical systems.

The work began almost a year ago by determining the extent of Year 2000 problems, if any, on

Inmarsat's key systems (45 identified), with a view to defining solutions and implementation plans by the end of 1997.

The key systems include Land Earth Stations, Network Coordination Stations, Mobile Earth Stations, Electronic Service Activation Systems (ESAS), Inmarsat Global Network, Terminal Fingerprinting Systems, Mobility Management, TT&C Services, Operational Alarms and Measurement including Common Acquisition Front-End, Satellite and Network Control and Monitoring Systems including GPS receivers.

Presently, solutions as required are being implemented on the 45 priority systems and should be finished by late 1998.

The team also continues to re-evaluate the priority of all other systems in order to escalate those systems which business drivers may have changed.

The team continues to investigate and implement solutions where necessary on all other non-priority systems during 1999, to ensure compliance of all Inmarsat systems before the century roll-over.

Circle 20 on Reader Service Card

By Captain Lars Brødje. Capt. Brødje was formerly Business Development Manager, Marketing Manager and Maritime Adviser within the Maritime Division of Inmarsat. Courtesy of BIMCO's Website.

SAILOR launches new standards for SAT-B

SAILOR SAT-B
SP4400

Rotary Joint
Single-cable installation
with standard cable
Easy service access
Sturdy mechanical
construction
Easy software
modifications
Module-designed
electronics



Close at hand...

The SAILOR GMDSS CERTIFIED SERVICE concept has been developed to ensure the shipping industry a uniform level of service covering specific requirements for spare parts, replacement units and technical manuals, all supported by annual technical training of service personnel.

In-depth research and development have gone into the creation of the new SAILOR SAT-B. It includes many improved features compared with the equipment previously available on the market. 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).

SAILOR

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Circle 27 on Reader Service Card

SatCom Notes

Mackay Communications Keeps Information Flowing

Mackay Communications Inc. designs, installs and repairs satellite communications systems designed for offshore, marine and land-mobile applications. The company specializes in 64Kbps data transmission, real-time video and voice communications. Worldwide installation, licensing and repair service are offered through Mackay Marine, a wholly-owned subsidiary of Mackay Communications.

Circle 5 on Reader Service Card

Raytheon Wins U.S. Navy Ship-To-Shore Deal

Raytheon Systems Co. was awarded an initial \$9.5 million contract for ship-to-shore data communications by the U.S. Navy, the first stage in a potential multi-year contract that could be worth more than \$400 million.

The contract covers the Navy's extremely high frequency follow-on terminals, which provide low and medium data-rate shipboard satellite communications.

The contract includes options for additional ship and shore terminals, training and life-cycle support valued in excess of \$400 million. These terminals, configured for installation on many types of Navy combat ships and shore sites, will serve as the basis for the U.S. Navy's information technology of the 21st century effort, Raytheon said.

Circle 3 on Reader Service Card

ICO Opens Minds

ICO is a relatively new global mobile communications company, designed to offer affordable, cost-effective communications worldwide. ICO aims to offer global mobile communications services by combining affordable terminals, which will be as small as today's cellular phones, with low service charges.

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Circle 313 on Reader Service Card

ChartCo Offers Electronic Chart Service

To assist the shipping industry through the transition from paper to electronic charts, London-based ChartCo has set up a service called OceanSTAR to enable access to official paper and electronic data. A comprehensive global network of "one-stop shops" operated by existing chart agents and distributors will be able to deliver both

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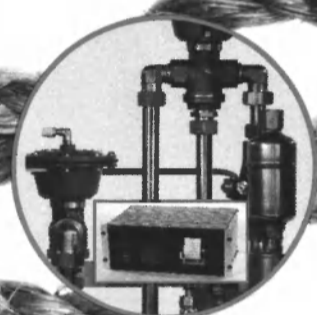
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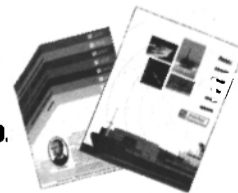
service engineers will maintain your communications, navigation and below-decks equipment with global, 24-hour-a-day service. Need quick access to airtime at competitive rates? We'll link you via INMARSAT and AMSC and we'll give you rates as low as those purchased directly from a land earth station.

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Circle 266 on Reader Service Card

ChartCo's service and complementary paper data.

Circle 2 on Reader Service Card

Clearing The Air

Satellite Marketing specializes in the supply and installation of satellite television for marine applications. The company is the commercial agent for many manufacturers and service providers,

including Datron, DMC, DirecTV and USSB.

Circle 8 on Reader Service Card

Inmarsat Proceeds Toward Privatization

In its latest move toward privatization, the Inmarsat Council has approved steps for the establishment of interim funding arrange-

ments to allow for the start up of the Horizons project. Project Horizons is Inmarsat's initiative comprising a constellation of four geostationary satellites to offer broadband, high-speed mobile multi-media services to users with portable/mobile terminals. The first Horizons satellite is planned to be operational by 2002.

Circle 7 on Reader Service Card

BT Nabs Princess Contract

Princess Cruise Ships has signed a contract with BT North America Inc. for Inmarsat satellite communications services. Princess will purchase BT Inmarsat A, B-Sat, and C-Sat services for ship-to-shore voice communication services through the remainder of 1998. The cruise line reportedly intends to add B-Sat High Speed Data communications in a few months.

Circle 41 on Reader Service Card

ORBCOMM Keeps It Clear

Founded in 1990, ORBCOMM has grown its business quickly and now employs more than 300 individuals to provide its vast array of monitoring, tracking and position determination and two-way messaging services. It differentiates itself from the pack with whole fleet management products, including, for example, the tracking of barges anywhere.

Circle 6 on Reader Service Card

Stratos Keeps Expanding Service

Stratos Mobile Networks is a multi-network mobile satellite service provider offering a diverse portfolio of communications services to the maritime and land customers. The company's worldwide satellite facilities enable a full range of satellite services.

GN Comtext is linking up with Stratos to provide a new ship-to-shore messaging system, Ocean-Connect. Ocean-Connect will ultimately allow direct satellite communications between all ship and shore based messaging equipment via a dedicated secure network.

Circle 4 on Reader Service Card

Stratos Partners With SpecTec

Stratos Mobile Networks recently announced a partnership with SpecTec to provide AMOS Mail High Speed Data service. The 64Kbps service will provide Inmarsat mobile satellite users in the four ocean regions with a high speed data link to a mailbox on the AMOS Mail server.

Circle 9 on Reader Service Card

Globe Wireless Introduces GMDSS Connection

Globe Wireless, a global maritime telecommunications service provider, offers shipowners a way to more fully utilize their investment in GMDSS with GMDSS Connection package, a



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.

Nera's well-tested Saturn B and Saturn C terminals ensure the participants standard phone connections, fax, e-mail and video recording transmission.

By the end of 1997 Nera had delivered nearly 2 000 B Marine terminals, which represents a market share of more than 40 percent.

Nera Satcom AS
P.O. Box 91, N-1361 Billingstad, Norway
Tel: +47 67 24 47 00, Fax: +47 67 24 46 21
Homepage: <http://www.nera.no>

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.

Circle 270 on Reader Service Card

All Nera Inmarsat terminals are at the cutting edge of operational safety and connection quality. Nera are the world's leading supplier of Inmarsat stations, with a worldwide service network of subsidiaries and agents.



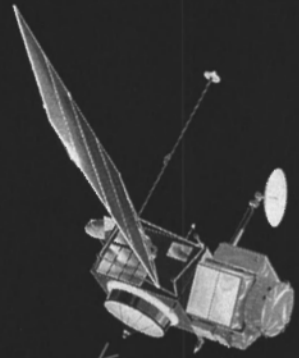
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Tracphone 25 is KVH's new compact Inmarsat marine telephone system. Its great performance, economical price and small size make it perfectly suited for boats as small as 35'.

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Circle 210 on Reader Service Card

GlobeEmail automated messaging system that can use equipment in GMDSS consoles manufactured by JRC, Furuno, SEA or Skanti. "Installing GlobeEmail along with a GMDSS console will return significant cost savings every month," said **George Turner**, Globe Wireless president.

Circle 10 on Reader Service Card

SMC Adds TurboFax Service

SMC International, a satellite communications software specialist, has added SMC TurboFax to its range of Global Portable Office Software for Inmarsat mini-M. It is designed for use with both marine and land mobile variants of Inmarsat mini-M and M systems.

Circle 13 on Reader Service Card

MariTel Expands Service

MariTel, a provider of marine VHF telecommunications services, has reportedly improved its service at Convent and Hammond, La. MariTel's site at Hammond is designed to improve coverage on Lakes Pontchartrain and Maurepas.

Circle 12 on Reader Service Card

Q-Mar System Provides Peace Of Mind

The advent of electronic navigation, particularly that of GPS and DGPS, has so thoroughly changed the manner in which vessels are navigated that at times it seems unreal, even to those most intimately involved. The captains of Oceanex have found the new navigation technology to provide a high level of comfort and safety, helping to reduce stress onboard, particularly when navigating the confined waters of the St. Lawrence Seaway channels. Oceanex has incorporated a system from Q-Mar on the bridges of two vessels, *Cicero* and *Cabot*. The Q-Mar system has proven to be a valuable navigational aid.

Circle 16 on Reader Service Card

Sea Level SatCom

New from Westinghouse, Wavetalk is a rugged, compact and powerful marine satellite telephone with a sleek, lightweight antenna. Features include private voice and data with access to on-line services; optional fax; cordless phone; and more.

Circle 18 on Reader Service Card

Landsea Systems

Landsea Systems is the exclusive U.S. distributor for all of Thrane & Thrane's brand name products including: Radio Telex, GMDSS Inmarsat-C systems, fleet tracking software; and the compact maritime mini-M which is capable of voice, fax and more.

Circle 19 on Reader Service Card

Nera Puts Spotlight On R&D

Realizing that telecommunications products have a short lifecycle, Norway's Nera has a proven commitment to devoting ample resources to new R&D. On average, Nera spends eight percent of its total turnover on R&D efforts. In the long-term, anticipated customer needs within the next three to five years basically determine the agenda when new R&D projects are launched.

Areas of concentration for Nera's R&D programs include high-frequency microelectronics up to 30 GHz, modulation methods and signal processing for STM-4, new digital solutions for power network telecommunications and technology for handheld mobile satcom systems and management networks. Product size reductions, less bandwidth, lower cost, greater flexibility and efficient operations are constant goals.

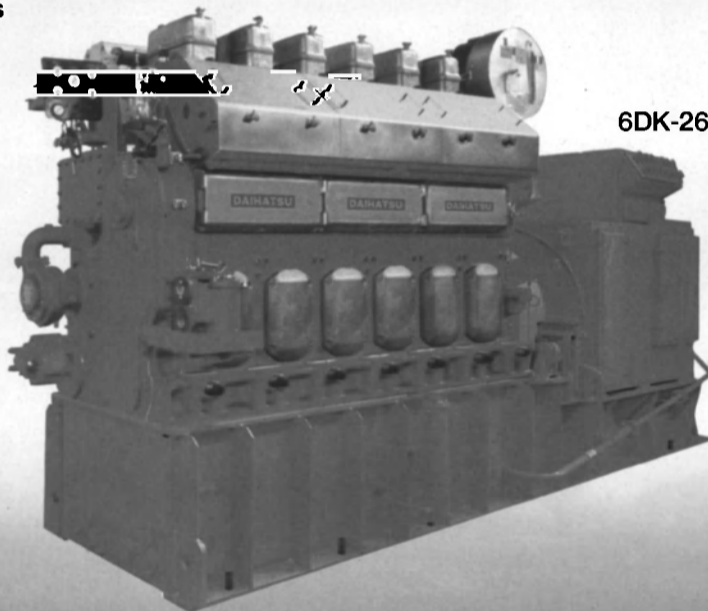
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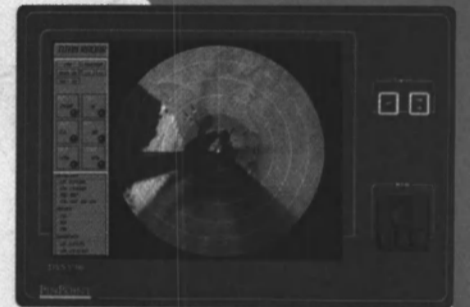
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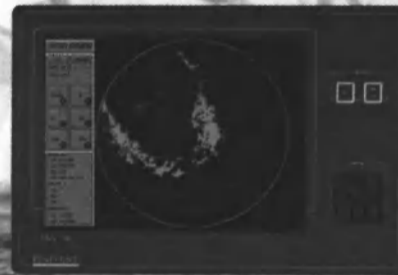
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Circle 321 on Reader Service Card

Comsat Teams With NOAA, USCG To Save Lives

Comsat Mobile Communications has teamed with the National Oceanic and Atmospheric Administration (NOAA) and the U.S. Coast Guard (USCG) to offer critical information free to mariners that use the Comsat-C satellite messaging service.

Previously, mariners had to pay for a

portion of the transmission costs of ship position, weather and rescue coordination reports associated with these safety programs.

Now, with new data compression technology, the cost of sending safety messages via satellite is dramatically reduced.

As a result, NOAA and the USCG are paying the satellite transmission costs for all seagoing vessels that enroll in the program with either agency. "Ships at sea, regardless of global location or country of origin, can use Comsat-C to participate in these programs," said **Thomas Collins**, vice

president and general manager of Comsat Mobile Communications.

Ships participating in the NOAA and USCG safety programs send weather reports called SEAS to NOAA and ship position reports called AMVER to the USCG.

Circle 14 on Reader Service Card

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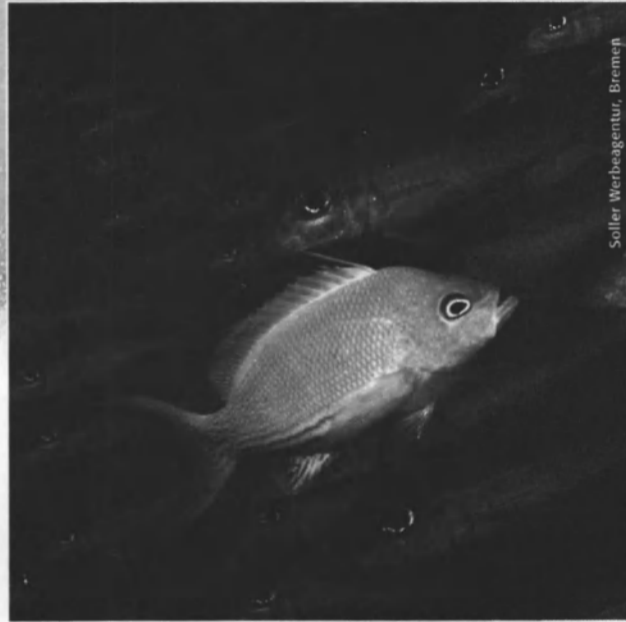
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Circle 240 on Reader Service Card

Telia Offers Maritex E-Mail

Telia Mobitel has recently introduced Maritex E-mail, a system the company dubs a brand-new scope of maritime messaging services via the internet.

Circle 39 on Reader Service Card

AMSC: Ensuring The Message Gets There

AMSC is a telecommunications company dedicated to providing satellite-based mobile voice and data communications services throughout the U.S. AMSC provides secure Skycell satellite communications all across North America, and hundreds of miles offshore, throughout the Caribbean.

Circle 40 on Reader Service Card

New Skanti System Offers Integration

Skanti A/S recently introduced two integrated MF/HF and DSC radio communication systems developed to fulfill the needs of all BMDSS applications. The TRP 1250 system consists of a control unit with integrated handset. The TRP 1500 allows for connection to a 500-watt transceiver unit.

Circle 42 on Reader Service Card

Sailor Offers New Sat-B

Sailor has created what it dubs the new standard for Sat-B. The new unit features a rotary joint to provide full freedom of rotation for the antenna. The Sat-B is designed to meet a customer's specific needs, and is supplied in different versions to meet a variety of communication requirements.

Circle 43 on Reader Service Card

Thrane & Thrane Introduces New System

Thrane & Thrane A/S introduced a new CapsatO GMDSS system, which is reported to be more integrated and compact than ever before. The small TT-3606E

(Continued on page 67)

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SKANTI

COMBRIDGE™ 9500 Mark II

- A new compact GMDSS solution



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- The pre-wired conning position modules with VHF/DSC equipment are installed separately.
- PC software upgrading of flash proms is easily performed by means of disks.

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Circle 283 on Reader Service Card

ERAM

This is the third article in a four-part series describing a project executed by the U.S. Navy in partnership with domestic and international shipyards, shipowner/operators and marine equipment vendors (the first two articles appeared in the September 1997 and January 1998 issues of MR/EN, respectively). The project involved an Engine Room Arrangement Model (ERAM) study, sponsored by the Mid-Term Strategic Sealift Technology Development Program (MTSSTDP) and orchestrated by the Shipbuilding Technology Department of the David Taylor Model Basin (DTMB).

The vision of the project was to initiate a customer-focused process that would enable the U.S. shipbuilding industry to design and build engine rooms that would promote internationally competitive commercial ships.

One medium-speed diesel (MSD) and three slow-speed diesel (SSD) engine rooms were designed in the course of two years. Each article focuses on one of the four engine room design products, the evolution of applying the IPPD methodology process, and the lessons learned from each stage of the project.

The first article focused on SSD#1. The SSD#1 design was a first step in achieving the project goals, which were to develop product (ship) designs that could be built with a construction schedule reduction of 40 percent (down to 18 months) and acquisition cost reduction of 15 percent (down to \$25 million for the engine room). The SSD#1 design was based on the M/V Betelgeuse; a Brazilian designed RoRo/LoLo convertible ship. SSD#1 achieved a schedule reduction of 20 percent (down to 24

months) at a cost of \$21.5 million if built in a European yard and \$35 million if built in an U.S. shipyard. The second article focused on MSD#1 which verified the repeatability of the design process. The MSD design utilized the SSD#1 design as the baseline.

Although no further improvement in the construction schedule was reported, the use of a large level 3 unit (Level 3 units are defined as an assembly of equipment, valves, piping and electrical mounted on a secondary foundation with all local wiring installed, all of which are designed to be constructed in a shop) enhanced the probability of a further reduction in schedule and cost as is being realized on the Sealift New Construction Program.

This article will describe the third design, SSD#2.

Product

During the SDD#2 design the 3-D product model (see Figure 1) increased in value as a design tool. The Steering Committee, system engineers and designers continued to become more proficient in the use 3-D images. The use of hand sketches had all but vanished from the process. The development of production and operator friendly arrangements by teams of designers and engineers became common place. Graphic images derived directly from the 3-D product model were used wherever possible. Conventional 2-D drawings were kept to the minimum necessary to keep everyone informed. This method accomplished two

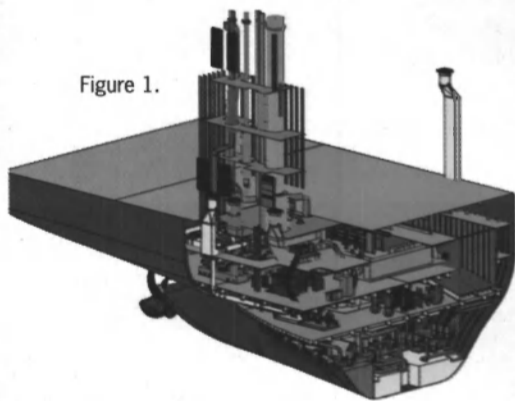


Figure 1.

very important goals.

The CAD team would spend a minimum amount of time creating 2-D drawings, as time previously devoted to creating 2-D drawings could be used to complete the product model.

The product model images could be quickly created from the workstation, which would allow the system engineers to obtain an exact, real-time configuration of the product model.

The team, having matured together, now realized that after the main engine is located; one of the biggest factors affecting the design is the location of and piping for the seawater system. This was even more of a factor on SSD#2 than on the previous designs due to the owners requirement for nine 215 cu.m./hr. pumps dedicated to supplying seawater to the cargo cooling reefer system (see Figure 2). A Great American Lines representative was brought in as a Steering Committee member to enhance the project by adding real life design/construction requirements.

The entire Seawater system received an extensive amount of

engineering and modeling time from the very beginning of the project. This amounted to almost 20 percent of the CAD teams modeling effort for the project.

A Great American Lines representative was brought in as a Steering Committee member to enhance the project by adding real life design/construction requirements.

During this design the CAD team, having become fairly proficient with the software, was able to create superior graphics in a very short period of time. This came about by utilizing several shortcuts and tricks that are only possible after many attempts. Creating colored isometrics dramatically added to the project in several ways. This included better descriptions of the designs being transmitted to the team. With the ability to review a critical area of the design in a single view the team was able to expedite its decision process and come to a consensus on which direction to proceed with on many arrangement questions. Also conveying information to individuals not in day to day contact with the arrangement was much more

efficient, "A picture is worth a thousand words." These colored isometrics were now widely used in the project report and during Design Reviews, where they were a factor in minimizing the time needed to prepare for and host the design review.

The fuel oil system (see Figure 3) was further refined and the amount of required piping was significantly reduced due to the improved arrangements that were developed as a result of the colored isometrics. In addition, a compact starting air/service air package was developed as a result of the improved utilization of the product model and direct interaction with the compressor vendor.

Figure 2.

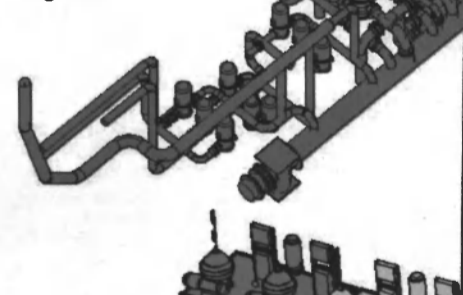
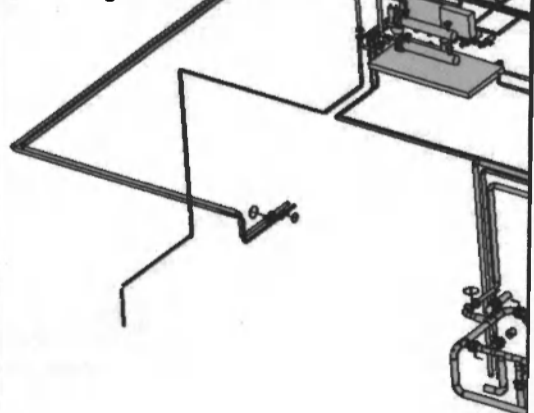


Figure 3.



CAD-Link
3D Product Model & Nesting
inside AutoCAD R14

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CAD/CAM

A single AutoCAD designer using the processes developed during the MSD project efficiently developed system diagrams. The resulting diagrams were uniform in appearance and detail. It was not until two-thirds of the way through this design that the team was even trained in the use of the visualization software package that was available since early in the first or second design. This package allowed the designers and engineers to quickly walk through the product model from any perspective. This was a significant oversight on the part of the team.

The majority of the design reviews for SSD#2 required less than a day's effort on the part of the team. The equipment database, with its hierarchical structure based on the System Work Breakdown Structure (SWBS), continued to be a cumbersome database to work with.

Team Process

The ERAM Team continued to develop as a "performing" team and could safely be referred to as a "self-directed" team. Ad-hoc sub-teams evolved to meet project needs and tasks, which were quickly dispatched.

The Training Sub-team developed a New Member Training Plan that enabled new members to quickly become performing team members. One of the first new members to utilize the plan, **Morten Sandvej** of Denmark, considerably enhanced the plan by including his lessons learned as a new member. The NSD Sulzer representative, **Jqregen Gerdes** of Switzerland, effectively utilized the enhanced training plan and quickly became a fully performing team member. In a period of three weeks, as a sub-team member of each of the system sub-teams, he was able to bring to closure the selection of the main engine and the requirements for the main engine support systems.

One of the problems that plagued the ERAM Team over the first two projects was project creep. An open items list process was developed where action items resulting from outside comments or action items that resulted from syner-

gistic teamwork were captured and tracked. Open action items were reviewed by the team at the Week-In-Review meeting, priorities were established and those items that were not value added were either deleted or scheduled at the end of the project.

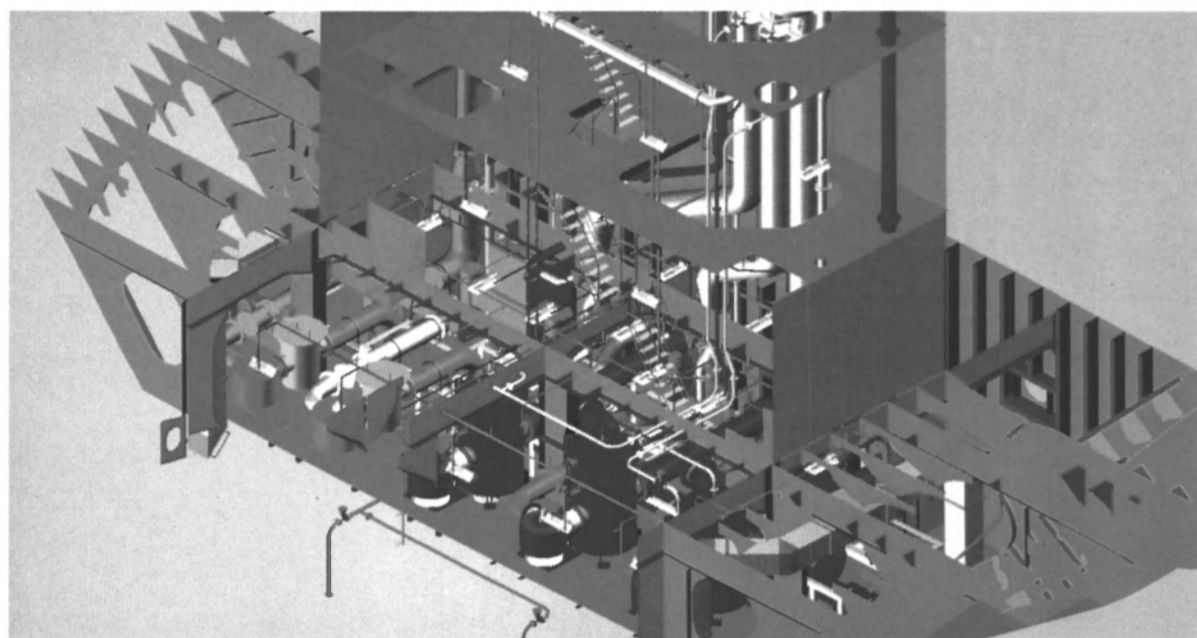
Little or no contact (other than weekly reports) was made with the

individuals' home offices, necessitating an appraisal process for individuals from the team to the home offices. A sub-team developed an appraisal process centered on performance as a team member, which was quickly endorsed and implemented. In addition a method to recognize individual achievement was initiated.

A peer review process was developed by **Glenn Parker** that allowed every team member to evaluate themselves as well as the other members. This was possible because of the small size of the team. This process was very useful as it gave a broad spectrum of information on the team members, as peers, saw an individual.

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CAD/CAM

Individual self-improvement efforts were focused on areas where a majority of the team was in agreement. This resulted in a significant increase in the team performance. A review of the relationship between the Steering Committee and the team was also carried out.

The output benefits of a "performing" team were clearly demon-

strated during this 16-week project, with both the resulting product model and project report becoming more detailed.

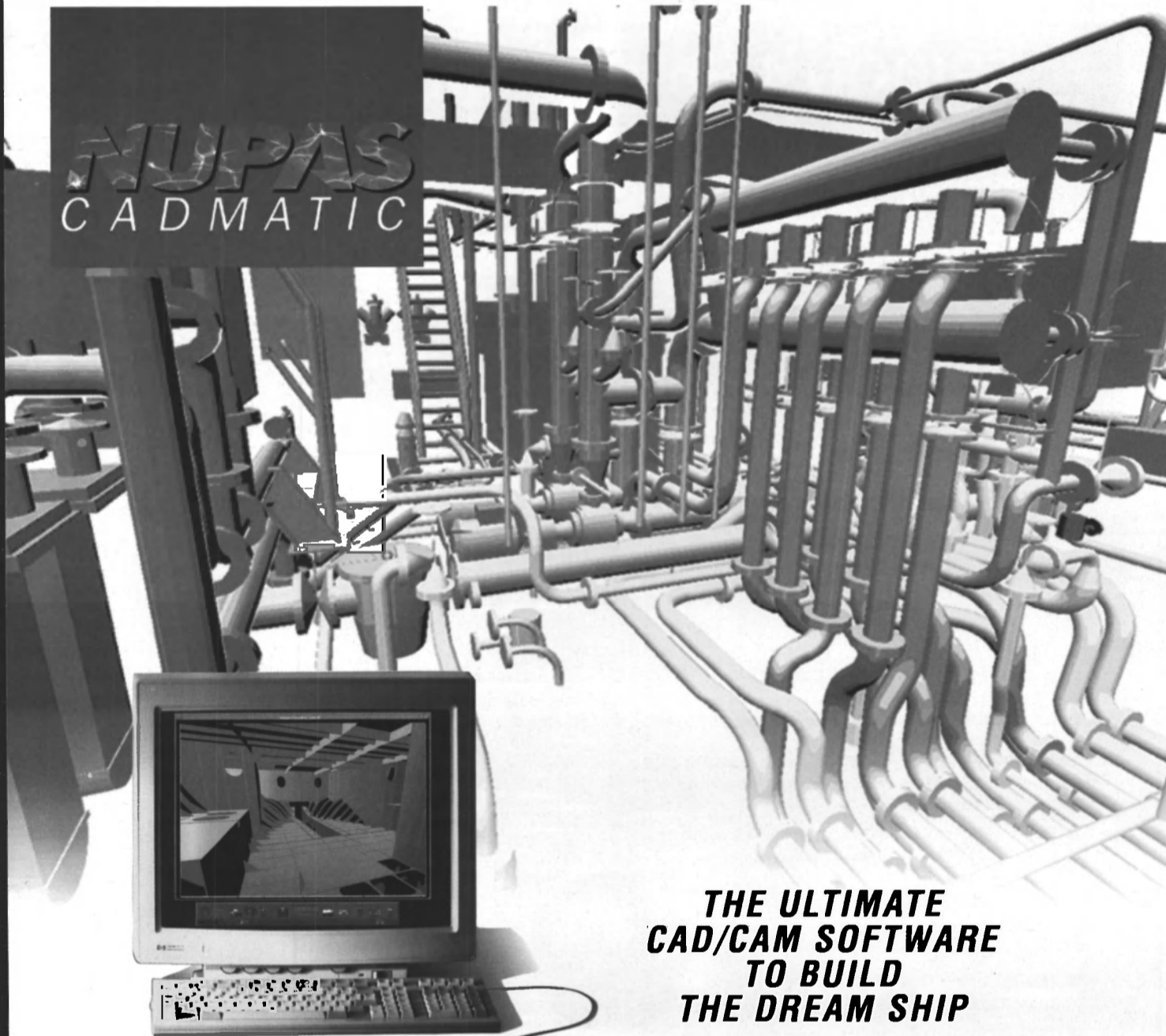
Lessons Learned

The 3-D product model can be a very effective interim product communications tool with very little enhancement if the reviewers are still to depart from the familiar 2-

D drawing format. Engineer/designer sub-teams developing the product model can reduce re-work and re-vamp the final product significantly. Concurrent operator input can have a substantial impact on life cycle operation and maintenance costs. A New Member Training Plan is essential to ensure the rapid integration of new team

members. A 10 percent change of personnel every other month can be accommodated if an effective training plan is in place. An action list, properly monitored and prioritized, can be a good tool to prevent project creep and also to justify project expansion. Managers generally seem to be unaware of the impact the simple requests can have on a project moving this rapidly. Interaction between off-site personnel and their supervisors can become non-existent. A means to bridge that gap on a regular basis is necessary to ensure fair evaluation of the off-site member against their on-site peers. The appraisal process developed by the ERAM Team is an effective communications tool. The peer review process is a very effective means of improving individual and team performance. Multiple comments on a particular bad or good trait can have a significant impact on focusing an individual on improving that trait. Comments from peers tend to be specific and are helpful in assisting an individual grow as a team member and as an individual. It is an effective tool in giving a team that has reached a plateau in their growth a boost. The review of a team's Steering Committee by the team can be an effective communications tool to improve their interaction. A single person's comment, generally, has little impact on that interface, however, multiple similar comments can bring about change.

An Integrated Process and Product Development Team that has reached the performing stage



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screen in real time. Simultaneously the system controls that the engineering data produced is correct, follows the yard's specifications, and can be directly used in the production. The continuous digital on-line information from design to engineering and production will guarantee a successful delivery on time. Nupas-Cadmatic is an open system with user friendliness beyond comparison and with shortest learning curve on the market. It can be easily fitted into your work procedures and IT environment. If you want more detailed information about the Nupas-Cadmatic Software features and installation possibilities, please don't hesitate to contact us.



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ERAM (core) team participants for the SSD#2 design were:

Country	Company	Name	Expertise
U.S.	D&P	Richard DeVries	Team Leader
U.S.	DTMB	Ben Kassel	MIS Manager
U.S.	Avondale Shipyard	Watson Perrin, II	Arrangements & HVAC
Brazil	CONSUNAV	Jorge Ribeiro	Arrangements & Piping
U.S.	D&P	Frank Worankowicz	Control Systems
U.S.	Bath Iron Works	Mark Cate	Arrangements & Piping
U.S.	NASSCO	Lee Duneclift	Arrangements & Piping
Denmark	Brix & Kamp A/S	Morton Sandvej	Arrangements & Piping

Other resources/expertise utilized on a part-time or rotating basis included: A&T/Vector Research (management consulting); Alfa Laval (fuel treatment); Allweiler (pumps); Ball & Kirch (filters and strainers); Crowley Marine (ship operator); D&P (electrical and structural engineering); Maersk Lines (ship operator); and Tranter (heat exchangers). The Strategic Design Method (SDM) was utilized to define the two outputs of the project — the Team Process and the Engine Room Arrangement Models. The Team Process would evolve during the four engine room designs and be documented at the conclusion of the project as the USER'S GUIDE.

CAD/CAM

Autoship Announces New Lease-Finance Program

Autoship Systems Corp. has announced a new lease-finance program, which will reportedly allow a shipyard of any size to implement the full suite of Autoship's PC-based integrated CAD programs with a monthly lease program over a term. The new lease program allows existing users to expand or add Autoship programs or upgrade, and includes monthly lease payment for shipping, installation, hardware, software and training.

Circle 24 on Reader Service Card

KCS Offers Tribon 4 Initial Structural Design

Kockums Computer Systems (KCS) recently announced its Tribon 4 Initial Structural Design which uses advanced features to assist designers in developing structural designs from concept to approval. The program lends a reduction in design cycles while permitting alternate structural configurations to be analyzed and evaluated. The design can be used immediately by the Tribon 4 Hull detailed design application, eliminating the need for rework as the design is refined. The Initial Structural Design application also provides preliminary planning and material requirements information in an accessible format at early stages in design development. Tribon 4 Initial Structural Design has been developed in cooperation with shipyards, design agents and classification societies and is available for WindowsNT environments.

Circle 25 on Reader Service Card

Bureau Veritas Launches VeriSTAR Full Ship Version

Bureau Veritas (BV) has launched a new version of its ship design and structural analysis system, VeriSTAR. The Full Ship version is aimed particularly at container ships, and is based on direct calculation of stresses induced in the ship's hull by sailing through waves.

"This package will constitute an unrivaled tool for the hull design and maintenance of container vessels and specialized cargo vessels, both in power, completeness and ease of use," said **Luc Gillet**, vice president of Newbuildings for the classification society. The most innovative aspect of this new version is the computation of the complete hull in one single run. The model extends from stern to bow and is not restricted to a limited

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part of the cargo area. BV has developed a complete set of loads to define a realistic representation of dynamic load combinations suffered by container ships at sea. A new dynamic visualization system has also been set up for easier manipulation of 3-D models. The graphic interface has been specifically designed for shipowners

Circle 22 on Reader Service Card

Yachting Consult Offers New Module

MasterSHIP Parametrics is the newest module available from Yachting Consult as part of the company's Master SHIP line of CAD/CAM software. The new product automates the drawing of ship construction parts. The module comes with a library of 40 para-

metric parts with closed contours and can be extended with the yard's own templates as used in its own design and building practice. MasterSHIP software automates the path from design to ship production and contains modules for construction drawing, lofting, expansion, automatic nesting and NC cutting of parts.

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Nupas-Cadmatic — Helping Shipyards Find Solutions

Nupas-Cadmatic is a CAD/CAM shipbuilding solution for forward-thinking shipyards. This software from Cadmatic is designed for hull, machinery, outfitting and interior design and engineering. The system controls engineering data while following shipyard specifications and can be used directly in production.

Circle 68 on Reader Service Card

Foran: Innovation Through The Years

Sener's Foran CAD/CAE/CAM system has been in development for more than three decades. The system is composed of different packages using a single data base to enable a 3-D topological product model to be defined, as well as to provide information on shipyard activities such as: hull form definition; naval architecture; hull structure; machinery; outfitting; HVAC; electricity; accommodations; materials management; and work preparation. Foran is reportedly suitable for all shipyards and ship types.

Circle 69 on Reader Service Card

ARL Updates CAD-Link

Albacore Research Ltd. (ARL) has added new features to its CAD-Link98 software, which allows shipbuilders to create 3-D structural product models using AutoCAD Release 14. CAD-Link addresses many time consuming procedures in part production. Interference checking of parts allows easy identification and changing of intersecting parts. The software allows users to examine models using real-time animation.

Circle 70 on Reader Service Card

Marinette Marine Delivers 4th Tender To USCG

United States Coast Guard (USCG) Cutter *Elm* (WLB-204) was scheduled to be delivered to the USCG on June 26 in a ceremony held at the Marinette Marine shipyard. The cutter was christened on January 24, 1998.

Elm's homeport will be in Atlantic Beach, N.C., and is under the command of LCDR Donald Triner. The cutter will sail with a crew consisting of five officers and 34 enlisted personnel.

Kvaerner Initiates Investigation Of New Uses For Aluminum

Kvaerner, together with Hydro Aluminum and Det Norske Veritas, has initiated a research program on improving the utilization of aluminum for shipbuilding.

The \$10 million program will be completed by the end of 1999, and focuses on new building materials and improved hull designs.

New Equipment Regs Slated For RoRo Ferries

European Union transport ministers have agreed to a program

which will require RoRo ferries to carry "black box" voyage data recorders.

Vessels will also be required to undergo safety checks before they start service, with regular checks thereafter. The directive will cover ferries of all flags on international and domestic services within Europe.

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General HydroStatics (GHS)

from Creative Systems, Inc.



Widely recognized as the most advanced and productive trim/stability/strength software. Specialized versions are available for ship operators, for salvage engineers and for small craft designers. Includes efficient modeling for all types of complex vessels, and the ability to analyze them both afloat and aground.

ShipCAM97 / CAD-Link97 NC-ryros97

from Albacore Research Ltd.



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

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(Continued from page 60)

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AT&T Goes Where Your Ship Goes

AT&T Mobile Satellite Services feature a complete range of reliable satellite communications solutions, including Inmarsat A, B, M and Mini-M. The company's hallmark is superior voice, data, fax and e-mail service capabilities.

Circle 48 on Reader Service Card

KVH Works To Minimize SatCom Costs

KVH offers a host of products designed to keep shipboard satellite communications charges in check. The company's Tracphone products are fully stabilized marine telephone systems designed to deliver reliable voice, fax and data via the services of AMSC's regional North American satellites or the new worldwide Inmarsat 3 satellites.

Circle 49 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 connection is established through the satellite to a land earth station (LES) and then automatically routed to the end user via the network.

Circle 50 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, some specifically designed for maritime application and substantial data. Services available from Station 12 include Inmarsat-A, B, C, M and mini-M.

Circle 54 on Reader Service Card

SingTel Continually Upgrades Services

Singapore Telecom earlier this year introduced its latest Inmarsat Marine satellite communications services – the InTouch Card, MPLUS Marine Satellite Phone and Inmarsat-C/CPLUS. These services are designed for small and private ship owners who

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rely on radio and cellular phone services for communications to and from vessels.

Circle 51 on Reader Service Card

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 QUALCOMM, the BOATRACS system provides software for use both on vessels and in the office.

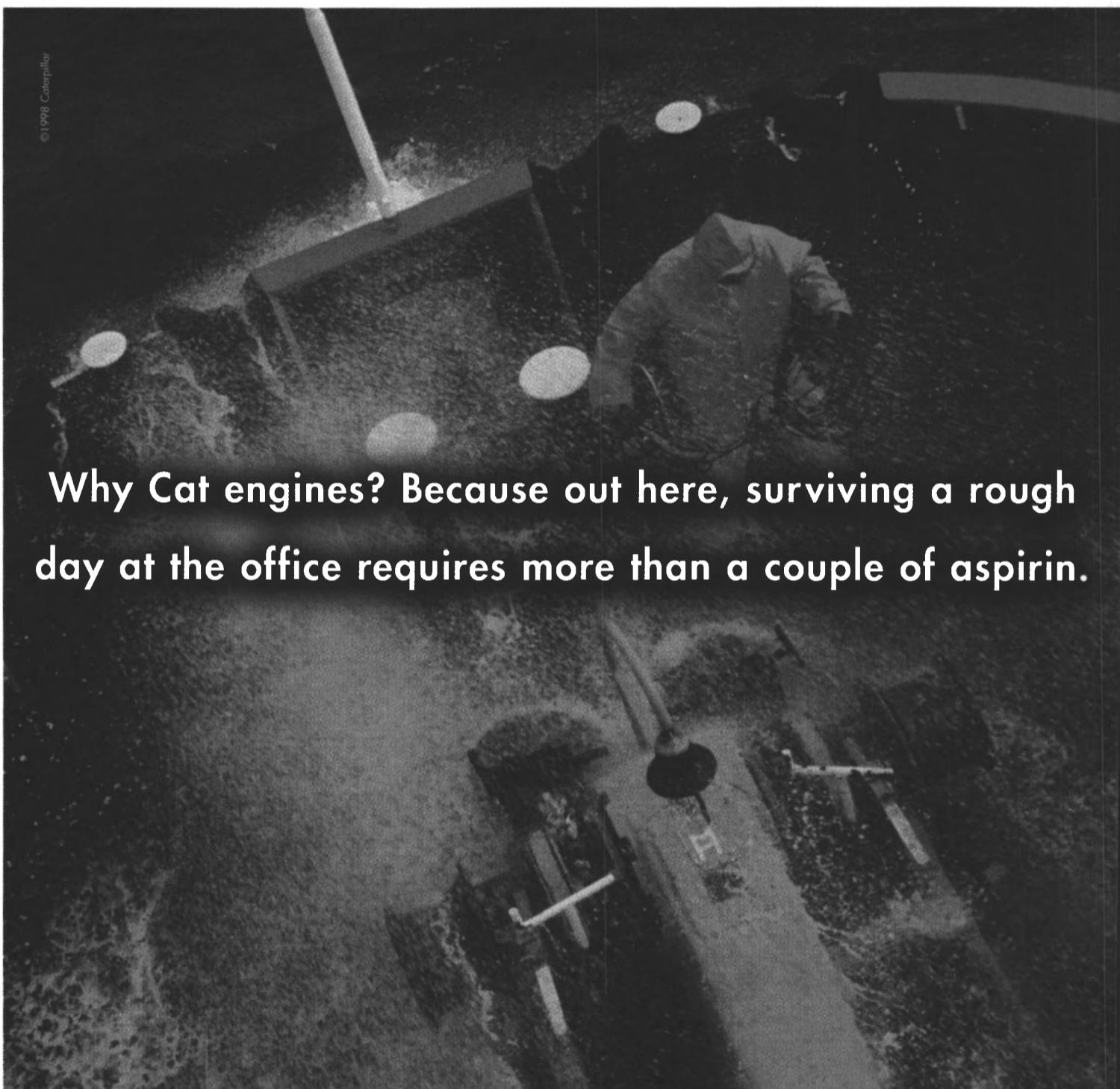
Circle 53 on Reader Service Card

MTN Provides Telecom Service To Princess Cruises

ICG Satellite Services, Inc. sub-

sidiary Maritime Telecommunications Network (MTN) earlier this year signed a multi-year agreement with Princess to provide the communications for the 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.

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Diesel Power Annual

Pictured in the background is the Ruston 20RK270.

The following pages feature Maritime Reporter's Diesel Power Annual, a comprehensive list of diesel engine products, manufacturers and suppliers. Publisher is not responsible for errors or omissions.

Model	Bore (mm)	Stroke (mm)	Cycle	Cyl.# in-line/V	kW/Cyl	rpm	bmp	Mean Piston Speed m/s	Output Range kW	3126TA	3196	3208T	3208TA	3304E	3306I	3306TA	3406E	3406T	3406TA	3408TA	3412T	3412TA	3412TA	3508E	3512E	3516E	3606TA	3608TA	3612TA	3616TA	3618TA
Alaska Diesel Electric Inc. 4120 14TH Ave. NW, P.O. Box 70549, Seattle, WA 98107-0549, tel: (206) 789-3880, fax: (206) 782-7822										47.8-52.2	110	127	130	114	121	121	137	137	137	137	137	152	152	152	170	170	170	280	280	280	280
Anglo Belgian Corp. NV, tel: +32 9 2670000; fax: +32 9 2240301 or 32092670067										60.8-82.0	130	150	114	121	121	137	137	137	137	137	152	152	152	170	170	170	280	280	280	280	
Caterpillar Engines P.O. Box 610, Massville, IL 61552-0610, tel: 800-321-7332; fax: 309-570-2558										20.0-29.9	110	127	114	121	121	137	137	137	137	137	152	152	152	170	170	170	280	280	280	280	
										21.9-40.5	130	150	114	121	121	137	137	137	137	137	152	152	152	170	170	170	280	280	280	280	
										23.5-35.5	110	127	114	121	121	137	137	137	137	137	152	152	152	170	170	170	280	280	280	280	
										23.7-34.8	110	127	114	121	121	137	137	137	137	137	152	152	152	170	170	170	280	280	280	280	
										26.7-44.2	110	127	114	121	121	137	137	137	137	137	152	152	152	170	170	170	280	280	280	280	
										56.0-99.5	110	127	114	121	121	137	137	137	137	137	152	152	152	170	170	170	280	280	280	280	
										31.0-50.0	110	127	114	121	121	137	137	137	137	137	152	152	152	170	170	170	280	280	280	280	
										34.2-72.2	110	127	114	121	121	137	137	137	137	137	152	152	152	170	170	170	280	280	280	280	
										32.6-54.5	110	127	114	121	121	137	137	137	137	137	152	152	152	170	170	170	280	280	280	280	
										31.2-39.5	110	127	114	121	121	137	137	137	137	137	152	152	152	170	170	170	280	280	280	280	
										26.4-47.5	110	127	114	121	121	137	137	137	137	137	152	152	152	170	170	170	280	280	280	280	
										51.2-83.9	110	127	114	121	121	137	137	137	137	137	152	152	152	170	170	170	280	280	280	280	
										93.2-140	110	127	114	121	121	137	137	137	137	137	152	152	152	170	170	170	280	280	280	280	
										55.9-140	110	127	114	121	121	137	137	137	137	137	152	152	152	170	170	170	280	280	280	280	
										93.2-139.8	110	127	114	121	121	137	137	137	137	137	152	152	152	170	170	170	280	280	280	280	
										248-338	110	127	114	121	121	137	137	137	137	137	152	152	152	170	170	170	280	280	280	280	
										750-1000	110	127	114	121	121	137	137	137	137	137	152	152	152	170	170	170	280	280	280	280	
										20-23.7	110	127	114	121	121	137	137	137	137	137	152	152	152	170	170	170	280	280	280	280	
										7.50-10	110	127	114	121	121	137	137	137	137	137	152	152	152	170	170	170	280	280	280	280	
										7.50-10	110	127	114	121	121	137	137	137	137	137	152	152	152	170	170	170	280	280	280	280	
										7.50-10	110	127	114	121	121	137	137	137	137	137	152	152	152	170	170	170	280	280	280	280	
										2980-4500	110	127	114	121	121	137	137	137	137	137	152	152	152	170	170	170	280	280	280	280	
										10.7	110	127	114	121	121	137	137	137	137	137	152	152	152	170	170	170	280	280	280	280	

MaK Wins Genset Order From HDW



Pictured is the MaK M32.

Kiel, Germany-based shipyard HDW has placed an order worth \$7.8 million with MaK Motoren GmbH & Co. KG for genset engines to be installed in two novel reefer containerships. The ship class is a new development for Dole Food Company Inc., and will have a capacity of approximately 1,040 ft. of refrigerated containers. To cover the electric power requirement for the refrigerated containers, each of the ships will be equipped with five diesel generator sets for series M 32 with a total power output of 17.3 MW. The engines are scheduled for delivery to the shipyard in the first half of 1999, with completion of the vessels to follow later that year.

Circle 29 on Reader Service Card

Alaska Diesel Upgrades Luger Engine

Alaska Diesel Electric's Luger L6125A diesel engine is now rated at 500 hp for planing hull applications. Changes to the engine include a new head gasget, as well as new head bolts and fuel lines. The new rating for the L6125 is part of ongoing

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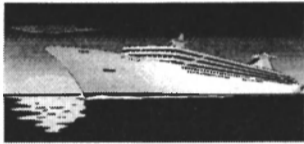
Diesel Power Annual

Model	Bore (mm)	Stroke (mm)	Cycle	Cyl.#	in-line/V	kW/Cyl	rpm	bmp	Mean Piston Speed m/s	Output Range kW										
12V-149T	146.05	146.05	2	12V	77.7	1900	10.03	9.25	932.5	8V-92T	122.94	127	2	8V	56-60.6	2300	9.67-10.48	9.74	448-484.8	
12V-71N	107.95	127	2	12V	31.1	2300	7.36	9.74	373.2	DEUTZ MWM, Motoren Werke Mannheim AG Postfach 102663, D68140, Mannheim 2 Germany. Fax: 49621384211										
12V-71T	107.95	127	2	12V	46.6-54.1	2300	10.45-12.13	9.74	497-559	Model	Bore (mm)	Stroke (mm)	Cycle	Cyl.#	in-line/V	kW/Cyl	rpm	bmp	Mean Piston Speed m/s	Output Range kW
12V-92N	122.94	127	2	12V	33.1	2100	6.27	8.9	397.2	616	132	160	4	8,12,16V	85	2300	15.7	11.2	384-1360	
12V-92TA	122.94	127	2	12V	67.16	2300	11.91	9.74	805.92	620	170	195	4	8,12,16V	140	1860	19.2	11.7	880-2240	
16V-149N	146.05	146.05	2	6V	49.4	1900	6.83	9.25	790.4	628	240	280	4	6,8,9,12,16V	225	1000	21.3	9.3	1230-3600	
16V-149T	146.05	146.05	2	16V	64.6	1900	8.32	9.25	1033.6	632	250	320	4	6,8,9,12,16,18V	385	1200	21.8	10.7	1560-6930	
16V-149TI	146.05	146.0	2	16V	83.9	1900	10.83	9.25	1342.8	640	370	400	4	12,16V	441	650	18.9	8.7	4120-7060	
16V-71N	107.95	127	2	16V	31.1	2300	6.96	9.74	497.6	645	330	450	4	6,8,9,L	460	650	22.1	9	2550-4140	
16V-92N	122.94	127	2	16V	35.4	2100	6.36	8.9	566.4	Electro-Motive Division, General Motors Corp. 9301 West 55TH La Grange Illinois 60525, USA. tel: +1 (708) 387 5853, fax: +1 (708) 387 5845.										
4-53N	98.55	114.3	2	4L	25.4	2800	6.25	10.67	101.6	Model	Bore (mm)	Stroke (mm)	Cycle	Cyl.#	in-line/V	kW/Cyl	rpm	bmp	Mean Piston Speed m/s	Output Range kW
4-71N	107.95	127	2	4L	31.1	2300	6.98	9.74	124.4	645E6	230	254	2	8,12,16V	74-98	720-900	5.6-6.26	6.1-7.6	595-1567	
6-71M	107.95	127	2	6I	32.8	2300	7.36	9.74	296.8	645E7C	230	254	2	8V	111-149	720-900	8.5-9.4	6.1-7.6	895-1193	
6-71N	107.95	127	2	6I	31.1	2300	6.97	9.74	180.6	645F7B	230	254	2	8,12,16,20V	133-163	720-900	9.84-10	6.1-7.6	1596-3132	
6V-53N	98.55	114.3	2	6V	26.1	2800	6.44	10.67	156.6	71067B	230	279	2	8,12,16,20V	139-186	720-900	9.84-11	6.9-8.4	1675-3728	
6V-53T	98.55	114.3	2	6V	29.8	2800	9.80	10.67	156.6	Fairbanks Morse Engine Division, Coitec Industries Inc. 701 White Avenue, Deloit, Wisconsin 53511, USA. fax: +1 (608) 364 0382										
6V-71N	107.95	127	2	6V	31.1	2300	7.36	9.74	1186.6	Model	Bore (mm)	Stroke (mm)	Cycle	Cyl.#	in-line/V	kW/Cyl	rpm	bmp	Mean Piston Speed m/s	Output Range kW
6V-71TA	107.95	127	2	6V	54.1	2300	12.13	9.74	324.6	0382										
6V-92N	122.94	127	2	6V	36.2	2300	6.26	9.74	217.2											
6V-92TA	122.94	127	2	6V	59.1	2300	10.21	9.74	354.6											
8V-149TI	146.05	146.05	2	8V	74.6-83.9	1900	9.63-10.83	9.25	596.8-671.2											
8V-71N	107.95	127	2	8V	31.1	2300	9.96	9.74	248.8											
8V-71TI	107.95	127	2	8V	43.1	2300	9.66	9.74	344.8											
8V-92N	122.94	127	2	8V	36.2	2300	6.26	9.74	289.6											

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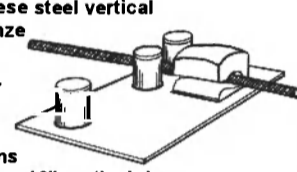
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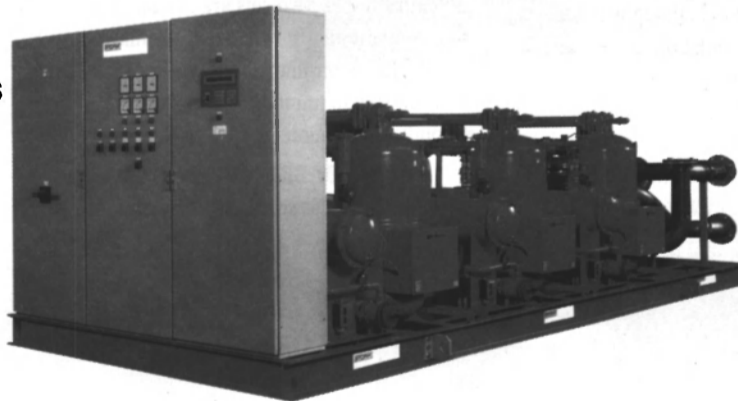
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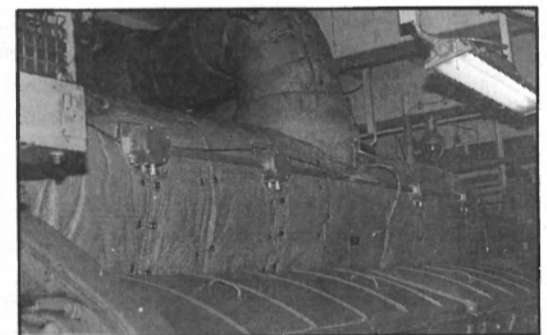
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Maritime Reporter/Engineering News

Diesel Power Annual

38DB-1/8	206.4	254	2	4-12L	132-149.3	750-900	5.9-6.2	6.35-7.6	2528-1790
381DB-1/8	206.4	254	2	6,9,12L	217.5-261	750-900	10.2	6.35-7.62	1305-3132
FM/ALCO 251	228.6	266.7	4	6L,8,12,16,18V	80-184.4	750-1200	6.4-10.67	6.4-10.67	480-2950

GMT, Engine Division of Fincantieri, Bagnoli Della Rosandra 334, Trieste, Italy. tel: +39 40 3193111, fax: +39 40 827371.

Model	Bore (mm)	Stroke (mm)	Cycle	Cyl.# in-line/V	kW/Cyl	rpm	bmp	Mean Piston Speed m/s	Output Range kW
A32	230	390	4	6,8,9L,12,14,16V	440	720-750	22.5	9.75	2640-7040
A32G	230	390	4	6,8,9L,12,14,16V	360	720-750	18.36	9.75	2160-5760
A55	550	680	4	6,8,9L,12,14,16,18V	1250	425-428	21.8	9.6	7500-22500
A55DF	550	680	4	6,8,9L,12,14,16,18V	1000	428	17.4	9.7	6000-18000
BL230	230	310	4	4,6,8,9L,12,16,18,20V	222	1050	19.7	10.8	890-4450
BL230P	230	310	4	4,6,8,9L,12,16,18,20V	190	720-1000	17.4	10.3	730-3800

Iveco Alfa SpA Viale Dell'Industria, 15/17, 20010 PREGNANA MILANESE, Milano, Italy. tel: +39 2 93510 1, fax: +39 2 93590029.

Model	Bore (mm)	Stroke (mm)	Cycle	Cyl.# in-line/V	kW/Cyl	rpm	bmp	Mean Piston Speed m/s	Output Range kW
M20	200	300	4	6,8,9L	155-190	900-1000	21.9-24.2	9-10	930-1710
M25	255	400	4	6,8,9L	290-300	720-750	23.7-23.5	9.6-10	1740-2700
M32L	320	480	4	6,8,9L	480	600	24.9	9.6	2880-4320

Model	Bore (mm)	Stroke (mm)	Cycle	Cyl.# in-line/V	kW/Cyl	rpm	bmp	Mean Piston Speed m/s	Output Range kW
8061SRM30	104	115	4	6L	36.8	2700	13.4	10.3	221
8281M32	145	130	4	8V	25.8	2100	6.9	9.1	206
8281SRM44	145	130	4	8V	40.5	2000	11.3	8.7	324
8281SRM70	145	130	4	8V	64.4	2200	12.8	9.5	515
8291SRM12	145	130	4	12V	73.5	2100	19.6	9.1	883
8291SRM85	145	130	4	12V	46	1800	14.2	9.1	552
8361SRM32	115	130	4	6L	31-39.3	2200-2400	12.4-14.5	9.5-10.4	184-236
8361SRM38	115	130	4	6L	46.6	2400	17.3	14.5	280
8460SRM28	120	140	4	6L	34.3	2200	11.8	10.2	206
8460SRM45	120	140	4	6L	43	2200	19.1	10.2	243

MAK Motoren GmbH and Co. KG, Falkensteiner Strasse 2, P.O. Box 24159 Kiel, Germany. tel: +49 431 3995 01, fax: +49 431 3995 157.

Model	Bore (mm)	Stroke (mm)	Cycle	Cyl.# in-line/V	kW/Cyl	rpm	bmp	Mean Piston Speed m/s	Output Range kW
M20	200	300	4	6,8,9L	155-190	900-1000	21.9-24.2	9-10	930-1710
M25	255	400	4	6,8,9L	290-300	720-750	23.7-23.5	9.6-10	1740-2700
M32L	320	480	4	6,8,9L	480	600	24.9	9.6	2880-4320

Ingalls, Raytheon to Team for DD 21 Competition

Ingalls Shipbuilding division of Litton Industries in Pascagoula, and Raytheon Systems Co., a unit of Raytheon Co., in Lexington, Mass., will team together to produce a total ship concept and design for DD 21, the Navy's 21st century destroyer.

"The Ingalls-Raytheon partnership is the result of a mutual agreement following a number of discussions with all of the parties, over the past several weeks," said Jerry St. Pe, senior vice president of Litton Industries and president of Ingalls Shipbuilding. "We are extremely compatible with our partner and we are looking forward to successfully competing for the DD 21 ship design over the next three years."

Under an agreement with the Navy, Ingalls and Bath Iron Works make up the Navy's Shipbuilder Alliance for the DD 21 contract. While leading two independent separate teams, each shipyard will have a small contingent representation on the other's team to ensure efficiency and producibility of ship construction.

Each competing team will be awarded approximately \$105 million over a three-year period to complete a system concept design, initial systems design and a virtual prototype of the team's total ship concept. At the end of the initial design period, the Navy will select one team's concept for continued development, design and eventual production.

Bollinger Names Ellis Executive VP

Michael C. Ellis was recently named executive vice president and CFO of Bollinger Shipyard, Inc. in Lockport, La. In his new position, Mr. Ellis will be involved with mergers and acquisitions, strategic planning, financial reporting and forecasting, cash management, information systems, banking and risk management.



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Circle 202 on Reader Service Card

Diesel Power Annual

Model	Bore (mm)	Stroke (mm)	Cycle	Cyl.# in-line/V	kW/Cyl	rpm	bmp	Mean Piston Speed m/s	Output Range kW
L23/30H	225	300	4	5,6,7,8L	130-160	720-900	17.9-18.2	7.2-9	530-1280
L32/40	320	400	4	5,6,7,8,9L	440	720-750	21.9-22.8	9.6-10	2200-3960

Model	Bore (mm)	Stroke (mm)	Cycle	Cyl.# in-line/V	kW/Cyl	rpm	bmp	Mean Piston Speed m/s	Output Range kW
D2866E/TE/LE	128	155	4	6L	27.5-41.7	1800-2100	7.9-13.9	9.3-10.85	165-250
D2866LE/401/3/3	128	155	4	6L	61.3-73.5	2100-2300	17.5-20.1	10.85-11.37	368-441
D2848LE/401/403	128	142	4	8V	35-73.5	1800-2300	12.8-21	8.52-10.9	280-588
D2840LE/LE401	128	142	4	10V	34.6-60.3	1800-2300	12.6-17.2	8.52-10.9	346-603
D2842LE/401/2/3/6/8	128	142	4	12V	35-73.5	1800-2300	12.8-21	8.52-10.9	420-882

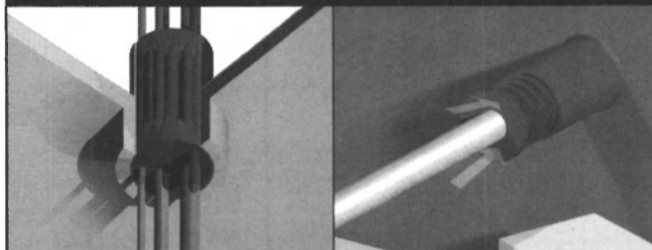
Model	Bore (mm)	Stroke (mm)	Cycle	Cyl.# in-line/V	kW/Cyl	rpm	bmp	Mean Piston Speed m/s	Output Range kW
Mirrlees Blackstone K MAJOR	400	457	4	6,8,9L,12,16V	544	600	19	9.14	2485-8709

Model	Bore (mm)	Stroke (mm)	Cycle	Cyl.# in-line/V	kW/Cyl	rpm	bmp	Mean Piston Speed m/s	Output Range kW
Mirrlees Blackstone MB430	430	480	4	12,16,18V	730	600	23	9.60	7302-13144
Mirrlees Blackstone MB430L	430	560	4	6,8,9L	800	514	23	9.60	4260-7200

Model	Bore (mm)	Stroke (mm)	Cycle	Cyl.# in-line/V	kW/Cyl	rpm	bmp	Mean Piston Speed m/s	Output Range kW
UEC33LSII	330	1050	2	4,5,6,7,8L	566	162-215	17.6	7.35	1230-4530
UEC37LA	370	880	2	4,5,6,7,8L	515	158-210	15.6	6.16	1120-4120
UEC37LSII	370	1150	2	5,6,7,8L	770	140-186	18	8	2100-6160
UEC43LSII	430	1500	2	4,5,6,7,8L	1052	120-160	18.1	8	2280-8416
UEC45LA	450	1350	2	4,5,6,7,8L	883	119-158	15.6	7.11	1910-7060
UEC50LSII	500	1950	2	4,5,6,7,8,9L	1376	93-124	17.4	8.06	2980-12380
UEC52LA	520	1600	2	4,5,6,7,8L	1177	100-133	15.6	7.09	2550-9410
UEC52LS	520	1850	2	4,5,6,7,8L	1324	90-120	16.9	7.4	2870-10590
UEC52LSE	520	2000	2	4,5,6,7,8L	1700	95-127	19	8.47	3720-13600
UEC60LA	600	1900	2	4,5,6,7,8L	1618	83-110	15.7	6.97	3350-12360
UEC60S	600	2200	2	4,5,6,7,8L			2		

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Circle 242 on Reader Service Card

Regulateurs Europa Supplies Royal Boskalis With Viking Management Systems



Regulateurs Europa has supplied three Viking management systems for engines onboard Boskalis vessel Fairway.

Regulateurs Europa recently supplied three Viking management systems for engines on Royal Boskalis vessel *Fairway*, a Verolme Heusden-built trailing suction hopper dredger which features a 23,245-sq.-m. hopper capacity. Viking controls and shaft generators are attached to the free end of each W 46 engine. The controllers communicate to each other through a serial link to ensure equally balanced generator loads, as well as to ensure that fluctuations in individual propeller loads do not affect the load balancing of the free end generators. As the engines reach their nominal power rating, the Viking system will signal the pitch controller that de-pitching is required to prevent engine overload. The W 46 engines are also fitted with Type 2232 ballhead actuators.

Circle 27 on Reader Service Card

ABS Appoints Kramek As Americas Division President

ABS announced the appointment of recently retired U.S. Coast Guard (USCG) Commandant Adm. **Robert E. Kramek** as president of ABS Americas Division in Houston, Texas. Adm. **Kramek** will be responsible for the administration of more than 600 ABS surveyors, engineers, and support staff located in offices throughout North, Central and South America. He is scheduled to assume his new position on August 15.

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Circle 200 on Reader Service Card

Diesel Power Annual

1765	75-100	17	7.33	3830-14120	1986	79-105	17.4	8.05	4300-15890
UEC60LSN	600	2300	2	4,5,6,7,8L	2942	63-84	17	7.84	6380-35300
UEC75LSN	750	2800	2	4,5,6,7,8,9,10,12L	3898	76-102	17.1	8.02	9900-46340
UEC85LSC	850	2360	2	5,6,7,8,9,10,12L	3861	54-76	17.1	7.98	10560-46780
UEC85LSN	850	3150	2	5,6,7,8,9,10,12L					

Mitsui Engineering and Shipbuilding Co. Ltd. 6-4 TSUKUJI, 5-Chrome, Chuo Ka Tokyo 104, Japan. tel: +82 3 3544 3625, fax: +81 863 23 2770

Model	Bore (mm)	Stroke (mm)	Cycle	Cyl.# in-line/V	kW/Cyl	rpm	bmp	Mean Piston Speed m/s	Output Range kW
ADD30V	300	480	4	6-18V	570	750	27	12	3430-10300
L42MR	420	500	4	6,8/	795	600	23	10	4770-6360
V42MA	420	450	4	12,16V	625	600	20	9	7500-10000

MTU Motoren und Turbinen Union, Friedrichshafen GmbH, 88040 Friedrichshafen, Germany. tel: +49 75 41 90 3381, fax: +49 75 41 90 2724.

Model	Bore (mm)	Stroke (mm)	Cycle	Cyl.# in-line/V	kW/Cyl	rpm	bmp	Mean Piston Speed m/s	Output Range kW
1163	230	280	4	12,16,20V	192.5-370	1000-1300	29.4	12.1	2310-7400
183	128	142	4	6L,6,8,12,V	19.3-70	1500-2400	19.3	11.4	116-846
2000	130	150	4	8,12,16V	50-83.9	1800-2400	22	11.5	600-1343
396	165	185	4	6,8,12,16V	55.8-160	1500-2100	23.1	13	575-2560
4000	165	190	4	8,12,16V	91.9-170	1500-2100	23.9	13.3	735-2720
538	185	200	4	16,20V	275-257.5	1900	24.2	12.7	3300-4120
595	190	210	4	12,16V	245-270	1750-1800	30.3	12.6	2945-4320

Maritime Technology Center Completed

Avondale Industries, Inc. and the University of New Orleans jointly dedicated the recently completed University of New Orleans - Avondale Maritime Technology Center of Excellence located at Avondale Shipyards in Avondale, La.

The new 200,000-sq.-ft. center houses the latest computer hardware and software, including state-of-the-art computer-aided systems, three-dimensional modeling capabilities, electronic visualization viewing rooms, training rooms, an amphitheater and much more.

The new facility will support the efforts of the Avondale Alliance in executing a \$641 million contract, which calls for the design, construction and support of the first of an anticipated 12 ships under the Navy's LPD-17 program, the next generation of Navy amphibious ships. The contract award provides for options exercisable by the Navy for two additional LPD-17 ships to be built by the Avondale-led alliance, which includes Bath Iron Works, Raytheon and Intergraph.

These options bring the total value of the first three ships to approximately \$1.5 billion, and it is anticipated that the Navy will acquire an additional 9 vessels in the next 5 years.

"Design work on the initial LPD-17 has already begun and delivery of the first ship is expected in 2002 with the delivery of the last of the twelve vessels not expected until 2008" said Albert L. Bossier, Jr., Chairman, President and CEO of Avondale Industries, Inc.

Weeks Marine Acquires Gulf Coast Trailing

Weeks Marine, Inc. has acquired the principal assets of Gulf Coast Trailing Company, a subsidiary of T.L. James & Co. The Gulf Coast Trailing Company's hopper dredges *Ouachita* and *Mermentau* will join the Weeks Marine hopper dredge *R.N. Weeks*, reportedly forming the second largest hopper dredging operation in the U.S.

July, 1998

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Circle 295 on Reader Service Card

Diesel Power Annual

956	230	230	4	12,16,20V	220-390.6	1500	26.2	1.5	2640-6250
99	97.5	133	4	4,6L	9.8-29.2	1500-2800	13.6	12.4	39-175

Paxman Diesels Ltd., GEC Alsthom, Paxman Works, Hythe Hill, Colchester, Essex CO1 2HW, UK. tel: +44 1206 795151, fax: +44 1206 797869

Model	Bore (mm)	Stroke (mm)	Cycle	Cyl.# in-line/V	kW/Cyl	rpm	bmp	Mean Piston Speed m/s	Output Range kW
VALENTA	197	216	4	6L, 8, 12, 16, 18V	206.7	1600-1640	22.97	11.8	610-3910
VPI85	185	196	4	12, 18V	222.2	1950	25.96	12.74	2000-4000

Perkins-Sabre: Sabre Engines Ltd., Ferndown Industrial Estate, Wimborne, Dorset, BH21 7PQ, UK. tel: +44 1202 893720, fax: +44 1202 851700

Model	Bore (mm)	Stroke (mm)	Cycle	Cyl.# in-line/V	kW/Cyl	rpm	bmp	Mean Piston Speed m/s	Output Range kW
215C	100	127	4	6L	26.33	2500	12.67	10.58	158
M225TI	100	127	4	6L	27.58	2500	13.45	10.58	165
225C	112	115	4	6L	31.33	2500	13.27	9.58	188
M265TI	100	127	4	6L	32.50	2500	15.65	10.58	195
275L	112	115	4	6L	33.67	2500	14.26	9.58	202
280C	112	115	4	6L	34.33	2500	14.55	9.58	206.5
300TI	100	127	4	6L	36.83	2500	17.72	10.58	221
320L	112	115	4	6L	39.17	2650	15.65	10.16	235
350C	112	115	4	6L	42.83	2600	17.45	9.97	257
370	112	115	4	6L	45.33	2600	18.47	9.97	272
M370TI	112	115	4	6L	45.33	2600	18.47	9.97	272
M600TI	135	152	4	8V	55.90	2100	14.69	10.64	447.5
M700TI	135	152	4	8V	62.50	2100	17.14	10.64	500
M800TI	135	152	4	8V	74.63	2300	17.88	11.65	597

Ruston Diesels Ltd., GEC Alsthom Vulcan Works, Newton-Le-Willows, Meyerside WA12 8RU, UK. tel: +44 1925 225151, fax: +44 1925 222 055

Model	Bore (mm)	Stroke (mm)	Cycle	Cyl.# in-line/V	kW/Cyl	rpm	bmp	Mean Piston Speed m/s	Output Range kW
RK215	215	275	4	6L, 8, 12, 16V	158	720-100	21.70	9.2	780-3160
RK270	270	305	4	6, 8L, 12, 16, 20 V	378	720-1030	23.64	10.16	1500-7550
RK 270 HF	270	305	4	6, 8L, 12, 16, 20V	253	720-1030	17.36	10.16	1320-5050

Sonico Industrial and Marine Engines, S-151 87, Sodertalje, Sweden. tel: +46 8 553 81000, fax: +46 8 553 82993

Model	Bore (mm)	Stroke (mm)	Cycle	Cyl.# in-line/V	kW/Cyl	rpm	bmp	Mean Piston Speed m/s	Output Range kW
DS11(330)	127	145	4	6L	38.7-40.5	1800-2100	X	8.76-10.22	232-243
DS9(223)	115	144	4	6L	25.8-27.3	1900-2200	X	9.12-10.56	155-164
DS/9(330)	115	144	4	6L	39.0-40.5	1900-2200	X	9.12-10.56	234-243
DS/9(400,450)	115	144	4	6L	49.55-2	2200-2300	X	10.5611.04	294-331
DS9(273)	115	144	4	6L	31.45-33.5	1900-2200	X	9.12-10.56	189-201
DS/11(392)	127	145	4	6L	45.7-48.0	1800-2100	X	8.76-10.22	274-288
DS/11(500,600)	127	145	4	6L	61.3-73.7	2100-2200	X	10.22-10.71	368-442
DS/14	127	140	4	8V	42.4-53.0	1800-2100	X	8.4-9.8	339-424
DS/14(653)	127	140	4	8V	60	2100	X	9.8	480
DS/14(675)	127	140	4	8V	62	2100	X	9.8	496
DS/14(750)	127	140	4	8V	68.9	2200	X	10.27	551

SEMT Pielstick, 2 Quai de Seine, B.P. No.75, 93202 Saint Denis Cedex, France. tel: +33 1 48 09 76 00, fax: +33 1 48 09 78 78

Model	Bore (mm)	Stroke (mm)	Cycle	Cyl.# in-line/V	kW/Cyl	rpm	bmp	Mean Piston Speed m/s	Output Range kW
PA4-200VGA	200	210	4	8, 12, 16V	165	1500	20.0	10.5	1325-2650
PA5	255	270	4	5, 6, 8, 11, 12, 16, 18V	220	1000	19.2	9.0	1100-3960
PA6	280	290	4	6, 8, 11, 12, 16, 18, 20V	325	1050	20.8	10.15	1950-6500
PA6-CL	280	350	4	6, 8L, 12, 16, 18, 20V	295	750	21.9	8.75	1770-5880
PA6B	280	330	4	12, 16, 20V	405	1050	22.7	11.55	4860-8100
PC2.6	400	460	4	6, 7, 8, 9L, 10, 12, 14, 16, 18V	550	520	22.0	8.0	3300-9900
PC2.6B	400	500	4	12, 14, 16, 18, 20V	750	600	23.9	10.8	9000-15000
PC2.6B-DF	400	500	4	12, 14, 16, 18, 20V	625	600	19.9	10.0	7500-12500
PC4.2	570	620	4	6, 7, 8, 9L, 10, 12, 14, 16, 18V	1215	429	21.5	8.3	7290-21870
PC4.2B	570	660	4	10, 12, 14, 16, 18V	1400	430	23.3	9.4	14000-25200
PC40	570	750	4	5, 6, 7, 8, 9, 10L	1325	375	22.2	9.4	6625-13250

SKL Motoren und Systemtechnik GmbH, Varn. Buckau-Wolf, Friedrich-List SH 8-39122 Magdeburg, Germany. tel: +49 391 40320, fax: +49 391 4032382

Model	Bore (mm)	Stroke (mm)	Cycle	Cyl.# in-line/V	kW/Cyl	rpm	bmp	Mean Piston Speed m/s	Output Range kW
6NVD 48 A-2U	320	480	4	6L	123	428	8.9	6.85	
6NVD48 AL-2U	320	480	4	6L	140	428	10.2	6.85	
6VD 18/16 AL-2	160	180	4	6L	75	1500	16.6	9.0	
6VD 18/16 AL-1	160	180	4	6L	90	1800	16.6	10.8	
6VD 26/20 AL-1	200	260	4	6L	88	1000	13.0	8.67	

6VD 26/20 AL-2	200	260	4	6L	110	1000	16.2	8.67	
6VD 29/24 AL-2	240	290	4	6L	150	750	18.3	7.25	
6VD 29/24 AL-1	240	290	4	6L	220	1000	20.1	9.67	
6NVD48A-2U	320	480	4	8L	121	428	8.9	6.85	
6NVD 48 AL-2U	320	480	4	8L	138	428	10.2	6.85	
BVD 18/16 AL-3	160	180	4	8L	90	1500	20.0	9.0	
BVD 18/16 AL-1	160	180	4	8L	109	1800	20.0	10.8	
BVD 24/16 AL-1	160	240	4	8L	80	1000	20.0	8.0	
BVD 24/16 AL-2	160	240	4	8L	96	1200	20.0	9.6	
BVD 26/20 AL-2	200	260	4	8L	110	1000	16.2	8.67	
BVD 29/24 AL-2	240	290	4	8L	169	750	20.9	7.25	
BVD 29/24 AL-1	240	290	4	8L	225	1000	20.6	9.67	
9VD 29/24 AL-2	240	290	4	9L	196	750	24.0	7.25	
9VD29/24 AL-2	240	290	4	9L	261	1000	24.0	9.67	

Lilstein Bergen AS, PO box 924 N-5002, Bergen Norway. tel: +47 55 19 90 00, fax: +47 55 199104

Model	Bore (mm)	Stroke (mm)	Cycle	Cyl.# in-line/V	kW/Cyl	rpm	bmp	Mean Piston Speed m/s	Output Range kW
B(AUX)	320	360	4	6, 8, 9L, 12, 16, 18 V	424-442	720-750	24.4	8.6-0	2545-7945
B(PROP)	320	360	4	6, 8, 9 L, 12, 16, 18 V	442	750	24.4	9	2650-7945
K(AUX)	250	300	4	3, 5, 6, 8, 9L, 12, 16, 18 V	195-221	720-900	20-22	7.2-9.9	585-3975
K(PROP)	250	300	4	6, 8, 9L, 12, 16, 18 V	202-223	750-825	22	7.5-8.25	1215-4010

Volvo Penta, S-40508, Gothenburg, Sweden. tel: +46 31 235460, fax: +46 31 510348

Model	Bore (mm)	Stroke (mm)	Cycle	Cyl.# in-line/V	kW/Cyl	rpm	bmp	Mean Piston Speed m/s	Output Range kW
KAMD	121	140	4	6L	39.2	1800	16.3	8.4	235
KAMD42P/DP/DPX	92	90	4	6L	28.3	3800	-	11.4	170
TAMD122A	130	150	4	6L	46.7	1800	15.6	9	280
TAMD162C	144	165	4	6L	62.5	1800	15.5	9.9	75
TMD102A	120	140	4	6L	26-29	1500-1800	12.3	7-8.4	158-175
TMD122A	130	150	4	6L	39.8	1800	12.5	9	221
TMD122A	144	165	4	6L	67.5	1800	17.0	9.9	405

Wärtsilä MSD Corp., World Trade Center, Leutschenbachstrasse 95, CH 8050, Zurich, Switzerland. tel: +41 1 305 7100, fax: +41 1 305 7199

Model	Bore (mm)	Stroke (mm)	Cycle	Cyl.# in-line/V	kW/Cyl	rpm	bmp	Mean Piston Speed m/s	Output Range kW
CW 170	170	200	4	6, 8, 9L, 12, 16, 18V	115-130	1500-1800	19.1-20.2	10-12	690-2340
CW 200	200	240	4	12, 16, 18V	175-200	1200-1500	21.2-23.2	9.6-12	2100-3600
Wärtsilä 20	200	280	4	4, 5, 6, 8, 9L	130-180	720-1000	22.5-25.8	6.7-9.3	520-1620
S20U	200	300	4	4, 6, 8, 9L	160-175	900-1000	22.3	10	640-1575
Wärtsilä 25	250	300	4	6L, 12, 16V	184-258	720-1000	18.7-20.8	7.2-10	1110-3680
Wärtsilä 26	260	320	4	6, 8, 9L, 12, 16, 18V	295-325	900-1000	22.1-24.3	9.6-10.7	1770-5850
Wärtsilä Vasa 32/32GD	320	350	4	4, 6, 8, 9L, 12, 16, 18V	370-410	720-750	21.3-24	8.4-8.75	1480-7380
Wärtsilä 32	320	400	4	6, 8, 9L, 12, 16, 18V	450-460	720-750	22.9-23.3	9.6-10	2700-8280
Wärtsilä 38	380	475	4	6, 8, 9L, 12, 16, 18V	660	600	24.5	9.5	3960-11880
Sulzer ZA40S	400	560	4	6, 8, 9L, 12, 14, 16, 18V	600-720	510	24.1	9.52	3600-12960
Wärtsilä 46/46GD	460	580	4	6, 8, 9L, 12, 16, 18V	905-1050	450-514	21.9-26.1	8.7-9.9	5430-18900
Sulzer ZA50S	500	660	4	6, 8, 9L	1080-1200	450	24.7	9.9	6480-10800
Wärtsilä 64	640	770-900	4	5, 6, 7, 8, 9L, 12, 16, 20V	1940-2010	327.3-428	23.5-25.5	9.8-11	10050-38800
Sulzer RTA38	380	1100	2	4, 5, 6, 7, 8, 9L	370-680	141-196	16.7	7.19	1480-6120
Sulzer RTA48	480	1400	2	4, 5, 6, 7, 8, 9L	600-1090	111-154	16.8	7.19	2400-9810
RTA48T									

Ferliship'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: Ferliship, Paseo De San Francisco De Sales, 8, 28003 Madrid, Spain, tel: +341 441 4138; fax: +341 441 4138.

OWNER / OPERATOR	SHIPYARD	TYPE	No	DWT	DELIV	PRICE M \$	OWNER / OPERATOR	SHIPYARD	TYPE	No	DWT	DELIV	PRICE M \$
CANADIAN INTERESTS	HALFAX SHIPYARD	AHTS	1	-	99/00	n/a	VIKING SUPPLY SHIPS	SEVMASH	PONTOON	2	9,750	99	n/a
ANGELICOUSSIS	SAMSUNG	BULK CARRIER	1	73,000	00	26	BAKRI	HANJIN	PRODUCT TANKER	2	45,000	99	68
NICHIMEN	MITSUMI	BULK CARRIER	1	46,500	99	n/a	D'ALITA	DAEDONG	PRODUCT TANKER	4	35,000	99/00	106
NORDSTRAND MARITIME	XINGANG SHIPYARD	BULK CARRIER	2	29,000	99	n/a	DUTCH INTERESTS	FERUS SMIT	PRODUCT TANKER	2	6,950	99/00	n/a
SUMITOMO CORP.	MITSUMI	BULK CARRIER	1	46,500	99	n/a	INDONESIA INTERESTS	KODJA BAHARI	PRODUCT TANKER	2	1,500	98/99	n/a
TAHO SHIPPING	CHINA SHIPB. CORP.	BULK CARRIER	1	80,000	3/00	28.75	MITSUBISHI CORP.+IINO KAIUN	NAMURA ZOSENSHO	PRODUCT TANKER	1	105,000	00	42
LEIF HOEGH & CO. A/S	DAEWOO	CAR CARRIER	2	-	00	113.8	SCORPIO SHIPMANAGEMENT	3 MAJ	PRODUCT TANKER	1	81,500	01	n/a
WALLENUS LINES	DAEWOO	CAR CARRIER	10	-	n/a	n/a	SCORPIO SHIPMANAGEMENT	3 MAJ	PRODUCT TANKER	1	63,000	01	n/a
A. P. MOLLER	CHINA SHIPB. CORP.	CONTAINER	4	31,500	99/00	138	SEARLAND SHIPPING	DAEDONG	PRODUCT TANKER	2	35,000	99	n/a
ALPHA SHIP	STOCZNIA GDYNIA	CONTAINER	2	29,300	6/11/99	n/a	SANTOKU SENPAKU	SHIN KOCHI JUKO	REEFER	1	6,000	99	n/a
CGM	CHINA SHIPB. CORP.	CONTAINER	2	31,500	12/99	66	BUILDER'S ACCOUNT	INCAT AUSTRALIA	RoRo	1	1,000	99	n/a
COLUMBIA SHIPMANAGEMENT	XIAMEN	CONTAINER	1	-	99	n/	FINNCARRIERS	JINLING	RoRo	2	8,100	00	n/a
COSCO	SHANGAI SHIPYARD	CONTAINER	5	25,800	00	110	NORDIC FOREST TERMINALS	JINLING	RoRo	2	7,300	00	40
COSCO	DALIAN SHIPYARD	CONTAINER	4	25,800	99/00	88	CENARGO	AESA (SEVILLA)	RoRo	2	-	12/99/00	105.5
GERMAN INTERESTS	KROEGERWERFT	CONTAINER	1	-	99	n/a	OKI KISEN	MITSUBISHI H.I.	RoRo	1	850	99	n/a
HANSA MARE	HYUNDAI	CONTAINER	2	-	99	n/a	VIKING SUPPLY SHIPS	GDYNIA	SUPPLY	3	3,000	99	33
NEPTUNIA COMPANHIA	ESTALEIRO ILHA SA	CONTAINER	2	-	00	120	ANGELICOUSSIS	DAEWOO	TANKER	1	300,000	00	76.5
SCHOELLER	XIAMEN	CONTAINER	1	-	98	n/a	CERES HELLENIC	SAMSUNG	TANKER	1	148,500	6/00	51
YANG MING MARINE CORP	SASEBO	CONTAINER	2	-	99/00	120	CHANDRIS	DAEWOO	TANKER	1	300,000	00	76.5
YANG MING MARINE CORP	CHINA SHIPB. CORP.	CONTAINER	3	-	00	180	GOULANDRIS	SAMSUNG	TANKER	2	310,000	00	153
FORMOSA PLASTICS	IHI	CRUDE OIL TANKER	2	260,000	01	166	NANJING CHANGJIANG	QIUXING	TANKER	2	10,000	99	n/a
MARUBENI	NKK CORP.	CRUDE OIL TANKER	2	105,800	00	n/a	NIPPON YUSEN KAISA (NYK)	IHI	TANKER	1	259,000	00	74.63
NORWEGIAN CRUISE LINE	LLOYD WERFT	CRUISE	1	-	00	332	TANKER PACIFIC	HYUNDAI	TANKER	2	105,000	00	n/a
RENAISSANCE CRUISES	GEC ALSTHOM	CRUISE	2	-	5/00	323	TEEKAY SHIPPING	SAMSUNG	TANKER	2	105,000	99	76
RESIDENSEA	HDW	CRUISE	1	-	01	54	BUKSER OG BJERGNING	PRESIDENT MARINE	TUG	1	-	99	n/a
SEA CLOUD KREUZFAHRTEN	ASTILLEROS GONDAN	CRUISE	1	-	2/00	n/a	ISRAEL ELECTRIC CORPORATION	ISRAEL SHIPYARDS	TUG	2	170	99	n/a
SILVERSEA CRUISES	MARIOTTI	CRUISE	2	-	00/01	300	KEPPEL SMIT TOWAGE	ODO ZOSEN	TUG	2	0	98	n/a
STAR CRUISES	MEYER WERFT	CRUISE	2	-	00/02	760	LES ABELLES	GEC ALSTHOM	TUG	10	-	99	45.8
DUTCH INTERESTS	SLOB	CHEM TANKER	2	2,600	99	n/a	VISAKHAPATNAM	HINDUSTAN SHIPYARD	TUG	3	-	99	n/a
SANSHO KAIUN	SHITANOE ZOSEN	CHEM TANKER	1	4,000	99	n/a	FUKUJU KIGYO	KANDA SHIPBUILDING	VEHICLE CARRIER	1	-	99	n/a
BROERE SHIPPING	SCHEEPSWERF BIJLSMA	CHEM TANKER	3	6,500	00	n/a	VAPORES SUARDIAZ	BARRERAS	VEHICLE CARRIER	1	0	12/99	n/a
BROVIG	BALTIC SHIPYARD	CHEM TANKER	1	6,000	99	n/a							
UNITED OCEAN CO	FUKUOKA	CHEM TANKER	3	11,500	99/00	50.1							
FORAMER	HYUNDAI	DRILLSHIP	2	32,300	99	n/a							
GLOBAL MARINE	HARLAND & WOLFF	DRILLSHIP	1	60,000	00	n/a							
PETROBRAS	TDI-HALTER	DRILLSHIP	2	-	99/00	170							
PETRODRILL	DAEWOO	DRILLSHIP	2	10,000	00	280							
ISTAMBUL DENIZ OTOBUSLERI	AUSTAL SHIPS	FERRY	2	-	98	n/a							
NEL LINES	GEC ALSTHOM LEROUX	FAST FERRY	1	-	99	n/a							
ROGALAND TRAFIKKSELSKAP	GDANSK	FERRY	3	-	00	n/a							
TIRRENIA SOC. NAV.	FINCANTIERI	FERRY	2	1,200	00	143							
COMPAGNIE CHAMRON	AUSTAL SHIPS	FERRY CAT	1	-	-	n/a							
COLNE	STOCZ POLNOCA	FISHING	1	365	99	n/a							
JAPANESE INTERESTS	MIHO SHIPYARD	FISHING	1	-	98	n/a							
SORHEIM ODD	SLIPEN	FISHING	1	-	99	n/a							
BLUEWATER ENGINEERING	HITACHI ZOSEN	FPSO	1	55,400	99	n/a							
MPG	HYUNDAI	FPSO	1	343,000	n/a	120							
DUTCH INTERESTS	PATJJE S	GEN CARGO	1	4,550	99	n/a							
HARREN & PARTNERS SCHIFFS	BODEWES BV	GEN CARGO	1	-	99	n/a							
TRITON	RUSE	GEN CARGO	7	4,750	99/00	n/a							
MITSUMI & CO.	NIPPON KKK	LNG	1	-	00	n/a							
BERGESEN	GDYNIA	LPG	2	60,000	00	120							
FORMOSA PLASTICS	MITSUBISHI H.I.	LPG	2	49,700	01	n/a							
BAUM & CO	JINAGYANG	MULTI-PURPOSE	1	-	98	16.6							
COSCO	GUANGZHOU	MULTI-PURPOSE	4	28,000	99/00	n/a							
EM Z SVITZER	BALTICA SHIPYARD	MULTI-PURPOSE	1	-	99	n/a							
INTERSHIP NAV.	JING JIANG	MULTI-PURPOSE	1	0	00	n/a							
INTERSHIP NAV.	HUDONG SHIPYARD	MULTI-PURPOSE	1	-	99	n/a							
PYRSOS MANAGING CO	DALIAN SHIPYARD	MULTI-PURPOSE	8	12,000	99/00/01	130							
APOLLO MARINE	SASEBO	ORE CARRIER	1	72,000	99	n/a							
NYK LINE	MITSUMI	ORE CARRIER	1	77,100	00	30							
ROGALAND	REMONTOWA	PASS/CAR FERRY	1	-	99	n/a							
ROGALAND	NORTHERN SHIPYARD	PASS/CAR FERRY	1	-	98	n/a							
BUILDER'S ACCOUNT	KVAERNER	PASS/CAR FERRY	1	-	98	n/a							
AUSTRALIAN GOVERNMENT	AUSTAL SHIPS	PATROL BOAT	8	-	99/00/01	38.3							



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(Continued from page 31)

bility was also evident in eight hours of trouble-free operation at 100 percent maximum continuous power rating.

The highlight of the program was its attainment of 41.3 knots at service power equating to around 90 percent MCR on 1,200-dwt, representing a 1.3-knot gain on the con-

tractual speed. Given the expectation from the market of all-year service dependability, no less significance should be attached to seakeeping properties that should allow the class to substantially exceed the operational limits of existing fast ferries on the Sardinia/mainland route network.

Tirrenia had earlier demonstrated its forward-thinking approach

to the business when it introduced the 102-m *Aquastrada* monohull sisters *Guizzo* and *Scatto* to the Sardinian traffic in 1993/94. While the Neapolitan operator elects to idle its *Aquastrada* passenger/car ferries during the winter months, *Aries* and *Taurus* are intended to competitively provide continuous service coverage through the high and low seasons.

One of the keys to the design's operating flexibility is a RoRo configuration which offers payload permutations from 460 cars to 30 trucks of 30-tons plus 150 cars, along with accommodations for 1,800 passengers.

The other instrument of service flexibility is the 70.8-MW (95,000-bhp) combined diesel and gas (CODAG) plant, comprising two General Electric LM2500 gas turbines of 22-MW each and four MTU 20-cylinder 1163-series diesels of 6.7-MW apiece.

While 40 knots-plus can be assured with every piece of the plant fired-up, the use of the four MTU engines alone should give 22-knots in laden condition, with 33-knots anticipated from the bank of diesels plus a single gas turbine.

SEC — Pioneering Spirit

While the transformation of state-owned Fincantieri, not least its organizational streamlining and considerable business impact in capital-intensive niche markets, has remained the commanding feature of the Italian shipbuilding scene over recent years, the vitality of the private sector bears significantly on the wider industrial well-being.

A pioneering spirit is amply demonstrated by Societa Esercizio Cantieri (SEC), which has effected a wholesale change in its structure, build system and target markets within just a decade.

The recent delivery of the first of a long series of Stena 4-Runner RoRo freight ships marks the turning of a new era both in SEC's international business development and in its production arrangements. From a fishing vessel orientation and subsequent diversification into factory ships, the company embraced stainless steel tanker technology in the mid 1980s, becoming one of Europe's most prolific builders of vessels for the petrochemical trades. Its activities in the specialized tanker category have reached new heights in terms of scale and design sophistication through a current project involving two 22,000-dwt stainless tankers for domestic owners Finaval and Marnavi.

SEC is now showing its mettle in an entirely different area of ship construction, having forged a link in the RoRo domain with Gothenburg-based Stena, widely perceived by shipbuilders worldwide as one of the most exacting clients. The recent completion of 12,350-dwt *Und Ege*, the first of five 4-Runners firmly ordered, and



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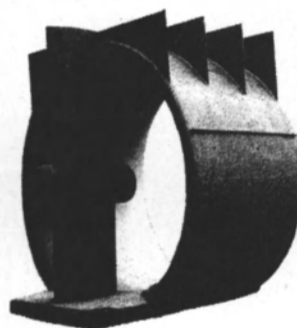
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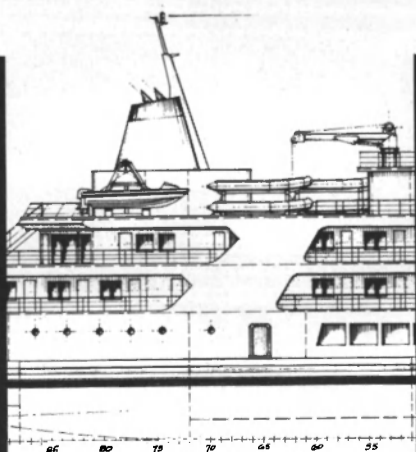
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the first of two sold by Stena to Turkish operator UND, gives form to SEC's new endeavours. The naming in May of the second ship, *Sea Chieftain*, signified a further broadening in the yard's international reputation, as the first of two of the series destined to be long-term chartered by Stena to the U.K.'s Royal Fleet Auxiliary.

There are strong indications that Stena will extend the 4-Runner program at SEC to seven, or possibly nine, vessels. Capacious and fast, offering 2,715-lane m for freight on three decks, and with a 23,040 kW four-engine installation promising a 22-knot service speed, the new type is the product of exhaustive market research. Maneuverability and turnaround times have been central considerations in the planning of the design, which lends itself to economic jumpoization at a future stage without penalizing main performance characteristics.

While Viareggio remains SEC's headquarters yard and the fountainhead for its commercial and technical endeavours, a strategy of fostering parallel production at various SEC-controlled premises along the Ligurian coast has been put into effect in the construction of the new RoRos.

Notwithstanding the extent of the preceding changes in its shape and business orientation, the company describes last year's shifts and turns in its technical set-up and work organization as Copernican in dimension. Certain traditional structures have been eliminated and replaced by modular construction methods entailing a distributed production system and the fabrication of blocks of up to 3,000 tons.

SEC president **Renzo Pozzo** said, "We have to accept that the so-called Global Village is slowly taking shape and, consequently, the world market, characterized by redundancy and areas of highly concentrated productivity, is materializing more quickly than was thought."

Although progress in the past had often been synonymous with multi-directional expansion, Mr. **Pozzo** said that a very different strategy had been initiated to meet the new international challenge: "Our present policy tends to be reductive — while, at the same time intensifying our production versatility, production speed and endless research for new technology." These criteria were concentrated from 1997 on the Stena RoRo project.

Ferrari — Revival At La Spezia

Two years after from its reconstitution following takeover by a new group of investors, Cantiere Navale Ferrari (CNF) has re-established itself as a vibrant part of the maritime production sector in La Spezia.

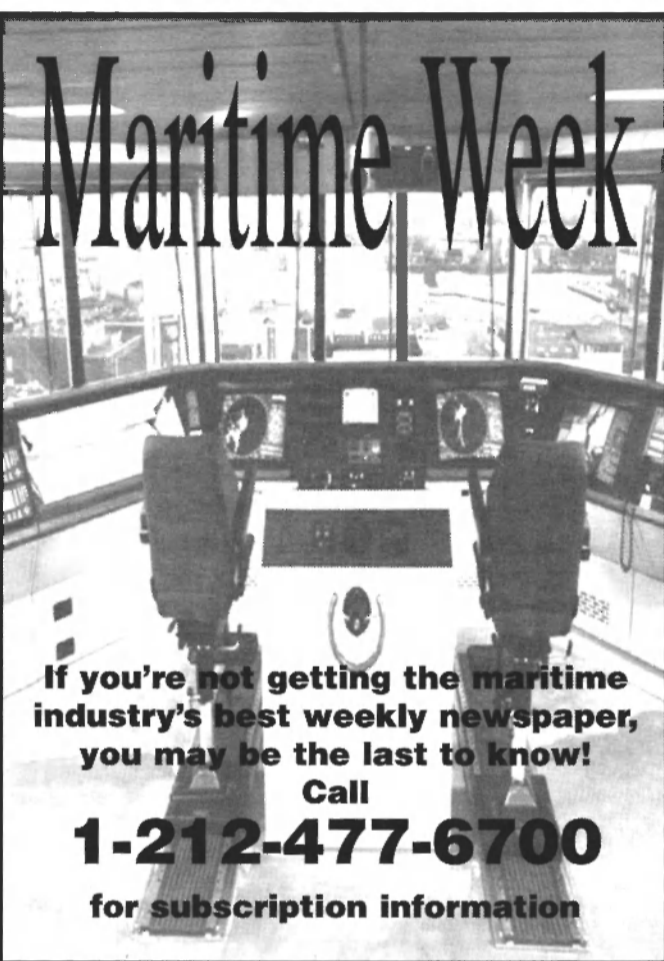
As a name synonymous with high-grade passenger vessels, a new focus for its skills has been

created by the joint venture with nearby Industrie Navali Meccaniche Affini (INMA) in the building of two, 23-knot conventional ferries for Tirrenia.

Due for delivery at the end of 1998, the 22,000-gt sister vessels are each intended to make two round-trips per day on the Naples/Palermo route, accommodating 1,200-passengers and offer-

ing 2,000-lane m for vehicles. Construction of hull and superstructure, together with propulsion machinery installation, has been assigned to CNF, while INMA will undertake the outfitting.

Measuring 607 x 88 ft. (185 x 26.8 m), the Tirrenia class is at the top end of the dimensional capabilities offered by the Ferrari yard, which has been extensively updat-



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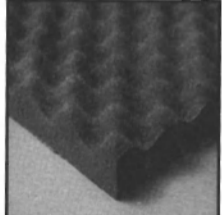
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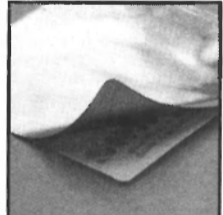
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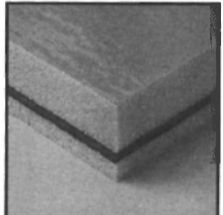
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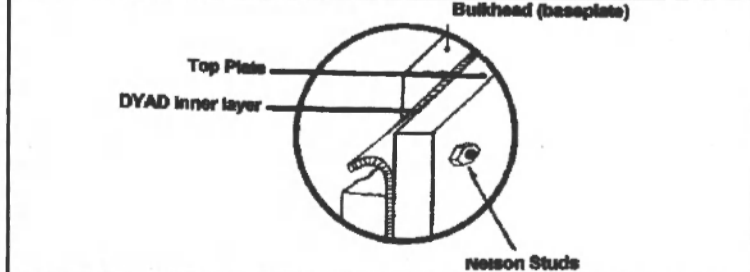


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ed following takeover, in line with plans to reassert itself in the international market.

Building on longstanding strengths, reinvigorated CNF is also targeting the newbuild sectors covering high-specification tugs and multi-purpose supply vessels. Picking up the challenge presented by the evolution of the global market, and demonstrating its propensity for cooperation, various collaborative agreements and joint ventures have been entered into with other industrial firms in specialised fields, including tug building.

The present contract with Fratelli Neri of Livorno spanning five 88.5-ft. (27-m) firefighting tractor tugs is indicative of the company's policy of creating synergistic relationships, optimizing the resources of La Spezia's maritime cluster so as to provide a better offer of competitive services to the market. The first of the Neri tugs was handed over last December, and the program extends into 1999, applying a

design rated for a 44-ton bollard-pull.

Particular significance in regard to both generic type and business source is also attached to a deal with the Maltese government for the construction of a multi-purpose tug equipped for firefighting, salvage and oil pollution control duties. CNF perceives a growing market for oil pollution combatant vessels in the Mediterranean.

INMA — Stainless Hallmark

The recent completion at La Spezia of the 5,300-dwt chemical parcel tanker *Stolt Shearwater* opened a new stage of investment in the Stolt-Nielsen Group's short-haul fleet, and gave fresh expression to INMA's standing in specialized tanker technology. As the first of a trio destined for the Stolt-Nielsen Inter Europe Service (SNIES), the vessel is distinguished by the adoption of a diesel-electric power and propulsion system, in a design

shaped by the ever-more pressing requirements of shippers for quality, dependable transportation at competitive cost.

The 5,500-cu.-m. capacity, all-stainless *Stolt Shearwater*, set to be followed in September this year and January 1999 by *Stolt Cormorant* and *Stolt Fulmar*, respectively, draws on key concepts employed in the revolutionary 37,000-dwt Stolt Innovation class from Danyard.

The central power plant in the SNIES vessel, based on four main diesel-generators driven by Wartsila 6L20 engines of 930-kW, feeds electrical energy to the 2,800-kW propulsion motor, bowthruster, cargo pumps and ship's services. The engineering arrangements allow machinery to be run in an optimized and economical manner across the varied operating profile characteristic of a shortsea tanker, matching output with power needs at any one time. Another important safety and environmental feature of the class is the prolongation of the double hull configuration beyond the cargo section in such a way as to protect the oil fuel tanks.

INMA, which is delineating a new strategy following this year's changes in senior management, is also committed to the outfitting of Tirrenia's new pair of 23-knot conventional ferries, under a collaborative agreement with fellow La Spezia shipbuilding firm Cantiere Navale Ferrari.

It is seeking further contracts to take the yard's workload beyond the first quarter of next year, with the range of possibilities including an extension of the Stolt series. Aside from the newbuilding activities which have come to assume a higher profile in recent years, INMA's prowess in demanding conversion and repair projects will undoubtedly leave it in good standing for the future.

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Maritime Reporter/Engineering News

(Continued from page 50)

ship repair sales peaked at \$8.4 million, the highest monthly figure since the record of \$9.3 million set in February 1997. Ship repair sales for the quarter were in line with budget expectations at \$21 million. These figures were a healthy 25 percent above the difficult market conditions seen in the fourth quarter 1997, but 20 percent below the corresponding period in 1997. Since March, both April and May have returned to a slow market.

A satisfactory number of vessels were repaired by the yard during the quarter, with 34 ships — ranging from ULCCs to small pollution control barges — visiting the yard. This compares with 37 vessels for the same period in 1997. According to ASRY, repair contract values have also be down on last year. The two new alongside Berths 7 and 8 are now in operation and the second phase of the planned increase in the yard's compressed air capacity is scheduled to be completed by 3Q 1998. ASRY's environmentally friendly marine sludge treatment plant, which was commissioned in November 1997, has been well received by owners and is experiencing high demand.

During the latter part of May, ULCC *Sea Splendour*, which is owned by Sweden's Frontline and managed by Norway's Jahre-Wallem, drydocked at the yard, the ship starting its repair operation in Dubai, where boiler work was completed, and then coming to Bahrain for steelwork, estimated to be in the region of 1,000 tons. This should push the price of repair, which will include a fourth special survey, to between \$5 and 6 million

Rotterdam's RDM has purchased Wilton Fijenoord Holdings BV, owners of Rotterdam's two large shiprepair yards, Verolme Botlek and Wilton Fijenoord and the newbuilding shipyard, Verolme Heus-den. It has also been announced that RDM is now in discussions with Rotterdam's Yssel-Vliet Combinat (YVC) for the take over of the Wilton Fijenoord repair yard at Schiedam. The shipyard, which employs some 280 workers, comprises two floating docks of 90,000 and 38,000 tons lifting

capacity, and two graving docks of 160,000 dwt and 40,000 dwt capacity, the latter graving dock being covered. The yard, once one of Rotterdam's major shipbuilding/shiprepairing facilities, has been concentrating on shiprepair activities since completing a series of submarines for the Taiwanese Navy during the late 1970s.

YVC currently operates two shipyards in the Rotterdam area — YVC Bolnes, which specializes in ship repair and conversion, and the newbuilding yard across the Maas at Capelle aan den IJssel (YVC Ysselwerf), and a section building yard at Groot Ammers. The repair yard at Bolnes comprises two floating docks of 25,000 and 18,000 tons lifting capacity, It is the long term intention that the ship repair yard at Bolnes will be closed and all shiprepair and conversion activities will be centralized at the Schiedam yard and then the newbuilding yard at IJssel, will also close down and newbuilding activities will also be relocated to Schiedam. The section building yard at Groot Amers will be unaffected by this development. In its opening month, Dublin's Harris Pye Drydocks, formerly Dublin Drydocks, has secured over \$1.5 million worth of orders, with Chief Executive **Peter Schmidt** saying he is confident on building on this very good start and stated that "we now have, in conjunction with Harris Pye, a very good management team in place and we have a good nucleus of skilled workers. This, together with the extensive back-up Harris Pye can provide, will ensure a bright future for Harris Pye Drydocks in Dublin."

The privatization of Lithuania's Western Shiprepair Yard is beginning to slow following a disappointing response or interest from western-based parties. The yard has only received three initial bids, all three from former eastern countries. The first is a joint venture between Baltija Shipyard (Kallingrad) and a local Lithuanian investment group; the second

comes from Riga Shipyard, in neighbouring Latvia; and the third from a joint venture between a Ukrainian company and a Lithuanian investment group. It is therefore likely that the Lithuanian government may postpone the privatization until more western companies come forward. The current asking price for the yard is some \$20 to 25 million, but market sources indicate that \$17 million would be a more realistic price.

South Africa's Elgin Brown & Hamer (EB&H) has received permission from Portnet, South Africa's state-owned port authority, to locate a floating dock in the port of Durban. EB&H is now looking for a 8,000 to 10,000 tons lifting capacity floating dock on the sale and purchase market. This investment by EB&H is the largest single private investment in the South African repair industry for many years, and will increase Durban's repair capacity by some 30 percent.

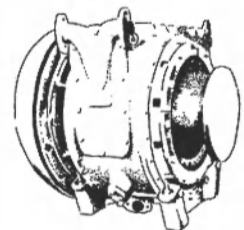

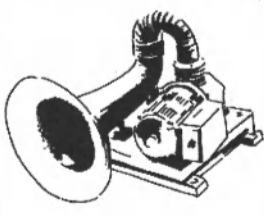


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This directory section is an editorial feature published in every issue for the convenience of the readers of MARITIME REPORTER. A quick-reference readers' guide, it includes the names and addresses of the world's leading manufacturers and suppliers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

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Carrier Transicold, P.O. B. 4805, Syracuse, NY 13221
Refrigeration Resources, 210 Westside Ave., Jersey City, NJ 07305
Stork Canada, 47 boul. Marie Victorin, Candiac, Quebec, Canada, J5R 1B6
ALARMS, FACTORY MUTUAL-APPROVED
Datostar Marine Products Inc., Unit 100 18 Gostick Pl., N.Vancouver, Canada V7M3G31
SELCO 353 A Asbury Commons Dr., Atlanta, GA 30338

ALLOY

Ampco Pumps, 4000 West Burnham St., Milwaukee, WI 53215

ALUMINUM BOATS

American Eagle Mfg., 780 Pearle Jensen Way, La Conner WA 98257
Munson Mfg., 780 Pearle Jensen Way, La Conner WA 98257

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All Alpha Int'l., Inc. P.O. Box 498985, Cincinnati, OH 45249
Crandall Dry Dock Engineers Inc., P.O. B. 505804, MA 02150
G.J. Wortelboer Jr. BV, P.O.B. 5003, 3008 AA Rotterdam, Nether Marit Chain, 230 Avenue Desandrouins, 59300 Valenciennes FRANCE
Washington Chain & Supply Inc., Box 3645, Seattle, WA 98124
Waterman Supply Co., P.O. Box 596, Wilmington, CA 90748
Willem Pot, P.O.B. 29102, 3001 GC Rotterdam

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

AUTOMATION SYSTEMS

Electronic Design, 3020 20th St., Metairie, LA 70002-4911

AUTOPILOT SYSTEMS

Mackay Communications 2721 Discovery Dr., Raleigh, N.C. 27604-1851
ComNav Marine, 1915 Stainsburg Ave., Vancouver, B.C. CANADA

BALLAST

Ballast Technologies, 4620 S. Coach Dr., 85714, Tucson, AZ
Redland Genstar Inc., Executive Plaza IV, Hunt Valley, MD 10912-1031

BASKET STRAINERS

Beard Industries Inc., 601 Benton Kelly Street, Shreveport, LA 71106-7198

BATTERY CHARGERS

Newmar, 2911 West Garry Ave., Santa Ana, CA 92663

BEARING—Rubber, Metallic, Non-Metallic

Blohm & Voss Industrie GmbH, P.O. B. 100720, D-2000 Hamburg 1, GERMANY
Simplex-Turmar Inc., P.O. B. 168, Little Neck, NY 11363-0168
U.S.A. Reps:
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Kahlenberg Bros. Co., P.O. Box 358, Two Rivers, WI 54241
Orion Corp., 1111 Cedar Creek Rd., Grafton, WI 53024
Duramax Marine, 16025 Johnson St., Middlefield, OH 44062
Thordon Bearings Inc., 3225 Mainway, Burlington, Ont., CANADA L7M 1A6
Vesco Plastics, P.O. B. 40647, Cleveland 2022 SOUTH AFRICA

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

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Skookum, P.O. Box 280, Hubbard, OR 97032

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BOAT RENTAL

Edison Chaisset, P.O. Box 309, Galliard, LA 70354

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BOILER MANAGEMENT

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Jack Faulkner, 2419 Caddy Lane, P.O. Box 371, Flossmoor IL 60422
Mowbray's Tug & Barge Sales Corp., 35 De Hart St., Morristown NJ 07960

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Blohm & Voss Industrie GmbH, P.O. B. 100720, D-2000 Hamburg 1, GERMANY
Panel Specialists, Inc./Thermax, 3115 Range Rd., Temple, TX 76501
Raiko Ltd., U.S.A. Reps: Simplex-Turmar Inc., P.O.B. 675, Tonawanda, NY 14151-0675
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CABLE TRANSIT SYSTEMS

CSD North America, 250 Commercial St., Unit 2006A, Manchester, NH 03101
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Rox Corp., 12402 E. 60th St., Tulsa, OK 74146-6922

CAD/CAM SYSTEMS

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Autoshop Systems Corp., #403, 611 Alexander St., Vancouver, BC, Canada V6A1E
Creative Systems, Inc., P.O. B. 1910, Port Townsend, WA 98368
IMSA, 13 Jenkins Court, Suite 200, Durham, NH 03824
Kockums Computer Systems AB, PO Box 50555, S-202 15 Malmo SWEDEN
Scientific Marine Services, Inc., 101 State Pl., Suite F, Escondido, CA 92029
TIMSCO, P.O. B. 91360, Mobile, AL 36691
Ship Motion Associates, 10 Danforth St., Portland, ME 04101-4567

CARGO MONITORING A CONTROL SYSTEM

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CHAINS

Columbus McKinnon Corp., 140 John James Audobon Pkwy, Amherst, NY 14228
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Washington Chain, P.O. Box 3645, Seattle, Wa. 98124

CHARGE AIR COOLERS

Crane Heatex, 17 Grandview Ave., W. Orange, NJ 07052

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Unisphere Americas, 57174 Hardin Rd., Slidell, LA 70461
Unitor Ship Service Inc., 2375 W. Esther St., Long Beach, CA 90813

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Det Norske Veritas, 70 Grand Ave., Riveredge, N.J. 07661

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Flexible Decking, 2708 N. Australia Ave. Ste. 9, West Palm Beach, FL 33407
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ICG Satellite Services, 8400 NW 52nd St., Suite 110, Miami, FL 33166
Maritime Telecommunications Networks, Inc., 8400 NW 52nd St., Suite 110, Miami, FL 33166
Ascom Tateco AB, Eppendorfer Weg 234, D-20251 Hamburg, GERMANY
AT & T Maritime Services, 412 Mt. Kemble Ave 5170, Morristown, NJ 07960
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Chand Corporation, 157 Hwy 654, Mathews, LA 70375
Coastal Oceanographics, Inc., 11-G Old Indian Trail, Middlefield, CT 06455
Creative Systems, Inc., O. Box 1910, Port Townsend, WA 98368
Sener, C/Severo Ochoa, 4 Parque Tecnologico de Madrid, 28760 Tres Cantos - Madrid SPAIN
Intecolor Corp., 2150 Boggs Rd., Deluth GA 30096
Proteus Engineering, 301 Pier One Rd., Stevensville, MD 21666

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Electronic Marine Systems, 800 Femdale Pl., Rahway, N.J. 07065

CONTROL SYSTEM—Steering

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Engine Monitor, Inc., 179 Hickory Avenue Harahan, LA 70123

Kockum Sonics, Inc., 819 Veterans Blvd., Suite 201, Kenner, LA 70068

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CYLINDER LOAD ANALYZER

General Thermodynamics, 210 South Meadow Rd., Plymouth, Ma. 02360

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Skookum, Inc., P.O. Box 280, Hubbard, OR 97032

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Pusnes, PO Box 102, N-4818, Faervik, NORWAY
Smith Berger Marine Inc., 516 South Chicago St., Seattle, WA 98108

Timberland Equipment, P.O. Box 490, Woodstock, Ontario N4S 7Z2 CANADA
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Reverse Osmosis of South Florida, 12301 SW. 133 Court, Miami, FL, 33186

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DIESEL ENGINE—Spare Parts A Repair
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Alaska Diesel, 4420 14th Ave., NW, Seattle, WA 98107
Brigantine Services Ltd, 48 Wang Lok St., Yuen Long
Hermont Marine Inc., 3528 Griffith, St. Laurent, Quebec Canada
Industrial Estate, New Territories, HONG KONG
Caterpillar, Inc., Engine Div., P.O. Box 610, Mossville, IL 61552-0610

Castoldi S.p.A., Viale Mazzini, 161, 20081, Abbiategrosso, ITALY
Cummins Engine Co., 4500 Leeds Ave., Ste. 301, Charleston, SC 29405-8521
Cummins Mid-South, Inc., 110 E. Airline Highway, Kenner, LA 70062

John Deere, John Deere Rd., Moline, IL 61265
DMI Norshipp Co., P.O. Box 2100, Norfolk, VA 23501-2100
GEC ALSTHOM Diesels Inc., 10801 Kempwood Drive, Suite 1, Houston TX 77043-1412

Klattenberg Marine, 17 Grandview Ave., W. Orange, NJ 07052
MAN B&W Diesel AG, Stadtbachstrasse 1, D-86153 Augsburg 1, GERMANY

Air Marine Systems, 2701 Sonic Dr., Virginia Beach, VA 23456
MAN B&W Diesel A/S, Tegholmsgade 41, DK-2450 Copenhagen SV, DENMARK
MAN B&W Diesel, 17 State St., New York, NY 10004
Motor-Service AB, Box 2115, S-144 04 Ronninge, SWEDEN

Motor Service-Hugo Stamp, 3190 S.W. 4th Ave., Ft. Lauderdale, FL 33315
Paxman Diesels, P.O. Box 8, Paxman Works, Colchester, Essex, CO1 2HW, ENGLAND

Ulstein Bergen AS, PO Box 924, N5002 Bergen, NORWAY
Wartsila Diesel, 201 Defense Highway, Annapolis, MD 21401
Goltens, 160 Van Brunt St., Brooklyn, NY 11231

DIESEL FUEL DECONTAMINATION
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H.J. Merrihue, P.O. Box 23123, New Orleans LA 70183
JW Fishers, 65 Anthony St., Berkley, MA 02779
South Texas Underwater Divers, 2921 16th Ave. North, Texas City, Texas 77590
Muldoon Marine Services, Inc., P.O. Box 3221, Terminal Island, CA 90731

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Mapeco Walz & Krenzer, Inc., 90 Forest Ave., Locust Valley, NY 11560

Marine Accomodations, 3830 Willaimsburg Park, Suite 7 Jacksonville FL 32257
Railway Specialties Corp., 2979 State Rd., P.O. Box 29, Bristol, PA 19007

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Crandall Dry Dock Engineers Inc., P.O. Box 505804, Chelsea, MA 02150
Heger Dry Dock Engineers, Inc., P.O.B. 6605, Holliston, MA 01746
Poly Hi Solidur, 2710 American Way, Fort Wayne, IN 46899

DUCTORS
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L. F. Gaubert & Co., Inc., P. O. Box 50500, New Orleans LA 70150

MMC International, 60 Inip Dr, Inwood NY 11096
Air Marine Systems, 2701 Sonic Dr., Virginia Beach, VA 23456
Semco Marine Inc., 3721 SW 47th Ave., Ste 309, Ft. Lauderdale, FL 33314

ELECTRICAL MOTOR DRIVES
Tech Power Controls

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Schuyler Rubber Co., 16901 Woodred Rd., Woodinville, WA 98072

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Kraissl Co., 299 Williams Avenue, Hackensack, NJ 07061

FILTER SYSTEMS

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Raikko Ltd.: U.S.A. Reps: Simplex-Turmar Inc., P.O.B. 675, Tonawanda, NY 14151-0675

FIRE FIGHTING EQUIPMENT

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FIRE PROTECTION

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FIRE RESISTANT PANELS

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FIRE SAFETY PRODUCTS

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FIRE SUPPRESSION EQUIPMENT

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American Pacific Corp., 3770 Howard Hughes Pkwy, Las Vegas, NV 89100

FLAME RETARDANT TEMPORARY COVERING

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FLUID FILLED GAUGES

King Engineering, P.O. Box 1228, Ann Arbor, MI 48106-1228

FLUID HANDLING EQUIPMENT

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

FUEL DECONTAMINATION

Fuel Dynamics, 707 Mullet Dr. #110, Cape Canaveral, FL 32920
Environmental Solutions Int'l., 11002 Raccoon Ridge, Reston, VA 20191-4911

GALLEY EQUIPMENT

Cospolich Refrigerator Co., 949 Industry Rd., Kenner LA 70062
Jamestown Metal Marine Sales, Inc., 4710 Northwest Second Ave, Boca Raton, FL 33431
Lang Manufacturing, P.O. B. 905, Redmond, WA 98073
Marine Accommodations, 3830 Williamsburg Rd., Jacksonville, FL 32256

GANGWAYS, LADDERS

SlipNot Safety Flooring, 2545 Beaufait St., Detroit, MI 48207
Wooster Products Inc., 1000 Spruce St., P.O. Box 896, Wooster, OH 44691

GEAR REPAIR

Haley Marine Gears International, Inc., 2600 N. Concord Belle Chasse, LA 70037
Nico Marine Specialties, 39 Louisiana St., West Wago, LA 70094
Cincinnati Gear Company, 5657 Wooster Pike, Cincinnati, OH 45227

GENERATOR

Alaska Diesel, 4420 14th Ave., NW, Seattle, WA 98107
Baylor Co., 500 Industrial Blvd., Sugarland, TX 77478

QMDSS

International Communications, 813 Diligence Dr. Ste 120, Newport News, VA 23606
Sea, Inc., 7030 220th S.W. Mt. Lake Terrace, WA 98043

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Beaird Industries Inc., P.O. Box 31115, Shreveport, LA 71130
Crane Heatex, 17 Grandview Ave., West Orange, NJ 07052

HOISTS

Holly Hoist Corp., P.O. Box 86, St. Clair Shores, MI 48080-0086

HORNS/WHISTLES

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

HOSE & FITTINGS

Hydrasearch Co., Chesapeake Bay Business Park, 100 Log Canoe Circle, Stevensville MD 21666

HYDRAULICS

Cunningham Marine Hydraulics Co., 201 Harrison St., Hoboken, NJ 07030
Engine Monitor, Inc., 179 Hickory Ave. Harahan, LA 70123
Hamilton Jet, P.O. Box 709, Christchurch, NEW ZEALAND
Offshore Inland, Inc. 3521 Brookdale Drive, Mobile, AL 36618
Ultra Hydraulics Limited, Cheltenham Road East, Gloucester, GL2 9QN, ENGLAND
Demaree Inflatables Boats, 410 Oak St., Friendsville, MD 21531
Ocean Technical Services Inc., 1140 Peters Rd., Harvey, LA 70058-1705

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Sea, Inc., 7030 220th S.W. Mt. Lake Terrace, WA 98043

INSULATION

Blohm & Voss Light Insulation, Bartels & Laders GmbH, Nordereibstrasse 1S, 20457 Hamburg GERMANY
Panel Specialists, Inc./Thermax, 3115 Range Rd., Temple, TX 76501
Insulations, Inc., 1101 Edwards Ave., Harahan, LA 70123
Superior Energies Inc., P.O. Drawer 386, Grovas, TX 77619

INTEGRATED MONITORING SYSTEMS

Datatar, Unit 100, 18 Gostick Place, N. Vancouver, BC Canada

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Hopeman Brothers, P.O. Box 820, 435 Essex Ave., Waynesboro, VA 22980
Insulations, Inc., Rt. 5, 12360 Leisure Rd, Baton Rouge, LA 70807

Jamestown Metal Marine Sales, Inc., 4710 NW Second Ave, Boca Raton, FL 33431

Marine Accommodations, 3830 Williamsburg Rd., Jacksonville, FL 32256

Maritime Services Corp., 3457 Guignard Drive, Hood River, OR 97031

Directions In Design, 1848 Craig Rd., St. Louis, MO 63146

James P. Colie & Associates, 2116 Sherman St., Hollywood, FL 33020

Branton Ind., 1101 Edwards Ave., Jefferson, LA 70181

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Hopeman Brothers, Inc., P.O. Box 820, Waynesboro, VA 22980

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Walz & Krenzer, Inc., 90 Forest Ave. Locust Valley N.Y. 11560

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R.W. Femstrum & Co., 1716 Eleventh Ave., Menominee, MI 49858

Kahlenberg Bros. Co., P.O. Box 358, Two Rivers, WI 54241

The Walter Machine Co., Inc., 84-98 Cambridge Avenue, Jersey City, NJ 07307

LASER ALIGNMENT
Boland Industrial & Consulting Services, P.O.B. 91360, Mobile, AL 36691

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Avon Marine, 11215 Young River Ave., Fountain Valley, CA 92708

DBC Marine Safety Systems, 12351 Bridgeport Rd., Richmond, B.C. CANADA V6V1J4

Norsafe AS, P.O. Box 115, N-4818 Faervik, Norway

Viking Life Saving Equipment, 1625 N. Miami Ave., Miami, FL 33136

Willard Marine Co., Inc., 1250 N. Grove St., Anaheim, CA 92806

Zodiac of North America, P.O. Box 400, Stevensville, MD 21666

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Gothen Marine, 160 Van Brunt St., Brooklyn, NY 11231

Kockum Sonics, Inc., 819 Veterans Blvd., Suite 201, Kenner, LA 70068

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

Francis Searchlights/Stam Supply Co., 4415 6th N.W., Seattle, WA 98107

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Cincinnati Gear Company, 5657 Wooster Pike, Cincinnati, OH 45227

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Marine Power Associates, 1010 Turquois St., Ste 217, San Diego, CA 92109

Maritech, Seacraft, Bay Road, Newmarket, NH 03857

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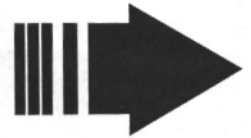
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Lohmann & Stollerfoht, P.O. Box 1860, D-58408 Witten, Germany
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Mapeco Products Inc., 90 Forest Ave., Locust Valley, N.Y. 11560
Markisches Werk, P.O. Box 1442, D-5884 Halver GERMANY
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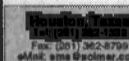


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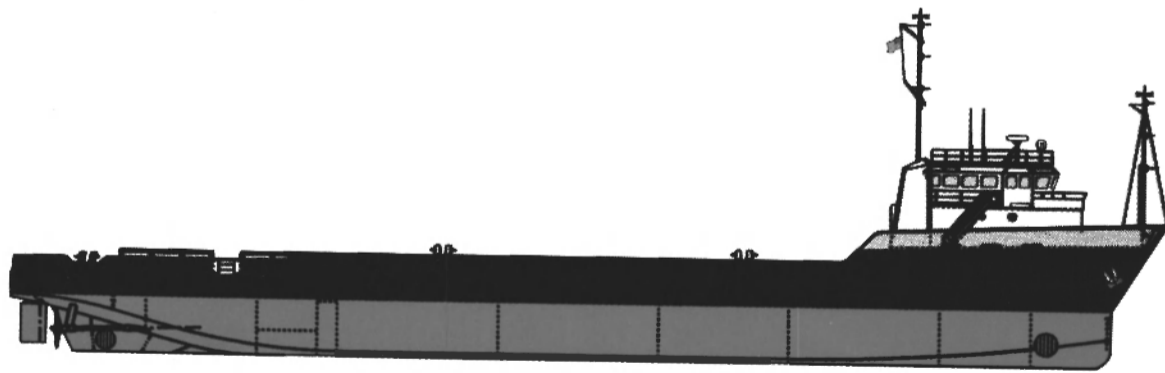
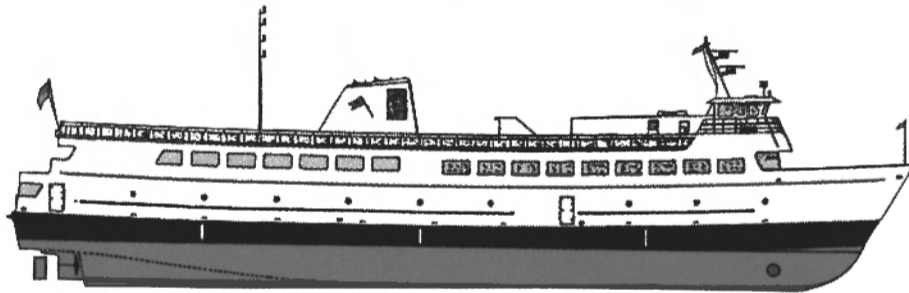
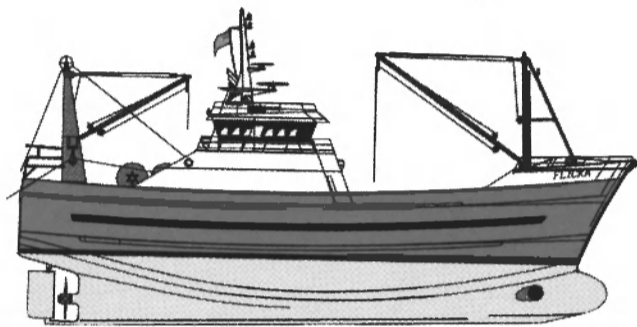
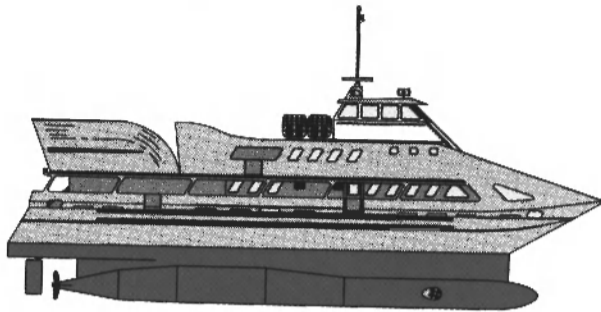
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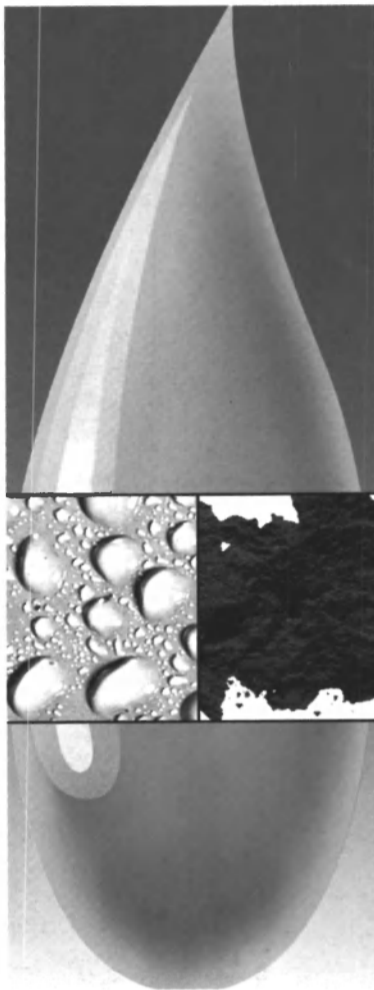
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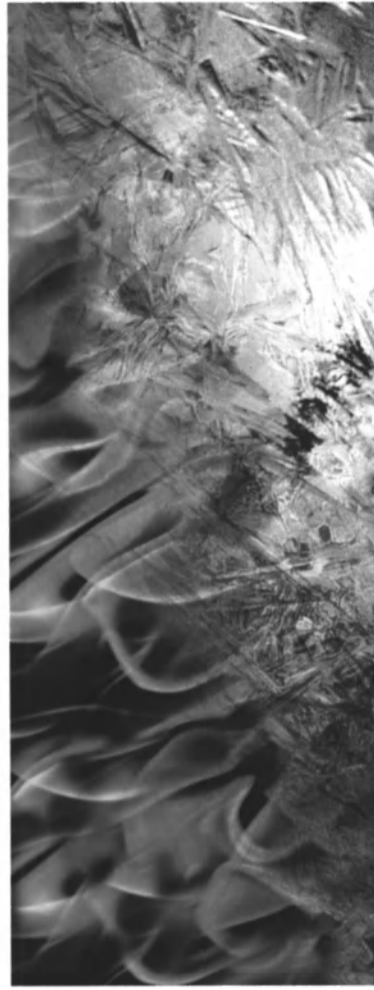
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