

May 2000

MARITIME REPORTER AND ENGINEERING NEWS

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Three For One

The U.K.'s 321-ft. trimaran Warship Demonstrator provides VT unique megablock building experience

Fuel for Thought

Erratic bunker fuel pricing and quality mandates trained buyers

The Buying Binge

Greek ferry operators fortify fleets with new vessels

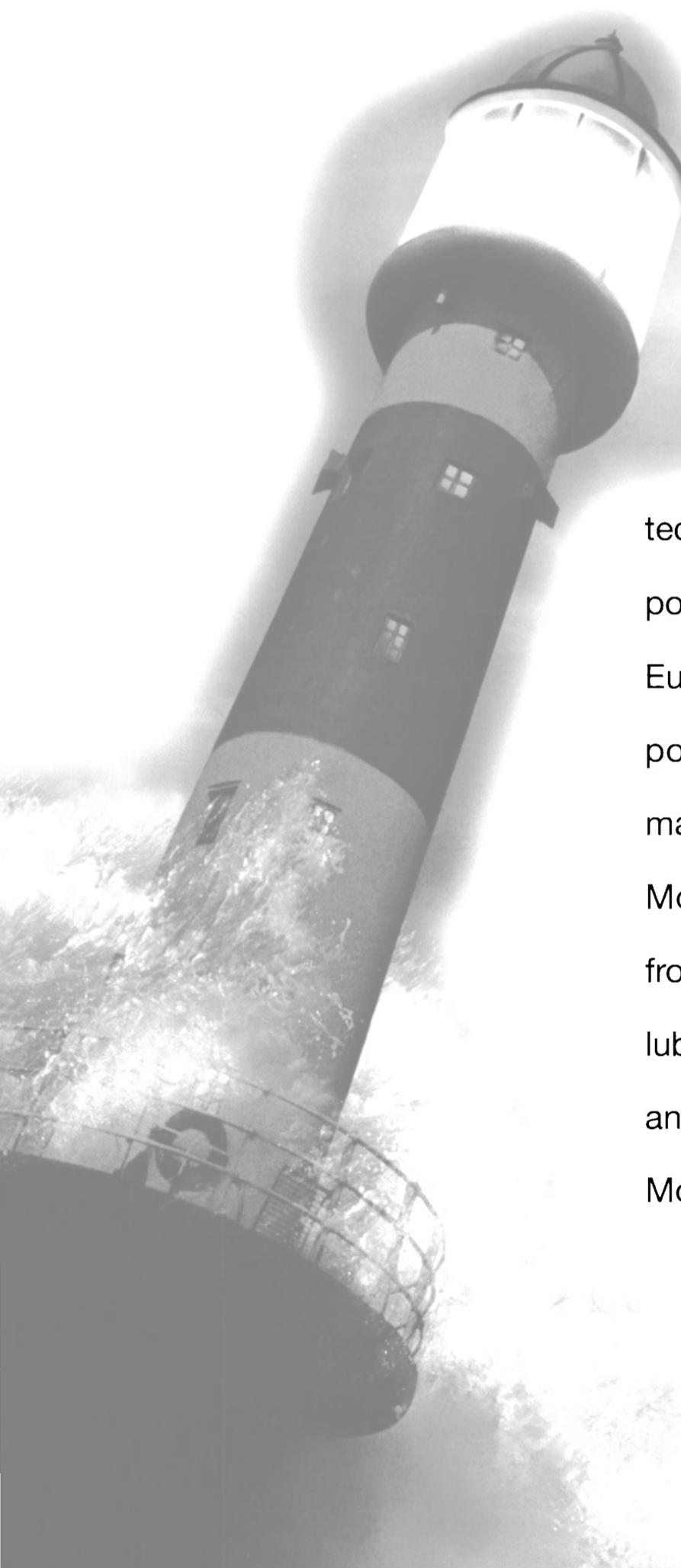
150 Years Young

Johann Fabmer's one-man boatyard has evolved into a versatile boatyard synonymous with safety

The Equipment Supply SAGA

Successful marine vendors have a new road map to product launch success

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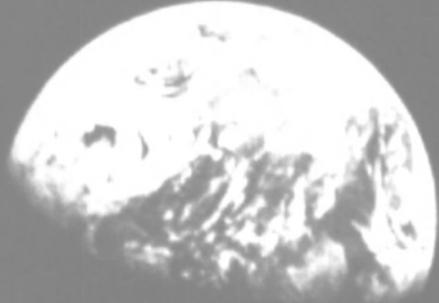
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Founder: John J. O'Malley 1905 - 1980

On the Cover: Vosper Thornycroft is nearing completion on the 321-ft. (98-m) Trimaran Warship demonstrator being built for the U.K.'s Defense Evaluation and Research Agency (DERA). The ship, to be delivered in August, will be used to evaluate its unique hull shaft for consideration as the Royal Navy's Future Surface Combatant.

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The maritime industry in the northern Netherlands continues to demonstrate true global competitiveness in its chosen fields of endeavor — building excellent ships in the under 10,000-dwt range. — by **David Tinsley**, technical editor

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Newbuilds demonstrate safety and stability products and systems mandated by evolving regulations.

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When **Johann Faßmer** started his one-man boat yard in 1850, it is doubtful that he could have imagined that 150 years later the company would be one of the premier boatbuilders in the world ... And still in family hands.

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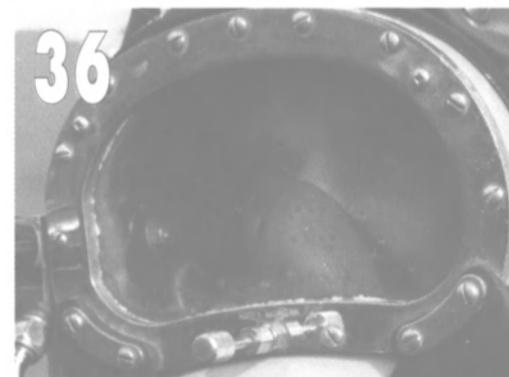
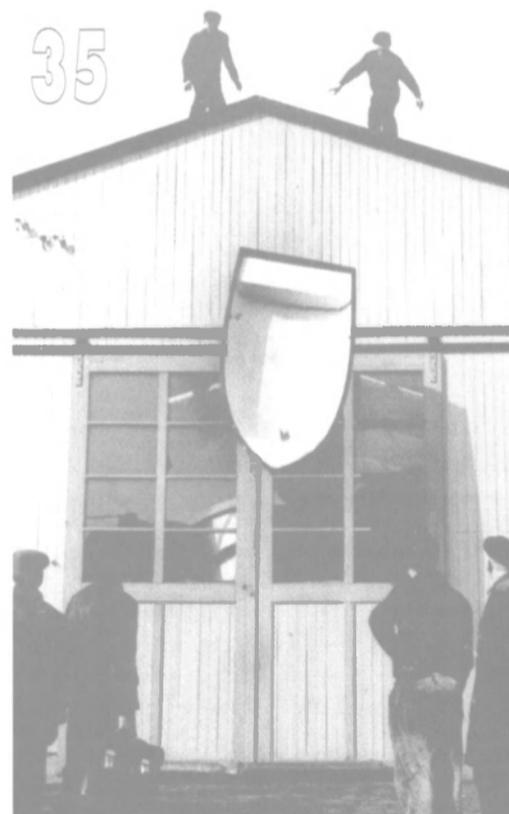
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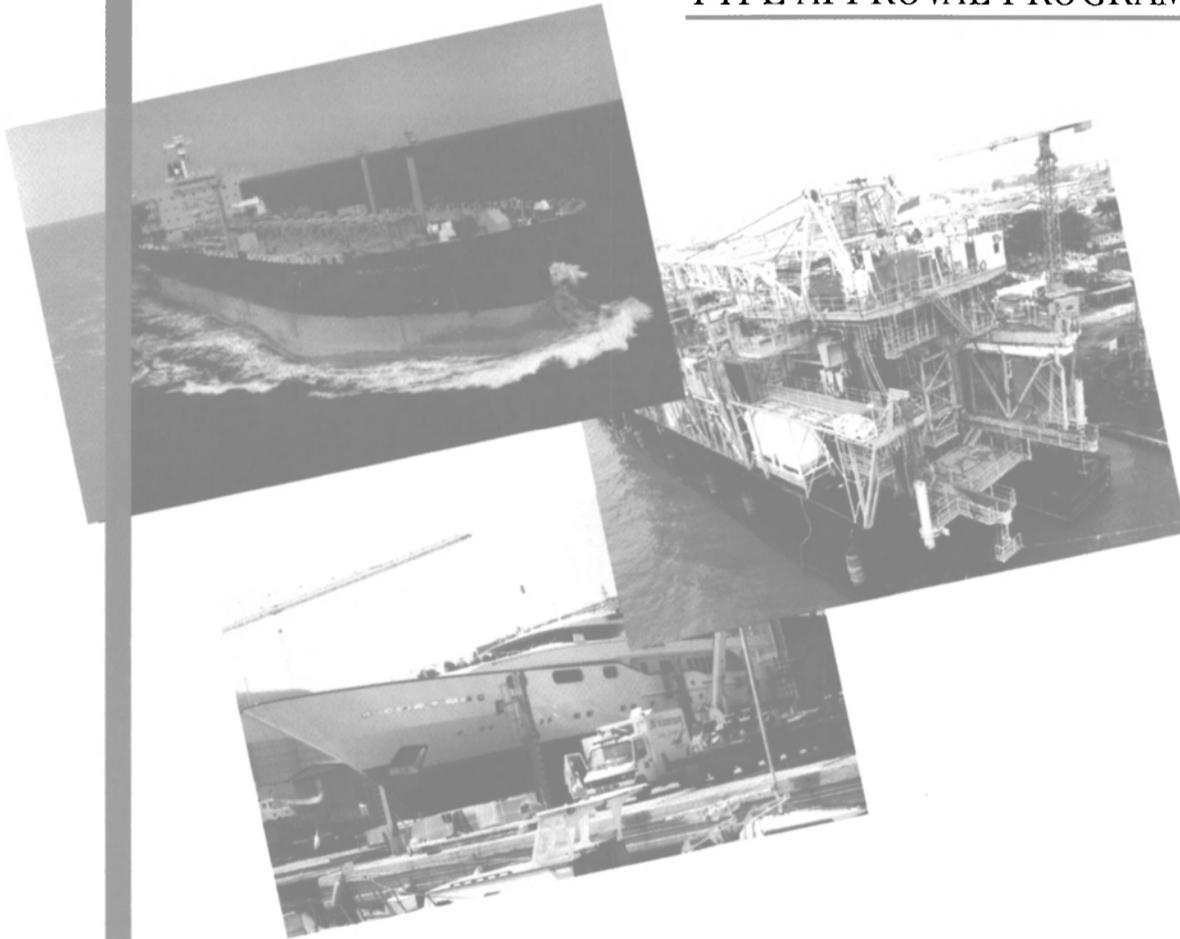
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MARITIME REPORTER AND ENGINEERING NEWS

118 E. 25th St., NY, NY 10010
Tel: (212) 477-6700; Fax: (212) 254-6271
e-mail: mren@marinelink.com
web: www.marinelink.com

PUBLISHERS

Charles P. O'Malley
John E. O'Malley
John C. O'Malley
jomalley@marinelink.com

Vice President/Editorial Director

Gregory R. Trauthwein
trauthwein@marinelink.com

EDITORIAL

Associate Editor
Regina P. Ciardiello
ciardiello@marinelink.com

Technical Editor

David Tinsley

Editorial Consultant

James R. McCaul, president, International Maritime Associates

Manager of Information Systems

Susan Cosme
cosme@marinelink.com

MARKETING

Marketing Manager
Mark Manzano
manzano@marinelink.com

PRODUCTION

Production Manager
Adam Hellman
hellman@marinelink.com

Asst. Production Manager

Oksana Martemy
martemy@marinelink.com

CIRCULATION

Circulation Manager
Dale L. Barnett
barnett@marinelink.com

ADVERTISING SALES

Director of Sales

Lucia Annunziata
annunziata@marinelink.com

Regional Sales Manager

Angela Criscola
criscola@marinelink.com

National Sales Manager

Robert C. Howard
Tel: (561) 368-4233
howard@marinelink.com

Regional Sales Manager

Brett Keil
Tel: (561) 368-6538
keil@marinelink.com

Assistant to Director of Sales

Jennifer Truman
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Editor's Note

E-Utopia?



Analysts, pundits, skeptics and just about anyone with a two-bit opinion have voiced their thoughts — informed and otherwise — as to the potential effects that the surge in “e-commerce” solutions will have on the transportation community at large. While the marine market is traditionally said to be slow in following general business trends, this supposed character trait has not been evident in the new electronic realm, as websites and on-line business portals covering nearly every niche of the industry are popping up quickly around the globe.

The questions surrounding the use of e-commerce solutions in the marine business now turn not to “when” and “if,” rather to “what degree.” The secretive nature under which much of the marine world operates could prove, at first, prohibitive in the full leveraging of electronic solution efficiencies. Generally speaking, the sharing of information has been limited at best, whether it is for specifications and pricing regarding bunker fuel, cargoes or vessel pricing.

A slew of new partnerships using e-commerce as the glue that binds could perhaps mark a turning point of sorts for the marine world. For example, OceanConnect, aiming to provide a fast and price-efficient marketplace for marine fuel transactions, has brought together a formidable grouping including BP Marine, FAMM, Shell Marine Products as well as broker Horace Clarkson PLC.

Another recent launch, Tradiant (www.tradiant.com), offers shippers, freight forwarders and transportation carriers a comprehensive suite of e-commerce solutions to optimize the flow of information across the entire transportation chain. The company and its product are unique in that the majority of its executive staff, from president and CEO John Urban (15 years at APL), on down cumulatively have centuries of shipping and international transportation experience.

E-commerce and its effects on the marine business will be a recurring theme in the pages of not only *Maritime Reporter & Engineering News*, but all of the products produced by The Maritime Group, including *MarineNews*, *Maritime Week* and www.marinelink.com. One of our symbols for this regular feature will be the litde “computer guy” pictured above, as the editorial coverage will not simply focus on the most recent web offerings rather real-world scenarios where e-commerce solutions have helped solve (or cause) problems. I invite readers to liberally contribute to this section by sending comments, suggestions and potential stories to trauthwein@marinelink.com.

Gregory R. Trauthwein

International Representatives

INTERNATIONAL OPERATIONS

CHARLES E. KEIL, Vice President
4400 N. Federal Highway, Ste. 121, Boca Raton, FL 33431
Telephone: +561-368-1021; Fax: +561-368-1161
24-hr Tel/Fax: +561-998-0313; Mobile Tel: +561-716-0338
bkeil@marinelink.com

Tony Stein, International Sales Manager
12, Braehead, Bo'ness, West Lothian EH51 0BZ, Scotland, U.K.
Telephone: +44 (0) 1506 822240; Fax: +44 (0) 1506 828085

Australia/New Zealand

Tony Stein
12, Braehead, Bo'ness, West Lothian EH51 0BZ,
Scotland, U.K.
Tel: +44 (0) 1506 822240;
Fax: +44 (0) 1506 828085

Argentina

R. LESLIE RAMSAY
Calle Pellegrini 173
Primer Piso, Departamento C
1009 Buenos Aires, Argentina
Tel: +54 1 394 8821;
Fax: +54 1 326 4377

Benelux

PAULA TACQ
Maritime Media ML
Otweg 18 2771 VX Boskoop, Netherlands
Tel: +31 172 230707;
Fax: +31 172 230708

Brazil

JOSE DUARTE DOS SANTOS
Multipla Agencial Martima, Ltda.
Rua Caroline Rodrigues 28
Cuarto Andar, CEP-11055-070
Santos, Sao Paulo, Brazil
Tel/Fax: +55 1 32 32 74 74

Central America

EDUARDO F. LOPEZ/ISEIA BAZAN
Transmarine Media Services, P.O. Box 8579,
Balboa Ave., Panama 5, Panama
Tel: +507 617 1469; Fax: +507 251 4794

China

WANG ZE/XU XIAO FENG
Liaoning Foreign Trade Advertising Corp.
2 Zhongshan Square, Dalian, China 116002
Tel: +86 411 2801924;
Fax: +86 411 2644606

Germany/Switzerland

HANSJORG BRANS
Maritime Media
Freiherr v. Stein Str. 24, D-63303
Dreieich, Germany
Tel: +49 6103 697745;
Fax: +49 6103 697743

Italy

VITTORIO NEGRONE
Ediconsult Internazionale
Piazza Fontane Marose, 3-16123
Genoa, Italy
Tel: +390 10 583684;
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Japan

AKIO ISHII
Ace Media Service Inc.
12-6, 4-chome, Nishiike
Adachi-ku, Tokyo 121, Japan
Tel: +81 3 5691 3335;
Fax: +81 3 5691 3336

Korea

JO, YOUNG SANG
Business Communications, Inc.
Kwangwhamun P.O. Box 1916, Seoul, Korea
Tel: +82 2 739 7840;
Fax: +82 2 732 3662

Portugal/Gibraltar

PAULO BREHM
AZ Publicidade Lda., Rua Almirante Barroso,
52-1 D, P-1000 Lisbon, Portugal
Tel: +351 21 3142256;
Fax: +351 21 3525157

Scandinavia

STEPHAN R.G. ORN/LEON SCHULZ
AB Stephan R.G. Orn, Box 184
S-271 24 Ystad, Sweden
Tel: +46 411-184 00;
Fax: +46 411 105 31

Singapore

CLARA WONG
The Euro-Asia Link, 20 Maxwell Road 07-18A
Maxwell House, Singapore 069113
Tel: +65 3231025
Fax: +65 3237026, +65 4564610,

South Africa

FINN KVAMSDAHL
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Spain

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Fax: +34 91 446 0214

Turkey

MIHAT BOYTUZUN
Kamera Corp., Cumhuriyet Cad. 257/3,
Harbiye 80230, Istanbul, Turkey
Tel: +90 212 248 48 64;
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United Kingdom

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Oslo Stock Market

Offshore Climbing Higher In Oslo

Shipping and offshore shares performed well in March with an increase in the Shipping Index of 2.3 percent. The Oslo market as a whole fell 2.2 percent, much due to the world-wide price fall for the IT and telecom sector.

Despite the uncertainty about the outcome of the OPEC meeting on March 27 and 28, a number of offshore shares rose significantly during the month. Even though the oil price fell slightly as a result of the meeting, it is obviously within a price range that is considered as comfortable by investors.

The two share classes in Smedvig (SME and SMEB) were both up about 19 percent in the period, topping the long list of positive performers in the offshore sector. All but five of the listed offshore shares increased their value during March. Polar Holding (POL) and Det Søndenfjeldske (SFJ) ended at the first two spots on the losers list, as they dropped 7.5 and 6.7 percent respectively. Stolt Comex Seaway (SCS) ended up 15.4 percent, Ocean Rig (OCR) was up 13.1 percent, while the two seismic companies Petroleum Geo-Services (PGS) and TGS Nopec (TGS) rose 12.6

and 2.9 percent.

Shipping shares also experienced a dominance on the winners' side, even though not as strong as in the offshore sector. One of the most heavily traded

shipping shares, Frontline (FRO), ended the month up all of 28.6 percent, while Bergesen (BEA and BEB) rose 9.3 and 6.9 percent respectively in its two share classes.

At the other end, Mosvold Shipping (MSL), Bonheur (BON), Leif Høegh & Co. (LHO) and Ganger Rolf (GRO) all

fell between six and two percent.

For the second straight month, the two cruise operators slowed the Shipping Index. Royal Caribbean Cruises (RCL) lost a solid 16.6 percent while the remaining tradable shares in NCL Holding (NCL) were down a more modest three percent.

Winners for the Month

| Shipping | List | Change |
|------------------------|------|---------|
| Frontline | Main | + 28.6% |
| Stolt Nielsen B | Main | + 12.2% |
| Nordic American Tanker | Main | + 11.1% |
| Actinor Shipping | Main | + 10.0% |
| Bergesen A | Main | + 9.3% |
| Offshore | List | Change |
| Smedvig A | Main | + 19.6% |
| Smedvig B | Main | + 18.8% |
| Brøvig Offshore | SMB | + 17.8% |
| Northern Offshore | SMB | + 15.5% |
| Stolt Comex Seaway | Main | + 15.4% |

Losers for the Month

| Shipping | List | Change |
|-------------------------|------|---------|
| Royal Caribbean Cruises | Main | - 16.6% |
| Mosvold Shipping | Main | - 6.3% |
| Bonheur | Main | - 5.1% |
| NCL Holding | Main | - 3.0% |
| Leif Høegh & Co. | Main | - 2.8% |
| Offshore | List | Change |
| Polar Holding | SMB | - 7.5% |
| Det Søndenfjeldske | Main | - 6.7% |
| Awilco B | Main | - 2.9% |
| Navis | SMB | - 2.1% |
| Awilco | Main | - 0.7% |

It was a battle royal,
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Resilient Dutch Network



As a bastion of ship production in the under 10,000-dwt-vessel range, the industry in the northern Netherlands continues to demonstrate true global competitiveness in its chosen fields of endeavor. While much of European shipbuilding bewails the intensified onslaught from the Orient, impinging on an ever-greater range of ship types and ever-widening circle of European shipowning communities, the yards and allied firms in the northernmost Dutch provinces are putting down building blocks in new market areas.

Key points of the investment-underwritten drive to increase market reach and develop business volume are a push towards larger vessels, up to 20,000-dwt in some cases, and the forging of new relationships with builders in Eastern Europe. Industrial evolution in the north Netherlands has involved an active policy of reinvestment and improvement in the means of shipbuilding production. The rise of new ship and section assembly halls over the windswept landscapes

fringed by the Waddenzee and the IJsselmeer is complemented by continuous design development, not least in the industry's core business of supplying dry cargo ships, multi-purpose vessels and container feeder carriers. The design effort couples 'added-value' with series production potential, and marries the vital requirement for construction-friendly forms with a deep understanding of the needs of the ship operator and industrial freight market.

More than ever, the region's strength in shipbuilding and the allied sectors derives not only from its professional skills but also from a propensity for collaboration between like-minded, but wholly-independent firms.

Networking between assembly yards, section builders, cut steel suppliers, marine equipment makers and design engineering firms has conferred a high level of self-sufficiency, while specialization in each case has fostered very high productivity levels. While subcontracting of bare hulls to cheaper-cost

countries has long been a policy of certain small-ship and craft builders in the Netherlands, the principle of networking is being extended to include stronger relationships with selected yards in Eastern Europe. Just as the new investments in shipbuilding in the northern and middle regions of the Netherlands have largely complemented rather than displaced existing facilities on the inland waterway network, augmented relationships with yards in Eastern Europe do not signify a diminution in the indigenous shipbuilding resources.

As the latest example of business verve, the recently expanded Volharding Group has signed a new agreement with Daewoo Mangalia Shipyard in Romania paving the way to a growing, annual supply of hulls for outfitting in the Netherlands. The pact with the Korean majority-owned Romanian yard, plus investments in Volharding's two shipyards, specialist outfitting facility and section building yard in Groningen province, should see the group's new-

building output in 2000 rise to 18 vessels from nine last year. The typically Dutch and German client profile has been broadened by contracts from Mediterranean and Southeast Asian owners for multi-purpose vessels, while the group's market focus now extends from 1,800-dwt to 20,000-dwt, compared to the maximum 9,000-dwt hitherto.

One of the key constituents of the industry in the north is the sales, marketing and design engineering firm Conoship International. Jointly owned by the member yards, which include the Volharding Group, Conoship acts as an antenna for the individual builders in the international market, taking a proactive line in business development and the providing project support through to the contract stage, fulfilling a matchmaker role between customers and the shipyards.

Conoship is emblematic of the northern industrial structure and business ethos as a whole, since it lives by gener-



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730,000-cu ft. class signals an impending new phase in production from a region, which has recently turned out a range of vessels and designs establishing the popularity of the 9,000-dwt size in the multi-purpose scenario. Another example of a Dutch yard having coupled investment in the home ground with a link-up in Eastern Europe is Peters

Scheepwerf. The commissioning in 1998 of a new hall for the construction of vessels up to 12,000-dwt has raised the scope of its Kampen premises on the IJssel beyond the traditional coaster sizes. At the same time, a strengthened connection with the Czech shipyard CSPL, for the supply of coaster hulls, has sharpened Peters' competitiveness at

the lower end of the capacity band.

Ever-growing Damen Shipyards meanwhile, while maintaining a northern presence with its Hoogezand yard aside the Winschoter Diep near Groningen, last year acquired a majority holding in Santierul Naval Galati in Romania, following five years' cooperation between the Hoogezand and Galtz yards.

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New Runners From U.K. And Japanese Stables

With the continuing consolidation in the marine engine building sector, and unwavering pressure on engine prices, the stakes are rising all the time as regards design development. But the considerable resource allocation represented in designing a new engine and bringing it to market have, of course, to be countenanced to ensure competitiveness and respond to new and evolving business opportunities and clients' expectations. At a time when it is set to be taken over by Germany's MAN Group, UK producer Alstom Diesels has unveiled a long-mooted addition to its medium-speed range in the shape of the RK280 series. Conceived initially for unit powers up to about 12,000-bhp (9,000-kW), the 280 mm-bore design promises to be a worthy consort to the popular RK270, which has found particular application in its biggest configurations as a propulsion prime mover in large, high-speed ferries. Tailored to the essential requirement for compact, concentrated power in heavier-payload fast ferries and also military vessels, the RK280 also represents a new initiative in the potential territory of the gas turbine. Following on from last year's move by Wartsila NSD to strengthen its mid-range two-stroke offering with the Sulzer RTA60C, Japanese low-speed diesel engine designer Mitsubishi has announced an addition to its UE family. With the UEC68LSE, the Japanese firm has put a finer edge on competition in a segment of the business with an established contender at 680 mm-bore, the Sulzer RTA68T, and with the MAN B&W S70MC as a widely-favored choice at 700 mm-bore. Since the latest UE type covers the power band at about 20,000-32,000-bhp (14,700-23,500 kW) on a crankshaft speed of 95 rev/min, it provides owners and yards with a new powering option for a host of bulker, tanker and other types. The UEC68LSE applies the LSE concept first employed in the UEC52LSE engine, which provided a 15-percent power gain on the same fuel consumption as the 50LSII type in the indigenous range.

Circle 35 on Reader Service Card



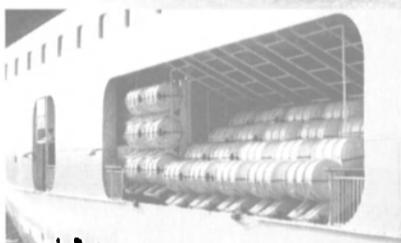
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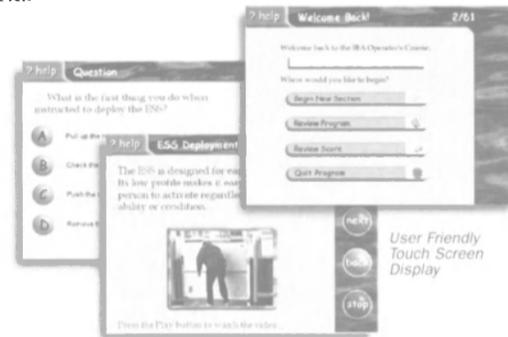
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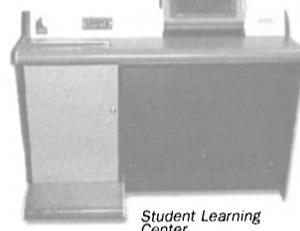
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Contracts

Mitsui O.S.K. Orders Five Containerships

Japan's Mitsui O.S.K. Lines Ltd. (MOL) has ordered three 6,000-TEU containerships from Ishikawajima-Harima Heavy Industries Co. (IHI). Both companies declined to comment on the contract terms, but industry sources esti-

mate a such vessel would cost over five billion yen. MOL also placed an order for two 6,000-TEU container ships with unlisted Japanese shipbuilder Imabari Shipbuilding Co Ltd, it said in a statement. The five new vessels with a service speed of 25.5 knots, to be deployed in the company's trans-Pacific services,

will replace its current 2,800 TEU vessels in 2002.

Fincantieri To Construct Ferries For SNCM

Fincantieri has agreed with the French company SNCM to build a 574 ft. (175 m), 44,500-ton ferry, which will operate

between Marseilles and North Africa. The new vessel will be equipped to hold 2,200 passengers and 700 cars.

With a propulsion system designed for two different service speeds, the ferry will be able to move at 24 knots with all four of its engines running for a total 30,000 kW, or at 18 knots with two engines running for 10,000 kW. Fincantieri's own efficient hull lines provides a reduction of the installed power of about 10 to 15 percent. With construction occurring at Fincantieri's Ancona yard, the vessel is scheduled for a spring 2002 delivery.

Circle 3 on Reader Service Card

Chantiers Subcontracts P&O

Chantiers de l'Atlantique, St. Nazaire, France, has subcontracted the hull form development and model tests of P&O's two new 971 ft. (296 m) cruise vessels to SSPA Sweden AB in Gothenburg. The order also calls for maneuvering and seakeeping tests with a free-sailing ship model, as well as cavitation tunnel tests.

Circle 37 on Reader Service Card

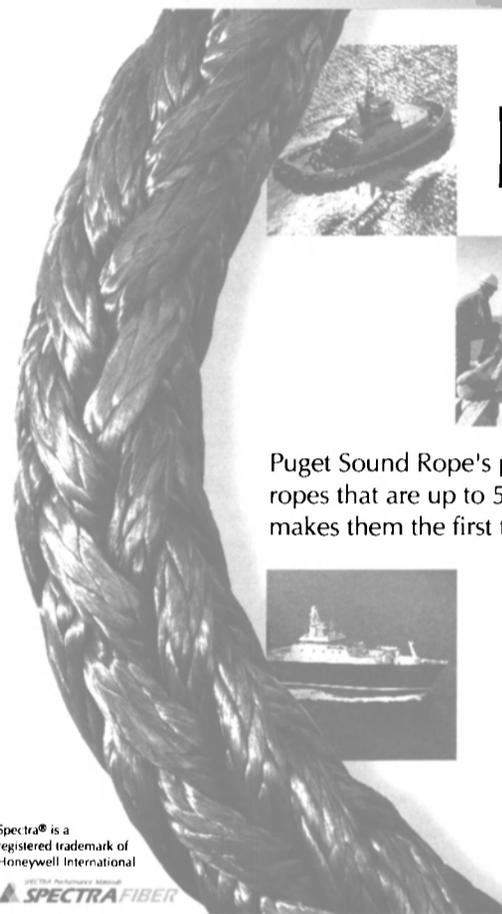
MDC Plans For Debris Management Vessel

The Marine Design Center (MDC) of the U.S. Army Corps of Engineers (USACE) intends to acquire a debris management vessel to serve the U.S. Army Corps of Engineers, Huntington District (CELRH) at the Bluestone Lake and Dam project. An option for exercise of a second vessel will be included in the solicitation. The vessel will be used to carry driftwood and debris on both the New River and Bluestone Lake in Southeastern West Virginia. It will also be suitable for intermittent operation that may occur throughout the year. Measuring approximately 50 x 20 ft. (15.2 x 6 m) with a draft of 5 ft. (1.5 m), the vessel holds a small, heated deck-house with enough space for propulsion and steering controls. A pedestal mounted, diesel powered hydraulically-operated, loader-type crane with a rated lift capacity of 17,000 lbs. is also housed on the vessel.

FGH Finalizes \$40M Contracts

Friede Goldman Halter (FGH) has finalized six new contracts valued at approximately \$40 million total. The contracts have been signed with the following customers:

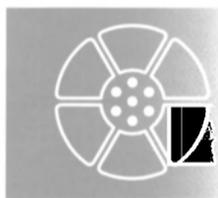
The Venezuelan government has called upon FGH to construct a pair of 153 ft. (46.6 m) LCU-type logistics support vessels. Financing has been secured and construction of the vessel's is expected to commence during the sec-



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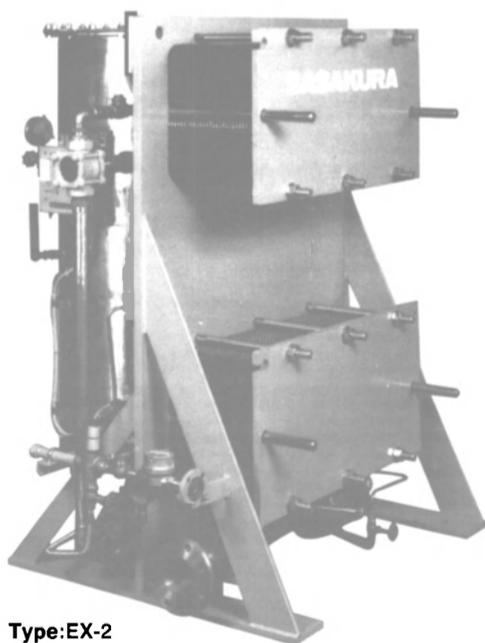


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Circle 26E on Reader Service Card

Contracts

ond quarter at the company's Moss Point Marine shipyard in Escatawpa, MS for a fourth quarter 2001 delivery.

FGH will design and construct a deep-water mooring system for Atwood Oceanics for installation onboard Atwood Eagle — a semisubmersible drilling rig able to operate in up to 5,000 ft., and for the fabrication and installation of equipment for Atwood Richmond. The 8-point combination traction-winch/windlass mooring system will be designed by the FGH Engineered Products Group's AmClyde division and manufactured by its BLM Offshore facility. Delivery is scheduled for January 2001.

Construction for winterization of Sedco 714 semisubmersible drilling unit for Transocean Sedco Forex will be performed at Friede Goldman Newfoundland's Cow Head Offshore fabrication facility in Newfoundland. Most of the work should be completed by the end of the second quarter.

Circle 48 on Reader Service Card

Bergesen Orders Two VLCCs

Hitachi Zosen Corp. has exercised an option by Bergesen D.Y., Norway for the construction of two additional VLCCs. The option had initially been granted to Bergesen when the sales contracts for four VLCCs were agreed last January.

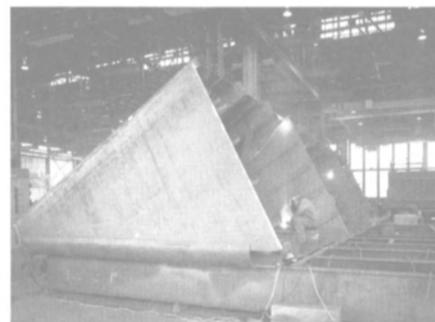
Currently in the process of revamping its fleet, Bergesen was attracted to Hitachi Zosen's technologically-driven double hull vessels, which can be assigned for worldwide operation.

U.K. Yards Eagerly Await \$475M Ferry Deal

British Prime Minister **Tony Blair** said his government will take the needs of domestic shipbuilders into account when it awards a \$475.1 million contract

for naval ferries. But Blair, facing pressure from shipbuilders and oil industry workers fighting to stop the contract going abroad, also said his government was bound by strict European Union rules in awarding the contract. The Ministry of Defense has asked for bids to build six RoRo equipment transport vessels, a deal worth about \$474 million. Because the RoRo ferries will be used for commercial not military purposes, European Union competition rules apply which do not allow preferential treatment for British yards.

SENECO Awarded Barge Contract



A welder with SENESECO works on the bow of a steel barge utilized by a Boston company.

The Southeastern New England Shipbuilding Corp. (SENESECO) has been granted a contract for the construction of a 180 x 50 x 8 ft. (54.8 x 15.2 x 2.4 m) ocean class deck barge with an option to build a second vessel.

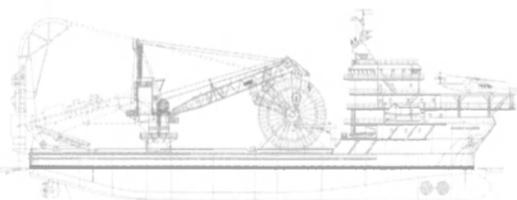
The contract calls for SENESECO to build a barge for Recon Group, which is affiliated with Reinauer Transportation, Newark, N.J., who owns and operates various fuel and cargo barges on the East Coast.

The ABS-classed vessel will be capable of carrying a crawler crane with a deck loading of 2,000-lbs. per sq. ft.

Circle 79 on Reader Service Card

Bender Chosen By Torch To Build Innovative Deepwater Vessel

Bender Shipbuilding and Torch, Inc. have joined forces to build M/V Midnight Warrior — a Deepwater Construction Vessel. The contract, which was signed on March 31, calls for an ABS-classed, diesel-electric, 15,000-hp vessel. Designed by Guido Perla and Associates, Midnight Warrior is equipped to provide offshore flowline installation, offshore umbilical installation and subsea construction. With 3-3,000-hp azimuthing thrusters on the stern and 2-2,000-hp tunnel thrusters in the bow, the vessel is also able to provide worldwide operations.



Outboard profile of M/V Midnight Warrior

Circle 76 on Reader Service Card

Chiles Offshore Agrees With Keppel

Chiles Offshore LLC has partnered up with Keppel FELS Limited in Singapore to construct a KFELS MOD V "B" design, cantilevered jackup drilling rig not to exceed \$110 million, included

owner-provided equipment. A proprietary design owned by Keppel the KFELS MOD V "B" has been based on the MOD V "harsh environment" jackups, and will be delivered with a leg length measuring between 465 and 545 ft. (141.7 and 166.1 m). The MOD V replaces jackups built during the 1970s.

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Circle 23 on Reader Service Card

Effectively Assessing Your Risks

by *Bonnie Gershon*, vice president and manager, Maritime and Surface Transportation, Summit Bank

One of the greatest challenges facing a lender in the maritime industry is appropriate assessment of risk. In this exciting, varied and vibrant industry, a lender's effective risk assessment requires a thorough understanding of the vagaries that characterize the industry. Many of the companies have been in business for 100 years or more. They have a long family history associated with the sea that has charted their economic destiny for decades.

Experience and expertise are the key factors in designing a successful strategy to serve the maritime market, which is made up of skilled professionals who know their business from A to Z. Vessel owners also are proud of their company history. For instance, they jump at the chance to show off models of their vessels, current units and those that have

achieved the status of razor blades. Many are named after beloved family members and reflect a company's heritage - specifically how it has grown and continued to operate over the years.

Through relationship building and personal attention to our maritime clients, Summit Bank has learned of family and business disputes, failures and natural disasters. This is an industry where the perils are quite real and the emphasis on safety is a universal theme. In fact, a good safety record is a vital factor of which some members of the industry are justifiably proud. Listening to weather conditions signifies much more than planning a summer vacation, because hurricanes and storms can have an intimate impact. For this industry, the weather too often becomes an issue of crisis management — rescue at sea, a

sinking vessel, pumping sand back onto the beach.

Nevertheless, in the maritime industry we often hear of good growth ideas that require financing. Part of risk assessment is deciding whether a particular financing opportunity represents a "bankable" risk. Bankable relationships with a customer often last for many years and are rewarding for both parties. A good banking relationship includes many dimensions that can span several life stages of either the business or the people involved in running the business. A good banker seeks to understand the long-term strategy and the financial needs of a customer in order to structure the appropriate financial growth plan. Such a plan may also involve acquisitions and mergers, estate planning, and succession issues for management.

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Marine Finance

pensate for these potential downside risks. Specifically, they are not structured to share in the financial upside of the project if, or when, the owners succeed in the business venture. These opportunities may, instead, represent a risk that is more appropriately funded with equity from investors, or through a private placement or other capital market services.

Let's say a banker makes a loan for \$1 million. If that loan becomes uncollectible and deemed a write off, it will take \$50 million at a two percent spread over a one-year period to make up the difference. An offset of this magnitude represents a costly mistake in risk management.

The duration of a loan is another factor in assessing risk. The longer the term, the greater the risk. Part of a banker's job is to match loan repayment with the appropriate asset life and cash flow. Generally, it is more beneficial to finance short-term assets with a short-term loan or line of credit, or to finance longer-term assets with term debt. However, some of the equipment used in the marine industry has a very long asset life. In these cases, a bank may seek to limit the risk imposed by a lengthy amortization requirement with a short-term balloon payment.

Maritime companies have financing needs that are unique. Their needs may be substantially large due to a variety of circumstances: the necessity to enlarge the fleet with new or used vessels; acquisition of another company; or a greater loan than the bank will normally finance. Under these circumstances, it may be appropriate for the customer's lead bank to arrange a "club" or "syndicated" loan. A club loan is usually a loan held by two to three banks. A syndicated loan may be larger in size and include up to 10 banks or more in the group.

Customarily, maritime customers use sophisticated capital markets products to finance various long-term growth opportunities. Privately placed long-term mezzanine loan and/or equity can be used to support a management buy-out, a large acquisition or other substantial financing needs. Longer-term debt and equity can help a business weather a downturn.

For maritime business success, bankers must be aware of the uniqueness of the industry and determine what is a "bankable" deal in order to effectively meet the important challenge of correctly assessing and managing risk.

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financial services, including equipment leasing, cash management and personal banking. A division of Summit Commercial, MAST focuses exclusively on serving the needs of maritime customers in this specialized industry by providing the experience, resources and flexibility to recommend the best industry-specific banking solutions that meet the compa-

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Marine Finance

Coflexip Stena Awarded \$58 Million Contract

One of Coflexip Stena Offshore's U.K. entities was awarded a large EPIC contract worth \$58 million by BG International for its Blake subsea field, offshore Scotland at a depth of 295 ft. (90 m).

Situated approximately 9.5 km North

of the Ross field in the Moray Firth, the Blake field will be tied-back to the existing Ross FPSO Bleo Holm, operated by Talisman.

Work scope for the project includes the installation of all the subsea structures and control system, including a manifold with six production wells gathered around, as well as two satellite

water injection wells.

The engineering, manufacturing and installation of all the flowlines (rigid reeled, pipe in pipe, flexible) and umbilicals for the infield and tie-back connections; and the disconnection/reconnection of the FPSO that will be towed to and back from a conversion yard during Summer 2001.

NASSCO Awarded \$230 Million 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.

Measuring 950 ft. (289.5 m) and containing 390,000 sq. ft. of cargo carrying space, the vessel's construction will commence this summer for mid-2002 delivery.

Kongsberg To Provide Profiler For Fugro

Kongsberg Simrad Mesotech has been granted a contract by Fugro Geoservices of Lafayette, La. to deliver a specially modified SM 2000 multibeam profiler, which is capable of operating depths of 3,000 m. The multibeam will be part of the development of Fugro's new DT-3500, a technical enhancement of its current bottom-referencing deep water survey system — a system that will be installed in a tow vehicle. This device will gather bathymetric data on deep water surveys in a variety of areas, specifically the Gulf of Mexico.

Circle 75 on Reader Service Card

Kittiwake Nabs \$800G Order

Kittiwake, known for its rugged electronic fuel and oil test equipment, has been granted an order worth approximately \$800,000 for Oil Test Centers to install an oil condition monitoring program in the Australian Navy.

The U.K.-based company presently supplies for the U.K. Royal Navy, the navies of Spain and Brunei, as well as the Pacific and Atlantic fleets of the U.S. and Military Sealift Command.

Circle 38 on Reader Service Card

MacGregor Elevators Featured On Cruise Newbuilds

MacGregor's passenger ship division recently raised its orders to 146 for installation of its elevators on cruise and ferry newbuilds in German yards. The latest contract encompasses a 21-elevator shipset for Norwegian Cruise Line's 78,000-gt newbuild project Sky II cur-

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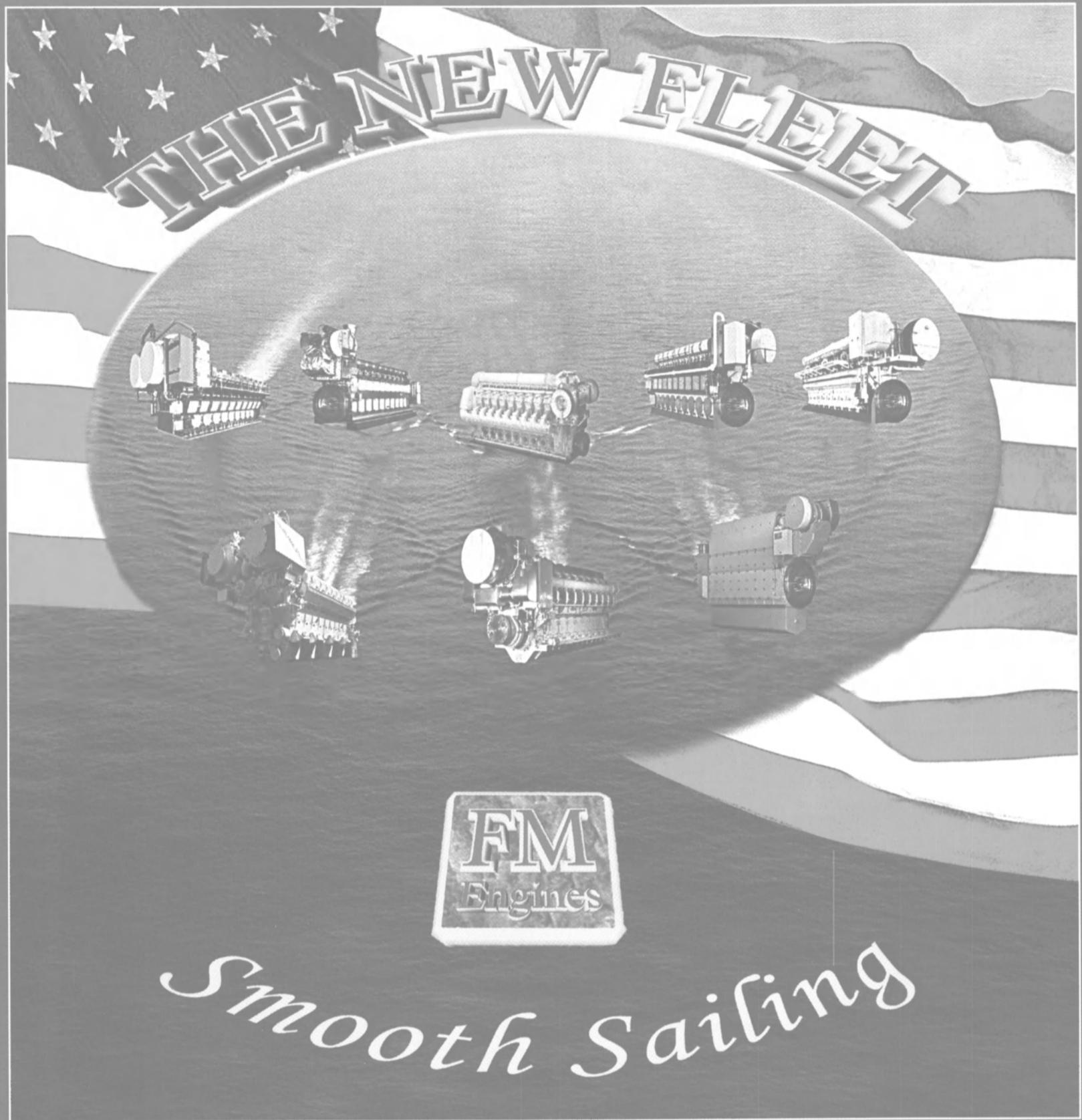
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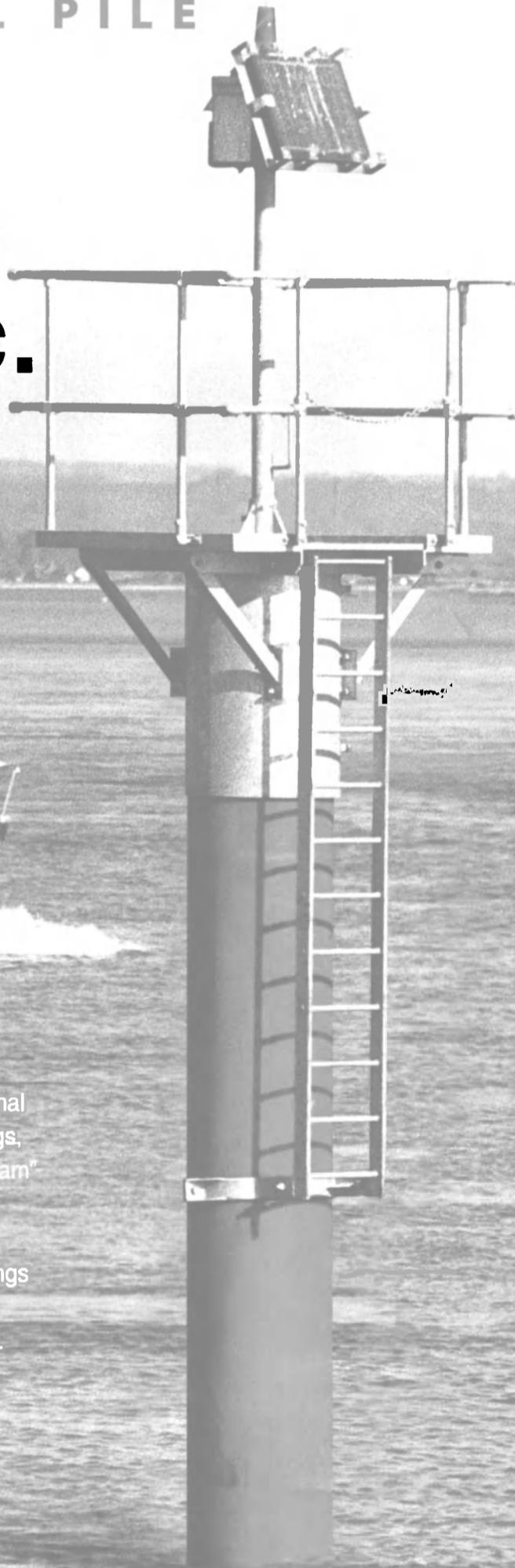
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Marine Finance

rently on order at Lloyd Werft shipyard.

Five cruise vessels on order at Meyer Werft also boast MacGregor's elevators, such as P&O's Aurora; RCI's Radiance of the Seas and a sistership hull; Star Cruises' Superstar Libra and its 112,000-gt newbuilding.

Circle 4 on Reader Service Card

R&B Falcon Awarded Drilling Contract

R&B Falcon Drilling has been granted a \$108 million drilling contract by Petroleo Brasileiro S/A Petrobras for a three-year contract for the DP drillship Peregrine II for operations in Brazil in up to 1,200 m of water.

Currently situated in Galveston, Texas, where an upgrade project consisting of installation of a new blowout preventer stack and control system is underway, the unit will mobilize from Galveston this month to begin operations upon arrival in Brazil.

Oceaneering Intl. Receives Underwater Services Contract

Oceaneering Intl. was awarded a frame agreement for underwater services to Statoil in the Norwegian sector of the North Sea. The contract, which has a primary term of three years and two one-year extension options, replaces a previous multi-year contract between the company and Statoil.

Under the agreement's terms Oceaneering will provide remotely operated vehicle (ROV) drill support services onboard six semisubmersible drilling rigs and additional ROV construction/intervention operations from oilfield support services.

Litton Marine Wins U.K. Ministry Contract

Litton Marine Systems was granted an order from the U.K. Ministry of Defense for the supply of navigational radars for 19 support vessels in service with the Royal Navy and British Army. With installation to be complete by June 2000, the radars will be furnished by Litton's Decca Marine subsidiary in New Malden, U.K.

Circle 39 on Reader Service Card

Aker Wins Mooring Contract

Aker Marine Contractors (AMC) and Chevron Overseas Petroleum Azerbaijan Limited (COPAL) have agreed to provide a preset mooring system to support COPAL's drilling program off Azerbaijan in the Caspian Sea. AMC's contract encompasses the transportation of the preset mooring system to Baku in

Azerbaijan, the lease of the system for two years, and storage and installation.

AMC designed the mooring system to be used in conjunction with either the Istigal or Dada Gorgud — the only two semisubmersibles in the Caspian Sea — to extend their mooring capabilities to water depth of 2,460 ft. (750 m).

Schlumberger Wins Contract

Schlumberger Oilfield Services received two multi-million contracts from BHP Petroleum for seismic data processing services. BHP selected Schlumberger based on the company's differentiating capabilities in depth imaging provided by Seismos, Schlum-

berger's seismic data processing software. Assisting in the evaluation process are Schlumberger geophysicists. Present at BHP's office, the geophysicists are directly linked to the Schlumberger Megacenter Data Processing facility in Houston.

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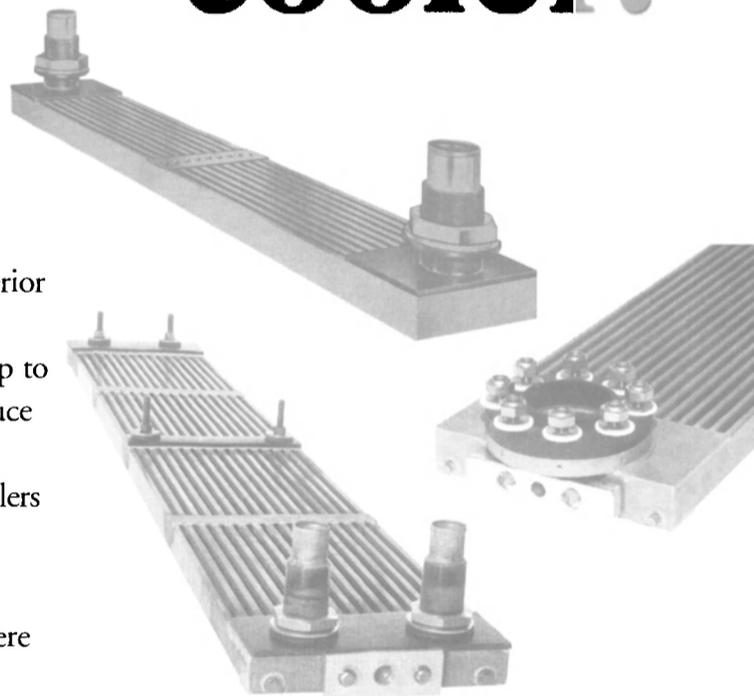
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Congressional Maritime Legislative Initiatives In 2000

The year 2000 has enjoyed special significance as a transition year bridging two centuries. Similarly it has significance with U.S. lawmakers for the Second Session of the 106th Congress. As

the last year of the currently elected Congress, this year anticipates action on a series of pending legislative measures and yet to be introduced proposals affecting the maritime industry. Specifi-

cally tax-related legislation and maritime policy-related legislation could be addressed.

The following is a sampling of possible changes in the law:

I. Maritime-related Tax Legislation:

There are several tax-related provisions that could be considered. One of the main bills emphasizing maritime tax issues has been introduced in the House by Rep. **Jim McCrery** (R-LA) as H.R. 3225 and in the Senate by Sen. **John Breaux** (D-La.) as S. 1858. These bills include such measures as:

A. Capital Construction Fund Program. The McCrery/Breaux legislation would expand the Capital Construction Fund (CCF) program to allow earnings from U.S.-flag, foreign-built ships to be deposited into a CCF for the construction of ships in the United States. Qualified withdrawals from a CCF would continue to apply only to U.S.-built vessels and would be expanded to include vessels that operate between coastwise points of the United States. Contributions to a CCF would no longer be treated as preference items under the alternative minimum tax for corporations. Finally, owners of U.S.-flag vessels would be allowed to contribute to a CCF the 50 percent ad valorem duty on foreign ship repairs that applies to present ships under 19 U.S.C. 1466.

B. Other tax-related provisions in the Breaux/McCrery bills:

Merchant mariners working aboard certain vessels would be covered by section 911 of the Internal Revenue Code, thus excluding up to \$80,000 of the wages they earn while working in foreign commerce.

The acquisition cost of a U.S.-flag ship would be deductible as an expense rather than being treated as a capital investment.

The alternative minimum tax for corporations would not apply to shipping companies owning a fleet of four or more U.S.-flag vessels.

The \$2,000 tax deduction available to passengers in the domestic cruise trade would also be available to passengers aboard a U.S.-flag cruise vessel operating between a U.S. port and a foreign port.

Equally as significant, Congressman **Duncan Hunter** (R-Calif.) has introduced H.R. 3392, which provides various incentives for the development of a U.S.-flag, U.S.-built cruise industry, including CCF coverage and expansion of the business entertainment tax deduction.

The chances of enacting favorable tax provisions for the maritime industry are enhanced by the existence of other mar-

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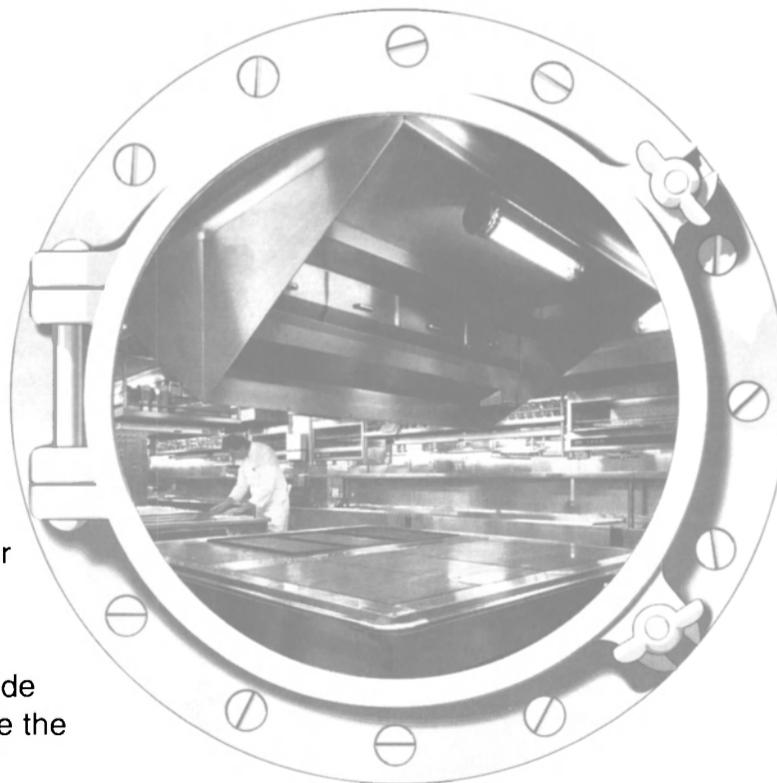
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Legal Beat

itime tax bills to exempt seamen's wages when in the foreign trade (H.R. 3162), to restore the exclusion of shipping income from Subpart F (in particular, section 954 of the Internal Revenue Code) and reduce the adverse impact of U.S. international tax policies on the competitiveness of the U.S. shipping industry (H.R. 265), and to revitalize the international competitiveness of the United States-flag merchant marine (H.R. 2159).



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II. Other Maritime-related Legislation and Proposals. Other legislation may address government programs and policies that affect the maritime industry. These initiatives may include:

A. Domestic Shipbuilding Loan Guarantees - Title XI Funding. With the commitment to provide loan guarantees for the construction of cruise ships and for projects requiring lesser amounts of guarantees, the amount of funding available to cover the cost of the Government's risk for further guarantees under Title XI of the Merchant Marine Act, 1936, is less than \$50 million. There is an effort in the industry to add an additional \$50 million to the Title XI account, which will permit around \$1 billion in guarantees since, on average, the risk cost is about 5 percent of the loan amount. The recently enacted appropriation for fiscal year 2000 provided only the President's budget request of \$6 million to cover Title XI loan guarantee costs. The President's budget request of only \$2 million for Title XI in FY2001 provides an additional obstacle. If a number of the projects are submitted to MarAd, a funding shortfall will occur unless legislative relief is provided.

B. Cargo Preference. The Administration's proposed MarAd authorization bill may once again include an amendment to alter the requirements of section 901(b) of the Merchant Marine Act, 1936, to permit foreign-built dry bulk vessels and breakbulk vessels to be placed under U.S.-flag and used for carrying agricultural preference cargo. Because this provision was rejected last year as having an adverse impact on existing operators and domestic shipbuilding, it is unlikely to be successful this year.

C. Scrapping. Currently, scrapping of ships in the U.S. does not occur because of prohibitions on exporting hazardous materials contained in them and the environmental risks associated with disposing of those materials. In addition, the domestic price paid for scrap has fallen dramatically making it uneconomical. MarAd and the Navy have aging mothballed fleets that need to be addressed. In fact, the Navy now has in progress a pilot program of paying domestic firms to dispose of old ships. As MarAd Administrator, **Clyde Hart** has called for innovative ideas, and Congressional action to facilitate disposal of both government and

privately owned vessels.

D. Coast Guard. Bills introduced in both the House and Senate to authorize appropriations for the Coast Guard for FY 2000 and 2001 have been considered, but not yet enacted. The Coast Guard bill traditionally becomes a vehicle for various maritime amendments, often late in a congressional session.

E. Bills Affecting Marine Cabotage. Among all of the policy-related legislation, none evokes more of a response than pending legislation designed to alter the domestic coastwise trading laws of the United States. However, the U.S. Maritime Cabotage Task Force and others in the industry have expressed strong opposition to these bills because of their implications for undermining U.S.-flag requirements generally and enactment appears unlikely. Examples of these include:

Sen. Brownback's (R-Kan.) bill (S. 1032) to amend the Jones Act to permit foreign-flag vessels to carry forest products and other agricultural commodities in the U.S. coastwise trade.

Several bills to override the requirement under the Passenger Vessel Services Act of 1986 (PVSA) that only U.S.-built, U.S.-flag ships may transport passengers in the coastwise trade.

F. Replacement for Harbor Maintenance Tax. In March 1998 the Supreme Court declared that the existing harbor maintenance tax (HMT) on the value of exports was unconstitutional. In May 1999 the Administration sent legislation to the Congress that would terminate the remaining HMT on imports and domestic cargo and replace it with a new Harbor Services Fee (HSF) to be imposed on four different categories of commercial ships in excess of 3,000 gross tons, including tankers and bulk vessels. The proposed fee is expected to raise about \$980 million annually, to be used for maintenance dredging and harbor deepening projects. Because of broad maritime industry opposition, the proposal has little support among Members of Congress, many of whom prefer that dredging be funded from general appropriations as was the practice prior to the establishment of the HMT in 1986.

What will result from the consideration of these bills during the Second Session of the 106th Congress this year remains to be seen. Given the pending and possible legislative proposals and the impending national elections, however, the year 2000 promises to be one of intrigue and challenge for the maritime industry in the United States.

The preceding was authored by Duncan C. Smith III, Dyer Ellis & Joseph

American V. Awarded Contract

American V. Ships has been named the technical manager of three vessels to be chartered to the recently established Wallenius and Wilhelmsen joint venture, Wallenius-Wilhelmsen Line. American V. will continue to manage the 5,600-unit each Faust and Fidelio, which have been under the company's management since 1989. American V. signed a six-year contract with Automar International Car Carrier to be the technical manager of the U.S. flag vessels, Faust and Fidelio.

The company will provide its full range of technical management services including operating, crewing, budget control, purchasing and quality assurance. The three vessels are chartered through

September 2005 to American Roll-on Roll-off Carriers, a U.S. subsidiary of Wallenius-Wilhelmsen Lines.

Ulstein Brattvaag Wins Winch Contract

Norwegian owner Taubatkompaniet has ordered two additional Rauma Brattvaag winch outfits from Ulstein Brattvaag worth approximately \$12.6 million. Part of the Rolls-Royce group, Ulstein will supply winches for two anchor handling vessels to Taubatkompaniet, which are being constructed by Dalian Shipyard in China. Delivery of the first main winch is scheduled for November 2000 — with the second following in February 2001.

RoRo Report

Spaarneborg Premieres As First Of Stora Enso's New Series

A member of the Wagenborg trio, MV Spaarneborg was constructed at German shipyard Flender Werft as part of a key component within a new transport system developed by forestry product company Stora Enso.

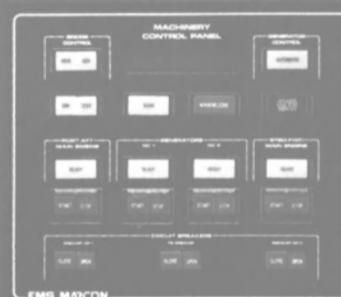
Modeled after a new intermodal project, the vessel, as well as its two sisterships measures 600 x 82 x 49 ft. (183 x 25 x 15 m), with a deadweight of 13,000-dwt. Cruising at speeds of 18 knots, Spaarneborg, as well as

its additional fleet members - Schieborg and Slingeborg — will run between the Gothenburg to Zeebrugge route.

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RoRo Report

product containers - the technologically-driven SECU (Stora Enso Cargo Unit) container - measures 45 x 12 x 12 ft. (13.8 x 3.6 x 3.6 m), with an endloading door. The SECUs can hold up to 70 tons of cargo, where they will be stowed on the lower hold, main deck and part of the weather deck via a transliifter. Benefiting the most from this revolution are transportation outlets, specifically the coordination between Sweden's rail network, North Sea traffic and Europe's inland water-

ways.

Dutch shipping company, Wagenborg Scheepvaart, the benefactor of these Netherlands-flagged vessels, is chartering the trio to Belgium-based Cobelfret Ferries N.V. Noteworthy of their single-propeller driven power, the Bureau Veritas classed RoRos are equipped with a low speed crosshead diesel engine (7RTA 52 U) type with an output of 10,920 kW at 135-rpm. The engine plant's foreship location frees up the cargo

holds from internals, mainly engine casings, which might block the cargo intake. Holds have been squared off for utmost use of cargo decks. In addition to transporting Storaboxes, the vessels can carry trailers, trucks, containers, private cars and general cargo.

Touted as environmentally-friendly, the low fuel consumption, high cargo capacity vessels' propulsion machinery will burn low-sulphur heavy oil, while their plants will be equipped with exhaust emission treat-

| Main Particulars | |
|-------------------|-----------------------------------|
| Flag | Dutch |
| Classification | Bureau Veritas |
| Length, (o.a.) | 602 ft. (183.4 m) |
| Length, (b.p.) | 570 ft. (173.6 m) |
| Breadth, (molded) | 83 ft. (25.2 m) |
| Displacement | 21,667 |
| Lightweight | 9,167 tons |
| DWT | 12,500 |
| Speed | 18 knots |
| Cargo capacity | 2,500 truck lanes; 136 STORABOXES |
| Heavy oil | 1,578 cu. m |
| Diesel oil | 339 cu. m |
| Water ballast | 7,804 cu. m |
| Main engines | Hanjung WNSD, Sulzer |
| Main engine type | 7 RTA 52 U, 10,920 @ 135-rpm |
| Auxiliary engines | Wartsila |
| Propellers | LIPS Holland |
| Generators | Wartsila |

| | |
|------------------------|-----------------------------------|
| Anti-heeling system | Frank Mohn |
| Reduction gears | Wartsila |
| Deck machinery | Mester, Brohl |
| Shafting | Radomir, Leko |
| Bearings | A. Friedrich Flender |
| Coatings | Wismarer Korrosionsschutz |
| VHF radio | Radio Holland |
| Radar | Kelvin Hughes/Radio Holland |
| Compass | Raytheon, Furuno, Cassens & Plath |
| GPS | Leica/Radio Holland |
| SATNAV | Leica |
| Pumps | Allweiler, Dudek, Bormemann |
| Heat exchangers | Alfa-Laval, Prang |
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RoRo Report

ment units. Electrical supply is granted through two auxiliary diesel generators and one shaft generator having a total capacity of 3,360 kW. A special rudder operating 70 degrees to both sides, in addition to two bowthrusters, and one stern thruster, allows Spaarneborg to perform non-tug assisted maneuvers.

Circle 30 on Reader Service Card

MacGregor Outfits Advanced KHI-Built RoRo

Kawasaki Heavy Industries (KHI) expanded its RoRo tonnage references with the January delivery of the 2,300 lane-meter trailer carrier Celandine to Belgian operator Cobelfret, which was scheduled to be joined by sistership Vic-

torine this past March.

KHI's trailer carrier deliveries feature cargo handling/access outfits from MacGregor/Kayaba, which has long been a constant force within the RoRo equipment sector in Japan. With rolling freight capacity provided on the tanktop, main and upper decks, as well as the van deck and weather deck, stern access to

main and upper decks is present via a ramp/door supplied by MacGregor-Kayaba measures 75 ft. (22.9 m) with a 10 ft. (3 m) flap, and has an effective driveway width of 49 ft./58 ft. (15m/20.8 m). In the closed position, the ramp serves as a weathertight door for the starboard side opening into the main deck.

Circle 53 on Reader Service Card

First Of RoRo Series Joins Wallenius Fleet



MS Tamesis, the first of a new generation of RoRo vessels boasting innovative designs has joined the Wallenius Wilhelmsen fleet.

Joining three sisterships to be delivered throughout the next 10 months, Tamesis was commissioned in 1998 by Wilh. Wilhelmsen of Norway - one of two equal shareholders in Wallenius Wilhelmsen.

Delivered on April 13 by Daewoo Okpo Shipyard, the Mark IV RoRo provides 35 percent more covered capacity for specialized RoRo cargo than the previous Mark III design. Suitable for carrying a total capacity of 5,400 cars, the vessel is specifically designed for project and other unique or heavy lift cargo such as power generators, construction and agriculture equipment.

Measuring 787 x 106 ft. (240 x 32.2 m), the vessel, whose name in Latin means River Thames, has a deadweight of 38,300 tons.

Circle 63 on Reader Service Card

| Main Particulars | |
|---------------------|--------------------|
| Length, (o.a.) | 787 ft. (240 m) |
| Breadth, (molded) | 106 ft. (32.2 m) |
| DWT | 38,300 tons |
| Stern ramp width | 39 ft. (12 m) |
| Stern ramp capacity | 320 tons unit load |
| Number of decks | 8 |
| Deck area capacity | 45,889 sq. m |
| Volume capacity | 125,620 cu. m |
| Car unit capacity | 5,400 |
| Engine | B&W 8L 70MC (MK5) |
| Service speed | 20 knots |
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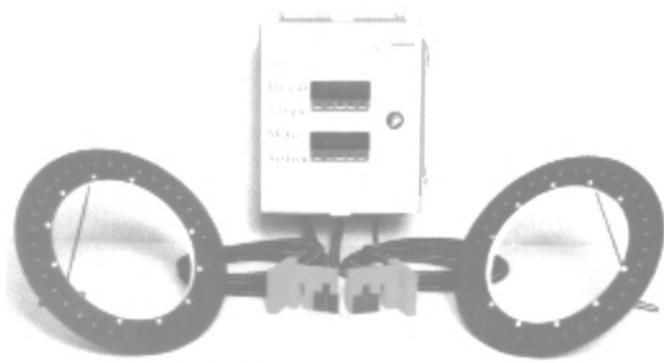
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THE DIGITAL TORQUE METER SYSTEM

- COMPETITIVELY PRICED
- FIBER OPTIC DIGITAL TECHNOLOGY
- ACCURATE, REPEATABLE, RELIABLE
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The Digital Torque Meter (DTM) System measures shaft horsepower and RPM by employing fiber optics to detect the twist in a rotation shaft. Real time measurement at all speeds is accomplished without signal conversion by processing the digital outputs from two stationary sensors and interrupters, mounted on the shaft, pass through a beam of visible light. No drilling, welding, or machining is normally required for installation. Calibration is accomplished at start-up by programmable means, without the need for any additional test equipment and can be easily verified by operating personnel. The DTM System consists of an electronic display/enclosure, fiber optic cables, stationary sensors (orange) and multiple slot interrupters (black rings) as shown in picture.

Circle 244 on Reader Service Card

New & Notable

Eastern Builds Research Vessel For U of M

The University of Miami's Rosenstiel School of Marine and Atmospheric Science recently received F.G. Walton Smith at its Virginia Key facility from Panama City, Fla.-based Eastern Shipbuilding. Designed as an advanced research catamaran boasting technologically-driven onboard laboratories, the all-

aluminum vessel is capable of both shallow and deep-water marine and atmospheric research.

Named for the first dean and founder of the Rosenstiel School, the vessel will be used in combination with the University's new Center for Sustainable Fisheries, aimed at research and education to protect threatened fisheries.

Measuring 96 ft. (29.2 m) with a 40 ft. (12.1 m) beam



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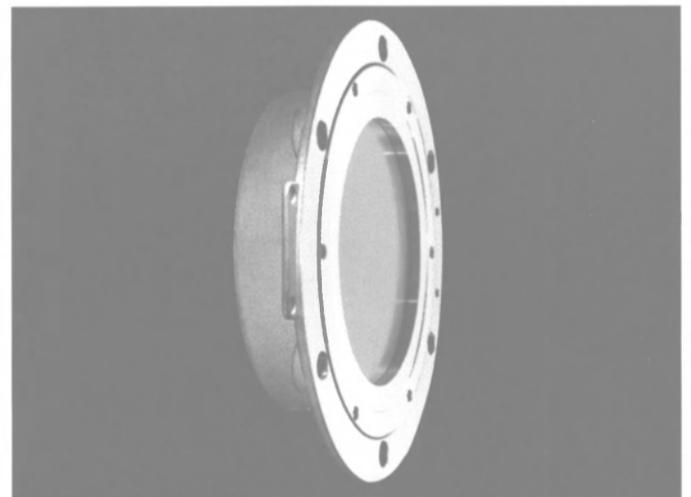
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THE RADAR



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The first flat array antenna for liquid tank gauging. This software driven array allows for each sensor to remotely configure itself for the type of product as well as the structural characteristics within each tank. It is completely self-diagnostic and is factory calibrated using a laser interferometer to .1mm. It is designed for the harshest environments and can be provided in a high temperature version to 385°F. It is intrinsically safe with Class 1, Div. 1, Group D & C approvals. As a smart sensor, all processing calculations and software are resident in the device itself, only a high level generic data output, i.e., RS485 (or others on request) is sent to the cargo control area.

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Circle 225 on Reader Service Card

New & Notable

and operating at a draft of 6 ft. (1.8 m), the vessel was constructed inside a total aluminum fabrication building, with Timothy Graul & Associates of Sturgeon Bay, Wisc., providing the vessel's design to the University for bidding purposes. F.G. Walton Smith accommodates 20 persons and holds both laboratories with both wet and dry spaces

comprised of 800 sq. ft., with an added 800 sq. ft. of multipurpose space on the stern. Power is provided by a pair of Cummins QSK 19 main engines rated at 760-hp each, connected to Servogear Model HD220HL variable pitch propeller systems, and generators are Cummins model 6BT5.9GM2 80 kW.

Circle 33 on Reader Service Card

3.MAJ Delivers Chaleur Bay

3.MAJ Brodogradiliste of Rijeka, Croatia has delivered Chaleur Bay - the second of its four-part oil/products carrier series. The Liberian-registered vessel group, which was ordered by Inter Shipping is formatted for transportation of crude oil and oil products, with cargo



space divided by one corrugated longitudinal bulkhead. Double sides protect the cargo space, and in addition to conventional double bottom within cargo space, double sides were applied in fuel oil tanks, in compliance with strict international environmental requirements.

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FIRE PROTECTION

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| Main Particulars | |
|---------------------------------|-------------------------------|
| Flag | Malta |
| Class | ABS |
| Length, (o.a.) | 750 ft. (228.5 m) |
| Length, (b.p.) | 722 ft. (220 m) |
| Breadth | 106 ft. (32.2 m) |
| Draft | 41 ft. (12.5 m) |
| Deadweight | 60,913 tons |
| GT | 40,705 |
| Trial speed | 15.3 knots |
| Main engine | Wartsila NSD 12, kW @ 105-rpm |
| Propeller | Ni-Al |
| Boilers | Aalborg |
| Cargo pumps | Frank Mohn |
| Inert gas system | Permea |
| Capacities: | |
| Cargo tanks | 81,645 cu. m |
| Water ballast tanks | 29,060 cu. m |
| Heavy fuel oil tanks | 3,058 cu. m |
| Diesel oil tanks | 297.7 cu. m |
| Lubricating oil tanks | 111.6 cu. m |
| Fresh water tanks | 241.3 cu. m |
| Centrifugal separators | Alfa-Laval |
| Central cooling system | Garbarino |
| Distilled water system | Alfa-Laval |
| Automation system | ABB |
| Ballast system | Frank Mohn |
| Firefighting system | Consilium Marine |
| Bilge system | Garbarino |
| Lifesaving equipment | Viking |
| Anchoring and mooring machinery | |
| | Kamewa-Aquamaster |
| Integrated bridge system | Consilium Selesmar |

Eastern Shipbuilding Launches OSV

Measuring 204 ft. (62.1 m) with a 44 ft. (13.4 m) beam and 16 ft. (4.8 m) depth, offshore supply vessel San Rafael is being constructed by Eastern Shipbuilding Group for Naviera Tamaulipas of Tampico, Mexico for operations in the Bahia de Campeche (Bay of



Maritime Reporter/Engineering News

Campeche) fields off Eastern Mexico.

The vessel's propulsion package is comprised of Caterpillar 3516B main engines rated at 2,000-hp each at 1,600-rpm, with Caterpillar Engine Vision Alarm and Monitoring System, coupled to Reintjes WAF-862 gearboxes with four-blade stainless steel propellers. Special equipment housed includes a 1,000-hp Thrustmaster retractable tunnel/azimuthing bowthruster powered by a Caterpillar 3508B engine.

Tank capacities include 110,000 gals. of fuel; 211,000 gals. of drill/water ballast; and 7,200 cu. ft. of bulk mud in six tanks. With delivery scheduled for June, San Rafael will be classed by ABS.

Circle 94 on Reader Service Card

Seacraft Shipyard Delivers M/V Sea Holly



Designed for extended excursions, the 110 ft. (33.5 m) long range yacht M/V Sea Holly, was delivered by Seacraft Shipyard of Amelia, La.

A flat bottom skiff and vee bottom runabout, both of which are secured on removable boat cradles, are located on the aft main deck. Outfitted with a hydraulic crane to handle the boats and cargo hold, the vessel is also equipped with two fighting chairs, outriggers and swim platform.

The upper deck holds a large pilot-house equipped with a contemporary electronic package that includes GPS, VHF, SSB, radar, satellite telephone and vessel monitoring system. Operating in the engine room are three GM 12V71 engines closed coupled to TD 514 marine gears with three rudders, offering the option of either single screw operation for extended range/reduced fuel consumption or triple screw operation for high speed.

Circle 95 on Reader Service Card

Kvichak Supplies Patrol Vessel

Kvichak Marine, Seattle, Wash. delivered the 54 ft. (16.4 m) all-aluminum catamaran M/V Thresher to California Fish & Game. Designed by Teknikraft of Auckland, New Zealand, the partially foil-supported catamaran will be sta-

tioned in Dana Point as a Fish and Game Enforcement patrol vessel for Southern California.

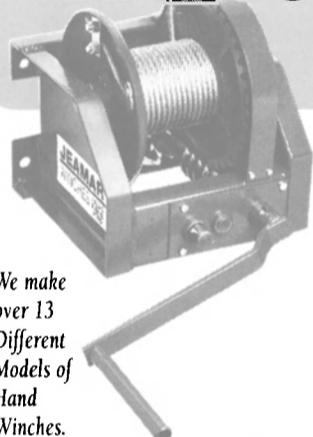
Weighing approximately 28 tons fully loaded, Thresher is powered by twin Caterpillar 3196 DITA diesel engines, driving 30 in. stainless steel propellers through Twin Disc MG 5114A gears, Thresher cruises at 26 knots with a top speed of 30 knots.

With a beam of 20 ft. (6 m), the vessel's deck equipment is comprised of an aft deck A-frame to deploy and retrieve customer supplied Hurricane inflatable. A rotating articulated crab block davit allows for the hoisting and retrieval of fishing traps and pots of a diameter up to 60 in.

Kvichak also marks its one-year anniversary at its new Seattle location.



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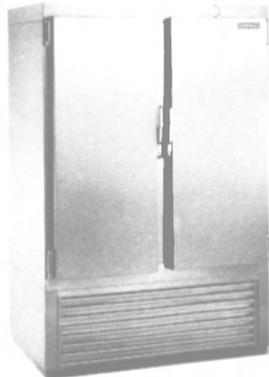
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THE SEA SWITCH TWO



Smart Electronic Level Switch with No Moving Parts

The Sea Switch Two was designed and patented for all tank applications. The Sea Switch Two offers a reliable solution for liquid level detection and control for cargo, ballast, and storage tanks, without any moving parts.

The Sea Switch Two uses a fully static system that is based on the propagation of an acoustic wave into a metallic rod. A piezo-electric sensing element produces a wave along the rod. As the liquid reaches the sensing element the oscillation stops and the alarm is activated.

The Sea Switch Two sensor detects high, high-high, or low level in any liquid with an alarm output given by a dry contact or current loop change 6-18 mA.

- Easy installation • Self-test built-in
- Fully static system – no moving parts

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<http://www.emsmarcon.com>

Circle 224 on Reader Service Card

New & Notable

After a seven-year search process, the company settled into its current site, which was previously owned by Flohr Metal Fabricators. The 35,000 sq. ft. yard and offices has been instrumental in the company's expanding all-aluminum vessel line.

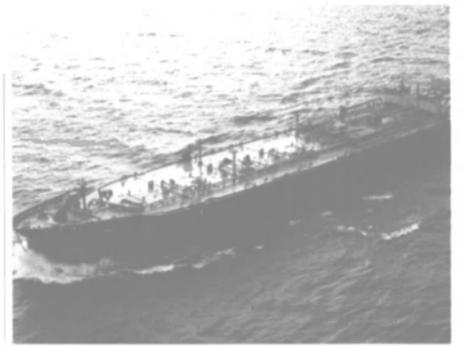
Circle 96 on Reader Service Card

Bay Shipbuilding Delivers OPA 90 Barge

Bay Shipbuilding (BSC) of Sturgeon Bay, Wisc., completed construction of Mobil Oil's new 140,000-barrel, double-hull tank barge. Named Seneca, the barge will be utilized to transport

refined petroleum products in Exxon/Mobil's northeast U.S. markets.

Measuring 504 x 78 x 37 ft. (153.6 x 23.7 x 11.2 m), the barge has 16 epoxy coated cargo tanks that can be offloaded with four cargo pumps, each rated at 3,800-bph. The vessel holds a cylindrical bow with a deep notch stern



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equipped with Intercon's tug/barge coupler system.

Seneca was designed by Corning Townsend of CT Marine, and although construction called for additional needed time, both parties (Mobil and BSC) benefited from an accelerated delivery - occurring on December 13, 1999 - four months ahead of schedule.

Circle 97 on Reader Service Card

Ingalls-Built IWO JIMA Is Navy's Newest LHD 7



LHD 7, the U.S. Navy's newest large-deck multipurpose amphibious assault vessel was christened Iwo Jima on March 25 at Litton Ingalls Shipbuilding in Pascagoula, Miss. The vessel is the second of its kind to bear the namesake of the heroic participants in the 1945 Battle of Iwo Jima - an event that was remembered by the six men who raised the American flag over Mount Suribachi. Second in size to the Navy's aircraft carriers, the LHD 7 is designed to transport the Navy/Marine Corps by the sea to land battle, as well as support the effort, primarily was the command vessel of an Amphibious Ready Group.

Circle 98 on Reader Service Card

Cruise Ship Tender Arrives

The 88 ft. (26.8 m) cruise ship tender, Pinta, was delivered to Royal Caribbean Cruise Lines (RCCL) by Keith Marine, Palatka, Fla. Engineering for Pinta was provided by DeJong & Lebet Naval Architects.

Classed by DNV to hold 250 passengers, the tender boasts large fuel tanks and water tanks for transfer to the shore facilities at the remote island that it services.

Power is provided by a pair of Detroit Diesel Series 60 main engines, developing 400-hp at 1,800-rpm.

Circle 193 on Reader Service Card

The LEADER

in Maritime Communications



The US Military has unique requirements for telecommunications services and Maritime Telecommunications Network meets their needs. MTN provides dedicated private networks to the US Navy from nuclear aircraft carriers to supply ships.

MTN currently supports four government contracts: two as a prime contractor and two as subcontractor

MTN has strategically positioned itself to supply both tactical and non-tactical communications services to the Navy by utilizing commercial off-the shelf (COTS) technology and services.

This affords rapid and inexpensive implementation of new services. Because of this pioneering effort, MTN provides communications services to the Government that save money and do not sacrifice quality.

If your network needs the security and reliability demanded by the US Navy, call the Leader in Maritime Communications.

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Campeche) fields off Eastern Mexico.

The vessel's propulsion package is comprised of Caterpillar 3516B main engines rated at 2,000-hp each at 1,600-rpm, with Caterpillar Engine Vision Alarm and Monitoring System, coupled to Reintjes WAF-862 gearboxes with four-blade stainless steel propellers. Special equipment housed includes a 1,000-hp Thrustmaster retractable tunnel/azimuthing bowthruster powered by a Caterpillar 3508B engine.

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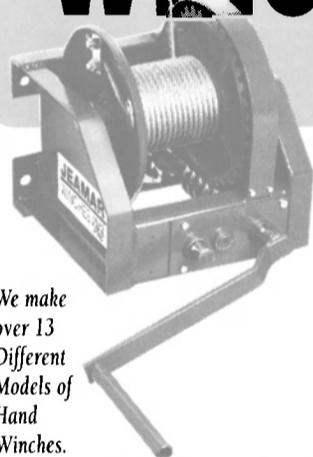
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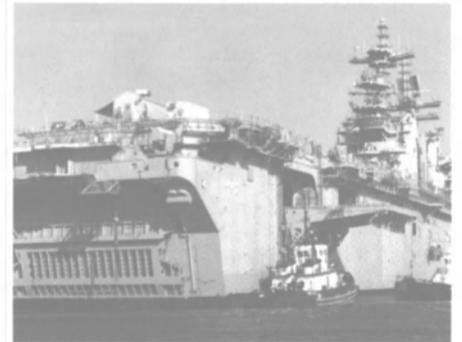
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Trimaran Demonstrator Progressing At VT

A new shape in navy warships is quickly taking shape in the U.K., as Vosper Thornycroft (VT) has completed structural work on the 321 ft. (98 m) Trimaran Warship demonstrator being built for the U.K.'s Defense Evaluation and

Research Agency (DERA). The upper bow structure, weighing approximately 25 tons, was maneuvered into position on the RV Triton, which is scheduled for launching this month. The ship will be delivered to DERA in August before

starting the initial phase of a trials program that will determine whether trimaran hulls will be considered for the Royal Navy's Future Surface Combatant.

BT has built the ship using mega-

blocks weighing up to 200 tons each. Five mega blocks have been fabricated and extensively fitted out before consolidation.

"Building a trimaran of this size has meant dealing with several challenges that we have not encountered in building conventional ships. The lessons learned have been invaluable and have provided us with unrivalled experience in building this from of ship," said VT project manager **Mike Carter**. "If trimaran is the way ahead, VT is undoubtedly at the forefront.

RV Triton has reached structural completion in less than 15 months since DERA chief executive Sir John Chisholm cut the first steel in January 1999. Accolades for this impressive production schedule is largely attributable to advanced manufacturing methods including the use of a high-quality plasma cutting system.

"The RV Triton build has resulted in new VT productivity records for large steel ships, and this has enabled us to build the ship within the limited budget and to a demanding program," said Carter. "With several new Royal Navy programs on the horizon, the trimaran has been an important demonstration of VT's capabilities."

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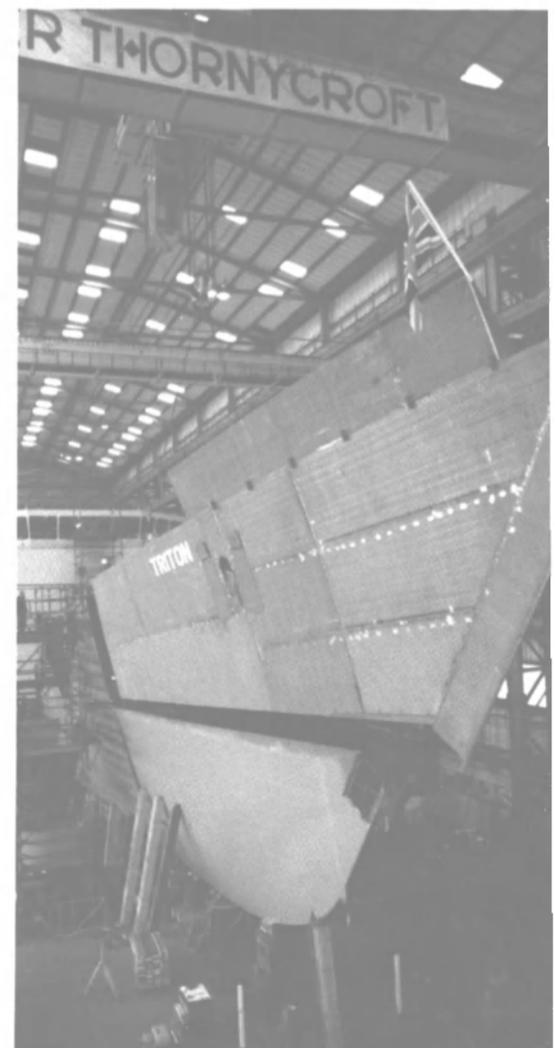
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Alstom, USN Team For Integrated Solution

Alstom Drives & Controls has worked with the U.S. Navy (USN) to produce an electric power and propulsion system which is compact and robust, while meeting exacting and demanding USN standards.

Traditional Navy practice in the realm of ship and equipment development and procurement has largely flown out the window in lieu of investigating and incorporating proven product and system technologies from commercial origins, with a hard-line stance on initial and life-time costs. The benefactors of the "new" attitude is obviously the USN, which has been able to steadily drive down costs while sacrificing little if anything in performance. In addition, it has opened new markets for key component and systems manufacturers once locked out of this lucrative work.

Traditional USN practice has seen the use of mechanical transmission systems, utilizing either nuclear, diesel or gas turbine prime movers. Until recently, electric propulsion was ruled out for many Navy applications because the DC electric motor has various design limits, including power limitations. In planning the new propulsion module for its future ships, however, USN is now considering electric propulsion for specific technical, commercial and operations reasons. Electric systems could potentially help the Navy optimize budgets in some applications. For example, a typical Navy vessel run at less than 50 percent full power most of the time, a condition ripe for the benefits of an electric system. Electric systems can also be designed for silent operation, critical in today's stealth-stringent environment. In addition, electric propulsion offers ship designers the flexibility to achieve a compact overall machinery layout, a design which can obviously be more resilient to damage.

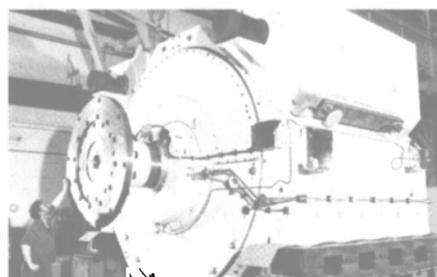
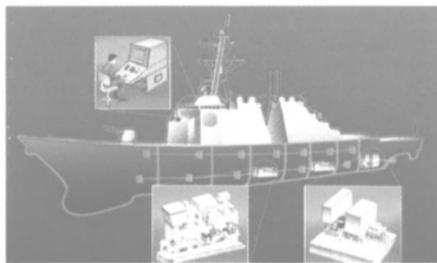
Alstom Drives & Controls propose a customized AC induction motor, to fit

the tight available space, with the added benefit of a novel PWM converter design to suit either an induction motor or a future permanent magnet motor. The Alstom system is desirable as the company can act as the single-source provider for all power generation and

vessel propulsion, helping to ensure smooth integration. All products in the Alstom suite is the result of thorough and effective design to satisfy the elements of shock loading. Generator units are resiliently mounted to withstand 15g above resilient mountings and even the

converter suites, with their delicate electronic components, can withstand the shock loading attenuated by resilient mounts. The propulsion motors are designed to withstand mounting foot shocks up to 80g.

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33

MDI: Shipyard Production Expertise

Maritime Design, Inc. (MDI) offers a wide range of technical services, but director of marketing & sales, **Bob Rogaski** stresses MDI's shipyard experience to ship owner prospects. "Maritime Design, Inc. demonstrates a long

line of experience with the medium size shipyard and possesses strong talent and experience in shipyard production. This experience will benefit the ship owner via MDI's unique Linking Design with Production capability for resolving mat-

ters of ship production with mission requirements and regulatory issues."

MDI has pioneered a cost-effective proprietary CAD/CAM production system for ensuring material control and fabrication fit-up through a work breakdown methodology. "All processes in the MDI system are approached and rationalized using first principles from

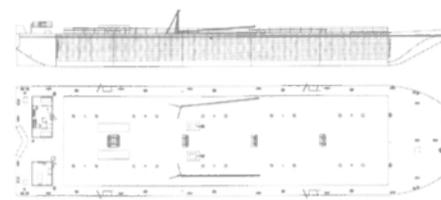


FIG. 202. Moments after the vessel was waterborne, she listed sharply to port, and tugs raced to the rescue.

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the classic art of design engineering integrated with state-of-the-art technique and equipment."

Maritime Design, Inc. president **Jim Konopasek** was actively involved in contributing to the final rule language (33 CFR Part 157) of double hull treatment to "existing vessels" and also holds a U.S. design patent for double hull treatment. MDI is particularly interested in assisting the inland and coastal barge and tanker operators resolve their double hull compliance issues.

Maritime Design, Inc. has identified a growing need for reliable and accurate project status information by senior management. Konopasek said that, "while large shipyards generally enjoy series class construction over a long term, the medium size shipyard is often challenged by multi-project constructions in short durations with demanding paths. For example, today's medium size shipyard generally possesses a core group whose individual qualifications represents and fulfills the shipyard's intentions for approaching a shipbuilding project. The supporting personnel to these groups may experience a large turnover from project to project and today, may not acquire the desired training and experience. All shipbuilding activities are complex and may wage risk to government contracting agencies, ship owners, shipbuilders and financial institutions. Each stands to realize substantial benefit by utilizing (cooperatively or individually) the MDI Quality Track Assurance Team. Companies that recognize or practice ISO 9000 quality standards will greatly enhance their program with the MDI Quality Track Assurance Team."

Circle 72 on Reader Service Card

FR. Fassmer & Co.: Keeping It In The Family

Fassmer-Shipyard this year celebrates its 150th year in business, and the companies' chronology is literally a case study in the effective use of and evolution of marine materials. Founded as a one-man boatyard by Johann Faßmer in Bardenfelth in 1850 for the purpose of boat building, the company has evolved from a one-man shop producing wooden boats for hydraulic engineering and fishery to a dynamic medium-sized company, which today builds everything from a 177 ft. (54 m) fishing surveillance craft to a wide range of lifeboats, tenderboat and fast rescue boats for the cruise and ferry markets.

From the trees to the water

Fassmer-Shipyard was literally built of wood, wooden boats that is, and the company served the aforementioned commercial market for its first 30 years admirably. When **Carl Johann Friedrich Faßmer** - known as **Friedrich** - joined his father's business in 1880. Under his management, the company was enlarged for the first time, and its product range was extended to include sporting boats. By this time, word of the company's good quality had spread, and the backlog had increased accordingly. During the 1890s, the company added a second boatbuilding shed, acquired new mechanical equipment and increased the number of employees to 20.

The next period of growth came around 1920, when **Johannes Arnold Ludwig Faßmer** - known as **Hans** - took over management as the third generation. The company was able to weather the severe economic storm of the times through diligence and the delivery of high quality product, but also through expansion of product, as it now offered its dinghies and popular motorboats. Large orders for naval cutters and dinghies, which started to be constructed from steel, made it necessary to erect another production hall in 1940.

Alloys, GRP and Aluminum: Banking on the future

Planned shipbuilding after World War II did not start again until after the currency reform of June 20, 1948. Whereas until only wood and steel had been used for building boats, 1948 brought the first order for a boat made from light alloy.

In the mid-50s **Friedrich (Friedel)**, and **Heinz Faßmer**, the company owner's two sons, went into business with their father. At that time, the production of lifeboats accounted for an ever-increasing share of production. Initially built from wood in the traditional way, steel and aluminum were increasingly being utilized.

In 1958 Fassmer was one of the first shipyards in Europe to start using plastics, an advancement at the time, which literally set the company's future course through today. Only a year later, the first lifeboat made from glass fiber reinforced plastic was delivered to DDG Hansa Shipping Co.

Just before the 1960s, the company outgrew its original site and the decision was made to relocate the works outside of the dike at Motzen, where in 1961 the first boat was launched on the yard's own slipway. In the early 1960s, the company was a diverse entity producing boats for many commercial and consumer markets in nearly every material available. A range of different working and authority boats, as well as sporting boats and lifeboats - built from

steel, light alloy and glass fiber reinforced plastic - now dominated production at the Fassmer-Shipyard.

It had been recognized by the company early on that wood was going to be replaced by modern materials, a realization that helped Fassmer prosper while other similar-sized competitors failed.

In 1964 **Hans Faßmer** transferred management of the company to his two sons, **Friedel** and **Heinz**, at which time the company employed about 40 people.

With new management in place, the company made many decisions and deals, which laid the foundations for its current status. In 1968 Oldenbusch & Co. - a company mainly involved in ships equipment and light metal construction - was acquired. In the 1970s, the company gained Volkswagen AG as a customer for elevated roofs made from GRP, a contract that was won largely because of the company's gained experience in the area of its lifeboat work. It was during this period that the breadth of Fassmer's offering was firmly established - special shipbuilding; lifeboats; production of non-industry components made of fiber composites; and ship equipment - a factor which would keep the company strong during good times and bad.

In hindsight, development of lifeboats and tender boats for cruise ships was an important step in the company's history, in step with quickly changing regulations regarding safety according to SOLAS and IMO. However, at least as important from the company's view, was the development of completely enclosed lifeboats of the GMR type (enclosed motor lifeboats) or, respectively, TGMR type, which were used as tanker lifeboats. A test in which an enclosed lifeboat with sprinkler system was left in a sea of flames for 10 minutes in 1983 demonstrated the resistance of the new boats. Similarly, the development of free-fall lifeboats in the early 1980s was another important step, and in 1985 the first free-fall lifeboat of the GAR type 6.0 was delivered to Sietas Shipyards for the ship Uwe Kahrs.

The mid-1980s marked another generation of management with the company, as **Hans Faßmer**, the son of **Friedel Faßmer**, joined the company and immediately became involved in the construction of a 100 ft. (30.5 m) police boat for the Bremen River Police. The contract was significant, as it led to a large number of orders for similar boats made from the sea-water resistant aluminum. **Holger Faßmer**, the son of **Heinz Faßmer**, joined the company in 1990 and concentrated on the area of composite components. Two years later, **Harald**, another one of **Heinz's** sons, came onboard, and now holds the spot of the last of today's managing directors. He has since been responsible for the shipbuilding and construction division.

The company, one never to rest on its laurels, is preparing to prosper for the next 150 years today. The reunification of Germany allowed the company to make a cooperative agreement with Barth Shipyards, extending its productions and service to the Baltic Coast. In 1996 Fassmer Schiffsservice GmbH Rechlin in Mecklenburg was founded and is a 100 percent subsidiary. Today enclosed lifeboats mainly are equipped here, and small boats up to 49 ft. (15 m) are offered to public authorities. Shipbuilding capacities were significantly increased in 1997, with the raising of the shipbuilding hall and through the long-term partnership with Yantar Shipyards in Kaliningrad.

Circle 64 on Reader Service Card



Drop test from the roof of the boatbuilding shed using a plastic rowing boat in 1957.



Heinz Faßmer, Hans Faßmer and Friedrich Faßmer.



Fassmer's current managing directors, **Holger, Hans and Harald Faßmer**.



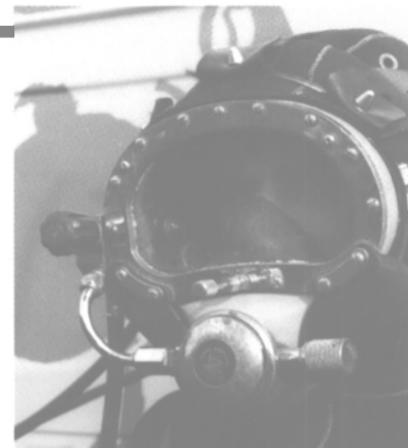
The 177 ft. (54 m) fishing surveillance craft for Mauritania at the finishing pier.

Wet Welding Provides More Than Quick Fix

The aim of any shipowner is obviously to keep a vessel in shape and operating for as many revenue-generating days as possible per year (cargo rates willing,

of course). Singapore - which is one of the world's busiest ports - was the sight of a unique repair job on a Panamanian tanker.

A three-man Hydrex (Antwerp, Belgium) repair team was dispatched to Singapore to enact inwater repairs to cracks in the stern area. Unlike the



majority of the company's work, which calls for fast response repair and maintenance, the repair was indeed unique.

The shipowner had called upon Hydrex in January asking for advice concerning a crack repair in the rudder of the 735 ft. (224 m) ship. Upon inspecting the reports, the Hydrex technical manager found that this particular wet weld repair required a specialized underwater welding procedure, which in turn needed to be certified by American Bureau of Shipping (ABS).

ABS is, of course, one of the world's leading ship classification societies, and has been since its founding in 1862. ABS is responsible for determining the structural and mechanical fitness of ships and marine structures in accordance with their intended use.

Following the initial inquiry to its head office, the Hydrex technical support staff rolled into action to process the paperwork and initiate the weld tests and procedures for this certificate. With only a few diving companies around the world possessing this highly regarded certificate, it was essential to Hydrex that the ABS certificate be issued as quickly as possible so that repairs could be carried out. With three of its divers already highly trained, all that was needed following paperwork was setting the ABS test day. Early in January 2000 an ABS surveyor arrived to witness the test, and Hydrex's three diver/welders performed the wet weld in the training tank, with a live video link-up so that the surveyor could witness the event up close. The result: all three diver/welders were fully certified.

Once on the scene, Hydrex's staff utilized the report of a local diving company in Fujairah, which had reported the cracks on the rudder. Upon making the initial dive, however, it was found that both cracks had actually increased in length since the earlier inspection, meaning that immediate repair was crucial. With the approval of the ABS surveyor, the crack repairs got underway. Firstly, the preparation work was done and then the task was passed to the certified wet welders. The welds were performed in one working day and were fully passed and approved by the ABS surveyor on site.

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Composite Shafts Save Weight, Money

Composite shafts from American Vulkan aid shipowners in terms fuel consumption, maintenance cost, weight savings, reduced noise and vibration and the need for fewer bearings.

The Applied composites shafting system - thanks to high stiffness and vibration-absorbing properties of the material - carbon fiber shafts feature a very high critical speed. The shafting can be combined with Vulkan highly flexible torsional resilient couplings between the diesel engine and gearbox, allowing the unit to cover a large span.

Circle 25 on Reader Service Card

Comprehensive Composites Services

Structural Composites of Melbourne, Fla. specializes in fiber reinforced plastic (FRP) composite structures and materials for the marine industry, among others. The company is a single source for most any composite needs, including engineering, scientific testing and research and development support. Composite prototypes and process development are also available. The company, founded in 1987, has grown quickly and now employs 24 and has two branch facilities. Two years ago the company acquired Sigma Labs, which provides agency certification testing and product development support for commercial industry. Structural Composites

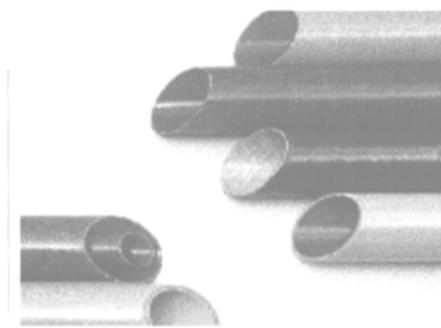
prides itself on its non-destructive testing services (in cooperation with ABS and the U.S. Coast Guard), which allows for a composite hull, for example, to be tested without damaging the vessel, helping vessel owners avoid costly maintenance and repair bills.

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Fibercast Pipe For Marine Applications

Fibercast of Tulsa, Okla. manufactures a line of fiberglass reinforced plastic (FRP) pipe and fittings that are designed

(Continued on page 40)



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A New Wave of Customer-Driven Offerings: The SAGA Process

In the past, companies have expanded their product lines via strategic acquisition of complimentary companies. More recently companies have expanded their product offerings by creating strategic alliances with other companies to surround clients with recognizable brands. The wave of the future is to expand through customer requested and customer led programs. Cruise ship operators have long known that the only way to guarantee repeat business is by offering the guest a fair price and by exceeding all of the guests expectations. To meet these ends, cruise ship operators are requiring more specialized services in support of the expanded needs of guests. This growing trend of vendors that focus on customer needs is already effecting the field of vessel procurement. To meet these changing needs progressive vendors, such as Unitor, are already following strategic models to support the expanded needs of their customers. Successful vendors will increasingly utilize a SAGA process to promote a culture of customer driven programs. The SAGA process is a four-step model for launching a new customer offering onto the market. SAGA stands for (S) Start a New Strategy, (A) Advance the strategy, (G) Group Focus, (A) Analyze the strategy.

When commencing a strategy, the vendor must have a process to identify the needs of the customer. A vendor must always be in tune with its customer's evolving needs. Customers' businesses are constantly expanding or contracting and — depending upon the direction the

industry is going — will change the nature of the business relationship. It is no longer acceptable to solely monitor product shortages to customers to determine effectiveness. One must monitor all aspects of the business relationship. A critical area to monitor is customer requests. What a customer actually requests of the vendor, regardless if it is part of the vendor's portfolio at the time, is critical information. For example, it was this type of data that was the basis of the Unitor Cruise Service concept product list. Vendors must monitor what the customers' request beyond the traditional supply. If one customer requests a certain item, chances are good that five other companies believe that the vendor supplies it on a regular basis. Start offering what the client is requesting, rather than what the vendor feels the customer should be requesting. It is these requested items that make the best strategies to start.

The second process in SAGA is to advance a strategy. Once data has been gathered about possible new offerings, advance these thoughts within the organization. Discuss these new products or services with all

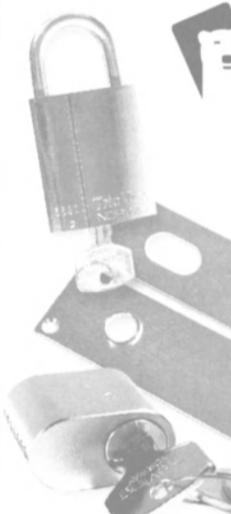


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levels in the organization, especially with customer service. Gather as much information from within the company regarding the merits of the idea. Let others add, modify and grow the idea. The best idea to advance is one that was formed at all levels of an organization. If one person has heard these requests, then chances are good that others have heard them as well. If it turns out that other groups have heard similar requests often then the chances are good that the project will be very successful. A common concern in this process is that it leaves the initiator open to rejection and criticism. Do not be afraid of rejection by others in your organization. Rejection is just a sign of resistance to change and has nothing to do with the value of the idea. Do not let this stop the process. If it is fact-based, criticism can be extremely helpful. Always search for valid reasons that are based in fact and not answers such as "we have already tried that years ago and it failed," or "I feel that my customers will not go for that." If you find these reasons early, you can avoid having a fatal flaw in your business plan. On the other hand, if others state they have not had similar requests or there are some compelling valid arguments why the company should not go in that direction - then this is valid criticism. If the facts do not support the expansion, scrap the project and search for a new offering. Regardless of the outcome, make the most of the data and then either proceed to gathering external data or start the SAGA process over.

The third process in SAGA is group focus.

Once the vendor has gathered internal information, then proceed with gathering information externally. Group focus, unlike the other processes, has two distinct phases. Phase one is to discuss the ideas in small focus groups; phase two is locating a suitable company for a strategic alliance. In phase one of group focus the vendor must contact a few long-standing customers for feedback. The vendor must gather a small group of long standing customers and ask them if the direction under consideration has merit. These vendor comparisons will undoubtedly offer both positive and negative comments - leading to an effective



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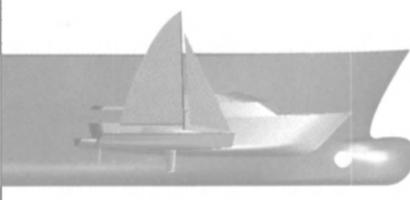
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learning experience through these discussions. Focus groups are excellent forums to establish exactly what favorable and poor vendor performance look like to customers. If customer response is negative, consider scrapping the idea. More companies have failed by introducing a host of products that customers do not want than by the launching of a single program that the customer really requires. If customer response is positive, then proceed to phase two of the group focus process.

Phase two is to find an acceptable vendor to partner with in this new direction. If possible, start discussing cooperative efforts with companies that may have been mentioned in the focus groups. This phase of the process will take considerable effort, however the final result will certainly be worth the effort. This step will also take time to educate this new partner vendor to the ways of the customers, as well as the ways of the industry. Once all contractual and operational details have been completed, launch the program with as much fanfare and enthusiasm as possible.

Analyzation is the focus of SAGA's fourth step.

Once the new vendor program has been launched and has been operating for a few weeks, one must analyze and review feedback about the program. Gather feedback from the industry as well as from customers receiving the new product or service. This process is very important and many organizations have a tendency to skip this process. Typically, if a program becomes a financial success - the company does not follow up. If it is unsuccessful, the follow up consists of an inquisition-type search from someone to blame within the organization.

These types of behavior are to be avoided and real analysis of what succeeded and what failed is necessary for the success of the next project. Companies must learn from their successes and failures alike. More importantly, just because a new project achieves its sales targets does not mean that it does not have a hidden potential of one hundred times its current success. Companies have a tendency to forget that sales targets established for any new program are only a guess; the actual potential of the program can only be determined after reviewing the reaction of the market.

Although the goal is to always create successful new programs, much can be learned by examining failure. Unsuccessful programs should be examined quickly, as failure can be a result of many different factors. A common mistake of companies is to slowly reduce a program over time. It is best to totally

end a program and give ample notice to users prior to the ending of the offering. This allows for an orderly transition and avoids a long drama of both companies watching sales and service slip, and while it may not be popular with customers, it certainly will not turn them away from a new company offering.

Companies that consistently apply the

SAGA process will find themselves with a strong portfolio of aggressive programs that offer customers superior quality and service. Unitor is one such company that clearly follows the SAGA process. The Unitor Cruise Service program is a clear sign of the new wave of programs that will be designed for and by customers.

Robert Lee Gordon is the director of purchasing for Ocean Development Company. 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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(Continued from page 37)

to deliver long, reliable service in a variety of demanding marine applications.

The company's products are centrifugally cast and filament wound, and have proven themselves to be resistant to

corrosive saltwater environments.

They also offer a full line of fittings and accessories for each grade of pipe, including hand lay-up fittings.

Circle 66 on Reader Service Card

Alu-Coated Piston Rings Withstand Marine Rigors

In order to reduce the running-in time when testing components on its 4T50MX research engine, MAN B&W



developed an aluminum-bronze coating for the sliding surface of piston rings. Aluminum-bronze has shown excellent results as a piston ring coating too, and has consequently been introduced on the company's new engines in order to reduce the running-in time and the cylinder oil consumption. Alu-Coat rings are also offered as an alternative standard for MAN B&W MC type engines already in service. The company reports that the difference in price versus un-coated rings is about 20 percent, a cost that is more than covered in savings from reduced cylinder oil consumption.

Circle 67 on Reader Service Card

Seasafe Offers Fiberglass Strut Systems

Seasafe offers a complete selection of non-metallic accessories, fasteners, hangers, pipe clamps and channels in its Fiberglass Strut and Accessories. Most Seasafe Strut Products are available in a choice of resins: either vinyl ester or polyester, and the company offers its staff to help customers with their choice.

Circle 68 on Reader Service Card

Cost-Saving Coating Approved

A new machinery coating has recently qualified for use aboard Navy ships. The new coating is comprised of nanostructured particles, will allow the Navy to save money by extending the service life of machinery and other assets. The first use of the coating will be as a replacement for hard chrome on a series of submarine components.

The coating was developed under the Office of Naval Research (ONR) Science and Technology (S&T) Affordability Initiative and the DoD Dual Use S&T Program. The new coating is a nanostructured version of a widely used conventional alumina-titania ceramic composite. It is applied by an environmentally safe thermal spray process using existing commercial off-the-shelf equipment. Nanostructured materials contain particles or grains that are smaller than 100 billionths of a meter (4 millionths of an inch) in diameter, or 100 nanometers. Materials with this ultra-fine microstructure exhibit unprecedented mechanical properties. "The mechanical properties of materials begin to change drastically as we reduce grain size into the nanoscale regime," said Dr. Lawrence Kabacoff, ONR Materials Division program officer.

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Kurz Joins Hvide As CEO

In the latest of various corporate changes that have occurred at Fort Lauderdale, Fla.-based Hvide Marine, the company has elected **Gerhard E. Kurz** as CEO and a member of its Board of Directors. He replaces **James J. Gaffney**, who had been serving as interim chairman and will now hold the position of non-executive chairman of the board. **Jean Fitzgerald**, who managed to bring Hvide to new levels by taking the fledgling company out of Chapter 11 bankruptcy, took on Hvide's reins as chairman and CEO following the resignation of longtime CEO, **Erik Hvide** last year. Fitzgerald, who recently underwent successful heart surgery, will continue to serve Hvide as a consultant and member of its Board.

Kurz comes to Hvide following his recent retirement as president of Mobil Shipping and Transportation Company (MOSAT) - a position he had held since 1989.

Leading up to his final position at The Mobil-Oil affiliated company, which operated a fleet of 30 deep-sea tankers and 26 tugs and barges, Kurz began his career in London at Mobil Shipping Company Limited in 1964 as a chartering assistant. The following year, Kurz was transferred to the company's Marine Division in New York where he pursued and earned an MBA from New York University. Proceeding a slew of promotions, Kurz was appointed vice president of planning, Middle East and marine transportation before taking on the head position at MOSAT.

AMSEC Acquires Rosenblatt & Son

AMSEC LLC has attained the naval architecture and marine engineering firm M. Rosenblatt & Son, New York, New York. The company, which is known as one of the premier marine design engineering firms worldwide, has aided in the design of ships and shipboard systems for the U.S. Navy since 1947. Terms of the acquisition were not disclosed.

With headquarters in Virginia Beach, Va., AMSEC recently expanded by more than 30,000 sq. ft., resulting from its strong business growth on all fronts, including design, maintenance and in-service engineering support.

Caterpillar Acquires Sabre

Caterpillar, Inc. has attained Sabre Engines, a U.K.-based company that specializes in high performance marine diesel engines.

Sabre established a cooperation agreement with Perkins Engines Company in 1991, calling for Perkins to tout core engines to Sabre for marinization. The addition of Sabre to the Caterpillar operation will complement the company's global offering of marine power systems below 300-bhp.

ation will complement the company's global offering of marine power systems below 300-bhp.

New MD At Schottel

Dr. **Detlef Reinsberg** was elected the new managing director of Schottel GmbH & Co. in Spay/Rhine, Germany. Reinsberg, who began his career as a financial director with ABB in Man-

heim, and later with the Fresenius Group in Bad Homburg, will spearhead a group of companies whose main plant reached sales of \$61.3 million in 1999.

UTC And Carrier Acquire Electrolux

United Technologies Corp. (UTC) and its Carrier Corp. subsidiary have attained Electrolux Commercial Refrigeration from Electrolux Group for approximately \$145 million.

A global supplier of refrigeration equipment for commercial customers within the supermarket, food and beverage markets, Electrolux Commercial Refrigeration will be integrated into Carrier's Commercial Refrigeration Operations Unit. With 2,300 employees, Electrolux Commercial estimates its 1998 sales at more than \$300 million.

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Efficient Bunker Buyers "Need to Know"

By Ivar Tønnesen, chairman of the International Bunker Industry Association (IBIA)

The bunker industry is witnessing interesting times. Throughout the last 12 months, prices have doubled for many grades of fuel, reaching unparalleled levels. At the same time, the industry has seen the launch of the first serious Internet-based marine fuels sales operations. While apparently unconnected, both developments have had a similar effect on the industry. They have underlined the importance of training and education for those in the bunker business. Without knowledge, those working in marine fuels, purchasers in particular, will not be able to face up to the challenges of high prices and electronic trading.

The sharp increase in bunker prices during the last year is in stark contrast with what was going on immediately prior to the rise. Eighteen months ago, oil prices around the world were at levels that could barely sustain well exploitation in some areas, and they looked to be heading lower still. *The Economist* went so far as to predict that oil prices would dip as low as five dollars per barrel. Behind the fall was a

massive oversupply of oil in nearly every market. This was good news for consumers, including the shipping lines, for whom buying bunkers is the most expensive part of running a fleet. Bunker prices in key markets edged close to \$50 per ton at one stage.

It didn't last, though. *The Economist* was proved wrong. Rather than dipping further, oil prices suddenly started to rise. Alarmed at collapsing revenues, OPEC dramatically pegged back its production. The tried and trusted supply-and-demand mechanism did the rest. Oil prices started to climb. First back to sustainable levels, then to heights that sent jitters around the world. At the time of this writing, oil in some markets is being quoted at close to \$30 a barrel, a rate previously only matched during the oil crises of the 1970s.

The consequences for the bunker industry of the high oil prices were profound. Prices rose in line with the wider oil picture. Fleet managers saw their monthly fuel bills increase dramatically. Rates were rising so fast that even a

day's delay in placing an order could add thousands of dollars to the final invoice. Shipping companies, already operating with slim margins or even at a loss, reacted by charging shippers bunker surcharges and told their crews to go slow in order to burn less fuel. Some made the error of buying as cheap as they could, regardless of quality, and got caught out with off-spec fuel.

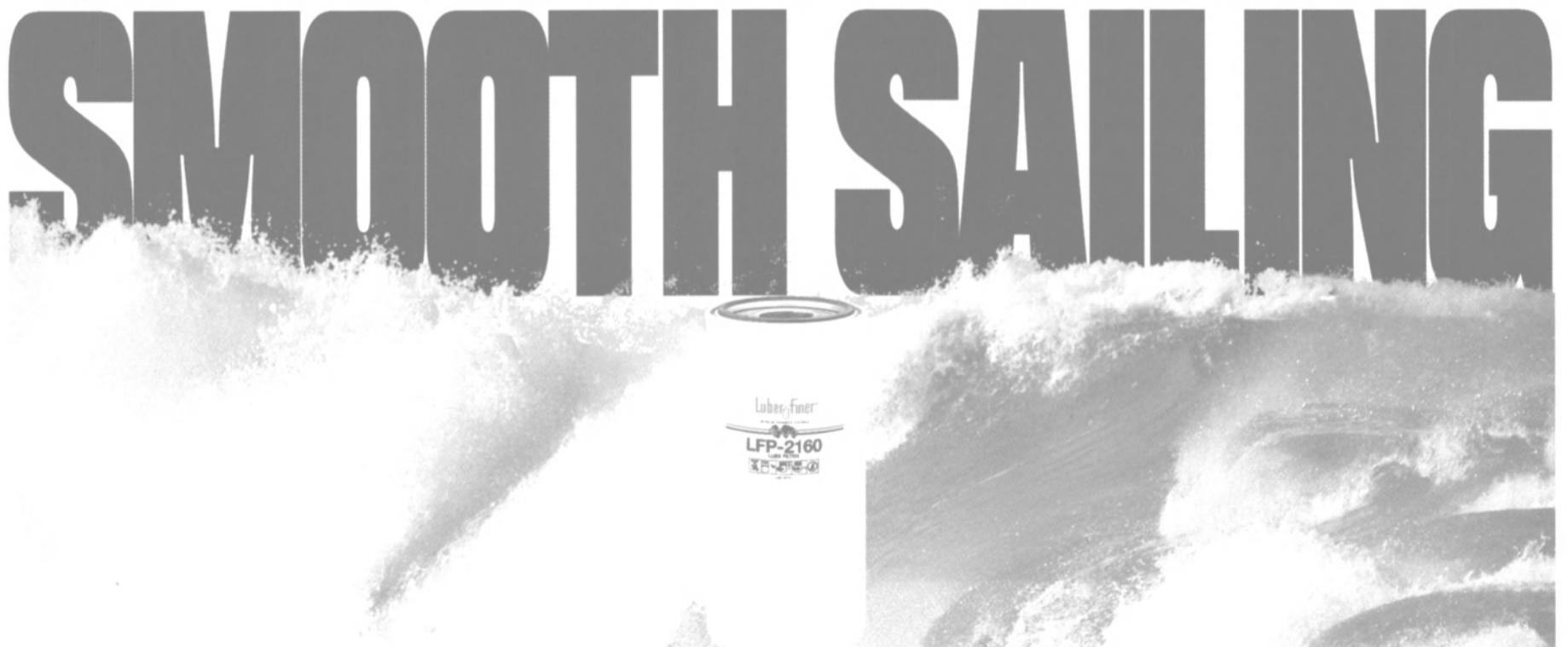
The increase in bunker prices has proved the merit of training and education in the industry. It is almost certain that those ship operators who invested in training for their bunker purchasing staff are now reaping the benefits. They are doing so, either because their purchasing staff were able to buy their fuel ahead of time at lower prices, using sophisticated products now available to the bunker industry, or because their staff are able to make the best of a bad situation.

You would think that in an environment where a difference of a few dollars in bunker prices can spell the difference between a profitable and a loss-making voyage, that the Internet, with its capac-

ity to provide information from a wide range of sources directly to the purchaser's PC, would be a boon. Indeed, there is a lot of bunker price information available on the Internet. It is even possible to buy fuel on the Web. Yet without proper knowledge of how the bunker industry works, purchasers will not be able to get the best out of these new services.

Many news articles have focused on the launches of online bunker purchasing sites. Two of the most renowned launches have been of eFueloil.com (backed by Chemoil and Itochu) and OceanConnect.com (founded by a grouping of Shell, BP and F&M, itself a joint marine fuels marketing initiative of Chevron and Texaco). So far, newly-

(Continued on page 64)



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Lubricant Technology Proven Tough Under Fire

When Texaco, now represented in the marine lubricants market by FMM (Fuel and Marine Marketing), launched Taro 40 XL 40, the lubricant was designed to address pressing field problems in medium speed engines. Three years later FMM is in a position to evaluate the performance in a large number of engines and to compare the field results with competitive lubricants. The pressing problems arose from a series of engine design and fuel processing changes. Although aimed at improving engine efficiency and making savings, the changes resulted in a series of difficulties. The best known are engine blackening, undercrown deposits, piston head corrosion, fouling of purifier heaters, increased oil consumption, base number depletion, oil scraper ring clogging and increased piston deposits. To operate the new medium speed engines satisfactorily, a new generation of lubricants was needed. The new oils had to be able to disperse high concentrations of cracked asphaltenes in the lubricant and have enhanced thermal stability to resist extreme temperature conditions.

To understand the impact of the new lubricant generation on the field performance, it is necessary to look into the causes of the field problems and the working mechanisms of the new lubricants.

Engine blackening through fuel contamination

In modern medium speed diesel engines the fuel pump pressure has been increased, sometimes up to 1600 bar. This contributed to high fuel pump leakage and increased fuel contamination of the lubricant. Analyses of used oils from medium speed engines running on heavy fuel (HFO) indicated an average HFO contamination of two percent. In some cases levels up to 15 percent were detected.

Most of the HFOs in use today come from cracking installations. The cracked asphaltenes, an inherent part of modern HFOs, don't dissolve in lubricants but instead coagulate and form floating asphalt particles of two to five microns. These particles are very sticky and form black deposits on all metal surfaces of the engine. These result in black deposits in the cambox and in the crankcase. The deposits also cause oil scraper ring clogging. This can lead to high oil consumption.

Deposits are also formed in the hot areas of the engine such as the piston grooves, the piston lands and in the cooling spaces of the piston. If an oil barrier is used to seal the fuel pump, asphaltene coagulation can occur on the surface of the fuel pump plunger, sometimes leading to fuel pump blockages. These deposits

can obstruct the fuel pump drain. This results in excessive fuel ingress into the lube oil, aggravating the deposit problems and causing serious viscosity increases due to fuel admixture.

Significant differences in the degree of blackening can be observed in the field. The differences are largely due to purification conditions and fuel pump type. The problems can be minimised by effective purification, which removes the asphalt particles from the lubricant. Extreme engine blackening is experienced in case of poor purification in combination with high HFO pump leakage.

Solutions

It was to resolve these problems that the new lubricant technology was developed. In the latest generation of lubricants, asphaltenes are dispersed in the lubricant.

Inspection of a high number of engines of different makes, which have accumulated up to 20,000 hours with Taro 40 XL 40, show excellent general cleanliness and considerably improved piston cleanliness. Excellent results are obtained even with high HFO contamination levels up to 8 percent. Product testing in the laboratory and engine inspections in the field indicate that there is a substantial difference between the performance of the different commercial oils on the market. In particular, the amount of asphaltenes that can be dispersed is significantly different. This is reflected in the high number of dirty engines still found in the field. Engines with a relatively high level of HFO contamination and a moderate oil quality still suffer asphaltene deposits, heavy deposit formation in purifiers, in purifier heaters, high filter consumption etc.

FMM found that of all the tested commercial lubricants, Taro 40 XL 40 was able to disperse the highest level of cracked asphaltenes. Nearly all engines lubricated with Taro 40 XL 40 were fully clean. Excellent piston cleanliness was obtained. The cleaning intervals of the purifiers were reduced as was, in many cases, filter consumption. Deposit formation in purifier heaters was almost eliminated.

The field results obtained with Taro 40 XL 40 are illustrated in Figures 1 to 4.

They show the cleanliness obtained with the new lubricant as compared with the previous generation of oil. Figure 1 shows typical blackening of a cambox due to 4 percent HFO contamination of the lubricant.

Figure 2 shows a cambox lubricated with Taro 40 XL 40, despite a high HFO contamination level of 4 percent, the blackening is fully eliminated.

Figures 3 and 4 compare crankcase cleanliness in an

(Continued on page 63)

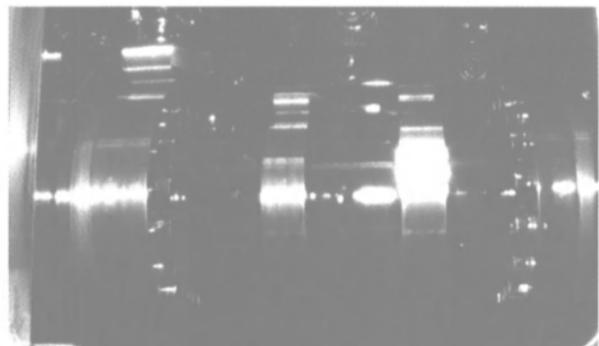


Fig 1: Typical blackening of a cambox due to 4 percent HFO contamination of the lubricant

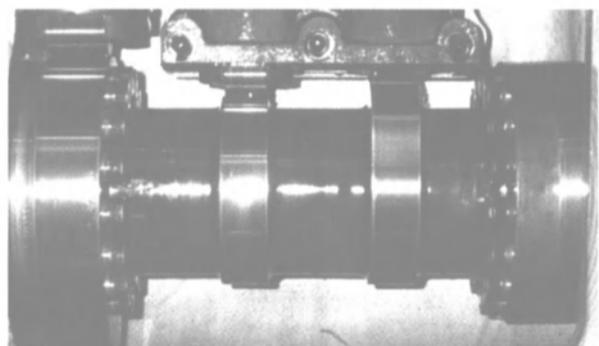


Fig 2: A cambox lubricated with Taro 40 XL 40, despite a high HFO contamination level of 4 percent, the blackening is fully eliminated.



Fig 3: Crankcase blackening due to heavy fuel contamination

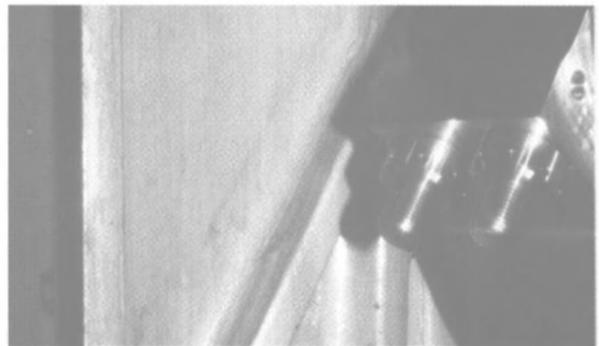


Fig 4: A clean crankcase operating with Taro 40 XL 40

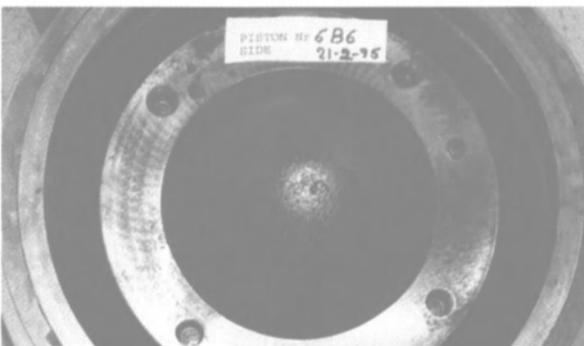


Fig 5: Carbon layer build up in cooling chamber

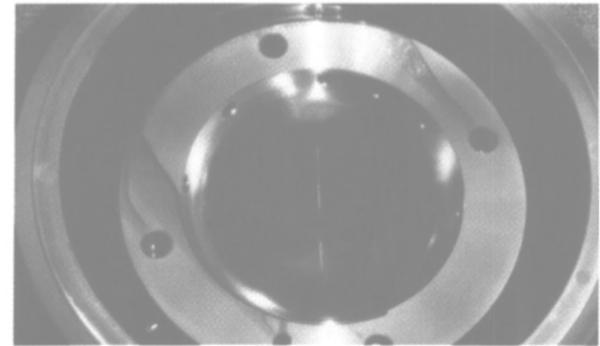


Fig 6: A similar cooling chamber in an engine lubricated with Taro 40 XL 40

Online Fuel Supplier Fueled By Support

Online marine fuel supplier OceanConnect signed a strategic alliance with ship broking group Horace Clarkson

Plc. "Clarksons will support OceanConnect.com's initiatives to develop credit insurance and swaps capability to the online marine fuels marketplace," the company said. Clarksons, the world's biggest shipbroking group will also

become an equity partner in OceanConnect. In the last month OceanConnect has announced partnerships with shipping companies Eletson Corporation, Keystone Shipping Co and Stena Bulk AB plus Japan's Nippon Mitsubishi Oil

Company and energy information provider Petroleum Argus. Scheduled to begin operations in late spring, OceanConnect said it aims to provide a fast and price-efficient marketplace for marine fuel transactions plus real-time information on pricing and product availability. Other investors include BP Marine (a unit of BP Amoco), Fuel and Marine Marketing LLC (a joint venture between Texaco and Chevron) and Shell Marine Products (a Royal Dutch/Shell unit).

ExxonMobil Forms New Global Team



Mark P. Andreotta

ExxonMobil has established a new global marine lubricants organization, which is part of the company's Lubricants & Petroleum Specialties Company. The new team is comprised of executives from both former companies with a combined total of 60 years of marine lubricants experience. The new group includes: **Mark P. Andreotta**, vice president, Global Marine and Aviation Lubricants, Fairfax, Va.; **Ray J. Pomfret**, regional manager, Africa, Europe and Middle East, Leatherhead (Esso Petroleum); **Tom Arne Ingovoldstad**, regional marine manager, Asia Pacific, Singapore (ExxonMobil Asia Pacific Pte.); **Andy Janssen**, regional marine manager, Americas, Fairfax, Va. and **Keith P. Saddler**, Global Equipment Builder and Marine Products Manager, Fairfax, Va.

The company also appointed **Steve Walker** as technical manager to oversee the implementation of an Operations Integrity Management System (OIMS).

Fuel-Tek Touts New Fuel Conditioner

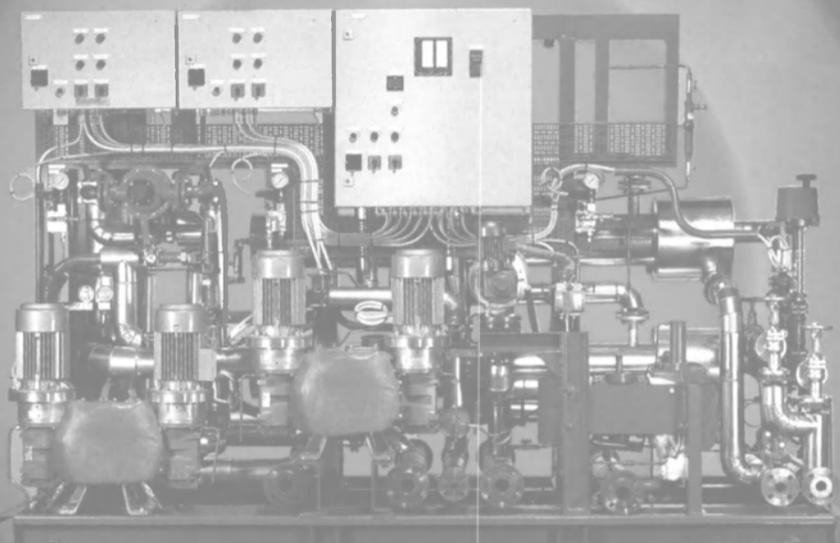


Florida-based Fuel-Tek has developed a new fuel conditioner specially designed for the marine market - Fuel-Tek Marine CAL-5 - a multifunctional additive package. The product addresses every fuel storage and handling problem encountered within the maritime industry. Cal-5 is a fuel stabilizer that contains surfactants, non-ionic dispersants and organic combustion catalysts coupled with proprietary FAB-20 technology. This conglomeration offers an environment that is unsuitable for the formation and growth of fungi, algae and bacteria. Cal-5 also eliminates soot in the exhaust stream, lubricates the fuel system, extends filter life and disperses water. A 16-ounce bottle will treat 640 gallons and a one-gallon container will treat 5,000 gallons.

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Marine Fuels, Lubricants & Additives

Onboard Napa Power Promotes Fuel Economy



Finnish-based marine software developer Onboard-Napa Oy has added a system for lowering the operational costs of ships. The

system aids the user in planning voyages so that the destination port is reached on time in a cost-effective way. This idea is modeled on the same technology utilized for the Napa system for CAE tasks, and for the Onboard-Napa system used with onboard calculations of ship loading and damage stability. A user-friendly tool for planning routes, schedules and optimizing ship operations, Onboard Napa-Power can also be used for reporting fuel consumption and costs, and compiling statistics on various voyages. The system can be interfaced with the other systems already installed on the bridge, thus minimizing the input required from the user.

Circle 81 on Reader Service Card

World Fuel Services Sells Oil Recycling Segment

World Fuel Services Corp. has sold its oil recycling segment - known as the International Petroleum group of companies - to Dallas-based EarthCare Company. The transaction was valued at \$28 million in cash and \$5 million in EarthCare common stock, subject to certain resale restrictions and price protection. The company is expected to record a considerable gain from the sale during the fourth quarter of fiscal 2000.

The sale of the oil recycling segment repositions World Fuel Services as a downstream marketer and financier of aviation and marine fuel products and services to a worldwide customer base.

Circle 88 on Reader Service Card

ThermoProbe TP-5 Is Rugged, Compact

With safety in mind, the ThermoProbe TP-5 is a basic petrochemical gauging thermometer designed to be rugged, simple and compact, yet lightweight. The case is comprised of tubular extruded aluminum with an integrated probe holder. Cover plates have gaskets and an unbreakable pressure-sealed water proof switch to ensure reliability in severe conditions. The unit is powered by a common 9V transistor battery, which is easily accessible, removable and securely fixed. An individual button provides on/off operation and a photocell controls the backlight for use.

Circle 83 on Reader Service Card

May, 2000

Dylon Lubricant Develops Heavy Duty Grease

Dylon Lubricant Technologies has developed heavy duty grease Grade GR-424. The water-resistant grease formulated for industrial equipment is designed specifically for heavy duty ser-

vice where high loads and demanding environments are common. GR-424 remedies most heavyweight lubrication problems, and is perfect for use in anti-friction bearings, open gears, universal joints and other harsh environment equipment. The grease is comprised of a heavily loaded chemistry featuring four

percent solid film additives, which build a barrier between metal parts for maximum metal-to-metal separation. What could most likely be dubbed as the product's most unique feature is its advanced polymer and its ability to lock out moisture and other contaminants.

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45

Onboard Analysis Made Easy With Tech'Care



Elf Lub Marine's self-contained onboard analysis system, Tech'Care is designed to facilitate monitoring of machinery lubrication between more

comprehensive Diagomar plus analyses. Tech'Care provides quick and accurate diagnoses so that all necessary remedial action can be taken on the spot.

Using simple techniques, the user-friendly Tech'Care kit enables engineers to check the condition of machinery and lubricants whenever the need should arise. The kit, which is comprised of easy-to-use equipment designed to ensure good repeatability, tests three

main characteristics such as water content, seawater detection and viscosity.

The test kit contains reagents and solutions for 50 analyses, with consumables being resupplied in the same quantities.

Circle 87 on Reader Service Card

PlutOcen Offers Improved Combustion

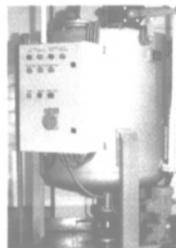
PlutOcen® F is a highly concentrated

combustion improving agent that is a solid fuel additive. With the maximum concentration of the active compound available as a solid, it is therefore possible in this type of application to achieve a mixing ratio of 1 kg of PlutOcen® F per 40,000 kg of fuel - meaning that one metric ton of fuel requires just 25 grams of this product. When applied, PlutOcen F is dissolved in diesel oil and this solution is added to the fuel. PlutOcen is soluble in any kind of fuel without leaving any residue.

Circle 90 on Reader Service Card

PRI-D Is Super Concentrated

Power Research Inc. keeps fuel fresh and ready with its PRI-D super concentrated, complete fuel treatment that improves all diesel fuels — enabling them to perform to their utmost potential. Touted as a highly effective preventative maintenance tool, PRI-D's proprietary, refinery grade chemistry prevents carbon deposits and fuel system fouling. The product works chemically within diesel fuel to improve the combustion process — allowing for improved engine performance. PRI-D also works to lower harmful emissions, including NOx and SOx.



Circle 91 on Reader Service Card

National Spencer Introduces Zee Line Of New Products

A full color Zee Line New Product brochure touts new industrial-grade transfer and storage products from National-Spencer, Inc. The brochure is comprised of detailed information on new product offerings in hose reels, 3:1 ratio oil pumps, preset digital meters and equipment packages.



Circle 92 on Reader Service Card

Biotech Device Cleans Enviro

EnSolve Biosystems was granted USCG and IMO certification for its oily water separator. The premiere commercial unit will be installed on a 1,000 ft. (30.4 m) cargo vessel operating in the U.S. Great Lakes. The PetroLinator is the first of technologically-driven separators that meld modern biotechnology with physical separation of oil from water. Using a newly patented biotechnology process to clean oily water, the PetroLinator includes a fail-safe monitoring process to ensure that water discharged is cleaner than the regulatory limit of 15 parts per million.

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DURAMAX MARINE LLC

Innovative, efficient DuraCooler™ is redefining the cutting-edge of keel cooler design. Its **unique streamlined header** enhances internal coolant and external seawater flow to reduce system pressure drop and increase heat transfer efficiency—for smaller keel cooler requirements and a reduction in cooling system costs. DuraCooler utilizes **high-strength 90/10 cupro-nickel tubing** for improved heat transfer and resistance to corrosive/erosive effects of seawater. Plus, the computerized Duramax Marine® sizing system helps make a custom fit on a new construction or retrofit.



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Greek Ferries: The New Business Model

The ultra competitive Greek ferry market has not only proven to be a fertile breeding ground for advanced marine technology, it has served as a role model for the direction of shipping services in both the region and the world.

The Greek market has provided the collective builders and suppliers of advanced fast and conventional ferries a rich environment for business over the past few months, a trend that seems likely to continue. Specifically, Greek owners and operators have been at the forefront of an international buying binge for large, fast passenger, vehicle and cargo carrying craft. Driven by the need for speed, many owners are turning to advances in marine electronic and propulsion systems to ensure that the multi-million dollar investments are kept running safe and efficient.



Pericles S. Panagopoulos, chairman, Attica Enterprises

and the perpetuation of monopolies have created a lackluster industry."

Heavy Investment In New Ships

Hallmarks of the Greek ferry market in the past 12 months have been consolidation and major investment in new ships, and the December 1999 takeover over of Strintzis Lines by Attica Enterprises serves as the perfect example.

Attica Enterprises, a leading Adriatic passenger shipping firm, recorded a net profit improvement of 0.5 percent to 9.1 billion drachmas (\$24.5 million) in 1999 (excluding Strintzis Lines; Strintzis and Attica results will be combined in 2000), on earnings before interest and depreciation growth of 3.4 percent to 13.1 billion. Strintzis Lines 1999 net profit rose 27 percent to 3.0 billion drachmas (\$72.3 million) on sales growth of 10.5 percent to 26.8 billion, with earnings before interest and depreciation increasing 10.3 percent to 7.2 billion.

Strintzis Lines is ideally positioned to capitalize on phenomenal growth in both its passenger and truck segments. Year-end 1999, Strintzis saw passenger volume jump nearly 20 percent to 1.9 million, and truck volume leap an astounding 39 percent to 131,000, as compared to 1998 numbers.

The substantial increase in commercial traffic in the Adriatic is in line with the

"Consumers can choose the best available rather than being forced to accept mediocrity, so that competing companies are forced to continuously improve their products or service," said **Pericles S. Panagopoulos**, chairman of Attica Enterprises board in the company's annual report. "This is exactly the opposite of what is happening in Greece's domestic sea transportation, where lack of competition



Superfast III undoubtedly contributed to Attica Enterprises' Superfast Ferries posting of a 15.1 percent rise in net profit during 1999.

company's strategy of reorienting the fleet to RoPax ferries with greater truck capacity and higher speed. It is worthy to note that the growth rates in the Adriatic were achieved despite the introduction of three new fast ferries by other operators.

The company has staked its future on partnerships and new ships. In September it agreed to a takeover with Attica Enterprises. The companies aim to expand their operations into new domestic and international routes while taking advantage of economics of scale and operating synergies. After signing its agreement with Attica, the company proceeded to launch three new brand names: Blue Star Ferries, Blue Ferries and Blue Star Jets.

Under the Blue Star Ferries trade name will operate all newbuildings, ie. Blue Star 1, Blue Star 2, Blue Star Ithaki, Blue Star Chios and Blue Star Mykonos. All other vessels of our fleet will operate under the trade name Blue Ferries, except of the two catamarans, the Seajet 1 and Seajet 2 that will trade as Blue Star Jets.

This rebranding is expected to help increase sales and our market share, domestically as well as in Adriatic routes

Strintzis has been particularly active in the ordering of new ferries for expanded operations, and on March 31, 2000 it took delivery of Blue Star Ithaki from Daewoo Heavy Industries Ltd. Blue Star Ithaki is an ultra-modern RoPax Ferry and can achieve maximum speed of 25 knots. This month and later this summer, the company plans to take delivery of Blue Star 1 and Blue

Star 2, which are currently at their final stage of construction.

The vessels will serve daily the Patras - Brindisi route at a record time of nine hours and the Patras - Ancona route via Brindisi daily at 21 hours. In addition, during the first quarter 2000 the keel-laying of the vessels Blue Star Chios and Blue Star Mykonos will take place at the Hellenic Shipyards Co.

Last November Strintzis exercised the option for a third newbuilding at Hellenic Shipyards Co. This vessel is due to be delivered within the first six months of the year 2002.

The company sees its investment in newbuildings and the cooperation with Attica Enterprises paying immediate dividends, with an improved profit margin owed to the operational efficiencies of its new ships and intense marketing and promotion of its new brands.

Superfast Ferries Profits Flying

Attica Enterprises said its main unit Superfast Ferries Maritime SA posted a 15.1 percent rise in net profit to 8.6 billion drachmas (\$23.2 million) in 1999, on sales growth 10.4 percent to 29.6 billion and a 11 percent rise in earnings before interest and depreciation to 12.5 billion.

Superfast Ferries Maritime SA ranked first for the second consecutive year in passenger and commercial vehicle traffic, and second in private car traffic among the 45 ships in service in the Adriatic Sea routes

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Greek Ferry Report

between Greece and Italy.

Its four Superfast ferries carried 13.7 percent more passengers, 20 percent more trucks and 24.2 percent more private vehicles in 1999 compared to 1998. Strintzis Lines was in third place in overall traffic in the Greece-Italy routes with its six ships, carrying 14 percent of

passengers, 16.1 percent of lorries and 13.3 percent of private vehicles. It recorded a 21.4 percent rise in passenger rise in 1999 versus 1998, 60.1 percent growth in trucks and 63.1 percent growth in private vehicle traffic. The six brand new ferries of latest technology due for delivery this year are expected to

boost group sales and profits in 2000.

Minoan Earnings Up 60 Percent

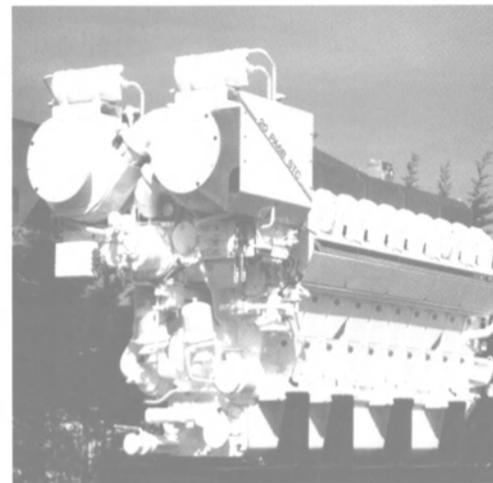
Minoan Lines reported that 1999 earnings before depreciation grew 60 percent year-on-year to 20 billion drachmas, on operating revenue growth of 7.5 percent to 46.5 billion drachmas (\$125.5

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SEMT Engine Built for NEL Lines

million). Earnings before depreciation and financial expenses improved 53 percent in 1999 to \$62.1 million. The earnings report was particularly impressive in the face of traffic losses due to the Kosovo crisis. Its investment of \$660 million in seven newbuildings is expected to be completed mid-2002, allowing for a renewal of its fleet and the realization of capital gains from the sale of older vessels. Four of the new vessels are being built by Fincantieri, with the other three coming from Samsung.

34 Ship Ordering Binge Subsides

Fast moves on the water were matched with like speed in the boardroom, as Minoan Lines' 70-percent subsidiary Minoan Flying Dolphins completed a rather aggressive and amazing buying spree last year into this, acquiring 34 vessels. The company, which became an instant favorite with equipment suppliers and shipyards alike, went on a purchasing swing that included buying:

Attica To Deploy New Fleet In 2001

Attica is hoping that its success with the Superfast ferries in the Greek and Italian markets bodes well for its new service offering to the north. Attica Enterprises plans to deploy four new 29.2-knot, 29,800-grt Superfast car-passenger ferries in the Baltic Sea in 2001.

Superfast VII, VIII, IX and X, from Germany's Howaldtswerke Deutsche Werft AG are designed to carry 604 passengers in 172 cabins, as well as 125 trucks and 110 cars. The new routes will connect Stockholm and Helsinki to northern Germany in about 17 and 21 hours respectively.

Greek Ferry Report

• ferry Penelopi A. from Agoudimos Lines for an undisclosed sum, adding about 350,000 passengers and 60,000 cars to Minoan Flying Dolphins' total of passengers and vehicles transported and about 1.2 billion drachmas in revenues annually.

• four ferries — Super Naias, Panagia Ekatonapyliani, Apollon Hellas and Ulysses — operating on routes to the Cyclades islands and the Argosaronic Gulf.

• in November 1999 a block of 10 ferries, including Poseidon Express II, Pegasus, Milos Express, Papadiamantis, Poseidon Hellas, Aeas, Apostolos, Hellas, Aphaea and Aegina

• three ferries — F/B Anemos, F/B Lemnos and F/B Macedon — from the shipping family Nomikos for an undisclosed amount. At the time the company reported that the three ferries have a combined annual turnover of about 2.05 billion drachmas (\$6.51 million), carrying 300,000 passengers and 50,000 cars to the Sporades annually and 125,000 passengers to the Dodecanese destinations.

• six ferries, operating in the sea routes linking the ports of Piraeus and Rafina with the Cyclades islands.

The ferries are Express Afrodite, Express Athena, Express Apollo, Express Hermes, Express Olympia and

Express Santorini.

• ferry Sea Speed 1, a three-month-old newbuild from FBM Marine.

• four RoRo vessels, including Sea Trailer from Valentine Marine Ltd., Star Trailer from Kameron Marine, Nave

Trailer from Nave Maritime and Cielo Trailer from Cielo Maritime. At the time the company said that the RoRo vessels were acquired to complement Minoan Lines' six highspeed ferries operating in the Adriatic Sea, offering cargo transport services.

• five used ferries which service routes linking the port of Piraeus with islands in the Saronic gulf.

The ferries are F/B Nefeli, F/B Georgios, F/B Saronikos, F/B Eftyhia and F/B Express Danae.

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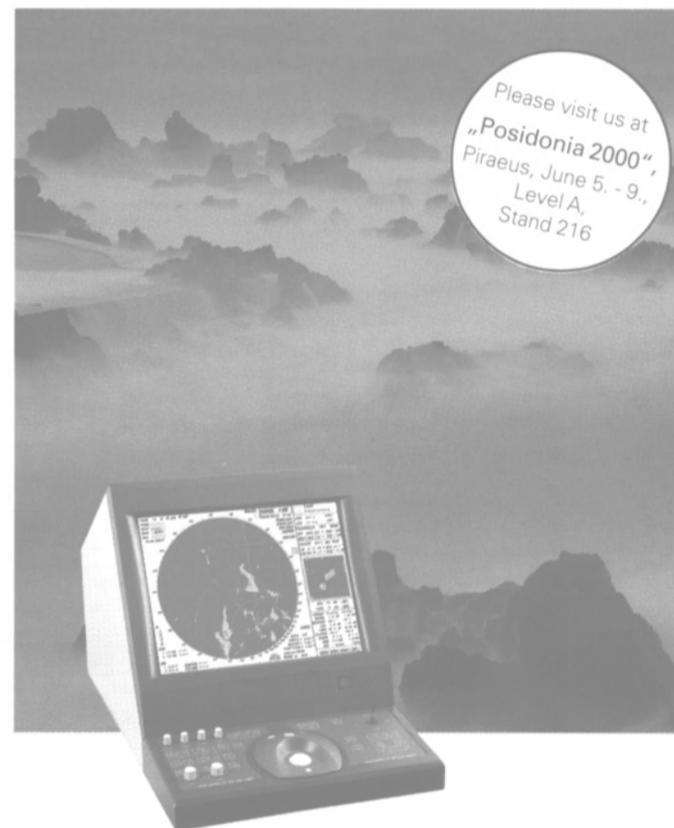


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49

Strintzis Annual Report

(Select Financial Details)

January 1 to December 31, 1999

| (GRD million) | 1999 | 1998 | 1997 |
|-------------------|--------|--------|--------|
| Revenue | 26,762 | 24,678 | 21,175 |
| Operating Profit | 2,891 | 3,678 | 3,194 |
| Net Profit (Loss) | 3,253 | 2,118 | 1,081 |
| Total Assets | 96,110 | 75,661 | 43,639 |
| Vessels | 80,996 | 65,434 | 36,234 |
| Long-Term Debt | 36,201 | 19,268 | 15,441 |
| Equity | 50,522 | 47,511 | 20,456 |

Investing activities

| Vessels acquisitions & Improvements | 1999 | 1998 | 1997 |
|---------------------------------------|----------|---------|-------|
| (27,280) | (29,260) | (6,025) | |
| Property, plant, and equipment | (115) | (284) | (252) |
| Proceeds from sale of subsidiary, net | 232 | 0 | 0 |
| Proceed from sale of vessel, net | 10,190 | 0 | 0 |

Financing activities

| New loans | 1999 | 1998 | 1997 |
|-----------------------------|----------|---------|---------|
| 45,356 | 5,333 | 2,517 | |
| Repayment of long-term debt | (28,066) | (2,273) | (2,205) |

Key Traffic Data (January to December)

Volumes in thousands

| | 1999 | 1998 | % |
|------------|---------|---------|-------|
| Passengers | 1,865.7 | 1,558.8 | 19.7% |
| Vehicles | 256.2 | 249.1 | 2.8% |
| Trucks | 131.7 | 94.9 | 38.8% |

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Marine Literature Review



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Circle No. 101



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ABS comprises three operating divisions: ABS Europe, ABS Pacific, and ABS Americas with divisional headquarters in London, Singapore and Houston,

respectively. The corporate office also located in Houston. This divisional arrangement allows decisions to be made at a local level, providing for quick response to industry needs. Each division is staffed with a complete complement of administrative, technical and operational personnel able to provide the full range of classification services. ABS, the classification society, has several affiliates, which operate under ABS Group of Companies, Inc. They provide verification, certification, training, risk and reliability services to land and marine based industries worldwide.

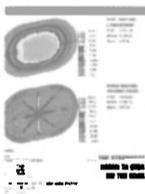
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Aurand

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Circle No. 103



Baier Hatch Company

Baier Hatch Company manufactures a complete line of cast aluminum, steel, and stainless steel flush deck hatches. The product line includes round, oval, hinged, lift out, and coaming hatches. The company maintains a large inventory of hatches and parts for immediate delivery.

Circle No. 104



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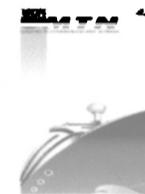


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Circle No. 116



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Circle No. 117



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Marine Literature Review

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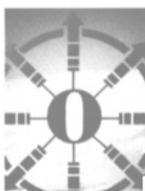


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Circle No. 129



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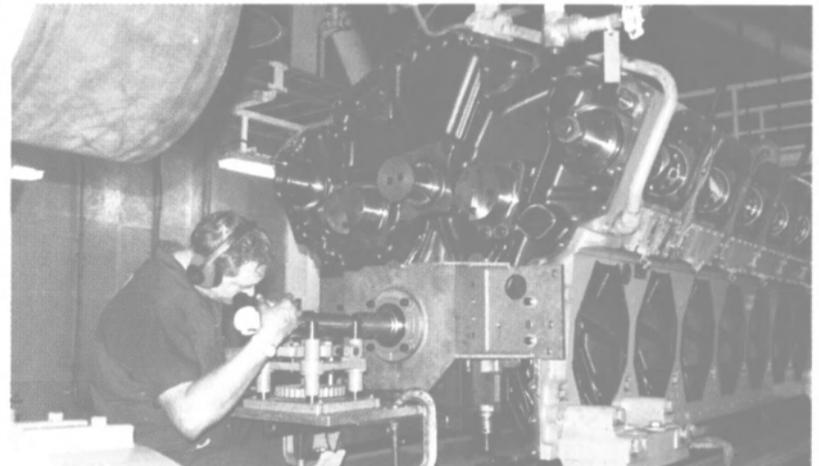
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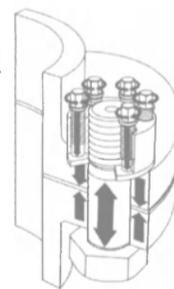
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- Safe
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- Fast - saves man hours / down time
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Circle 277 on Reader Service Card

Marine Literature Review

The Soundcoat Company

Since 1963, The Soundcoat Company Inc. has been a leading supplier of engineered materials for solving noise control problems for the marine industry. With over 5,000 products and four decades of product development, we have the most extensive line of noise reduction, vibration control and gasketing materials in the world. The Soundcoat Company, Inc. 1 Burt Drive, Deer Park, NY 11729; (tel): 800-394-8913; (fax): 631-242-2246; e-mail: info@soundcoat.com; web: www.soundcoat.com.

Circle No. 132

Stork Canada

Stork Canada, incorporated under Federal Charter in 1960 is a member of Stork N.V., The Netherlands. Stork Canada is engaged in the field of HVAC and refrigeration in diverse areas such as marine, liquid waste management, industrial pumps, plastic processing and technical services.

Circle No. 133

Tampa Bay Shipbuilding & Repair Company

Tampa Bay Shipbuilding & Repair Company is a full service conversion and repair facility located in the protected harbors of Tampa Bay, Fla. With easy access from the Gulf of Mexico, and being the largest, most complete shipyard between Pascagoula, Miss. and Hampton Roads, Va., Tampa Bay Shipbuilding & Repair Company is your only choice for vessels up to 907 ft (276.4m) in length and 15 ft (45.7m) in width at Keel Block.

Circle No. 134

Tech Power Controls

Reliability is the key to success in the marine industry. Tech Power Controls offers the engineering design, manufacturing, and 24-hour installation and service support for all your marine propulsion, thruster, and power control requirement. Tech Power Controls' products are designed and manufactured to exacting quality requirements in its ISO-9001 facilities.

Circle No. 135

Thermax

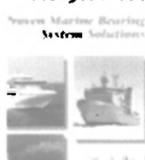
Thermax non-combustible, non-toxic, marine construction boards are used worldwide for joiner bulkheads, panels, liners, ceilings, door and furniture cores. Thermax has all major regulatory body certificates (USCG, Canada, DNV et al) and meets the requirements of IMO/SOLAS resolutions. Thermax is sold, distributed, warehoused, laminated and cut to size in North America by PSI.

Circle No. 136

Thordon Bearings — Proven Bearing System Solutions

Thordon Bearings, a pioneer in the development of pollution free bearing designs, offers a choice of

THORDON



sealed or open, water lubricated propeller shaft bearing systems. The Thor-Lube sealed stern tube system combines proven XL bearings with Thor-Lube, a water soluble, non-polluting lubricant. Thordon's open, water lubricated system choices are COMPAC, XL and Composite; each offering specific advantages in different water environments.

Circle No. 137

USMMA Global Maritime and Transportation School

The primary mission of the USMMA Global Maritime and Transportation School is to offer leading-edge education and training programs that will benefit professionals from the maritime and transportation industry (private-sector, military and government). Through its education and training initiatives, the USMMA GMATS is dedicated to optimizing America's economic and strategic intermodal transportation system and its global transportation interest.

Circle No. 138

Enercon Engineering Inc.

Enercon Engineering Inc. has served the needs of the power generation industry since 1975. We are a listed manufacturer for engine generator controls and switchgear under UL 891 and UL 1558. System designs are available for 50/60 HZ applications up to 15 kV. Also available are engine generator assembly, packaging and testing services. Currently our control systems are operating in over 60 countries worldwide. These systems range from single unit generator mounted controls to multiple unit automatic paralleling systems using state-of-the-art computerized controls with remote monitoring and control capabilities.

Circle No. 139

Goltens

For more than 60 years, Goltens — New York Corp. has provided high quality, worldwide, 'round-the-clock diesel engine repair, maintenance and parts. All Goltens' services and products are available in port, at sea, in dry dock, in-site, on-site or at one of Goltens' worldwide fully-staffed facilities. Crankshaft Grinding, Engine Overhaul, Fuel Equipment Repair, Rebabbiting of Bearings, Line Boring, Steel & Pipe Fabrication, as well as Cogeneration Services. For complete details on all Goltens' services and products and for a free brochure, contact: Armando Giachin, Bill Armstrong or Ivo Sisic, Goltens-New York Corp., 160 Van Brunt St., Brooklyn, NY 11231; tel: 718-855-7200; fax: 718-802-1147.

Circle No. 140

AON Marine

Aon Marine, a division of Aon risk Services companies, Inc., represents more than 500 years of combined marine experience, an accumulation of knowledge unequalled in the marine

industry. Our established and proven tradition of providing innovative marine programs has never been stronger. Marine coverages run the gamut from standard cargo and hull risks to large and unusual exposures, such as offshore exploration and production platforms.

Circle No. 141

BAND-IT

A new full-line catalog from BAND-IT. The Clamping Experts, includes complete details on BAND-IT's stainless steel clamps, fittings, installation tools and accessories. Several new products are described in the full-color catalog including Band-Lok, an economical new tie featuring single piece construction and self-locking Ball-Lok ties, available coated or uncoated in two widths.

Circle No. 142

Brite Products For Metal Preservation

Brite Products manufactures zinc-rich paints to protect metal from rust and corrosion in a variety of applications — including marine. It offers two coatings —

Brite Zinc for the repair of galvanizing and 1st Zinc for the priming of bare steel and iron. For more information, visit www.briteproducts.com or call 1-888-99BRITE.

Circle No. 143

Caterpillar

Caterpillar Engine Products Division has developed new, more powerful versions of its successful 3500B engines.

The new 3512B and 3516B have a longer stroke than standard 3500 Series B engines providing more displacement. Power is increased as much as 13 percent giving the 3516B a top commercial rating of 2,500KVA at 1,500 rpm (50 Hz Genset); 2,500 hp at 1,600 rpm.

Circle No. 144

Climax Portable Machine Tools, Inc.

This eight-page, full-color brochure describes features and benefits of Climax's line of portable boring, milling, turning, flang facing, pipe end prep and valve remachining tools.

Climax tools reduce downtime and dismantling costs for repairs by machining equipment right in place. Tools are easy to install and operate.

Circle No. 145

CMP Corporation

For nearly 30 years, CMP Corporation has been manufacturing the finest quality replacement compressor parts in the industry. CMP's extensive line of replacement compressor parts includes pistons, rods, cylinder liners, valve plates oil pumps, crankshafts, and many others for the refrigerated transportation industry.

Circle No. 146

Compressed Air & Gas Institute

The Compressed Air and Gas Institute, Inc. is a non-profit organization of many companies, which manufacture air and gas compressors, pneumatic machinery and air and gas drying and filtration equipment: products which have myriad applications worldwide in construction, manufacturing, mining and the process and natural gas industries.

Circle No. 147

Dayton T. Brown

The Dayton T. Brown Engineering and Test Division is one of the most complete. Independent engineering and testing facilities available in the United States, providing objective independent test

and engineering information for Fortune 1000 industrial and commercial companies, as well as defense and government entities. Dayton T. Brown tests include some of the following: Hammer Shock, Vibration, EMI/EMC, Climatics, Inclination, Shipboard Power and Noise.

Circle No. 148

Draeger Safety, Inc.

Draeger Safety introduces a new brochure featuring the Draeger MiniWarn. The brochure describes in detail how Draeger's new multi-gas instrument fits the user's specific gas detection applications. Using a new rugged ergonomic design and enclosure, the Draeger MiniWarn features easy operation, integrated thinking, flexibility in applications due to the Draeger Sensors and cost effective ownership.

Circle No. 149

Edgewater Machine & Fabricators

Edgewater Machine & Fabricators, Inc. has been a diversified manufacturer within the marine industry in excess of 40 years. We have the talent, equipment

and facilities to engineer, prototype, test and finish to your specifications.

Edgewater operates a quality assurance system with rigid adherence to the MIL-I45208A standards for quality and excellence, assuring compliance to all customer specifications.

Circle No. 150

E.H O'NEIL COMPANY

A-60 Decking lightweight, non-combustible, insulating approved by Lloyd's Register, DNV, Germanischer Lloyd, U.S. & Canadian Coast Guards.

Circle No. 151

ExxonMobil Marine Fuels

Two successful companies each with over 100 years in the business... the Esso, Mobil and Exxon names... a global presence... premium marine products... and quality people.

And there's more... we're coming together

Marine Literature Review

as ExxonMobil Marine Fuels! Our focus will remain on you the customer. Our premium marine fuels products will continue to be available in over 400 ports worldwide, including the premier bunker ports of the A/R/A, Singapore, Panama and Hong Kong.
Circle No. 152

SmartAsh SKIMOIL Inc. — SmartAsh, Power to burn!

A product of SKIMOIL, SmartAsh is an innovative combustion system that meets EPA requirements for burning non-hazardous refuse. SmartAsh uses no fuel. Simply load a 55-gallon, open head, steel drum; light it and clamp on the lid. Two 120v electric high-velocity blowers create a cyclone of intense heat. Combustion is so complete the volume of materials is reduced to an average of 3 percent ash.
Circle No. 153

Fulton Industries Free, full-color 16-page catalog details complete line of Industrial, Government, Premium, and Consumer flashlights.

Included are Industrial Lights, Explosion Proof (safety) Lights, Waterproof, UL & ASTM maritime lights, Hard Hat, Inspection... and much, much, more! Call Fulton Industries at 1-800-537-5012 or
Circle No. 154

GE Marine Engines GE Marine Engines have vast experience power over 400 military surface combatants, aircraft carriers, patrol boats, fast ferries, and cruise ships. GE Marine Engines are superior for marine propulsion due to their compact size, high power to weight ratio, high efficiency, outstanding reliability and availability, environmental compatibility with the regulations in ports and on the high seas and lower operation and maintenance requirements.
Circle No. 155

Anchors - Chains - Winches G.J. Wortelboer Jr., B.V. specializes in supplying marine products - essentially anchors chain-cables, and windlasses — with deliveries on a worldwide basis. The company is headquartered in Rotterdam, where a substantial stock is kept, guaranteeing immediate delivery to virtually every port in the world.
Circle No. 156

Gyro Chemical & Equipment Gyro Chemical & Equipment, an ARO Pump Distributor, maintains a large inventory of pumps and packing at our warehouse in Deer Park. Gyro is able to air freight any of these pumps to any port in the world at reasonable prices, because of special rates with carriers. Equip your fillet with ARO Series 425!
Circle No. 158

Heartstream Heartstream, a Hewlett-Packard Company, produces the HP Heartstream ForeRunner. This product utilizes highly accurate, computerized technology to automatically assess if a shock is appropriate. So users don't have to be trained in interpreting an electrocardiogram. ForeRunner activates the shock button only when a life-threatening heart rhythm is identified.
Circle No. 159

INTERCON INTERCON, the trade name for Intercontinental Engineering Manufacturing Corporation, is a 40-year-old company that is leading the way in articulated tug-barge couplers. This includes: *ATB Coupler systems and hull modules *Patented mechanical drive with engagement safeguards *Application engineering - new build or retrofit *ABS and SUCG approved *Worldwide product support.
Circle No.160

Jan Verhaar Omega Thrusters Jan Verhaar builds reliable, long-life Omega bow and stern thrusters. With a thrust direction that's adjustable over 360 degrees, Omega thrusters will keep any ship on the right course. They're the ideal complement to a Bollard Pull DP system of 24.9 LBF/kW. The thrusters' extremely compact size allows their installation in even the smallest engine room.
Circle No.161

Kahlenberg Brothers Co. Kahlenberg Brothers Company possesses a heritage of manufacturing and machining expertise, which spans more than a century. A leader in the manufacture of sound signaling equipment, and other special-

ized marine products, Kahlenberg is also a certified supplier of contract machining services, utilizing cutting-edge CAD/CAM and CNC technology.
Circle No. 162

Kvichak Marine Industries Maintain on-water safety with a Kvichak patrol boat. Whether it's law enforcement, fisheries patrol or fire fighting, our patrol boats are ready to respond. We're putting all-aluminum workhorses to work coast to coast — let us put one to work for you!
Circle No. 164

MAN B&W MAN B&W is one of the world's leading propulsion specialists, and state-of-the-art propeller and control system technology forms a crucial cornerstone of the complete propulsion package. From Main Engines to CP Propellers and Control systems, to Generating Sets, to CAPA and CoCo Software... MAN B&W has it all!
Circle No. 165

MultLang Systems Now your tour personnel can accommodate an unlimited number of international guests in their national languages! The MultiLang System uses proprietary software and superior wireless technology from Phonic Ear for a completely portable simultaneous commentary solution. Guests wear comfortable wireless receivers and pre-recorded audio information in broadcast simultaneously in any language, directly to the listener anywhere on board the vessel.
Circle No. 166

NLB Corporation In water jet surface prep, no one provides more than NLB. From hulls and decks to heat exchangers, nothing cleans and prepares marine surfaces better than ultra-high pressure water jets. And no one can put them to work for you like NLB. NLB water jets produce a white metal finish without the expense and hazards of abrasive blasting. They also reduce airborne lead particulates by 99.9%, according to the National Shipbuilding Research Program. For a FREE demonstration, call: 248-624-5555.
Circle No. 167

Norwegian Maritime Equipment Norwegian Maritime Equipment specializes in the sales of second-hand and new equipment to various international clients.

The company is able to offer cost-effective delivery to companies, followed by a complete over haul or reconditioning according to ISO 9000-approved systems and recertification by classification surveyors.
Circle No. 169

RESET

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And not only for repairs, but also for conversions, in which we have demonstrated our capabilities during some recent sophisticated projects.

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e-mail: aster@aster.es

Marine Literature Review

Paratherm HE Paratherm Corp.

Paratherm HE non-toxic high flashpoint (440 degree F) fluid provides precise, uniform temperature control in closed-loop marine thermal systems. Exceptionally efficient fluid's low viscosity means lower pump HP requirements. High flashpoint allows much higher system operating temperatures (USCG regs). Odorless transparent fluid has passed Bioassay, is human-safe and is safely and easily disposed.

Circle No. 170

Phoenix Marine

Phoenix International's Waterborne Ship Repair Program is an umbrella service package designed to protect vessels with varying levels of scheduled underwater services in regional ports of call — keeping fleet assets out of drydock, at sea, safe, and in regulatory compliance with planned program care and worldwide rapid-response emergency service. The Program features HULLSCAN Automated Hull Inspection System, PROPSCAN computer Aided U/W Propeller Scanning and Repair, Permanent Hull Repair Procedures, Underwater Structural Welding to Code, Professional Engineer Support, and a Hull Cleaning Network. A slide presentation is available on CD.

Circle No. 171

Stork-Kwant

The Stork-Kwant Universal Telegraph operates various transmitters and signaling devices from one control lever; i.e. signals to remote control systems, telegraph orders, contacts for one-way alarm and order recording, etc. The single control lever operation offers a considerable savings in space.

Circle No. 172

Tranter, Inc.

Tranter's on board in a wide variety of shipboard applications for the company's three plate-type heat exchangers: Superchanger plate and frame, Plate coil prime surface, and Maxchanger all-welded plate. An 8-page TIS-108A Technical Bulletin outlines many of them. Schematics visually describe 12 applications, along with photographs.

Circle No. 173

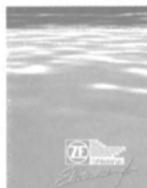
Ultrapoly

Ultra Poly manufactures UHMW-PE marine fendering to guard vessels and structures against abrasion damage. UHMW-PE fendering is easy to install and largely maintenance free. UHMW absorbs no water, is impervious to most chemicals, does not chip, peel, crack, rot, or wear out.

Circle No. 174

ZF Marine

ZF Marine is the world's largest supplier of marine transmissions, covering a power range from 10 to 10,000 hp, and has manufacturing locations in Italy,



Germany, Brazil and the USA. ZF Marine produces heavy-duty gears for all types of workboats as well as fast ferry and naval craft.

Circle No. 175

C-Map Commercial

C-Map Commercial markets the CM-93, which is a professional electronic charting database for the Americas. With its various locations worldwide, some of C-Map's recent additions to its product line include: Block Charts, which is for the Gulf of Mexico and Bathymetric Charts, developed for the Mid-atlantic, West Coast, Gulf of Alaska and Bering Sea.

Circle No. 176

Juniper Industries, Inc.

Juniper Industries has the largest inventory in the country — from individual components to completely assembled Navy Standard doors, hatches and shuttles. More products include:

dogging assemblies, hinge assemblies, drop bolt assemblies, busings, springs, packing plungers, studs, and much more!

Circle No. 177

Kaplan & Associates

Kaplan & Associates, Inc. is a United States Manufacturer of Heavy-Duty Outboard Drive Marine Propulsion Systems and Tunnel (Bow) Thrusters. This includes Seal Kits, Gear Sets, Overhaul Kits, "Hard to find Parts," New & Used Thruster, Prop Shafts and Marine Equipment as well.

Circle No. 178

Mektech Composites

Finally, there's a fire retardant, low smoke/low smoke toxicity phenolic FRP that's processed as easily as polyester. It's called Cellobond FRP and it's processed from phenolic resins available in a wide range of viscosities for: Hand lay-up/sprayup, Filament winding, Press molding, Pultrusion, RTM.

Circle No. 179

MB Industries

MB Industries (Modular Building Industries) has extensive design expertise in manufacturing modular buildings to fit a myriad of applications. MB has a patent pending lightweight U.S. Coast Guard building (SEA SHELTER) and is the leader in modular blast buildings for petrochemical applications. The PETRO BLAST 5.0 and PETRO BLAST 8.0 are providing a cost effective and safe solution for personnel in blast prone areas.

Circle No. 180

The Ultimate Protector

Today's modern vessels require superior performance and protection from a Fendering system. Urethane Products Corporation has a proven system for today's demanding marine



operations. Marine Guard fenders are designed to safely absorb the immense amount of energy generated by a ship's weight and relative velocity as it approaches a dock, pier or another ship.

Circle No. 181

W&O Supply

Engineers and purchasing agents for shipyards, ship owners, cruise lines, and the military have relied on W&O Supply for more than 30 years to meet their needs and their budgets for high-value, leading-edge piping, valves, fittings, flanges, tubing, metrics, and metals. Whether you need commodity or engineered products, W&O products save money by reducing weight, installation & production time, and maintenance costs. W&O Supply's product portfolio includes ANSI spec, DIN or JIS metric, and U.S. MIL-SPEC.

Circle No. 182

Flow International

Flow International Corp. is the world's leading developer and manufacturer of ultrahigh-pressure (UHP) waterjet technology for cutting, cleaning and food safety applications. FLOW provides total system solutions for industries including automotive, aerospace, paper, surface preparation and food production.

Circle No. 183

Watermark Navigation Systems

We design and manufacture the finest navigation aids available including buoys, regulatory signage, battery powered lights and barge navigation lights. Choose from our standard products or let us know your unique requirements and we can custom design your navigation aids. We also represent a number of marine safety related products. Give us your requirements and we can source the equipment.

Circle No. 184

Tube Lighting Products

From Tube Lighting Products, comes LEDtreads 2000. LEDtreads 2000 takes the latest electronic technology into floor lighting systems. LEDtreads are comprised of ModuLEDs in heavy vinyl tracking. Consisting of housing, replaceable circuit board and LEDs, ModuLEDs offer good pathway visibility requiring less power than traditional filament lamps.

Circle No. 185

Clean Seal, Inc.

When it comes to sealing the elements in or out, the best product for the application is most often an extruded rubber product. Clean Seal, Inc. has been supplying the automotive, transportation, marine, military and recreational marketplaces with sealant materials since 1978.

Circle No. 186

Ballast Technologies, Inc.

Ballast Technologies, Inc. (BTI) has been the premier provider and installer of fixed ballast materials since 1983. Our product and service known as Perma Ballast, is widely acknowledged

to be the quickest and most cost-effective method of ballast installation today. Our environmentally safe process and materials require minimal vessel modification, providing savings to the vessel owner or shipyard.

Circle No. 188

Cambridge — ViscoFuel 2000

The ViscoFuel 2000 is Cambridge Applied Systems' most advanced HFO viscosity management system. The rugged SPL 392 electromagnetic "in-line" sensor is installed in a bypass loop, which includes a block valve on each side for proper equipment isolation. The ViscoFuel 2000 electronics package is offered with several mounting configurations. The electronics returns three 4-20mA signals for: temperature (degree C), viscosity (cP or cSt), and control.

Circle No. 189

Circle Seal Controls

Circle Seal Controls has designed and qualified a family of motor operated valves to meet the most stringent aerospace specifications for extra long life. Often interchangeable with prior production valves, these super long life motor operated valves have been selected to replace competing valves on many current and future aerospace applications.

Circle No. 190

Atlantic Marine, Inc.

Owned by Atlantic Marine, Inc., The Alabama Shipyard offers one of the largest floating dry docks in the USA, conveniently located on the Gulf Coast to provide docking service for

larger ships trading in and around the Caribbean/Gulf of Mexico region. With its Aframax capacity, dual wing wall cranes and four dock arms, it is a self-contained drydocking/repair facility.

*An overall length of 854 ft. (260m) *Clear width of 164-ft. *(50m) between the wing walls *A lifting capacity of 50,000 long tons displacement

Circle No. 191

Electronic Marine Systems, Inc.

The Radar, manufactured by Electronic Marine Systems, Inc. is a smart radar level sensor with generic RS485 output. It's the first flay array antenna for liquid tank gauging. This software driven array allows for each sensor to remotely configure itself for the type of product as well as the structural characteristics within each tank. It's completely self-diagnostic and is factory calibrated using a laser interferometer to .1mm.

Circle No. 192

Canada

Icy Wasteland Or Shipping Utopia?

Controversy between the U.S. and Canada regarding the rights to the Northwest Passage became a frontburner item recently, based on the deployment by the U.S. of an icebreaker on a rare trip through Canada's disputed Arctic waters.

The U.S. Coast Guard's new polar icebreaker Healy is scheduled to carry out a series of experiments in the Arctic ice before sailing through the passage in June and July. In discussing the matter, Canadian officials stress that permission was granted for the trip, and that the country was not relinquishing its claim to all the waters that fall within its boundaries.

These include the Northwest Passage, a term used to describe the different possible routes through the numerous islands that dot Canada's vast Arctic which — while rarely navigable because of ice — represent by far the shortest potential sea route between Europe and Asia. However, the not so small matter of global warming and the prospects that in the not so distant future a clearer, more navigable lane — even for a portion of the year — would be available for regular maritime traffic, has raised the matter's importance of anyone involved in trade matters, which could benefit from the cost-saving route.

Washington disputes Ottawa's claim and others, who say the usually ice-clogged waters of the passage are international and therefore open to all shipping. The commander of Canada's forces in the far north has already said the country might have to use its military to enforce its claims over all its territory.

Washington has, in the past, stoked tension with Canada by twice sending ships through the passage without permission — the specially designed oil tanker Manhattan in 1969 and the icebreaker Polar Sea in 1985.

The trip by the 16,000-ton Healy will only be the third complete transit

through the passage by a U.S. ship since the two countries signed a 1988 agreement on Arctic cooperation pledging to help each other's icebreakers.

Healy can carry 75 crew members and up to 50 scientists and is primarily designed as an Arctic research vessel.

Fears regarding the potential opening

of the waterway center around possible damage to the ecologically vulnerable passage each year. Canada's belief that it has the right to regulate traffic in the Northwest Passage rests partly on a law it passed in 1970 to protect the fragile Arctic environment from spills of oil and other waste from large bulk carriers.



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MARITIME PHOTOGRAPHY



Walter Garschagen specializes in maritime and industrial photography, and travels worldwide photographing vessels and operations for the maritime industry. For information on assignment work or stock images for your next advertisement, contact him at:

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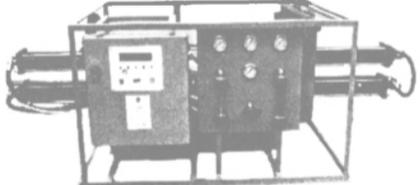
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<http://www.ghsport.com>

Version 7 Update

After several months of testing and regular use in the field, it is clear that GHS' Version 7 for Windows is **excitingly successful!**

- It's faster than anyone expected!
- It's stable and trouble-free.
- It's 100% compatible with data files from version 6

Watch for exciting new GHS developments in 2000.
Remember that while it may be imitated,
there is *only one genuine GHS!*

GHS

General HydroStatics

Ship Stability and Strength Software:

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Circle 216 on Reader Service Card

Veripos Establishes Canadian DGPS Service

Veripos now offers a Differential GPS service in Canada providing Inmarsat-delivered signal correction facilities for high-accuracy offshore navigation and positioning over ranges up to 2,000 km.

Two land-based reference stations provide rapid correction update rates and low data latency with data uplinked via Inmarsat's Atlantic West communications satellite for transmission to users.

Circle 27 on Reader Service Card

Specialties Cornerstone of Canadian Market

The past decade was a tough one for the Canadian shipbuilding market. It was a decade that produced a decline of both employment and decline of new-builds, many of which were contracted in the late 1980s still awaiting construction. This unfinished business was concentrated mostly on various military projects that had been thought out but were never actually followed through. It is estimated that by the time the 1990's came to a close that Canadian yards had experienced the worst decade since post-war times with total sales declining by about 50 percent since 1991. In addition, total employment in the industry has broken off by about 50 percent from 12,000 workers in 1990 to today's figure of 5,000.

It has been reported that these figures, while they are grim, are not a reflection of the Canadian maritime industry as a whole, but merely the shipbuilding community's staggering unemployment and

economic rates. Some may find that in these trying times, they are better suited for employment in a field that would deem more productive, despite the industry's relatively high wage pay out.

Customarily, shipbuilders around the world would fall back on their government and national carriers for sustainment, but alas, this is no longer an option. All shipbuilding countries must construct vessels for export, as well as for their own use. For instance, government policy states that government fleets must be renewed and repaired in Canada, while this is good news for the country's shipbuilding arena in that owners will not call upon outside yards, the maintenance of the country's government fleets alone cannot sustain the industry.

In revitalizing this industry, Canada's strengths lie within the construction of high-value specialty vessels, such as ferries, ice breakers, naval craft, offshore

support vessels and barges. The vessels are an intricate portion of the country's economy, as they can be marketed internationally. In fact, it has been noted that Canadian shipyards have experienced a government assisted rationalization that has lowered their capacity by 40 percent - furthering the industry as much better suited to future market prospects.

To further implore Canadian companies to build their fleets and Canadian yards, other means of revenue could be dedicated to Canada's Coastal Trading Act, which states that the owner of a ship constructed or purchased internationally must pay a 25 percent tariff (except as provided under NAFTA), to have their vessel fly the Canadian flag, as well as operating in the country's domestic trade. This tariff, combined with the additional Capital Cost Allowances shown in the Income Tax Act and Regulations provide the only policy tools.

According to **Les Holloway**, executive director, Marine Workers Federation, the Canadian maritime industry is important to the country's infrastructure and sovereignty.

Holloway feels that more pressure needs to be placed on Canada's federal government to get the wheels spinning on an industry that is in dire need of set policies and procedures. He will, in fact be presenting his argument to a federal committee comprised of all political parties regarding a pending bill titled: Bill C.213 - Calling For A National Shipbuilding Policy. At press time, the committee was gearing up for a second reading on this bill.

Touting itself for the production of quality products, the Canadian maritime industry has strived to further its means for the past 10 years, despite a downturn. The industry recently experienced a successful run with its patrol frigate construction program, which could most

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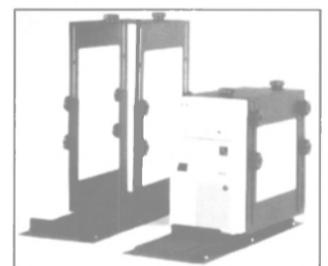
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probably be the mold for a premiere vessel on the cusp of the latest technology. This program has led to Canadian industry as holding automation and system integration skills that are top-of-the-line. The industry also has the means to develop, design and build specialty vessels for niche markets. Specifically, naval architect Robert Allan who completed the design last year for a new escort tug for Norwegian tugowners Johannes Ostensjo dy AS. The tug, which incorporates many unique hull form developments is currently being built at Astilleros Zamakona of Spain. The company also created a low manning design that features many new components in the development of a high-performance ship-assist tug for Brusco Tug & Barge of Longview, Wash., which will be delivered during the fourth quarter 2000.

While the overall aura within Canadian shipbuilding seems to be industry downturn, the yards have not let up in terms of competition. Canadian chargeout rates are comparable to the U.S. and Japan, and in some instances less than European competitors, but higher than Korea and China. On another hand, labor costs, after converted into U.S. dollars are typically lower in Canada than in the U.S. when dealing with most industry aspects. It has been estimated that the average total hourly labor costs in Canadian shipbuilding are \$5 per hour less than in the U.S. The country's labor costs are low in terms of its competitors, with hourly costs standing at 50 percent less than German yards and 40 percent lower in Japan. Despite the downturn in business, Canadian yards successfully completed some technically challenging projects. Canada Steamship Lines (CSL) has fared well, with CSL Niagara (one of MR/EN's Great Ships of 1999) and the M.V. Rt. Hon. Paul J. Martin - two seamax vessels that are the largest Canadian ships to be constructed for the Great Lakes-St. Lawrence. Paul J. Martin is also noted as the second (including CSL Niagara) of a three part forebody joining to be built by Port Weller as part of a \$100 million fleet reinvestment program by CSL.

Consortium Acquires Davie

A U.S. consortium comprised of Syntek Technologies and Transnational Capital Venture attained Davie Industries of Levis, Quebec, Canada.

Located on the St. Lawrence River near Quebec City, the shipyard had previously been functioning under a trusteeship for the past two years, resulting from a failure of its previous owner, Dominion Bridge Corp. of Montreal. Despite this, Davie has managed to remain fully operational with successful completion of refit work for the Canadian Navy, upgrade work on the oil production platform P-36 for Petrobras in Brazil, as well as damage repairs on the cruise vessel Norwegian Sky. The consortium's transaction will readily lift all constraints to Davie's recent activities.

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Canada News Notes

Irving Shipbuilding Appoints New President

Irving Shipbuilding elected **Alastair J. Bisset** as its new president with responsibility for its divisions and affiliates, Saint John Shipbuilding, Halifax Shipyard, East Isle Shipyard, Dartmouth

Marine Slips, Fleetway Inc. Atlantic Quality & Technical Services, Shelburne Repair and Steel & Engine Products. Bisset, who began his career in the shipbuilding industry in 1982, held various positions with Vickers Shipbuilding from 1986 to 1994 and was sales director for A&P Falmouth from 1994 until

1998.

St. John Shipbuilding is the largest of the yards in the Irving group, and is completing the final stages of its second 1,174-teu containership Kent Sprint. Halifax Shipyard is preparing to deliver the second UT722 Atlantic Hawk to Atlantic Towing Limited. In addition,

East Isle Shipyard completed the 10th in a series of 4,000-hp Z-drive tugs.

Circle 28 on Reader Service Card

Autoship, PAI 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. Separately, Autoship recently introduced Release 8 of its Autoship hull design program. The software release, which includes supporting documentation, a new help system and new online user's manual, also boasts Library of Parts marine equipment that will enable the user to quickly finish a detailed model of the fully outfitted vessel.

Circle 22 on Reader Service Card

Thordon Compac Bearings Used For Algonova Refit

Despite a tight delivery schedule, Thordon Bearings was able to convert the oil tanker Algonova to a Thordon Compac water lubricated propeller shaft bearing at Heddle Marine in Hamilton, Ontario. "This was the first vessel at Algoma Tankers where we used Thordon in the stern tube," says Eric Height, marine superintendent-engineering at Algoma. Since the stern tube was now shorter than the previous bearing (2:1 vs. 4:1 L:D ratio), the only modification to the existing stern arrangement was a ring in the housing to prevent the bearing moving forward. In addition, Fincantieri has ordered Thordon's Compac system for three vessels in P&O/Princess Cruises' Grand Princess series newbuild program, with an option for a fourth Thordon system.

Circle 29 on Reader Service Card

Federal Welland Named After Historic Canal

Currently gearing up for its 171st season, the Welland Canal was formally recognized by Fednav by naming its ocean bulk carrier Federal Welland upon its September 2000 christening. Currently under construction in Japan, the vessel will transit the Great Lakes/Welland Canal during the 2000 autumn season.

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Premier Miller Supports Offshore Oil Development

Voicing his support of the development of the offshore oil and gas industry on the coast of British Columbia, Premier **Dan Miller** stated that he is "not opposed to the lifting of moratorium on offshore oil and gas exploration." Discussed at a luncheon during a business summit held by the Mayor and City Council of Prince Rupert this past January, Miller added that "clearly, there are some benefits to be realized from the development of the industry."

The Business Summit also recommended that a Canada/British Columbia offshore petroleum board be established with decision making capabilities modeling those established in Nova Scotia and Newfoundland. As it stands, there is both federal and provincial legislation preventing offshore oil and gas exploration of Canada's west coast.

MV Paul J. Martin Christened At Port Weller

Canada Steamship Lines christened M.V. Rt. Hon. Paul J. Martin at Port Weller Drydocks at the Lake Ontario entrance to the Welland Canal. The vessel is the newest addition to Port Weller's fleet joining CSL Niagara as one of two Seamax vessels - the largest Canadian ships ever constructed for the Great Lakes-St. Lawrence.

Paul J. Martin is the second part of a forebody trio to be built by Port Weller as part of a \$100 million fleet reinvestment program by CSL.

Measuring 740 x 78 x 48 ft. (225.5 x 23.7 x 14.7 m), the vessel required 6,000 tons of steel, and a new hull was constructed and joined to the engine room portion of M.V. H.M. Griffith. Paul Martin is designated as the second ship to be constructed to the St. Lawrence Seaway's new maximum size allowances, and boasts the most technologically driven, self unloading system available. The vessel holds the ability to unload cargo rates up to 5,445 tons per hour. The third vessel of this \$100 million contract is scheduled for a 2001 delivery. CSL holds options on two additional vessels with Port Weller Drydocks delivery in 2002 and 2003.

Circle 6 on Reader Service Card

Construction Contract Awarded For New Z-Drive Tug

Brusco Tug & Barge, Inc. of Longview, Wash. has awarded a construction contract for a new 78 ft. (23.8 m) Z-drive tug to Diversified Marine, Inc. of Portland, Ore.

This new tug is the seventh in the series of the ASD 23/35 high-perfor-

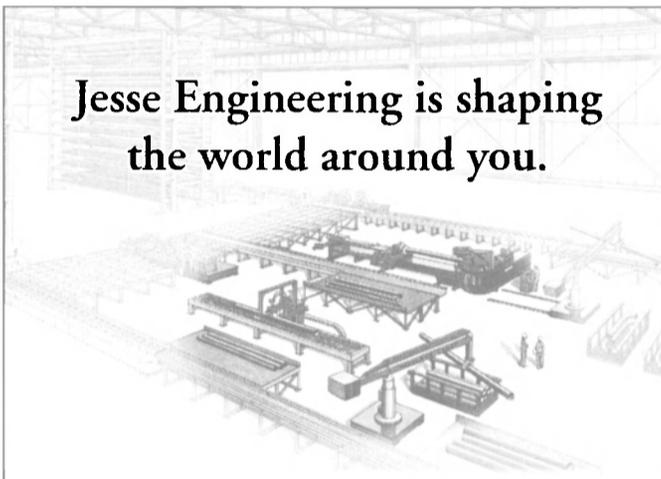
May, 2000

mance, low-manning tug design developed by Robert Allan Ltd. (see illustration page 57), and incorporates several new features reflected in the ongoing development of this class of modern high-performance ship assist tug. The most significant change to the design is the increase in power installed in this tug design since its initial development

more than 20 years ago. As a consequence of the higher power, the beam of the tug has been increased to provide greater stability, and the fendering system has changed significantly to reflect both the higher power, and changes in fender and hawser technologies. During the two decades of development and refinement to this particular Robert

Allan Ltd. design, six tugs were built and are presently operating in Canada and the U.S. The tug is powered by two Detroit Diesel Model 12V4000 diesel engines, each rated at 1,800 bhp driving Ulstein Model 1350H Z-drives. Markey Machinery Co. is supplying the hydraulic towing winch, which has a "render recover" feature.

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Canada News Notes

Fleet Technology Completes Option Study

Fleet Technology Limited concluded an option study for the Canadian Navy's proposed Logistics Support Vessel. The study, which was performed under contract to the Navy, examined various vessel types and mixes to satisfy the current

Naval requirements, seeking a variety of capability and cost solutions.

As prime contractor, Fleet Technology was supported in the project by BMT Defence Services Limited and Fleetway Inc. Fleet recently completed its premiere year of operations as an affiliate of the BMT group of companies. BMT holds a 30 percent stake in the otherwise

Canadian privately-held company. During its first year of operations, FTL has included BMT Defence in the work on concept designs for the new Canadian Navy ALSC, while recently, the staff from FTL has contributed to BMT Ship Design in England for work on cable ship conversions. Fleet is responsible for the development of the design and class

approval process for a unique floating coal transfer station based on a semisubmersible hull. Named the SST or Sea Spider, the vessel has been developed by Massachusetts-based Semi-Submersible Transshipper (SSTI). Following Class approvals, Fleet was called upon by the owner to assist with engineering support for the delivery voyage from Shanghai to Berau transshipment site off Borneo. The company initially considered a wet tow, but abandoned this notion when it was determined that a dry tow, using a barge involved the least risk. The SST has since been successfully commissioned and is expected to be a prototype for future, similar vessels.

Circle 7 on Reader Service Card

Zenon Patents Unique Black Water Treatment

Zenon's AMST (Aerated Membrane Treatment System) is an integrated system that purifies black and gray water - meeting the strictest international standards. The AMST complies with all environmental rules, but with those of the future as well - a necessity for today's contemporary vessels.

The rugged and reliable AMST system includes the company's patented Zee-Weed® membrane technology, which will be installed onboard Holland America's Statendam for a July 2000 operation date. The system requires low maintenance for standard ship operations.

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CANADIAN INSTITUTE OF MARINE ENGINEERING GREAT LAKES BRANCH "Mari-Tech 2000"

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Canadian Company Reports

Allied Shipbuilders

Situated on the north shore of Vancouver Harbor is Allied Shipbuilders, which up until the mid-1980s, operated a near capacity newbuilding facility producing various types of vessels. Business conditions led the company to concentrate more on repairs, while performing new construction as needed. This strategy has proven itself, as the yard now drydocks and repairs a large portion of the Canadian west coast commercial fleet. The yard services more than 200 vessels from 50 to 250 ft. (15.2 to 76.2 m) annually at its three floating drydocks.

Circle 9 on Reader Service Card

Deutz Canada

With three authorized distributors in Canada, flanked by various dealers, Deutz Canada has two service centers in Montreal and Sudbury, as well as various dealers tapped to service and maintain Deutz equipment in Canada. A subsidiary of Deutz AG, the company distributes a variety of high, medium and low speed engine series. High speed engines come in seven series, in various cylinder multiples that offer a closely stepped power range from 6-hp to 600-hp with continuous operating speeds of 3,600-rpm. The medium speed 628 series is manufactured in six, eight and nine in-line, and V-12 and V-16 configurations. This series focuses on a power range from 1,000 kW to 3,600 kW.

Circle 10 on Reader Service Card

IMPEG

IMPEG (Industrial Marine Power Engineering Group) offers comprehensive turnkey marine propulsion systems, focusing on Z-Peller systems and controls. The company now features various models of Niigata Z-Pellers FPP Series and Niigata Controllable Pitch Z-Peller (CPP Series) models, which cover 1,000-hp-3,600-hp range.

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Midwest Power Products

Midwest Power Products is the authorized Canadian distributor for GM Electro-Motive Division Power Marine and Industrial Products. Ranging in individual outputs from 1,050-bhp through 5,000-bhp for continuous duty application are the Electro-Motive Division diesel engines/marine propulsion units. Marine generator sets range from 745 kW through 3,580 kW continuous when operating at 900-rpm.

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Prime Mover Controls Focuses On Versatility

Prime Mover Controls specializes in versatile propulsion control heads. The remote control device is available in a variety of configurations with many options, configuring it for a vast range of control applications. The head's watertight construction allows for installation in outside stations, while large illuminated scales and pointers focus on the control handle so it can be seen from a distance. Available with up to four switches and eight potentiometers per side, the control head's standard control lever movement is 140 degrees. It is also manufactured in single or dual lever models with electric, pneumatic or mechanical output, and in most models, a propulsion order telegraph can be imple-

mented as a backup communication system.

Circle 13 on Reader Service Card

RC Marine

RC Marine has refit CFAV Quest with its ISAC CDP-3000D integrated steering and autopilot center, replacing the vessel's existing system with current technology. The innovative center includes micro processing based on controllers, navigational steering/track keeping capability, accurate dual rudder synchronization and helmsman

steering and information displays. The CDP was customized to interface into Quest's already present steering system. This procedure encompassed major electrical, electronic and mechanical engineering to successfully combine both systems.

Circle 14 on Reader Service Card

Simsmart Touts Advanced Design Tool

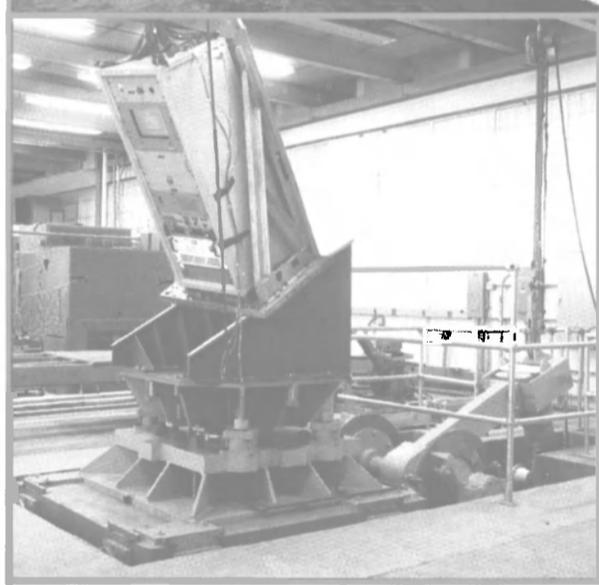
Simsmart has developed a unique and technologically driven process and control design tool through dynamic virtual opera-

tion and modeling. Touted as the virtual engineering environment, Simsmart is used in various military and industrial applications concentrating on fluids and gas processes, Heating-Ventilating-Air Conditioning (HVAC) and associated AC/DC electrical systems and related process controls.

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Mannesmann Board Appoints Top Executives

The Board of Directors of Mannesmann Rexroth Corp. has elected five executive vice presidents, furthering the company's new "Combined Strengths Strategy."

Established in 1999, this concept focuses on improving customer service and taking advantage of the synergies among the company's seven individual businesses.

Greg Andricopoulos



Andricopoulos



Cossentine

los was appointed vice president, corporate finance; **Mike Cossentine** assumes the position of vice president, marketing services group; **Susan Hallsby** was elected general counsel and secretary; **Martin Hoelscher** was named vice president, information technology; and **Ron Keller** will serve as vice president, Hydraulics Group Finance.

Tampa Bay Shipbuilding Elects New CEO

Tampa Bay Shipbuilding & Repair Company announced the appointment of **Walter J. Hartley Jr. (Joe)** to the position of president and CEO. A native of Jacksonville, Fla., Hartley has an extensive background in the ship repair and conversion industry. His previous experience includes vice president at Atlantic Dry Dock in Jacksonville; president and

CEO of Atlantic Marine in Mobile, Ala.; and president and CEO of S & H Land Corporation in Jacksonville.

Raytheon Enters Distribution Agreement With STN Atlas

Raytheon Marine Company High Seas Products (RMC) has entered into a cooperative agreement with STN Atlas Marine Electronics for worldwide distribution of Inmarsat-B Satellite Communication Systems. The agreement calls for Raytheon to offer its own branded supplemental Inmarsat-B satellite communication system

Circle 51 on Reader Service Card

Japan Radio Adds New Staff

In an effort to continue its ever widening expansion program within the marine electronics market in both North

and South America, Japan Radio Company has added key personnel to its U.S. headquarters offices, JRC North America, Seattle, Wash.

Ray Carter has joined the company as national sales manager, with experience in the commercial fishing electronics industry. **Matthew Wood** was elected as the new western regional manager, responsible for sales administration on the U.S. West Coast, in Central and South America, as well as coordination of JRC projects in the Russian Federation. **Randy Murray** joins JRC as a customer service representative from West Marine, where he worked as electronics manager for the Seattle-Lake Union branch.

Neva Set For September

There is currently a large potential for expansion within the cruise industry in

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Russia and the Black Sea, which will be analyzed and presented during the two leading Shipping Exhibitions in these areas throughout the next 18 months.

Regarding Russia, St. Petersburg leads the expansion with more than 160 vessels scheduled to port this year. The local market also plans to grow extensively while also planning the eventual introduction of turnaround and home port operations. These developments will be instrumental in the formation of the exhibition, conference and seminar programs at the fifth NEVA maritime exhibition at St. Petersburg from September 25-28, 2001.

Meanwhile, Dolphin Exhibitions will present Dolphin Capital Cruise for the Black Sea at its fourth international maritime show Odessa 2000 in the Ukraine, which will occur from October 17-20, 2000.

Circle 31 on Reader Service Card

Friede Goldman Appoints Two

Friede Goldman Halter (FGH) has elected **John F. Alford** as president and COO. Alford, who previously served as FGH vice president with responsibility for business development, joined Friede Goldman Intl. in 1996 following a career in banking.

Richard T. McCreary assumes the role of group president, Halter Marine. McCreary was previously the company's senior vice president, administration and managed the company's vessel repair business.

Bender Adds Pinkham To Sales Team

Bender Shipbuilding & Repair has named **Michael Pinkham** to its sales

and marketing team.

Pinkham, who has 23 years of experience in the marine and shipyard industry, will be responsible for solicitation and coordination of international inquiries, as well as calling on domestic accounts.

Mackay Attains Raytheon's Field Service

Mackay Communications has acquired Raytheon Marine Company's seven U.S. field service locations. The addition, which includes four Raytheon locations on the East Coast and three on the West, expands Mackay's presence into all major U.S. ports. The new locales will be run as part of Mackay Marine.

Marquette Expands Fleet

Marquette Transportation, Paducah, Ky., has added a pair of 8,000-hp vessels to its inland waterways towing operation. Currently being built at Quality Shipyard in Houma, La., the 180 ft. (54.9 m) sisterships of John Paul Eckstein were designed by CT Marine, Rowayton, Conn. Named Kay A. Eckstein and Ray A. Eckstein, the vessels will commence operation this month, and in August, respectively.

Powered by twin CAT 3612 marine engines, each rated at 4,000-bhp at 900-rpm, driving Bollinger propellers, the new vessels' propulsion package will be identical to John Paul Eckstein, except

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for one new addition — Even-Flow Struts.

Thrustmaster To Rep MJP

Thrustmaster of Texas was chosen by MJP Waterjets as the sales and service representative for the U.S. Gulf Coast.

Circle 44 on Reader Service Card

Appeal Favors Comsat

Under the terms of the contract with a maximum value of \$111.9 million over a five-year period, the U.S. Court of Appeals for the Federal Circuit reversed and vacated a ruling by the U.S. Court of Federal Claims, thereby validating this contract awarded by the U.S. Navy to Comsat. The court of claims decision had effectively blocked implementation of the company's contract beyond January 2001 to provide worldwide satellite services to the Navy via the Inmarsat satellite system. Litigation began when Stratos LLC challenged the award of the Navy contract to Comsat in a federal court of claims. Originally awarded to Comsat in June 1999, the contract is an

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indefinite delivery/indefinite quantity ordering agreement, in which the Navy leases and pays for services on an as-needed basis.

Willard Marine, MetalCraft Sign Teaming Agreement

Fiberglass marine defense contractor, Willard Marine, agreed with Canadian aluminum boat manufacturer Metal-Craft Marine to provide Willard with an extensive line of aluminum boat designs adding to its already successful fiberglass line of small boats and RIBs. Metal-Craft, who is a major supplier to the Canadian Federal Government, will represent Willard's line in Canada.

Lubricant Technology Proven Tough Under Fire

(Continued from page 43)

engine with 4 percent HFO contamination before and after the use of Taro 40 XL 40.

Undercrown deposits

Due to the continuous increase in output, the piston cooling space temperatures have been increasing. The piston undercrown temperature is typically about 250°C. In the latest engines, temperatures of 300°C have been measured. This can cause carbon deposits on the piston undercrown due to thermal carbonisation of the lubricant. The carbon deposit layer forms an insulating layer upsetting the piston cooling increasing the piston temperature. Temperature increases of around 100°C have been measured.

A second deposit formation mecha-

nism is the adhering of the asphalt particles that originate from HFO contamination. The build up of such a carbon layer in the piston coolant chamber is illustrated in Figure 5.

To cope with the extreme temperature conditions, especially in highly loaded engines, the thermal stability and oxidation stability of lubricant had to be substantially increased. FAMM has found that the thermal stability and oxidation stability of Taro 40 XL 40 has matched and even exceeded a number of synthetic commercial oils.

Figure 6 shows a similar piston cooling space of an engine lubricated with Taro 40 XL 40. No carbon was formed in spite of very high cooling space temperature (300°C) and HFO contamination of 4 percent. This was due to a combination of thermal stability and asphaltene dispersion technology.

Piston Head Corrosion

Undercrown deposits in combination with high load operations can lead to piston head corrosion. Undercrown piston deposits inhibit cooling, resulting, as already mentioned, in an increase of about 100°C in piston temperatures. Above 450°C, some sodium/vanadium salts form a melt with the piston crown material, causing hot corrosion on top of the piston. In case of high load operations and reduced piston cooling, the critical temperature is easily reached at the top of the piston. As a result, material melt and material removal by hot corrosion is occurring. This means earlier replacement of the piston crowns and, in severe cases, hole formation in the pistons, a problem which could endanger the safety of a ship.

Field inspections of a number engines lubricated with Taro 40 XL 40

indicate that in nearly all cases the piston undercrown deposit problems were eliminated. Very severe applications, such as power plants in the tropics running constantly at 100 percent load, were included in the study.

Looking back at the experience of the last three years, Roger Stubbs, FAMM's General Manager Lubricants Europe, sees Taro's success as further evidence that marine lubricants cannot be regarded as just another commodity. He said the lubricant had shown 'outstanding' levels of cylinder and crankcase protection at a time when high output engines with high internal temperatures and pressures and reduced oil consumption had become the norm.

By Ing. A. Verhelst, of FAMM's Marine Lubricant Technology Department.

First published in Marine Lube Buyer, March 2000.

ABS OIL TESTING SERVICES

(Summary of Fuel Oil Samples analyzed at select ports, March 1-31, 2000)

ABS Oil Testing Services is recognized as a global leader in the provision of quality, professional and practical fuel management, fuel analysis and consultancy programs for the marine, offshore and power generation industries.

| | D@15C | V@50C | MCR% | ASH% | H2O% | S% | V | NA | AL-SI | TSP% | | D@15C | V@50C | MCR% | ASH% | H2O% | S% | V | NA | AL-SI | TSP% |
|---|----------------|----------------|--------------|--------------|--------------|--------------|------------|-----------|-------|--------------|---|-----------------|----------------|--------------|--------------|--------------|--------------|------------|----------|-------|--------------|
| ANTWERP, BELGIUM AVERAGE MAX | 980.7 991 | 349.6 412 | 12.8 17.9 | 0.05 0.13 | 0.31 2.7 | 2.29 3.58 | 132 202 | 30 47 | 34 | 0.02 0.12 | MOBILE, AL. AVERAGE MAX | 991.1 991.7 | 357.3 372.5 | 16.5 16.8 | 0.04 0.04 | 0.15 0.2 | 3.64 3.82 | 135 152 | 14 16 | 22 | 0.04 0.05 |
| BALBOA, PANAMA AVERAGE MAX | 976.5 980.8 | 328.1 333.2 | 14.3 15.1 | 0.07 0.07 | 0.15 0.2 | 2.02 2.08 | 243 290 | 16 30 | 24 | 0.04 0.06 | MOIN, COSTA RICA AVERAGE MAX | 987.4 989.4 | 215 250 | 14.2 14.6 | 0.05 0.05 | 0.3 0.3 | 2.58 2.63 | 108 129 | 9 12 | 31 | 0.02 0.02 |
| BUENOS AIRES, ARGENTINA AVERAGE MAX | 958.9 975.8 | 166 175 | 7.4 8.9 | 0.01 0.02 | 0.13 0.2 | 0.42 0.6 | 4 5 | 23 33 | 45 | 0.02 0.03 | MONTREAL, CANADA AVERAGE MAX | 983.9 991.7 | 223.9 320.7 | 15.9 18.4 | 0.03 0.03 | 0.1 0.1 | 1.3 1.4 | 74 82 | 9 12 | 36 | 0.06 0.07 |
| CRISTOBAL, PANAMA AVERAGE MAX | 989.4 992.6 | 255.2 345 | 13.2 15.5 | 0.07 0.08 | 0.43 1.2 | 2.24 2.44 | 155 233 | 24 106 | 22 | 0.79 6 | NEW YORK, NY AVERAGE MAX | 985.3 992.4 | 298.7 379.1 | 13 16.8 | 0.07 0.1 | 0.36 2.91 | 2.88 3.66 | 232 310 | 17 45 | 24 | 0.05 0.09 |
| EIJAIH, UAE AVERAGE MAX | 970.5 989.2 | 344.5 394.8 | 15.4 17.2 | 0.04 0.05 | 0.2 0.3 | 2.96 3.44 | 108 184 | 28 37 | 6 | 0.03 0.06 | PHILADELPHIA, PA AVERAGE MAX | 987.7 995.7 | 313.2 380 | 13.4 15 | 0.06 0.09 | 0.2 0.6 | 2.64 3.42 | 244 298 | 15 23 | 23 | 0.05 0.09 |
| GIBRALTAR, SPAIN AVERAGE MAX | 988.5 991 | 315.3 380 | 14.2 17.3 | 0.04 0.09 | 0.34 3.17 | 2.92 3.8 | 152 298 | 22 60 | 13 | 0.02 0.05 | PIRAEUS, GREECE AVERAGE MAX | 969.1 989.6 | 301.6 367 | 11.1 19.1 | 0.04 0.09 | 0.12 0.4 | 3.07 3.89 | 116 220 | 16 48 | 8 | 0.02 0.09 |
| GOTHENBURG, SWEDEN AVERAGE MAX | 986.4 989.6 | 347 363 | 14.7 15.8 | 0.03 0.05 | 0.08 0.2 | 2.38 2.69 | 128 192 | 23 32 | 9 | 0.02 0.08 | PORT ARTHUR, TX AVERAGE MAX | 984.9 988.5 | 357.1 383.8 | 14.1 17.5 | 0.03 0.06 | 0.12 0.2 | 2.41 2.91 | 70 128 | 8 11 | 13 | 0.01 0.02 |
| HAMBURG, GERMANY AVERAGE MAX | 970.1 981.3 | 311.7 390 | 11.2 15.3 | 0.04 0.04 | 0.1 0.2 | 1.4 2.2 | 111 220 | 9 14 | 38 | 0.02 0.02 | PORTLAND, ME AVERAGE MAX | 990.1 996.2 | 353.3 511.4 | 14.1 16.6 | 0.05 0.1 | 0.22 0.7 | 2.01 2.59 | 205 341 | 16 33 | 27 | 0.06 0.08 |
| HONG KONG AVERAGE MAX | 975.4 989.2 | 246.6 328 | 14.2 17.5 | 0.02 0.05 | 0.07 0.1 | 2.93 3.15 | 89 108 | 9 10 | 14 | 0.03 0.05 | PUNTA CARDON, VENEZUELA AVERAGE MAX | 975 976.3 | 378.5 379 | 13 16 | 0.08 0.08 | 0.2 0.2 | 2.63 2.64 | 266 315 | 17 19 | 29 | 0.02 0.02 |
| HONOLULU, HI AVERAGE MAX | 967.9 973.8 | 306 373 | 15.5 17.6 | 0.04 0.04 | 0.19 0.2 | 1.72 1.88 | 71 82 | 6 9 | 19 | 0.03 0.06 | ROTTERDAM, NETHERLANDS AVERAGE MAX | 997.6 1010.2 | 400.9 496 | 15.8 19.2 | 0.04 0.06 | 0.32 2.3 | 3.23 3.66 | 141 234 | 11 27 | 23 | 0.03 0.1 |
| HOUSTON, TX AVERAGE MAX | 985.2 993.8 | 222.4 343 | 15.7 19.8 | 0.07 0.66 | 0.96 28.3 | 2.84 3.67 | 177 275 | 12 88 | 34 | 0.03 0.16 | SAN FRANCISCO, CA AVERAGE MAX | 981 983.2 | 148.5 170.5 | 13.1 16.5 | 0.04 0.06 | 0.25 0.4 | 2.36 2.61 | 154 169 | 5 7 | 17 | 0.03 0.03 |
| JEDDAH, SAUDI ARABIA AVERAGE MAX | 948.3 950.2 | 169 180.7 | 10.8 10.9 | 0.02 0.03 | 0.42 0.85 | 2.51 2.6 | 33 39 | 36 48 | 5 | 0.01 0.01 | SEATTLE, WA AVERAGE MAX | 986.4 994.7 | 246.5 366.9 | 13.7 17.8 | 0.04 0.07 | 0.27 0.4 | 1.95 2.03 | 101 163 | 14 32 | 24 | 0.04 0.08 |
| KAOSHUNG, TAIWAN AVERAGE MAX | 956.7 963.1 | 134.7 185 | 7.4 8.3 | 0.01 0.02 | 0.25 0.3 | 2.79 3.21 | 45 57 | 9 13 | 7 | 0.01 0.02 | ST. CROIX, VIRGIN ISLANDS AVERAGE MAX | 982.3 993.2 | 210.2 302 | 16 17.2 | 0.04 0.06 | 0.09 0.1 | 2.36 2.9 | 111 157 | 27 72 | 19 | 0.04 0.06 |
| LOS ANGELES, CA AVERAGE MAX | 989.2 993.1 | 281.9 362 | 12.2 17.3 | 0.07 0.28 | 0.39 0.9 | 1.77 2.43 | 139 307 | 20 54 | 32 | 0.04 0.09 | TAMPA, FL AVERAGE MAX | 974.5 983.5 | 158.9 228 | 15.5 17.1 | 0.06 0.07 | 0.18 0.25 | 3.03 3.17 | 182 243 | 11 13 | 13 | 0.03 0.04 |



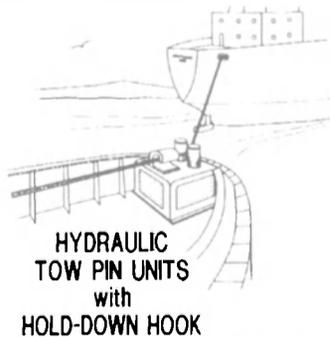
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created ExxonMobil has resisted the temptation to sell marine fuels online. The company says that buying online will mean buying the cheapest bunkers available, as price is the only factor under consideration. This is fine, if cheap fuel is what you want. But just what is cheap fuel? One definition says it is fuel that you buy at a low price. This, however, takes no notice of quality, which in turn can mean you end up paying dearly for your fuel after all. Bad quality fuel can lead to costly and time-consuming problems onboard ships. What the Internet quoted as the cheapest deal may cost thousands of dollars more. Online price quoting for fuels is in itself not a bad thing, but it does mean that the person using the net as a purchasing tool must be able to marry up the prices quoted with the quality of fuel they actually want - this requires knowledge. Critics of online bunker buying have asked where you can turn to when problems occur. Relying too heavily on the Internet means that you will have no recourse to a human being. Going online to e-mail a faceless, silent corporate entity will not bring the missing barge alongside. No doubt these fears are being overplayed, but it does set the mind thinking. Again, a sound knowledge of the industry will help locate the right person to solve the problem.

Technology has always served to make life both easier and more difficult. Computers are a good example. Modern life would be unimaginable without them. Yet they have created an entirely new set of problems for humans to wrap their heads around. Those who have used new technology to their advantage have always been the ones with the knowledge to do so. So it is with the Internet and bunkering. Those who can harness new online technology to make the most of their knowledge of the marine fuels industry will flourish. For evidence of this, you need only look at how ship operators are succeeding, or otherwise, in today's high-price bunker market.

Maritime Reporter/Engineering News

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Robertson Marine Systems, 3000 Kingman St., Suite 207, Metairie, LA 70006

Scientific Marine Services, Inc., 101 State Pl., Suite F, Escondido, CA 92029

Stork Kwant, P.O. Box 23, 8600 AA Sneek, Netherlands

Kobelt Mfg Co., Ltd., 8238-129 St, Surrey, B.C. V3W0A6

Stork-Kwant BV, P.O.B. 23, 8600 AA Sneek, Netherlands

Prime Mover Controls, 3600 Gilmore Way, Burnaby V5G 4R8 Canada

Raytheon Marine Co., 676 Island Pond Rd., Manchester, NH 03109

Stork Kwant, P.O. Box 23, 8600 AA Sneek, Netherlands

Kobelt Mfg Co., Ltd., 8238-129 St, Surrey, B.C. V3W0A6

Stork-Kwant BV, P.O.B. 23, 8600 AA Sneek, Netherlands

Prime Mover Controls, 3600 Gilmore Way, Burnaby V5G 4R8 Canada

Raytheon Marine Co., 676 Island Pond Rd., Manchester, NH 03109

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Stork-Kwant BV, P.O.B. 23, 8600 AA Sneek, Netherlands

Prime Mover Controls, 3600 Gilmore Way, Burnaby V5G 4R8 Canada

Raytheon Marine Co., 676 Island Pond Rd., Manchester, NH 03109

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Stork-Kwant BV, P.O.B. 23, 8600 AA Sneek, Netherlands

Prime Mover Controls, 3600 Gilmore Way, Burnaby V5G 4R8 Canada

Raytheon Marine Co., 676 Island Pond Rd., Manchester, NH 03109

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Stork-Kwant BV, P.O.B. 23, 8600 AA Sneek, Netherlands

Prime Mover Controls, 3600 Gilmore Way, Burnaby V5G 4R8 Canada

Metairie, LA 70006

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Stork-Kwant BV, P.O.B. 23, 8600 AA Sneek, Netherlands

Prime Mover Controls, 3600 Gilmore Way, Burnaby V5G 4R8 Canada

Raytheon Marine Co., 676 Island Pond Rd., Manchester, NH 03109

Stork Kwant, P.O. Box 23, 8600 AA Sneek, Netherlands

Kobelt Mfg Co., Ltd., 8238-129 St, Surrey, B.C. V3W0A6

Stork-Kwant BV, P.O.B. 23, 8600 AA Sneek, Netherlands

Prime Mover Controls, 3600 Gilmore Way, Burnaby V5G 4R8 Canada

Raytheon Marine Co., 676 Island Pond Rd., Manchester, NH 03109

DBC, 12351 Bridgeport Rd., Richmond, BC Canada

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

EXHAUST GAS CLEANER
Gyro Chemical, P.O. Box 853, Deer Park, TX 77536-0853

EXPANSION JOINTS
Silex Inc., 7850 Tranmere Dr., Mississauga, Ontario L5S1L9
Applegate Industrial, 1440 Government Street, Baton Rouge, LA 70802

FAIRING COMPOUND
Philadelphia Resins, P.O. B. 309, Montgomeryville, PA 18936

FANS - VENTILATORS - BLOWERS
Dry Air Technologies 313 N. Oak St, Burlington, Wa 98233
Jon M. Liss Associates, Inc., 411 Borel Ave., San Mateo, CA 94402

FASTENERS
Jamestown Distributors, P.O. Box 348, Jamestown, RI 02835
Superbolt, P.O.B. 683, Carnegie, PA 15106

FENDERING SYSTEMS/BUOYS - Dock & Vessel
Plastic Pilings Inc., 1485 South Willow Ave., Rialto, CA 92376
Kahlenberg Bros. Co., P.O. Box 358, Two Rivers, WI 54241
Duramax Marine, 16025 Johnson St., P.O. Box 67, Middlefield, OH 44062-0067
Viking Fender Co., 1160 State St., Perth Amboy, NJ 08861
Ultra Poly, Inc., 2926 South Steele St., Tacoma, WA 98409
Urethane Products Corp., 17007 South Broadway, Gardena, CA 90248
Promar, 115 Industrial Blvd., Keameysville, W. VA 25430
Schuyler Rubber Co., 16901 Wooded Rd., Woodinville, WA 98072

FILTERS/FILTER SYSTEMS
Boll-Filter Corp., 15 Int'l Dr. E. Granby, CT 06026
Luber-Finer, Inc., 200 South 4th St., Albion, FL 62806-1313

FIN STABILIZERS
Blohm & Voss Industries GmbH P.O. B. 112289, D-2042 Hamburg 1, GERMANY
U.S.A. Repts: Simplex-Turmar Inc., P.O. B. 675, Tonawanda, NY 14151

FINANCING
Summit Bank, 65 Madison Ave., Morristown Ave., NJ 07960

FIRE & SAFETY PRODUCTS
Brookdale International, 1-8755 Ash St., Vancouver BC, V6P6T3
Fr.Fassmer & Co. D-27804 Beme/Motzen, Germany, IndustriestraBe2
Nautical Safety Products, P.O. Box 590462, Houston, TX 77259
IMSSCO, 2040 Harbor Island Dr., Suite 201A, San Diego, CA.92101
Insulations, Inc., Rt. 5, 12360 Leisure Road, Baton Rouge, LA 70807
Ginnell Fire Protection Systems, 835 Sharon Drive, Westlake, OH 44145
NoFire Technologies, 21 Industrial Ave., Upper Saddle River, NJ 07458
Panel Specialists, Inc./Thermax, 3115 Range Rd., Temple, TX 76501

FLANGES
Jesse Engineering, 5225 7th St. E. Tacoma, WA 98424

FLUID HANDLING EQUIPMENT
Graco, Inc., P.O. Box 1441, Minneapolis, MN 55441

FRESH WATER GENERATOR
Sasakura Engineering, 7-32 Takeshima, 4-chome, Nishiyodogawa, KY, Osaka555, Japan

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

FUEL DECONTAMINATION
Algae X Int'l, PO Box 4011, Ft. Myers Beach, FL 33932
Fuel Dynamics, 707 Mullet Dr. #110, Cape Canaveral, FL 32920

GALLEY EQUIPMENT
Cospolich Refrigerator Co., 949 Industry Rd., Kenner LA 70062
Dutchess Baker's Machinery Co., 1101 John Ave, Superior WI 54880
Jamestown Metal Marine Sales, Inc., 4710 Northwest Second Ave, Boca Raton, FL 33431
Lang Manufacturing, 6500 Merrill Creek Pkwy, Everett, WA 98203
Manne Accommodations, Inc., 3830 Williamsburg Park Blvd., Building 7, Jacksonville FL 32257
Richard Galley Supply, PO Drawer 4035, Houma, LA 70361

GANGWAYS, LADDERS
Nautical Safety Products, P.O. Box 590462, Houston, TX 77259-0462
Schoellhorn-Albrecht, 575-105 Rudder Rd., St. Louis, MO 63026
SlipNot Safety Flooring, 2545 Beaufault St., Detroit, MI 48207
Wooster Products Inc., 1000 Spruce St., P.O. Box 896, Wooster, OH 44691

GASKETS/CLEATS
Harbor Industries, Inc., 9471 Baymeadows Rd. Ste 307 Jacksonville, FL 32256

GEARS & GEAR REPAIR
Goltens - New York Corp., 160 Van Brunt St., Brooklyn, NY 11231
Haley Marine Gears International, Inc., 2600 N Concord Belle Chasse, LA 70037
Nico Marine Specialties, 39 Louisiana St., West Wago, LA 70094
The Falk Corp., PO Box 492, Milwaukee WI 53201-0492
Marine Gears, P.O. Box 689, Greenville, MI 38702
Centofanti Marine Systems, Inc., P.O. Box 660, West Elizabeth, PA 15089-0660
Cincinnati Gear Co., 5657 Wooster Pike, Cincinnati, OH 45227

GENERATOR
Baylor Co., 500 Industrial Blvd., Sugarland, TX 77478
Insulinde Recycling B.V., Deccaweg 3, 1042 At Amsterdam, NETHERLANDS

GMDS
International Communications, 813 Diligence Dr. Ste 120, Newport News, Va. 32606
Furuno USA, Inc., 271 Harbor Way, S. San Francisco, CA 94080
Radio-Holland USA, 8943 Gulf Freeway, Houston, TX 77017

HATCHES AND DOORS
Juniper Int'l., 72-15 Metropolitan Ave., Middle Village, NY 11379
Railway Specialties Corp., 2979 State Rd., Bristol, PA 19007
Baier Hatch Co., 16901 Wood-Red Rd., Woodinville, WA 98072

HEAT EXCHANGERS
Alfa-Laval Separation Inc., 955 Meams Rd., Warminster, PA 18974
Computube (Britannia Heat Transfer) Ltd., 15-20 Coleshill Industrial Estate, Station Road, Coleshill, Birmingham B46 1JP UK
Crane Heatex, 17 Grandview Ave., West Orange, NJ 07052
Trantler, Inc., P.O. Box 2289, Wichita Falls, TX 76307

HEAT TRANSFER FLUID
Paratherm Corp., 1050 Colwell Rd., Conshochecken, PA 19428

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

HOIST RINGS
Jergens, Inc. 15700 S. Waterloo Rd., Cleveland OH 44110

HORNS/WHISTLES
Airchime Mfg. Co. Ltd., 5478 267th Street, Gloucester Industrial Estate, Langley, B.C. Canada V4W 3S8
Kahlenberg Bros Co., P.O. Box 358, Two Rivers, WI 54241
Kockum Sonics, Inc., 933 Industry Rd., Ste105, Kenner, LA 70062

HYDRAULICS
Cunningham Marine/Hydraulics Co, Inc., 201 Harrison Stret, Hoboken NJ 07030
Dayton T. Brown, 555 Church St., Bohemia, NY 11716
Engine Monitor, Inc., 179 Hickory Ave. Harahan, LA 70123
Hamilton Jet, P.O. Box 709, Christchurch, NEW ZEALAND
Offshore Inland, Inc 3521 Brookdale Drive, Mobile, AL 36618
Ultra Hydraulics Limited, Cheltenham Road East, Gloucester, GL2 9QN, ENGLAND
Demaree Infatables Boats, 410 Oak St., Friendsville, MD 21531
Ocean Technical Services Inc., 1140 Peters Rd., Harvey, LA

70058-1705

HYDRAULIC TRAINING
Consolidated Fluid Power, 155 Wright Ave., Dartmouth, N.S. Canada B4C 3M1

INCINERATORS
Therm-Tec Inc., PO Box 1105, Tualatin, OR 97062

INFLATABLES
Ocean Technical Services Inc., 1140 Peters Rd., Harvey, LA 70058-1705
Zodiac of North America, P.O. Box 400, Thompson Creek Road, Stevensville, Sparks MD 21152

INSULATION
Blohm & Voss Light Insulation, Bartels & Laders GmbH, Norderebstrasse 15, 20457 Hamburg GERMANY
Panel Specialists, Inc./Thermax, 3115 Range Rd., Temple, TX 76501
Insulations, Inc., 1101 Edwards Ave., Harahan, LA 70123
Mascoat Products, 3500 E. T.C. Jester, Suite N, Houston, TX77018
Pacor, Inc., P.O. Box 107, Westville, NJ 08093x
Superior Energies Inc., P.O. Drawer 386, Groves TX 77619

INTEGRATED MONITORING SYSTEMS
Datastar, Unit 100, 18 Gostick Place, N. Vancouver, BC Canada

INTERIORS
Bauer Interiors, 733 Dante St., New Orleans, LA 70118
Custom Ship Interiors, Inc., P.O. Box 882, Solomons MD 20688
Hopeman Brothers, P.O. Box 820, 435 Essex Ave., Waynesboro, VA 22980
Hopeman Brothers, 1 E. Broward Blvd., Ft. Lauderdale, FL 33301
Hopeman Brothers, Inc., Rt. 5, 12360 Leisure Rd, Baton Rouge, LA 70807
Jamestown Metal Marine Sales, Inc., 4710 NW Second Ave, Boca Raton, FL 33431
Manne Accommodations, Inc., 3830 Williamsburg Park Blvd., Building 7, Jacksonville FL 32257
Maritime Services Corp., 3457 Guignard Drne, Hood River, OR 97031

ISOLATORS
Lo-Rez Vibration Control, Ltd., 186 West 8th Ave., Vancouver B.C. V5Y 1N2

JET BOWTHRUSTERS
Thrustmaster of Texas, P.O. Box 840189, Houston, TX 77084-0189

JOINER - Watertight Door—Paneling—Ceiling System—Decking
All Alpha Int'l., Inc. P.O. Box 498985, Cincinnati, OH 45249
Branton Ind., 1101 Edwards Ave., Jefferson, LA 70181
Custom Ship Interiors, Inc., P.O. Box 882, Solomons MD 20688
Hopeman Brothers, Inc., P.O. Box 820, Waynesboro, VA 22980
Insulations, Inc., 1101 Edwards Ave., Harahan, LA 70123
Manne Accommodations, Inc., 3830 Williamsburg Park Blvd., Building 7, Jacksonville FL 32257
Maritime Services Corp., 3457 Guignard Drne, Hood River, OR 97031
Panel Specialists, Inc./Thermax, 3115 Range Rd., Temple, TX 76501
Walz & Krenzer, 91 Willenbrock Rd., Unit B4, Oxford CT 06478

KEEL COOLERS
R.W. Fernstrum & Co., 1716 Eleventh Ave., Menominee, MI 49858
Kahlenberg Bros. Co., P.O. Box 358, Two Rivers, WI 54241
The Water Machine Co., Inc., 84-98 Cambridge Avenue, Jersey City, NJ 07307

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

LAUNDRY EQUIPMENT
Richard Galley Supply, PO Drawer 4035, Houma, LA 70361

LIFEBOATS/RAFTS
Amencan Eagle Mfg., Inc., 780 Pearle Jensen Way, LaConner, WA 98257
DBC Manne Safety Systems, 12351 Bndgeport Rd., Richmond, B.C. CANADA V6V1J4
Fr.Fassmer & Co.D-27804 Beme/Motzen, Germany, IndustriestraBe2
Norsale AS, P.O. Box 115, N-4818 Faervik, Norway
Edgewater Machine & Fabricators, P.O. Box 358, Edgewater, FL 32132-0358
Viking Life Saving Equipment, 1625 N. Miami Ave., Miami, FL 33136
Willard Marine Co., Inc., 1250 N. Grove St., Anaheim, CA 92806
Zodiac of North America, P.O. Box 400, Stevensville, MD 21666

LIFEBOATS REPAIR
Nautical Safety Products, P.O. Box 590462, Houston, TX 77259
Willem Pot, P.O.B. 29102, 3001 GC Rotterdam

LIFESAVING EQUIPMENT
MGI International, 119-225 West 1st St., North Vancouver, B.C. CANADA
Stearns Manufacturing, P.O. Box 1498, St. Cloud, MN 56302
Viking Life Saving Equipment, 1625 N. Miami Ave., Miami, FL 33136
Zodiac of North America, PO Box 400, Thompson Creek Rd., Stevensville, Sparks, MD 21152

LIFT EQUIPMENT
JLG Industries, Inc., JLG Drne, McConnellsburg, PA 17233-9533

LIFT EQUIPMENT TESTING
Water Weights Inc., 5139 Brooks St., Suite E, Montclair, CA 91763

LIGHTING SYSTEMS / EQUIPMENT
ACR Electronics, Inc., 5757 Ravenswood Rd., Ft. Lauderdale, FL 33310-5247
Archway Manne, 4501 Swan Ave., St. Louis, MO 63110
Goltens Marine, 160 Van Brunt St., Brooklyn, NY 11231
Kockum Sonics, Inc., 933 Industry Rd., Ste105, Kenner, LA 70062
Pauluhn Electric Mfg. Co., Inc. P.O. Box 53, Pearland, TX 77588
Francis Searchlights/Slam Supply Co., 4415 6th N.W., Seattle, WA 98107

LIQUID OVERFILL PROTECTION SYSTEMS
King Engineering Corp., P.O. Box 1228, Ann Arbor, MI 48106

LOGISTICS
VL Logistics Consultants, Inc., 3420 Bienville Blvd., Ocean Springs, MS 39564

MACHINERY MAINTENANCE, REPAIR, OVERHAUL, AND TESTING
Goltens - New York Corp., 160 Van Brunt St., Brooklyn, NY 11231
Mackay Communications, 2721 Discovery Dr., Raleigh, N.C. 27604-1851
Maritime Power 200 Henderson St., Jersey City, NJ 07302

MANAGEMENT SYSTEMS & SERVICE
Hornblower Manne, Pier 3 Fenboat Santa Rosa, San Francisco, CA 94111
PCS Manne, 174 Colonnade Road S., Nepean, Ontario K2E715

MARINE ACCOMMODATIONS
Manne Accommodations, Inc., 3830 Williamsburg Park Blvd., Building 7, Jacksonville FL 32257

MARINE BUILDING SUPPLIES
King Wholesale Supply, Co., Inc., P.O. Box 4002, New Orleans, LA 70178-4002

MARINE CEILING
Hydro-Aluminum, Vik Verk, N-5880 VIK | SOGN, Norway
Insulations, Inc., Rt. 5, 12360 Leisure Road, Baton Rouge, LA 70807
Panel Specialists, Inc., 3115 Range Rd., Temple, TX 76501

MARINE CONSULTANTS
PCS Marine, 174 Colonnade Road S., Nepean, Ontario K2E715
Hornblower Marine, Pier 3 Ferryboat Santa Rosa, San Francisco, CA 94111
Boland Industrial & Consulting Services, P.O.B. 91360, Mobile, AL 36691
Schoellhorn-Albrecht, 575-105 Rudder Rd., St. Louis, MO 63026

MARINE DECKING & FLOORING
Hopeman Brothers, Inc., P.O. Box 820, Waynesboro, VA 22980
E.H. O'Neil, 1405 Chippendale Rd., Lutherville, MD 21093
Insulations, Inc., Rt. 5, 12360 Leisure Road, Baton Rouge, LA 70807

Polyspec Corp., P.O. Box 1600, Sapulpa, OK 74067
Flexible Decking, 2708 N. Australian Ave. Ste. 9, West Palm Beach, FL 33407
Lonseal Inc., 928 E. 238th St., Carson, CA 90742
SlipNot Safety Flooring, 2545 Beaufault St., Detroit, MI 48207

MARINE DRILLING & BLASTING
Marine Drilling & Blasting, Inc., P.O. Box 18098, Beverly Hills, CA 90209-4098

MARINE ELECTRONICS
Frank L. Beier Radio, 2001 Ridgelake Dr., Metairie, LA 70001
Autronica USA, 234 Industrial Pkwy, Northvale, NJ 07647
Kockum Sonics, Inc., 933 Industry Rd., Ste105, Kenner, LA 70062
Saab Marine Electronics AB, Box 13045, 402 51 Goteborg, SWEDEN
Manne Electric & Process Control, 3931 Leary Way NW, Seattle, WA 98107
ACR Electronics, Inc., 5757 Ravenswood Rd., P.O. Box 5247, Ft. Lauderdale, FL 33310-5247
Raytheon Marine Co., 676 Island Pond Rd., Manchester, NH 03109
Scandinavian Micro Systems, P.O. Box 155, N-1411, Kolboten, NORWAY
Seacoast Electronics, 240 Talleyrand Ave., Jacksonville, FL 32202-1228
Scientific Marine Services, Inc., 101 State Pl., Suite F, Escondido, CA 92029
Marine Electronics Solutions, Inc., 1522 Crabapple Cove, Jacksonville, FL 32225

MARINE ENGINEERS
DB Engineering, 1000 South Main St., Mansfield, Texas 76063

MARINE EQUIPMENT
Plastic Pilings Inc., 1485 South Willow Ave., Rialto, CA 92376
Waterman Supply, P.O. Box 596, Wilmingon, CA 90748
Maritime Power Corp., 200 Henderson Str., Jersey City, NJ 07302
Bohnet & Associates, 1150 Rule Rochelle, Sidell, VA 70458
Schoellhorn-Albrecht, 575-105 Rudder Rd., St. Louis, MO 63026
Scardana Americas Bkg, 502 Empire St., Montreal, Greenfield Park, J4V1V7, Canada
MacGregor, 20 Chapin Road, Unit 1012, NJ 07058
McElroy Machine, P.O. Box 4454, Biloxi, MS 39535-4454
Rasmussen Equipment Co., Inc., 8727 5th Ave. S., PO Box 81206, Seattle WA 98108
Superior Lidgerwood-Mundy, 1101 John Ave., Superior, WI 54880
Commercial & Manne Products, 3924 Forest Dr., #11, Columbia, SC 29204

MARINE FINANCING
Debis Financial Services, 201 Meml 7, Suite 70, Norwalk, CT 06856

MARINE INSTRUMENTATION
Autronica USA, 209 Industrial Pkwy, Northvale, NJ 07647

MARINE MEDICAL SUPPLIES
Fleet Medical Resources, P.O. Box 52048, New Orleans, LA 70152-2048

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

MARINE SERVICES & EQUIPMENT
Kyodo USA, E. 80, Rte. 4, The Atrium, Paramus, NJ 07644

MARINE SURPLUS SALES
Defense Reutilization & Marketing Service, 2163 Airways Blvd., Memphis, TN 38114

MARITIME TRAINING & SCHOOLS
Calhoun MEB A Engineering School, 27050 St. Michaels Road, Easton, MD 21601
GSI Marine, 4016 Strawberry Road, Suite B, Pasadena, TX 77504-3050
Mahne Safety Int'l., Manne Terminal Laguardia Airport, NY 11371

MECHANICAL PUMP SEALS
John Crane Manne, USA, 1536 Barclay Blvd, Bufallo Grove, IL 60089

METERS
Selco USA, 2508 Lakebrook Ct., Atlanta, GA 30360

MONITORS
Intercolor Corp., 2150 Boggs Rd., Deluth GA 30096
Barco Int'l, 2558 Mountain Industrial Blvd., Tucker, GA 30084

MONITORING SYSTEMS
Mackay Communications, 2721 Discovery Dr., Raleigh, N.C. 27616-1851
Datastar Marine Products Inc., Unit 100 18 Gostick Pl., N. Vancouver, Canada V7M3G3

MOORING LINES
Phyllystran, Inc., 151 Commerce Drive, Montgomeryville, PA 18936-9628

MOTOR PROTECTION EQUIPMENT
Manne Safe Electronics, 37 Staffern Dr., Concord, Ontario L4K CANADA

MOUNTING SYSTEMS
Lo-Rez Vibration Control, Ltd., 186 w 8th Ave., Vancouver B.C. Canada V5Y 1N2

NAVAL ARCHITECTS, MARINE ENGINEERS, SURVEYORS
Band, Lavis, & Associates, 900 Ritchie Hwy, Suite 203, Severna Park, MD 21146
Advanced Manne Enterprises, Inc., 1725 Jefferson Davis Hwy., Arlington, VA 22202
Bay Engineering, 253 N. First Ave., Sturgeon Bay, WI 54235
Donald L. Blount, 2550 Elsmere Ave., Sle. K, Norfolk, VA 23513
C. Baxter & Associates, P.O. Box 9006, Mobile, AL 36609
CDI Manne Co., 9550 Regency Square Blvd., Ste. 400, Jacksonville, FL 32225
Crane Consultants, 15301 First Ave S., Seattle WA 98148
C. R. Cushing, 18 Vesey St., New York, NY 10007
CT Marine, 56 Crooked Trail, Rowayton, CT 06853
Cunningham & Walker, 1762 Providence Hollow Lane, Jacksonville, FL 32223
DeJong & Lebet, Inc., 1734 Emerson Street, Jacksonville, FL 32207
Design Associates Inc., 14360 Chef Menteur Highway, New Orleans, LA 70129
Designers & Planners, 2120 Washington Blvd. Ste.200, Arlington, VA 22204
Fleet Technology, 311 Leggett Dr., Karata, Ontario, Canada K2K 1Z8
GHM Inc. (Ind. Measurement Consultants), P.O. Box 1836, Newport News, VA 23601
Gibbs & Cox, Inc., 50 West 23rd St., New York, NY 10010
John W. Gilbert & Assoc., Inc., 199 State St., Boston, MA 02109
The Glosten Assoc. Inc., 600 Mutual Life Bldg., 605 First Ave., Seattle, WA 98104
Guido Perla & Assoc., 720 3rd Ave., Ste. 1200, Seattle, WA 98104
JH Inc., 3412 Progress Dr., Bensalem, PA 19020
R.D. Jacobs & Associates, 11405 Main St., Roscoe, IL 61073
Kvaerner Masa Marine Inc., 201 Defense Highway, Suite 202, Annapolis, MD 21401
James S. Krogen, 799 Brickell Plaza Ste. 701, Miami, FL 33131
Rodney E. Lay & Associates, 13891 Atlantic Blvd., Jacksonville, FL 32225
MCA Engineers, Inc., 2960 Airway Ave., #A-103, Costa Mesa, CA 92626
Alan C. McClure Associates, Inc., 2600 South Gessner, Houston, TX 77063

McElroy Machine & Mfg Co., Inc., P.O. Box 4454, Biloxi, MS 39535-4454
John J. McMullen Associates, Inc., 4300 King St., Suite 400, Alexander, VA 22302
Fendall Marbury, P.O. Box 2321, Annapolis, MD 21401
Marine Design & Operations, Inc., 225 E. 1st Ave., Roselle, NJ 07203
Maritech, Seacraft, Bay Road, Newmarket, NH 03857
Maritime Design, 13000 Sawgrass Village Circle, Ponte Vedra Beach, FL 32082
R.J. Mellusi & Co., 71 Hudson St, New York, NY 10013
Nautical Designs, Inc. 2101 S. Andrews Ave, Suite 202, Ft Lauderdale FL 33316
Olsen Manne Surveyors Co., P.O. Box 283, Port Jefferson, NY 11777
M. Rosenblatt & Son, Inc., 2341 Jefferson Davis Hwy, Arlington VA 22202
Sargent & Herkes, 225 Baronne St., Suite 1405, New Orleans LA 70112
Scientific Marine Services, Inc., 101 State Pl., Suite F, Escondido, CA 92029
Sea School, 10812 Gandy Blvd. St. Petersburg, FL 33702
Seaworthy Systems Inc., P.O. Box 965, Essex, CT 06426
George G. Sharp, Inc., 100 Church St., New York, NY 10007
R.A. Steam, Inc., 253 N. 1st Ave., Sturgeon Bay, WI 54235
MSCI, Inc., 1452 Duke Street, Alexandria, VA 22304
A.K. Suda & Ass., 3004 19th St., Metairie, LA 70002-4989
TIMSCO, P.O. Box 91360, Mobile AL 36691
Sea Transport Corp., PO Box 1043, Southport Qld 4213 Australia
U.S. Ship Design, 705 S. E. 24 M St., Ft Lauderdale, FL 33316
Vibtech, Inc., Box 435, N. Kingston, RI 02852
Washburn Doughty, P.O. Box 296, E. Boothbay, ME 04544

NAVIGATION & COMMUNICATIONS EQUIPMENT
Byrne Rice & Turner, 1172 Camp St., New Orleans, LA 70130
C-Map/Commercial, 133 Falmouth Rd., Mashpee, MA 02649
C-Map, P.O. Box 212 4371 Egersund Norway
Coretec Inc., Prince Charles Bldg., 120 Torbay Rd., Suite E100, St. Johns, Newfoundland, Canada A1A 2G8
Electronic Marine Systems, 800 Ferndale Pl., Rahway, N.J. 07065
Furuno U.S.A., 271 Harbor Way, S. San Francisco, CA 94080
ICS Electronics Ltd., Unit V, Rudford Industrial Estate, Ford, Arundel, West Sussex, UK
Mackay Communications, 2721 Discovery Dr., Raleigh, N.C. 27616-1851
Negron Marine Consultants, 840 Bond Street, Elizabeth, NJ 07201
Radio-Holland USA, 8943 Gulf Freeway, Houston, TX 77017
Raytheon Marine Co., 676 Island Pond Rd., Manchester, NH 03109
Scandinavian Micro Systems P.O. Box 155, N-1411, Kolboten, NORWAY
Simrad, 19210 33rd Avenue Street, Lynwood, WA 98036
Simrad Robertson, 10801 Hamerly, Suite 100, Houston, TX 77043-1923
Standard Communications, P.O. Box 92151, Los Angeles, CA 90009
Trimble Navigation, 585 North Mary Avenue, P.O. Box 3642, Sunnyvale, CA 94086
Waterway Communications System, Inc. 453 E. Park Pl., Jeffersonville, IN 47130
Offshore Systems International, 5013 Pacific Hwy East, Fife, WA 98424
Offshore Systems International, 107-930 W. 1st St., N.Vancouver, BC Canada V7P3N4
Litton Marine Systems, 1070 Seminole Trail, Charlottesville, VA 22901-2591
Magellan Systems Corp., 960 Overland Crt., San Dimas, CA 91773-1742
Icom America, Inc., 2380 116th Ave. NE, Bellevue, WA 98004
KVH Industries, Inc., 110 Enterprise Center, Middleton, R.I. 02842-5268

NOISE & VIBRATION
Soundcoat, 1 Burt Dr., Deer Park, NY 11729
Noise Control Engineering, 799 Middlesex Turnpike, Bilerica, MA 01821

NOZZLES/NOZZLE SYSTEMS
Harrington Metals, 6720 124th Ave., Fennville, MI 49408
Custom Nozzle, P.O. Box 547, Pascagoula, MS 39568

OFFSHORE BUILDINGS
Pinnacle Building, 306 Caldwell Ave., Erath, LA 70533

OIL—Marine—Additives—TESTING
Mobil Oil Corporation, 3225 Gallows Road, Fairfax, VA 22037-0001
Castrol North America, 1500 Valley Rd., Wahne, NJ 07470

OIL TANK CLEANING
Brain Industries Australia, Pty. Ltd., 21 Bearing Rd., Seven Hills, NSW 2147 AUSTRALIA

OIL/WATER SEPARATORS
Alfa-Laval Separation, Inc., 955 Meams Rd., Warminster, PA 18974-0556
Alfa-Tec, Inc., 4027 21st Ave. West, Seattle, WA 98199
Blohm & Voss Industrie GmbH P.O. B. 100720, D-2000 Hamburg 1, GERMANY
Fast Systems, 3240 North Broadway, St. Louis, MO 63147
MMC International, 60 Inip Dr, Inwood NY 11096
Nelson Industries, Highway 51 West, Sloughton, WI 53589
RGF Environmental Group, 3875 Fiscal Court, W.Palm Beach, FL 33404

PARTS LOCATOR SERVICE
Inventory Locator Service, 3965 Mendenhall Road., Memphis, TN 38115

PIPE FITTINGS/CUTTINGS/CONNECTING/SYSTEMS
Jesse Engineering, 5225 7th St. East, Tacoma, WA 8424
Georg Fischer DISA Pipe Tools Div., 407 Hadley St., Holly, MI 48442
Lokring Corp., 396 Hatch Drive, Foster City, CA 94404
Victaulic Co., 4901 Kesslersville Rd., Easton, PA 18042
Blucher Josam, 2501 S. Front Street, Philadelphia, PA 19148

PNEUMATIC HOISTS
J.D. Neuhaus, 9 Loveton Circle, Sparks, MD 21152

POLLUTION CONTROL PRODUCTS
Enecon Corporation, 125 Baylis Rd., Melville, NY 11747-3800

PORT DEVELOPMENT
RTM Star Center, 2 W.Dixie Hwy., Dania, FL 33004

POWER SUPPLIES
Schaefer, Inc., 200 Butterfield Dr., Ashland, MA 01721

PROPELLERS—Repairs
Kahlenberg Bros, P.O. Box 358, Two Rivers, WI 54241
Byrne Rice & Turner, 1172 Camp St., New Orleans, LA 70130
Holland Ror Propellers, 2273 Batataria Blvd, New Orleans LA, 70072
Phoenix Manne Inc., 2361 Jefferson Davis Hwy Suite 140 Arlington, VA 22202
Rice Propeller, Av Rios Espinoza No. 88, Col. Benito Juarez, Mazatlan, Sin, Mexico 82180
Proper Pitch, P.O. Box 314, Seybiville, DE 19975

PROPULSION EQUIPMENT
—Bowthrusters, Diesel Engines, Gears, Propellers, Shafts, Turbines
Avondale Industnes, Harvey Quick Repair, P.O. Box 116,

Harvey, LA 70058
American Air Filter, P.O. Box 35690, Louisville, KY 40432
ABB Drives Inc., P.O. Box 372, Milwaukee, WI 53201-0372
ABB Industry Oy, P.O. Box 185, 00381 Helsinki, FINLAND
ABB TURBOCHARGER, INC., 1460 Livingston Avenue, N Brunswick, NJ 08902
Aquamaster-Rauma Ltd., Box 220, SF-26101, Rauma, FINLAND
Kamewa America Inc., 106 Park Place, Suite 200, Covington, LA 70433, USA
Kamewa AB, Box 1010, S-68129, Kristinehamn, Sweden
Kamewa Finland Oh, "Aquamaster", Box 220, FIN-26101 Rauma, Finland
Kawasaki Heavy Industries, Ltd., Tokyo Head Office, World Trade Center Bldg., 4-1 Hamamatsu-cho 2-chame, Minato-ku, Tokyo 105-6116 Japan
Brunvoll A/S, P.O. Box 370, N-6401, Molde, Norway
ZF Marine 3131 SW 42nd St., Ft. Lauderdale, FL 3312
Caterpillar, 100 NE Adams Street, Peoria, IL 61629-2320
Centa Corp., 8185 Cass Ave., Darien, IL 60561
The Falk Corp., PO Box 492, Milwaukee, WI 53201-0492
Fincantieri, Diesel Engines Div—GMT, Bagnoli della Rosandra 334, Trieste, ITALY
Jan Verhaar Omega Thrusters, P.O. Box 119, 2340 AC Oegstgeest, NETHERLANDS
GEC ALSTHOM Diesels Inc., 10801 Kempwood Dr. Ste 1, Houston, TX 77043-1412
Gollens Worldwide, 160 VanBrunt St., Brooklyn, NY 11231
Harbormaster Marine Inc., 31777 Industrial Rd., Livonia, MI 48150
Harrington Metal, 6720 124th Ave., Lennville, MI 49408
Kahlenberg Bros. Co., P.O. Box 358, Two Rivers, WI 54241
Kaplan and Association, 30088 Crest Forest, Farmington MI 48331
Krupp Mak, 7555 Danbro Crescent, Mississauga, Ontario, CANADA L5N 6P9
LIPS B.V., P.O. Box 6, 5150 BB Drunen, The Netherlands
Lohmann & Stolterfoht, P.O. Box 1860, D-58408 Witten, Germany
Lo-Rez Vibration Control, 186 West 8th Ave., Vancouver, BC CANADA, V5Y 1N2
Mapeco, Inc., 91 Willenbrock Rd., Unit B4, Oxford CT 06478
Markisches Werk, P.O. Box 1442, D-5884 Halver GERMANY
MAN B&W Diesel, 17 Slate St., New York, NY 10004
MAN B&W Diesel A/S, Ostervej 2, DK-4960 Holeyby, DENMARK
MAN B&W Diesel A/S, Alpha Diesel, Niels Juels Vej 15, DK-9900 FredenksHAVN, DENMARK
MAN B&W Diesel GmbH, Stadtbachstrasse 1, D-86153 Augsburg 1 GERMANY
Ornithruster Worldwide, 30555 Soton Ind. Pkwy., Cleveland, OH, 44139
Orion Corp., 1111 Cedar Creek Rd., Grafton, WI 53024
Oy Wartsila Ab, Vasa and Abo Divisions, P.O. Box 244, SF65100 Vasa, FINLAND
Propulsion Systems Inc., 601 N.E. 26 Cr., Pompano Beach, FL 33064
Karl Senner Inc., 25 W Third, Kenner LA 70062
Schottel-Werft, Manizer Strasse 99, D-56322 Spay/Rhein, GERMANY
Schottel Inc., 500 Industrial Blvd., Sugar Land, TX 77478
Siemens Electric Ltd., 1180 Courteneypark Rd., Mississauga, ONTARIO
Stewart & Stevenson, 1400 Destrehan, P.O. Box 8, Harvey LA 70059-0008
Thrustmaster of Texas, P.O. Box 840189-12227 IFM 529, Houston, TX 77284-0189
Ulslein Bergen Diesel A/S, P.O. Box 924, N-5002, Bergen, NORWAY
Ultra Hydraulics Limited, Cheltenham Road East, Gloucester, GL2 9QN, ENGLAND
Voith Hydro Marine Technology, P.O.B. 1125, D89509, Heidenheim, GERMANY
Marine Propulsion Inc., 1505 Corbin Ave., Hammond, LA 70403
The Cincinnati Gear Company, 5657 Wooster Pike, Cincinnati, OH 45227
Renold Hi-Tec, 512 W. Crescentville Rd., Cincinnati, OH 45246
U.S. Rep: Voith Schneider America Inc., 121 Susquehanna Ave., Great Neck, NY 11021
Schottel-Werft, Josef Becker GmbH & Co. KG, HRP, 432 Realty Dr., Dretna, LA 70056
PUMP—Repair—Drives
Alfa-Tec, Inc., 4027 21st Ave. West, Seattle, WA 98199
Scardana Americas Bkg., 502 Empire St., Greefield Park, J4V1V7 Canada
Advanced Environmental Systems, 2 Sutton Rd., Webster, MA 01570
Hamworthy Marine, Inc., 1129 Hospital Dr. Ste 3C, Stockbridge, GA 30281
Marine Electric & Process Control, 3931 Leary Way NW, Seattle, WA 98102
Kraissl Co., 299 Williams Avenue, Hackensack, NJ 07061
Vita Motivator, 566 Parker St., Newark, NJ 07104
PURIFIERS
American Ship Repair, 1011 38th St., Brooklyn, NY 11219
RADARS —ARPA
Furuno USA, Inc., 271 Harbor Way, S. San Francisco, CA 94080
Radio-Holland USA, 8943 Gulf Freeway, Houston, TX 77017
REFER COMPRESSORS
CMP Corporation, P.O. Box 15199, Oklahoma City, OK 73155
REFRIGERATION COMPRESSOR REPLACEMENT PARTS
CMP Corporation, P.O. Box 15199, Oklahoma City, OK 73155
Bailey Refrigeration, 2323 Randolph Ave., Avenel, NJ 07001
REGULATORY DATABASES
Solutions Software, 1825 Turtlehill Rd., Enterprise, FL 32725
RH PROPULSION
Boli Filter, 15 International Dr., East Granby, Ct., 06206
Gollens, 160 Van Brunt St., Brooklyn, NY 11231
RIGID INFLATABLE BOATS
Willard Marine, Inc., 1250 N. Grove St., Anaheim, CA 92806
Zodiac of N. America Thompson Creek, P.O. Box 400, Stevensville, MD 21666
ROPE—Manila—Nylon—Hawsers—Fibers
Cortland Cable Co., 44 River St.(PSR), Cortland, NY 13045-0330
Phillystran, Inc., 151 Commerce Drive, Montgomeryville, PA 18936-9628
Puget Sound Rope, 1012 Second St., Anacortes, WA 98221
Pelican Rope Works, 4001 W.Carriage Way,Santa Ana,CA 92704
Rasmussen Equipment Co., P.O. Box 81206, Seattle, WA 98108
ROTATING EQUIPMENT
FCS, Inc., 22 Main Street, Centerbrook, CT 06409
ROVS/LIGHTS/CAMERAS
Deep Sea Systems Int'l, P.O. Box 622, Falmouth, MA 02541
RUBBER FLOORING
Tuflex, Inc., 4521 West Crest Ave., Tampa, FL 33614
RUDDER BEARINGS & BUSHES
Duramax Marine, 16025 Johnson St., P.O. Box 67, Middlefield, OH 44062-0067
Thordon Bearings, Inc., 3225 Mainway, Burlington, Ontario Canada L7M 1A6
SAFETY PRODUCTS
Brookdale International, 1-8755 Ash St., Vancouver BC, V6P6T3
MGI International, Ste. 113-980 West 1st Street

N.Vancouver, BC CANADA V2P 3n4
Viking Life Saving, 1625 N. Miami Ave., Miami, FL 33136
New England Marine & Industrial, 200 Spaulding Turnpike, Portsmouth, NH 03801
Nautical Safety Products, P.O. Box 590462, Houston, TX 77259
Norwegian Maritime Equip., AS, Box 244, NO-5460 Husnes, Norway
SANITATION DEVICE—Pollution Control
Alfa-Tec, Inc., 4027 21st Ave. West, Seattle, WA 98199
Byrne, Rice & Turner, Inc., 1172 Camp Street, New Orleans, LA 70130
Exceltech International Corp., 1110 Industrial Blvd., Sugarland, TX 77478
Envirovac Inc., 1260 Turret Dr., Rockford, IL 61111
Fast Systems, 3240 North Broadway, St. Louis, MO 63147
AlfaTec, Inc., 4027 21st Ave. West, Seattle, WA 98199
Microphor, 452 E. Hill Rd., Willis, CA 95490
Owens Mfg., Hwy 92, Youngsville, LA 70592
SATCOM
Motorola, 1500 Dundee Dr., Arlington Heights, IL
SATELLITE COMMUNICATIONS
Boatrac, Inc., 10675 Sorrento Valley Rd., Ste. 200, San Diego, CA 92121-1609
Furuno USA, Inc., 271 Harbor Way, S. San Francisco, CA 94080
KVH Industries, Inc., 110 Enterprise Center, Middleton, R.I. 02842-5268
ICG Satellite Communications, 8400 NW 52nd St., Suite 110, Miami, FL 33166
Mackay Communications, 2721 Discovery Dr., Raleigh, N.C. 27604-1851
Iridium N.A., 8449 S.River Pkwy, Tempe, AZ 85284
Norwegian Telecom, Postboks 6701 St. Olavs Plass, N 0130, Oslo, Norway
PTT Telecom, Station 12, P.O. Box 30150-2500 JD The Hague, NETHERLANDS
Radio-Holland USA, 8943 Gulf Freeway, Houston, TX 77017
Raytheon Marine Co., 676 Island Pond Rd., Manchester, NH 03109
Singapore Telecom, 15 Hill Street, Telephone House, 2nd Storey, Singapore 0617
Telstra Mobile Satellite & Radio Services, 79 St Hilliers Rd., Auburn NSW 2144, AUSTRALIA
Magellan Systems, 906 Overland Court, San Dimas, CA 91773
Sratos, 150 Melcalfe St., Suite 1900, Ottawa, Ontario K2P 1P1 Canada
Comsat Maritime Services, 6560 Rock Spring Drive, Bethesda, MD 20817-1146
Stalton 12, P.O. Box 30150, NL-2500 JD Den Haag, Netherlands
SCARIFIERS
Desmond-Stephan, P.O.B. 30, Urbana, OH 43078
SEALS
John Crane Marine, USA, 1536 Barclay Blvd, Buffalo Grove, IL 60089
Blohm & Voss Industries GmbH,P.O. B. 112289, D-2042 Hamburg 1, GERMANY
U.S.A. Repts: Simplex-Turmar Inc., P.O. B. 675, Tonawanda, NY 14151
Duramax Marine, 16025 Johnson St., Middlefield, OH 44062
Circle Seal Controls Inc., 2301 Wardlow Circle, P.O. Box 3300 Corona, CA
Orkot Inc., 2535 Prairie Rd., Unit D, Eugene, OR 97402
Orkot Composites Ltd., Bradmarsh Business Park, Rotherham S60 1BX
SEATING
H.O. Bostrom Co. Inc., Progues Ave., Waukesha, WI
SEPARATORS- LUBE OIL/FUEL OIL
SOTECO, 276-16010 Ceranesi Genova, Italy
American Ship Repair, 1011 38th St., Brooklyn, NY 11219
Westfalia Separator, 100 Fairway CT., Northvale, NJ 07647
SHAFT HORSEPOWER MEASURING SYSTEM
FCS, Inc., 22 Main Street, Centerbrook, CT 06409
Instruments Computers & Controls, 78 Londonderry Tpke, Suite E 12 Hookset, NH 03106
SHAFT SEALS
Duramax Marine, 16025 Johnson St., Middlefield, OH 44062
Blohm & Voss Industries GmbH,P.O. B. 112289, D-2042 Hamburg 1, GERMANY
U.S.A. Repts: Simplex-Turmar Inc., P.O. B. 675, Tonawanda, NY 14151
SHAFTS
American Vulkan, 2525 Dundee Rd., Winter Haven, FL 33884
SHIP LIFTS
Synchrolift Inc., Two Datan Center, 9130 S. Dadeland Blvd., Miami, FL 33156-7850
SHIPBOARD MANAGEMENT SYSTEMS
Spar Associates, 927 West St., Annapolis, MD 21401
SHIPBOARD TESTING
Dayton T. Brown, 555 Church St., Bohemia, NY 11716
SHIPBUILDING—Repairs, Maintenance, Drydocking
Amfels, Inc., P.O. Box 3107, Brownsville, TX 78523
Astilleros Espanoles, S.A. Ochandiano, 14-16 28023 El Plantio SPAIN
Atlantic Marine, Inc., P.O. Box 3202, Mobile AL 36652
Atlantic Marine, Inc., 8500 Hecksher Dr., Jacksonville, FL 32226
Avondale Industries Inc., P.O. Box 50280, New Orleans LA 70150
Bender Shipbuilding & Repair, P.O. Box 42, Mobile AL 36601
Bisso Marine Co., P.O.Box 4113, New Orleans, LA 70178
Blount Marine, 461 Water St., Warren, R.I. 02885
Bollinger Lockport & Larose, P.O. Box 250, Lockport, LA 70374
Chris-Marine AB, P.O. Box 9025, S-2000 39, Malmo, SWEDEN
Conrad Industries, 1501 Front Street, P.O. Box 790, Morgan City, LA 70381
Eastern Shipbuilding Group, 2200 Nelson Street, Panama City, FL 32402
Fincantieri SpA Cantieri Navali Italiani, Via Cipro 11, 16129 Genoa ITALY
Gollens - New York Corp., 160 Van Brunt St., Brooklyn, NY 11231
Gulf Coast Fabrication, Inc., P.O. Box 539, Lakeshore, MS 39558
HDW, Kiel, Germany,USA Rep.: Roland Marine Inc., 90 Broad St., NY, NY 10004
Halter Marine Group, Inc., 13085 Industrial Seaway Rd, Gulfport, MS 39053
Hitachi Zosen, Hitachi Shipbuilding & Engineering Co., 1-1-1 Hitatsubashi Chiyoda-Ku Tokyo 100 Japan
In-Place Machining Co., Inc. 929 North Buffum Street, Milwaukee, WI 53212-3793
Jacksonville Shipyards, 750 E. Bay St., Jacksonville, FL 32202
Jeffboat, Inc., P.O. Box 610, Jeffersonville IN 47130
Kawasaki Heavy Industries, Ltd., Tokyo Head Office, World Trade Center Bldg., 4-1 Hamamatsu-cho 2-chame, Minato-ku, Tokyo 105-6116 Japan
Leavac Shipyards, P.O.Box 1190, HWY 90 East, Jennings, LA 70546
Lindenau GmbH, Skagerakuler 10, Postfach 9093 D-2300 Kiel, Friedrichsort GERMANY
Mariso USA, Inc., 100 Davidson Ave., Sommerset, NJ 08873
Motor-Service AB, Box 2115, 144 04 Ronninge, SWEDEN
Newport News, 4101 Washington Ave., Newport News, VA 23607
Peterson Builders, Inc., 101 Pennsylvania Ave., Sturgeon Bay, WI 54235-0650
Tronmas Marine, 37 Branford Street, Patchogue, NY 11772
Samsung Heavy Ind., 25, 1-k, Bongrae-dong, Chung-ku, Seoul, Korea

SeaFab, P.O. Box 1651, 4111 Cedar St. Pascagoula, MS 39567
Service Marine Industries, P.O. Box 3606, Morgan City LA 70381
Southwest Marine, Foot of Sampson Street, P.O. Box 13008, San Diego, CA 92170
Skipperliner Shipyards, 621 Park Plaza Dr, Dept 21, LaCrosse WI 54601
Steiner Shipyard, Inc., P.O. Box 742, Bayou la Batre, AL 36509
Sundial Marine Construction, 5605 NE Sundial Rd., Troutdale, OR 97060
Swath Ocean, 979 G Street, Chula Vista, CA 92011
Talleres Navales del Golfo, Isote San Juan de Ulva S/N, 91800 Veracruz, Ver. Mexico
Washburn Doughty, P.O. Box 296, E. Boothbay, ME 04544
Westport Shipyard, P.O. Box 308, Westport, WA 98595
Willard Marine, inc., 1250 N. Grove St., Anaheim, CA 92806
Zodiac of North America Inc., Thompson Creek Rd., P.O. Box 400, Stevensville, MD21666
Friede Goldman, 525 E. Capitol Street, Suite 402, Jackson, MS 39201
Tampa Bay Shipbuilding, 1130 McClosky Blvd., Tampa, FL 33605
Ocean Technical Services Inc., 1140 Peters Rd., Harvey, LA 70058-1705
FirstWave/Newpark Shipbuilding, 2102 Broadway, Houston TX 77102
Cascade General Inc., 5555 N. Channel Ave., Bld. 71, Portland, OR 97217
Ocean Technical Services, 1140 Peters Rd., Harvey, LA 70058
SHIPYARD / CABLES
American Shipyard Corp., One Washington St., POB 570, Newport, R.I. 02840-0343
Anixter Wire & Cable, 2617 Edenboro Ave., Metairie, LA 70002
Atlantic Marine - 8500 Hecksher Dr., Jacksonville, FL 32226
Damen Shipyards, POBox 1, 4200AA Gorinchem/Holland
SHEAVES
Skookum, P.O. Box 280, Hubbard, OR 97032
SHOWERS AND FAUCETS
Scanmix Corp., 230 Bartlett St., Lewiston, ME 04240
SHRINKWRAP CONTAINMENT
Hipp Plastic Wrap, 4070 Kearny Mesa Rd., San Diego, CA 92111
SILENCERS
Silex Inc., 7850 Trannere Dr., Mississauga, Ontario L5S1L9
Applegate Industrial, 1440 Government Street, Baton Rouge, LA 70802
Beard Industries Inc., P.O. Box 31115, Shreveport LA 71130
Nelson Division, Exhaust & Filtration Systems, Hwy. 51 West, P.O. Box 428, Sloughon, WI 53589
Houston Marine Training Services, 5728 Jefferson Hwy, New Orleans, LA 70123
Applied High Technology, 4 Place Dee Commerce
Brossard, Suite 201 Quebec Canada J4W-3B3
SIMULATION TRAINING
Ship Analytics, Inc., Rte. 2 & 184, N. Stonington, CT 06358
Marine Safety, Marine Air Terminal, Laguardia Airport, NY 11371
SKILLED LABORERS
Ameriforce, 650 E. 27th St., Jacksonville, FL 32206
SOFTWARE
Autoship Systems, Suite 312-611 Alexander St. Vancouver, BC V6A1E1
SOUND CONTROL
Soundcoat, One Burt Dr., Deer Park, NY 11729
STAIRMASTER SAFETY TREADS
SlipNot Safety Flooring, 2545 Beaufait St., Detroit, MI 48207
Wooster Products, Inc., 1000 Spure Street, Wooster, OH 44691
STEERING GEAR/STEERING SYSTEMS
A. Van der Velden B.V. Rotterdam, P.O.B. 2061, 2930 AB Krimpen aid Lek, NETHERLANDS
Cunningham Marine Hydraulics Co., 201 Harrison St., Hoboken, NJ 07030
Engine Monitor, Inc., 179 Hickory Ave., Harahan, LA 70123
Summer Equipment, 24 West 4th Ave., Vancouver, B.C. V5Y1G3
Kobalt Manufacturing Co., Ltd., 8238-129 street, Surrey, B.C. V3W0A6
Jastram Engineering, 485 Mountain Hwy N., North Vancouver, B.C. CANADA V7J 2L3
STERN TUBE BEARINGS/ BUSHES
IHC Lagersmit, P.O.B. 5 - 2960 AA Kinderdijk - HOLLAND
Blohm & Voss Industries GmbH,P.O. B. 112289, D-2042 Hamburg 1, GERMANY
U.S.A. Repts: Simplex-Turmar Inc., P.O. B. 675, Tonawanda, NY 14151
Raikio Ltd., Loudwater, High Wycombe, Bucks
Hamshire ENGLAND HP1090W
Duramax Marine, 16025 Johnson St., P.O. Box 67, Middlefield, OH 44062-0067
Thordon Bearings, Inc., 3225 Mainway, Burlington, Ontario Canada L7M 1A6
Vesco Plastics, P.O. Box 40647, Cleveland 2022, South Africa
STERN TUBE SEALS
Blohm & Voss Industries GmbH,P.O. B. 112289, D-2042 Hamburg 1, GERMANY
U.S.A. Repts: Simplex-Turmar Inc., P.O. B. 675, Tonawanda, NY 14151
Duramax Marine, 16025 Johnson St., P.O. Box 67, Middlefield, OH 44062-0067
IHC Lagersmit, P.O.B. 5 - 2960 AA Kinderdijk - HOLLAND
John Crane Marine USA, 1536 Barclay Blvd., Buffalo Grove, IL 60089
STORAGE/WORKSHELTERS
Poly-Steel Shelters, 1209 E. Ocean Blvd, Stuart, FL 34996
STRAINERS
Kraissl Co., 299 Williams Ave., Hackensack, NJ 07061
STUD/BOLT TENSIONERS
Superbolt, P.O. Box 683, Carnegie, PA 15106
SURFACE PREP TOOLS
Advanced Environmental Systems, 2 Sutton Rd., Webster, MA 01570
Aurand Mfg., 1210 Ellis St., Cincinnati, Ohio 45223
NLB Corp., 29830 beck Rd, Wixom MI 48393
Graco, Inc., P.O. Box 1441, Minneapolis, MN 55440-1441
Flow International Corp., 23500 64th Ave. S., Kent, WA 98032
TANK GAUGING SYSTEMS
FCS, Inc., 22 Main Street, Centerbrook, CT 06409
TANK LIQUID GAUGES
Technical Marine Services, 6040 N. Cutter Circle, Portland, OR 97217
TANK LEVELING INDICATORS
ERL Marine Products div, PO Box 1026, New Albany, IN 47151-1026
MMC International, 60 Inip Dr. Inwood NY 11096
Prme Mover Controls, 3600 Gimore Way, Burnaby V5G 4R8 CANADA
Saab Marine Electronics AB, P.O. Box 13045, S-402 51 Goteborg SWEDEN
Technical Marine Service, 6040 North Cutter Circle, Portland, OR 97217
Electronic Marine Systems, 800 Ferndale Pl., Rahway, N.J. 07065
Auxitrol, 168 Bureau de la Colline, 92133 Saint-Cloud Cedex, France
King Engineering Corp., P.O. Box 1228, Ann Arbor, MI 48106

Kockum Sonics, Inc., 933 Industry Rd., Ste105, Kenner, LA 70062
TESTING SERVICES
Wyle Laboratories, 7800 Govem's Dr. S.W., Huntsville, AL 35807
Fleet Technologies, 311 Legget Dr., Kanata, Ont, K2K 1Z8 Canada
M.A.C.E., 5910 N.E. 15th Ave., Fort Lauderdale, FL 33331
THRUSTER SYSTEMS
Holland Roer Propellor B.V., P.O. Box 2020, 2930 AA Krimpen a/d Lek, NETHERLANDS
Ornithruster Worldwide, 30555 Soton Ind. Pkwy., Cleveland, OH, 44139
TORSIONAL VIBRATION SPECIALISTS
M.A.C.E., 5910 N.E. 15th Ave., Fort Lauderdale, FL 33331
T.W. Spaetgens, 186 W. 8th Ave., Vancouver, BC, CANADA, V5Y 1N2
Vibranalysis Engineering Corp., 9300 Gamebird, Houston, TX 77034
TOWING SERVICES
McAllister Bros., Inc., 17 Battery Pl., New York, NY 10004
TRAINING
RTM Star Center, 2 W.Dixie Hwy., Dania, FL 33004
Marine Safety, Marine Air Terminal, Laguardia Airport, NY 11371
TRANSMISSIONS
ZF Marine 3131 SW 42nd St., Ft. Lauderdale, FL 3312
TRAVEL AGENCY
Instone Travel Tech, 3646 Greenbriar Dr., Houston TX 77098
TURBOCHARGERS—Repairs
ABB Turbocharger Co., 1460 Livingston Ave., North Brunswick, NJ 08902
Turbo USA Inc., 3005 SW 2nd Ave., Ste. 105, Ft. Lauderdale, FL 33315
ULTRASONIC HOMOGENIZER
VOLMAR s.a.s. Viale Lombardia 241, 20047 Brugherio (MI) Italy
ULTRASONIC TESTING
Coast Diving Services, P.O. Box 1548, San Pedro CA 90733
M.A.C.E., 5910 N.E. 15th Ave., Fort Lauderdale, FL 33331
UNDERSEA CABLE CHARTS
AT&T Undersea Cable, 340 Mt. Kemble Ave, Morristown, NJ 07960
UNDERWATER EQUIPMENT/ SERVICES
J.W. Fisher, 1953 County St., E Taunton, MA 02718
Phoenix Marine Inc., 2361 Jefferson Davisa Hwy /suite 140 Arlington, VA 22202
VACUUM EQUIPMENT
Vector Technologies, 6820 N. 43rd St., Milwaukee, WI 53209
VACUUM TOILET SYSTEM
Envirovac Inc., 1260 Turret Dr., Rockford, IL 61111
Fast Systems, Inc., 3240 N. Broadway, St. Louis, MO 63147
Jets Vacuum Sewage System, P.O. Box 14, N-6060 Hareid, NORWAY
VACUUM CONVEYORS
Vector Technologies, 6820 N. 43rd St., Milwaukee, WI 53209
VALVES AND FITTINGS
Cla-Val Co., P.O. Box 1325, Newport Beach, CA 92663
Ian-Conrad Bergan, 3409 Gulf Breeze Pkwy, Gulf Breeze, FL 32561
Leslie Controls, 12501 Telecom Dr., Tampa, FL 33637
Loeffler Corp., 201 E. Lincoln Hwy., Penedel, PA 19047-4097
MMC International, 60 Inip Dr, Inwood NY 11096
Service Valves & Fittings, PO Box 9665, Mobile, AL 36609
W&O Supply, 3465 Evergreen Ave., Jacksonville, FL 32206
VAPOR RECOVERY CONTROLS
Electronic Marine Systems, 800 Ferndale Pl., Rahway, N.J. 07065
Ian-Conrad Bergan, Inc., 3409 Gulf Breeze Parkway, Gulf Breeze, FL 32561
VENTILATION SYSTEMS / PRODUCTS
ABB Flakt Marine, Box 1043, S-436 21 ASKIM SWEDEN
Novenco Hi-Press A/S, P.O. Box 310,Roskildevej 325A, DK-2630 Taastrup, DENMARK
Delta T Systems, PO Box 9159, Jupiter, FL 33468
Dry Air Technologies, 313 N. Oak St., Burlington, WA 98233
Stork Canada Inc., 47, boul Marie-Victorin, Cardiac, (Quebec) Canada J5R 1B6
VIBRATION ANALYSIS
Stork Canada, Inc., 47, boul Marie-Victorin, Quebec, Canada, J5R1B6
Vibranalysis Eng. Corp., 9300 Gamebird, Houston,TX 77034
Maritech, LLC, 100 Powdermill Rd., Acton, MA 01725
VIBRATION SCREENING TOOL
Predict/DLI, 253 Winslow Way West, Bainbridge Island, WA 98110
VIDEO
Moxie Media Inc., 800 Distributors Row Sde B, Harahan, LA 70123
VISCOMETERS
Cambridge Applied Systems, 196 Boston Ave., Medford MA 02155
WASTE WATER TREATMENT
Envirovac, 1260 Turret Drive, Rockford, IL 61111
Fast Systems, 3240 N. Broadway, St. Louis, MO 63147-3515
RGF Environmental Group, 3875 Fiscal Court, W.Palm Beach, FL 33404
Red Fox Environmental Services, P.O. Box 53809, Lafayette, LA 70508-2529
Uniservice Americas, 57174 Hardin Rd., Slidell, LA 70461
WATER JET CLEANING
Flow In'l., 23500 64th Ave.South Kent, WA 98032
WATER PURIFIERS
Reverse Osmosis of South Florida, 150 SE 29 St., Ft Lauderdale Florida, 33316
AlfaTec, Inc., 4027 21st Ave. West, Seattle, WA 98199
Alfa-Laval, Desalt A/S, Stamholmen 93, DK-2650 Hvidovre, Copenhagen,DENMARK
Alfa-Laval Separation Inc., 955 Mearns Rd., Warminster, PA 18974
Boli Filters, 15 Intri Drive, East Granby, CT 06206
Pall Rochem, 5775 Rio Vista Drive, Clearwater, FL33760-3114
WATERTREATMENT SYSTEMS
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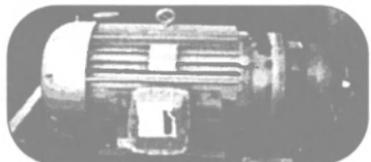
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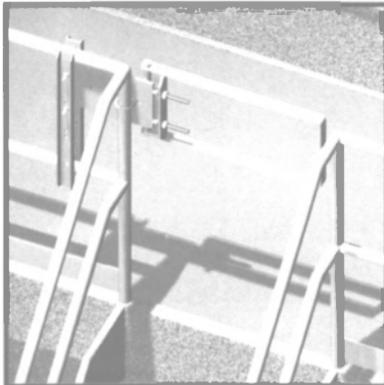
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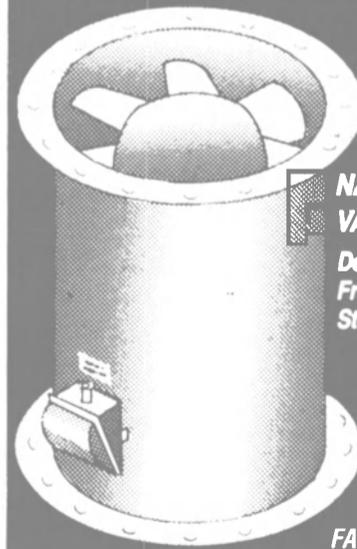
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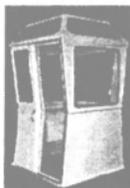
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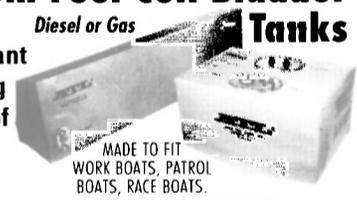
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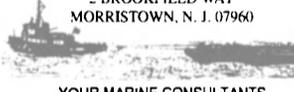
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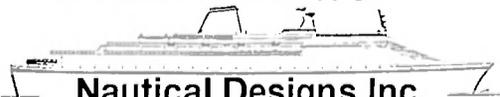
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Two (2) BERG 710 H/4 Controllable Pitch Propeller Systems

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Everett, WA 98208
Mr. Whitney Ducker
(425) 338-3344

NEW ORLEANS
Karl Senner, Inc.
25 W. Third St.
Kenner, LA 70062
(504) 469-4000
Telefax: (504) 464-7528

EAST COAST
Olof Wadehn Enterprises
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Huntington, Long Island
New York 11743
Mr. Olof Wadehn
(631)692-4548