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No. 4

Vol. 62

On the Cover: Sea Horse I constructed by Bollinger Shipyards of Lockport, La. for Seahorse Marine is designed to support offshore shelf production and drilling activity. Bollinger recently signed an additional contract to build the sixth 145 ft. (44.1 m) utility/supply vessel for Seahorse. Offshore coverage begins on page 32.

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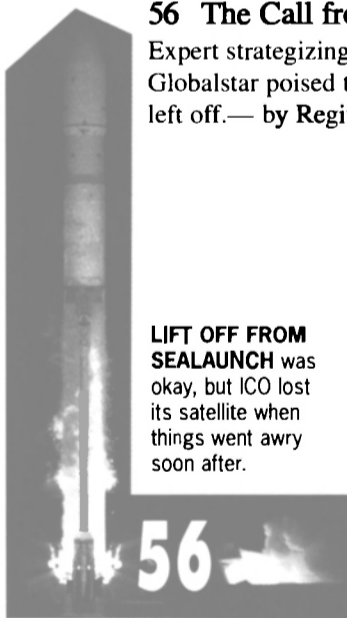
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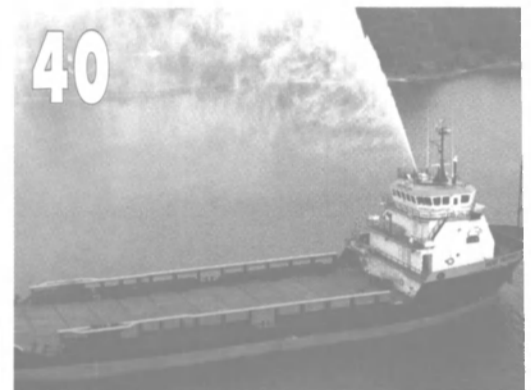
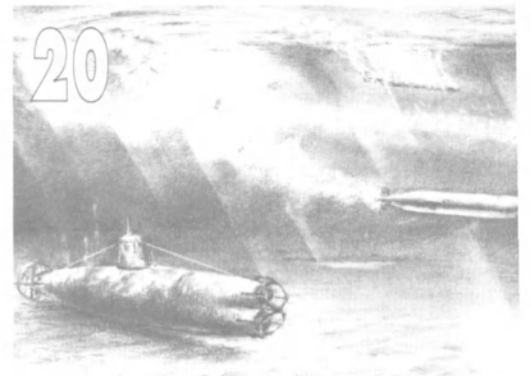
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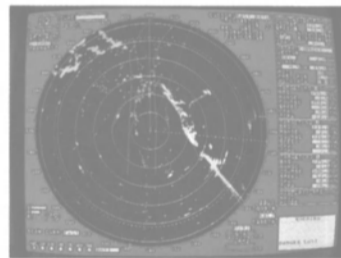
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Editor's Note

Despite seemingly best efforts by world leaders, it appears that the wild gyrations which are the hallmark of the oil industry, will never truly be tamed. For proof, simply check out the Offshore Market report on page 32, which touts the "lingering \$30+" barrel of oil. Between the writing of that piece and this one (about a week), OPEC leaders had met, decided to boost production seven percent and sent oil prices screaming down below the \$25 level. While an immediate \$5 per barrel price would normally spread doom throughout the GOM region and all of the various maritime industries which support it — it seems that confidence regarding a second-half 2000 bounceback is still intact. OPEC's recent actions were driven more by politics than anything else, as U.S. leaders implored them to boost production to ease consumer pricing and alleviate summer shortage fears. Suppliers, largely, have yet to see the traditional inquiries that would definitively mark the comeback, but enough positive signs abound — such as increased hiring at offshore service companies, steadily rising rig counts and hot stock valuations for many of the leading companies — to indicate the next boom is coming.

While many of the yards in the GOM area are eagerly awaiting the return of the offshore and related business, Litton-Ingalls Shipbuilding in Pascagoula is quietly becoming the cruise capitol in the U.S. The company, which already has the United States Line fleet on its orderbook, announced a MOA signed with SeaAmerica Cruise Lines of Hollywood, Fla. to build a pair of 42,000-dwt, 1,000-passenger cruise ships, pending MarAd Title XI funding. Legal Beat columnists from Dyer Ellis & Joseph give MR/EN readers a Title XI update, including activity in the soaring ferry market, starting on page 14.

Gregory R. Franthum



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Jotun: Greening the trade in crude

Bringing her first cargo to Europe following completion by Samsung Heavy Industries, the 306,000-dwt British Pioneer has given new expression to environmental-consciousness in the crude oil transportation sector. While the security of her 2.1-million barrel cargo containment has been enhanced by the compulsory double hulling, the non-mandatory continuation of the double shell aft better safeguards the bunker spaces, reducing the risk of fuel oil spillage in the event of the aftship being breached. In addition, her potential impact on marine life has been lessened through the adoption of a newly unveiled, tin-

free antifouling.

Although it currently comes at a very substantial price-per-liter premium, Jotun's SeaQuantum product is claimed to stand shoulder-to-shoulder performance-wise with the tin-bearing self-polishing paints, which have enabled shipowners to operate at drydocking intervals of up to 60 months. While Jotun developed the formulation for the coating, Japanese chemicals group Nippon Oil and Fats (NOF) came up with a silyl polymer to replace the environmentally hazardous tin compounds used in the ubiquitous self-polishing antifouling coatings. Multiple full-ship pilot appli-

cations over the past seven years provide Jotun with the basis for its claims for the long-run potency and also enhanced fuel-saving effect of the system.

British Pioneer, first of a quartet for BP Amoco Shipping, is one of a host of newbuilds to be treated with the copper-based underwater coating. The anticipated ban on the application of all antifouling coatings containing TBT (Tributyltin) by January 1, 2003 will focus more minds on the 'greener' alternatives.

Teaming-up for the long term

Prime contractorship, or single sourcing, demonstrated to advantage over the

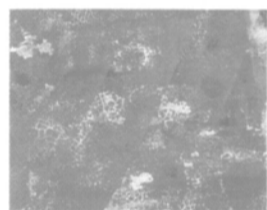
years in the defense and offshore sectors, is regarded in many circles as expedient to the needs of increasingly complex, time-pressured commercial shipbuilding projects. It also allies with the trend among shipyards towards greater reliance on outsourcing.

But aside from the practical advantages of a turnkey approach in fulfilling a newbuild program within the requisite time, budgetary and quality constraints, 'one-stop shopping' can also mean less long-term risk for the shipowner.

Engine supplier Wartsila NSD and propulsor specialist John Crane-Lips are about to formalize a new pact for the delivery of complete marine power and propulsion packages. At the signing of the letter of intent in February, the Finnish group's president, **Ole Johanson**, underlined the fact that this would mean "no accountability gaps" from the customer's perspective.

With any erring in schedule-keeping and unplanned downtime being anathema to operators today, having recourse

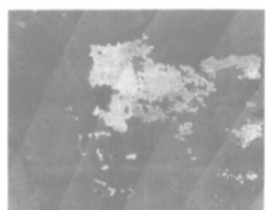
Product comparisons after drying



Company A product



Company B product



Company C product



Jotun SeaQuantum

Jotun's new SeaQuantum product offers shipowners many advantages of TBT paints without the TBT

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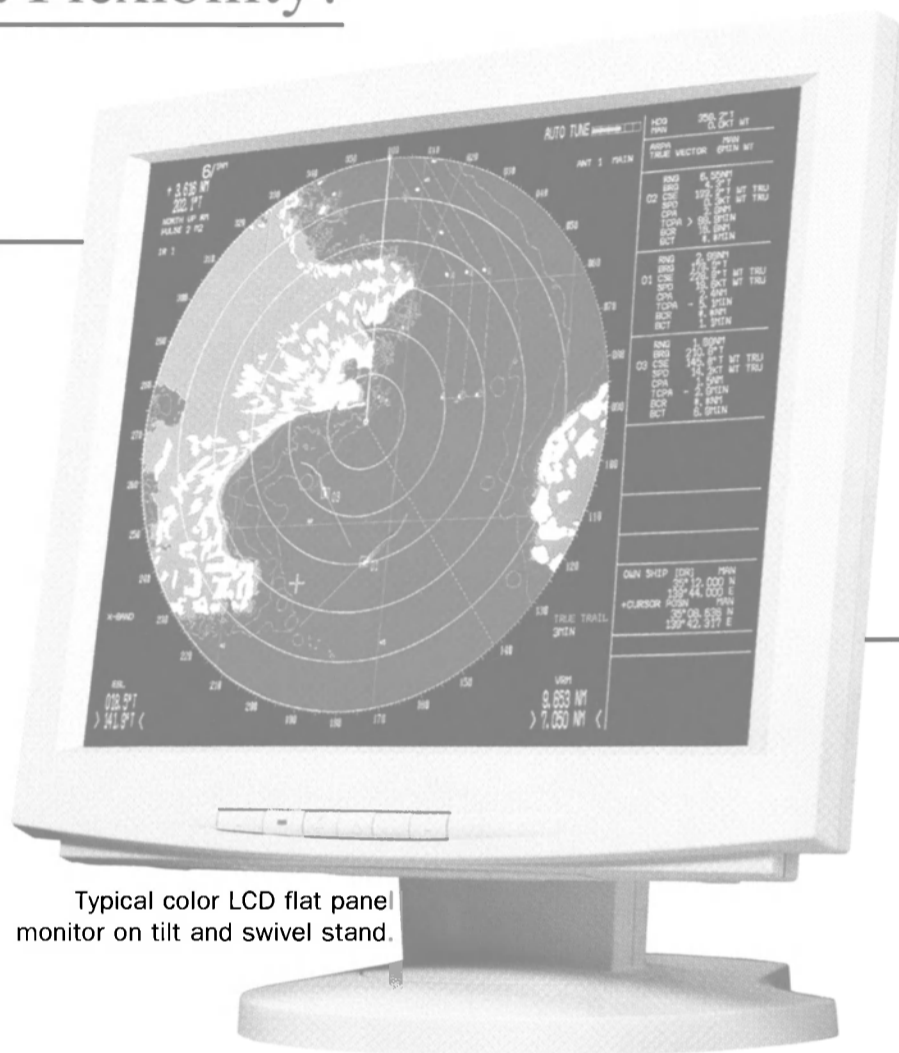
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Alliances of such a nature accordingly promise long-run benefits in addition to conferring efficiencies in the design and execution of a project, through the delivery of functionally integrated, complete

systems. Indeed, Wartsila NSD and John Crane-Lips are looking beyond the generative effect of the agreement on product sales to the extra opportunities that it offers in tendering long-term or life-cycle support. Significantly, service has come to account for 31 percent of the Finnish engine group's turnover, and its U.K.-owned collaboration partner

attributes similar importance to its after-sales activities.

The link-up brings a complete array of two-stroke and four-stroke diesel machinery, transmissions, shaftlines, propellers, seals and bearings, thrusters, waterjets, pods and controls under the aegis of the Wartsila-Lips banner, albeit with Wartsila NSD acting as integrator

and main contractor.

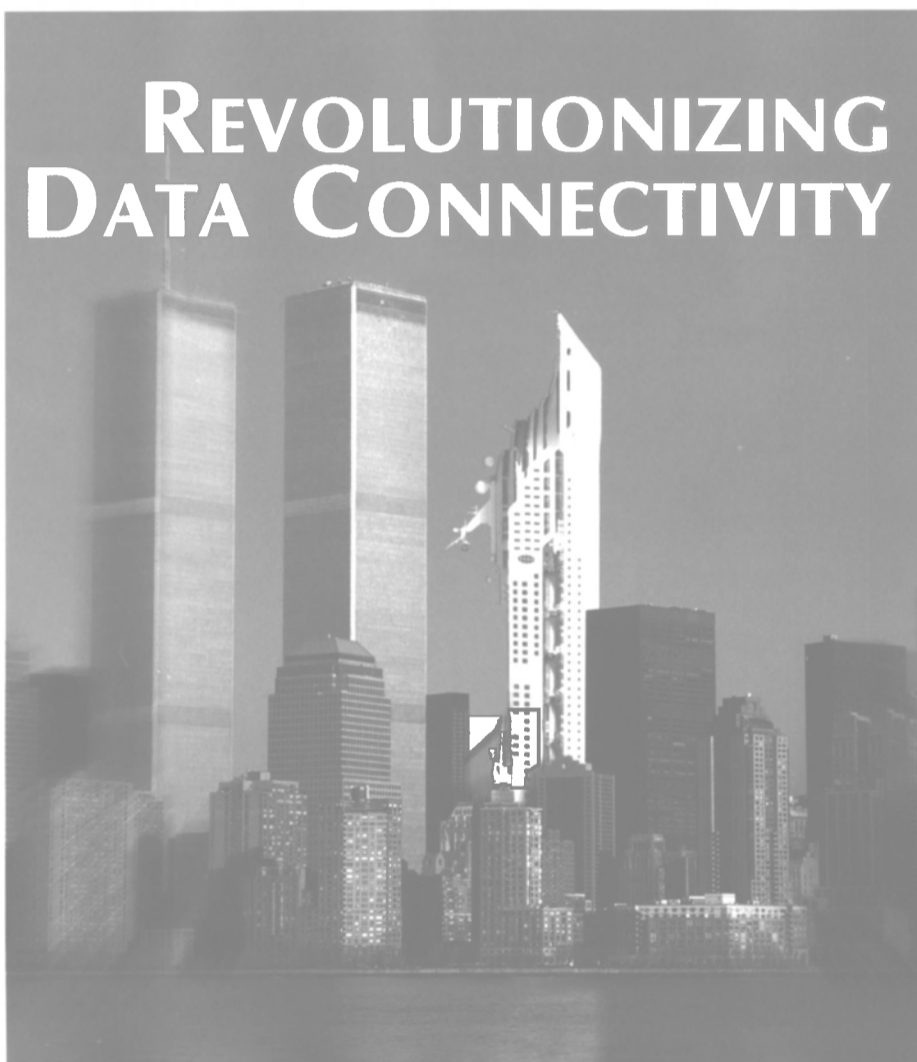
The move is all the more notable for the single-minded, self-reliant attributes long displayed by Wartsila NSD and its Finnish antecedents. However, if it seems to go against the grain in that respect, the collaboration is distinguished by the remarkable degree of product complementarity, which it confers. It is equally significant in denoting a meeting of minds in two European advocates of vigorous investment in technology and champions of in-house manufacturing control. The Finnish group recently gave further expression to its belief in the partnership-type approach by entering into a working agreement with Carnival Corporation for the development of a 'smokeless' diesel engine. Using potent medium-speed machinery from the existing range as the design basis, Wartsila NSD will apply common rail fuel injection technology and its direct water injection method to a project for a diesel-electric propulsion plant with exceptional environmental credentials and an increased level of efficiency.

Careful packaging and delivery

Although it is now looking to a period of consolidation, the robust acquisitive policy pursued over the past few years by the independent research organization British Maritime Technology (BMT) has widened its market reach and strengthened its hand in providing 'packages' of services. Chairman **David Goodrich** confirmed that "BMT's continued long-term strategy is to become a 'one-stop' consultancy, differentiated by the outstanding quality of its products and services and integrity of its advice." The restructuring of the group last fall, putting all subsidiaries and joint ventures under the supervision of two management companies in Greater London and Virginia showed understanding of the importance of being able to efficiently and quickly deliver and respond to customers.

Assembling the components of a comprehensive service capability is not in itself a guarantee of turnkey business, as BMT clearly recognizes. As in all such situations, the various companies and personnel need to be able to interact freely, in identifying and pursuing business opportunities, looking to the common good of the organization.

The institution of the Employee Benefit Trust system in 1998 was a prudent, motivating measure. Nonetheless, pragmatic management has laid down building blocks on which to create a single-sourcing platform. One example of this is a secure system of internal communication, using the electronic medium, through which market intelligence can



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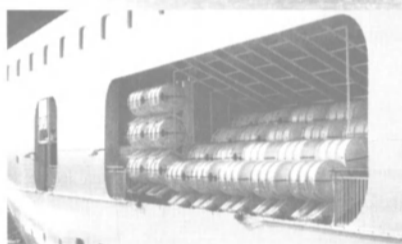
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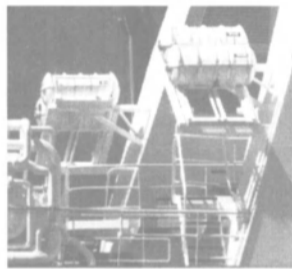
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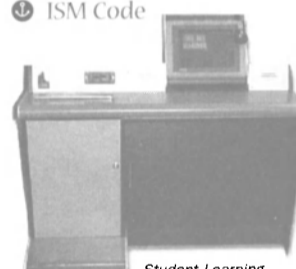
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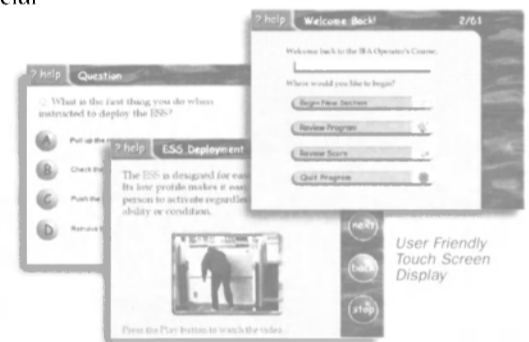
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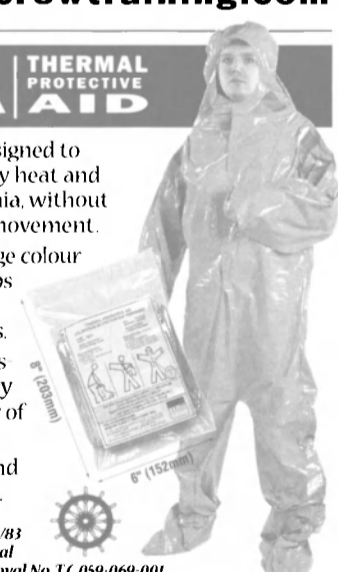
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be shared and personnel strengths and resources can be rapidly identified for matching to project enquiries and upcoming needs.

John Gallagher, who has resumed his previous position as president of the Arlington-based BMT subsidiary Designers & Planners after three years as BMT Group chief executive in the U.K., is long experienced in collabora-

tive methods of working and is a leading advocate of using combined capabilities to optimum effect. In an overview of group activities, Gallagher said "a particularly encouraging trend is the pooling of resources by our companies to provide a tailored response to given business opportunities."

For instance, the specialist skills of five group firms have been drawn

together in assisting the U.K.'s Maritime & Coastguard Agency determine a long-term management strategy for the 1944 wreck of the munitions ship Richard Montgomery in the Thames Estuary. As a further demonstration of joint endeavors, several BMT companies in the U.K., U.S. and Sweden are involved in a multiple cables design project, pooling areas of specialist

knowledge, and providing the customer with a single point of contact by way of a lead company.

Know-how manifested in products and services is the result of experience and a considerable plough-back of earnings into research and development (R&D). Last year, it invested the equivalent of more than 10 percent of U.K. turnover in R&D, compared with an average figure of less than three percent for British companies.

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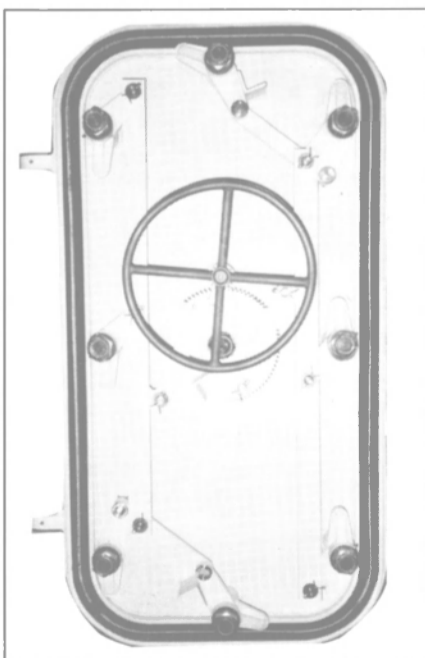
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Ingalls Selects Joiner Team For AMCV Ships

Ingalls Shipbuilding, a division of Litton Ship Systems, has selected Hopeman Brothers Marine Interiors and Jamestown Metal as the joiner subcontractors for American Classic Voyages' (AMCV's) United States Lines new-builds. The shared subcontract is valued at more than \$200 million.

The two companies, who in the past have been head-to-head competitors have teamed up to construct all cabins, as well as all public spaces onboard each of the 72,000-grt, 1,900-passenger vessels, which are currently being constructed at Litton's Pascagoula, Miss. yard. The cruise vessels, which are the first to be built on U.S. soil in more than 40 years, will offer excursions to the U.S. Hawaiian Islands beginning in 2003.

MDC To Repair USACE Dustpan Dredge

The Marine Design Center (MDC) of the U.S. Army Corps of Engineers (USACE) is set to provide the dredging modification and repairs to Hurley — a USACE dustpan dredge.

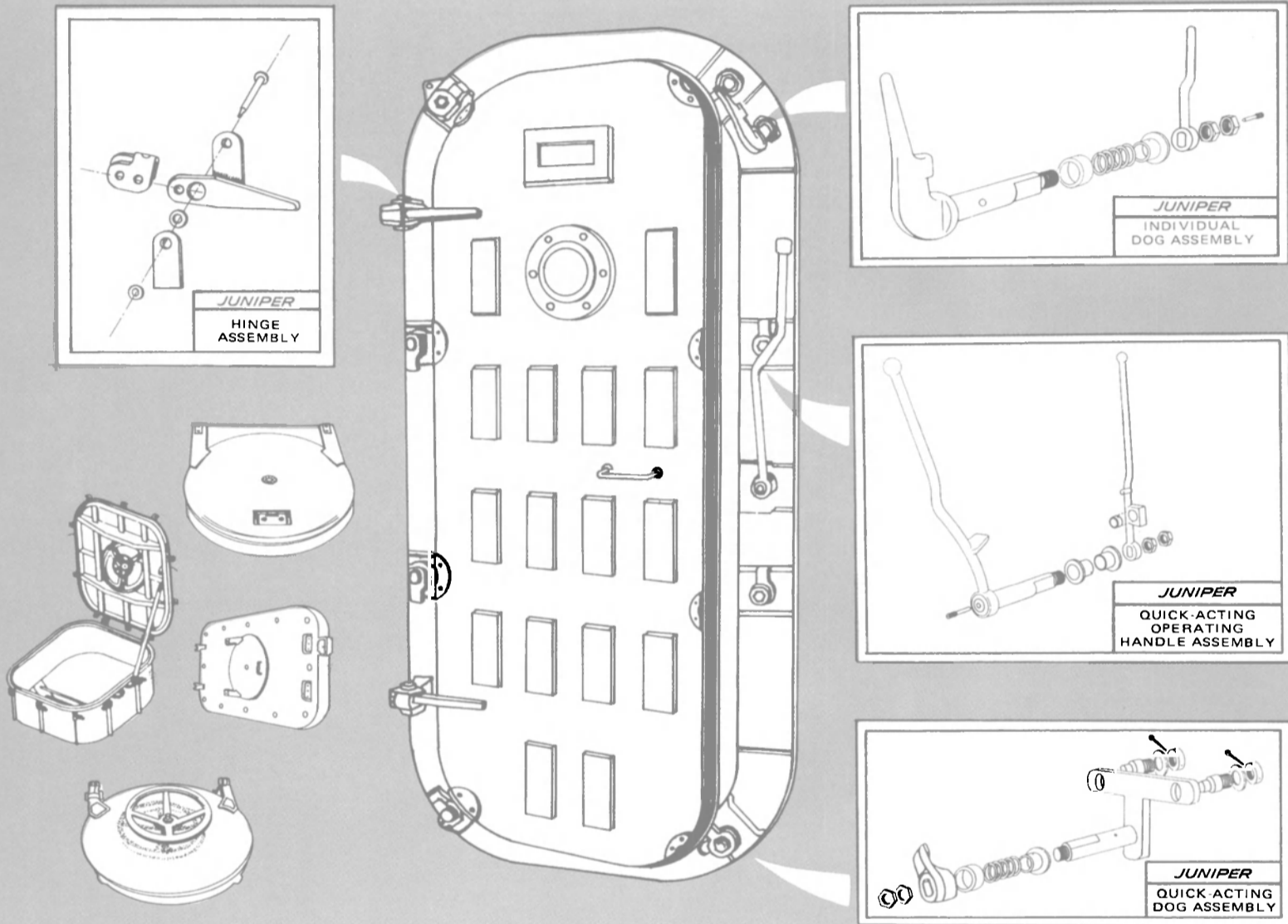
Measuring 300 ft. (91.4 m), with a beam of 58 ft. (17.6 m) and a depth of 12 ft. (3.6 m), the vessel's light displacement is 2,100 tons. Comprised of steel and welded construction, the dredge was built in 1992, and is operated by the Memphis District USACE.

Hurley's dredging ladder will be extended with intentions of replacing the existing ladder, while the vessel's hull (horn area) will be lengthened to accommodate the new ladder. In order to achieve this upgrade, drydocking will be necessary to facilitate removal and replacement of the dredging ladder.

A solicitation will be issued as an Invitation For Bids with the IFB requiring design development based upon a preliminary design prepared by the USACE Marine Design Center. Available in March 2000, the IFB may include contract options for related repairs. Award is expected in May 2000, and shipyard engineering and material procurement is to commence prior to the vessel's arrival.

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Financing Sources for U.S. Government Programs

Recent growth in ferry construction, particularly in the U.S., has been significant. The U.S. Department of Transportation recently reported that the U.S. marine transportation system annually transports 134 million passengers by ferry. Although the U.S. fleet represents a small percentage of the worldwide fleet, the U.S. fleet has recently experienced one of the largest and most rapid growth rates. This growth represents an increase both in sheer numbers as well as in the size of new vessels. The DOT recently reported that the U.S. currently has more fast-ferry shipbuilding under way than any other country, with an estimated 14 fast ferries under construction.

With this increased demand and growth in newbuildings and transaction size, U.S. ferry owners and operators need to continually assess the financing opportunities available. Because most ferry owners and operators are not large companies, public debt and equity mar-

kets are generally unavailable. Although many borrowers routinely look to banks, finance companies and leasing companies for their financing needs, there are, however, other financing sources available through the U.S. government that should be examined: Title XI loan guarantees and grants under the Transportation Equity Act for the 21st Century.

Title XI Financing Guarantees

Title XI financing guarantees have obvious benefits: relatively low interest rates, maturity up to 25 years, and high loan-to-value ratios. The Title XI Federal Ship Financing Program, codified under Title XI of the Merchant Marine Act, 1936, as amended, is administered by the Maritime Administration of the U.S. Department of Transportation ("MarAd"). The Title XI program is a loan guarantee program providing a U.S. government guarantee of private-sector financing, typically in the form of



guaranteed bonds issued by the borrower/shipowner. With the guarantee, the bonds are priced by the bond market based on a relatively small spread over the yield of a U.S. Treasury security with comparable maturity. For example, recent transactions have priced between 60 and 75 basis points over a U.S. Treasury Bond with a comparable maturity.

Maturity on guaranteed debt can be up to 25 years, a term typically not found in bank financing, and is otherwise limited only by the useful life of the vessel. Amortization can be either level debt

(i.e., fully amortized) or level principal. Additionally, the financing can be up to 87.5 percent of the "actual cost" of the vessel, including construction costs, design costs, supervision and inspection costs, outfitting and equipping costs, and most other items. Investment banking, legal and accounting costs are excluded, but construction period interest and the guarantee fee charged by MarAd are financeable. MarAd will not, however, finance foreign components of the vessel unless a waiver is obtained based on the superiority of the

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The costs of the guarantee consist of (i) a small \$5,000 application fee, (ii) an investigation fee is equal to 5 percent of guarantee amount up to \$10,000,000, plus 1.25 percent of guarantee amount in excess of \$10,000,000, and (iii) a guarantee fee. The guarantee fee, paid upon issuance of the debt, is financeable and is based on the present value of an annual fee equal to 2.5 percent through 5 percent of guarantee amount during construction and 5 percent through one percent after delivery. Lower fees are charged to borrowers with lower debt-to-equity ratios. Of course, there are other costs, such as investment banking, legal and accounting that vary based on each transaction. Investment banking fees are generally 0.375 percent to 0.5 percent of the principal amount of bonds sold and legal fees typically range from \$50,000 to well over \$100,000 for complex transactions.

To be eligible for Title XI financing, a vessel must be constructed, reconstructed or reconditioned in U.S. shipyards, but can be used in either the domestic or foreign trade. Each proposed project undergoes a thorough due diligence review by MarAd, including an economic feasibility study, financial tests, a review of operating experience, and collateral review. MarAd will also need to be comfortable with the ability of the shipyard and its financial strength.

The process for obtaining Title XI financing can take from six weeks to several years depending on various factors, including complexity of the transaction. A typical transaction takes six to nine months. Pre-application meetings and regular contact with MarAd are essential to timely completion of the transaction. After submission of the initial application, MarAd will request additional information and, once all information is obtained, will either reject or accept the transaction within 60 days. If the transaction is accepted, a commitment letter will be issued and documentation will be completed.

TEA-21 Grants

The Transportation Equity Act for the 21st Century ("TEA-21") created two primary financing sources for ferries: The Ferry Boat Discretionary Program ("FBDP"), which is a discretionary grant program established solely for ferry boats and terminals, and the Congestion Mitigation and Air Quality Improvement Program ("CMAQ"), which is not limited to ferries and, in fact, only recently has been used to finance ferry projects. Changes in TEA-

21 opened up both the FBDP and CMAQ to private owners and operators, recognizing the important role that the private sector plays in meeting transportation infrastructure needs.

Ferry Boat Discretionary Program

Originally established by the Intermodal Surface Transportation Equity

Act "ISTEA" in 1991, and administered by the DOT's Federal Highway Administration (FHWA), the FBDP encourages public and private operators to address marine transportation infrastructure needs. FBDP funds are available for construction or improvement of ferry boats and ferry terminal facilities. FBDP funding has been set at \$38 mil-

lion per year for each of fiscal years 1999-2003. Of those totals, \$20 million per year was earmarked for Alaska (\$10 million), New Jersey (\$5 million) and Washington (\$5 million). The remaining \$18 million per year is available for open competition, subject to certain overall budgetary constraints. The maximum amount of a project that can be



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funded by the FBDP is 80 percent, with the remaining 20 percent funded from other sources, which can be a combination of state, local or private sources.

To be eligible for FBDP funding, the ferry and/or terminal to be constructed or improved must be (a) publicly owned, or (b) publicly operated, or (c) majority owned by a public authority if the oper-

ation provides substantial public benefits. In addition, the ferry must have a route linked to a public road (other than an Interstate highway) or provide passenger-only service. Ferries that operate in international waters, except for Hawaii, Puerto Rico, Alaska, and ferries between the United States and Canada, are ineligible.

Companies interested in receiving FBDP funding must submit an application to their state department of transportation, which then forwards selected applications to the FHWA. The FHWA then selects projects based on the following criteria:

- (1) expeditious completion;
- (2) leverage of private or other public

funding;

- (3) amount of funding requested (smaller requests are given priority);
- (4) state priorities; and
- (5) national geographic distribution of funding.

Congestion Mitigation Air Quality Improvement Program

The CMAQ program, also initially established under ISTEA, funds transportation projects that will reduce traffic congestion and improve air quality. Administered by the FHWA and the Federal Transit Administration ("FTA"), the CMAQ program provides funding for capital improvements, as well as operating assistance. The federal share for most projects funded under CMAQ is 80-90 percent. Total CMAQ program funding of has been authorized at approximately \$1.4 billion for each of fiscal years 1999-2003.

CMAQ funds are apportioned to states based on a statutory formula, incorporating the air quality and population of the state. The method of allocation of CMAQ funds to projects varies within each state with either the state department of transportation, the relevant metropolitan planning organization, or both generally having responsibility for CMAQ funds. CMAQ money is available only in areas that have not been in compliance with air quality standards under the federal Clean Air Act for certain air pollutants. Generally, medium to large metropolitan areas are eligible. Projects must result in tangible emissions reductions. Projects also must be included in a state's conforming transportation plan and in its transportation improvement program, which are required by TEA-21.

Conclusion

There are a number of financing sources for ferries in today's market. Which option, or combination of options, is best depends on the situation of the operator, whether a start-up or existing business. An operator should explore all alternatives and select one to maximize benefits. Generally, only larger borrowers will find it easy to access bank lending, while finance companies provide more flexibility. Title XI is always a good option if you have the required equity and can pass the government's due diligence standards. Where operators can team up with a public sponsor and where a project meets a demonstrated transportation need, federal grants under TEA-21 provide an attractive option.

by Todd D. Snyder & Lara Bernstein Mathews, Dyer Ellis & Joseph

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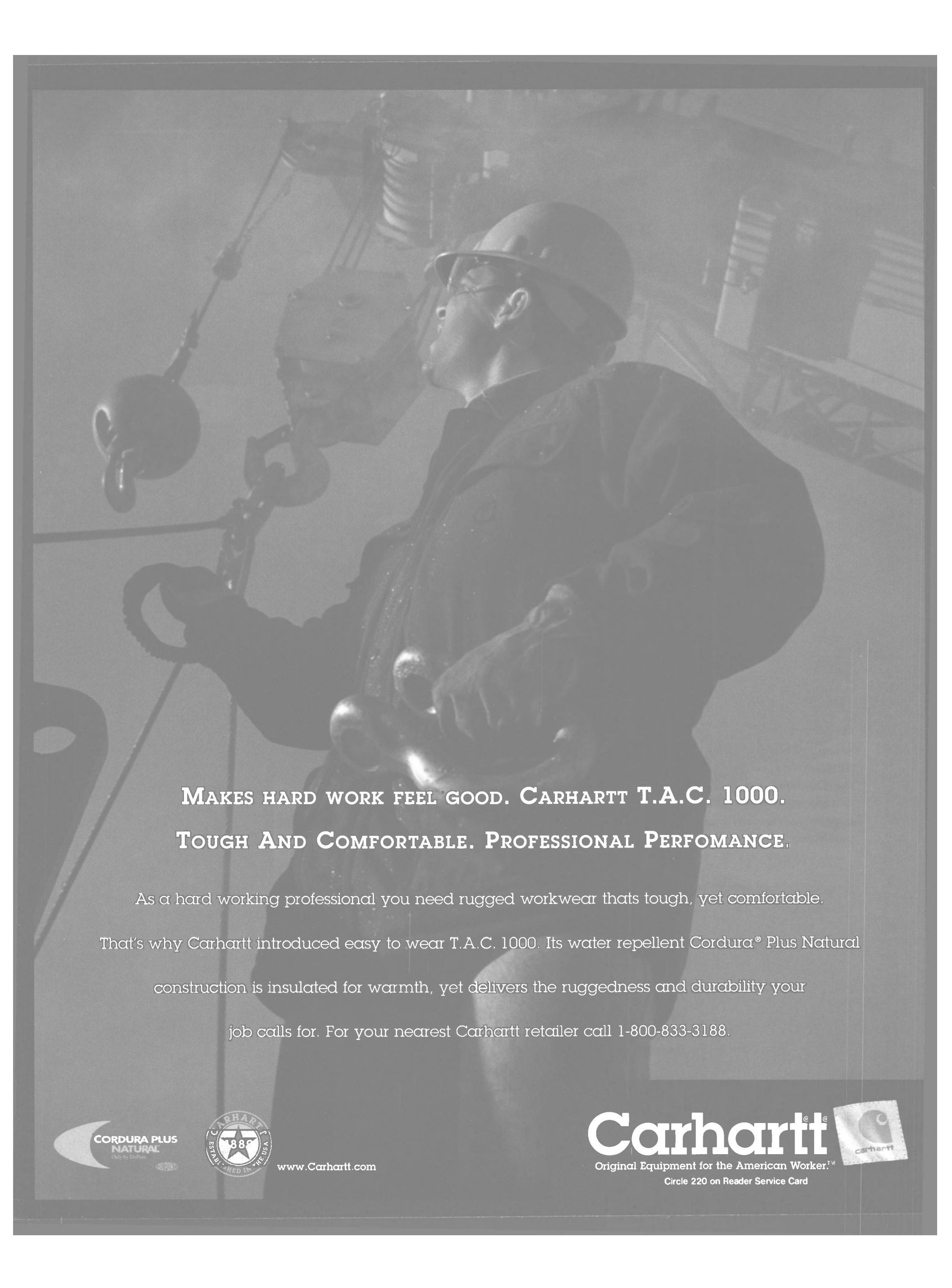
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Ship Repair & Conversion

Deltamarin And Almaco Join Together

Deltamarin and Almaco are branching out to serve the cruise industry with the opening of offices in Fort Lauderdale, Fla.

For the purpose of upgrading their services in the expanding conversion mar-

ket in Miami, Deltamarin and Almaco have penned a cooperation agreement. Both companies will provide a total solution to refurbishing and conversion projects of cabins and public spaces. Despite its new presence within the industry, Almaco has made its mark with significant jobs for Carnival, Royal Caribbean and Star Cruises. By joining

together with Delatmarin, both companies can provide a full package including space inspections, 3-D computer modeling, planning, design and installation supervision/installation.

Delatmarin will also focus on the safety and after sales market for cruise vessels.

Markus Aarnio has been nominated as

president of Delatmarin. Aarnio, who is a naval architect, began his career as a project engineer with the company. Prior to joining Deltamarin, Aarnio was a manager of project department and the virtual reality group at Deltamarin Helsinki.

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ASRY Reports Prosperous 1999



Red Band's tanker Knock Dun was the 2,000th vessel to be repaired at ASRY.

ASRY's services were high in demand last year, as the yard reported a satisfactory performance for 1999, following the record volume of repairs seen in 1998.

A total of 114 vessels underwent repair work at ASRY — ranging from ULCCs to offshore support vessels — 93 vessels were docked and 21 carried out afloat repairs. These figures come in slightly below 1998's total of 119 including 101 dockings — although the amount of vessels docking at ASRY for afloat repairs rose by 17 percent in 1999. With a 500,000-dwt capacity graving dock and two floating docks, occupancy averaged 89 percent — marginally under the 92 percent average noted in 1998.

Securing a formidable portion of the international and local ship repair market this past year, 40 percent of the yard's customers were Arab owners, while a strong demand was seen in Greece, Norway, India, Sweden and the U.K. Giving the yard the most of its business last year was KOTC who brought five tankers into ASRY for work. NCC/Odtjell called upon the yard to repair four of its tankers, while Bakri Navigation. The Shipping Corporation of India and UCO Marine utilized ASRY for similar work on their respective fleets.

Two significant repairs performed by the yard this past year were the 20-year life extension upgrade and repairs to 53,624-dwt LNG Norman Lady, and the first Special Survey and routine docking of 138,557-dwt tanker Knock Dun, which was noted as the 2,000th vessel to undergo work since the yard opened its doors in 1977. Norman Lady received major repairs to its five spherical cargo tanks, which was a premiere undertak-

Ship Repair & Conversion

ing on LNG tonnage by the yard. Following this successful venture, Norman Lady's owner is currently considering similar repairs to its sister vessel.

Further expanding its newbuild capabilities, ASRY signed a Memorandum of Understanding with Colombo Dockyard for the exchange of expertise and capabilities regarding small vessel design, specifications and newbuildings. Through this agreement the yard will enhance its potential within small vessel newbuilds to accommodate future orders for harbor tugs and other service craft.

Circle 55 on Reader Service Card

Malta Drydocks Lands Crown Odyssey Refit

Malta Drydocks has won a contract to refit the 34,250-ton Orient Lines luxury cruise liner Crown Odyssey. The ship is to be docked between April 25 and May 4 for what has been described as a "substantial" refit, including pipe works and machinery and an overhaul of propellers, shafts and stabilizers.

The Crown Odyssey will be the first cruise liner at Malta Drydocks this year and the first time Orient Lines is sending a vessel to Malta Drydocks, dockyard officials said. The contract was won despite stiff competition from ship repairers in Portugal and Italy.

Over the past few years Malta Drydocks carried out work on Cunard's Royal Viking Sun, Sagafjord, Vistafjord and Sea Goddess II, the Renaissance Four of Renaissance Cruises, Carousel and Seawing, operated by Airtours and Island Breeze of Premier Cruises.

The value of the new contract has not been disclosed.

Newport News Lands Repair Contract on MSC Vessel



MV/PFC William Baugh

Newport News Shipbuilding (NNS) has been granted a contract for ship repair work on Military Sealift Command (MSC) pre-positioning vessel MV/PFC William Baugh chartered through Maersk Lines.

With terms not yet disclosed, a portion of the contract calls for hull blasting and

painting; underwater equipment survey; tank blasting and painting; overhaul of deck cranes; and repair of machinery components.

Measuring 755 ft. (230 m) with a beam of 90 ft. (27.4 m) Baugh arrived at NNS on March 6 where it will remain until its scheduled redelivery on April 4.

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Tug Pair Is Repowered

The St. Laurent Forest Products Corp. of West Point, Va. has been running Elis and Sture — a pair of 84 ft. (25.6 m) tugs — since their construction in 1980 in Houma, La.

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ing company's oil barge, the tugs' original engines began to show signs of wear and tear.

Deployed in the Chesapeake Bay, the vessels are often towing two 200 ft. (60.9 m), 1,500-ton wood chip barges from satellite plants around the Bay to the paper plant in West Point.

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TIN0077/B

A New View



An artist's conception of an attacking midget submarine launched its two torpedoes, one hitting the WEST VIRGINIA and the other running towards the OKLAHOMA.

Advanced photo analysis helps prove midget subs role in Pearl Harbor attack

For years, forensic historians relied on survivor and eyewitness testimonies and, if available, material testing or intelligence reports to help gather evidence to piece together an event. In the early 1990's, seduced by computer technology, photo imagery analysis gained a tremendous uplift enabling imagery scientists to use special algorithms to enhance and sharpen images; changing the way we view the world today. History recorded that five midget submarines deployed as advance forces to attack capital ships in Pearl Harbor had failed to inflict any damage. By the use of digital photo imagery combined with forensic engineering analysis technology, the results of an analysis on a single photograph taken during the 1941 attack will change that view. — by Peter K. Hsu

The Setting

In the early pre-dawn hours of December 7, 1941, five Japanese Type-A midget submarines quietly launched from the various mother subs less than 10 miles outside of Pearl Harbor. They were the Advance Force planned to enter the harbor and attack in concert with the air raid, to sink capital ships and to block the narrow harbor entrance (figure 1). The narrow entrance channel of Pearl Harbor was blasted out of coral to a depth of 65 ft. at the center. Anti-torpedo nets were strung up one backing the other at the entrance throat from shore to shore. Each of the anti-torpedo nets hung down 35 ft. as a primary defense against torpedo shots up into the

harbor. The nets were also intended to prevent submarines from entering the harbor. The approach to Pearl Harbor was heavily guarded. The torpedo nets were open during the day but closed from nightfall to sunrise (figure 2).

The Secret Weapon

The type A midget submarines that attacked Pearl Harbor were secret weapons kept not only from the Japanese public, but also from nearly the entire Japanese navy as well.

In 1934 under the direction of Kishimoto, two midget submarines were built at Kure. They were an experimental craft without conning towers. It was designed as an auxiliary weapon to be carried by fast surface vessels. The two crafts were coded as "Metal Fitting, Type A" were built in secrecy and tested as "Target A" — achieving an underwater speed of 25 knots.

After testing, conning towers were added to the design. In 1936 two more were built. The following year, the midgets were tested and launched from seaplane tenders. Although they had to be launched close to the target, the test pilots realized that these midgets could be used as a stealthy attack craft. Mass production of midget submarines was underway in strict secrecy. Training — also conducted in the strictest of secrecy — commenced at Ourazaki for selected elite crews chosen to operate these attack midgets designated as HA3-44 and to be carried by mother submarines or surface vessels (figure 2). At the end

of October 1941, Admiral Yamamoto at the urging of Captain Hankyu Sasaki finally consented to the use of Type-A midget submarines in the Pearl Harbor attack operation. (see picture above)

The Type-A Imperial Japanese midget submarine, as built in 1938, was a two-man complement sub — a junior officer who conned the boat and a petty officer who manipulated the control valves and ballast for diving and trim.

Structurally, the midgets were connected by four longitudinally welded, cold-rolled 10-in. steel strakes reinforced by welded transverse angle-iron frames. Its length measured 78.5 ft. overall with a 6 ft. diameter hull and displaced 46 tons while submerged. Two bolted hull joints permitted the midget

to be separated into three sections.

The hydrodynamic characteristics of the Type-A midget submarine provided little reduction in speed even when submerged. The drag resistance of a full conning tower, strategically located, was kept to a minimum only achievable in Japanese midget submarines due to the smaller physical size and height of the pilot and crew. The midget's length to diameter ratio was 13.3 to 1, closely resembling its weapon, the Type-97, 45 knot, torpedo whose ratio is 12.3 to 1. Their ability to navigate through small entrances was attributed to its slim design, distinguishing itself from many of its counterparts, including the European and Allied designs.

The midget was propelled by a single

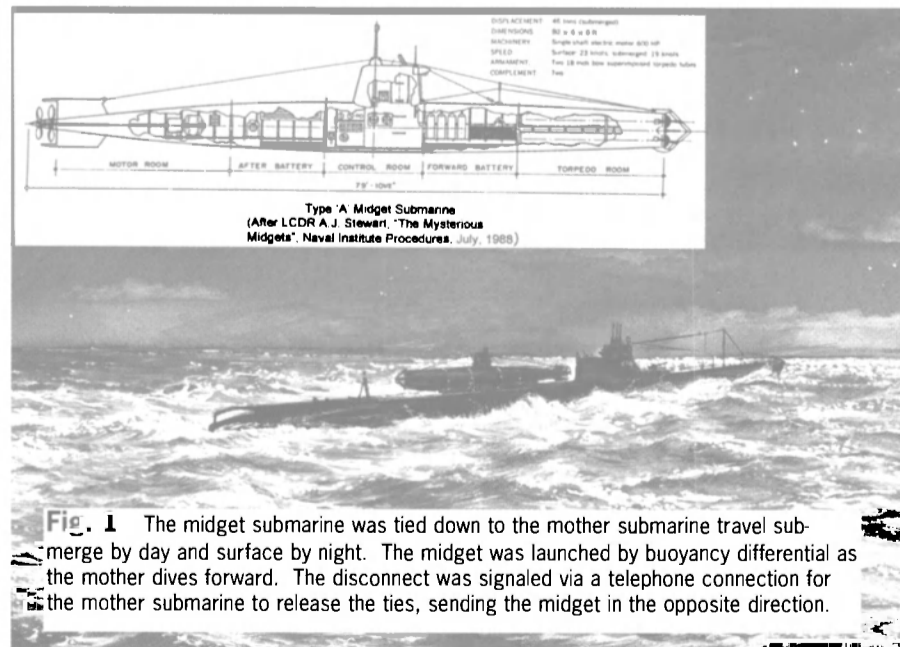


Fig. 1 The midget submarine was tied down to the mother submarine travel submerge by day and surface by night. The midget was launched by buoyancy differential as the mother dives forward. The disconnect was signaled via a telephone connection for the mother submarine to release the ties, sending the midget in the opposite direction.

600-hp electric motor via single geared shaft with contra-rotating propellers. Power was supplied from acid-cell batteries but without on-board recharging generators. Re-charging could only be accomplished by a mother sub or by a tender. She had a top speed of 23 knots surfaced and 19 knots submerged for 55 minutes of battery power. However, at a submerged speed of 2 knots, the midget had an effective range of 100 miles.

The midget submarine carried two 18-in. torpedo tubes mounted one over another. For the Pearl Harbor attack operation, it was armed with two Type-97 torpedoes, each with an approximately 800-lb. explosive warhead, twice the amount in the Type-91 aerial torpedo. The Japanese torpedoes fueled by oxygen, leaving hardly any wake, are capable of hitting targets faster from longer range. They were considered more advanced than the allied forces.

The Attack

At 0755 the first wave of the Japanese carrier planes commenced their attack at their targets. The first wave of torpedo bombers "Kate" B2N5 attacked in groups, flying in an opposite direction attack pattern. The light cruiser USS HELENA was torpedoed while the other group attacked Battleship row. The USS Helena was hit at 0758, recorded in her ship's log. This time was a critical datum for establishing a torpedo attack timeline in the forensic analysis. The rear gunner of a "Kate" took a series of photographs as she flew over the target. One of which was released and shown to the world as propaganda by Japan. This perhaps was one of the most important combat photos of its time.

Presence of a Submarine

In 1994, Historian and National Park service of the USS Arizona (BB38) memorial, **Daniel Martinez** and noted historian and journalist, **Burl Burlingham**, suggested that the combat photos contained an image of a Japanese midget submarine near Battleship row. An Arlington photo-imagery company digitized the photo and by use of computer algorithm technology, enhanced and sharpened the image of the suspected submarine. Measurements of the submarine were obtained for comparison by triangulation and special imagery techniques employed. Measurements were computed by referencing a scaled stereo imagery of the harbor taken by the Army Air Corp at the end of November. A detailed version of the photogrammetry analysis was published by The U.S. Naval Institute in the December 1999 issue of *Naval History* magazine.

Image Source and Identification

The combat photograph, figure 4, for

the forensic analysis was provided by the Naval Historical Center. It was taken during the first wave of the attack by the Japanese Navy carrier based Nakajima B5N2 "Kate" torpedo bomber. This aerial photograph was published in the Japanese press shortly after the Pearl Harbor attack. This photographic image is considered one of the most dramatic combat photographs taken during the 20th Century. Shortly after the attack on

Pearl Harbor, an American citizen living in Spain obtained the original positive photo print. It was reported that he received the photograph from the Japanese Embassy in Madrid. Since the original negative has never been found, all subsequent reproductions have come from the lone photograph kept at the Navy Historical Center in the Navy Yard. Imperial Japanese naval history recorded that five Type-A class midget

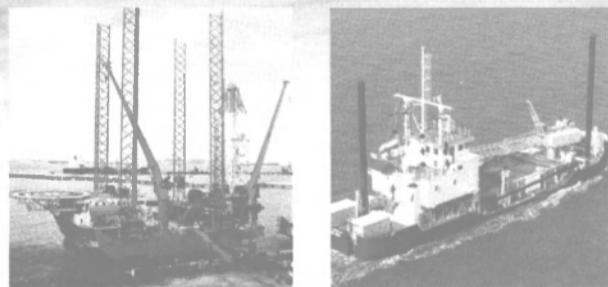
submarines were planned in concert with the main force to attack Pearl Harbor. An anomaly was captured on the surface in the photograph taken by an Imperial Japanese Navy flight crew. With this premise it formed the basis for the photo imagery analysis.

Photo Imagery Analysis (by Autometric, 1994)

The photographic imagery analysis



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considered five phases to be conducted on the photograph (figure 4, page 83).

* The first phase involved photo scientists who digitally reproduced the image, then digitally enhanced it by applying computer algorithms and techniques. The photographic imagery obtained from the U.S. Navy Historical Center was digitized into a computer software image file. Next an edge-sharpening algorithm was applied to the overall image scene. The subject area and the anomaly were then digitally magnified by a factor of 200, 400 and 800 percent. Each magnification was analyzed to determine which magnification would best maintain image integrity.

* The second phase was to establish the chronology of the photograph. Smoke clouds and debris can be seen rising from Hickam Airfield obscuring most of it. This indicates the photograph was taken shortly after one initial attack run on Hickam, which occurred at 0755 hours on December 7, 1941. Smoke can be seen rising from the USS HELENA and the USS OGLALA. This indicates that at least one, if not both ships had been hit. The log of the Helena was very specific about the time she was struck by a torpedo at 0758 hours. **Dan Martinez**, the Park Historian at the USS ARIZONA Memorial, provided the time of the torpedo strike on the HELENA. History documented the first wave of torpedo bombers attacking Battleship Row within minutes of the attack on Hickam Airfield. Photo evidence shows that the first torpedo strike against Battleship Row (USS CALIFORNIA, USS OKLAHOMA, USS WEST VIRGINIA) has been completed. The CALIFORNIA had been struck by one torpedo and was leaking oil, the OKLAHOMA had been torpedoed and was listening to Port and the WEST VIRGINIA had been struck with at least one torpedo as indicated by several torpedo wakes. The first attack on Battleship Row took place at 0758 hours.

* The third phase was to investigate the photograph for observable objects, which would lend themselves to the presence of a midget submarine. The digital image was examined and digitally interpreted for visual observables to support the premise that a Japanese Type-A class midget submarine was present in the area during the attack. Figure 5 shows that a rectangular, black object is present in the area. The object appears to be sitting on top of a dark linear structure. The composite shape is surrounded by white water area, which looks as though a wave is about to cover the rectangular object. Two distinct water spray rooster tails appear behind

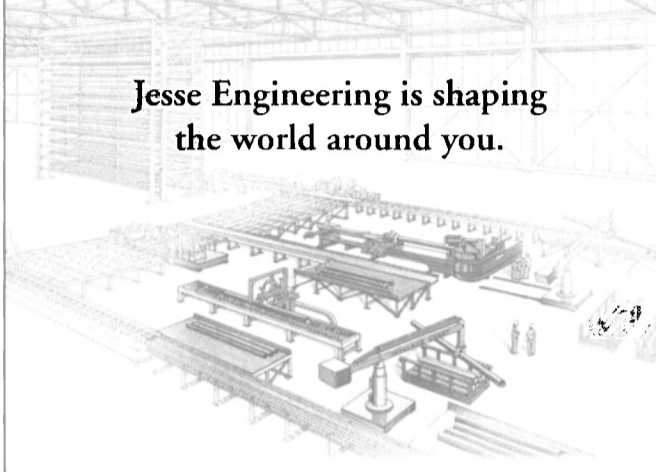
the first two. Each rooster tail appears to coincide with the passing of each shock wave. The height characteristic of these rooster tails grows toward the anomaly with the smallest tail occurring first, or being the oldest.

* The fourth phase involved the precise set of photographic measurements of the anomaly in the image. Two photo

objectives must be achieved by a photogrammetric approach. First, the location of the anomaly in the geographic reference; second, the position of the anomaly relative to the battleships in the field view. The second objective was to determine the height and size of the anomaly. To achieve these objectives, the position and altitude of the camera used by the gunner/observer in the


"Kate" must be defined by using at least photogrammetric triangulation. The location of the anomaly was established by measuring the pixel location of the anomaly. Several objects with known location were also measured to establish the validity of the triangulation resection. The geographic coordinates of the anomaly were calculated as 21° 21' 04.2" North latitude by 157° 57' 12.5"

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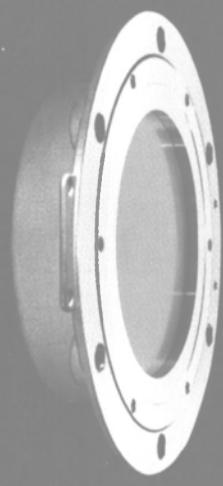


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Naval History

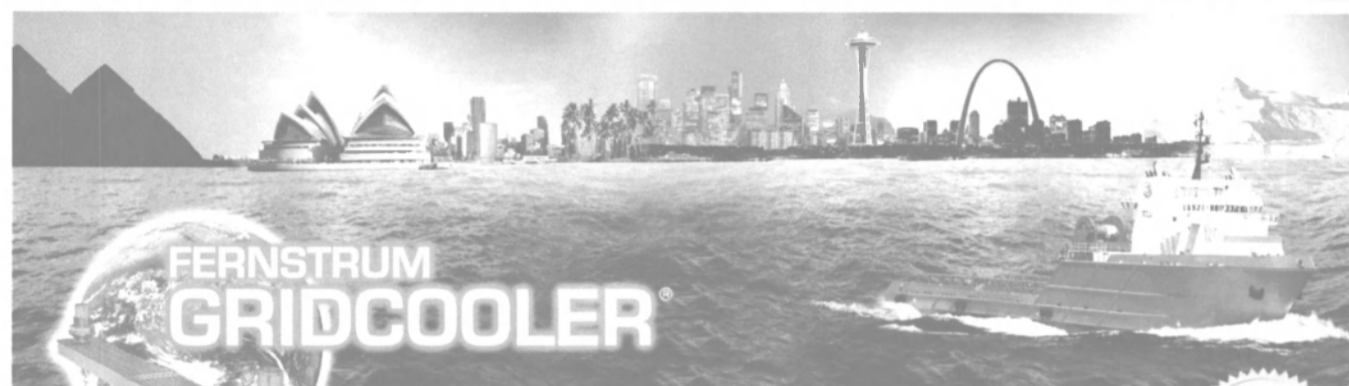
West longitude. The minimum height and length dimension of the anomaly were thus determined by the same technique and calculated to be 1.25 m and 18.2 m, respectively.

* The fifth and final phase was to compare the size ratio of the anomaly with the specification of the Japanese

Type-A class midget submarine. The vertical height of the feature, as computed to be 1.3 m, compares favorably with the height of a Type-A class midget submarine sail, which measures to be 1.7 m. The length dimensions fall within the design length overall of the Type-A midget submarine.

Forensic Engineering Imagery Analysis "FEIA":

To establish a methodology for forensic analysis, a positive photo print of the combat photo was obtained from the Naval Historical Center (figure 4). Imagery enhancement and sharpening techniques were applied to key areas of interest established from chronology of



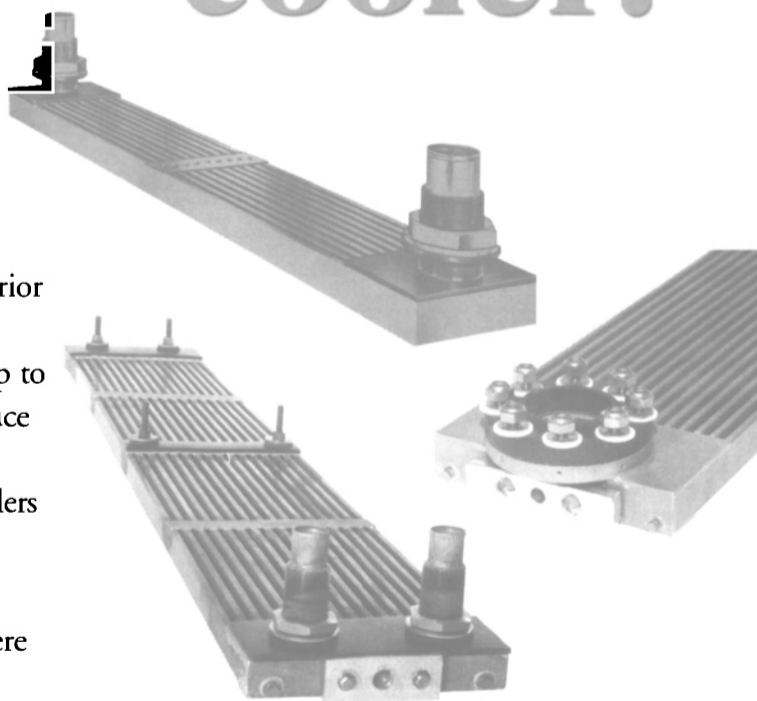
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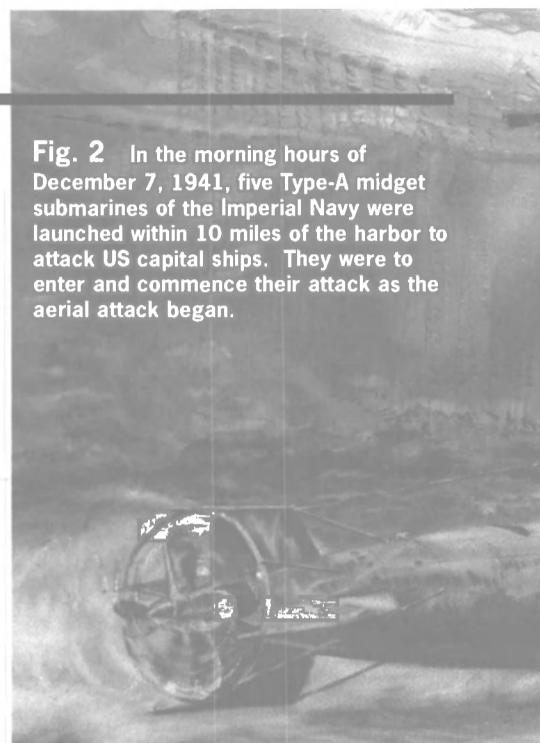
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Fig. 2 In the morning hours of December 7, 1941, five Type-A midget submarines of the Imperial Navy were launched within 10 miles of the harbor to attack US capital ships. They were to enter and commence their attack as the aerial attack began.



images deserved and activity scenario postulated. The approach of the forensic engineering imagery analysis differed from the Autometric imagery analysis in that FEIA emphasized on "how the images of interest got to look the way it was, frozen in time." In simple terms — what caused it to look like that?

History documented that the first attack wave occurred at 0758, by Rudimentary Shadow analysis, it was verified that the combat photo was taken between 0801-0803, thus establishing the latest time at about 0803. In the absence of both a huge waterspout associated with torpedo detonations against the side of the ship and torpedo bombers flying over the battleships, it was concluded that the attack group had completed its attack run.

Six torpedo tracks can be seen in the photo. Four appear partially erased by the traveling surface concussion waves. Two tracks appear to be thinner and show less alteration by the wave concussion. Four of the torpedo tracks can be seen in alignment with respective water splashes associated with aerial torpedo drops. The two thinner tracks that were less affected by the wave concussions converged at a point coinciding with the linear object but without water splashes. One of the thinner tracks (no.5) terminated with a small water plume characterized by the beginning of an underwater explosive detonation against the side of the WEST VIRGINIA hull (figure 4).

The observed aerial torpedo trades were measured from their entry splash points to the targets. Torpedo running times were computed and chronologically summarized. The surface concussion rings propagated radially from the WEST VIRGINIA and OKLAHOMA were the result of the torpedo detonation, its gas bubble in expansion and contraction, a phenomenon of underwater explosion. The magnitude and propagation velocity of the concussion waves can be measured. Thus total



elapsed time intervals were computed to be 174 seconds (approximately three minutes) after the HELENA was hit. This substantiated that the combat photo was taken at approximately 0801. (Rudimentary shadow analysis indicated the time was 0801-0803).

As the concussion waves approached the advancing midget, they crashed passed its conning tower onto the contra-rotating propellers. Generating three distinct rooster tail sprays, various progressively increase in size from the earliest spray, the farthest and smallest. The distance between each of the rooster tails was computed and found to coincide with the pattern of the propagating waves. Thus enabling to compute the distance between the observed vertical edges of the rooster tail to the midget conning tower and found to be 38 ft., match half of the midget's overall length of 80 ft.

The thinner tracks were a typical characteristic of the Japanese Type-97 submarine torpedo. Test reports of U.S. conducted torpedo run trials after the war indicated only minimal wake was visible to the overhead flying observation aircraft during the test runs. The thinner tracks characteristically are also indicative that they were more recent with older track defused in time. Thus their convergence in the absence of water splashes and the thinner tracks characteristic lend evidence that a submarine was present and fired two torpedoes at the targets.

During an underwater explosion event, the chemical reaction of the solid explosive yields gaseous products and exerts high explosive pressure on the surrounding water. The disturbance (compression shock wave) near the charge propagates radially at three to five times the speed of sound. The surrounding water is compressed and attains an extremely high radial velocity. The compression shock wave reflecting from the free surface results in a tensile reflected wave, causing a region of

water to cavitate, thus forming a bulk cavitations zone. The water refraction near the surface wave has a vertical velocity. The midget submarine is within the cavitation zone and was buffeted by a vertical motion, exposing the conning tower and its contra-rotating propellers.

The magnitude of the vertical velocity by explosive gas pulsation will lift an

object vertically in the cavitation region. Extrapolations of the bulk cavitation zone calculated from selected charge size and attack geometry indicated that the midget submarine was within the cavitation region causing the submarine to be launched upward by the explosion.

As the submarine broached near the surface and headed into the oncoming waves caused by the concussion. Water

crashed into the propeller disk, forming three distinct rooster-tail sprays synchronous with each passing wave. The third smallest rooster tail had dissipated somewhat by the time the photo was taken. This underwater explosion analysis has substantiated the action the midget took and strengthened photography evidence of the existence of a
(Continued on page 83)

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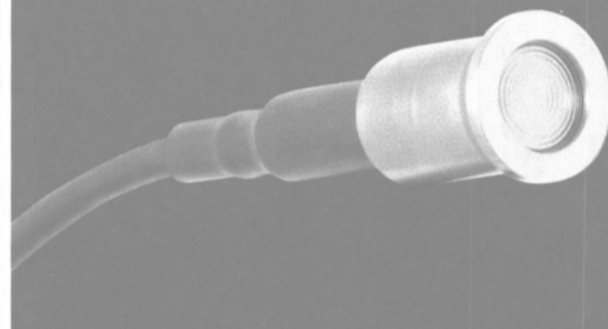
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Strategic Value Adding Purchasing

Robert Lee Gordon — director of purchasing for Ocean Development Company and one of the world's most sought after projects, the building of the Project America cruise ships — shares with MR/EN the process of selecting a coatings manufacturer

An effective purchasing strategy is at the core of successful purchasing departments. Strategies that offer total value to an organization should be the goal of all purchasing organizations. Purchasing professionals around the world are always in search of new strategies that creatively reduce costs and add previously unrealized value to an organization. Since motivating multi-company groups is difficult, the purchasing

department must offer a clear strategy that offers value to all involved. Hence, Purchasing Programs, procuring products plus services, is a strategy that can be employed successfully to bring value to all involved.

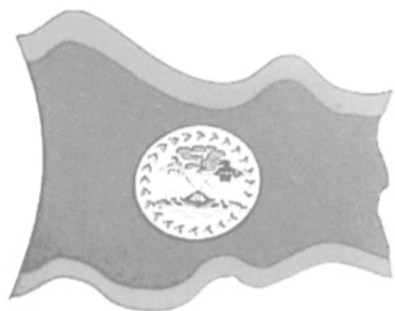
The theory of Purchasing Programs is to leverage vendors to offer products and services — whereas previously — vendors were only offering products. The approach is to challenge vendors to offer

significant value in areas not previously realized. This shift requires that the purchasing department refuse to purchase products based solely on the acquisition cost of the product. The evaluation of the total purpose of the product and services within an enterprise is the key. Purchasing Programs utilize the vendor's services to enhance the value of commodity purchases. Purchasing Programs focus on buying service plus

products, not simply products. This concept is simple, however the application of such a methodology of purchasing within an organization is difficult. Unlike purchasing to simply reduce the purchase price of a product, Purchasing Programs need careful planning prior to the solicitation of requests from vendors. Effective Purchasing Programs must have clearly defined objectives, a process to review these objectives, and a method to evaluate the objectives of the process.

American Classic Voyages (AMCV) had been struggling with coating technologies, and had diversified their vendor and product base in the hopes of finding the most effective mix of products and vendors. AMCV also spent

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M/S Patriot (former ms Nieuw Amsterdam) was purchased from Holland America for \$114.5 million and will begin December 9, 2000. This ship also falls under the purchasing auspices of Robert Gordon.

considerable time and effort in the research and testing products that companies offered in hopes of finding the correct items to meet their needs. After research and review, purchasing determined that concentrating purchases with one particular vendor would be more effective in gaining the commitment of one qualified company to assist in handling the company's paint requirements. After careful study of the company's total purchases, and vendor base, International Paint

was determined to be the best fit - its size, reputation, and ability further supported this decision. In addition, the company was awarded significant projects in AMCV's future expansion.

Once International Paint was identified as a potential partner to create a Purchasing Program for AMCV, International Paint was approached by Ocean Development, a wholly owned subsidiary of American Classic Voyages, with the lure of additional business. A three-element program was created by Ocean Development (ODC) to offer incentives to all parties involved. Beginning with a rebate program, which was created to lower overall costs, it was also designed to offer the operating divisions incentives to concentrate their purchases with this supplier. Secondly, there was up front allowance granting paint to AMCV that would be used to support their upcoming projects. Third, there would be a quantifiable process to allow the vendor to address all coatings issues in an attempt to offer coating solutions to existing problems.

Upon implementation of this plan, there would be then be a multi-division meeting to address all of the coatings challenges. A meeting was set

where all individuals involved with paint were to participate in a feedback session with a senior vice president of International Paint. The purpose of the meeting was to clarify requirements on both sides in order to establish an action plan.

With favorable intentions in mind, the initial meeting opened with all participants venting their dissatisfaction with the previous level of service of International Paint. There were several outstanding issues with the company, such as incorrect invoices, lack of a consis-

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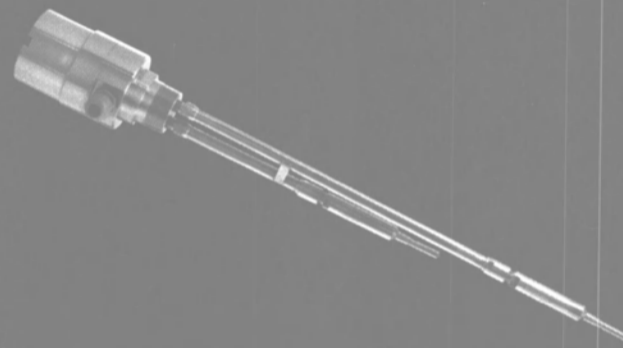
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Purchasing

tent customer service representative, and lack of product, which matched existing paint. The International Paint representative listened attentively to each complaint and took copious notes regarding each concern. Once all of the concerns had been raised, the International Paint representative apologized for all the

problems previously encountered and assured that these issues would be corrected. He then launched into his presentation explaining what his company could offer and discussed what steps the two companies should take in the future. This presentation included considerable data regarding International Paint and its

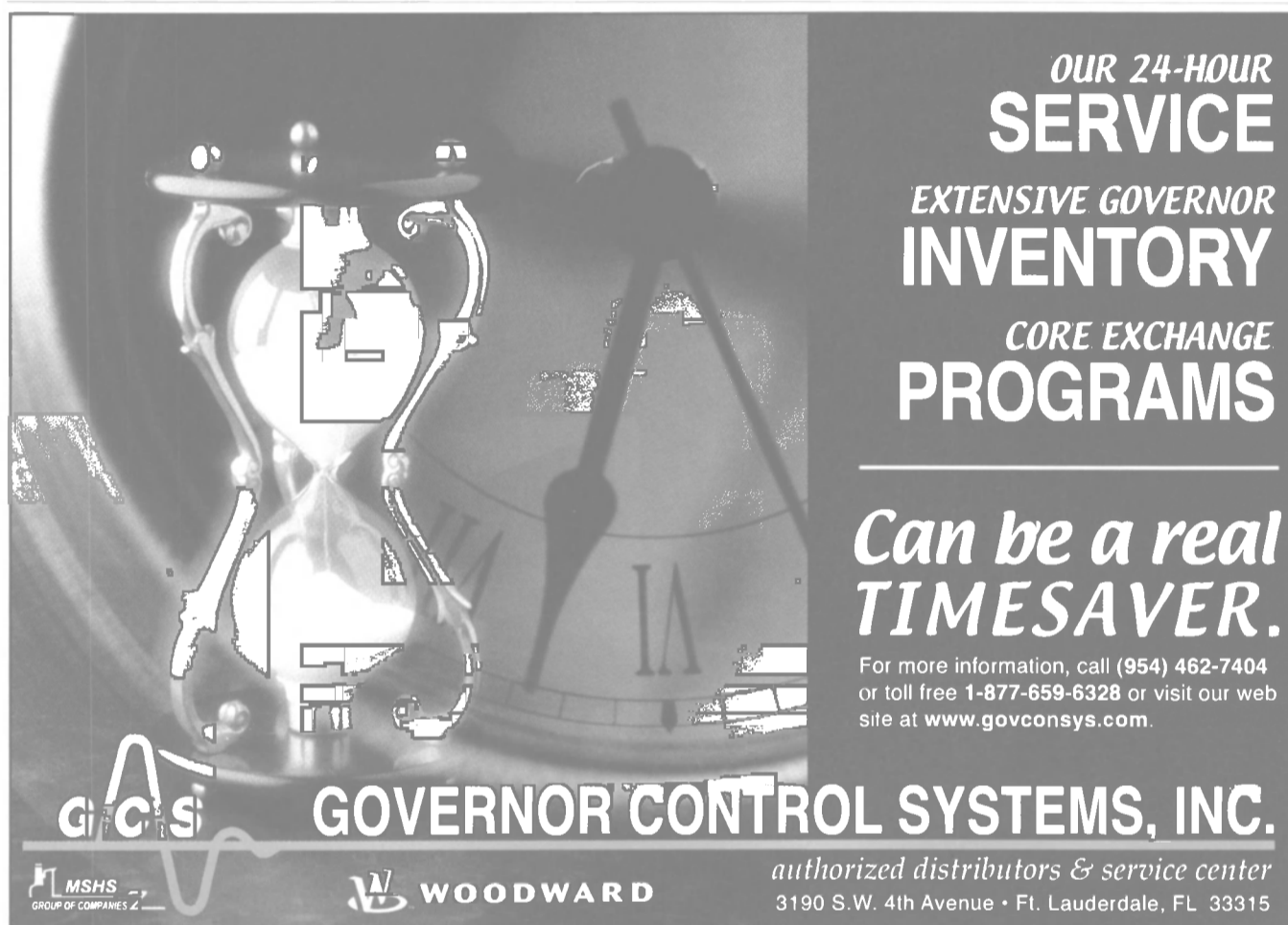
many different offerings. It was clear that International Paint had the resources to offer all of the needed coatings services. The challenge then became to determine in what priority should these offerings be implemented.

A few days following the meeting, International Paint had already distrib-

uted a task listing complete with responsible parties and due dates, which in turn became the vehicle for the Purchasing Program. Each issue, concern, support and training requirement was included on this list, thus mobilizing International Paint resources in ports around the U.S. This program also included the full time services of International Paint inspectors in three key ports in support of various projects, as well as a paint application and use training program for end users. International Paint was also called upon to provide coatings handbooks for new projects, the creation of a color matching program for existing coatings, a custom blend on demand program, and a paint identification program. Through the diligence of ODC and International Paint, the program was ultimately labeled a success. International Paint has been diligently delivering the desired results along with correcting previous omissions in their service. After six months all participants were asked to rate International Paint; the company was rated 3.59 on a scale of 1 to 4. Although there is some room for improvement it is very clear that the overall satisfaction level is favorable.

In addition to this improvement in service, AMCV has received custom training and the services of paint inspectors in three key ports. If AMCV were to fund additional full time paint inspectors and training at these sites the cost to the company would amount to approximately \$100,000. Clearly there is considerable benefit by bundling these services within the cost of the product rather than purchasing these services independently. Labor savings, costs savings, expertise and training are all tangible benefits of the program. International Paint has benefited from its early involvement in the process of color selections. This has allowed them to offer critical input regarding past experience with other owners, as well as giving them input early into the upcoming projects. International Paint also learned how to mobilize its offerings in a manner to increase customer satisfaction and to better understand the unique needs of the cruise industry. In what could be dubbed as a win-win situation, AMCV has received a valuable partner with regards to coatings technology, and International Paint has been rewarded with a loyal client.

Robert Lee Gordon is currently the director of purchasing for Ocean Development Company. Mr. Gordon is responsible for all project related purchasing of hotel, nautical, and engineering products for Project America, M/S Patriot, Columbia Queen, and the coastal vessels.



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Flender Werft Awarded Superfast Ferries Contract

Flender Werft Aktiengesellschaft has signed a contract with the Greek shipowner Superfast Ferries Maritime S.A., which is a subsidiary of Attica Enterprises S.A. This \$192.4 million contract calls for the construction of two technologically driven Superfast car/passenger ferries. The agreement also allows Superfast to exercise the option for the building of two more ships to be delivered at a later date. Known as the yard's hull numbers 682 and 683, the two ferries will be named Superfast XI and Superfast XII, are scheduled for delivery in January 2002 and May 2002, respectively. Measuring 656 ft. (200 m) with a breadth of 82 ft. (25 m) and a draft of 21 ft. (6.4 m), the vessels' four main engines will attain a service speed of more than 28.5 knots. Deadweight will be 6,000-ton and trailer capacity about 2,000-lane meters.

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Schat-Harding Wins Premiere Order

Safety specialist Schat-Harding received its first order for its innovative new space saving lifeboat saving system geared toward cruise vessels. Known as the

UNIC davits, four sets will be supplied to the World of ResidenSea project, which is currently underway at Norway's Fosen yard. Melding together the space saving functions of a telescopic stored power davit with the ease of a gravity davit, the UNIC product is based on a trolley running in a travelling beam that can be stowed under deck, or can be free-standing to allow a balcony on the cabins above. Once the beam is put into motion through a stored power unit, the force of gravity swings the boat away from the ship.

Circle 52 on Reader Service Card

STE To Build Ships For Singapore Navy

The marine division of Singapore Technologies Engineering Ltd. (STE) will build five new frigates for the Republic of Singapore Navy (RSN). The government-linked defense group did not disclose the contract value. The Ministry of Defense (MINDEF) contracted France's Direction Des Constructions Navales (DCN) to build six new frigates to replace RSN's six missile gunboats. The new ships would be equipped with combat systems and stealth technology.

Crystal Commits To Third Ship

Crystal Cruises has signed a commitment to construct a third vessel in addition to its already-operating Crystal Harmony and Symphony. The line's parent company, NYK, is currently negotiating with shipyards for the newbuild project.

Based in Los Angeles, Calif., the company plans to build a vessel similar to its current two-member fleet.

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Projections center on When, not If

As the per barrel price of oil continued to soar through new stratospheres, offshore oil drilling companies and key marine industry suppliers alike wonder when the next offshore boom will ignite.

The cyclical nature of the offshore exploration and production beast is legendary in financial circles, riding boom and bust waves for years at a time. While industry analysts and insiders alike had forecast a pick-up in activity no sooner than mid-year 2000, the collective industry is "itching" to get back to the business of building, repairing and supplying the myriad of rigs, boats and other business opportunities that abound in a full-blown boom oil market. Patience it seems is wearing thin, particularly in the face of dwindling business prospects and the lingering of the \$30+ barrel of oil. While it seems all too natural that sustained high prices would sooner than later drive a resurgence of the moribund offshore business, a host of factors — chief among them the very nature of today's corporate consolidated oil industry and the political powerplays by the OPEC nations — have conspired to delay the inevitable upswing in the Gulf of Mexico.

A potential positive can be seen in the Offshore Safety Article, which begins on page 36. In discussing Schlumberger's safety and training program Bruce Adams, the QHSE manager, admits that the high level of hiring in 1Q 2000 has created "high" demand for safety and training sessions.

Delay Ahead

Despite the logic of a serious business run resulting from current pricing, it seems the rebound will be delayed a bit longer than originally anticipated. The supply and demand curve will be permanently skewed by the fact that so few hold such a tight grip on the majority of the world's oil supply.

It was late in 1997 when the offshore oilfield markets were enjoying one of its extended booms, and signs of the times included soaring dayrates, yards working at overcapacity and desperate for labor to fulfill the mounting new and refurbish rig and vessel orders. The offshore oil sector was a Wall Street darling, "supplanting technology and biotech for a while as 'the' sector in which to invest. Also, evolving technology that allowed producers to discover

and recover resources in deeper waters more efficiently seemingly made the industry bulletproof.

Enter OPEC.

At a meeting in Jakarta, Indonesia in November 1997, OPEC leaders decided to raise production quotas in an effort to cash in on the high-flying market. While this action alone cannot be blamed for the staggering collapse of oil pricing in 1998 and 1999, it — combined with a serious financial crisis and resultant oil demand downturn in Asia — conspired to drag per barrel pricing into a quagmire that hit bottom at less than \$10 per barrel in March of last year.

"Ghost of Jakarta," industry consolidation, political issues and questionable numbers current drivers in world oil markets

Following repeated cries from around the globe, OPEC finally cut daily production in an effort to prop the lagging price of oil. That action taken last spring has resulted in a more than tripling of the price of oil, which barreled through the \$30 level in recent months. The production output has effectively squeezed supply worldwide, as demand has steadily increased during the drawdown. According to recent reports from International Energy Agency (IEA), "the numbers show markets are tight and getting tighter."

The recent oil-price crisis set back non-OPEC output growth for at least a year, a recent report released by Deutsche Banc Alex. Brown said, adding, while currently such an event should spur investment, the extensive 16-month price slide should delay any significant output response from non-OPEC producers.

Analysts say there is a lag time for exploration spending to play catch up with oil prices — for every one month when crude prices are below the cost of production, it takes three months of high prices to regain the volume of produc-

tion lost during the low cost period.

Exploration for oil outside of OPEC picked up in the late 1970s in order to counter dependence on the cartel's oil following oil price shocks in 1973 and 1979. Currently, the world depends on this group's production to meet about two-thirds of the current 75 million bpd of crude oil demand.

Although oil demand growing and crude oil prices have topped \$33 a barrel, analysts say upstream spending still lags. A Deutsche Banc energy analyst explains, "Demand seems to be back on track (following the Asian economic crisis), especially with the U.S. economy continuing to surprise. But companies continue to approach upstream spending cautiously, choosing instead to reduce debt, buy back shares, and explore for natural gas."

Significant Growth on the Horizon?

From 2000 to 2003, Deutsche Banc Alex. Brown estimates that worldwide demand should grow some 6.5 million bpd, or 1.625 million bpd annually. On the supply side, after five years of growth during which non-OPEC production rose by an average of around 770,000 bpd annually, 1999 saw output outside the cartel stay flat. This year, expectations are for a large gain, but not from new projects but from those put on hold last year. Other analysts' predictions are significantly more skeptical, with some predicting a jump of 200,000 to 300,000 for 2000, with no quantifiable measure until 3Q 2000.

While many industry watchers continue to tout the high price of oil as an indicator that production in other, non-OPEC entities will start soon, many continue to maintain faith in the much-touted international rig count as a measure of increased activity.

Another trend that demands attention of interested U.S. marine builders and suppliers will be the decision by the MMS whether to allow the use of FPSOs in the Gulf of Mexico. Allowing these vessels, which are used widely in other offshore oil producing regions around the world (see chart), would spark activity in U.S. yards. While a

(continued on page 35)

U.S. Gulf Offshore Rig Count Hits 20-Month High

The Gulf of Mexico rig count continues to rebound, according to Offshore Data Services' weekly mobile offshore rig count. On March 24, 155 of the 198 mobile offshore drilling rigs in the U.S. GOM were under contract. The week's tally represents a four-rig increase over the previous week's count, and a nine-rig increase over the month-ago figure.

U.S. Gulf of Mexico		
Category	24-Mar	5 years ago
Total rigs	198	179
W/contract	155	118
W/O contract	43	61
Utilization	78.3%	65.9%

Europe/Mediterranean Sea		
Category	24-Mar	5 years ago
Total rigs	105	103
W/contract	84	95
W/O contract	21	8
Utilization	80%	92.2%

Worldwide		
Category	24-Mar	5 years ago
Total rigs	638	615
W/contract	499	500
W/O contract	146	118
Utilization	78.2%	81.3%



Source: Offshore Data Services

photo: Walter Garschagen

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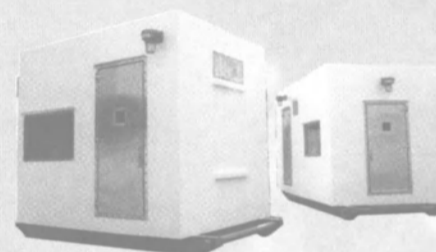
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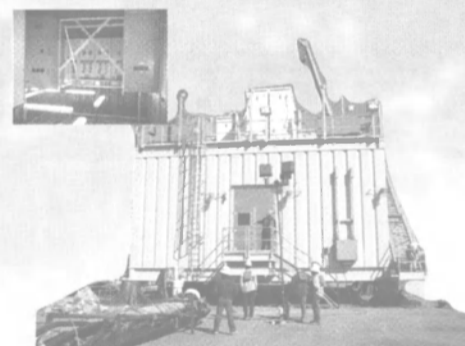
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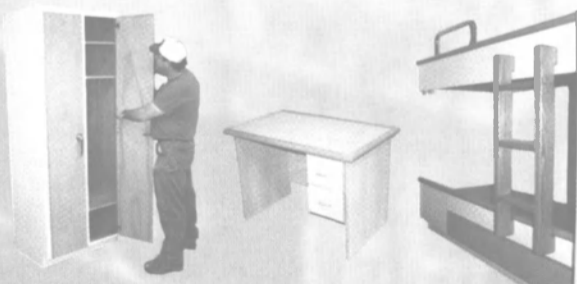
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DCR Optimistic About Future Of Offshore Drilling Sector

While it may be impossible to predict when offshore rig utilization will begin a meaningful recovery, Duff & Phelps Credit Rating Co. (DCR) has noticed certain industry developments that suggest improved conditions. Operating

rates for drilling rigs have increased steadily over the past 12 months as drilling day rates for a shallow water jackup rig have risen from a low of \$22,000 to current levels of approximately \$50,000, the DCR report

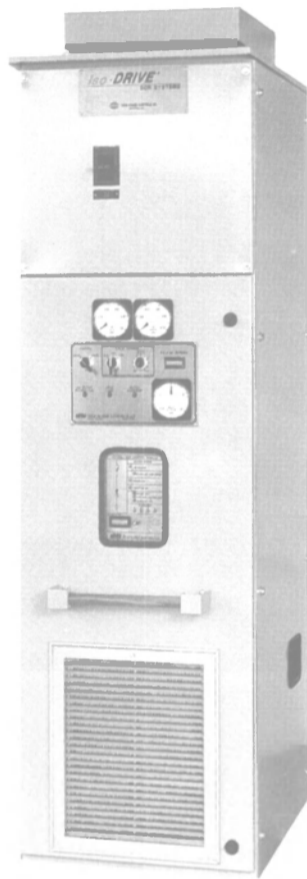
explains. Offshore drilling rig utilization has also steadily increased from a low of 72 percent during the summer of 1999, to 81 percent in February 2000.

Yet, the report continues, utilization of the worldwide mobile offshore drilling

fleet is only about 81 percent, compared to about 99 percent two years ago when West Texas Intermediate and North Sea Brent crude prices reached their last post Gulf War peak of \$22 and \$24 a barrel, respectively.

However, the current state of offshore drilling activity is not a surprise, reports DCR. Historically, there has always been a delay or lag effect between commodity price movements and demand for offshore drilling rigs. For example, an oil price recovery that began in February 1994 was not followed by meaningfully higher rig utilization until about May 1995. And, in late 1998, when oil prices were approaching \$11 per barrel, rig utilization was still close to 95 percent. Instead of responding immediately to brief and highly uncertain changes in crude prices, major integrated oil companies have frequently elected to wait for a sustainable pricing range that will support an appropriate level of spending. This pattern can be altered by several factors, according to DCR. Some E&P companies are utilizing increased cash flow from higher oil and gas prices to reduce debt levels, strengthen their balance sheet or postpone spending decisions until after they complete reorganizations or acquisitions. Some of the recent mergers that have taken place are having a dampening effect on independent E&P companies' capital spending until the major E&P companies sell off properties they do not see fitting with the newly merged operations. Also, advances in seismic and drilling technology reduce the number of rigs that are required. Improved drill bits allow the same amount of footage to be drilled with fewer rigs, and better seismic data reduce the number of dry holes.

The drilling industry may have learned from their mistakes during the mid-1980s when the sector experienced speculative rig building, namely in the shallow water jackup market. Commodity prices dropped and a number of drilling companies had no contracts to support the over abundance of rigs. Most current construction projects, either newbuilds or conversions, for the deepwater market have been undertaken only upon the signing of a drilling contract, which should help maintain a balance between supply and demand for this market. Overall, the DCR report states, the current oil price environment will be beneficial for all segments of the energy industry, including the offshore drilling market. While DCR anticipates a steady increase in dayrates and rig utilization if crude prices remain strong, it may be sometime before the industry returns to levels seen in the last peak of 99 percent utilization and record dayrates.



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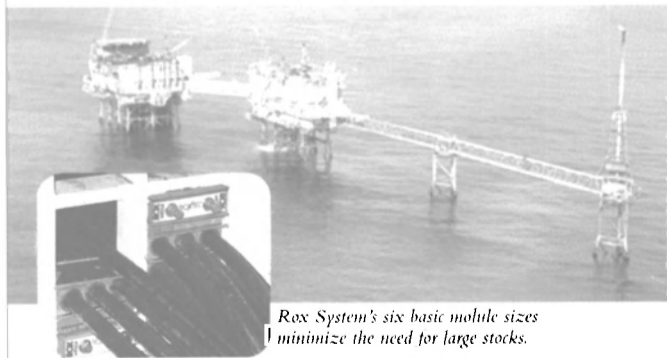
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Circle 287 on Reader Service Card

Offshore Market

(continued from page 32)

decision is not expected before 2001, there is significant opposition to the deployment of FPSO vessels in the Gulf, due mainly to the environmental concern — real or perceived — which comes with offshore storage operations.

According to a recent report from Washington, D.C.-based International Maritime Associates, there are currently 107 floating production systems in operation worldwide, which is an increase of 67 percent over the total tallied in September 1996. At the time of the report (November 1999), orders were in hand for 21 floating production and five storage systems. Another 54 floating storage vessels (without production capability) are currently in operation.

Operating Inventory of Floating Production Systems Worldwide

Tension Leg Platforms	11
Production Semis	32
FPSO vessels	62
Production Spars	2

Source: International Maritime Associates (IMA)

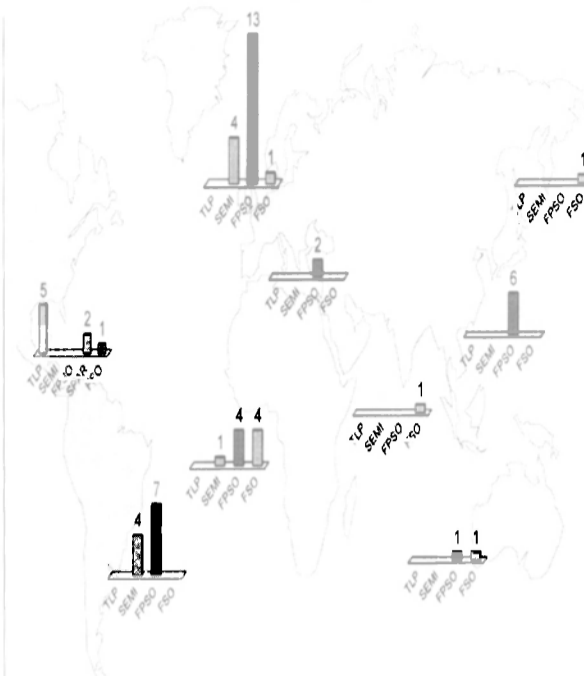
Looking ahead, International Maritime Associates projects orders to 62 to 84 additional floating production systems to meet installation requirements by the end of 2005, with FPSOs counting for about 70 percent of the new units, and the balance being production semis, TLPs or spars. Capital expenditures for these new systems will total \$17.3 to \$23.8 billion over the next five years.

Forecast of Orders for Floating Production Units - Next 5 Years

Type	No. Units		Estimated Capex (\$B)	
	High	Low	High	Low
FPSO	58	46	\$14.9	\$11.8
Semis	5	2	1.9	0.8
TLPs	12	8	4.3	2.9
Spars	9	6	2.7	1.8
5-yr Total	84	62	\$23.8	17.3
Annual Avg.	17	12	4.8	3.5

Source: International Maritime Associates (IMA)

49 Floating Production and 9 Storage Systems have been installed since September 1996



Note: includes 3 production units relocated from other fields

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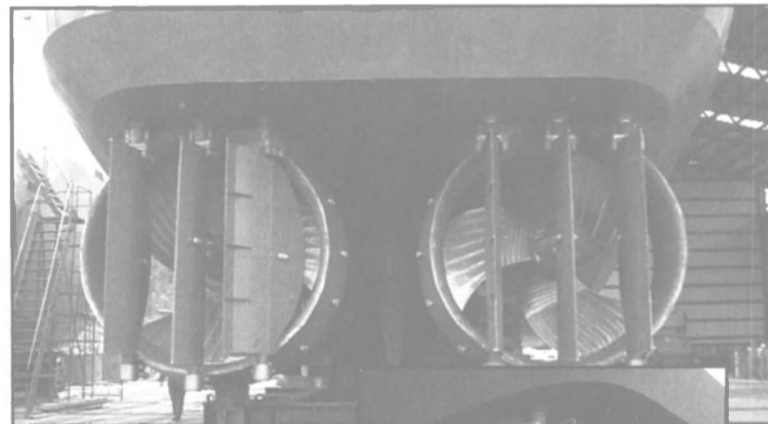
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Offshore Safety

Offshore Industry Leaders Invest Heavily In Safety Programs

The offshore oil industry market, by its very nature, is a challenging work environment that poses many safety hazards, particularly for individuals and companies which lack adequate safety training. *Maritime Reporter & Engi-*

neering News sought the insight of two offshore industry leaders — Schlumberger and Halliburton — to discover how the industry leaders set the stage for a work environment that is safe for workers, equipment and investment.

Note: Participants in the survey were Bruce Adams, the QHSE manager for Schlumberger Oilfield Services; and Tom Knode, the HSE Manager for the Business Development segment of Halliburton Energy Services.

MR/EN: How long has your current safety training program been in place?

Tom Knode: Halliburton Energy Services and its predecessor companies have conducted safety training for employees for at least the past three decades.

Bruce Adams: The current Schlumberger New Employee Safety Training program (NEST) was developed in 1991. This is a six-day, intensive training course covering a variety of mandatory safety topics. In 1992, the National Ocean Industries Association (NOIA) recognized the program as the best overall training program in the offshore industry and awarded Schlumberger the NOIA "Safety in Seas" award for 1992.

MR/EN: How much money is spent annually on the safety program?

Knode: The safety program, including safety professionals, equipment, training, and auditing, runs into the tens of millions annually.

Adams: The NEST program is part of a much more comprehensive safety effort in Schlumberger. From 1996 to 1998, the amount of money spent on safety by Schlumberger in the U.S. alone increased from \$12.4 million to \$19.4 million annually.

MR/EN: Is the program conducted in-house? Or are the employees sent to an off-site facility?

Knode: The majority of safety training is conducted in-house. Our training and safety professionals primarily conduct the training. In addition to traditional classes, computer-based training is gaining acceptance as a preferred alternative for selected topics and courses (e.g. re-fresher training). This is especially useful for those working offshore who may not be able to routinely attend facility safety meetings or classes. (Off site) We use facilities that have pools for offshore water survival and some H2S Train-the-Trainer.

Adams: Both. NEST schools are conducted at Schlumberger facilities throughout the Gulf Coast and at third party facilities in Lafayette, La. Class size plays a large factor in determining where a session will be held. Trained Schlumberger personnel teach the majority of NEST instruction. There are several sessions in NEST such as Offshore Survival, Confined Space Entry and Fall Protection, which require special facilities/equipment to provide the best level of hands on instruction. Third parties teach these specialized training

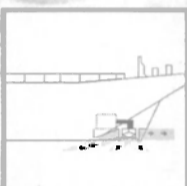
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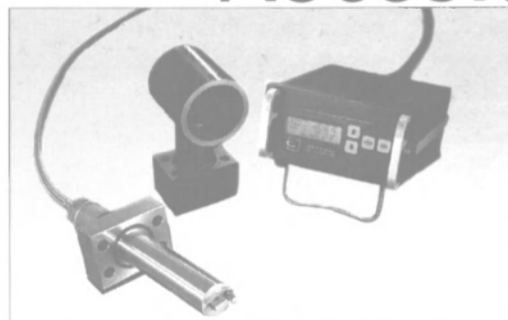
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Maritime Reporter/Engineering News

sessions. Off-site, we are currently partnered with Total Safety in Lafayette. The training professionals of Total Safety provide instruction for several sessions in NEST while providing all training facilities for class sizes up to 30 employees.

MR/EN: How often are training program "classes" held? What percentage of the employee base participates at any one time?

Adams: The number of NEST sessions held depends on our activity and current level of hiring. During the first half of 2000, we have scheduled one session per month. Due to the high level of new employee hiring during the first quarter of 2000, we have held additional sessions to meet this high demand. All new employees who have been hired since the previous NEST session was held will attend. In addition, more experienced employees will attend these training sessions to have their expired training renewed. The average number of attendees at a NEST session varies from 25-40 employees (two-three percent of the employee base in the Gulf Coast).

MR/EN: Are the classes mandatory? Are there optional classes for employees interested in getting more training?

Adams: All Schlumberger employees are required to attend NEST within the first 90 days of employment. Most employees will attend within their first two to four weeks with the company. All of the training sessions in NEST are mandatory and many require annual refresher training. In addition to these sessions, there are several other mandatory safety training classes that Schlumberger employees attend. A wide variety of optional classes are also available to employees via different forms of media, including classroom instruction, video, CD-ROM, and Web-based training.

MR/EN: What penalties exist for non-compliance to the safety policies, or non-attendance to the sessions?

Knobe: Progressive discipline is applied to those violating safety policies. Bonuses and merit increases can also be withheld or reduced when policy is violated or safety competency requirements were not met.

Adams: Schlumberger employees monitor the status of their training utilizing a Safety Passport. The Passport records training sessions the employee has attended, participation in safety activities, active involvement on teams such as the LPT and special safety recognition. Based upon the validity dates recorded in the Passport, each employee is responsible for scheduling attendance at safety classes when they are due for an update. Each individual has an annual performance objective to ensure all required safety training is current. Failure to attend scheduled training sessions would result in an individual being unable to achieve this performance goal.

MR/EN: What steps are taken to ensure the policies and skills learned in training are kept up during the workday? Are there random checks? Weekly meetings?

Knobe: There are daily, weekly and monthly safety meetings held at the facilities. Pre and post-job safety meetings are held on the well-site. Hazard observation cards are used to identify unsafe acts or conditions. Routine inspections of the facility and work-sites are conducted by different levels of management. Each of these reinforce the competencies gained in the safety training.

Adams: Each facility conducts a program of regular safety meetings, which are led by management and the LPT. In addition, daily safety meetings are conducted at the job site and a Job Safety Analysis (JSA) is completed on each operation performed. Each Schlumberger employee is taught to observe the actions of others and to shut down any operation deemed unsafe until corrective action is taken. In addition, a detailed audit program is used to evaluate facilities, management systems and job sites. These audits are conducted by all levels of management to ensure safety policies and standard operating procedures are being followed.

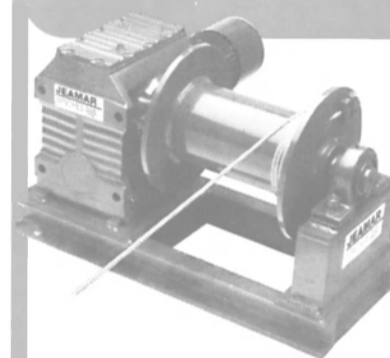
MR/EN: Are there changes planned for your program in the next one to five years? New courses or skills added, or dropped?

Knobe: We will move towards a behavioral-based safety program that will require training for observation of safe behaviors. A migration away from traditional classroom training towards computer-based training for those courses that can be delivered via distance learning is underway. Computer

skills will have to be developed in the workforce so that this system can be fully utilized. Language and other barriers that do not manifest themselves in the classrooms will be brought out during the implementation of the new training.

Adams: The Schlumberger safety program and the training it entails, including NEST, is continuously

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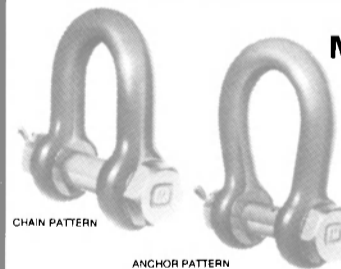
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Offshore Safety

updated and modified based upon identified risks, regulatory requirements, and the needs of our employees. There is no doubt the structure of NEST in two years will vary from today's NEST.

MR/EN: How has your company's operations changed (for better or worse) as a

result of a safety program?

Adams: The list of significant benefits of a world-class safety program is quite extensive. Over the past three years these benefits to Schlumberger in the Gulf Coast include:

- A Driving Incident rate 1/5 national

average

- 27 percent reduction in Worker's Comp expenditures over 3 years (97/98-7.2MM, 98/99-6.5MM, 99/00-5.3MM)

- 26 percent reduction in Total Recordable Incident Rate in 1999

- 75 percent reduction in Lost Work

Day injuries in Gulf Coast

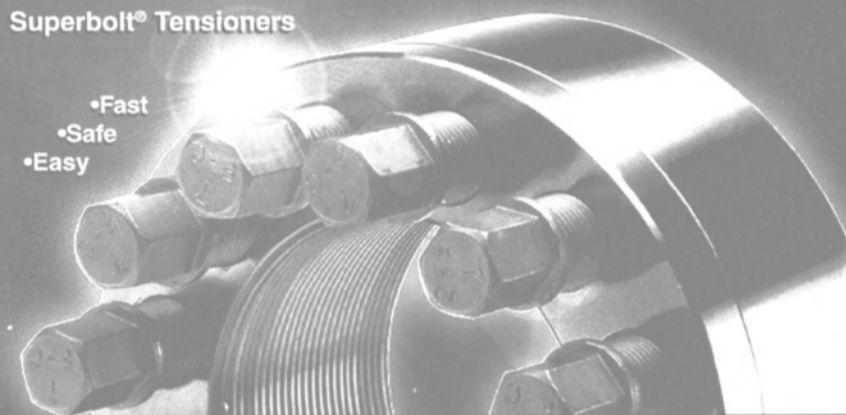
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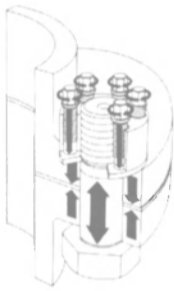
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Electronic Engines Power New OSV Breed

The offshore supply vessel market remains as competitive as ever, with companies attempting to lure customers with the best possible value for their day rates and other appealing offers. Hornbeck Offshore Services Inc., Mandeville, La., found a simple answer to stay ahead of the competition: build a well-designed fleet and equip it with the best technology you can afford. "It's that simple," says Carl Annessa, Hornbeck vice president of operations. "Customers want to contract boats that get the job done for the best value. We've incorporated certain design components in our vessels to make that possible, one of which is powering them with Caterpillar electronic engines."

Hornbeck Offshore owns a fleet of seven offshore supply vessels (OSVs) that are contracted to oil companies for oil exploration and production services, as well as drill rig support in deep water. The vessels currently operate in the Gulf of Mexico and transport a variety of cargo, including liquefied drilling fluids, water, diesel fuel, dry bulk products, drilling tools and various supplies. The company also owns four tugboats and seven offshore tank barges that are operated under the Leevac Marine brand.

The seven OSVs are new — the first was delivered in late 1998, five were delivered in 1999, and the next is due in early 2000. Annessa says much thought was put into the design and development of the vessels.

"When we decided to construct a new fleet of OSVs, we wanted to break the mold by rethinking how the vessels should be designed," Annessa explains. "There are many boats on the market that have new vintage but old technology. We basically went the other way." A distinguishing feature of the "new breed" Hornbeck OSVs is the dynamic positioning (DP) system, which is essential for supporting deepwater rigs. Five of the vessels measure 200 x 54 ft. (60 x 16.2 m) and two are 240 ft x 54 ft. (72 x 16.2 m). With a draft of between 13 and 14 ft. (4.1 m), the vessels are designed with high deadweight hulls. Powered by twin electronic Caterpillar 3516B engines each rated 2,000 bhp (1,492 kW) @ 1600 rpm, the vessels' main engines power Reintjes



PHOTO CREDIT: Aero-pic, Inc. of Jacksonville, Florida

hydraulic gearboxes turning five-blade props. The 200 ft. (60 m) class are equipped with a Cat 3412 powered bow thruster rated 600 bhp (447 kW), three Cat 3406 generator sets each rated 250 kW that parallel on one switchboard, and one Cat 3304 emergency generator rated 99 kW. The 240 ft. (72 m) class has the same specifications, but also includes an additional 600-bhp (447 kW) bow thruster and a 300-bhp (224 kW) stern thruster. The local Cat dealer, Louisiana Power Systems, Belle Chasse, La., provided the engines.

Initial and Long-Term Costs

A major decision for Hornbeck when building the New Breed OSV fleet was engine selection. Annessa

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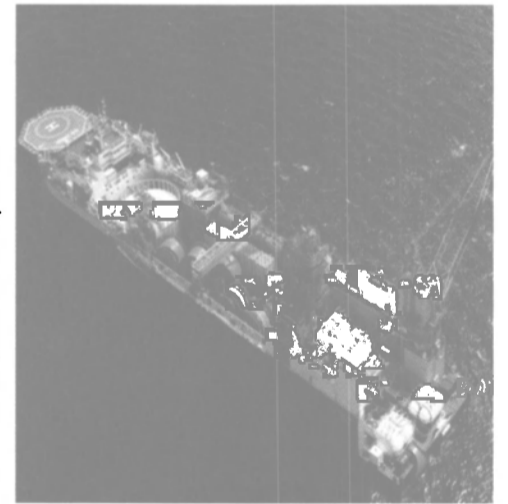
Name & Builder Location		
HOS Crossfire	200 ft. (60.9 m)	Atlantic Marine, Jacksonville
HOS Super H	200 ft. (60.9 m)	Atlantic Marine, Jacksonville
HOS Brigadoon	200 ft. (60.9 m)	Atlantic Marine, Jacksonville
HOS Dakota	200 ft. (60.9 m)	Atlantic Marine, Jacksonville
HOS Thunderfoot	240 ft. (73.1 m)	Leevac Shipyards, Jennings
HOS Deepwater	240 ft. (73.1 m)	Leevac Shipyards, Jennings

PHOTO CREDIT: Aero-pic, Inc. of Jacksonville, Florida

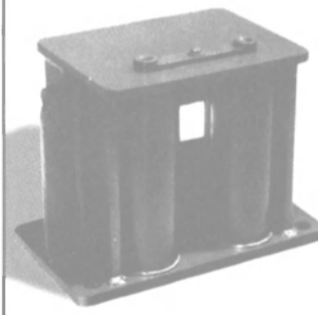
Angola And Canada Provide Projects For Smit Pioneer

Smit Pioneer, the first of Smit International's new class of multipurpose offshore installation vessels, has been busy in its first few months of service. This vessel is one of four former LASH barge carriers purchased by Smit over the past two years. Three of the dock-type vessels are operating successfully in the global heavy transportation market. Smit Pioneer, however, was converted at a U.K. yard for the offshore installation and cablelay roles.

Immediately following sea trials and commissioning, Smit Pioneer sailed to Le Trait, France, last October to load for a subsea installation program in the Kuito Field, offshore Angola, under a contract won by Smit Maritime Contractors. Smit Pioneer has now commenced a 105-day charter for subsea installation work in Canadian waters. Once again, the vessel loaded at Le Trait, on the Seine, for departure to the Terra Nova Field, offshore Newfoundland. The assignment began earlier this month. The client for both Angola and Canada is Coflexip Stena Offshore. In the former case, Smit Pioneer installed flexibles in the Kuito Field, together with buoyancy tanks and counterweights required for the mid-water arches. This work was associated with the first phase of the fast-track Kuito development. The spread mobilized for the subsea works includes a 66 ft. (20 m) diameter carousel and the Coflexip VLS (Vertical Lay System), positioned at the aft moonpool. A 20 x 20 ft. (6 x 6 m) moonpool plug was engineered, to ensure that the radius of the flexibles remained within the specified parameters. Smit Pioneer is a unique offshore installation vessel, outfitted to remain on station for extended periods. There is accommodation for a



(continued on page 43)



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says that Caterpillar main and auxiliary engines figured prominently into the process when considering initial investment, ownership cost and technology.

"The Cat engines were a logical choice from every standpoint," he explains. "The initial cost of the 3516B engine is extremely competitive. Its compact size makes it easy to install in a smaller place, which allows for more cargo storage. Many competitive engines require purchasing lots of extra equipment during installation; with Cat, it's a complete package."

To determine the engine with the best lube oil and fuel consumption, Hornbeck conducted life cycle analyses between the Cat 3516 engine and a competitive engine. The results impressed Annessa: Total fuel consumption per vessel has averaged between 40 to 60 gallons (151 and 227 L) per running hour with the Cat engines, about one-half the consumption of vessels fitted

with the competitive engine. Lube oil costs per horsepower were lower as well. And because these costs are passed on to the customer, Annessa says, it's to Hornbeck's advantage to keep them as low as possible.

With many competitive OSVs powered by conventional mechanical diesel engines, Annessa found that electronic controls were another key benefit to the Cat engines. "There's a great deal of

emphasis on tradition in this industry. It's difficult to change what people are comfortable with - they like what they know works. But I'm more comfortable with the monitoring and diagnostic capabilities of electronic engines. They alert us if there's a problem, and the built-in safeguards can limit engine damage in high load situations." The engines also produce minimal smoke — a benefit Annessa finds useful with cur-

rent and pending emissions regulations. Overall, Annessa is pleased with the New Breed fleet and believes his customers are, too. "Our goal is to provide a high level of service at high value to the client. We give it to them by contracting professionally crewed, well-built, reliable boats, and the Cat engines have greatly contributed to that."

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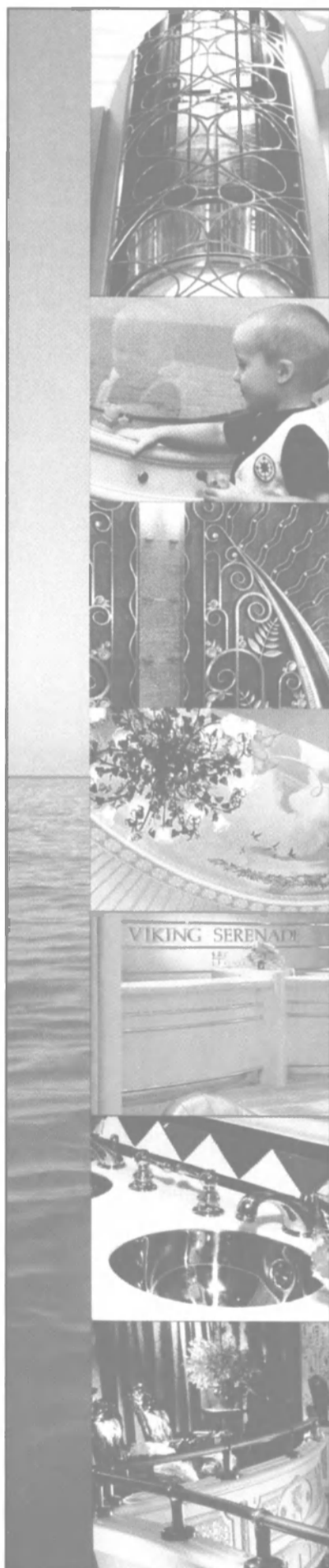
Rig Repowered At Houston Ship Repair

In a joint effort between Wartsila NSD and Houston Ship Repair, an innovative rig was repowered in the U.S. Gulf comprised of the installation of new gensets on Transocean Sedco Forex's semisubmersible drilling rig Transocean Amirante. The upgraded semi, which is now equipped with more than 8 MW generation capacity — is poised to meet future offshore challenges.

The joint-venture, which was spawned in 1998, was designed to meet the specific needs of the owner. Work entailed schedule flexibility, as well as the possibility of quayside or offshore installation. The project began with a joint onboard survey, followed by meetings with Transocean, Wartsila NSD and HSR to determine responsibilities and detailed planning



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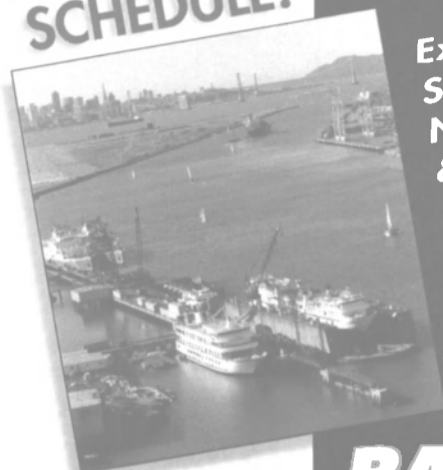


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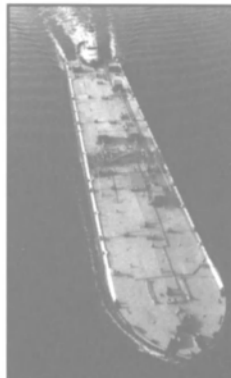
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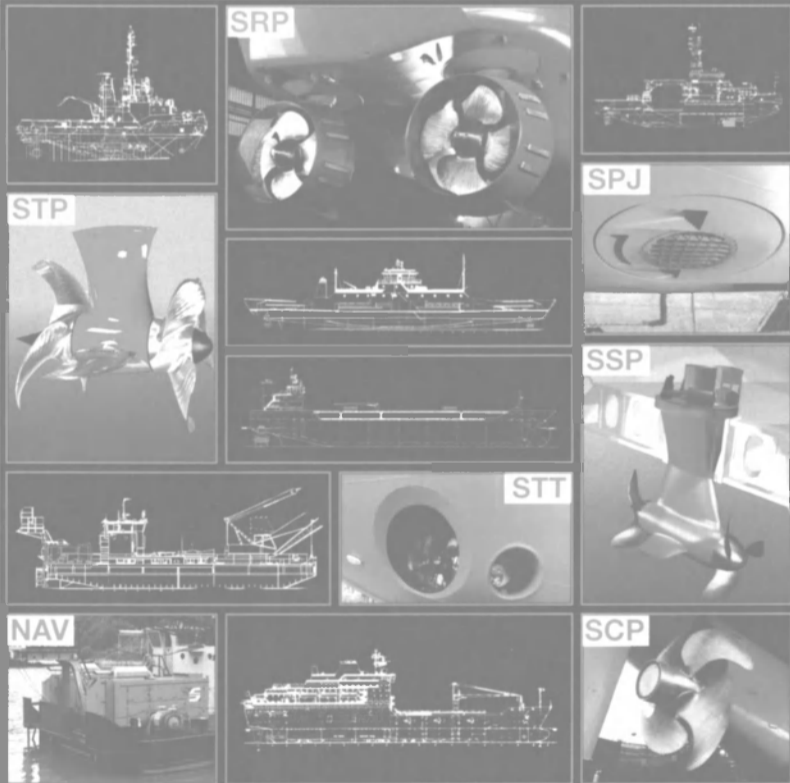
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(continued from page 41)

for a successful project.

The vessel's existing units were replaced with four Wartsila 12V200 generator sets, rated at 2,100 bKW at 1,200-rpm. "We find these units are extremely popular due to the excellent load response, low capital cost and capability of working within the footprint of most all existing rig power systems, thereby minimizing the expense for repower," says **Bob Kimmons**, regional manager for Wartsila NSD. Performing the majority of the yard work at Mobile, Ala., Houston Ship Repair also completed all necessary engineering as well as mechanical and electrical engineering of auxiliary systems. So that rig downtime was kept to a minimum, installation was completed in three phases, the first two consisting of the change out of exhaust pipes and silencers, in addition to the upgrading of electrical components, specifically transformers. Consisting of five weeks,

(continued from page 40)

minimum of 80 persons, including 50 project personnel. Equipment includes an advanced DP system, two moon-pools, a fully heave-compensated revolving crane (rated 150 tons dynamic load), an overhead crane and a Super Puma-capable helideck. The primary operational roles include the installation of moorings for FPSO's, diverless tie-ins, well servicing, flexlay, manifold and riser installation, ROV support and cablelay. The spread required for Terra Nova includes 12 reels, the Coflexip VLS (installed at the forward moon-pool), a trencher and an ROV. The Coflexip contract is Smit's second award connected with Terra Nova — the first development in Canadian waters to require an FPSO. Smit Transport & Heavy Lift is to provide heavy lift services during the outfitting of the FPSO (a newbuild from Daewoo, Korea) at the Bull Arm facility. This program of lifts will be performed next month by Asian Hercules II (3,200 tons lift capacity) — the largest floating sheerlegs in the Smit fleet. Smit Pioneer's task is to trench and lay flexibles in the field, 350 km off St John's Newfoundland. Water depth on location is 312 ft. (95 m). Petro-Canada is the Project Operator. Drilling began in June of last year.

In recent months, an additional role has been identified for Smit Pioneer — as an all-weather surface platform for Smit's POLREC (Pollutant Recovery) system, developed to pump out oils and chemicals from wrecks. The need of an all-weather surface platform was identified following the loss of the tanker Erika off France last December. Smit used POLREC successfully in an award-winning project to pump out Bunker C cargoes from two small tankers lost off the Korean port of Busan. In these cases, the POLREC diverless recovery system pumped the oil to a barge equipped with reception facilities.

April, 2000

the third phase that began during late 1999 involved removing the old units; redundant piping and equipment; performing suitable foundation modifications; installing new common bases engines and alternators; and installing new equipment and piping. New power cables were also implemented, as were control cables, AVR's, control systems, digital governors and rewiring of some existing electrical and controls systems.

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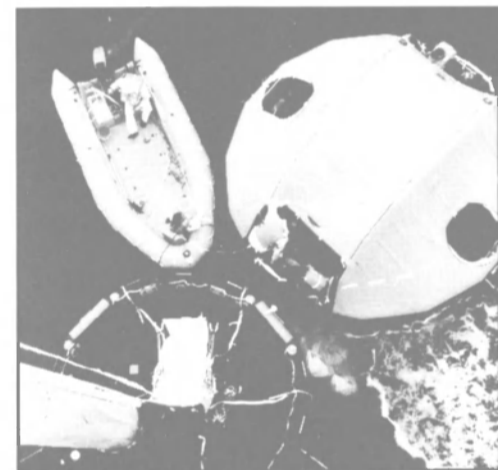
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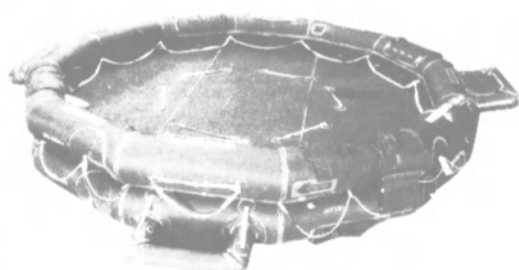
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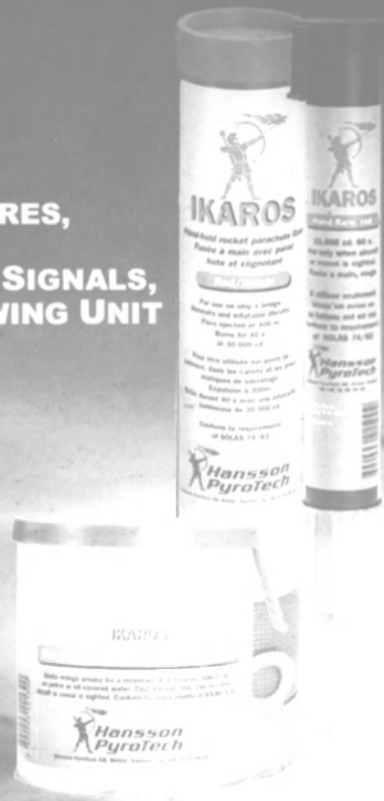
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Charting The World Electronically

The advent of electronic chart technology has left ship and boat owners with an unprecedented tool to aid in safe and efficient navigation. But while the electronic advances have swept interest and headlines around the world, they have also created a considerable amount of confusion regarding, for example, when electronic charts can legally replace paper versions.

With the notion of clearing the air, *MR/EN* has spoken with one of the world's leading companies in the field, C-Map, to discuss the ins and outs of new electronic chart technology.

Currently, ship owners are focusing on the availability of quality electronic chart data for ECDIS. C-Map, being the largest supplier of charts in digital format, has responded to the requirements by offering worldwide coverage on CD ROM. The data from C-Map is coded in proprietary System Electronic Navigational Chart (SENC), optimized for direct use by the onboard ECDIS computer. This format, dubbed CM93 by C-Map, has been adopted by many manufacturers of ECDIS systems (Please see Table 1).

ENC & ECDIS

It is imperative to note that only National Hydrographic Offices (HOs) can issue Electronic Navigation Charts (ENC) data as a paper chart replacement. HOs can, and do, subcontract work to commercial companies, but the HO is ultimately responsible for data quality control. Only when ENCs are displayed on a type-approved ECDIS system can they replace paper charts.

The International Hydrographic Organization (IHO) has defined the ENC chart format specified in the S-57 Edition 3 (S-

57/3) product specification, which is a detailed format developed as a data exchange format to be used by HOs. It is not a format designed to be manipulated and displayed on a navigation screen, and for this reason the ECDIS Performance Standards accept that ENC data is compiled into an internal format in the ECDIS system, or in a SENC format. Thus, one of the more critical steps is ensuring the integrity of the data when compiling from ENC to SENC format. The presentation of nautical charts and symbols on a navigation system is defined by the IHO as well, in the S52 specification, which is also referred to in the ECDIS Performance Standards.

Partnerships

C-Map, in effect, acts as a link between the HOs and the users of digital nautical charts, and the company is constantly developing new technology and services to achieve this goal. C-Map is not only working with HOs to digitize paper charts, but working with them also to develop their national ENC portfolios in S-57/3. C-Map developed the CM-93 Edition 3 (CM-93/3) format that fully complies with the S-57/3 format as defined by the IHO.

Data produced by C-Map is produced in CM-93/3 format, which is used by a number of system manufacturers as their SENC format. C-Map has developed software that compiles S-57/3 data in CM-93/3 format. The compiler was type-approved by DNV, to ensure that there is no loss or corruption of data in this process. This compiler is supplied to system manufacturers that use CM-93/3 as a SENC to enable their systems to read S-57/3 data directly.

The CM-93/2 chart portfolio of 13,900 chart files produced by C-Map has been converted into the same CM-93/3 SENC format, but it can only be used as an aid to navigation. ECDIS systems that use CM-93/3 have access to extensive chart coverage. As ENC data becomes available, this will take priority over other data and be clearly recognized as official data when displayed, but unfortunately only limited ENC data is presently available.

Distributing charts in the SENC format means that the updating of charts can be carried out via the Internet, or remote access using a shipboard communications line. The SENC format, in effect, is a compressed format (approx. 1:5) in comparison to S-57/3, and additionally, no compression is required onboard.

Circle 137 on Reader Service Card

Table 1

ECDIS and ECS Manufacturers that have selected C-Map CM93 Cartography for their ECDIS

Company	For more information Circle
Advanced Marine Technology	121
Coastal Oceanographics	122
Corp Ten Intl.	123
EDO Corp.	124
Electronic Design Inc.	125
Kongsberg Simrad	126
Leica	127
Litton Sperry Marine	128
Lockheed Martin	129
NetSea Inc.	130
Northrop Grumman	131
Q-Mar	132
Quality Positioning Services	133
Racal Pelagos Inc.	134
Raytheon Marine	135
Ship Analytics	136

Reality Checked

ECDIS type-approval is encouraging more shipowners to trust in technology

Shipowners are about to find themselves under a barrage of propaganda about electronic charts and the display systems that run them. These systems have been around for some years, and are used heavily in the offshore, dredging, fishing and leisure fields. But merchant shipping, with a few exceptions, has shied away from using electronic charting, preferring to wait for a common international standard and type-approved equipment. The common standard is now in place, and the first approved ECDIS systems are entering the market. By this summer, there will be a choice of systems, some offering glossy boxes with shiny buttons and some offering facilities owners never dreamt they needed. But what is the reality?

The reality is that a simple PC running well-thought-out software can save time, money and reduce the risk of accidents. The ability of modern PCs to process information means they can be harnessed to improve safety by helping the bridge team manage and display inputs from multiple sources in one convenient place. "Electronic chart and information display systems cut the likelihood of navigational error, cut down on the possibility of an accident, cut chart correcting time and reduce crew fatigue," says **Malcolm Brown**, ECDIS manager of Aberdeen-based Sea Information Systems. "But ECDIS systems are not mandatory, and many owners still regard them as an expensive magic black box. They should think of them as a sensible way to use computers to make their ships more efficient and safer."

Brown has seen the way the offshore and fishing industries have embraced ECDIS. "For fishermen at sea, ECDIS represents the difference between profit and loss, danger and safety. A single computerized chart display system can replace paper charts, free up space that would otherwise be occupied by a navigation station, and allow fast and accurate access to navigation information and positions at any time," says Brown.

This attribute is transferable to mainstream shipping traffic. "How many times have you wished for an accurate real-time fix when entering unfamiliar ports?" says Brown. "Many seafarers worry about out of date charts, but ECDIS upgrades are regularly issued.

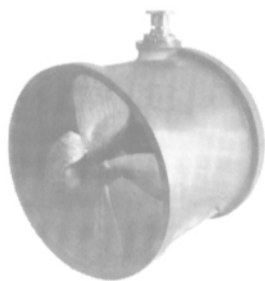
Rather than relying on messy pencil marks on paper charts, and worrying about the accuracy of your corrections, the system is an accurate, instantaneous way of upgrading and correcting your charts," he continues.

Brown, who is a master mariner himself, says one of the aspects that discourage more shipping companies from installing ECDIS is that many applica-

tions of IT to safe navigation are dressed up as expensive systems. "They can run just as well on any PC," he says. "SIS will be launching one of the first stand-alone internationally approved ECDIS systems on the market this spring. But at its heart is a standard PC running sophisticated software. Manufacturers don't need to present their ECDIS in fancy covers," he said

Companies with experience of chart plotting software on ordinary PCs for demanding applications such as offshore rig moves, dredging and fishing, can show just how reliable PC-based systems are. "When working offshore, the movement and positioning of oil rigs and pipelines is a considerable investment," Brown says, "Anything that will reduce the amount of time and cost posi-

Maneuver...Propel...Position



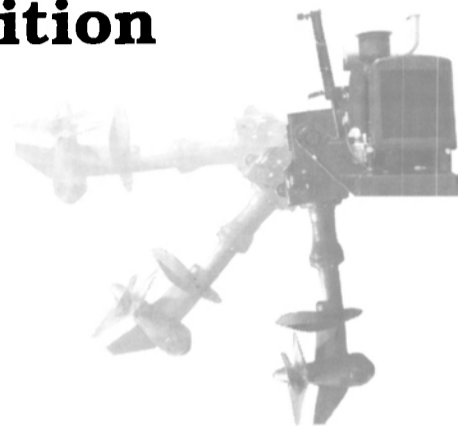
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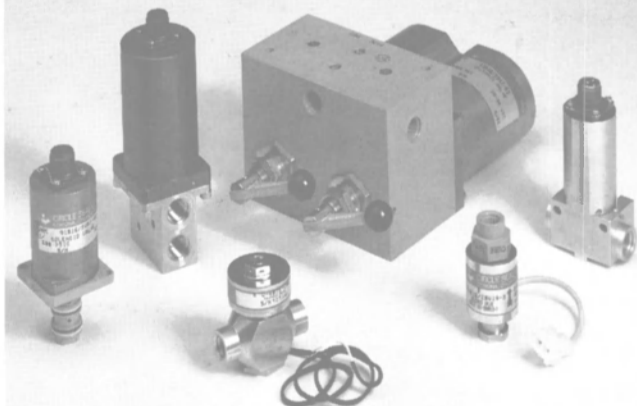
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Circle 22 on Reader Service Card

(continued from page 45)

tioning a platform in its correct location, will be attractive to the owners of the rig." ECDIS is ideal for this. It avoids costly delays as hydrographers confirm and re-confirm that the platform is over the right spot. "By plugging ECDIS software into a GPS plotter, the exact location is easier to pinpoint," he says.

SIS markets a range of software under its Microplot label. Each combines on a single screen all the necessary navigational and environmental information required for the bridge team to make quick and safe assessments of impeding situations. Microplot software was designed by master mariners for mariners, and has a track record stretching back to 1984 in the offshore, fishing and dredging industries. In general shipping, Canada Maritime and a number of other leading operators have chosen to fit Microplot systems in a bid to improve safety.

"This success in general shipping has been a result of listening to what ship operators want. Some owners may be put off by the idea of fitting another expensive black box when it is not yet a requirement of the rules," says Brown. "But if they see it as a straightforward PC system which adds to safety, saves time and is cost effective, they can begin to use IT for other uses. It is the software that is the key, not the shiny buttons on the cabinets."

Safety at Sea • Products

Sailor Meets The Call For Help

Sailor's maritime communications product line ranges from leisure market radios to equipment for fishing vessels of various sizes. The company offers the Sailor A1 VHF, which consists of a transceiver unit, control handset and optional loudspeakers and/or external power supply. The product comes in two versions: Basic and DSC (Class D*). Both are developed to increase safety and ease communications for all kinds of vessels. The system's VHF DSC offers a secure and dependable way to make a distress call with just the touch of one button. The system transmits the ship's identity code, and specifies the position and time of call when GPS-connected.

Circle 138 on Reader Service Card

Prosar Technologies Aims To Save

Prosar Technologies serves the marine market with a variety of safety products. The company offers personal rescue lights, emergency position indication beacons (EPIRBs), emergency locator transmitters (ELT), radio detection finders and search and rescue response transponders (SARTS).

The company's Kannad 406WH is a

self-buoyant EPRIB unit that floats free and automatically activates. Complying with all COSPAS-SARSAT specifications, the product transmits on 406.025 Mhz and 121.5 Mhz, while its distress signal can be positioned within one nautical mile.

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Video Medical Procedures

Maritime Training Services has introduced a new training videotape and accompanying handbook titled, "Medical Emergencies: The Officers' Shipboard Guide." Designed to be used together, the video and handbook package instructs viewers in dealing with the most common medical procedures and emergencies encountered at sea. The training package stresses various medical procedures through interviews, demonstrations and simulations.

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NoFire Technologies Helps Ships Meet SOLAS

In December 1996 the IMO adopted amendments to the SOLAS Convention that affect fire safety measures aboard ships. The amendments encompass a new International Code for the Application of Fire Test Procedures, which has

been made mandatory on or after July 1, 1998.

These significant changes affect Chapter II-2 of the SOLAS Code, Construction-Fire protection, fire detection and fire extinction. Regulation 34 requires nearly all exposed and concealed surfaces to have low flame-spread characteristics, as well as all paints not being

capable of producing an excessive amount of smoke and toxic products.

In response to these new amendments and guidelines, NoFire Technologies, located in Upper Saddle River, N.J. has developed NoFire A-18 paint, which has been tested at Southwest Research Institute of San Antonio, Texas, exceeding requirements and complying with Reso-

lution A.653(161) and Resolution MSC.41(64). NoFire A-18 has Type Approval from the U.S. Coast Guard, ABS, DNV and Lloyd's Register for use on all vessels.

The preceding was excerpted from an article written by Dr. Samuel Gottfried, DEE, PhD; NoFire's president/chief technical officer.

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Holger Heinrich, Managing Director
Westfalia Separator Mineraloil Systems GmbH



McMurdo Presents New Line of VHF Radios

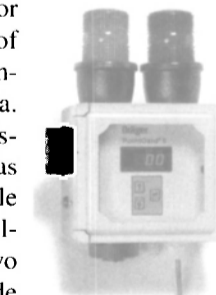


McMurdo, Ltd. has launched a new range of handheld VHF Radios. The R2 range includes the McMurdo R2 GMDSS VHF radio and the R2 Professional VHF radio, both of which are formatted to withstand harsh environments. Known as the smallest GMDSS-compliant VHF radio available, the R2 GMDSS is built to comply with stringent IMO, GMDSS and ETSI standards for use in survival craft and onboard vessels for daily operations.

The R2 Professional is a fully featured 54-channel VHF radio designed to meet the new European Standard EN 301 178 for professional mariners.

Draeger Launches PointGard II

Draeger Safety's new PointGard II is a microprocessor-based, stand-alone gas detector that continuously monitors toxic gases and oxygen in ambient air. Both Compact and economical, the instrument detects toxic levels of gases, as well as excess or deficient levels of oxygen in any non-classified area. Bright LEDs display the target gas concentration, while an adjustable volume horn and two strobes provide alarm annunciation at the point of hazard. The PointGard's apex is its electrochemical DraegerSensor — the most recent development in gas sensing technology. Designed for accuracy, stability and long life span, the user-friendly product is a true turnkey gas detection system that contains optimized temperature compensation with cross-sensitivity given to other gases minimized to ensure an accurate reading of the target gas concentration every time.



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Propulsion Performance Products

Corsaire 13000 Embodies Integrated, Advanced Propulsion System

The new 440-ft. (134-m) mono-hull high-speed ferry Corsaire 13000 will soon undergo speed trials at the French shipyard Alstom Leroux Naval, and the successful testing and subsequent operation of the advanced vessel will prove the value of the complete propulsion system supplied by MTU.

The ship is planned to operate for the French SNCM (Societe Nationale Maritime Corse-Mediterranee) on the 189-n m. crossing from Marseille and the island Corsica at 42 knots. The ship's propulsion and power generation system — virtually all of which was supplied by MTU — is truly one of the vessel's distinguishing features. The engines, gas turbines, gearboxes, couplings, shafts, generators, and fuel and exhaust systems all come from MTU — as well as the comprehensive electronic control and monitoring system.

The heart of the propulsion system is two MTU 20-cylinder 1163 series engines, working in combination with a pair of GE LM 2500 gas turbines. Together they generate 65,000 kW.

For onboard and emergency power, MTU has supplied five 12V 183 engines. In addition, the ship is equipped with the MCS-5 Type 2 electronic control and monitoring unit for the propulsion system, the onboard power supply units and many measuring points throughout the ship.

The Corsaire 13000 is one of the first commercial projects to boast the complete MTU package, a company that has a long history in supplying similar systems for naval applications.

The integration of much of the propul-

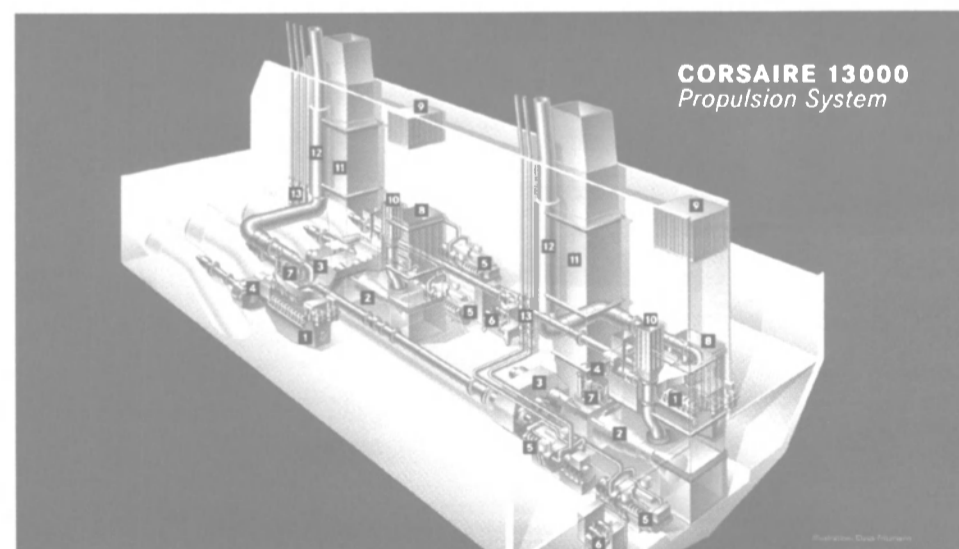


sion package is a natural evolution of the consolidation of marine equipment suppliers today. There are fewer, larger players on the international maritime market, and while lack of choice could lead to disadvantages for owners and builders, the field is still fiercely competitive enough so that "one-stop shops" actually help to make the vessel design and construction process more efficient and cost-effective. Previously (and in many cases, still), shipbuilders are tasked with integrating all elements into a cohesive system, a process that takes time and expertise. The single-system supplier helps to alleviate critical time spent otherwise on such system integration.

Circle 65 on Reader Service Card

The new 440-ft. (134 m) Corsaire 13000 features an integrated propulsion package, including the below designated components and systems.

No.	Description
1	2 MTU 20V 1163 Diesel Engines
2	2 LM 2500 gas turbine modules
3	2 Renk BS 210 reduction gearboxes
4	2 ZF BU 5300 reduction gearboxes
5	5 ship power units with MTU 12V 183 diesel engines
6	2 starter systems for gas turbines
7	2 fuel supply units for gas turbines
8	2 combustion air noise silencers for gas turbines
9	2 combustion air intake filters for gas turbines
10	2 cooling air silencers and fans for gas turbines
11	2 exhaust gas silencers for gas turbines
12	2 exhaust gas silencers for 20V-1163 diesel engines
13	5 exhaust gas silencers for 12V-183 diesel engines



System-Know-how for the Corsaire 13000

MTU delivers complete propulsion and onboard power supply systems.

1 2 MTU 20V 1163 diesel engines

2 2 LM 2500 gas turbine modules

3 2 Renk BS 210 reduction gearboxes

4 2 ZF BU 5300 reduction gearboxes

5 5 ship power units with MTU 12V 183 diesel engines

6 2 starter systems for gas turbines

7 2 fuel supply units for gas turbines

8 2 combustion air noise silencers for gas turbines

9 2 combustion air intake filters for gas turbines

10 2 cooling air silencers and fans for gas turbines

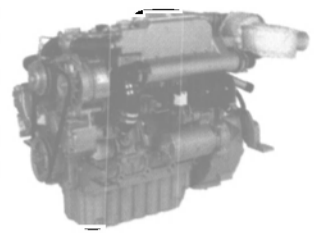
11 2 exhaust gas silencers for gas turbines

12 2 exhaust gas silencers for 20V-1163 diesel engines

13 5 exhaust gas silencers for 12V 183 diesel engines

New Perkins Sabre Engine Unveiled

The new turbocharged Perkins Sabre M85T diesel engine is now available in the U.S. and Canada. The engine is the latest addition to the Perkins Sabre 65 to 800-hp range, and significantly is the engine maker's fourth addition in the past 18 months. The new three liter, four cylinder engine is thought to be ideal for the re-power market as the compact engine has a low-line profile better than many two liter engines on the market, the manufacturers say. The M85T develops its maximum 85-hp at 2,600 rpm, helping to reduce wear and minimize vibration.



Circle 58 on Reader Service Card

Composites For Lighter, Stronger Shafts

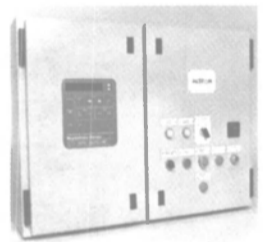
Cutting weight without compromising strength is a mantra for marine vessel and equipment designers. Celsius Applied Composites offers shafting and coupling products, which promise to perform in the rigorous marine environment while saving significant amounts of weight. Applied Composites shafting systems include composite shafts, bearings, bulkhead seals, spacers and fasteners. Acabflex gives a new perspective to lightweight flexible couplings, and are available in sizes up to 150 kNm.



Circle 62 on Reader Service Card

Derektor Boats To Offer Advanced Equipment

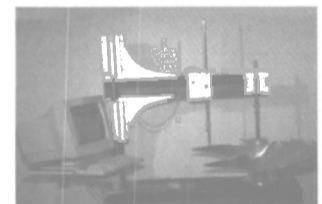
Alstom Regulateurs Europa is supplying a host of advanced products and systems for a new 135.5 ft. (41 m) fast ferry being built by Derektor Shipyard for Nantucket/Woods Hole Steamship Authority. Specifically, the 36-knot, 300-passenger fast ferry will feature two Regulateurs Europa Viking Propulsion Control Panels (PCP) that interface with the Kamewa waterjets and Reintjes clutch/gearbox, which will enable functions such as back-flushing of the waterjets. Mounted on the twin Paxman 12VP185 engines (each @ 2,500 kWb) are Regulateurs Europa type 2231 hydraulic actuators with ballhead backup.



Circle 57 on Reader Service Card

Computerized Propeller Analysis

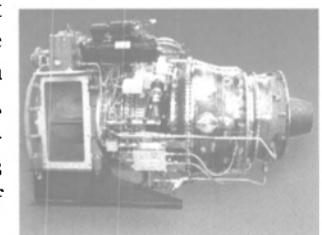
Hale Propeller is distributing the latest version of its Propeller Measurement Recording Instrument (MRI) to the marine industry through a strategic alliance with Michigan Wheel Crop. Hale's MRI is a sophisticated and versatile computerized 3-D propeller measurement and analysis device. A point-and-click command structure allows most users to learn the MRI operation in a few hours. The Hale MRI provides a complete propeller analysis — consisting of thousands of measurements — in five minutes.



Circle 63 on Reader Service Card

TF50 Gas Turbines Specified For High-Speed Yacht

Vericor Power Systems supplied Detroit Diesel Corp. with a TF50 aeroderivative marine gas turbine for the Detroit Eagle, a high-speed megayacht. This is significant, as it will mark the first TF50 to begin operation. The 153-ft. (46.6 m) Detroit Eagle is expected to have a cruising speed of approximately 35 knots.



DDC will supply the completely integrated Combined Diesel and Gas Turbine (CODAG) system for the vessel.

Circle 64 on Reader Service Card

Propulsion Notes

S&S To Supply Gensets For Holland America

Four of S&S Energy's GE LM2500 aero-derivative gas turbine-generator sets will be utilized by Holland America on four of the line's newbuilds. Scheduled to be constructed at Fincantieri's Marghera shipyard, each 951 ft. (289.8 m), 84,000-ton vessel will be equipped with one of the gensets, operating in tune with one or more of the five diesel generators onboard. This combination enables the vessels to run in environmentally sensitive areas using clean gas turbine power. The vessels will also incorporate a podded drive propulsion system, which provides better maneuverability and enhanced operating efficiencies.

Operating approximately 2,500 hours per year, each LM2500 will be fueled by Marine Gas Oil. The turbines will be configured with a low-pressure waste heat boiler tapping into each vessel's steam system.

Circle 71 on Reader Service Card

TRAC Stabilizers Provide Improved Control

Known for its TRAC thrusters, American Bow Thruster added a high performance, active fin roll TRAC Digital Stabilizer, which monitors rate of roll and heel angle.

The system automatically measures vessel speed, and quickly adjusts system gain accordingly to eliminate long-standing weakness of traditional stabilizer systems.

A specially designed winglet increases lift by 30 percent while lowering drag by 20 percent for optimal performance. While there are no special adjustments mandated for different sea states, the TRAC automatically adjusts to any sea state for maximum stabilization. Available in sizes ranging from 2.5 to 58 sq. ft., TRAC easily integrates with ABT thruster and central hydraulic systems.

Circle 14 on Reader Service Card

Cole Hersee Introduces Brass Ignition Key

Cole Hersee Co., manufacturer of heavy-duty electrical products for the vehicle industry, has introduced the M-725 switch. This practical device is equipped with shoulders at the key entry that help provide torque from the key to the switch to eliminate shearing of the key shank. In order to keep moisture away from the electrical contacts, the product is filled with o-ring seals. Solid brass screw terminals and chrome-plated hardware complement the switch as well.

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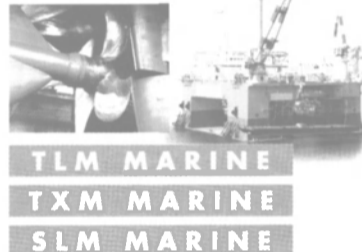
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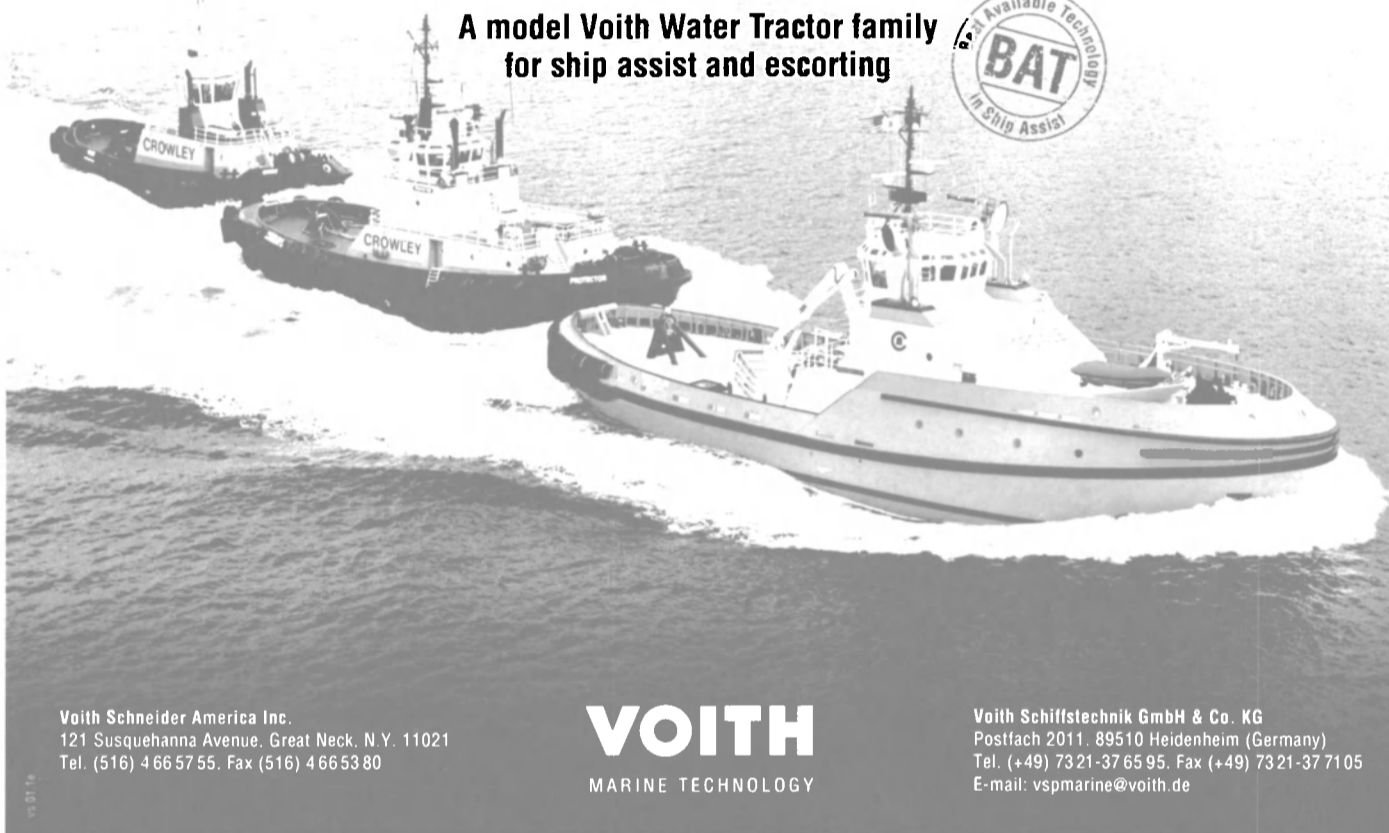
Propulsion Performance Products

Is Diesel-Electric Propulsion the System for You?

For the right types of vessels, diesel-electric propulsion offers a myriad of advantages over other systems — among them are: better performance, greater cargo capacity, lower costs, and longer equipment life. Although other considerations can enter into play, what constitutes the "right type of vessel" has largely to do with the difference

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Circle 309 on Reader Service Card



Close-up shot of SCR cabinet.

between the power required for main propulsion versus what is required for maneuvering: the bigger the disparity, the larger the potential reward.

Supply boats, tugboats, research vessels, drill ships, gaming vessels, and in particular, vessels performing dynamic positioning represent prime candidates for a system, which has many experts wondering why it is not employed more extensively. "Diesel-electric has powered the petroleum industry's on- and offshore drilling rigs for decades, is used exclusively in railroad locomotion, and has long been favored by the U.S. Navy for research and specialty craft," notes naval architect **Norman DeJong** of DeJong & Lebet Inc., Jacksonville, Fla.

"With an SCR drive, a vessel can go farther, faster, quieter, consume less fuel, carry more cargo, have more maneuverability, reliability, and require less maintenance," he adds.

Synonymous with diesel-electric propulsion, SCR drive takes its name from the silicon-controlled rectifiers — SCR units — at the heart of the system. A typical design comprises three or more diesel-powered generators in parallel, feeding fixed-voltage alternating current to a common switchboard (diagram). The switchboard distributes ac to the SCRs, which convert it to variable-voltage direct current for the vessel's propulsion motors, bowthrusters,



Photo of full SCR system.



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tow winches, and sundry dc equipment. The switchboard also supplies ac for the ship's normal service, auxiliary loads, and lighting.

Ken Robbins, president of Marine Propulsion Inc., Hammond, La., relates the arrangement to an electrical power station for a small community. "You can draw as much power out of it as you put into it," he says, "and can send that power wherever it's needed."

The advantages of diesel-electric drive impact three interrelated areas of prime consequence to vessel owners: performance, operating cost, and payload capacity.

Performance-related benefits focus around the superiority of dc traction motors for high-torque maneuvering and dynamic positioning. The motors are capable of providing full torque at all times, even at zero rpm, and furnish dynamic (or regenerative) braking capability. Propeller reversals happen within five to 10 seconds by reversing the polarity of the dc power, thus eliminating the need for a reverse gear.

With dc traction motors rpm can be controlled all the way to zero, whereas diesel rpm cannot be reduced below idle speed. Moreover, dc motors are indifferent to extended periods of lightly loaded low-speed operation — a condition hostile to direct-diesel fuel economy and engine life.

During high-speed operation, a dc motor can exceed rated rpm by 50 to 100 percent — safely and harmlessly — simply by reducing the field current. Horsepower holds steady at maximum output, although torque output above rated rpm decreases proportionately as revolutions-per-minute climb.

Other diesel-electric operating benefits help lower the vessel's overall cost of operation. The engines, for instance, never have to lug or strain against the governor; they're always humming along at rated rpm under 60 percent load or more — a condition promoting component longevity and maintenance savings. The use of engine-generator sets permits adding-on or shutting-down engines as demand fluctuates, ensuring the efficient use of available horsepower, economical fuel consumption, and minimized wear.

"A good analogy would be several air compressors supplying a large reservoir serving several air motors operating at variable outputs," suggests DeJong. "If you need more air, engage another compressor. If you need less, disconnect a compressor or two."

With horsepower requirements tied to electrical generation rather than propelling and maneuvering the vessel, smaller diesels can be specified. "Maintaining top vessel speed with two large engines running at 60-percent load is not

nearly as cost-effective as running two smaller engines at full load," Robbins says. "Yet that's precisely what can happen with direct-diesel, should maneuvering performance dictate engine size."

The cost-efficiencies with electric drive go even further. For example:

- No dedicated engine (and associated fuel-delivery, starting, cooling, lubricating, and exhaust equipment) for each

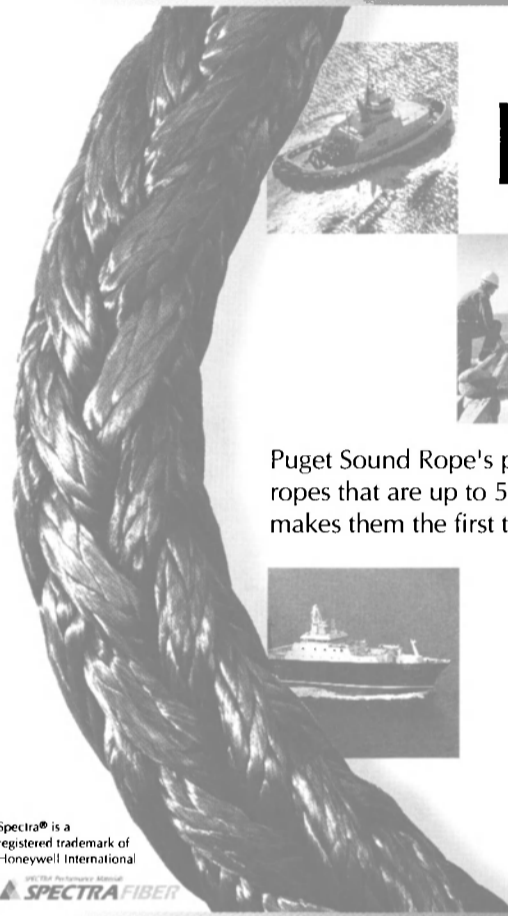
driven load (thrusters, main screws, winches, pumps, etc.) — just standard, direct-coupled dc motors powered from the ship's service generators;

- no clutches or reverse gearing to maintain or repair.

Additionally, the engine-generator sets come skid-mounted for level installation on resilient pads that minimize noise and vibration and make for a quieter vessel.

There's no aligning engines with gearing, since there's no gearing in the first place, and thus no mulling over tilt angles when complying with American Bureau of Shipping (ABS) trim standards.

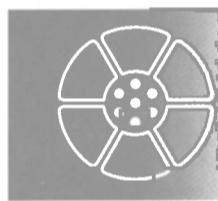
These latter benefits introduce the subject of design flexibility and how diesel-electric drive can favorably impact cargo space.



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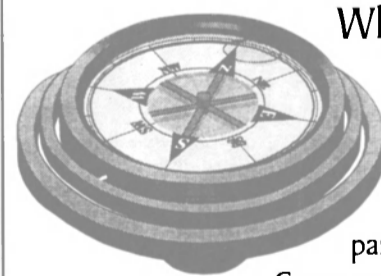
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Propulsion Performance Products

"Diesel-electric drive conveys extraordinary freedom of configuration," says DeJong. "Because the engines and generators can go just about anywhere, you can place them forward and use their weight as trim ballast, creating more room for cargo aft." Forward placement also locates the engines close to the stacks, which shortens intake and exhaust plumbing. That lets the engines breathe, and therefore work, more easily, with less exhaust back-pressure to overcome.

Versus controllable-pitch propulsion, electric drive can deliver equivalent performance with fewer moving parts. Equivalent performance, because the propellers have full shaft horsepower on tap in all modes of operation. Fewer parts, because the system eliminates the valves, rams, and other hardware of CP

hydraulics. Another advantage: multi-shaft maneuverability with only one engine running.

But that's not to suggest an either-or proposition. To the contrary, SCR-controlled dc motors can be, and have been, used to power CP propeller reduction gearing and virtually all other types of propulsion loads, from reduction gears with fixed pitch propellers to Z-drives to low-speed water jets and tunnel thrusters. The choice is a function of application. Which harks back to the original question of whether or not diesel-electric is the system for you.

Therefore, do consider SCR drive:

- When propulsive power constitutes a small percentage of the total required for maneuvering, positioning, pumping, lighting, and so on;
- when maximum torque and respon-

sive control are necessary for dynamic positioning and bollard pull conditions;

- when maneuvering agility, especially with rapid propeller reversals, is of paramount importance; and
- when physical criteria either preclude direct-diesel or render it cost-prohibitive - SWATH vessels with hulls or struts of inadequate size; sternwheelers and other vessels requiring forward-positioned machinery to avoid trim problems; configurations that would necessitate more than one machinery space to accommodate direct-diesel, with a corresponding multiplication of cooling, intake, exhaust, ventilation, and control provisions.

And do consider it in spite of any concerns you may have about harmonic distortion. Some vessel operators fear that, with a large electric plant, harmonic dis-


tortion reflected on the ac line could cause computers, navigating equipment and other sensitive electronic devices to malfunction. As Robbins points out, "It just isn't a problem. The potentially adverse effects of harmonic distortion are easily eliminated at the design stage. The simplest and most economical method is to apply harmonic filters to the ship's sensitive equipment." By connecting filters to these sensitive loads, instead of to the source, much less filtering is required to neutralize harmonic distortion.

As for the singular "don't": Do not consider an SCR drive system when main propulsion, particularly under consistent loads for extended periods, constitutes 80 percent or more of the total power demand. Only rarely will such applications gain much benefit from diesel-electric.

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Jeff McMahon is vice-president of International Electric Company Inc., a Houston, Texas-based manufacturer of SCR drive systems for oil-well drilling and marine applications.


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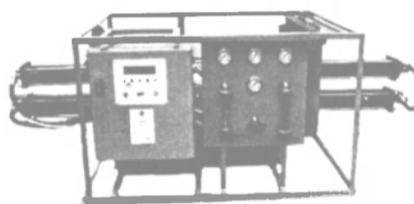
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Drew Marine, MAN B&W Launch Redesigned Fuel Mill




From left: **Wilhelm Pape**, MAN B&W manager; **Dieter Faustmann**, Drew Marine regional marketing manager; **Jack Finnegan**, manager of new business development for Drew Marine; **Nels Henrickson**, Drew Marine vice president of marketing; and **Peter Planitzer**, MAN B&W manager.

The Drew Marine Division of Ashland Specialty Chemical Co. and MAN B&W Diesel AG have launched production of redesigned Fuel Mill dynamic homogenizers through a new working relationship between the companies. Under the manufacturing agreement, MAN B&W will produce all of the homogenizers that Drew Marine provides to shipowners worldwide for the full range of proven fuel-homogenization applications. In addition, MAN B&W is integrating Fuel Mill units into its Fuel-Water Emulsification module. Drew Marine's homogenizer is a milling machine equipped with concentric, cone-shaped gears with toothed surfaces that grind heavy fuel oil as it is pumped through the handling system. Drew

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Marine supports the homogenizer through a unique program of comprehensive fuel management designed for optimizing the treatment of problem fuels. An independent testing laboratory in Taiwan has documented the performance of the Fuel Mill dynamic homogenizer. The research showed significant improvement in the homogeneity and viscosity of heavy fuel oil following homogenization.

Circle 60 on Reader Service Card

Austal Breaks 24-Hour Record

Reaching speeds of 47.7 knots, the Austal-built "Villum Clausen" has written its name into the record books, breaking the record for the longest distance traveled by a ship in 24 hours. Enroute to Denmark, the 282 ft. (86 m) gas turbine powered vehicle-passenger catamaran covered a distance of 1,063 n m in a 24 hour period — adding another 45 n m to the previous record. The record breaking journey took place on the passage between Sumatra and Cochin, India, during the fast ferry's delivery voyage from Austal's Western Australian shipyard to the Danish island of Bornholm for BornholmsTrafikken. The average speed on the run was 44.2 knots. "After 23 hours Villum Clausen covered the distance of 1,018.2 n.m., which is the distance of the previous record, held by the Danish fast ferry Cat-Link V, which won the Blue Riband of the Atlantic on July 20, 1998," said ship's Captain **Claus Kristensen**.

The propulsion plant of the aluminum catamaran comprises 2 x GE LM2500 gas turbines generating 18,000 kW each, 2 x Renk gearboxes and 4 x Kamewa waterjets.

Circle 56 on Reader Service Card

Dynalco Engine Analyzers Type-Approved

Dynalco Controls, a Crane Co. company, announced that its Diesel-Trap 9240, 9220 and 9220/P portable diesel engine performance and vibration analyzers, in conjunction with Dynalco's RTwin analysis software, have received type approval from the American Bureau of Shipping. The Diesel-Trap analyzer determines diesel engine performance and mechanical condition. Depending on the model, these analyzers collect phase marked cylinder pressures, vibration and ultrasonic data. The 9240 model comes with Dynalco's Beta-Link, a built-in digital wireless transmitter/receiver unit for flywheel reference.

RTwin software manages the engine data and structures it in displays and reports for extensive statistical analyses.

Circle 59 on Reader Service Card

PropExpert V. 4.2 Released

HydroComp, Inc. released PropExpert version 4.2. — a software tool from HydroComp, Inc. for propeller sizing and selection. The response that a user gets after clicking the Build button on the Sizing page has been changed. PropExpert now searches harder to find a

solution before returning with its warning and error messages. There will no longer be multiple messages (e.g., the best diameter is larger than the maximum) during the calculation. One general message at the conclusion of the Build will be shown only if the sizing encountered serious cavitation, an opti-

mum diameter is larger than the maximum, or if a maximum speed could not be found. HydroComp is always improving PropExpert's speed prediction algorithms as new data is made available. This version includes an improved prediction for all vessels.

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Propulsion Performance Products

GE To Supply Gas Turbines For IHI

GE Marine Engines has received a contract from Ishikawajima-Harima Heavy Industries (IHI) to supply two LM2500 aeroderivative gas turbines. The units will be used to power a single 11DD Murasame-class destroyer being

constructed for the Japanese Maritime Self-Defense Force (JMSDF).

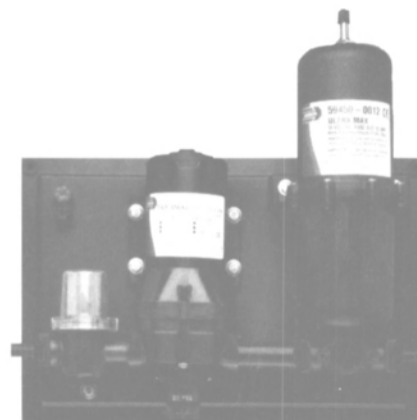
This past year, GE garnered similar orders from IHI for eight LM2500 gas turbines to power 09DD and two 10DD Murasame-class destroyers, scheduled for delivery in 2002 and 2003, respectively. The 11DD project brings the total number of LM2500s in the JMSDF fleet

to 49 — including all engines on order — operational and spares.

The LM2500 gas turbine kits for the destroyers will be manufactured at GE's Evendale, Ohio facility, while IHI will assemble and test the gas turbines and modules at its Kure No.2 plant. The destroyer will be commissioned in 2004.

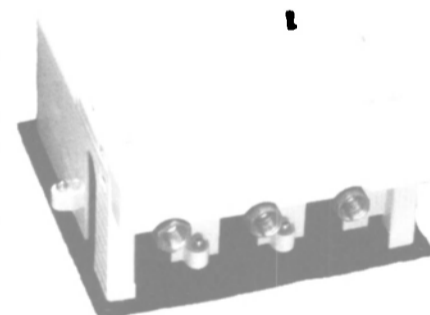
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Jabsco Offers Oil Change Kit



Jabsco's Ultra-Max system.

ITT Jabsco has recently released a variety of new products. Among them is Ultra-Max mini-outlet water systems, an all-encompassing fully-assembled solution that includes a powerful pump, inlet strainer and accumulator tank mounted on a corrosion-proof base. Easy to install in just a few minutes, the product can be mounted to the base in any form, making two snap-in plumbing and two wire connections, using screw down terminals on the base shelf.




Jabsco's new oil change system.


Significant in Ultra-Max is the Par-Max pump that can self-prime at up to five ft., running dry without damage, while providing quiet, low-amp operation. Matched with a Pumpguard strainer with fine mesh stainless screen, the Par-Max motor is thermally protective and fully-compliant with USCG electrical regulations. The company's Oil Change System is designed for changing onboard oil in an easy and safe manner. Consisting of a reversing impeller pump with a multi-valve manifold, the system can be installed in any vessel's engine compartment. Plumbed directly to the oil pan of each onboard engine and/or generator, the system is supplied with a five-way manifold equipped with three brass valves. Measuring 11 x 11.5 x 5.25-in., the product weighs nine lbs. and is available in both 12 and 24-volt DC operation.

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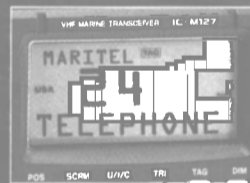
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MARITEL

Marine Communications System

Calling All Mariners

By Regina P. Ciardiello
associate editor

Globalstar, L.P brought its next-generation strategizing to fruition with the release of full commercial access of its mobile satellite service in the U.S. through its distributor Globalstar U.S.A. With the recent demise of Iridium, and ICO Global Communications' ongoing recovery from bankruptcy, Globalstar's entry into the market is seemingly ideal. Vessel owner/operators increasingly rely on state-of-the-art communication tools to ensure safe, efficient operations. Much as has transpired in consumer markets, the wider availability of communication technology — and subsequent drive-down of equipment and airtime pricing — fuels airtime usage. One of the most prominent trends to hit the industry is the era of satellite communications, supplemental to the conventional "cell-phone," satellite services offer extended service to remotely-located areas — areas where cellular coverage is nonexistent. Enter Globalstar U.S.A. (GUSA), an indirect subsidiary of Vodafone Air-Touch Plc, the company has sole exclusivity to sell its satellite service throughout the continental U.S. The newly established service provides customers with the ability to place and receive phone calls and short messages. In due time, the company is also striving to

release an e-mail and other data features across other parts of the world.

The land-based section of this network is both owned and operated by Globalstar U.S.A. throughout the U.S., Canada and the Caribbean. With gateways situated in Clifton, Texas; Smiths Falls, Ontario, Canada; High River, Alberta, Canada; and San Martin-Texmelucan, Mexico, the service places each call to the nearest satellite, which then rebounds to the closest gateway from where the call is being made. The next step involves a routing into the landline system.

Known as "Bent-Pipe" Architecture, this method allows the call to move through a terrestrial infrastructure — leading to upgraded call quality and fewer dropped calls.

With coverage encompassing approximately 85 percent of populated areas worldwide through its 48 low-earth orbit (LEO) satellite constellation. Orbiting the globe every 113 minutes, the Globalstar system provides its customers exclusively with Code Divisional Multiple Access (CDMA) communication transmission technology.

This tool, which satisfies customer demands of larger network call capacity, enhanced security and distinct voice quality is, according to **Andy Radlow**, GUSA director of marketing, "the most popular and fastest growing wireless standard that is well-suited to harsh radio environments." This handy tool also allows the user to talk to five satellites at one time and if one satellite is obscured by a large object, the other Globalstar-deployed satellites will maintain the user's current connection.

Getting It Off The Ground

Established in 1991, San Jose, Calif.-based Globalstar L.P. is a conglomeration of international telecommunications companies. The venture was spearheaded by Globalstar co-founder, Loral Space & Communications and Qualcomm — with noted strategic partners such as — DACOM, Daimler-Chrysler Aerospace, Space Systems/Loral and parent company, Vodafone AirTouch. Through subsidiaries and joint ventures, U.K.-based Vodafone, came onboard in 1994, and currently serves as the service provider for Globalstar in 15 countries throughout North America, Europe, Australia and Africa. The company holds an eight percent interest in the Globalstar conglomerate.

Preceding its grant for licensing from the FCC this past December, GUSA orchestrated the first phase of its satellite services through a trial period occurring from October to December 1999. During this time, both the company's distributors and targeted potential customers acted as testers of the impending network.

Following this free trial period, the individuals were asked to evaluate the service's good and bad points, as well as offering ways in which the system could be more user friendly.

After implementing some fine-tuning to its network, premiered its revolutionary service to the world on February 28 at CTIA Wireless 2000 in New Orleans, La.

Globalstar To The Rescue

Seemingly gone from the satellite communication scene is the pioneer Iridium LLC, which ceased service, potentially forever, on March 18. Fol-

lowing a high profile romp through Chapter 11 restructuring and billions of dollars from partner Motorola, Iridium simply could not find any interested buyers who were willing to pick up its pieces. Despite Motorola's attempt to help Iridium recover (it held a 20 percent minority interest), the company had been treading murky waters up until its demise. A letter drafted by Motorola to Iridium customers stated, "that unless a qualified buyer comes forward and provides additional funding by March 15, we do not expect

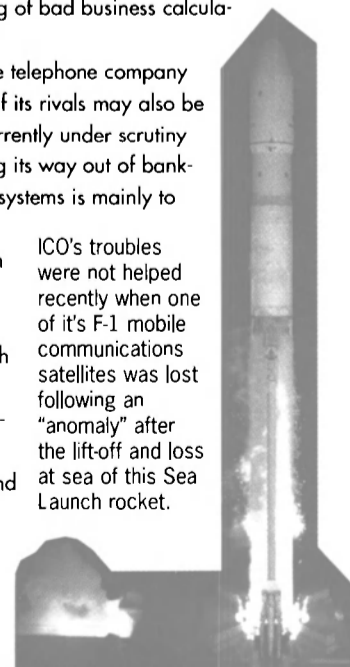
The Qualcomm GSP 1600 Globalstar/CDMA/AMPS Tri-mode handset is priced at \$1,500.

Connecting To A Bridge Over Troubled Waters

Iridium LLC, a bankrupt \$5 billion satellite telephone service, went down in history on March 18 as one of the costliest corporate fiascoes of all time. The Washington-based company said it was cutting off telephone service to its 55,000 customers as of 11:59 p.m. on Friday, March 17 — prior to a court-ordered liquidation. Iridium's final act will be to "de-orbit" — and ultimately burn up — its constellation of 66 satellites now 485 miles (780 km) high, which was the first to make staying connected possible from any spot on Earth. The network has been reported to have cost between \$5 billion to \$7 billion. By beaming instructions to on-board devices, engineers eventually will tip the craft, one by one, on a path that will send them down in flames. The target will be the ocean — a spectacle that may be visible from Earth. A judge cleared Iridium to spend \$8.3 million to start winding up its business while selling remaining Earth-bound assets, including ground stations. Iridium had been operating under court protection from its creditors since last August, less than a year after its network became operational on Nov. 1, 1998. The company's bankruptcy reflected a string of bad business calculations and high expectations.

The costly collapse of Iridium LLC, the \$5 billion satellite telephone company that cut off service on March 18, has analysts wondering if its rivals may also be in danger of burning up. One of Iridium's counterparts currently under scrutiny is ICO Global Communications, which is currently climbing its way out of bankruptcy. Analysts said the rapid evolution of ground-based systems is mainly to blame for Iridium's failure and serves as a warning signal to ICO that its targeted subscriber base has already begun eroding. ICO, before filing for bankruptcy, planned to charge anywhere between \$.50 and \$3 per minute. Analysts said that cost could be brought down significantly with bankruptcy proceedings that have erased the company's debt. But its bankruptcy woes are well documented. Billionaire cellular pioneer **Craig McCaw** is trying to pull the financially grounded satellite network out of bankruptcy and into service by the third quarter of 2002. The company, whose shares were delisted by Nasdaq in December, has a new focus that will be more on Internet and data-based services rather than on its original mission of voice transmitting networks.

ICO's troubles were not helped recently when one of its F-1 mobile communications satellites was lost following an "anomaly" after the lift-off and loss at sea of this Sea Launch rocket.



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Satellite Communications

Iridium service to be available after 11:59 p.m. EST on March 17." The notice, which appeared on Motorola's Web site, also suggested its customers to explore other services, such as Globalstar should they want to continue satellite service.

Quick thinking and decisive planning

already had Globalstar on its feet even prior to the March 17 blackout date. The company's distributors had already implemented aggressive promotions targeted to the estimated 55,000 Iridium customers. One distributor was even boasting an offer where Iridium customers could trade in their now-useless

phones for \$495 toward a Globalstar system. Globalstar flaunts a selection of products that are maritime industry-specific. From the small vessel owner, all the way up to the world's largest cruise ship - Globalstar's satellite service function can provide voice and data communications from as much as 200 miles off-

shore U.S. east and west coasts.

Small vessel owners are likely to favor the GSP-1600 tri-mode handset. Due to its crisp digital voice function, this portable hand-held unit can be used as an emergency communications alternative should the onboard radio fail. Used on small fishing boats as a weather monitoring device, the product, which weighs a little more than 11 ounces, can easily be switched from cellular to satellite mode. The company also touts a maritime fixed phone that is similar to its hands-free car kit. Priced at \$999, the GCK 1400 is designed for use with the tri-mode phone. The Qualcomm-manufactured unit is specially weatherized for added protection against water damage.

While Globalstar's maritime base constitutes for just 15 percent of its business, the company is working to boost that number with promotional events sponsored by renowned maritime organizations such as Raytheon. Standing firmly on the fact that Globalstar services are marketed to many niches rather than one mass market, therefore there is no "average customer." The company reaches out to not only vessel owners and operators, but to a division that works to support the maritime world - the oil and gas industry. Those located at offshore drilling rigs and remote drilling locations can look to Globalstar to provide them with a communicable device to provide their home offices with project reports and updates, mainly through Globalstar's GSP 2800/2900, which can be placed on a wall or desk. Ideal for use in remote areas, where drilling rigs are typically located, this model is priced at \$2,499. In addition, larger vessels, typically cruise ships can connect to their internal PBX system for outside voice access at homeport - a cost-effective way to keep the lines of communications open on both ends.

Touting three domestic pricing plans based on a monthly service charge, as well as fees for satellite connection and utilization, Globalstar U.S.A. has developed each plan with various needs in mind, beginning with the Beyond Basic Plan. At \$29.99 per month, users will pay a cost of \$1.69 per minute for satellite airtime, while the Beyond 100 Plan is \$169.99 per month including 100 minutes of satellite airtime with additional minutes costing \$1.49. For more reliant users, the Beyond 250 Plan runs at \$369.99 with 250 minutes airtime - additional minutes are \$1.39. Offered by GUSA agents, and set by GUSA resellers according to market conditions, these fees are non-inclusive of international long distance charges.

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Satellite Communications

MTN, BT Hook-Up Cruise Ships To Cell Phone Network

In a move which perhaps heralds the next plateau in at-sea communications, Maritime Telecommunications Network (MTN) in Miami announced an innovative partnership in which its satellite communications network will be used for a new service developed and patented by BT A&M, BT's satellite communications division. Cruise Connect, as the new service will be dubbed, will enable passengers and staff on cruise ships to make and receive calls from cell phones at sea.

"MTN is excited to bring the extended convenience of connecting cellular networks with vessels served by MTN's global C-band network," said **Bradford Briggs**, MTN's senior vice president and general manager.

MTN is a leader in maritime communications, providing C-Band, voice, fax, data and internet communications to the cruise industry, the U.S. Navy, and to offshore oil and gas platforms around the world. MTN also provides ship-to-shore live video

and radio broadcast capabilities in C-or Ku-Band. The company — a subsidiary of ATC Teleports Inc. of Fairfax, Va. — is on a strong growth pattern and has recently signed a five year lease on a 23,763-sq.-ft. building to expand its operations.

Cruise Connect functions via the installation of discrete, mini cellular stations installed on the vessels. These stations are linked, via the MTN satellite communications network, to a mobile switching center within the land based cellular network. The system should prove desirable in many instances, as it allows the user to utilize their cell phones — to both make and receive calls to their normal number — as well as to receive billing via their regular statement. It also will provide a valuable service, as the regular shipboard phones are disconnected the night before docking back at the homeport, so that billing can be reconciled by the morning disembarkation.

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(See page 68 for more SatCom News)

Stratos Awarded \$48M Contract

Stratos has received a long-term (42-month) U.S. Space and Naval Warfare (SPAWAR) contract valued at \$48 million for the provision of Inmarsat -B 64Kbps (High Speed Data) lease services to the U.S. Navy's battlegroups. The contract is inclusive of the battlegroups' associated amphibious readiness groups, as well as other U.S. Navy ships supporting worldwide U.S. interests.

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NASSCO Wins \$230M Contract

National Steel and Shipbuilding Company (NASSCO), was granted a \$230 million contract to build its eighth large, medium-speed RoRo vessel per the U.S. Navy's Strategic Sealift Program. The contract wraps-up the 20-vessel LMSR Program that NASSCO has shared with other U.S. shipbuilders. The company now has contracts for 11 vessels, three conversions and eight new constructions.

GPC Awarded Contract

GPC was granted a multi-year contract by the MMS for Support of Scheduled Annual Maintenance, Spare Parts and Post Deployment Inspection, Repair and Refurbishment of Oil Spill Response Equipment. GPC is scheduled to maintain pre-positioned pollution response equipment inventory, such as oil boom, skimmers, pumps, barges and ancillary equipment.

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Norwegian Manufacturers Maintain Edge

The cliché "the more things change, the more they stay the same," certainly applies to the past, current and future role of the Norwegian maritime cluster in the grand scheme of the international ship and boat building communities.

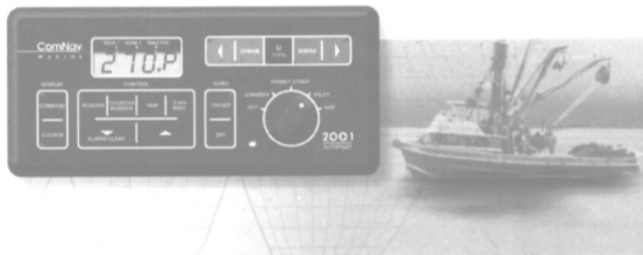
Few countries, if any, can boast the maritime history of Norway, a history that entails many colorful tales surpassed only by the number and magnitude of marine innovations, which have emerged from a country with a population (approx. five million), which is smaller than many large cities. And while corporate consolidations around the globe continue to morph the marine market — including many notable Norwegian companies such as Ulstein, which is now a portion of the Rolls Royce group — it's a safe bet that the level of innovation and creativity emanating from these companies will not waver.

The formula for success in Norway is quite simple, actually, and can be credited to a level of hard-work, market intelligence and cooperation which is unequalled.

Despite its size relative to world population, Norwegians stand tall in the maritime community, with Norwegian merchant vessels accounting for a hefty 10 percent of the world fleet. It is this platform — a diverse fleet of large oceangoing ships — that sets the stage for Norway's product and service prowess. Norwegian cooperation among shipowners, manufacturers, finance and government is legendary in that a mutually beneficial environment was created and is carefully nurtured. Technology companies work hand-in-hand with some of the most quality-conscious shipowners in the world, developing, testing, refining and bringing to market a breadth of advanced marine systems and products.

While the home market plays a critical role on the system and product creation end — and Norwegian owners are undoubtedly swayed to sometimes favor "home cooking" over outside solutions

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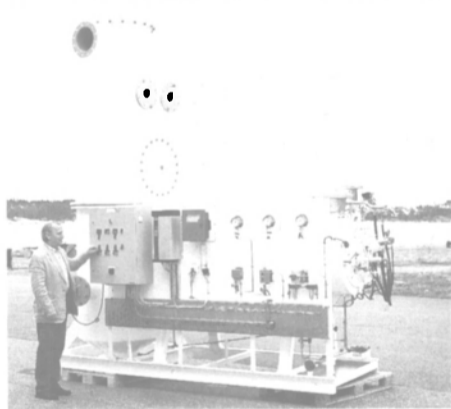
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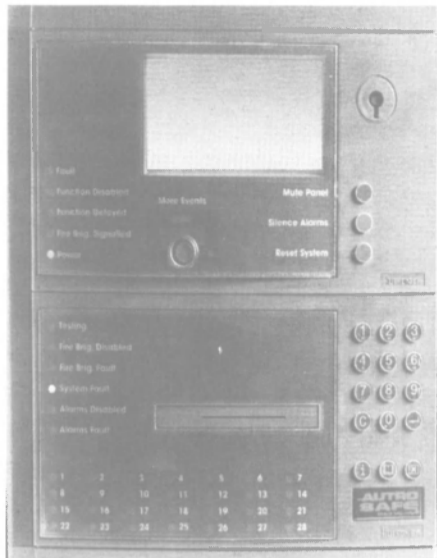
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For additional information on the products highlighted in this report, please circle the appropriate number on the Reader Service Card in this edition.

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New from Autronica is a fire safety management system that comprises a new fire detection system combined with a color graphic indication and control system.

— these companies have proven their mettle on the competitive and increasingly cost competitive international market. An impressive 60+ percent of Norwegian ship's gear is exported worldwide, and major manufacturers through the assistance of the Norwegian Trade Council are continually searching for new means to produce products closer to the consumption area, whether it is through international expansion, partnership or licensing agreement. Highlighted in the ensuing pages are just a few of the country's more notable recent successes.

Unitor, a company, which is a truly international service group with operations in 80 countries, centers its product and service offerings around improving ship management efficiency and reducing operational costs, while promoting safety at sea. Unitor's latest offering — a new soot remover liquid and dosing unit designed to improve diesel engine and turbocharger efficiency — is sure to be a hit given the high profile of propulsion related issues. Offered from the Unitor Chemical Service, the new products from part of the company's redefined marine chemical service concept. Increased soot deposits can cause a range of problems, including exhaust system soot fires. Unitor's new Soot Remover Liquid has been engineered to prevent soot build-up at low exhaust gas temperature (200 degrees C/392 degrees F). The catalysts in the new system form a vapor upon heating, penetrating the deposits and catalyzing the carbon. The modified soot then ignites and is safely burned in the exhaust system. The liquid can be manually or automatically dosed into a vessel's exhaust trunking, upstream of the boiler. The automatic dosing unit — a valuable feature in the attempt to save valuable crew time —

April, 2000

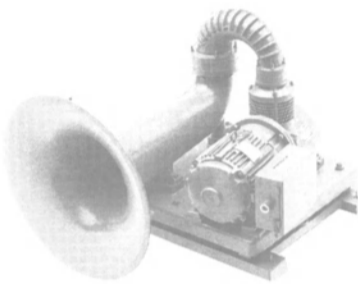
uses a Programmable Logic Controller to inject specified doses of the liquid at programmed intervals.

The Litton Ingalls American cruise shipbuilding project has been a natural draw for many European suppliers, particularly Norwegian companies who have a long history of supplying the

vibrant Scandinavian passenger vessel market. Valmarine's Damatic XDI was selected to be aboard the new U.S.-build ships. The ship automation system will include coverage of the two most critical onboard systems, the machinery plant and the air conditioning plant. In total, there will be approximately 8,500 input

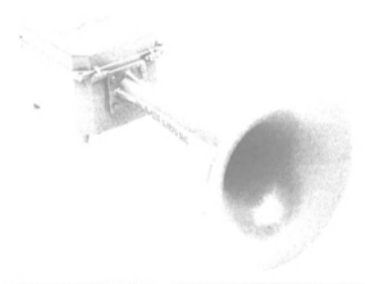
and output signals, and will cover most major areas including control, monitoring and alarm systems; power management systems; heating, ventilation and AC systems; and serial line connections, including the Cegelec/Kamewa Mermaid POD's Control System. Key functionality includes one operator complete

HEAVY-DUTY SIGNALS by Kahlenberg



Model S-120 Piston Horn

Chosen for use on aircraft carriers as well as commercial vessels over 200 meters in length, the S-120 utilizes an oscillating piston driven by 7-1/2 horsepower 3 phase 220/440 volt electric motor producing 143 dB and a fundamental frequency of 94 Hz in 1/3 octave band at one meter.



Model S-203C S-203 CHT

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

Kahlenberg Signals were developed to withstand the punishing use of commercial and military service. Their durability has been demonstrated over decades of service on ocean-going vessels ranging from naval warships to commercial vessels. Military specifications have required extensive testing for many of these whistles and the accessories supplied with them, which have proven the exceptional qualities of Kahlenberg design and manufacturing.

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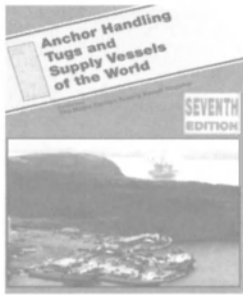
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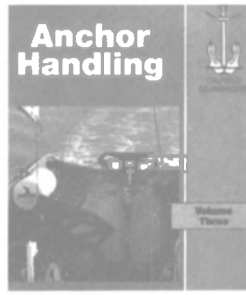
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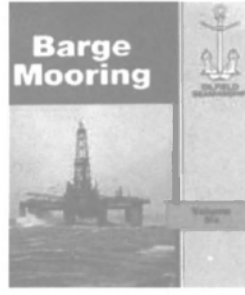
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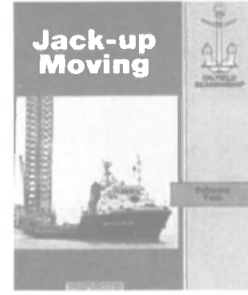
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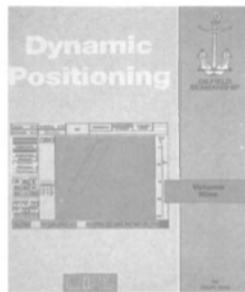
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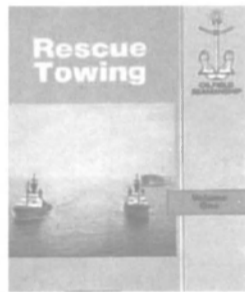


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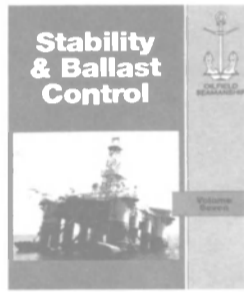
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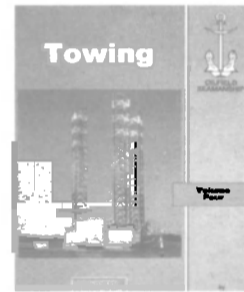


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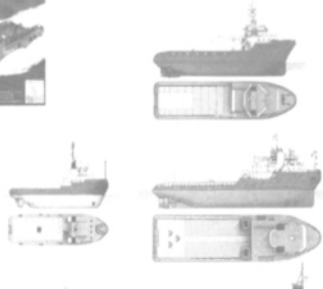
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indication and control system, and is a UNIX (or LINUX) based system, which provides a complete GA plan in one scrollable picture with a very high resolution.

Daleside Shipping Services, which

has had great success with its Rustibus rust removal system for plain surfaces, has recently introduced its new concept for rust removal on pipe lines. The new system Rustibus Pipe, is a mechanical machine designed for de-scaling and

control of all machinery and equipment, and an Operator Guided Maintenance System.

Autronica offers a fire safety management system that comprises a new fire detection system combined with a color graphic indication and control system. Linked together, the systems are able to detect all types of fires, indicated the status of the fire situation and monitor/control all actions to be taken. The company, a division of Navia Maritime, has a well-regarded position among cruise operators in the world, a reputation validated by five recent orders, including ships for Trasmediterranea, Carnival, Strintzis lines, Anek Line and Royal Caribbean.

AutroSafe is the name of the new fire detection system to be installed on all of the new vessels, and is believed to be the only distributed, interactive fire detection system with self verifying detectors. AutroMaster 5000 is the graphic

Loddesol New President Of NSA

The Norwegian Shipowners' Association unanimously elected **Leif Terje Loddesol**, Wilh. Wilhelmsen in Oslo, as president for two year period. **Johan G. Hvide** from Seatrans in Bergen was elected vice president. Other members of the new board include: **Terje J.K. Andersen**, managing director, Farstad Shipping ASA; **Kjell G. Bjerke**, managing director, Transocean; **Einar Fredvik**, managing director Rasmussen Maritime Services; **Per Haram**, managing director, Simon Mokster; **Tom Erik Klaveness**, shipowner, Torvald Klaveness & Co.; **Trygve Seglem**, managing director, Knutsen OAS Shipping; **Endre Ording Sund**, managing director, Anders Wilhelmsen & Co.; and **Nils Aardal**, director, Jo Tankers.

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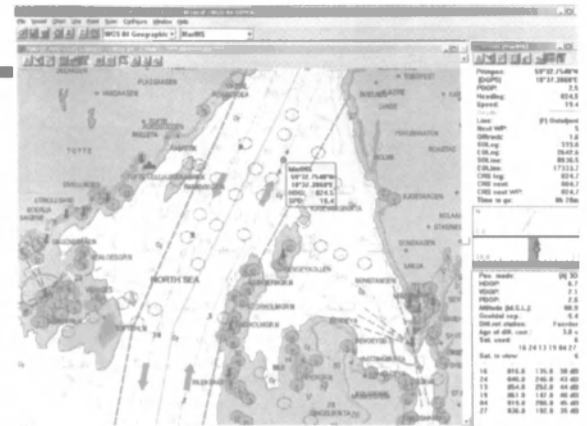
cleaning outer pipe surfaces, 360 degrees in one operation. The system is designed to clear pipes at a rate of up to 25 m/hour, and the system is available in sizes from two to 12 in. The system, for use onboard ships, and oil rigs, is designed to be installed around the pipe

by one worker.

Charting A New Course

The Norwegian influence in the development and refinement of electronic charts is well recorded. KonMap Maritime Systems last month launched a

new product family, a system that uses the latest IMO/IHO standards for chart presentation overlaid with DXF-data. The systems support S57 — edition 3 and C-Map CM93e3 nautical chart data.



KonMap Maritime Systems' new product group utilizes the latest IMO/IHO Standards in chart presentation overlaid with DXF-data. Included in the family of products are MarECS (electronic chart system) MarINS and MarINS Dredger.

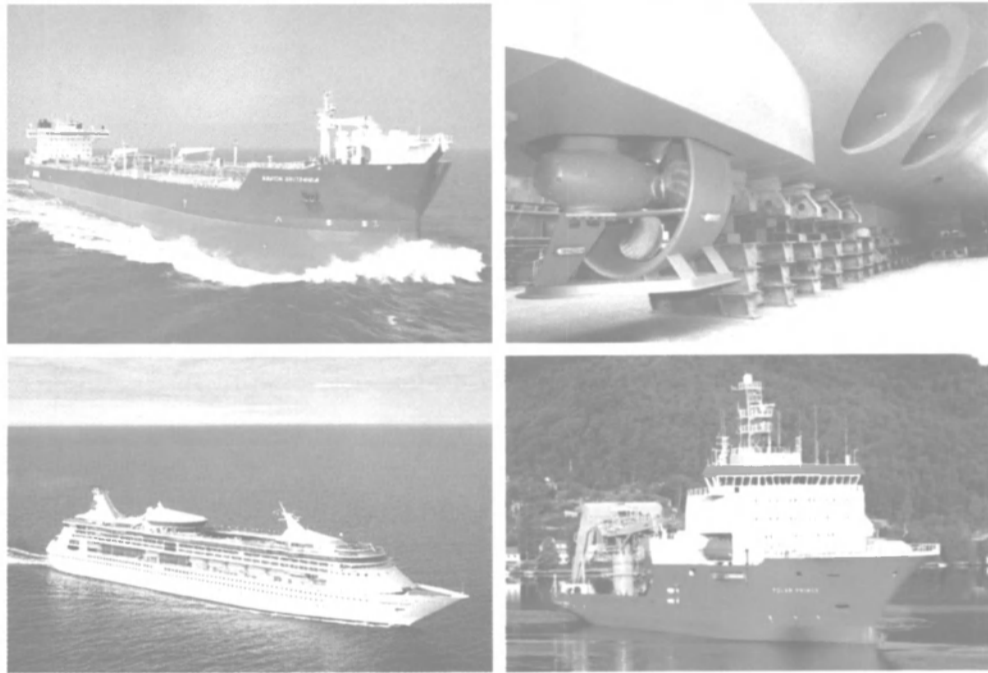
The new products family includes: MarECS (electronic chart system); MarINS (integrated nav. System for operation control); MarINS Dredger (dredging and underwater blasting control system); MarWEB (internet client for fleet management and remote ops monitoring; as well as modules for operation monitoring, cable lay control, and a suite of products for production of plots, charts and reports.

A key advantage of the family of products touted by the manufacturer is the fact that — after a moderate initial investment — the sailing system can be upgraded to a complete survey system, KonMap MarINS. This means that the one system alone is enough to cover the full range of operations, from sailing to complex survey control.

On the other side of the business, Primar recently announced that M/S Mignon, operated by Wallenius Lines AB, is now navigating with Primar Official ENC Service on a newly type-approved ECDIS system from Finland's Navintra Ltd. This announcement is significant in that for the first time ever, a vessel can navigate with Official Electronic Navigational Charts (ENCs) instead of traditional paper charts. The vessel, which travels around the globe, will have the ability with the Primar service to electronically download charts and weekly updates, regardless of the vessel's efficiency. ECDIS EC 1000 was type-approved on February 7, 2000 by GSH in Germany.

Based in Stavanger, Norway; Primar acts on behalf of the Hydrographic Offices to deliver an Official ENC service.

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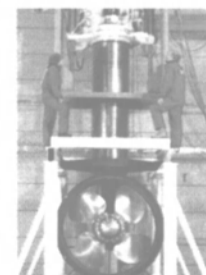
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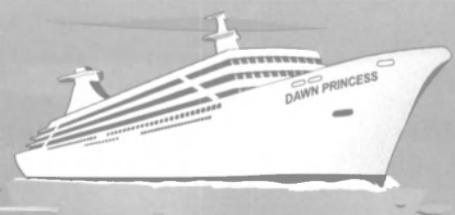
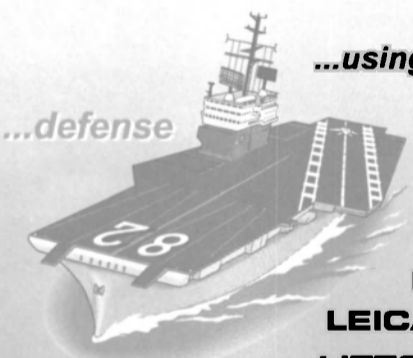
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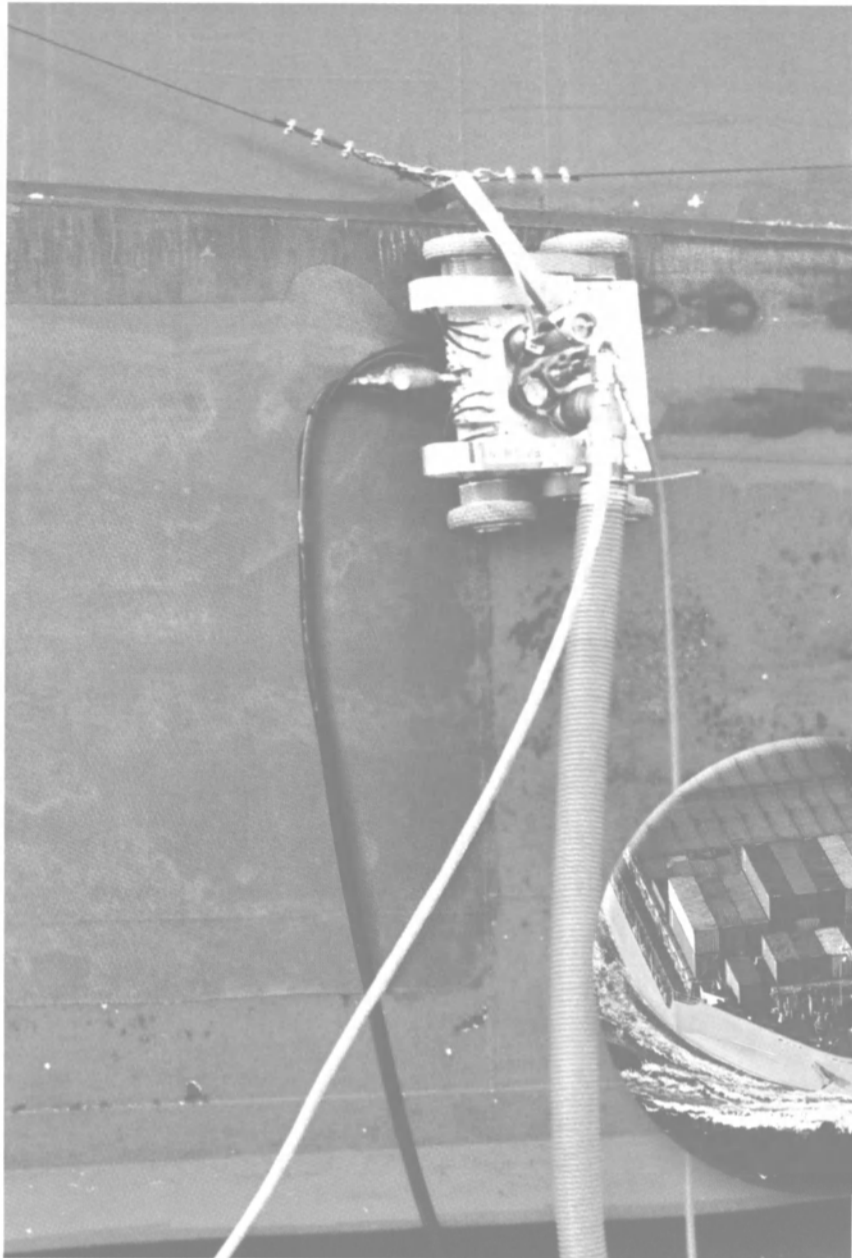


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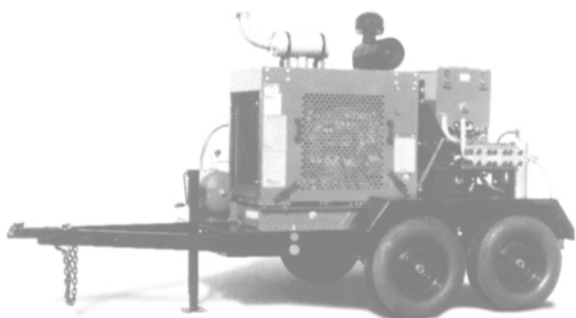
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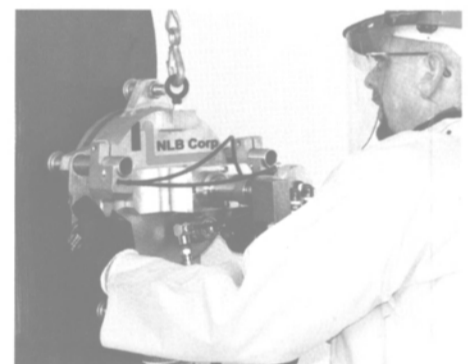
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Cosat Expands Communications Pipeline

Communications between ship and shore have evolved at light speed, driven by a handful of companies — new and old — which have persistently pushed the capabilities of satellite communications. A leader of this parade has surely been Cosat, which is one of

the world's leading suppliers of global satellite services and digital networking services, products and technology. Cosat offers a vast array of communication solutions, driven by and designed to fit owners' exacting needs, whether it be naval, commercial or offshore. But Cosat has been far from passive in the advance-

ment of communications at sea, and has introduced a number of services devised to illustrate to owners the cost and operational advantages of high volume, seamless communication solutions.

Chief among these are products geared to the quickly expanding cruise shipping market, a demanding market which requires high capacity and seamless communication systems for both passenger and crew purposes.

Cosat recently won a three-year contract with Cunard to provide worldwide data and voice satellite communications to Cunard's fleet of eight cruise ships. In addition to services being provided via the Inmarsat satellite system, Cosat is also supplying a new 128 kbps C-Band service for the QE2, providing one of the most advanced shipboard satellite communication solutions available.

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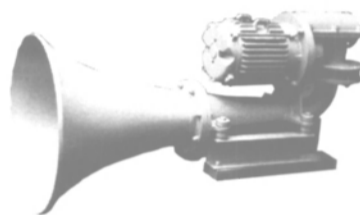
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Raytheon And Thrane & Thrane Agree

Raytheon Marine Company has signed a cooperative agreement with Thrane & Thrane, to become a worldwide distributor of maritime satellite telephone systems. The agreement calls for Raytheon's High Seas and Recreational product units to offer their own marked Inmarsat Mini-M Maritime Telephone, complementing its comprehensive selection of navigation and communications systems, which includes Inmarsat-B and C, and VHF products.

One such ware is the Mini-M maritime telephone - a telephone that provides distinctive quality calls, fax, prints and e-mail messages anywhere in the world. Fit for a variety of recreational and IMO-compliant vessels, Mini-M is designed in a sturdy aluminum casting.

The product's small antenna and compact design of the below-deck transceiver unit provide for convenient installation of the Mini-M on a wide variety of vessels. Operated from the handset, two-wire DTMF phone interface, connected fax machine or data port through Hayes AT command sets, Mini-M's two-way tracking antenna measures only 21 cm in diameter and 23 cm high, and can be mounted up to 70 m away from the below-deck transceiver unit.

Circle 72 on Reader Service Card



Dimensions and Weight

Electronics unit	25 x 268 x 211 mm, 1.3 kg
Maritime Stabilized Antenna	210 x 240 mm, 2.2 kg
Cradle for handset	160 x 61 x 27 mm, 0.15 kg
Handset	200 x 52 x 33 mm, 0.25 kg

Leica Extends Its Influence In DGPS Arena

Leica, already a major player in the international marine DGPS beacon market, has extended its market share further with orders from China, South Africa and Australia. Leica won a contract from the Chinese Maritime Safety Administration to supply seven marine differential GPS (DGPS) beacon systems, augmenting the nine existing beacon stations already supplied by Leica under previous contracts. The new contract represents the third phase in China's program to deploy a national DGPS network of beacon transmitters providing overlapping coverage of the country's coastal waters and harbors.

In South Africa, Leica was chosen to supply a network of four DGPS beacon stations and a remote control station. The four broadcasting stations will be located at Cape Columbine, Cape Agulhas, Cape Recife and Cooper, and each reference station will consist of two dual-frequency Leica MX9330 beacon DGPS reference receivers and an MX9320 integrity monitor.

The Australian Maritime Safety Authority awarded Leica a contract for two DGPS beacon stations to be established at Corney Point and Perth. Each will have redundant reference stations and an integrity monitor for reliability and uninterrupted operation. The Australian installations will be based on the 12-channel MX 9400 DGPS receiver, which uses Leica's patented AccuCode technology to achieve extremely stable pseudorange measurements.

The installations in China, South Africa and Australia, combined with a large installation last year in Bangladesh, are part of a growing international network of DGPS beacon stations, which are being deployed to provide safer navigation in coastal waters and harbors. The Leica DGPS systems typically yield navigation accuracies of five meters or better throughout the service area. The Leica solution complies with international RSIM, RTCM SC-104 and IALA standards.

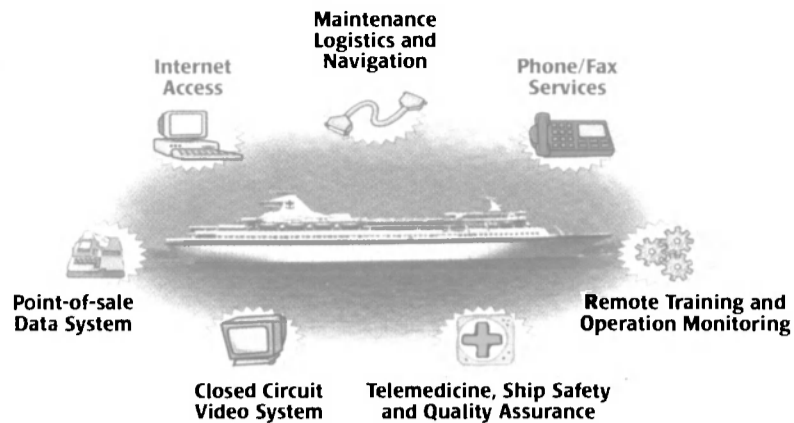
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ViaSat Ups Phase Two

ViaSat has raised the delivery of Phase two of its contract with Star Cruises, attaining an order worth more than \$500,000 for additional installation on the line's latest vessel — Superstar Taurus — that was set to be in Japan during March. The network was originally to have been completed by February, but StarWire terminals were deployed on eight Star Cruises vessels by the end of 1999. The full nine-vessel network was set for a January completion.

A dominant force in the Asia-Pacific, Star Cruises is installing ship-to-shore and ship-to-ship voice, data and video communication using the StarWire system. Phase two is a portion of the original \$6 million contract between ViaSat and Star Cruises that was reported this past June.

ViaSat is accelerating its core in the



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Satellite Communications

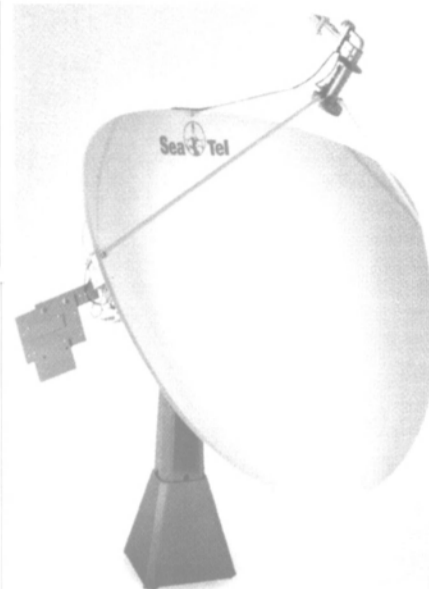
maritime market with two fresh strategic alliances with Sea Tel and Satpool. The agreement with Sea Tel calls for the provision of satellite tracking antennas for StarWire maritime systems, while the clause with Satpool states the contribution of its expertise in project management, integration and testing of shipboard communication systems.

The company also showed its newest system, which utilizes VSAT, at the Seatrade Cruise Shipping show in Miami. Taking advantage of the growing demand for data in maritime communications, ViaSat reportedly provides data at a pace of 30 times faster than its competitors.

Circle 199 on Reader Service Card

SeaTel Ushers Customers Into 21st Century

SeaTel has designed a new program to aid its current clientele in upgrading their out-dated gyro-stabilized antennas with its technologically-driven antenna system known as the Sea Tel Series '97. The company's systems are available in



both Television Receive Only (TVRO) and Transmit/Receive (TX/RX).

Although a significant amount of vessels are still running with the original Sea Tel antennas that were installed approximately 15 years ago. Though they are still functional, the old antennas fail to offer a host of new amenities that can be had with the company's newly-upgraded series. Equipped with an improved stabilization rate and a large pointing accuracy, the Series '97 also holds an upgraded throughput capacity.

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Globe Wireless Adds To Development Team

Globe Wireless, provider of maritime communications solutions has named six members to its customer support and software development teams: **Roger Chiu**, technical support and shipboard installations; **Vernon Harvey**, senior developer; **Patrick Reagan**, head of operations at Globe Wireless Liverpool; **Shane Rossbacher**, director of satellite services; **Patrick Tong**, leader of sales, installation and customer support in Northern Asia; and **Patrick Wong**, who assumes a senior position in technical and customer support.

Murphy Commences SatCom Service

Complementing its line of controls and instrumentation, Frank W. Murphy Mfr. has added satellite communications to its product offerings. The company now provides turnkey systems fit to supplement the current equipment's control system. For a nominal monthly fee, customers have

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Satellite Communications

the option of adding the satellite communication feature to their control systems for oil and gas production, as well as any industrial equipment operations.

Murphy touts itself as a reseller of the world's premiere low-Earth orbit satellite-based data communications system

owned and operated by Orbcomm, Dulles, Va. The functions also allows remote control and data acquisition, thus omitting the necessity of installing telephone lines or cellular service to the equipment site.

Circle 73 on Reader Service Card

Sait And Stento Sign MOU To Merge

Sait-RadioHolland and Stento have agreed upon a memorandum of understanding that they will merge. Sait, which is a service provider of profes-

sional wireless communications, and Stento, a company that develops and sells advanced integrated communication and security products, will be a forceful strategy within the growth of the respective companies.

The integration will be performed by Sait, who will voluntarily offer Stento's shareholders to attain all their shares of the new conglomerate's shares. The merger also allows the two groups to broaden their horizons in terms of revenues synergies through cross selling products that feed-off each other, thus achieving a sufficient scale to deliver larger projects, which in return provides bright opportunities for cost-effectiveness.

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Navionics Offers New Charts For B.C.

Navionics has released 36 new charts covering British Columbia's Coast. Each chart is high detailed, and available with full Port Service Guide coverage, extensive depth contours, spot soundings to 60 ft., and 16 radar-equivalent zoom levels. Charts are priced between \$99 and \$299 each.

Circle 84 on Reader Service Card

Maptech Offers Maps On-line

Mapserver is a new service from Maptech, designed as a free and easy way to view, print and e-mail nautical charts and topographic maps from the company's website at www.maptech.com. "Maptech's Mapserver is the first step in laying a strong foundation from what we see as the future for digital information on sea and land," said Ed Markham, president. "Later this year we will add navigation and GPS tools so the user can manipulate the data."

Circle 85 on Reader Service Card

Raytheon, Samsung Collaborate On Bridge System

Raytheon Marine and Samsung Industries have entered into a cooperative agreement to meld key components of Raytheon's Integrated Bridge System into Samsung's Naru 2000, which is an ECDIS-based Integrated Navigation System. The agreement is designed to increase business in Asia.

The joint-venture with Samsung is expected to bring in an additional \$10 million per year in new sales revenue. Naru 2000 boasts safety oriented technology such as a Weather Information System and a Collision Avoidance System.

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Encouraging best practice onboard using video and interactive media

By Captain Len Holder

Best practice, adhered to on all vessels, is beneficial for all concerned. It saves money for the ship operator, it reduces the risk of injury, damage or loss, it ensures the continued safety of the crew, and it provides an important quality marketing tool for the department that has to



Capt. Len Holder - "There is no longer the opportunity for ships' crews to be taught in the classroom scenario because there isn't the time."

sell the shipping company's services.

Continuing technical progress in vessel and operational design has emphasized the need to further develop crew education and training. But a problem lies with the traditional reliance on classroom-based teaching formats. Seafarers need the education and knowledge to go to them, rather than the other way round, and according to U.K. marine training provider, Videotel Marine International, video and interactive CD ROM-based training packages are the solution.

"Modern shipping practice means that turnaround times have accelerated, with runs ashore and time alongside suffering as a result. There is no longer the oppor-

tunity for ships' crews to be taught in the classroom scenario because there isn't the time," says Captain Len Holder, chairman of Videotel. "The result is that crews are now trained in remote locations, often onboard ships, at irregular hours."

Video and interactive teaching methods provide shipowners and operators with a cost-effective means of training their staff. Videocassette recorders and PCs are standard equipment on many ships, and allow easy access for many seafarers to those methods of training.


Other advantages of the Video and CD ROM-based packages are that this form of education can be delivered in various languages, overcoming what is often a




Multimedia CD-ROMs and onboard simulation can teach crews to handle a variety of situations.

hurdle to efficient education. This is particularly helpful in an industry where officers and crew are sourced from diverse and non-traditional seafaring


(Continued on page 85)




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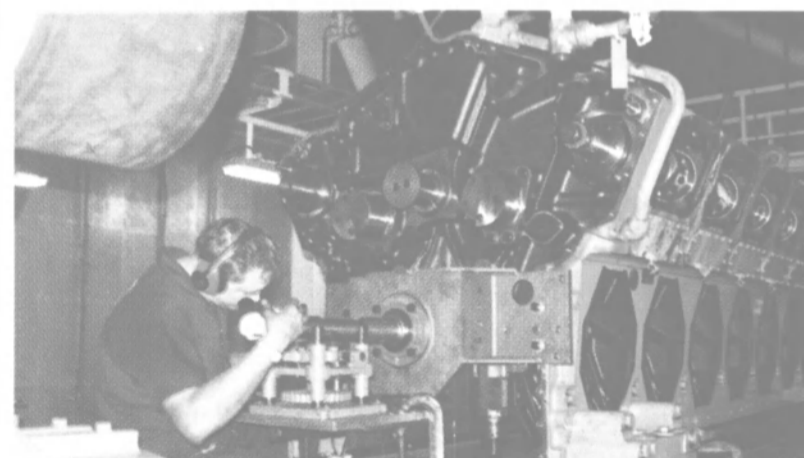
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Blount Completes Dinner Vessel

The 600-passenger dinner cruise vessel; M/V Horizon was delivered to Pegasus Yacht Cruises of New York by Blount Industries on March 5.

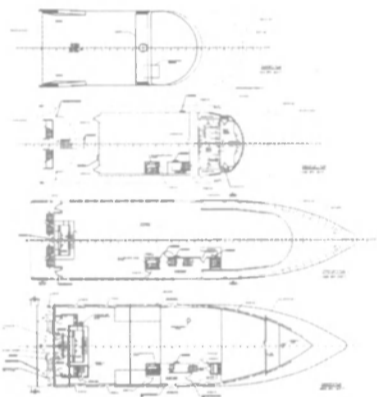
Measuring 161 ft. (49 m), Horizon boasts a welded steel, single chine hull with three enclosed dining decks, with all superstructure above the second deck is 100 percent aluminum construction. New Jersey-based Robinson Interiors designed Horizon with old world ambience in mind — its dining room features varnished cherry wood paneling and trim.

The vessel is powered by two owner-supplied Detroit Diesel 16V-92 engines, soft mounted for silent operation with Lo-Rez vibration mounts and couplings. Electric engine controls by Mathers provide throttle and gear control, while a Murphy alarm panel monitors the propulsion engines. Twin 200 kW Detroit Diesel 6V-92 generators supply electrical power for the vessel's services via a split bus switchboard. A dedicated Detroit Diesel 4-71 engine provides

power for a 125-hp, 22-in. diameter hydraulic bow thruster, while steering is achieved by an Autonav Electrohydraulic steering package with duplicate hydraulic pumpsets.

Two Rheem 18 kW water heaters provide 240 gallons of hot water to all the heads, bars, galley and other onboard services. An 80-ton Dunham-Bush Chiller, with a 60 kW boiler, provides the vessel's HVAC system.

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M/V Horizon Main Particulars

Length, (o.a.)	161 ft. (49.2 m)
Beam, (o.a.)	40 ft. (12.3 m)
Depth	11 ft. (3.2 m)
Design draft	7 ft. (2.1 m)
Tank capacities:	
Fuel oil	9,500 gal.
Potable water	6,100 gal.
Sewage holding	4,800 gal.
Gray water	1,700 gal.
Main propulsion engines	2 Detroit Diesel
Marine gear	2 ZF BW161-1
Engine controls	Mathers Microcommanders
Propeller	2 Bird Johnson
Shafting	4.5-in. Aquamet
Vibration mounts/isolation	Lo-Rez
Bowthruster engine	Detroit Diesel
Engine cooling	Walter's Spiral Tube Keel Coolers
Mufflers	Cowl Silencers
Ship's service generators	2 Detroit Diesel
Switchboard	Power Panels, Split Bus
Steering gear	Autonav
Radar	Furuno
VHF	ICOM
GPS	Northstar
Compass	Ritchie
Loudhailer	SEA ST8000 SeaHail
Depthsounder	Datamarine
Searchlight	2 Perko
Horn	Kahlenberg
HVAC	Dunham-Bush
Water heater	2 Rheem
Capacity	600
Crew	50

Spirit Cruises Accepts 15th Skipperliner-Built Boat

Spirit Cruises' 15th passenger vessel Elite I - designed and built by Skipper-Liner Shipyards was delivered to the company to benefit the corporate and wedding clientele of Norfolk, Va. Capable of carrying 149 passengers, the vessel will moor dockside with the 600-pas-

senger dinner vessel, Spirit of Norfolk.

Incorporating a technologically driven hull design, Elite is outfitted with two Caterpillar 290-hp 3208DIT propulsion engines, a 70 kW Cummins electrical generator and ZF 220A gearboxes. The vessel is able to hold 1,000 gallons of fuel oil, 750 gallons of fresh water and 666 gallons of waste. Boasting a 360-degree sky-lounge, the vessel features raised pilothouse, six different boarding stations and 280,000-btu of silent climate control.

Circle 45 on Reader Service Card

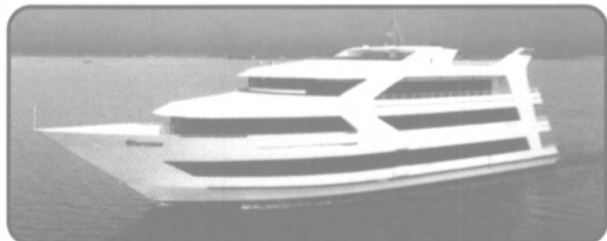
Gunderson Launches Last Of Barge Series

On March 17, Gunderson, Inc. launched Alaska Trader, the last of a three-part series of container barges for Pacific Trader and affiliated companies. Measuring 344 x 94 x 21 ft. (104.8 x 28.6 x 6.4 m), the deck cargo barge is



specifically fitted to carry 20 and 40-ft. containers, in addition to other types of cargo. The vessel will be delivered to its owners for container service operation

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between the Pacific Northwest coast and Alaska.

The largest of its kind to be constructed on the west coast in more than 10 years, the barge — as well as its two sisterships — was designed by Fisker-Andersen & Whalen marine architects for a fast-towing speed.

Circle 95 on Reader Service Card

Fincantieri Delivers Ocean Princess

Ocean Princess — the last of a four-part 77,000-gt vessel series — and newest member of the Grand Class —



Ocean Princess — the last of a four part vessel series constructed by Fincantieri for P&O Princess Cruises.



was delivered to P&O Princess Cruises by Fincantieri's Monfalcone yard on January 29.

The seventh vessel to be built at the yard for P&O, Ocean Princess joins sisterships Sun Princess, Dawn Princess and Sea Princess, which were delivered in November 1995, April 1997 and November 1998, respectively.

Able to accommodate more than 2,300 passengers and a crew of 800, the vessel is 856 ft. (261 m), with a height of 157 ft. (48 m) and breadth of 105 ft. (32 m).

Propulsion and power are provided by a diesel-electric power plant based on six Sulzer engines — with an overall power of 46 MW. Wartsila and NSD Italia supplied the vessel's engines.

Circle 48 on Reader Service Card

Arab Heavy Delivers Contemporary Vessel

Arab Heavy Industries has delivered a modern 167 ft. (51m) self-propelled and self-elevating service vessel to Bibby Line Arab Heavy Industries PJSC.

Named the Trident Bibby One, the DNV-classed vessel was constructed from a design based on a modern lift

boat concept — setting new performance standards in supporting offshore activities in the Middle East and Southeast Asia. The vessel will join Bibby's existing fleet of self-elevating platforms, which provide a range of production, hook up, repair and maintenance support services.

Boasting a unique design, Trident Bibby One is propelled by a 5,000-hp

twin-screw propulsion systems with forward and aft thrusters — all controlled by a sole joystick. With an extensive deck space of more than 9,700 sq. ft., the vessel can run in shallow waters from approximately 10 to 180 ft.

The vessel's accommodation module can hold up to 60 people.

Circle 46 on Reader Service Card



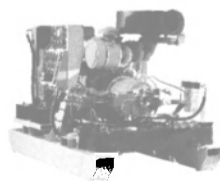
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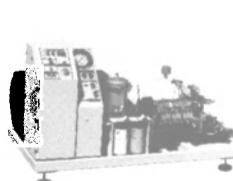


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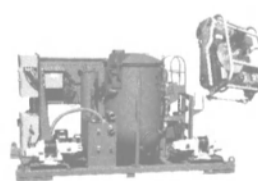
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ASME To Sponsor Course Series

ASME International (The American Society of Mechanical Engineers) is hosting a series of short courses from June 16-20, 2000 at the Holiday Inn Inner Harbor in Baltimore, Md.

Encompassing a wide variety of mechanical engineering topics, programs will focus on heating, ventilating and air-conditioning systems to computational fluid dynamics.

The organization will also hold additional course series from June 26-30 at the Radisson Hotel in Pittsburgh, Pa.; from June 5-9 at ASME Headquarters in New York City; and May 8-11 at the Torrance South Bay Hilton, Torrance, Calif.

For further information on any of these courses, contact ASME Information Central at (800) 843-2763 (U.S. & Canada) or (201) 882-1167; e-mail: infocentral@asme.org.

Crescent Releases Software Application

Crescent Vision interactive has issued Stability Test Pro, an integrated software application formulated to aid naval architects in managing and assessing stability test (incline experiment) data.

The program can be used in-house to timely process stability test data, or more significantly, onboard vessels during stability tests to generate an estimate of the lightship weight and center gravity prior to the conclu-

sion of the stability test - saving many hours of engineering time.

Designed to handle all aspects of a standard stability test - including the inventory phase - Stability Test Pro will automatically calculate the vessel's flotation characteristics at the time of the stability test.

Circle 44 on Reader Service Card

Jotun Acquires PRS

Jotun has acquired PRS (Products, Research, Service, Inc.), a regional manufacturer of marine, protective and industrial coatings under terms that were not disclosed. Established in 1946, PRS offers marine, protective and industrial coatings to an ever-expanding number of customers in the Gulf of Mexico region. In addition to its headquarters and factory in Belle Chasse, La., the company has warehouses and sales offices in Lafayette, La.; Houma, La; and Houston, Texas.

Circle 4 on Reader Service Card

Cummins Granted Emission Certification

Cummins Marine, has received International Maritime Organization (IMO) MARPOL 73/78 Annex VI emissions Statements of Compliance from Lloyd's Register of Shipping for its B series, C series, QSM11 and N14 series marine engines.

The company foresees that this certification will be recognized on an international basis as proper technical documentation for local emissions allowing agencies to comply with customer needs.

Each engine is shipped with a data tag and technical file, which identifies emissions compliance. Included in the technical file are copies of the U.S. Environmen-

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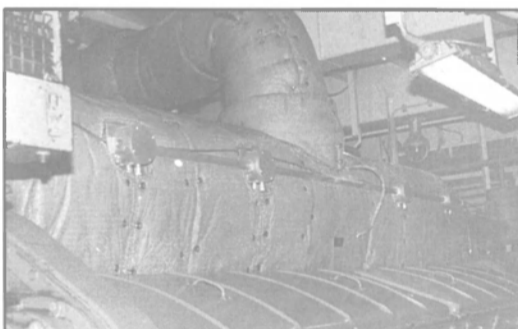
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Chemical Service News

Information from Unitor Chemical Service

Unitor Introduces New Soot Remover Liquid Prevents soot deposits at low exhaust temperatures

Recent improvements in diesel engine and turbocharger efficiency have led to a reduction in exhaust gas temperatures with a resulting increase in soot deposits.

deposits and catalysing the carbon.

The modified soot then ignites and is safely burned in the exhaust system.

units feature a stainless steel dosing pot which is filled with Soot Remover Liquid.

Using compressed air, the liquid is then injected into the exhaust trunking

The automatic dosing unit utilises a Programmable Logic Controller to inject specified doses of Soot Remover Liquid at programmed intervals.



Unitor Soot Remover Liquid and Automatic Dosing Unit

This problem often occurs in exhaust boilers with finned tubes, where buildup of soot deposits between the fins may ignite if the engine is run at full load.

Unitor Soot Remover Liquid has been formulated to prevent soot buildup at low exhaust gas temperatures (200°C/392°F). Regular use of Unitor Soot Remover Liquid effectively reduces the risk of exhaust system soot fires. The catalysts in Soot Remover Liquid form a vapour upon heating, penetrating the

Unitor Soot Remover Liquid provides a number of key benefits:

- it effectively prevents soot deposits at low exhaust gas temperatures
- it reduces risk of soot fires
- it is easily dispersed by manual or automatic dosing
- it is a cost effective maintenance product

Unitor Soot Remover Liquid can be manually or automatically dosed into the exhaust trunking upstream of the boiler.

Both manual and automatic dosing

Other New Unitor Chemical Products

Phone, fax or mail for further information on these new Unitor Chemical Service products.

- AQUATUFF
Heavy duty water based cleaner
- COMMISSIONING CLEANER
Simplifies cleaning of boiler systems on newbuildings
- DEFOAMER CONCENTRATE
Control of foaming in onboard sewage and waste water systems
- GAMAZYME BOE
Biological odour eliminator
- GAMAZYME TOILET DESCALER
Biologically active descaler for onboard toilet systems
- MAR 71
Disinfectant for closed circuit cooling water and lubricating oil systems
- MUD & SILT REMOVER
Lifts and disperses sediment buildup in ballast tanks
- POTABLE WATER STABILISER
Solves the problem of 'red water' and scale in potable water systems
- REEFER CLEANER
Cleaner and disinfectant for the prevention of bacterial activity
- ZINC COAT CONDITIONER
Removes metallic salt deposits after cargo tank cleaning
- CIRCULATION CLEANING UNITS
Portable units for cleaning onboard systems

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tal Protection Agency and Lloyd's Register statements of compliance certifying each engine.

Circle 8 on Reader Service Card

Cummins Appoints Schertz As Sales Manager

Cummins Marine has elected Leo Schertz as North American commercial

sales manager. A 12-year veteran of Cummins Engine Co., Schertz previously held assignments in engineering, customer quality and customer engineering at the company's headquarters in Columbus, Ind. and regional office in Singapore. He will be responsible for supporting the North American commercial markets including workboats, fishing vessels and oil field support.

ISR Appoints Latham As Marketing Manager

International Ship Repair, Tampa, Fla., elected Walter Latham as manager of business development. Latham, who has more than 30 years of experience in both the shipyard and shipping industries, will be directly responsible for customer service and business development.

Columbia Coastal Commences New Service

Columbia Coastal Transport LLC will begin regular weekly container barge service into Port Canaveral, Fla. commencing March 23. The premiere barge that is scheduled to call there will be Columbia New York - a 590-teu-container barge that is also capable of transporting reefer cargo.

Adding to its southern service will be a call to Port Canaveral on a weekly basis.

The company's new super-barge - Columbia Elizabeth - will soon be entering the company's Chesapeake service. One of the largest container barges ever built, the 912-teu vessel will provide services linking Norfolk, Va. and Baltimore, Md., effective immediately.

The deck cargo barge, which measures 343 x 94 x 21 ft. (104.5 x 28.6 x 6.4 m) was constructed by Gunderson, Inc., and is specially fitted to carry 20, 40 and 45-ft. ISO containers, including reefers.

Circle 5 on Reader Service Card

ACCL Offers New Chicago-Based Cruises

For the past five years, the U.S.-flagged American Canadian Caribbean Line (ACCL) — dubbed America's original smallship cruise line — has called upon Chicago on its Great Lakes excursions. Resulting from an increase in passenger and travel agency demand for more unique lakes adventure cruises, ACCL has added an entire summer of cruises from Chicago to its itinerary. Included in this voyage are several seven-day Lake Michigan circumnavigation cruises in addition to others departing, arriving, or continuing to Chicago, the Atlantic coast or Mid-America.

The company's Niagara Prince is the sole cruise vessel in America that can pass beneath Chicago's bridges - connecting the Great Lakes to the Mississippi and Mid-America. Known as one of three specially built small vessels that will run exclusively out of Navy Pier, Chicago, this summer will mark the vessel's inaugural season on the Great Lakes.

Able to carry 84 passengers, Niagara Prince is equipped with specialized features such as bow landings, allowing passengers to disembark onto remote islands and beaches along Lake Shores.

Boatrac's Exclusively Distribute MarStar

Boatrac's has gained exclusive rights as North American distributor of Netverk's MarStar software. The product is a communications interface that allows PCs or LANs in mobile or

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remote locations to connect with other computer networks and software applications via satellites and mobile network systems, in addition to the Internet. The program was especially developed for maritime use for systems such as Inmarsat-A, -B/HSD, -C, -M and Mini-M.

Boasting full transmission recovery from point of disruption and offering high-speed data at 64Kbps, the program operates with Microsoft Windows 95, 98 and NT. MarStar provides MAPI-compliant e-mail with attachments to be delivered across store-and-forward packet data systems, specifically Inmarsat-C and Qualcomm OmniTracs.

Circle 42 on Reader Service Card

RTS Touts Machinery Failure Database

A new database of shipboard machinery failure compiled from various incidents encompassing a broad spectrum of marine machinery is now available from Richards Technical Services (RTS). The database, which will be a useful tool to the shipping and insurance industries for both loss prevention and risk assessment is currently on sale in CD ROM format.

While the comprehensive product includes 15 fields of information, it does not divulge the name of the ship or operator, due to reasons of confidentiality. Instead, the fields provide type of machinery and vessel, cause of failure, age, size, and cost and time taken for repairs.

For those who are not tech-savvy, the program boasts a built-in glossary offering quick and easy explanations of unfamiliar terms.

Circle 47 on Reader Service Card

V. Ships Names Dlugokecki Marketing Manager

V. Ships has appointed **Christopher Dlugokecki** as marketing manager, North America. Dlugokecki, who has been with the company for the past three years, formerly held the position of fleet superintendent. He will now be responsible for identifying and developing new business opportunities for the organization, as well as promoting the worldwide services offered by V. Ships Group of Companies in the North American market.

Autoship And Port Automation Join Forces

Autoship Systems Corp. (ASC) and Port Automation International (PAI) have formed a marketing partnership.

Per the agreement, PAI will market ASC's load planning software solutions

to their customers. Beneficial to PAI customers is that they will now be allowed to electronically extend the logistics chain from port to carrier. In turn ASC's customers will receive more accurate, complete and timely cargo information.

Combining their expertise, the two companies will focus on selected ports

worldwide that handle container traffic, break bulk and RoRo vessels.

Circle 53 on Reader Service Card

DNV Cleans Up With Celebrity's Millennium

The premiere vessel to be built to DNV's new voluntary class notation


Clean Design is Royal Caribbean International's (RCI's) Millennium — the first of a new series of green ships for RCI.

Currently under construction at Chantiers de l'Atlantique in St. Nazaire, France for the RCI-owned Celebrity Cruises, the vessel will include DNV's new design, placing it at a formidable

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H E A T ▲ E X C H A N G E R S

Circle 303 on Reader Service Card

position environmentally.

In order to comply with a variety of ship types and trading patterns, two class notations — Clean and Clean Design have been introduced. Comprised of three main areas, such as: emissions to air, operational discharges to sea and accidental discharges to sea, the Clean Design function is the stricter of the two.

Clean is designated for vessels in

deep-sea trading, while Clean Design is geared toward ships in coastal waters

Circle 61 on Reader Service Card

NOL Group Elects Benbow To Senior VP

The NOL Group has named Anne Benbow as its new senior vice president of human resources. Benbow, who has

relocated to Singapore, has more than 20 years of experience in HR in the banking and financial sector leading large HR divisions in the U.S. and overseas, including Japan.

IRI Reiterates Tonnage Tax

International Registries (IRI), the administrators of the Marshall Islands register, confirmed that the previously

stated reduction in the Marshall Islands annual tonnage tax is for a minimum of five years.

The reductions, which were first announced in January, lower the annual tonnage tax from \$.25 per gross ton to \$.20 per net ton, producing a reduction of 50 percent in the annual tonnage tax rate payable for vessels currently registered in the Marshall Islands.

The minimum annual tonnage tax was also changed from \$1,000 based on 4,000-gt to \$500 based on 2,500 net tons.

ASG Integration Into Danzas To Be Completed In April

The integration of ASG into the Danzas group is on track and will be completed by next month, ASG's top executive said. "By April, ASG's three divisions - ASG Air & Sea, ASG European Road Transport, and ASG Logistics - will be fully merged with their corresponding Danzas units, but the name of ASG will remain," **Jorgen Ekberg**, ASG CEO, said.

"Along with the organizational changes, restructuring the global agents network, and the preparations to close down the ASG headquarters by next month, we have worked hard to maintain, or regain our business with customers, and so far we are ahead of budget," Ekberg said. He added that developments are much helped by current economic development in Sweden, where four percent rise in gross national product is expected, reflecting in increased trade as well as sea and air cargo growth.

Windstar VP Transfers To Parent Company

Rick Meadows, formerly vice president of sales and marketing for Windstar Cruises, a unit of Carnival Corp., has transferred to the parent company assuming the position of vice president of marketing.

Dex Secures Quality Tanker Fleet

Hull insurer Dex has signed its third fleet within just two months of starting underwriting at the beginning of the year. This latest addition to its portfolio includes four modern oil tankers and two tanker newbuildings from British owner Pritchard-Gordon Tankers Ltd. The deal was concluded through leading Lloyd's broking house Willis Group Limited.

Based in Sussex, U.K., Pritchard-Gordon will insure four 1990s-built double-hulled tankers, which trade mainly in the Caribbean, calling at ports such as Trinidad, Curaçao and Aruba. The



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tankers, all about 6,000-dwt in size, handle both clean and dirty oil products for a number of oil majors.

The two 9,990-dwt newbuildings, which are being built at Frisian Shipyard at Welgelegen in

Holland, are also double-hulled construction with totally segregated ballast and capable of carrying eight grades of cargo with complete segregation.

Oceaneering And Smit International Join Together

Oceaneering International and Smit International have joined forces to offer services to the telecommunications market for the installation, repair and maintenance of short-haul fiber-optic submarine cable systems. Known as Smit-Oceaneering Cable Systems, L.L.C. (SOCS), the new joint venture will be

headquartered in Houston, Texas.

An initial fixed investment of approximately \$20 million will include a dedicated telecommunication cable installation vessel — Ocean Hercules — outfitted with a cable repair and burial remotely operated vehicle. A cable plow and a burial assessment plow system are also included on the 269 ft. (82 m) dynamically positioned vessel. A sheltered cable deck with cable storage and

handling equipment for deployment of up to 2,000 tons of submarine telecommunication cable is also present onboard.

SeaArk Granted Six-Vessel Contract

Aluminum work and patrol boat builder, SeaArk Marine, was granted a contract by the U.S. Navy to construct six 40 ft. (12.1 m) Dauntless Class Patrol Boats.

The boats are being bought by the Department of Defense — backing the PERU Riverine Program. The six vessels will be operated in Peru along the Amazon River, as well as other river systems, while the Peruvian Coast Guard will utilize the vessels for patrol and drug interdiction.

With delivery scheduled to occur from June through November 2000, each SeaArk will include twin diesel inboard engines, comprehensive electronics package, berthing for four and weapons mounts.

Circle 1 on Reader Service Card

Harvey To Construct Third Vessel

Harvey Gulf International has signed an agreement with a Louisiana shipyard to build a third vessel that will measure 135 x 40 x 21 ft. (41.1 x 12.1 x 6.4 m), and will be powered by two EMD Turbos with Kort nozzles.

The vessel will be a sistership to the company's MV Harvey Titan, which was delivered in February 1998. The company, which has intentions to construct two more vessels that are still in the design stage, signed an additional contract during January for the construction of two 150 x 47 x 21 ft. (45.7 x 14.3 x 6.4 m) vessels.

Circle 2 on Reader Service Card

Crowley Granted ISO 9002 Certification

Crowley Logistics de Venezuela and Crowley Liner Services' Miami, Fla. warehouse, apparel freight services operation and Port Everglades terminal have been added to the company's list of ISO 9002 certified facilities and operations. Other areas included Crowley's Jacksonville terminal and freight services center; Pennsauken, N.J. terminal; and San Juan, Puerto Rico terminal and freight services operation.

This certification deems that the company has complied with the highly regarded international standards for quality at these locations.

Established by the International Organization for Standardization — ISO 9002 is a model for a quality assurance system.

The Fourth International Forum on Aluminium Ships
NEW ORLEANS • MAY 2000

The 4th in this highly successful series of conferences will take place at the Omni Royal Orleans Hotel, New Orleans, 10th & 11th May 2000.

Papers covering a wide range of topics have been submitted and a final programme will be announced early in 2000. The following topics form the core of the conference:

- * Operational experience and needs
- * Developments in materials and fabrication methods
- * Corrosion resistance and coatings
- * Methods to ensure adequate fatigue life
- * Developments in rules and regulations
- * Future trends; needs for further research and development.

As well as the conference programme there will be a visit to local shipyard, Textron Marine, on Friday 12th, and for those who wish to linger in "The Big Easy", there will be a golf tournament on Saturday 13th.

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courtesy of the New Orleans Metropolitan Convention & Visitors Bureau

Figure 4. Splash Points and Torpedo Tracks



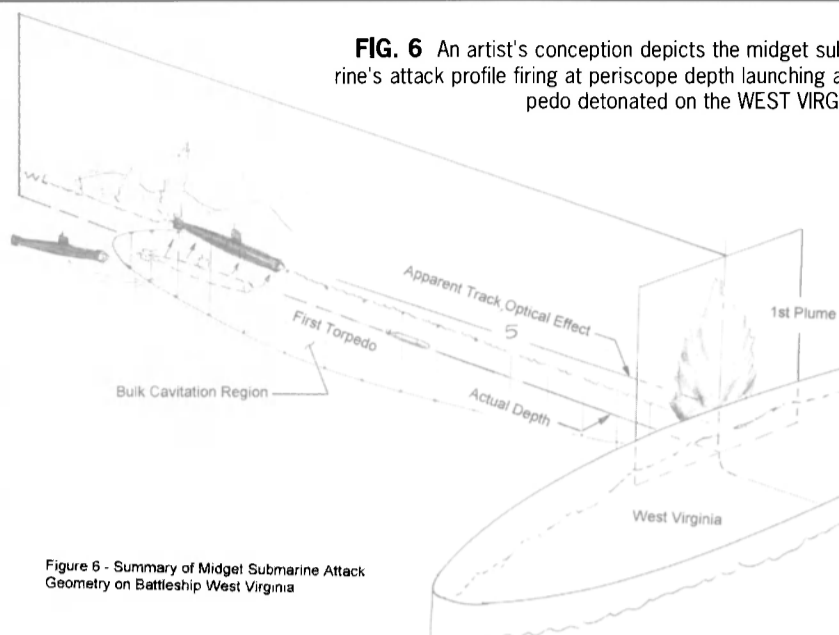
This combat photo was taken after the first group of attacking B5N2 "Kate" torpedo bombers during the first air raid. Battleships, splash points and torpedo tracks have been highlighted.

Figure 5. Object and Concussion Waves



An enlargement of the key feature indicates a black rectangular object atop a dark linear structure determined by analysis to be an exposed midget submarine due to concussion of a torpedo detonation on the USS WEST VIRGINIA. The rooster tail sprays were the result of the midget sub's propellers. A small plume can be seen on the portside of the battleship.

FIG. 6 An artist's conception depicts the midget submarine's attack profile firing at periscope depth launching a torpedo detonated on the WEST VIRGINIA.



midget submarine through a positive correlation between the motion history of the midget submarine and the observed surface disturbance generated. The observed torpedo track (figure 4 track no.5) indicated alignment with the water plume on the sport side of the WEST VIRGINIA. Due to the water's optical reflection and parallax effect, the torpedo was determined at a depth of about 15 ft. beneath the water surface. This alignment triangulates the impact point to be at the ship's lower armor edge but where the vertical plane intersects with the observed plume (figure 6, above).

Conclusion

At least two, possibly three midget submarines had entered Pearl Harbor. In the early hours of Dec. 7, due to naval activities, the nets were open from 0200 and reported closed at 0846 after the air attack had begun, providing free passage to the midgets. Out of the five midgets launched, Destroyer WARD sunk one at the harbor entrance; one was beached at Bellows Field; one was sunk west of Ford Island inside the harbor; the fourth midget launched both torpedoes at the cruiser ST. LOUIS near the harbor entrance and was reported sunk. Photo imagery analysis suggested sufficient evidence and substantiated by forensic analysis that the midget shown on the combat photo was the fifth midget; penetrated Pearl Harbor, released two torpedoes, one struck and detonated against the battleship WEST VIRGINIA. The other torpedo track was seen running towards the battleship OKLAHOMA. These controversial findings and also the combined analytical approach on what many currently regard as historic fact.

The fate of the fifth midget remains a mystery. She could have escaped during the confusion in the heat of the air raid or "crabbed" under the torpedo nets at night-fall and made it to open sea. In the evening hours of December 8, the mother sub I-16 received a message that the midget was experiencing "navigational problems". The midget could have slipped out to sea in a failed attempt to rendezvous with the mother sub. Given the ninja ideology of the time, it could have self destructed in deep water in order to keep the secret weapon from falling into enemy hands.

About the Author

Peter K. Hsu is a Technical Director in the Ship System Group of Anteon, and a member of the Marine Forensic Panel (SD-7) of the Society of Naval Architects and Marine Engineers (SNAME).

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(Continued from page 73)

nations. The trend is that while officers often speak English well, crews from these countries rarely do. Being able to provide training packages in their own language is a significant step towards ensuring they have the knowledge and skills to do their jobs properly. The obvious spin-off is best practice in all areas.

Interactive education also covers a huge range of training topics. Leaders in the market have published titles covering all aspects of ship operations, including complex procedures that are easier to demonstrate practically than explain in words. Holder believes in this practical side of video education. He says, "It is an excellent visual educational tool. As an example, ships' crews can use it to visualize certain maintenance and repair operations."

Other aspects of interactive education are the degree of interactivity previously not available to students on board ships. "Multimedia can interact with the student, provide specific facts and figures, ask questions, monitor answers, assess knowledge, and remember what a student has done during a session. It is an electronic equivalent to having a tutor on board," Holder says.

The most appealing aspect is its ability to monitor progress. "CD ROMs can highlight key points, and create and maintain a record every time a trainee uses it. It logs who used the package, when it was used, and what was achieved," he says.

The application of interactive media training to shipboard best practice has revolutionized the education of

seafarers in recent years. But computer-based training is not new; it has been around for nearly 20 years. However, it is only recently that computer systems have been developed using more power to process information faster.

Holder says, "Computers now provide an effective platform which combines information from various sources, and delivers it to the PC user in a single, interactive medium." He continues, "The same technological advances that have allowed PC games manufacturers to produce products of previously unheard of complexity and visual accuracy are helping education providers deliver sophisticated training packages that are able meet the requirements of today's maritime

industry."

The importance of onboard training will increase further. The maritime industry is experiencing a period of unprecedented regulation. With new legislation being introduced almost monthly, shipowners and operators need an effective and reliable method to train their personnel if they are to meet their regulatory responsibilities. CD ROM and video-based onboard training packages will play an important part in keeping crewmembers qualifications and experience up-to-date.

Captain Len Holder is chairman of Videotel Marine Limited, a U.K.-based producer of videos, workbooks, CD-ROM and CBT training materials.

Transas Unveils GMDSS Simulator

Transas Marine has extended its range of GMDSS simulators by introducing the TGS 4000 system. The new TGS 4000 simulator complements and enhances the existing TGS 2000 and TGS 3000 versions, by offering a number of new features which reflect the latest developments in shipboard communication equipment, based on modern PC environment.

The GMDSS simulator TGS 4000 includes one Instructor workplace and up to 16 Student workstations operating under Windows NT. In addition to the functionality gained in the previous versions, the TGS 4000 simulates communications via Inmarsat-B ship earth stations. The TGS 4000 offers the added facility for airplane communications using AERO VHF on the aircraft emergency frequencies. The new simulator provides realistic simulation of radio wave propagation. Two handsets are now connected to each workstation, instead of only one in the TGS 2000 and 3000. Interestingly, both handsets are connected directly to the PC via a dedicated port, so that no additional telephone line is required. A radar is simulated at each workstation (using the same PC), and real-time vessel movements are displayed on an electronic chart. Also, an enhanced Help facility is presented in HTML format so that the user can benefit from hyper-text options, making navigation within the Help menu more effective and user-friendly.

The new simulator TGS 4000 is designed for the training and examination of seafarers that are going to obtain General Operator Certificate (GOC) or Restricted Operator Certificate (ROC). The simulator can also be used as a component of the seafarers training and examination for the First-Class or Second-Class Radio Electronics Certificate. The simulator fully complies with IMO Resolution A.703 (17) and latest STCW code requirements.

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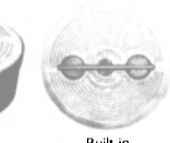
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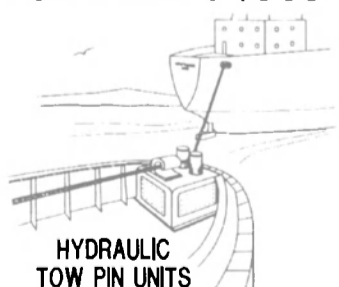
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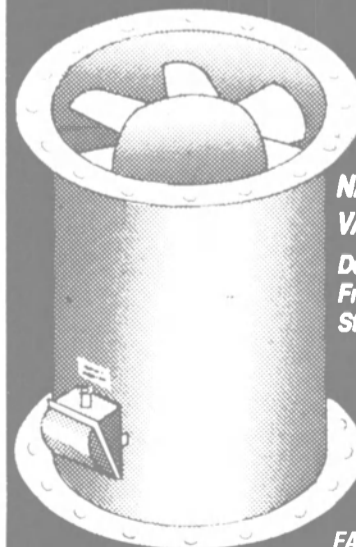
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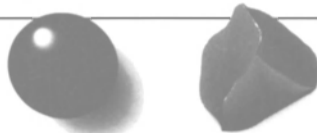
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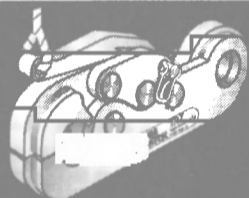
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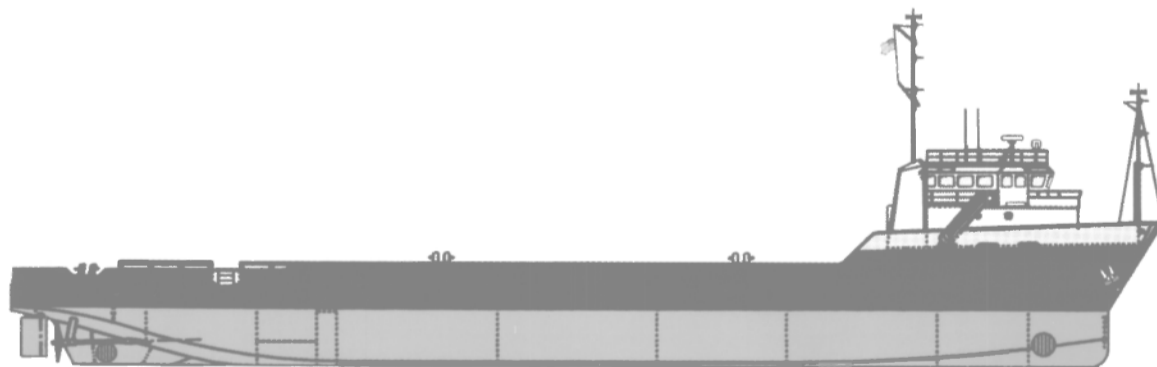
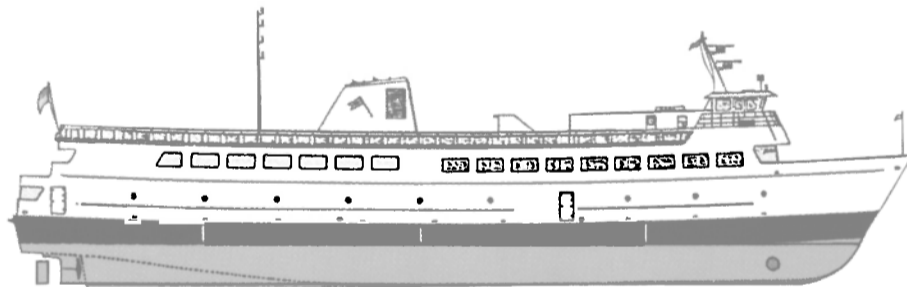
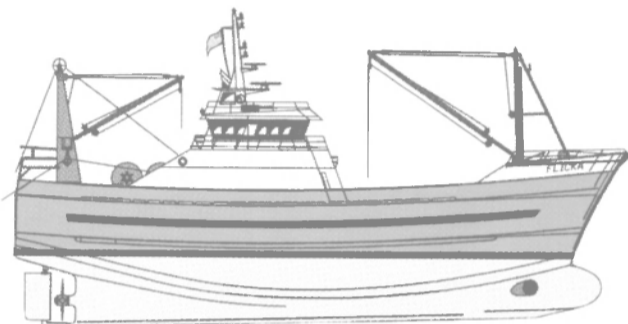
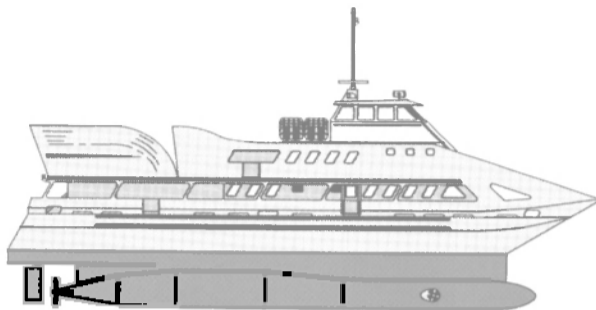
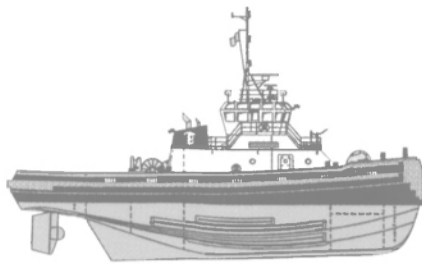
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