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MARCH 1997 EDITION

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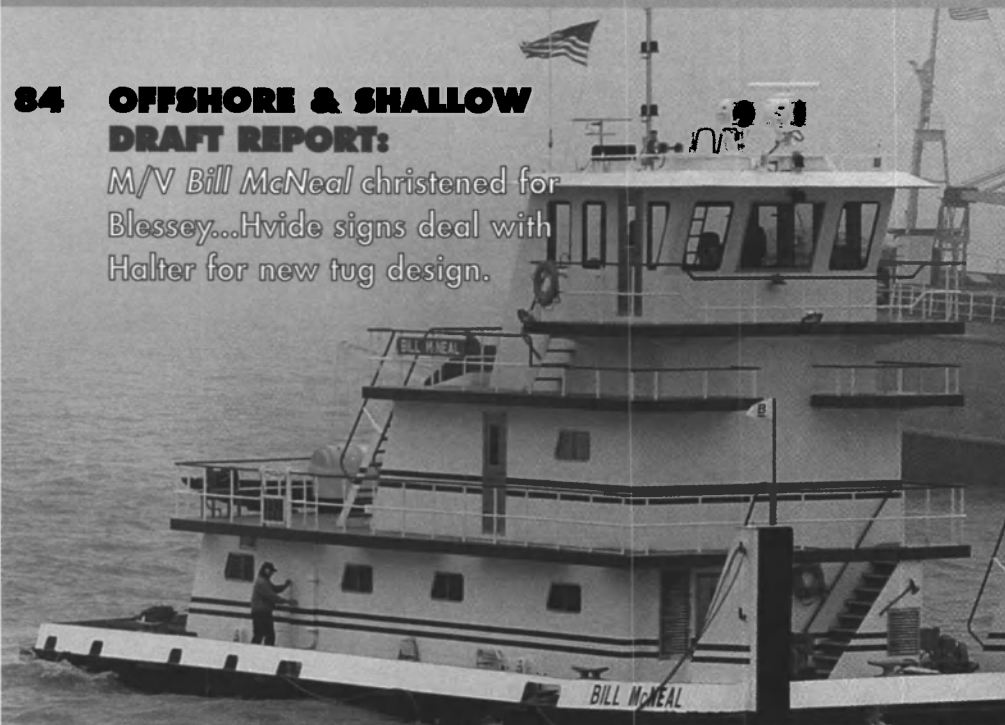
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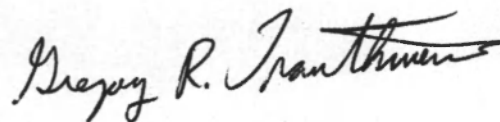
Technology and the maritime industry, at times, seem strange bedfellows. While a number of advances on the vessel design and equipment fronts have been made in recent years, some owners and operators are reluctant to invest in new systems, opting for the business-as-usual course, unless forced, by new legislation, to change.

The tanker industry is one such segment that has been required to adopt innovative technological solutions, under intense public and industry scrutiny. While the safe transport of oil is the norm, it takes only one incident to give the industry a long-lasting black eye. This month's Tanker Technology report, from David Tinsley, examines recent efforts by shipbuilders to integrate the latest technological means to ensure the optimum design and build of safe and efficient ships. Coverage starts on page 38.

On the new design front, Hvide, Elliott Bay Design Group and Halter Marine have teamed up to build a new design Ship Docking Module. Touted by Erik Hvide as "the first major breakthrough in tugboat design in nearly 100 years," the vessel features twin Z-drives and will cost approximately \$4.8 million to build. This story is a part of this month's Offshore/Shallow Draft coverage, which starts on page 54.

Two articles which appear separately this month, but actually go hand-in-hand, are the Ship Repair Guide (pg. 32) and the Coatings & Corrosion Control Review (pg. 65). These two sections graphically illustrate how prudent management of vessel maintenance schedules contribute to long-term life and productivity.

Lastly, I would like to welcome aboard David Tinsley as MR/EN's contributing Technical Editor. Many of you may be familiar with Mr. Tinsley's work, as he has spent more than 20 years in marine publishing. This tenure has included stints as Deputy Editor of Fairplay Intl. and as Editor of Lloyd's Ship Manager. His presence on staff is exciting, and his editorial insights should prove to be an invaluable resource to MR/EN's 30,000+ readers.



Gregory R. Trauthwein, Editorial Director.

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Shipping Funds

Why they fail ... and why they don't have to

by Sydney P. Levine, Shipping Intelligence

Every so often, the idea of a "shipping fund" surfaces at the intersection of the investment and shipping communities. In a few cases, ideas have gone beyond talk and actual investment vehicles have been created. But returns to investors have often been far less than predicted and the only lasting effect is that the reputation of shipping as a high-risk and low-return investment is enhanced.

Why is it that shipping can be a profitable business for individual shipowners and shipping companies, but similar profitability eludes groups of investors organized to be in the same business?

I believe that the answer to that question is rooted in conflicts between the way that shipping funds are organized and the nature of the shipping and financial markets.

These conflicts precipitate three economically harmful types of events. First, ships are bought when they should not be. Second, ships are not sold when they should be. And last, the investment manager develops a conflict of interest that adversely affects profitability as well as sours the relationship with investors.

To explain the logic behind these assertions, consider the history of a typical shipping fund.

Almost always, the impetus to start a shipping fund comes from the shipping rather than the investment side of the transaction. The reasoning goes something like this:

Regardless of shipping's poor reputation as an investment, we know that it is possible to make money in shipping; we've done it. Why don't we interest a group of investors with some serious money, say \$100 million, and assemble a fleet which we can then manage in the international charter market to the mutual benefit and profit of all?

Assuming for the moment that the capital has been raised — a difficult task under the best of circumstances — an actual shipping company is then formed, whose first task is to acquire a fleet which can begin trading.

At that point the reality of the markets — the ship resale, ship charter and financial markets — comes into conflict with the new shipping company's aims. Everyone in this venture would like to be fully invested, in ships, as soon as possible. However, it is not always a good time to buy ships, and the most prudent course at any given time may be not to buy. This prudent course is a hard one for investors to accept; after all, their money was not invested to languish in certificates of deposit or treasury bills.

So, as time passes, pressure mounts on the fund manager to find ships to buy. This pressure is not only from the investors; the manager also wants to put the invested money to work. And eventually, ships are bought, with the purchases justified by incorrect logic. This kind of pressure to buy happens not only when a fleet is being initially assembled, but whenever there is excess unemployed capital, such as after a ship has been sold.

Consequences Of Buying In Error

A ship should not be bought if the current and historic states of ship resale, charter and financial markets and the interrelationships among them indicate that there is a high probability that the proposed purchase will not deliver the desired return. In other words, the markets alone indicate when to buy a ship. Of course one must be able to correctly interpret market data,

(continued on page 22)

New Contracts

Orders are listed alphabetically, by vessel type. Publisher is not responsible for errors or omissions. For additional information on this, or other ship market information, contact: FERLISHIP, Paseo De San Francisco De Sales, 8, 28003 Madrid, Spain, tel: +341 441 4138; fax: +341 441 4138.

Owner/Operator	Shipyard	Type	No	DWT	Deliv	\$(M)
DANISH NAVY	DANYARD	—	4	—	—	16.9
SWIRE PACIFIC OFFSHORE	ULSTEIN VERFT	AHTS	1	—	3/98	23.4
NETHERLANDS GOVERNMENT	DAMEN SHIPYARDS	ANTI-POLLUTION	1	—	1998	24.8
U.S. NAVY	AVONDALE SHIPYARD	ASSAULT SHIP	1	—	—	641.4
PT FREEPORT	SINGMARINE DOCKYARD	BARGE	1	8,000	1998	—
PT FREEPORT	SINGMARINE DOCKYARD	BARGE	1	15,000	8/98	8.5
KEE-YEH MARITIME	IMABARI SHIPBUILDING	BULK CARRIER	1	74,000	5/99	26.5
—	GUANGZHOU	BULK CARRIER	2	27,000	1998	40
BERGESEN	HYUNDAI	BULK CARRIER	1	172,000	9/98	49
HORIZON SCHIFFAHRTS	EISA SHIPYARD	BULK CARRIER	6	44,000	99/99	161.7
ITOCHU CORP.	IMABARI SHIPBUILDING	BULK CARRIER	1	74,000	5/99	—
STEPHENSON CLARKE SHPG.	PT PAL	BULK CARRIER	2	15,000	1998	56
—	OSHIMA SHIPBUILDING	BULK CARRIER	3	47,000	1998	—
PRECIOUS SHIPPING	CHEUNG KU MARINE IND.	BULK CARRIER	—	18,500	98/99	—
MO SHIP MANAGEMENT	OSHIMA SHIPBUILDING	BULK CARRIER	2	47,000	1998	—
SHINWA KAIUN	NAIKAI	BULK CARRIER	2	28,000	98/99	36.6
PHOENIX MARINE SHIPHOLDING	OSHIMA SHIPBUILDING	BULK CARRIER	2	47,000	1998	—
SANKO KISEN	NAMURA ZOSENSHO	BULK CARRIER	5	49,000	98/99	100
NYK LINE	MTSUI	BULK CARRIER	1	150,000	12/98	35
HYUNDAI MERCHANT MARINE	HYUNDAI	BULK CARRIER	1	135,000	—	37.5
SAYGANLAR GROUP	PENDIK SHIPYARD	BULK CARRIER	1	12,500	8/98	24
MEDAFRET	DALIAN SHIPYARD	BULK CARRIER	2	28,000	1998	—
POLISH STEAMSHIP COMPANY	VARNA SHIPYARD	BULK CARRIER	2	41,500	97/99	—
PAN OCEAN SHIPPING	HYUNDAI	BULK CARRIER	2	30,000	1998	45
WAGENBORG SHIPPING BV	BODEWES BV	CARGO	3	7,900	98/99	—
STORU	STOCZNIA	CHEMICAL	4	6,000	98/99	84
MARNAVFINAVAL	CANTIERE NAVALE FRATELLI	CHEMICAL	2	12,000	—	—
BOLLORNO GROUP	CANTIERE NAVALE FRATELLI	CHEMICAL	1	—	4/99	—
MEDIMAR	CANTIERE NAVALE FRATELLI	CHEMICAL	1	14,400	—	—
EKTANK AB	JIANGNAN	CHEMICAL	2	13,500	1999	—
IBS	JINLING	CONTAINER	2	—	1998	—
HANSA TREUHAND	SAMSUNG	CONTAINER	1	—	1998	43
YARDINCI SHIPPING GROUP	YARDINCI	CONTAINER	1	5,200	1998	—
PINAT GIDA SANAYI VE TICARET	CELIKTEKNE SANAYII	CONTAINER	1	12,500	3/98	—
G KOPPELMANN	J.J. SIETAS	CONTAINER	1	11,150	1997	—
KIEPE-SCHPEPERS	J.J. SIETAS	CONTAINER	1	—	1997	—
HERMAN BUSS KG	MTW	CONTAINER	1	—	1998	—
UNGLORY MARINE	MURAKAMI HIDE	CONTAINER	3	—	1997	—
COMPAGNIE MARITIME DES ANTILLES DE LA GUYANE CMAG	ASTILLEROS ESPANOLAS	CONTAINER	6	—	99/99	—
AP MOLLER	ODENSE	CONTAINER	3	—	1999	481
CANADA MARITIME	DAEWOO	CONTAINER	2	40,120	1998	45
PINAT GIDA SANAYI VE TICARET	CELIKTEKNE SANAYII	CONTAINER	1	—	1998	—
KIRMAR SHIPPING	CELIKTEKNE SANAYII	CONTAINER	1	—	1998	—
HANSA TREUHAND	HANJIN	CONTAINER	1	21,000	1998	—
MTSUI O.S.K. LINES (MOL)	MINAMI NIPPON	CONTAINER	3	30,000	98/99	96
JIANGSU TONGYUAN	JINLING	CONTAINER	1	—	1997	—
ERNST KOMROWSKI	SZCZECIN SHIPYARD - STOCZNIA SZCZECINSKA	CONTAINER	1	—	1998	—
DALIAN VIVID DRAGON SHPG.	PEENE-WERFT	CONTAINER	2	—	1998	—
SCHOELLER	GDANSK	CONTAINER	5	—	97/98	137.5
ERNST JACOB	MTW	CONTAINER	2	—	1997	—
HANJIN SHIPPING CO.	HANJIN	CONTAINER	2	—	98/99	—
MTSUI O.S.K. LINES (MOL)	IMABARI SHIPBUILDING	CONTAINER	3	—	99/99	—
CLAUS-PETER OFFEN	FLENDER WERFT	CONY	5	—	1999	—
MINA COMP. DI NAVIGAZIONE	KVAERNER MASA	CRUISE	2	—	10/99	400
CARNIVAL CRUISE LINE	FINCANTIERI	CRUISE	1	—	2000	430
WESTMINSTER DREDGING CO.	VEROLME	DREDGER	1	6/98	—	—
JAN DE NUL	KRUPP FORDERTECHNIK	DREDGER	1	—	9/98	—
FINNISH NAVY	FINNYARDS	FAST ATTACK BOAT	1	8/88	21.6	—
PAN OCEAN SHIPPING	HANJIN	FEEDERSHIP	1	10,300	8/98	16.5
BLBM CO	FLEKKEFJORD SLIP & MASK	FISHING	1	—	1997	—
VOSTOK FISHING	ASTILLEROS GONDAN	FISHING	1	—	1997	—
KEVIN LIAM MCHUGH	FLEKKEFJORD SLIP & MASK	FISHING	1	—	1997	—
FRANK DOHERTY	KARSTENS	FISHING	1	1,000	1997	—
—	PEENE-WERFT	FISHING	10	—	—	—
PESQUERA EL GOLFO	ASMAV	FISHING	1	1,750	1997	—
—	ASENAV	FISHING	1	1,500	1998	—
OCEAN CREST INVESTMENT	HONDA	GENERAL CARGO	1	9,000	1997	—
WAGENBORG SHIPPING BV	VOLHARDING	GENERAL CARGO	3	7,900	1999	—
DOWA LINE	SASEBO	GENERAL CARGO	6	6,700	1997	—
TODA KISEN	SHIN KOCHI JUKO	GENERAL CARGO	1	9,000	1997	—
VAN OORD ACZ	IHC HOLLAND	HOPPER DREDGER	1	—	1998	—
DREDGING CORP	IHC HOLLAND	HOPPER DREDGER	1	—	1998	—
J DE NUL	VOLKSWERFT STRALSUND	HOPPER DREDGER	1	6,000	1998	—
CHINESE PETROLEUM CORP.	MTSUBISHI H.I.	LNG	1	—	—	220
ROYAL NAVY	INTERMARINE	MINEHUNTER	2	—	99/00	—
IRAN ISLAMIC REPUBLIC	HYUNDAI	MULTI-PURPOSE	6	22,000	1999	—
KG JEBSEN	HYUNDAI	OBO	2	110,000	—	100
U.S. NAVY	MOSS POINT MARINE	OCEANOGRAPHIC	1	1,500	1998	—
MINOAN LINES	FOSEN MEK VERKSTEDER	PASSENGER / VEHICLE	1	—	1998	111
KUMAMOTO FERRY	ISHIKAWAJIMA HARIMA H.I. (IH)	PASSENGER / VEHICLE	1	—	1998	—
HELGELAND TRAFIKSELSKAP	KAARBOS MEK VERK	PASSENGER/RoRo	1	500	9/97	12.3
MTSUI BUSAN	ONOMICHI	PRODUCT CARRIER	1	46,000	1998	30
MARNAVFINAVAL	CANTIERE NAVALE FRATELLI	PRODUCT CARRIER	2	36,000	—	—
AP MOLLER	DALIAN NEW SHIPYARD	PRODUCT TANKER	2	110,000	1998	—
PACIFIC CARRIERS	ONOMICHI	PRODUCT TANKER	2	46,500	1998	62
PRIMORSK SHIPPING CORP.	DAEDONG SHIPBUILDING	PRODUCT TANKER	3	45,000	1998	99
BENGT JOHNSON	—	—	—	—	—	—
REDERI AB VERITAS TANKER	JURONG	PRODUCT TANKER	1	11,500	—	—
MTSUI O.S.K. LINES (MOL)	SHIN KURUSHIMA	PURE CAR CARRIER	1	10,000	1998	—
NISSAN MOTORS	SHIN KURUSHIMA	PURE CAR CARRIER	2	—	1998	—
COSIARMA	FINCANTIERI	REEFER	2	11,650	1999	—
ARMATORI PARTENOPEI	FINCANTIERI	REEFER	2	11,650	99/99	—
MEDITERANSKA PLOVDIBA	BRODOSPLIT	REEFER	2	—	1998	—
JAPAN FISHERY AGENCY	NKK CORP.	RESEARCH	1	—	3/98	—
WOODS RIVER CRUISES	GEORGE PRIOR	RIVER CRUISER	1	—	1997	—
RIVER LINE	DEUTSCHE IND. W.	RIVER CRUISER	1	—	1997	5.4
MTC	DEGGENDORFER	RIVER CRUISER	2	—	98/99	—
U.S. NAVY	NATIONAL STEEL	RoRo	1	60,000	2000	—
SLOMAN NEPTUN	PENDIK SHIPYARD	RoRo	2	—	98/99	—
SOLSTAD SHIPPING	ULSTEIN VERFT AS	SUPPLY	1	—	3/98	23
CAMBRIDGE PARTNERS	SAMSUNG	TANKER	2	308,000	98/99	—
HALLA MERCHANT MARINE	HALLA	TANKER	1	300,000	—	80
STATOIL	ASTILLEROS ESPANOLAS	TANKER	3	125,000	98/99	260
PERTAMINA	PAN-UNITED SHIPYARD	TANKER	2	17,500	1998	47
NIPPON YUSEN KAISA (NYK)	SAMSUNG	TANKER	1	105,000	1999	44
VOLGOTANKER RIVER SHPG.	PENDIK SHIPYARD	TANKER	5	6,000	1999	—
SINOTRANS	GUANGCHUAN INTERNATIONAL	TIMBER CARRIER	2	27,000	—	—
PT FREEPORT	SINGMARINE DOCKYARD	TUG	2	—	98/99	—
KOTUG	PADMOS	TUG	1	—	1997	—
KUWAIT OIL TANKER	HYUNDAI	VLCC	3	285,000	—	—
GOLDEN OCEAN GROUP	HITACHI ZOSEN	VLCC	1	—	—	—

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For further information and test results, contact: Dept. A-S, Suite 1500, 224 West 35th St., NY, NY 10001.

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Vessel & Equipment Contract News

Kvaerner, Umoe Announce Bid Collaboration

Kvaerner Rosenberg in Stavanger and Umoe Sterkoder in Kristiansund are cooperating on a bid for the construction of up to six Norwegian escort vessels. Kvaerner Rosenberg and Umoe Sterkoder have formed a joint venture to bid for the planning, procurement and construction of the vessels. Umoe will build the hull and carry out some of the fitting-out operations. Kvaerner Rosenberg will plan, equip and commission the vessels. Kvaerner Mandal is to build those elements where composite materials could be used.

Both companies emphasize

the importance of positioning a strong Norwegian industrial group to secure work for Norwegian industry. Each have accepted the offer to participate in the Royal Norwegian Navy's integrated project organization which aims to identify specifications for the vessels during 1997. The Royal Norwegian Navy expects the contract to be awarded in 1999, with delivery of the first vessel in 2004-2005.

Lockheed Martin To Supply Spanish Navy

On Jan. 31, Spain's Ministry of Defense signed a letter of agreement with the U.S. Navy designating the AEGIS combat system for its newly approved F-100 class

of frigates. Lockheed Martin Government Electronic Systems currently provides the AEGIS combat system to the U.S. Navy.

The agreement is projected to be valued at approximately \$400 million for Lockheed Martin over a six-year period, pending delivery and negotiation of combat system engineering and production proposals. Under the program, Spain's Bazan Shipbuilders in the province of El Ferrol will build four F-100 class frigates. The AEGIS combat system will be provided to the Spanish Navy through a Foreign Military Sales (FMS) agreement with the U.S. Navy. Lockheed Martin will provide four combat systems, with work beginning in the second quarter of 1997.

"We are delighted with today's agreement. The broad base of support from the Navy, as well as congressional, labor and industry leaders made this agreement possible," said Robert B. Coutts, president, Lockheed Martin Government Electronic Systems.

For more information
Circle 70 on Reader
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Litton Credit Analysis Report Discusses Acquisitions

Acquisitions are likely to play a key role in Litton Industries' future growth, according to a recently released Duff & Phelps Credit Rating Co. (DCR) Credit Analysis report on the firm. The company's 'BBB+' (Triple-B-Plus) senior debt rating balances its policy of defense acquisitions with its strong financial measures

Recent Ship Sales

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

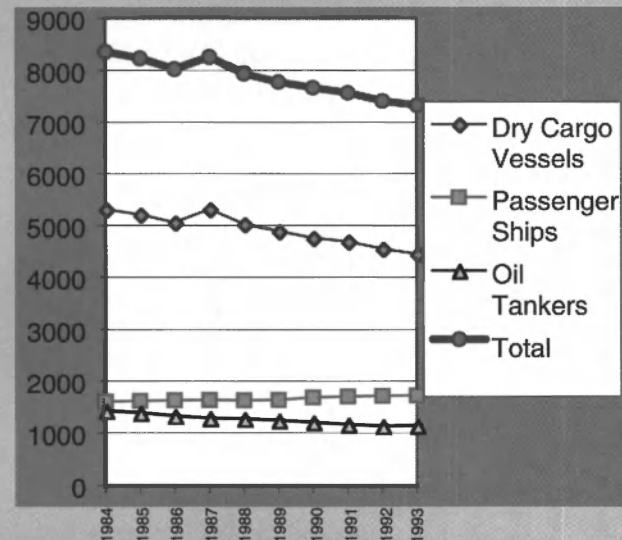
Date Reported	Vessel Name	Vessel Type	DWT	Year Built	Sale Price (M)
1/17/97	Balsa 35	Bulker	6,607	85	\$3.3
1/17/97	Balsa 36	Bulker	6,596	85	\$3.3
1/17/97	Balsa 37	Bulker	6,596	85	\$3.3
1/3/97	Sarine 2	Bulker	12,334	82	\$5.4
1/3/97	Linden	Bulker	19,717	72	\$1.5
1/24/97	Flora	Bulker	24,022	81	\$4.7
1/24/97	Khudozhnik Vladimir Serov	Bulker	24,354	77	\$2
1/24/97	Ocean Leader	Bulker	27,125	81	\$7
1/31/97	Federal Matane	Bulker	28,215	84	\$9.3
1/17/97	Buffalo	Bulker	32,628	72	\$1.6
1/17/97	Sincere Majestic	Bulker	34,320	76	\$3.1
1/24/97	Steel Flower	Bulker	35,910	77	\$2.6
1/17/97	Cargo Emerald	Bulker	36,071	78	\$6.3
1/3/97	Adrianople	Bulker	37,873	77	\$6.1
1/17/97	Aristogenis	Bulker	40,300	78	\$5.5
1/17/97	Aristotelis	Bulker	40,300	77	\$5.4
1/24/97	Pretty Flourish	Bulker	46,500	97	\$23.5
1/24/97	Pretty Prosperity	Bulker	46,500	97	\$23.5
1/24/97	Skaugum	Bulker	47,000	97	\$22.8
1/3/97	Crusader Venture	Bulker	61,883	82	\$8
1/17/97	Titus	Bulker	62,180	81	\$7.2
1/24/97	Ikan Bilis	Bulker	63,800	83	\$11.3
1/31/97	Otterpool	Bulker	64,592	82	\$9.8
1/10/97	Maryli	Bulker	64,657	77	\$5.7
1/3/97	Ios	Bulker	65,298	85	\$12.8
1/31/97	China Trader	Bulker	66,732	84	\$9.5
1/31/97	Dynasty	Bulker	70,242	89	\$17.4
1/3/97	Forum Glory	Bulker	71,749	72	\$2.7
1/10/97	Konkar Intrepid	Bulker	77,776	71	\$2.6
1/24/97	Channel Enterprise	Bulker	151,380	90	\$27.1
1/3/97	Matagrifone	Tanker	4,469	91	\$15
1/3/97	Jurong	Tanker	5,200	81	\$3
1/10/97	Awajishima	Tanker	5,819	79	\$2.7
1/3/97	Tenshun Maru	Tanker	6,752	84	\$5
1/31/97	Zavety Ilyicha	Tanker	19,986	70	\$1.2
1/3/97	Courier	Tanker	22,255	81	\$7.1
1/3/97	Santa Barbara	Tanker	30,628	74	\$3.7
1/10/97	Star Baltic	Tanker	31,502	76	\$4.5
1/24/97	Sibarde	Tanker	31,955	76	\$5.5
1/10/97	Leader Lt	Tanker	40,490	82	\$13.3
1/24/97	Flaminia	Tanker	63,774	85	\$20.4
1/3/97	Cosmo Mercury	Tanker	65,581	80	\$8
1/3/97	Knock Buie	Tanker	137,309	75	\$9
1/3/97	Svenner	Tanker	141,178	76	\$8.6

JAPAN: By The Numbers

Following are some key economic data in relation to the Japanese shipbuilding industry. (Sources: Japan Ship Centre, National Transportation Statistics Handbook, Ministry of Transport).

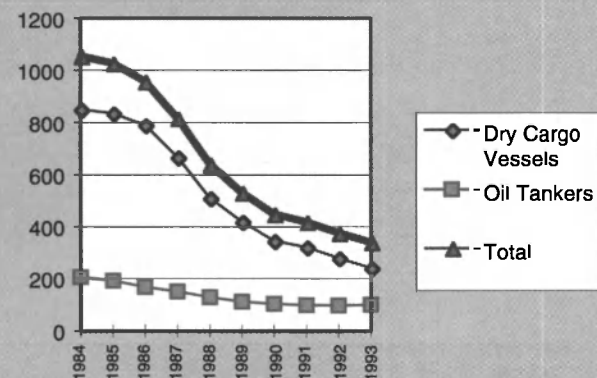
Merchant Ship Production In Japan: 1984 - 1993

(thousands gross tons)

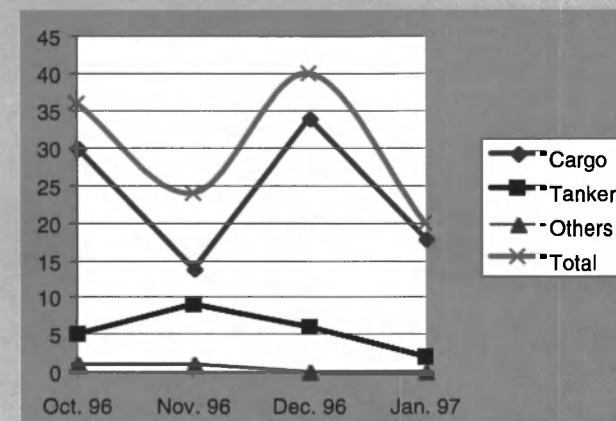


Oceangoing Vessel Production in Japan: 1984 - 1993

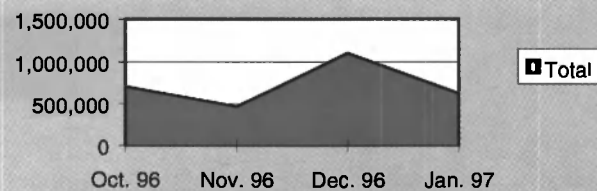
(thousands gross tons)



Domestic & Export New Orders In Japan: Oct. 1996 - Jan. 1997



New Ship Orders In Japan: Oct. 96 - Jan. 97





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and leading positions in advanced defense electronics and shipbuilding.

Although the decline in U.S. defense spending appears to have bottomed out, DCR does not expect a significant upturn before the end of this decade.

"Litton management turned to

acquisitions to grow revenues," said **George J. Podrasky**, a DCR group vice president and author of the report.

Litton has made several small acquisitions of complementary product lines in recent years. Acquisitions are stabilizing Litton's revenue outlook, and the

company is generating excess cash for debt reductions, acquisitions or share repurchases.

"Still, DCR cannot rule out Litton Industries becoming an acquisition target itself as other defense contractors seek to add volume in a shrinking market," Mr. **Podrasky** said.

EC Considers Sanctions For Substandard Ships

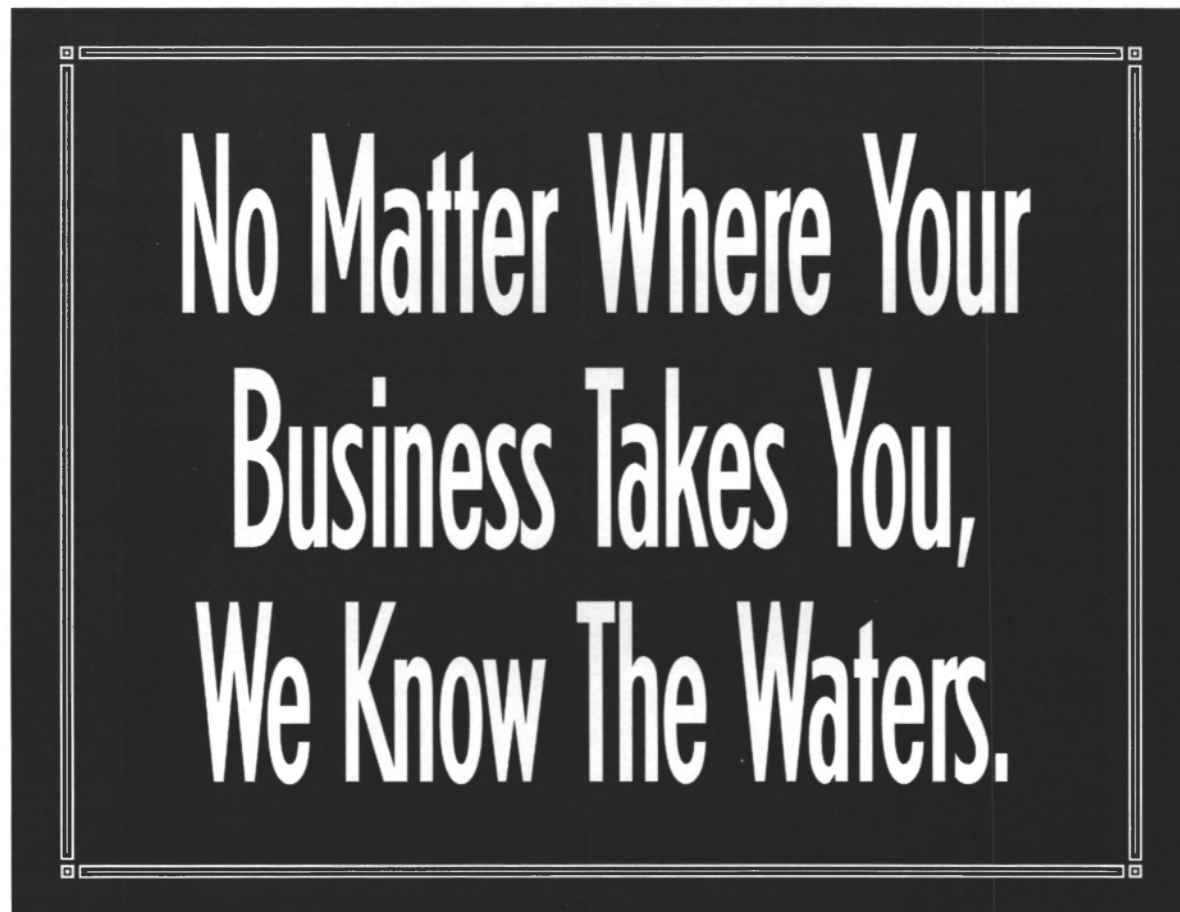
The operation of substandard ships, particularly in the tramp market, must be made so expensive that it becomes unattractive, **Roberto Salvarani**, of the Directorate for Marine Transport at the European Commission (EC), told a recent meeting of the Economic Advisory Committee of Germanischer Lloyd (GL).

In his speech to the GL committee in Hamburg, Mr. **Salvarani** said that approximately 1,000 ships are detained every year in Europe by port state control officials, and that 23 flag administrations — all IMO members — are on the black lists of these officials. He said that to improve this situation, the rigorous application of existing standards is needed, in lieu of the development of new, non-mandatory rules. Mr. **Salvarani** said that financial sanctions against substandard ships are being considered by EC as an additional inducement for ships operators/owners to comply with safety practices. In conclusion, the EC official called on class societies to keep up the measures already initiated to improve the quality of surveys. Additionally, he suggested that insurers exert pressure by setting high premiums or even refusing tonnage.

Raytheon Wins Navy Contract

The U.S. Navy's Space and Naval Warfare Systems Command (SPAWAR) has selected Raytheon Electronic Systems (RES) to provide AN/WSC-6, Super High Frequency (SHF) satellite communications antennas. The antennas are designed to provide secure command and control communications over military or commercial satellites. The basic contract calls for an initial award of \$1.1 million to provide four, 2.4-m shipboard SHF antennas. Options for 26 additional antennas and related engineering include the potential for an additional \$7.3 million in funding.

The AN/WSC-6 shipboard antennas will provide military users with high capacity communication links to support voice and data communications in either X or C bands. The antennas will interface with both military and commercial



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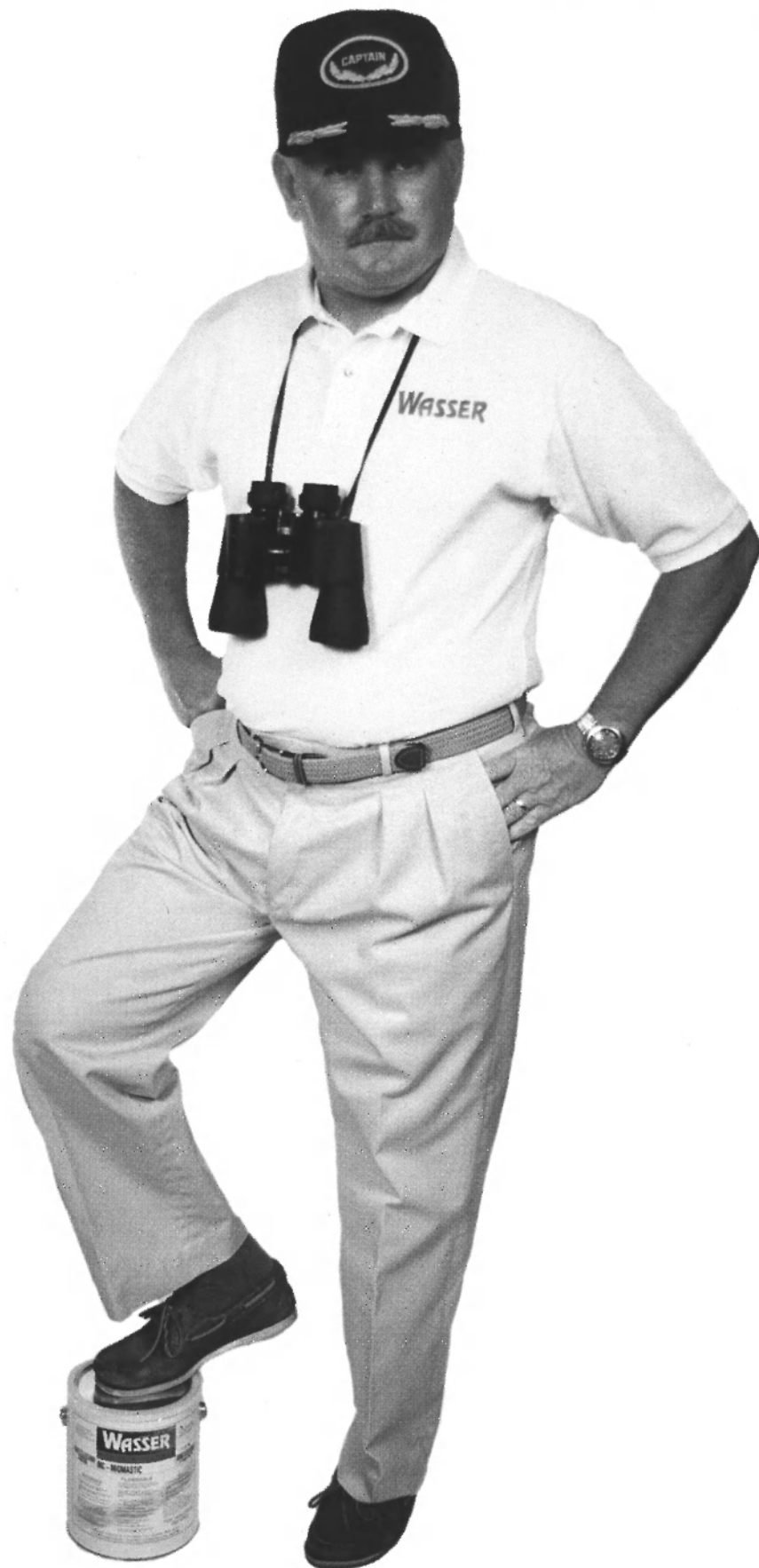
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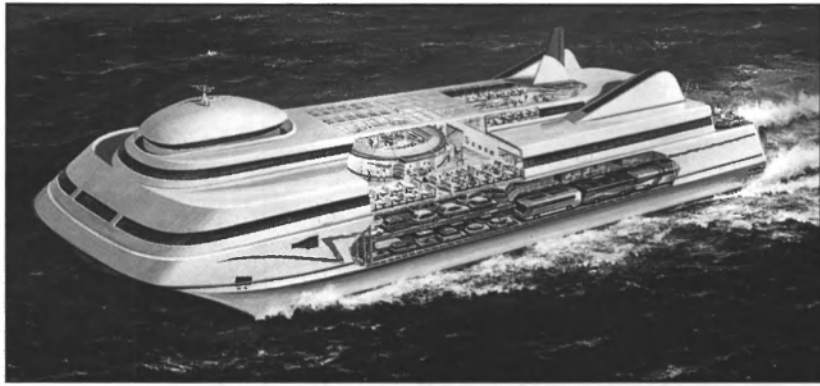
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Fincantieri To Use HydroComp Software

HydroComp, Inc. has announced that Fincantieri Shipyards, Trieste, Italy, has recently purchased multiple copies of its NavCad software. NavCad Version 3.5 for Windows is a software tool for the prediction and analysis of vessel speed and power performance.

It also reportedly facilitates the selection of suitable propulsion system components, including engines, gears and propellers.

The software can be used for every type of displacement, semi-displacement and planing craft, river barge, sailboat and catamaran. Version 3.5 also offers features such as sensitivity analysis, method expert prediction, method ranking and minimum hull drag analysis.

HydroComp, Inc. provides software products and consultancy services for the performance analysis and design of marine vehicles for industrial, governmental and other clients.

For more information on HydroComp
Circle 37 on Reader Service Card

AMS Granted Contract Continuation By U.S. Navy

American Management Systems (AMS) has been selected by the U.S. Navy to continue its work with the Surface Ship Maintenance Improvement Program, and to perform systems engineering and technical support services for the Puget Sound Naval Shipyard.

"These contract wins confirm the value we provide the Navy on a daily basis," said **Bill Purdy**, vice president and general manager for AMS's Navy work.

AMS's work with the Surface Ship Maintenance Improvement Program, estimated at \$100 million over five years, represents a third consecutive contract award that extends back to 1981. Since this partnership began, AMS's role has evolved from supporting a pilot

effort on three ships in the Atlantic Fleet, to helping the Surface Ship Maintenance Division in the Naval Sea Systems Command develop advanced maintenance policies and procedures for surface ships.

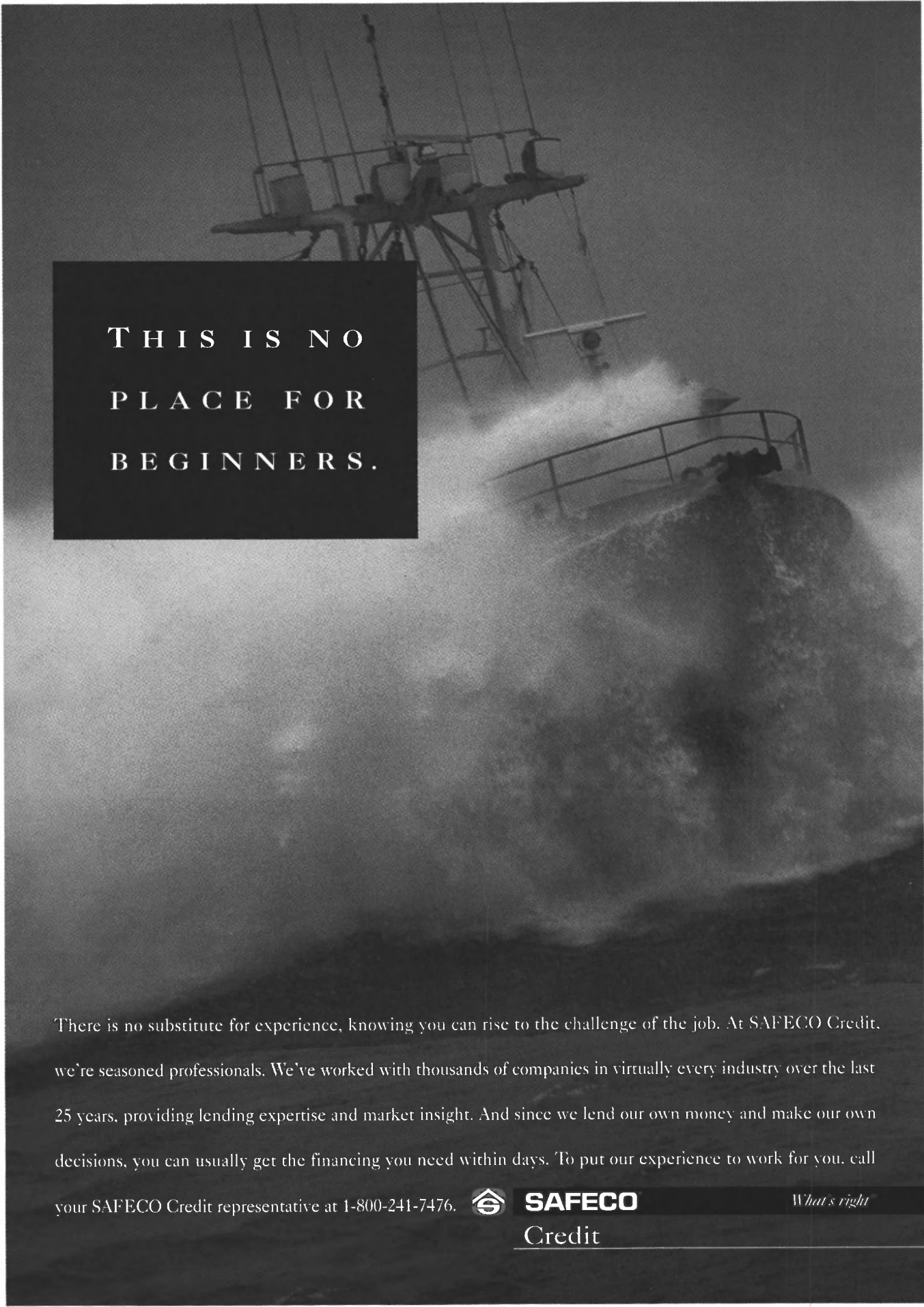
AMS and its subcontractors, SAIC/AmSEC, ADI Technology and Integrated Systems Analysis,

Inc. (ISA), will continue to provide support for the Surface Ship Maintenance Improvement Program, including the provision of certified port engineers to assist in defining ship repairs.

The Puget Sound Naval Shipyard task order, potentially worth an estimated \$52 million, will help

the Navy implement standardized technology solutions and high-quality systems in support of the naval shipyard community's critical support mission. AMS is a partner with SRA International, Inc for this effort.

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Litton Division To Supply Defense Systems For Norwegian Navy

The Laser Systems Division of Litton Industries Inc. has reportedly won a \$12.5 million contract

from the Royal Norwegian Navy for the Norwegian Hellfire Shore Defense System — Designator Configuration program. Under the terms of the contract, Litton will produce 54 systems for the Royal Norwegian Navy and Army, which will enable military personnel to acquire, track and survey

possible enemy targets by using daylight and thermal sights. The target information is then used to direct ground-launched missiles against targets. This compact system consists of a laser designator/rangefinder built by Litton Laser Systems of Apopka, Fla., an 8-12 micron thermal camera built

by Sagem SA of France, and a tripod and traversing head built by Instro-Precision Ltd. of the U.K. Litton will be the systems integrator and will deliver fully integrated day/night systems.

The shore defense system will be deployed by the Royal Norwegian Navy from its fast attack boats to mobile coastal positions.

For more information
Circle 71 on Reader Service Card

THE ART OF RECONDITIONING



Established in 1956, Brigantine Services Limited has specialised in the reconditioning of diesel engine parts. All reconditioning procedures are carried out to the exacting specifications of the engine manufacturers and the appropriate classification society.

Brigantine's experience is only matched by the quality of its workmanship. The company operates from its new 4,200 square metre modern workshop located in Hong Kong, and employs more than 100 technicians authorised to carry out repair and maintenance services by MAN B & W Diesel, Cummins Diesel, Mitsubishi Heavy Industries, Ulstein Hydraulic Brattvaag, Lyngso-VAI/MET Marine and the Hong Kong Government.

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EC Orders Dutch Yard To Repay Loan Excesses

The European Commission has decided that Danish yard Odense Staalskibsvaerft A/S must pay back with interest around 1 million DKR of state aid granted in relation to five shipbuilding contracts concluded in 1992. The decision is the result of a larger investigation of the financing of shipbuilding in Denmark in the period from 1987 to 1993. The Commission has examined 58 contracts and found that 53 of them respected the aid ceiling in force at the time the contract was signed (nine percent), while in five cases the aid granted exceeded that ceiling.

The Commission has examined 58 contracts in which a so-called mother-daughter company model was used. In these cases, the yard sold the vessel to a subsidiary (daughter company) which again sold the vessel to the real shipowner. The Commission initiated its investigation in July 1996, since it could not establish whether the aid ceiling had been respected in cases where such a model had been used.

The total amount of aid which the Commission considers incompatible with the Shipbuilding Directive is 1.018 million DKR (137,000 ECU, January 1997).

IRC Awarded Contract From Thai Government

International Response Corp. (IRC), the international affiliate of National Response Corp. (NRC) and Seacor Holdings, Inc., is part of a consortium that will establish a marine oil spill pollution control and monitoring program for the Pollution Control Department (PCD) of the Royal Thai Government.

The program involves a risk assessment study, development of

an oil spill trajectory model, preparation of a natural resource damage assessment (NRDA) plan for Thailand, development of an environmental recovery plan, and the preparation of an emergency oil spill response plan for PCD.

The consortium consists of IRC, Baktie BMT (Asia) Ltd., BMT Marine Information Systems Ltd., AEA Technology and STS Engineering.

IRC is also reportedly in the process of establishing Thailand's first facility for treating waste oils from ships docking in the country, in order to further Marine Pollution (MARPOL) guidelines.

For more information
Circle 72 on Reader Service Card

Day Cruise Operator Negotiates Property Development Agreement

U.S. day cruise operator Europa Cruises Corp. has entered into an agreement with Hilton Gaming Corp. which gives the latter exclusive rights to negotiate a joint venture agreement with Europa for a 180-day period of time with respect to the development of Europa's Diamondhead, Miss., property located on Bay St. Louis.

Hilton will pay \$400,000 for the exclusive right to negotiate, and if the agreement goes through, will develop a destination resort at Europa's 404-acre site. The site is adjacent to a site on which Circus Circus Enterprises, Inc. intends to develop a destination casino resort and hotel. Europa owns and operates four gaming ships — *Europa Sun*, *Europa Star*, *Europa Sky* and *Europa Stardancer* — which are homeported at four Florida ports.

OMI Completes Ship Sale; Exercises Contract Option

On Feb. 3, OMI announced the completion of a sale/leaseback of its U.S. flag crude carrier *OMI Columbia*. Proceeds from the transaction will reportedly be utilized to repay existing debts.

The company recently exercised the first of its two options with Daewoo Corp. and Daewoo Heavy Industries for the construction of Suezmax crude carriers, bringing the total of vessels ordered from the yard to three.

OMI is a major bulk shipping company operating in world mar-

kets with a fleet of 33 vessels, aggregating approximately 2.8 million dwt.

Stolt-Nielsen To Acquire Tank Container Business

On Feb. 3, Stolt-Nielsen

announced that it entered into an agreement to acquire the tank container division of Challenge International based in Le Havre, France. Challenge has reportedly played a major part in developing the tank container industry in France and currently operates 950

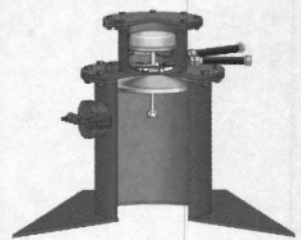
tanks in international trade.

Stolt Tank Containers will acquire the equipment and Challenge employees will reportedly be retained. The existing activities of Stolt's container business in France will be combined with those of Challenge and managed from Le

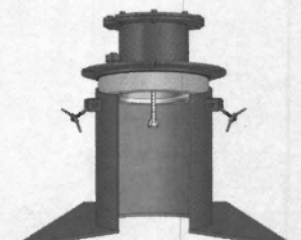
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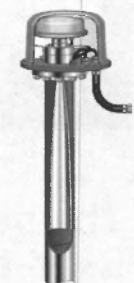
The **Parabolic Antenna Gauge** is used on most types of tankers carrying various cargoes.



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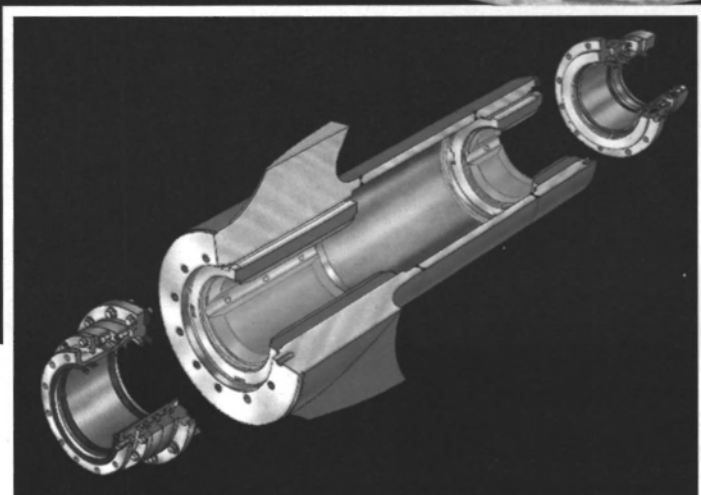


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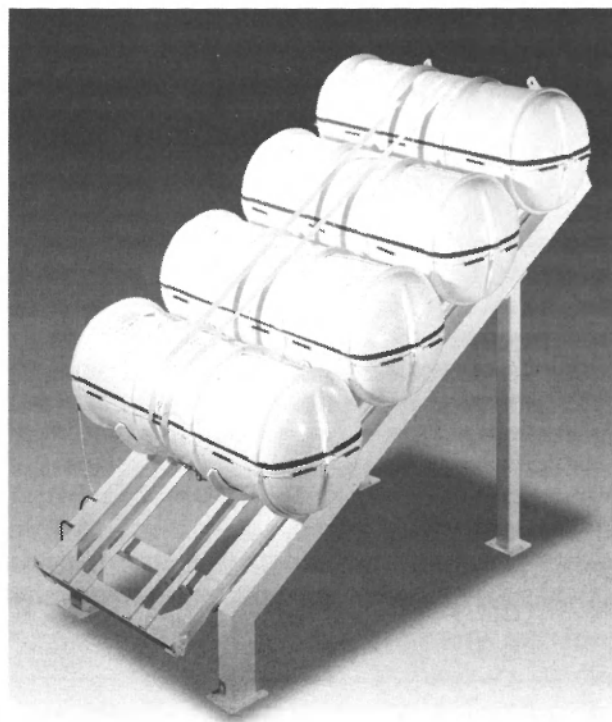


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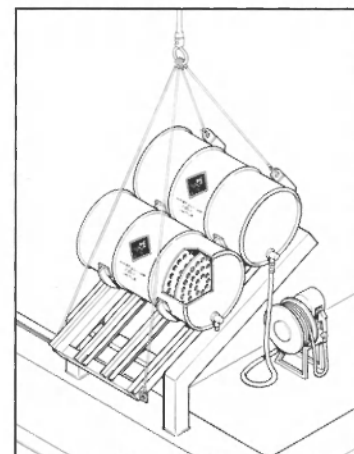
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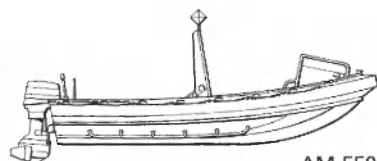
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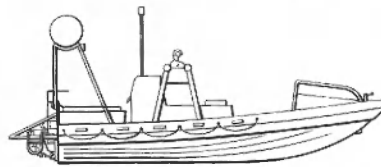
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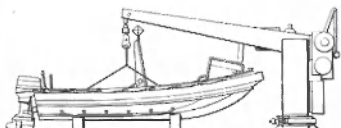


AM-700

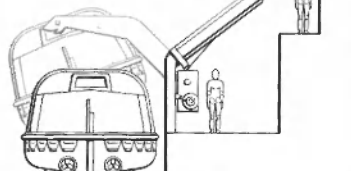
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Davits



Rescue Boat Davit

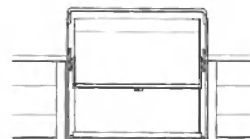


Overhead Gravity Trackway Davit

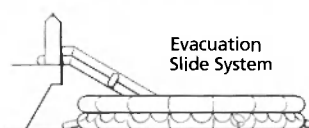
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Evacuation Slide System Stowage Container

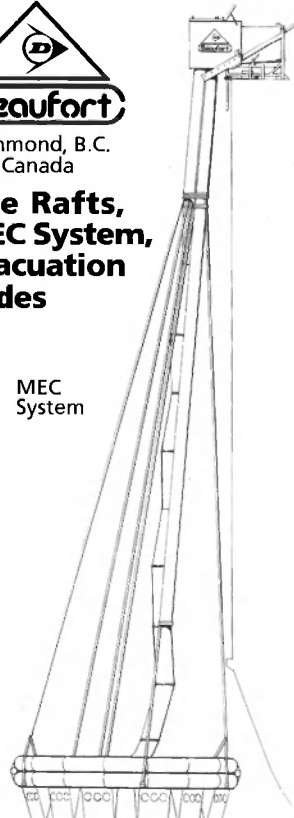


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Life Rafts, MEC System, Evacuation Slides

MEC System



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Trico Completes Vessel Acquisitions

Trico Marine Services, Inc. announced completion of the previously announced acquisition of five, 180 to 185-ft. supply vessels

and one utility vessel from Laborde Marine, as well as announced the signing of new charter contracts.

One of the acquired vessels, *Elkhorn River*, will be upgraded from 180 to 220 ft. (54.8 to 67 m) and will begin a three-year charter contract in mid-1997 for a well

stimulation company that provides boat-based well completion and workover services. Trico also signed an additional supply vessel charter contract with the same customer for *Stones River*, which will begin in March. The two vessels are expected to generate combined incremental revenues to Trico of approximately \$5.6 million on an annualized basis. Additionally, one of the acquired supply boats and the utility vessel will begin contracts for a seismic company.

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Royal Caribbean Releases Financial Earnings Info.

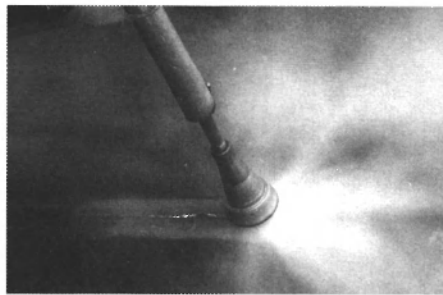
Royal Caribbean Cruises Ltd. (RCCL) reported net income of \$150.9 million or \$2.37 per share for the year ended December 31, 1996, compared to \$149 million or \$2.35 per share in 1995. Operating income for 1996 was up 18 percent to \$217 million compared to \$183.9 million in 1995. Revenues increased 14.6 percent in 1996 to \$1.36 billion compared to \$1.18 billion in 1995 as a result of a 15 percent increase in capacity primarily due to the addition of *Legend of the Seas* in the second quarter of 1995 and *Splendour of the Seas* in the second quarter of 1996. The 1996 results include a gain of \$10.3 million from the sale of *Song of Norway* in the fourth quarter and a charge of \$2 million for expenses incurred evaluating a potential transaction.

"I am very pleased with the results achieved during 1996, particularly in light of the softer market conditions we encountered during the second half of the year, especially in the fourth quarter," said RCCL CEO **Richard D. Fain**. "The strategic decision we made in 1992-93 to build the Vision series of ships is now paying handsome dividends. We have taken delivery of three of the six Vision ships, with two more scheduled for delivery in 1997 and the last one in 1998. We are confident that our recent order for up to two 130,000 gross register ton Project Eagle vessels will continue Royal Caribbean's dominant position in the industry as we enter the 21st century," he concluded.

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Shipping Funds

(continued from page 8)

and disciplined enough to exclude from calculation the interesting but irrelevant information flooding in.

The consequences of having bought "in error" are all framed in terms of probabilities. Since the future is uncertain, it is possible

that the purchase will in fact turn out well. More likely, the market conditions prevailing at the time of the purchase will impose a burden on the particular transaction that will be difficult to overcome, dooming the vessel to sub-par performance.

Similar logic applies to ship sales. The markets alone signal the proper time to sell a ship. But

in addition to the task of interpreting market indications — which are often not obvious — there are two other forces that are often in conflict with the market sell signals.

The first conflicting force is primarily psychological. Shipowners want to own ships, and they often continue to own ships until long after the market has said that it is

time to sell them. The losses so incurred will often substantially reduce the return from the ownership of the vessel.

The second force, when it exists, is a true conflict of interest. Many organizers of, and sometimes investors in, shipping funds are shipowners or managers. Often, the organizer will manage the investors' fleet — for a fee. While the ship management fee is certainly a legitimate cost of doing business, it also reaps profits for the manager and can conflict with the manager's obligation to investors. The management fee will be paid regardless of how well or how poorly a ship is faring and can surely be an inducement not to sell a ship which can be sold. While the amount of the management fee may seem small, it should be kept in mind that the manager may already have an organization to manage his or her own fleet, and the incremental cost of managing the investors' fleet may be close to zero, so that the management fee may represent a sizable profit increment. In the past, unhappy investors have ruefully referred to management fees as the insurance that fund sponsors use to underwrite their own profit.

This completes the description of the three economically harmful types of events mentioned earlier, but still leaves the question of how they are to be avoided.

Three fundamental changes in the way that "shipping funds" are organized will greatly improve the chances of reaching high rates of return. First, the management of the fleet should be divorced completely from the process by which decisions to sell and buy ships are made. Ideally, this means that a ship management company not affiliated with any of the investors or the fund organizer would be hired to run the ships. At the very least, the investors should insist that buy and sell decisions not be made unilaterally by the ship manager.

Second, rather than first accumulating a large pool of money and then finding ships to buy, funds should be raised and committed on a ship-by-ship basis. This removes pressure from unemployed capital that often contributes to poor buying decisions. In practice, this requires commitments from investors to furnish cash when needed. Admittedly, this technique moves the pressure to invest from the fund back to the investors. An investor may in fact decide not to contribute for a particular ship



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purchase but to invest elsewhere. But if the number of investors is not too small, the funds to buy a given ship should always be forthcoming from the group as a whole.

And last, the decisions as to when to buy and sell ships should be executed on an analytical basis. At present, hope and intuition guide many buy and sell decisions. Unfortunately, and there is research to confirm this, deals based purely on hope and intuition are not very successful. Nor, it would appear, are classical economic analyses and models. The reason that these latter techniques fail is because they do not take into account the separation of the world fleet into industrial and tramp shipping. Tramp shipping, where shipping funds operate, performs a type of arbitrage for the industrial carriers and this fact is little realized and not appreciated by the usual forecasting techniques.

But there is a technique that will work for shipping funds. The technique uses a trading rule for executing decisions about buying and selling ships. The ship trading rule is the product of both original research and extensive calculation, and it was developed through a process of several stages.

First, the history of the shipping and financial markets was examined, in order to identify the instances when the buying, trading and eventual selling of ships yielded high returns from low-risk investments in ships.

Second, a number of factors deemed to be relevant to the behavior of the markets were identified, and a computational scheme to rank the importance of the factors to the buy and sell decisions was devised.

Millions of computations were performed in order to discover the weighting of the factors that would best predict favorable market behavior.

The properly weighted factors were combined into a set of trading rules that could be applied to the shipping markets on a continual basis and to guide the judicious buying and eventual selling of ships.

Finally, the feasibility of the ship trading rule technique was tested by computer simulation. Using actual data, a fleet of nine ships was bought, traded and sold. All buy and sell decisions were made by the trading rules. Every simulated transaction was checked against actual history and the mechanics of the market. Nothing improbable was allowed and all

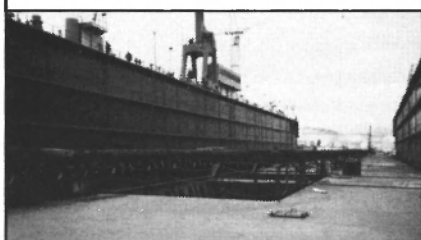
applicable fees and expenses were included. An extremely conservative investment strategy was followed in the simulation. The ships purchased were all 10 years old and the level of debt incurred was only 50 percent of the purchase price. Five of the ships were held for three years, two for two years and two for one year. The entire span of the simulated project was

57 months. Internal rates of return were calculated on a project basis for each of the nine ships. The returns varied from a low of about 20 percent to a high of almost 35 percent, with an overall average of just under 30 percent. These returns are quite remarkable considering the safety of the investment as measured by both the age of the ships and the low

level of leverage. In summary, the idea of a shipping fund is a good one. Such schemes have been largely unsuccessful in the past due to organizational and decision-making problems. With a carefully followed plan of investment based on market data and balanced profit-sharing, shipping can be recognized as a secure investment vehicle.

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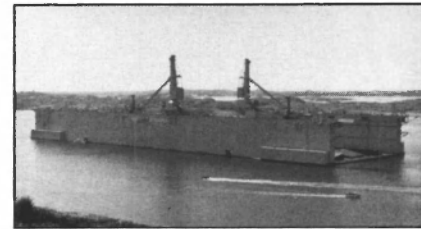
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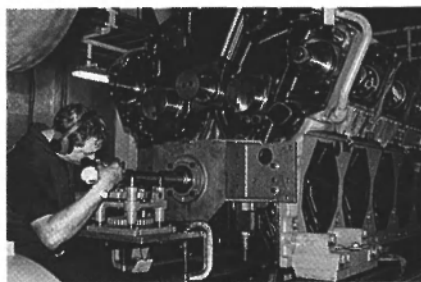
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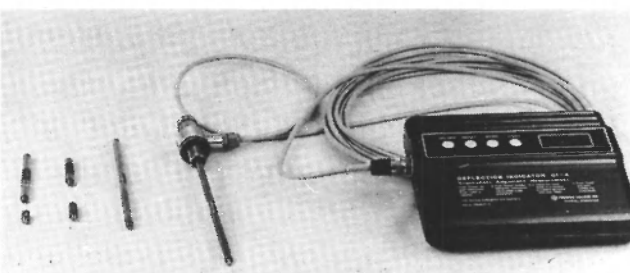
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Swedish Company Get Series Order From China

Swedish company Storebro Bruks has won a contract to supply two of its SRC 90 E special task boats to the Chinese Customs Service. The order was won largely because of the craft's proven performance on duty with the FMV

(Swedish Defence Material Administration). The new customer was particularly impressed with the strong carbon-fiber hull, which has a 22 degree deep-V, and built-in laminate reinforcement for protection during amphibious

operations. The craft has been tested at SP Technologies in the U.K. and reportedly calculated to withstand a force of 4G. The boats are propelled via an FF 410 waterjet drive, driven by a standard single Scania DSI 14 V-8 diesel engine

developing 625 hp. Measuring 38.7 x 9.8 x 2.4-ft. (11.8 x 2.9 x .73-m), the vessel has a two-ton loading capacity and carries around 600 liters of fuel for a range at full speed of 200 nm with four persons aboard. Storebro also started the new year with further series orders for the home market. While still in the process of completing 39 transport/ambulance boats for the FMV, the latter placed a contract in January for 13 additional dedicated ambulance vessels.

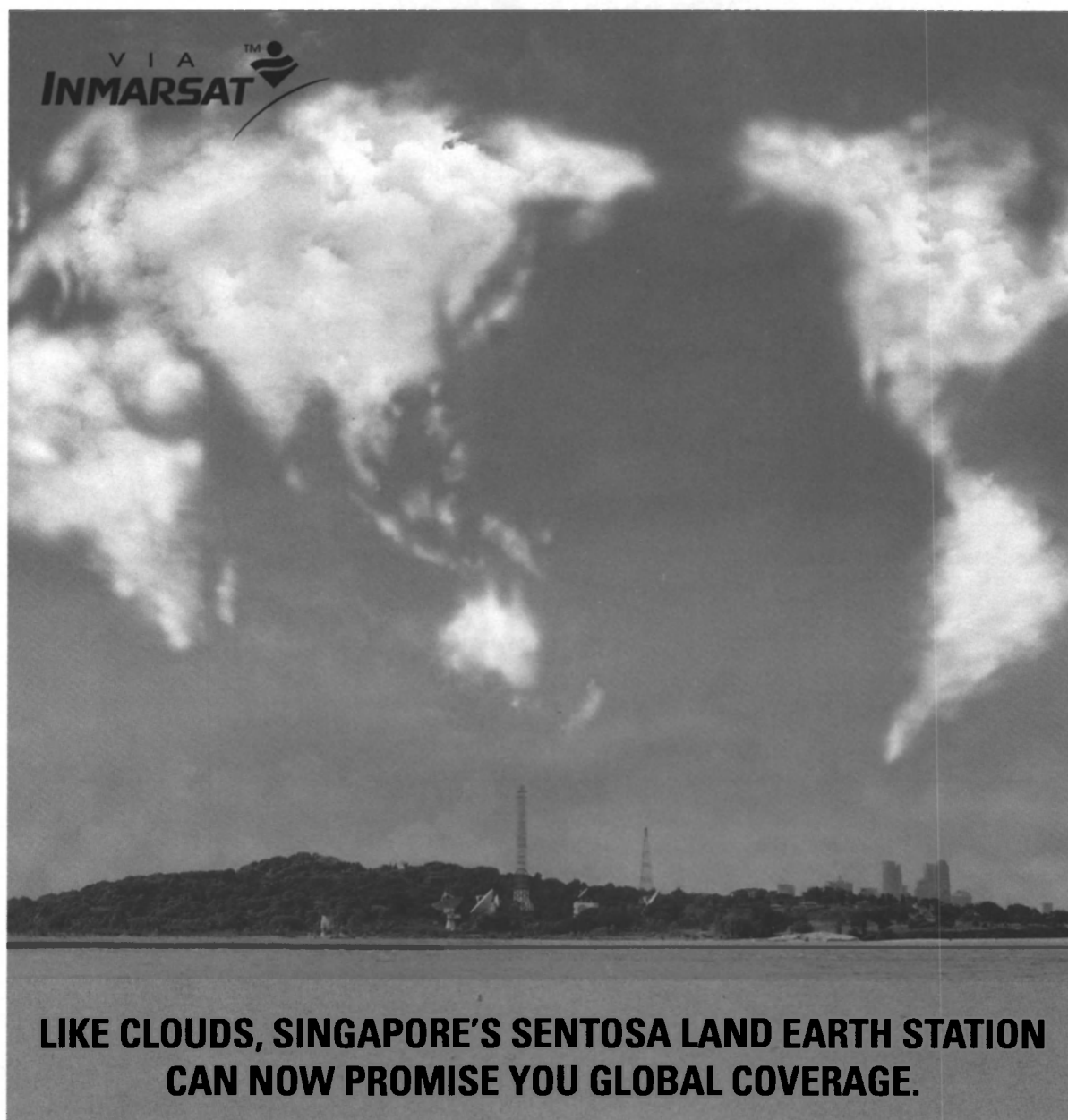
The FMV has also recently placed its Batch 2C deal for 40 Stridsbat (Combat Craft) 90 H craft with Swedish yards Dockstavarvet in Docksta and Gotlands Varv in Farosund. Six of the 20 boats to be built at Docksta are to be fitted out as command boats. Larger than Storebro's SRC 90 E design, the Stridsbat craft at 48.8 x 12.4 ft. (14.9 x 3.8 m) has a lightloaded displacement of approximately 13.5 tons. Twin Scania DSI 14S diesels driving FF waterjets give a loaded speed well in excess of 35 knots. The boats are built in all-welded aluminum and are heavily strengthened for forceful landing on unprepared beaches. The units have a high speed chine hull form with reverse sheer, shallow draft and a low profile for effective seagoing and shoreline camouflage.

Dockstavarvet is also progressing with an order for 16 Combat Boat 90 N vessels which have been specially configured for the rapid deployment of four seaborne light missile batteries forming part of Norway's new Hellfire Shore Defence System. The most recently delivered CB 90, KA 10 or *Trondarnes* has been fitted out with enhanced communications facilities.

Britons speculate on royal yacht

An announcement in the House of Commons confirming that \$106 million of public money is to be spent in the U.K. to replace *Britannia*, the Queen's 43-year-old yacht and diplomatic flag carrier, has spurred a flurry of speculation among British designers and shipyards.

Financing has been a factor in all schemes. Some proposals suggest replacement of *Britannia* by a pair of luxury cruise vessels, to be financed privately and operated on a commercial basis, with allowances for 40-day per annum use allocation for the British roy-



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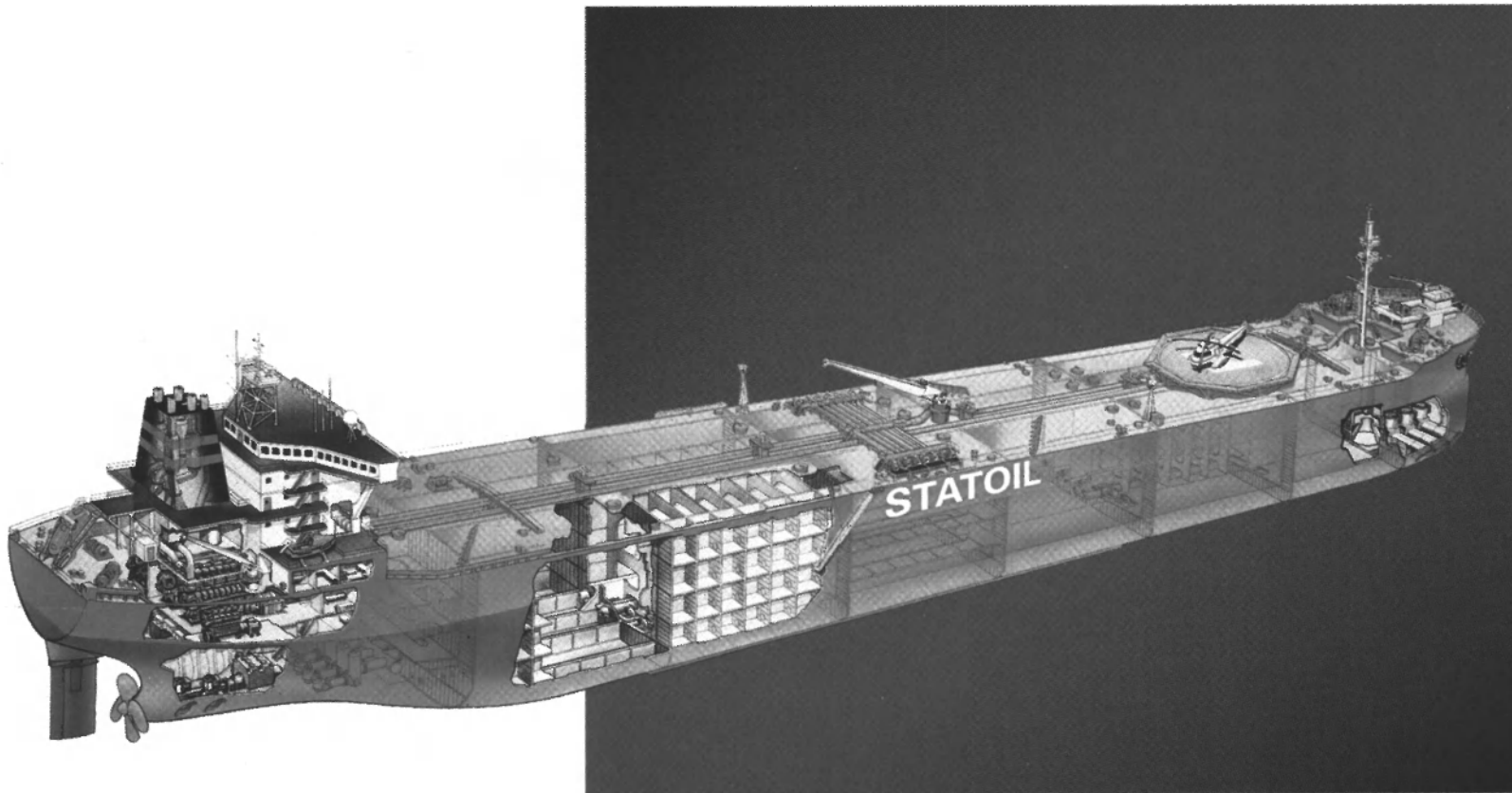
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Ship Repair Guide

(Continued from page 33)

Inc. (CDA), presented a paper on the advantages of using copper as an advanced marine construction material at the recent New Orleans conference. His presentation was based on a paper he co-authored with **Carol A. Powell**, a

British consultant to the CDA and the Nickel Development Institute.

Dr. **Peters** explained that applications for copper in the marine industry are quickly multiplying. "Copper alloys are used in a variety of things such as seawater piping systems and the auxiliary

hardware such as pumps," said the metallurgical scholar. Innovative uses of the substance in the marine sector include applications in fire systems onboard ships, in pipe structures for fire and process water on offshore structures, in condenser and heat exchanger tub-

ing onboard ships and coastal powerplants, and in desalination plants.

Riding In The Offshore Boom Wake

Some the newer applications of copper in marine construction have been spurred by the recent boom in offshore building. According to Dr. **Peters**, "Copper-nickel alloys are used to sheath spray/splash zones of offshore structures for corrosion protection." The substance reportedly offers added value in the long run for offshore operators due to the fact that marine barnacles and other pests cannot grow on copper. This protection against marine fouling is key to offshore structure operation, because such structures often corrode quickly in the spray/splash zone. The first company to make use of this technology was British Gas, which has reportedly protected a number of its offshore structures in the Morecamb Bay gas field off England with copper.

In addition, copper is also being used in the construction of smaller boats, particularly those sized from 50 to 60 ft. (15.2 to 18.2 m), including commercial vessels such as fishing boats and recreational craft such as personal yachts. The Copper Nickel Boat Co. in Deal Island, Md., formed a few years ago, is also reportedly talking about building a 48-ft. (14.6 m) pleasure craft with the material.

Copper is also being utilized in the construction of ships' hulls, which presents an important economic advantage when the costs of ship maintenance are considered. According to Dr. **Peters**, "Marine organisms do not want to grow on it; it's anti-fouling by nature." He also pointed out that this technology also offers a fuel-savings advantage because of a smoother hull structure which reduces overall vessel resistance in the water.

Next-Generation Innovation

Another copper ship hull application which is considered highly innovative is a sheathing technology whereby copper-nickel alloy (Alloy C 70600, 90% copper, 10% nickel) is applied over the existing hull of a large, oceangoing ship such as a tanker or containership. According to Dr. **Peters**, "The U.S. Maritime Administration funded an engineering study at Newport News Shipbuilding in the mid-



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1980s and studied the engineering of the system and the economics of doing it."

He further explained that while no shipbuilding interest has taken advantage of this technology, the NNS study proved that it is an efficient and economically prudent investment, in which the larger upfront capital costs of installing technology can be offset by savings in other areas in the long run. Dr. Peters also stated that the copper industry has demonstrated that use of this technology on large, oceangoing ships does not lead to rapid galvanic corrosion of ships' hulls.

While the maritime industry is not reknown for breaking with conventional methods of getting things done, many are hopeful that industry personnel will embrace the use of advanced construction materials such as copper. The challenge to this process lies in convincing people to sacrifice upfront costs for the technological and economical payoffs that will surely follow. In the meantime, several organizations are continuing to test advanced materials for marine applications in order to uncover operational advantages of new technology. One such organization is LaQue Corrosion Services in Wrightsville Beach, N.C., where an ongoing testing program on the use of copper in sheathed hulls and marine pilings is striving to perfect the next-generation innovations that will lead the industry into the 21st century. CDA has also reportedly carried on a program with oil companies over the past several years in order to perfect the use of copper as an offshore sheathing technology.

For more information on the use of copper as an advanced material for marine construction, contact the Copper Development Association at 260 Madison Ave., N.Y., N.Y. 10016, tel: (212) 251-7200; fax: (212) 251-7234.

Small Cruise Ship Gets \$4.1 M Upgrade

The 215 x 37 x 8.5-ft. (65.5 x 10.6 x 2.5-m), 107-passenger *Spirit of Endeavour*, the new flagship of Alaska Sightseeing/Cruise West (AS/CW), underwent \$4.1 million in renovations before sailing on its first series of cruises in November

1996. Built in 1983 at Jeffboat for Clipper Cruise Lines, *Spirit of Endeavour*, ex-*Newport Clipper*, was purchased by AS/CW in 1995. New design and shipyard work was performed by Pacific Fisherman Inc. and Elliott Bay Design Group of Seattle, and by

B.C. Research, Inc. and Nautican of Vancouver.

Shipyard refit work included installation of new bow and stern designs that are expected to increase the vessel's fuel efficiency by approximately 22 percent. A new bulb-like configuration forces

the current up and away from the hull, thereby reducing the bow wake and water resistance. A new stern ferring forces water to flow closer to the surface, creating a gently rolling wave that reduces the amount of drag created by the original stern. **Bryce Brockway,**

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Ship Repair Guide

senior manager of Engineering and Maintenance for AS/CW, said he believes that the vessel is the first U.S.-flagged, small cruise ship to undergo a bulbous bow modification. AS/CW reportedly tested the efficacy of the hull modifications by building a \$14,000, 1/20th-scale

model. B.C. Research tested several possible bulb designs in tanks located at the University of British Columbia which are especially equipped for measuring hydrodynamic resistance.

Other renovations included: fitting of a Novenco-HIPres fog sprin-

kler system; and installation of two CAT 3408 DITA diesel gensets with 350-kW generators, a 60-kW emergency genset, new emergency switchboard and a Nautican triple rudder system; and repowering with a pair of 1,500-bhp Caterpillar 3512B electronic injec-



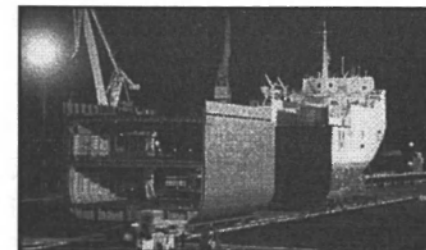
Spirit of Endeavour

tion turbocharged diesels, coupled with Reintjes reduction and reversing gears driving 56-in., four-blade nozzle propellers by Nautican. The ship was chartered to Tempress Cruises of Costa Rica for the winter and will return to Seattle in April to begin a season of seven-night Inside Passages cruises to Alaska. In the fall, the vessel will conduct cruises from San Francisco to the Sacramento River Delta.

For more information

Circle 74 on Reader Service Card

Bazan Carenas Tapped For Conversions



Bazan Carenas' work on the lengthening of *Benirredra* in early 1996 has led to the signing of contracts to lengthen two additional ships. The lengthening of *Benirredra*, which is owned by Contenemar Co., was carried out at the company's repair center in March. The shipyard added a 69-ft. (21-m) midsection — effectively increasing the ship's load capacity by 50 percent while improving maneuverability. The work was carried out in four weeks.

Recently, Bazan's Center of Repairs signed two new contracts for the lengthening of *Benijofar* and *Rolon Bahia Alcudia*, which have the same main particulars as *Benirredra*. *Benijofar* is also owned by Contenemar, while the latter belongs to Transportes

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Ship Repair Guide

Maritimos Alcudia. Work on the ships is scheduled for the second quarter of 1997.

For more information on Bazan
Circle 4 on Reader Service Card

Alufast's Challenge: Transform Ugly Duckling

Alufast took on a complete conversion job last year, which, in the company's words, entailed the total remodeling and refurbishment of the "ugly duckling" *Reef Trek* into a stylish, modern mini-cruise liner dubbed *Haumana*.

According to **John Mason**, managing director, there was nothing on the vessel that wasn't lengthened, remodeled or replaced.

The hull was lengthened 6.5 ft. (2 m) at the stern, in order to house spiraling staircases which lead passengers onto the glass bottom boat's launching platform. This doubles as a huge diving and swimming platform when it is lowered from the main deck level.

Haumana was fitted with new engines, generators, air conditioning and electrical circuiting. A new upper deck was fitted, offering passengers a luxury lounge area with both totally and partially enclosed areas. All of the original 20 cabins were removed and replaced with 22 newly decorated cabins.

Owned by Bora-Bora Cruises Cie, the vessel will operate short cruises through island lagoons in the islands around Bora-Bora.

Other companies involved in the refit work were Harris Marine (for decoration and outfit); E.J. Electrical, Australian Air-Conditioning Services; Sea West Engineering; and Fairway Marine (for painting).

For more information on Alufast
Circle 5 on Reader Service Card

New Marine Travelift Product Offers Flexibility

Marine Travelift's 100 BFM is engineered to handle loads up to 100,000 kg. The beam forward, sling-based design reportedly provides boat handlers with a

quick and flexible way to service a wide range of boat types. Operated from the centrally located operator's station, the 100 BFM minimizes the need for a large crew.

Heavy duty construction makes the 100 BFM durable, as the main

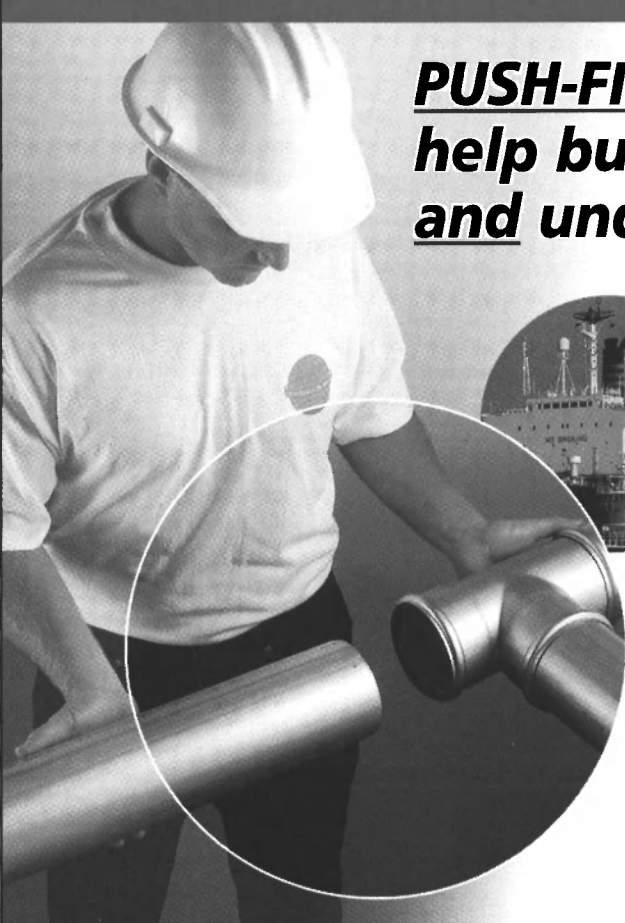
frame is composed of high-strength, low alloy steel. Hydraulic tubes are all stainless steel, while the pivot trunion design permits side frames to rotate over uneven terrain.

Marine Travelift also offers the

300 BFM model, which is designed to lift up to 300,000 kg.

For more information
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(SHIP REPAIR GUIDE
continued on page 94)



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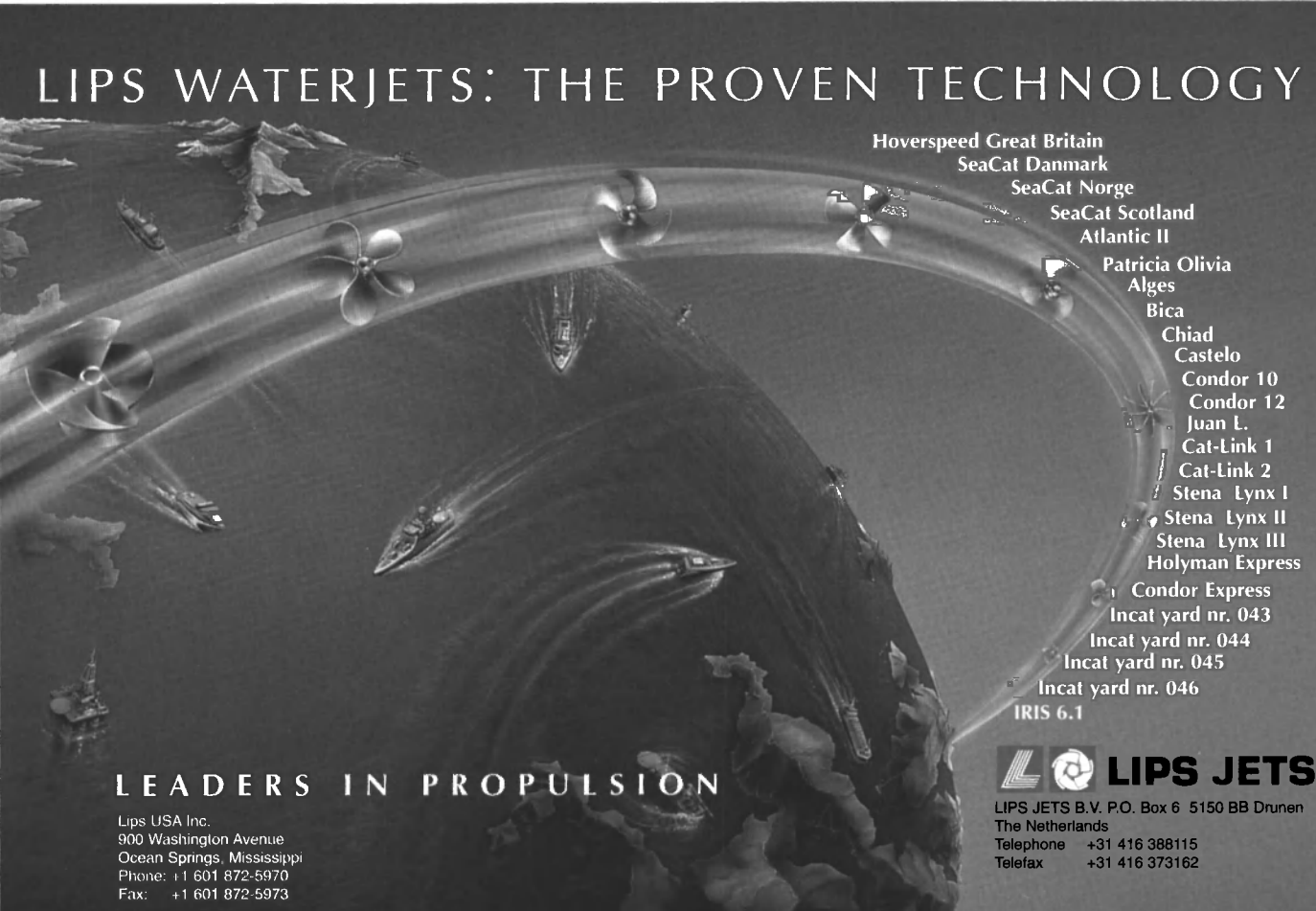
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Circle 335 on Reader Service Card



March, 1997

DOUBLE VISION

Touted for safety, double hull tankers nonetheless present technical challenges on many fronts

By David Tinsley, technical editor

Double hull tankers inherently have greater structural complexity, and thus increased steel input, welding and coating requirements, relative to their single-hulled predecessors.

Although the concept is not new, having been employed in product tankers, OBO carriers and membrane-type LNG carriers built prior to the legislation initiatives of the 1990s, the adoption of such configurations for large oil tankers is a steep change for operators, designers and shipyards.

Long in the forefront in the application of shipyard automation techniques — one milestone having been its commissioning of a welding robot at the start of the 1980s — Hitachi Zosen has developed a comprehensive system based on computer integrated manufacturing principles, for the production of crude carriers and other vessel types.

Defined by Hitachi as computer integrated management (CIM), the arrangements applied at its showcase Ariake yard break new ground by integrating product information, melding computer aided engineering (CAE), CAD, CAM, factory automation (FA) and production planning and management into a comprehensive production management system.

The new, integrated system links with the company's in-house developed Hicadec-H and Hicadec-P CAD systems for hull and piping design. Among its many attributes, it enables users to determine hull structure interaction, block weights and centers of gravity, assembly sequences for blocks, shop floor planning and workhour estimates. Through its simulation capabilities, CIM facilitates calculations regarding optimum arrangements for lifting and turning blocks.

CIM should progressively enhance productivity across a broad front, enabling Hitachi to retain the kind of competitiveness which has recently enabled the company to land consecutive contracts from Golden Ocean Group of Taiwan, Bermuda and the U.K. for a series of 310,000-dwt, double hull tankers. The VLCCs are due to be handed over in 1998 and 1999.

Innovative thinking spurred by the need to retain market competitiveness is encapsulated in Kawasaki Heavy Industries' Apple Slot design concept. The new structural design approach dispenses with conventional stiffeners in the transverse webs, through the use of apple-shaped slots at the connections between webs

and longitudinals.

Adoption of the Apple Slot system would mean about 25 percent fewer structural members compared with a conventional double-hulled VLCC of two million barrels or 280,000 dwt carrying capacity.

Approved by leading classification societies, the simplified structural design thereby offers savings in materials and workhour levels, facilitating higher levels of factory automation. In addition, by challenging the axiom that stiffeners are necessary, through the use of alternative compensatory measures, the designers have addressed the problem of stress concentrations at the stiffener/longitudinal connections associated with conventional arrangements.

Danish shipbuilder Odense has already used a slot method for the connections between longitudinals and the transverse structure in AP Moller's E-type, 300,000-dwt, double-hulled crude carriers. The overall design of the Eleo Maersk series is widely acknowledged as representative of an important advance in VLCC technology.

Symmetrical T-beams used as the longitudinal elements were slotted through the transverse members in both the inner and outer hulls, without the need for collars, as typically used in VLCC construction. Longitudinals were cut and fabricated by the yard to tolerances of plus or minus .9 mm in conjunction with the new form of structural connection, achieving high build precision and improvements in the quality of welding.

The method results in less welding than would have been entailed in the conventional approach to a double-hull VLCC, and enabled robotization to be applied to critical weldings to the benefit of consistency and accuracy.

The precision engineer-

ing principles applied to the Eleo Maersk class, commissioned into AP Moller's Maersk Tankers division between 1993 and 1995, meant that the number of components in the structure was 20 percent fewer than other designs, with resultant savings in fitting and welding. The design and build method, along with the adoption of heavier scantlings in certain areas of the bottom structure, is said to have made for a fatigue-resistant hull.

Three Suezmax crude carriers ordered by Samsung Heavy Industries by Nordic American Tanker Shipping for duty with the BP Shipping fleet will be repositories for the U.K. operator's latest thinking in shipmanagement techniques, as expressed in shipboard monitoring, maintenance and communication systems. The layout of the 150,000-dwt class is of added interest for the embodiment of a simple but innovative method of improved bunker tank protection.

The IMO legislation adopted internationally in 1992 that imposed double hulls on the tanker industry only requires a double bottom and double sides in way of the cargo section. BP, though, was concerned with the pollution hazard that could be presented if the fuel oil tanks in the aftship were to be breached in a collision. It has



Germany's Lindenau built this environmentally friendly double-hulled tanker. The general arrangement drawings of the ship can be found on page 41.

accordingly developed a straightforward method of protection that forms a low-cost alternative to the non-compulsory extension of the double shell aft. Its solution, built into the trio of crude carriers under construction at Kojé Island, is to incorporate flat longitudinal bulkheads in each bunker tank port and starboard. The resulting outer compartment of each fuel oil tank, accounting for approximately 20 to 30 percent of capacity, is of approximately the same width as the double hull around the cargo section.

The 79 to 80 percent of fuel in the inner compartment therefore has the equivalent of double shell protection while the hydrostatically balanced loading (HBL) principle can be used in the outer part to reduce outflow in the event of penetration. The arrangements are said to represent just a fraction of \$500,000 to \$1 million cost associated with double-hulling aft, and the attendant affect on engine room layout and pipe runs.

In Germany, Lindenau Werft's proactive approach to tankship design and construction, demonstrated in the Tanker Class 2000 concept, has borne fruit in a succession of contracts over recent years. The Kiel yard's objective has been to devise a vessel type offering operating and build efficiency against a backcloth of new environmental and safety legislation, and increasing market expectations in the way of performance and quality.

The completion of the 32,250-dwt product carrier *Seadevil* in the latter part of 1996 signified a new highpoint for Lindenau. The vessel is not only the biggest built to date by the yard, but is also the largest double hull tanker in the German merchant fleet. Carl Buttner's *Seadevil* (pictured to the left, diagram on page 41) provides a revenue-earning volume of 38,600-cu-m, whereby the cargo section is bounded by double sides and a double bottom. The double hull configuration is claimed to be four times more resistant to collision damage than single hull construction, acknowledged by Germanischer Lloyd through its class notation COLL 3 for all cargo tanks. The German yard says the arrangements will safeguard the cargo section even if the outer shell has been penetrated to a depth of 6.6 ft. (2 m), and that the increased protection against collision damage has attracted a reduction in insurance premiums.

Seadevil provides the first example of Lindenau's of athwartship 'volume' bulkheads. Stooled at the base and formed like a tank, presenting completely smooth surfaces to the cargo, the arrangements facilitate faster unloading and rapid but effective washing.

The design principles embodied in *Seadevil*, as in preceding new-buildings of 23,500 dwt and 13,100 dwt, are applicable to tankers as small as 1,500 dwt, and up to the 40,000 dwt vessel now possible on Lindenau's widened berth. More than 100 variants are offered,

allowing choices such as any ice class, hydraulic or electric deepwell pumps, and stainless steel tanks and propulsion systems.

Continuity of high-grade tanker production at Kiel has been ensured through an order from Italy's Emiliana Marittima for a

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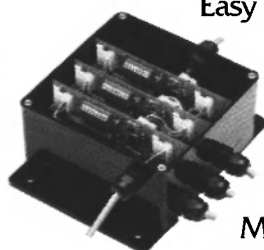


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TANKER TECHNOLOGY

14,000-dwt chemical carrier, whose closely-guarded design draws on know-how from the Tanker Class 2000 program.

Redundancy is a widely discussed theme in the industry today, but relatively few large, cargo carrying ships incorporate what can properly be described as

redundant propulsion systems. The tendency in new crude carriers towards service speeds one or two knots higher than that offered by earlier tonnage has seen larger amounts of power put through single shaft, single screw installations, although nothing like on the scale seen in the wider-than-Pana-

max containership sector.

All the more significant, therefore, is the fact that one prominent Scandinavian fleet operator is considering the use of two diesel engines and twin screws for an envisaged class of Aframax new-buildings. Moreover, Atlantic Richfield fleet subsidiary Arco

Marine is planning to adopt twin propellers, twin rudders and two completely redundant propulsion and electrical systems in a new class of tanker for the U.S. Pacific seaboard trade.

The double-hulled design, to be developed with Maritech funding by Arco in conjunction with National Steel & Shipbuilding Co., is intended as a replacement class for single-hulled tankers transporting crude oil from Alaska to refineries on the West Coast. Through its New York affiliate, MAN B&W Diesel is assisting with engine room design aspects of the project. Electric propulsion is central to a seminal new class of vessel, the multi-purpose shuttle tanker (MST), constructed in South Korea to the specific design requirements of the Norwegian state energy group Statoil. The 103,000-dwt *Berge Hugin* constitutes an advance in offshore tanker technology, raising Samsung Heavy Industries' profile as a builder of value-added tonnage, and providing the market with a versatile class of ship to support the development of marginal oil fields.

The MST concept embodies submerged turret loading (STL) and submerged turret production (STP) technologies, and an advanced dynamic positioning (DP) system which includes the use of twin tunnel thrusters in the bow and a retractable, azimuthing thruster in the afterbody.

In standard format, the MST can be used in a shuttle tanker or floating storage and offloading (FSO) role, while lending itself to rapid and economic adaptation for production duties as an floating production, storage and offloading (FPSO) unit. Thus, after an opening year of service in the North Sea from around March this year, *Berge Hugin* is to be retrofitted with an STP swivel and processing equipment for FPSO deployment on BP's Pierce field in 1998.

Given follow-on contracts from Statoil for two such ships in various configurations, plus options on three more, Samsung is looking to continuity in MST construction for several years ahead. Encapsulating Statoil's expertise as the world's largest operator of shuttle tankers, and as an innovative, far-sighted energy group, *Berge Hugin* points the way in offshore tanker design, conferring an unparalleled degree of operating flexibility and productivity in a single ship.

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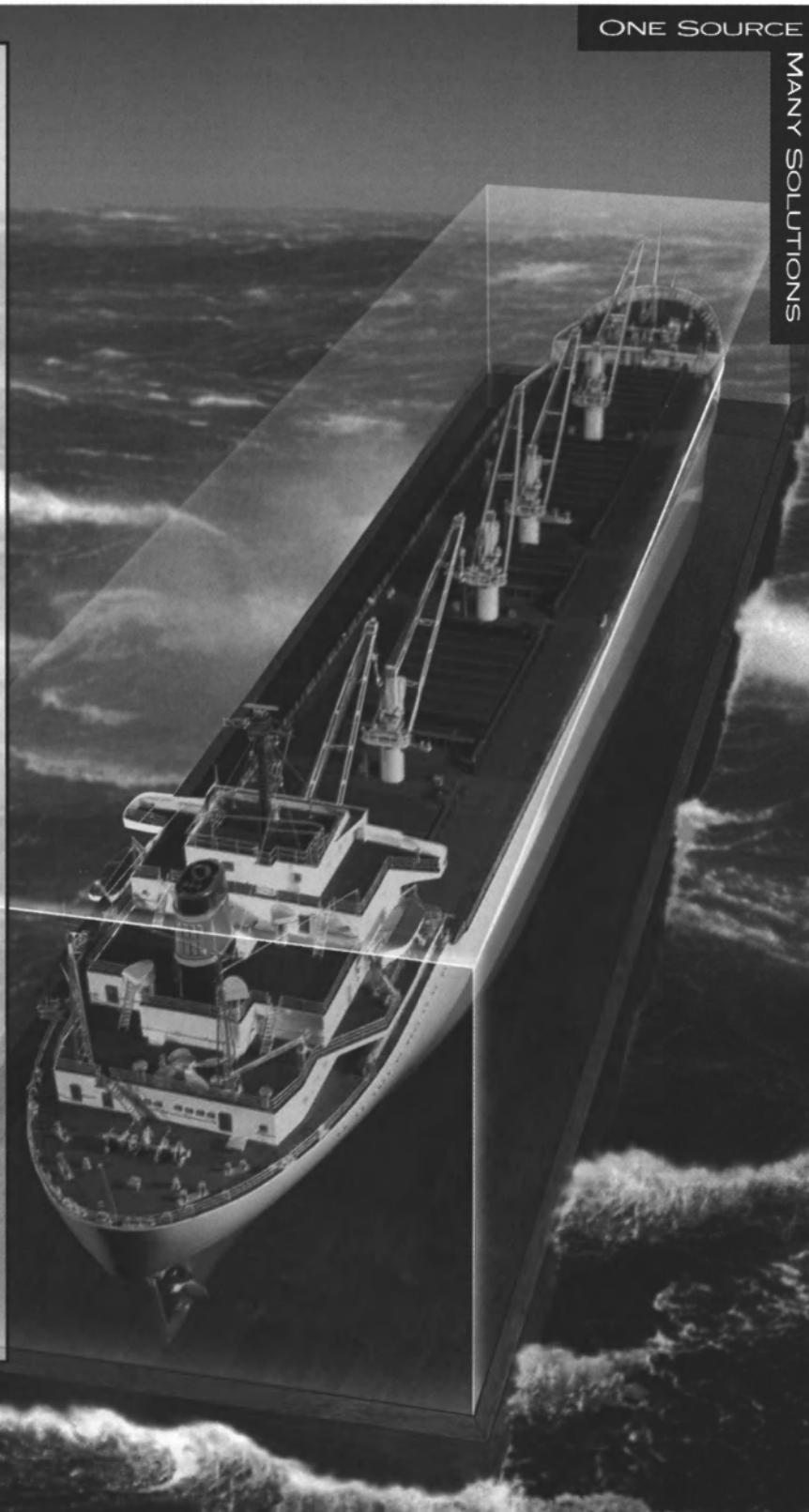
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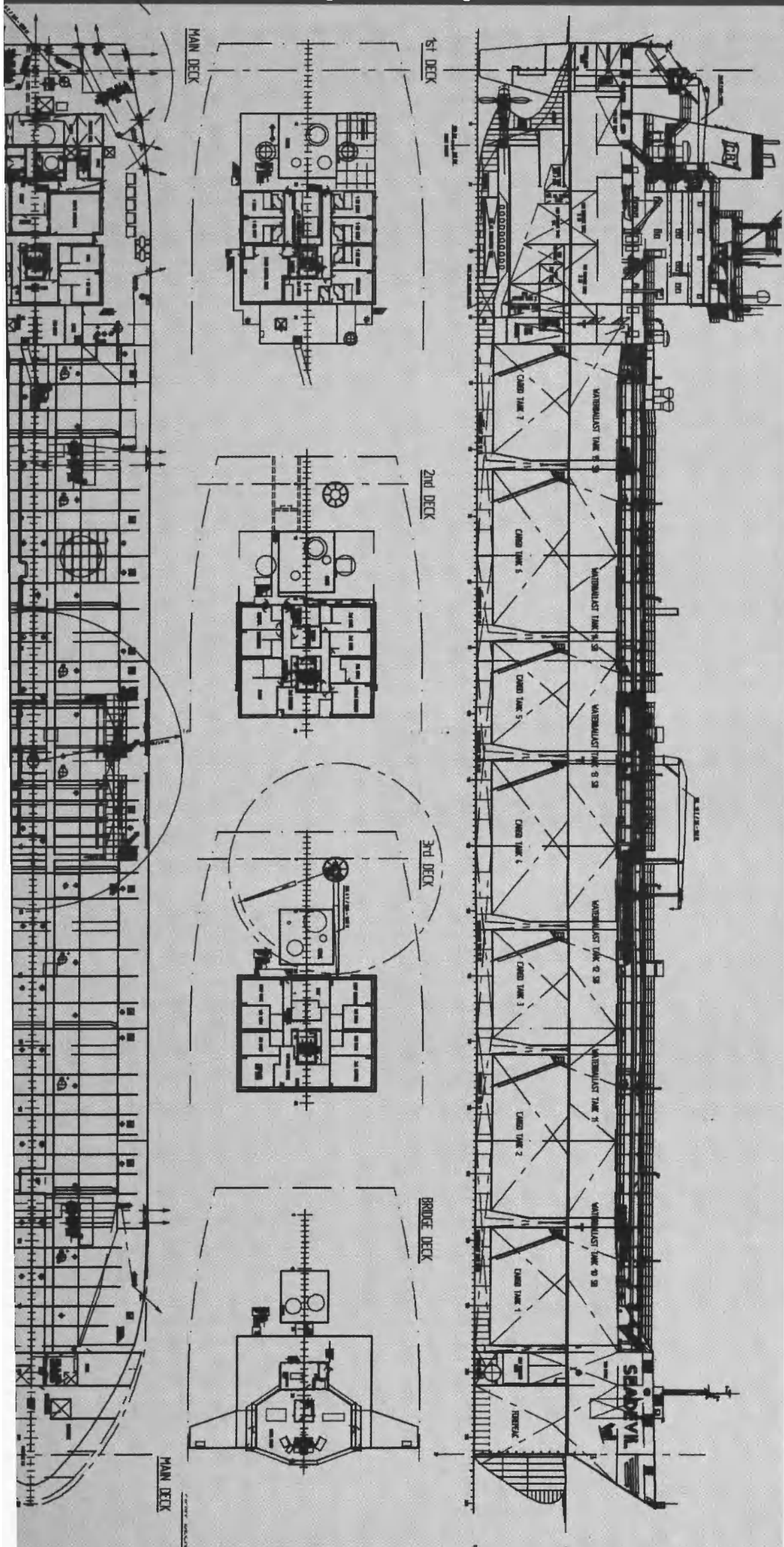


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(Partial) General arrangement drawings of Lindenau-built *Seadevil*.



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TANKER TECHNOLOGY

KMY Delivers Third LNG Carrier To ADNOC

The naming of the third of four LNG carriers built by Finland's Kvaerner Masa-Yards Turku New Shipyard for Abu Dhabi National Oil Co. (ADNOC) took place in

early November 1996. The ship, dubbed *Al Hamra* (pictured on this month's cover), is a 135,000-cu-m LNG carrier and was delivered in January. The last ship in the series is scheduled for delivery in May. The series is a technological-ly advanced type which has received much acclaim in these

pages since the contract was signed in April 1993. The first two vessels — *Mubaraz* and *Mraweh* — were delivered in January and June 1996, respectively. These two have been successfully engaged in transporting LNG from Abu Dhabi Gas Liquefaction Co. to Tokyo Electric Power Co. in Japan.

The LNG cargo containment system is based on the Kvaerner Moss-type spherical aluminum tank design. The carrier has only four spherical aluminum cargo tanks — each with a tank inner diameter of 40.4 m — which helps to simplify cargo systems and operations. The LNG tank manufacturing method was developed at the Turku New Shipyard.

For more information on the advanced LNG Carriers

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Converted Tanker Serving Maui B Offshore Field

Mitsui Engineering & Shipbuilding, jointly with its affiliated company Modec, delivered a Floating Production Storage & Offloading (FPSO) unit to Shell Todd Oil Services Ltd. of New Zealand. Named *Whakaaropai*, the FPSO was converted from a crude oil tanker. Newly installed is on-deck process facilities and a special turret mooring system.

After conversion work at a yard in Singapore, the unit sailed to the Maui B offshore oilfield located about 50 km from the west coast of North Island, New Zealand. The 833-ft. (254-m) FPSO has a maximum production capacity of 43,200 bbl/day, and a crude oil storage capacity of 660,000 bbl.

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W-3

Circle 236 on Reader Service Card

Lindenau Launches Advanced Double Hull

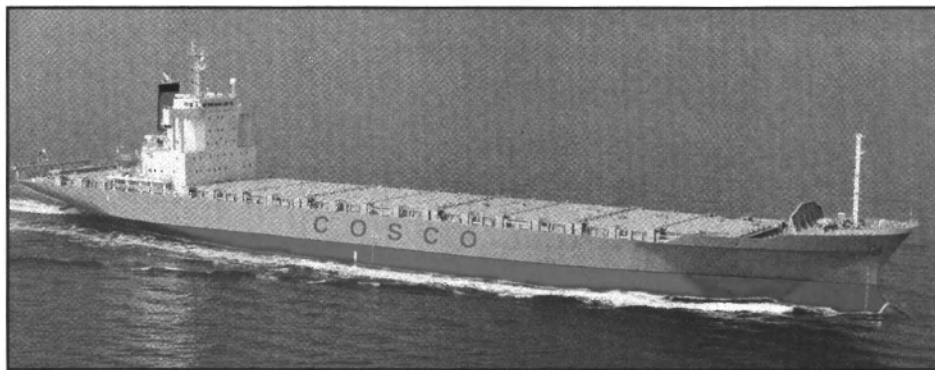
Lindenau GmbH has launched hull no. S 245, a 12,000-dwt, double-hulled oil and chemical tanker, the first of two vessels for Marichem Europe S.r.l. The shipowner requested that the tanker have a maximum length of 393 ft. (120 m); a maximum draft of 27 ft. (8.2 m); a minimum deadweight of 12,000 tons; and a speed of 15.5 knots. According to the yard, the request produced a vessel with a hull with a very unusual length to beam ratio and a relatively high block coefficient.

The ship is outfitted with an integrated computer control and operation system for cargo, machinery, navigation, communications and preventive servicing. It features a redundant propulsion system, as there will be a shaft generator installed which can be used either

(Continued on page 44)

Exporting Ships From U.S. To China

Alabama Shipyard Wins Containership Contract



In another boost to U.S. yard expansion into commercial business, Alabama Shipyard was recently tapped for participation in a containership project facilitated by the popular Title XI financing program.

COSCO Line (America) and Alabama Shipyard have completed the contract process for four 600-ft. (182-m), 1,432-TEU containerships. The vessels will be financed with the long-term financing guarantees provided by the U.S. Maritime Administration's Title XI program in the amount of \$138 million.

"This is significant recognition by a premier international shipping line that America can effectively compete in the international market," said U.S. Maritime Administrator **Albert J. Herberger**. "It also is the first time that the People's Republic of China and the U.S. have entered into a ship construction agreement."

Engineering will commence immediately, and the first ship is scheduled for delivery in 1999. The ships will be propelled by a slow-speed, two-cycle, direct reversible crosshead diesel engine driving a FP, five-blade propeller, producing a planned service speed of 19.1 knots.

The ship will feature a bulbous bow, raked stern and a transom stern with the deckhouse located over the machinery space aft of the No. 4 cargo hold.

The ship is divided by eight watertight trans-

verse bulkheads providing five cargo holds with a maximum carrying capacity of 522 twenty and 40-ft. containers below deck, and 835 twenty and 40-ft. containers above deck. There will be 130 receptacles for refrigerated containers (a mix of water-cooled and air-cooled boxes). The ship will be built in accordance to ABS rules.

For more information from Alabama Shipyard
Circle 16 on Reader Service Card

Alabama Containership Particulars

Length, o.o.	182.9 m (600 ft.)
Length, b.p.	172 m (564 ft.)
Breadth, molded	27.6 m (90.5 ft.)
Depth, molded	45.9 ft. (14 m)
Design draft	10 m (32.8 ft.)
Scantling draft	10.1 m (33.1 ft.)
Deadweight	23,850 tons
Gross tonnage	16,800
Propulsion machinery	Slow speed diesel engine of 16,000 bhp operating @ 101 rpm
Generation machinery	3 sets of 1,300 PS diesel engines operating @ 720 rpm, generating 1,100 kva each.
Speed, full displacement	19.1 knots @ 14,400 PS
Register	Panama
Classification	ABS
Fuel oil capacity	2,800 cu. m.
Diesel oil capacity	130 cu. m.
Fresh water capacity	240 cu. m.
Water ballast capacity	5,150 cu. m.
Accommodations	25 persons

CONFERENCE PREVIEW

The Safe Operation Of Tankers In Coastal Waters

The Institute of Petroleum, in association with the Nautical Institute, is organizing a major international conference on The Safe Operation of Tankers in Coastal Waters and Approaching Terminals. Scheduled to take place May 8 to 9 in London, the conference will follow shortly after the expected date of publication of the U.K. Marine Accident Investigation Branch report on the *Sea Empress* accident.

The two-day conference is expected to draw between 200 and 250 top executives, and the topics to be discussed include: tanker handling behavior at slow speeds and in shallow water; the safety of double hull structures; and Escort tugs in operation - the experience at Norwegian terminals and in the Solent.

For additional information on the conference contact **Jane Hill**, conference manager, The Institute of Petroleum, 61 New Cavendish St., London W1M 8AR, U.K.; tel: +44 171 467 7100; fax: +44 171 255 1472.

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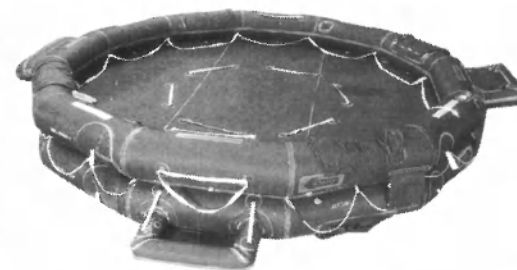
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Circle 21E on Reader Service Card

(Continued from page 42)

as an electrical drive motor for propulsion or a generator. In case the main engine fails, or the master decides to run the ship at a lower speed, the main engine can be de-coupled and the ship can be propelled with the electric motor

only. Aside from the main propulsion system, the ship will have a bow and stern thruster, as well as a HSVA high-efficiency rudder.

The complete steel construction of the ship is carried out as a double hull for the cargo tanks as well as the fuel tanks.

There are a relatively high num-

ber of cargo tanks (14) for a ship this size, which allows the vessel to be very flexible in respect to the number of cargoes it can transport.

For the loading and unloading of all cargo tanks, electrical deepwell pumps are installed.

For more information from Lindenau

Circle 75 on Reader Service Card

Consilium AB Acquires Metritape

The acquisition of Metritape Inc. by Consilium AB of Sweden is final. Metritape develops, manufactures and markets patented systems for gauging liquid levels in both marine and land-based applications. On ships, its products are used for measuring the level and temperature in cargo, fuel, ballast and service tanks aboard all types of ships. The Metritape level gauging system will be added to Consilium's growing family of marine products, which include equipment for tank cleaning, fire and gas detection, navigation, speed measurement, low-level lighting and security.

For more information on the Consilium product line-up

Circle 25 on Reader Service Card

Daewoo Captures Key Tanker Contracts

Daewoo's Shipbuilding Division won several important tanker contracts at the end of 1996, and put the yard within reach of its new order target of \$2 billion per year.

OMI Corp. ordered two 156,000-dwt crude oil tankers, with options for two identical ships. Maersk Tanker ordered a 125,000-dwt shuttle tanker for the Schiehallion Field, a vessel that will feature bow and stern thrusters for dynamic positioning. The year-end was rounded out with orders for two 135,000-cu-m, membrane-type LNG tankers for two Korean firms — Yukong Corp. and Korea Line Corp.

For more information on Daewoo

Circle 20 on Reader Service Card

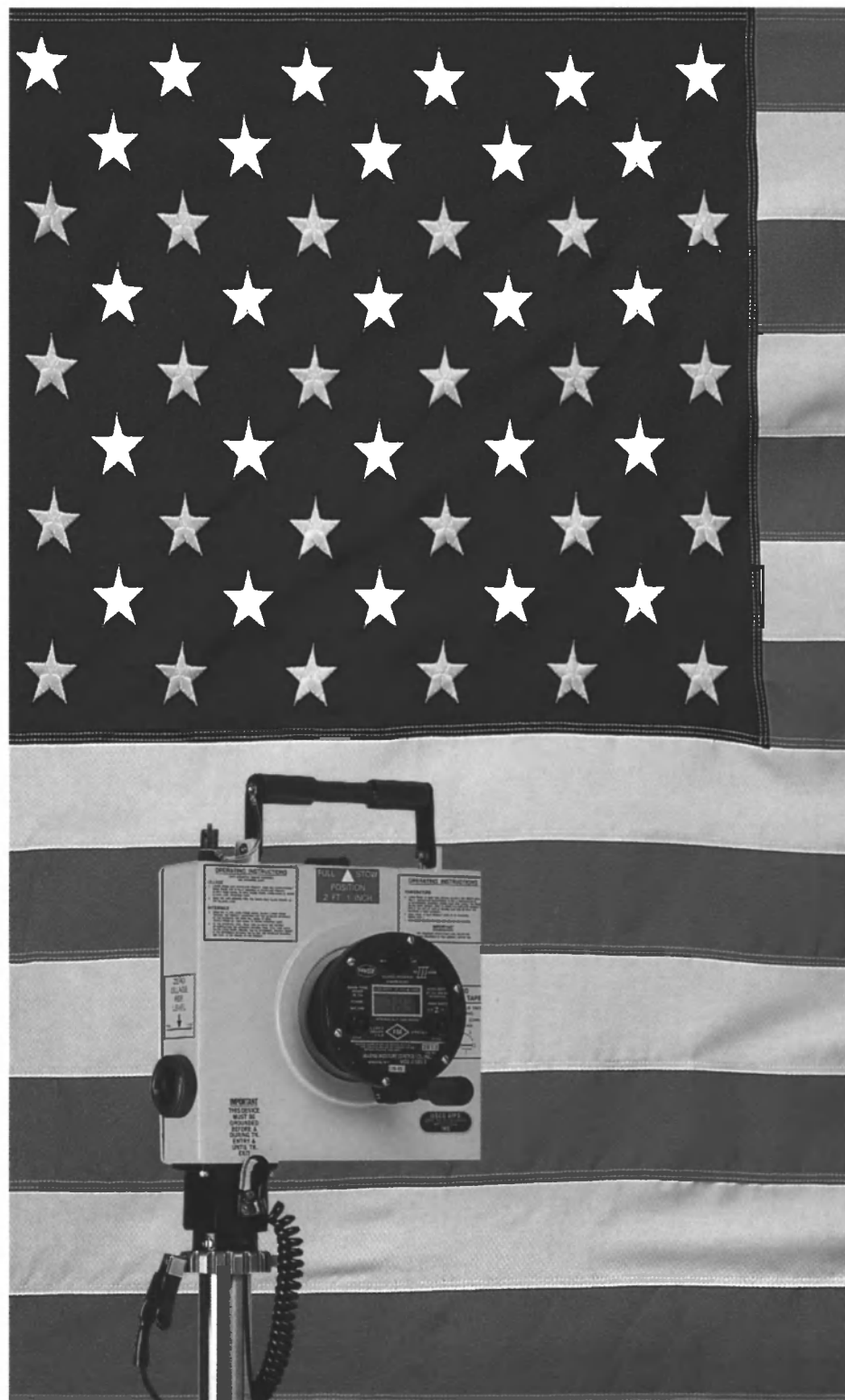
Chevron Taps Marinor For IT Solution

Chevron Shipping Co. has entered into a service contract with Marinor, a leading supplier of integrated IT solutions to the shipping and offshore industry, to develop a pilot project implementing Marinor's RASTwin Operation & Maintenance System and EDI-MAR Data Exchange System on three Chevron oil tankers. If the project is a success, the Marinor system will be implemented on Chevron's fleet of 35 ships.

For more information on the Marinor system

Circle 21 on Reader Service Card

50 GOOD REASONS FOR CHOOSING MMC TANK GAUGING TAPES.



"Made in America" might be the best reason for choosing an MMC Closed Trimode™ gauging tape shown here, but there are others:

Ease of operation — With a single penetration you'll measure ullage, interface and temperature. A steady tone sounds when the probe reaches oil, an intermittent tone when it senses water; the temperature appears on an LED display in the hub.

Accuracy — The electronic sensor is accurate to +/- 1/8 inch (3mm); for dryness, 3/8 inch (10mm) of bottom. The tape is available with either metric or feet/inches markings.

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Circle 271 on Reader Service Card

Advantages Of Electronic Portable Tank Gauging

The International Maritime Organization (IMO) has mandated certain directives concerning the measurements of cargo onboard tank ships, including oil/water interface detection for slop tanks, tank dryness dipping and the percentage of oxygen in the inerted ullage space of cargo tanks.

These mandates offer new challenges for the improved supply of portable electronic tank gauging instruments (ullage, oil/water interface, temperature measurements and oxygen sensing) with associated mechanical cargo sampling and sounding tapes and accessories.

Two of the most prestigious petroleum technical associations — the American Petroleum Institute and the Institute of Petroleum Engineers — are continually updated their standards for restricted and closed (gas-tight) gauging, sampling and sounding, providing worldwide industry guidelines for the acceptance of these portable measuring devices.

In addition to the gauging, sampling and sounding standards, the API and IP have updated their oxygen-sensing standards.

The advent of restricted and closed (gas-tight) gauging provides a number of significant advantages, including saved time and labor, improved accuracy and repeatability, and reduced atmospheric pollution.

Moreover, the electronic sensing capabilities of these types of portable gauging systems allow gaugers with less training and experience to operate equipment, with more reliable results than in the past.

In order to change from open gauging to restricted or closed gauging, shipowners are required to install at least one vapor lock (vapor control valve) on each cargo and slop tank. This gives operators tank access for electronic tank gauging instruments, along with sampling, sounding and oxygen sensing equipment.

This portable combination (UTI gauging tape and vapor lock) achieves two results for independent surveyors hired to verify the quantity of cargo loaded or ready for discharge.

The high quality portable gauging equipment available today delivers excellent resolution.

The preceding was excerpted from a paper from William Henry, president, MMC International Corp. MMC International is a leading manufacturer of portable gauging equipment. MMC vapor control valves and gauging tapes are in service on thousands of tankers.

For more information on MMC's products
Circle 19 on Reader Service Card

IT'S SHOW TIME

The following are some upcoming industry conferences and exhibitions which may be of interest to those in the tanker market.

Shipping '97: March 17-19, Stamford, CT.
Contact: **Carleen L. Kluss**, International Marketing Strategies, 28 Southfield Ave., Stamford, CT. 06902, tel: (203) 406-0106; fax: (203) 406-0110.

1997 Ship Production Symposium: April 20-23, New Orleans, La.
Contact: **Deborah Felts**, P.O. Box 0092, Pascagoula, MS 39567, tel: (601) 935-2781; fax: (601) 935-6838; e-mail: ltsdc@ingalls.com.

Offshore Technology Conference '97: May 5-8, Astrodome U.S.A. Complex, Houston, Texas.
Contact: Offshore Technology Conference, P.O. Box 833868, Richardson, Texas 75083-3868, tel: (214) 952-9494; fax: (214) 952-9435.

The Safe Operation of Tankers in Coastal Waters and Approaching Terminals: May 8-9, Duchess Mews, London, U.K. Contact: **Jane Hill**, Conference manager, The Institute of Petroleum, 61 New Cavendish St., London W1M 8AR, U.K., tel: +44 171 467 7100; fax: +44 171 255 1472.

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TANKER TECHNOLOGY

Hitachi Zosen Completes LPG Carrier

Antwerpen Venture, a 39,000-cu-m LPG carrier ordered by Cedonia Shipping, was completed by Hitachi Zosen's Ariake Works. The LPG carrier is Luxemborg regis-

tered and classed by DNV. It features three cargo tanks constructed of steel for low temperature service. The tanks are also designed for the transport of other liquefied gases, including ammonia and vinyl chloride monomers. The ship features a central control station, which monitors and controls both

cargo-handling equipment and the engine plant. Positioned in the wheelhouse, the system allows for one-person operation. Powered by a Hitachi Zosen MAN B&W diesel engine, the 25,337-gt ship is powered to 19.7 knots.

For more information from Hitachi Zosen
Circle 22 on Reader Service Card

New Insert Provides Continuous Level Indication For Deep Tanks

For deep tank monitoring over 20 ft., GEMS offers the Roll Out Linear Insert (ROLI), which was designed to offer accurate measuring of true level within + .5 in. The patented ROLI is, essentially, a flexible version of the voltage divider/processor insert assembly used in Gems Sensors' standard transmitter assemblies. While the ROLI system is normally used to measure liquid level in tanks deeper than 20 ft., it can be installed in tanks of any depth.

For more information on ROLI
Circle 23 on Reader Service Card

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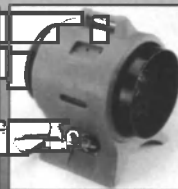
A perfect workhorse for small confined spaces. Available in several configurations including 115v 60Hz, 230v 50Hz, 12vDC and a blower only version.
* Stackable feature



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Airflow: 848 cfm (24 m³/min.)

VAF-3000

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* Stackable feature



Accommodates 12" (30.48 cm) duct
Weight: 32.5 lbs (14.74 kgs)
Airflow: 2091 cfm (59 m³/min.)

VAF-8000

Ideal for extra large confined spaces or for ventilating smaller areas in a shorter time period. Available in 220v 50/60Hz 3 PH and 220/440v 50/60Hz 3 PH. A 220v 50/60Hz 1 PH and a pneumatic version will be available soon.



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Circle 255 on Reader Service Card

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System Features

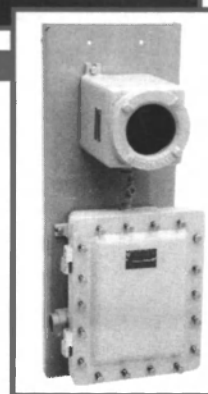
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Circle 245 on Reader Service Card

Gearbox Allows For Added Cargo Space

Valmet Power Transmission was recently chosen by Stolt-Nielsen to provide the propulsion gear drive for its chemical tanker under construction in Italy. The tanker, the first of three ships, will be delivered in August. The Valmet reduction gearbox chose has a "locked-train" system for increased redundancy and safety. The gearbox has a fabricated steel housing, which allows for flexible layout possibilities and fitting the gearbox into a limited space. This efficient space utilization allows for, in the end, optimal use of cargo space.

For more information from Valmet
Circle 24 on Reader Service Card

Infrared Gas Analyzers For Oil Tanker Pumphrooms

Opus 8000 is an integrated gas and temperature monitoring system from TQ Environmental plc. The system continuously monitors the atmosphere in the pumphroom for dangerous levels of hydrocarbon gas, while the PT100 probe provides continuous temperature monitoring of the cargo pump bearings.

The infrared gas analyzers are designed to provide accurate, reliable monitoring. Due to the analyzers' infrared source, there is reportedly no requirement for recalibration during the lifetime of the sensor. The gas detector can operate in an inert gas atmosphere.

For more information from TQ
Environmental

Circle 26 on Reader Service Card

ASNE Shew To Be Held In U.S. Capitol

The annual meeting of the American Society of Naval Engineers, ASNE Day 1997, is scheduled to take place in Washington D.C., from March 19 to 20. This year's conference will include a one-day forum allowing industry and government representatives to tackle key aspects of the Department of Defense's (DoD's) Acquisition Reform initiatives.

The session is scheduled to be conducted on March 19.

The DoD Acquisition Reform initiatives are aimed at reengineering the procedures used to develop and procure defense weapons systems in order to reduce the life cycle costs of those systems, shorten their acquisition cycle time, and improve utilization of the nation's total defense industrial base. ASNE Day 1997 has been structured to promote interaction between those in government who are defining the principles and objectives of acquisition reform, and those in industry or in government engineering and industrial activities striving to provide innovative responses to the challenge.

Since the reform began, ASNE Day has included discussions on the challenges and opportunities

raised by the initiatives for those who will develop, design, build, operate and maintain the naval systems that will carry the U.S. into the next century.

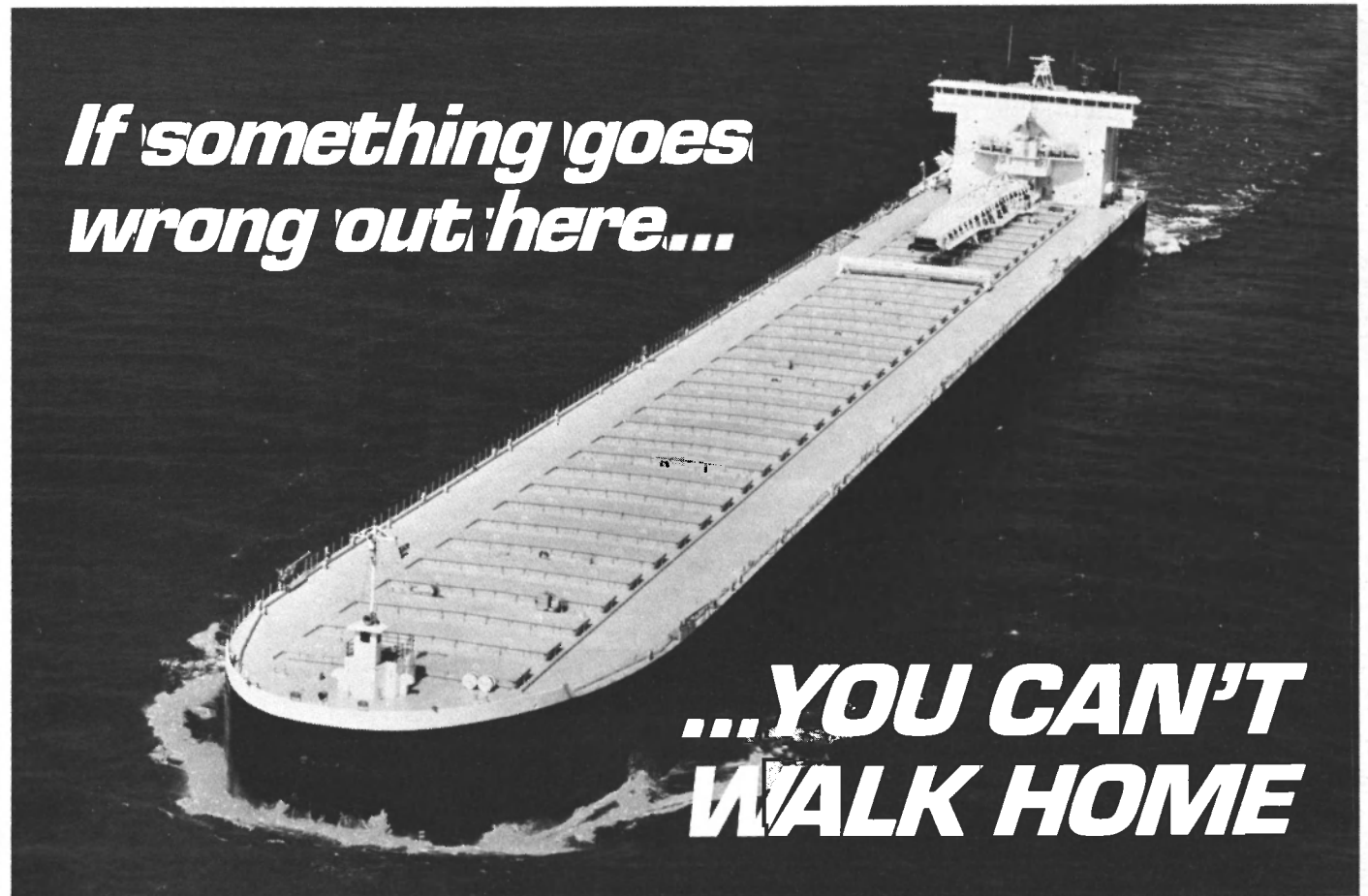
This year, however, the symposium will provide an unprecedented

opportunity for attendees to focus directly on how acquisition reform is impacting the maritime industry and the naval engineering professions.

In addition to the emphasis on acquisition reform, approximately

two dozen technical papers addressing themes such as cost of ownership, modeling and simulation and combat systems will be presented.

For more information on ASNE Day 1997, contact the American Society of Naval Engineers, 1452 Duke St., Alexandria, Va. 22314, tel: (703) 836-6727; fax: (703) 836-7491.



Northrop Grumman Announces 1996 Financial Earnings

Northrop Grumman reported record sales and operating margin for 1996, but registered a seven percent reduction in net income due primarily to a previously announced charge related to plant closures.

The company's net income for the year ended Dec. 31, 1996, was \$234 million, or \$4.33 per share, versus \$252 million, or \$5.11 per share, in 1995.

The year included two major non-recurring items: a pretax charge of \$90 million, or \$1.07 per share, related to the plant closures; and a pretax gain of \$28 million, or \$.34 cents per share, from the sale of shares the company owned in ETEC Systems Inc., a manufacturer of high technology equipment for the

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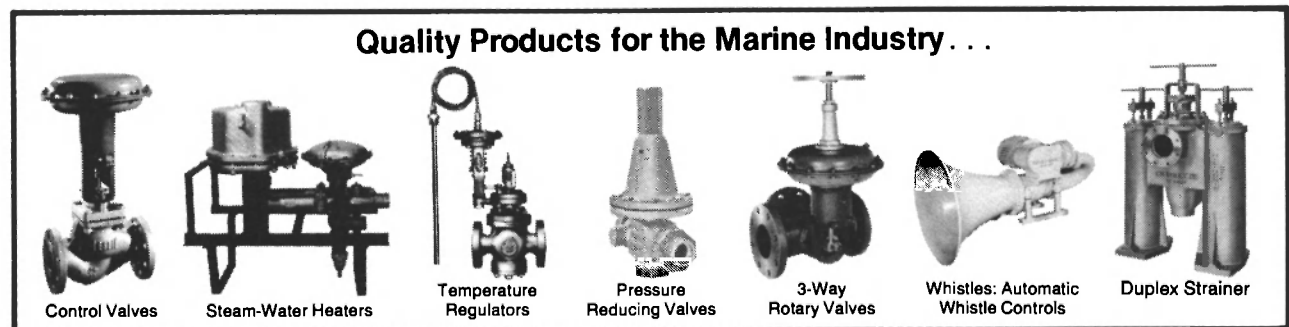
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(Continued on page 50)

Circle 207 on Reader Service Card

Stork To Cool Canadian Navy Iroquois Class Ships

Stork Canada Inc. has been awarded a contract to design and manufacture twelve 125-ton-refrigerant (TonR) screw-type chillers for the modernization of Iroquois class ships of the Canadian Department of National Defense. The first units are scheduled for delivery in May.

The screw type chillers will be designed to meet naval shock and vibration requirements and are the first of their type to be supplied to the Canadian Navy.

These units have been chosen for naval and cruise ship installation because of their large capacity rating, relatively compact size, and low noise and vibration emissions.

Stork Canada designs, supplies and manufactures HVAC and refrigeration systems for the marine industry, and provides conceptual designs, specifications and commissioning services for marine and offshore vessels.

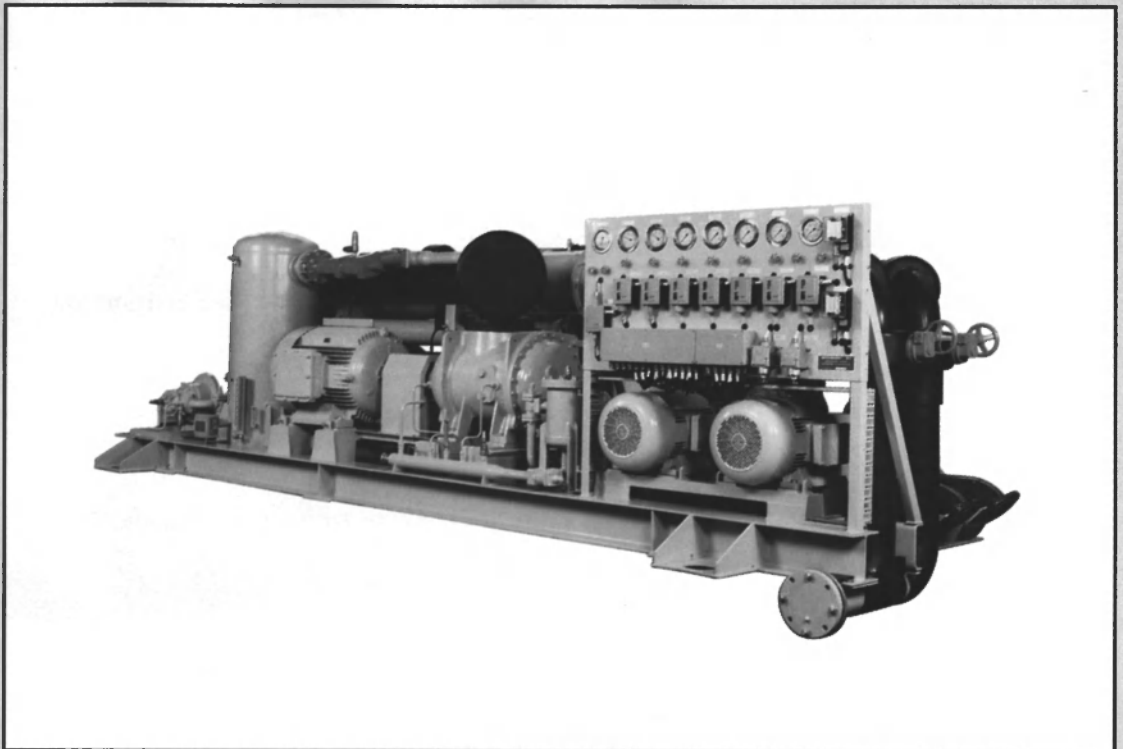
The company also supplies and services

pumps, and has recently introduced a new line of screw chillers, high efficiency fans and low noise air handlers.

Stork Canada, with annual sales exceeding \$11 million, has fortified its position as an industry leader in the U.S. and Canadian maritime industries. Trends in this maritime manufacturing segment mirror that of other industry supplier segments — companies are increasingly called upon to provide complete package solutions, from manufacture through installation.. Stork Canada designs, supplies and commissions HVAC

systems. In the near term, the company predicts this trend will continue, with partnerships forged between general HVAC equipment manufacturers and HVAC system designers. In the long term it could go one step further, with partnerships with shipbuilders and system design suppliers. With the advent of larger ships, vessel owners require quieter, energy conserving ships, and Stork Canada has positioned itself to capitalize on these factors.

For more information on Stork Canada
Circle 191 on Reader Service Card



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(Continued from page 47)

semiconductor industry.

The company's operating margin for 1996 reached an all-time high of \$658 million, up 23 percent from last year's previous record of \$536 million. Northrop Grumman's sales for 1996 were a record \$8.1 billion, up 18 percent from the \$6.8 billion registered in 1995. The company's business backlog at the

close of the year stood at \$12.4 billion, up 25 percent from the \$9.9 billion reported at the end of 1995.

The company's results for 1996 include 10 months of operating Westinghouse Electric Corporation, which Northrop Grumman acquired on March 1, 1996, and now operates as its Electronic Sensors and Systems

Division (ESSD).

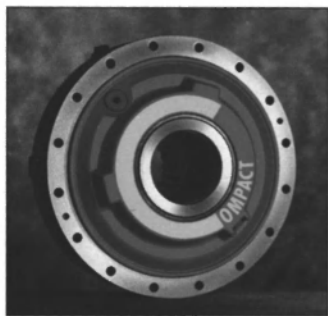
"The record operating margin achieved in 1996 reflects the success we've had in integrating businesses acquired over the past several years," said **Kent Kresa**, Northrop Grumman chairman, president and CEO. "The synergy we've achieved, coupled with our focus on streamlining operations

and an adherence to shareholder value objectives, are expected to lead to even better operational results in the years ahead," he added.

Mr. Kresa said he was "comfortable with an earnings per share consensus for 1997 on the order of \$5.80." He added that the company's sales for 1997 will be about \$8.4 billion, on track with the company's previously announced forecast of achieving \$10 billion in sales by the year 2000.

Regarding the company's bid for Hughes Electronics' defense business, Mr. Kresa reiterated his position that the Hughes acquisition was "not essential" and that while Hughes "would have been a good fit," the company was not willing to make an offer "at a price that would have taken value away from our shareholders."

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Avondale Announces 1996 Financial Results

Avondale Industries, Inc. reported net income of \$30.8 million, or \$2.13 per share, for 1996 versus \$28.2 million, or \$1.95 per share in 1995. Net sales for 1996 totaled \$624.9 million, up from \$576.3 million in the prior year. Net income for the 1996 and 1995 years included income tax benefits of \$9 million, or \$.62 per share and \$13 million, or \$.90 per share, respectively.

"The report of record financial results for 1996 caps a milestone year for Avondale," said **Albert L. Bossier**, chairman and CEO. "Our success in generating higher operating efficiencies and increased earnings was coupled with the award of a \$1.5 billion contract including options to Avondale in December 1996 as the prime contractor for the initial ship in the Navy's major LPD-17 shipbuilding program ... The capital we have invested to modernize our shipyard and the productivity programs we have implemented throughout the organization have led to these tangible results. We remain focused on extending this positive momentum and are actively seeking to participate in additional Navy programs as well as in commercial shipbuilding projects," added the yard executive.

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Falk Drives Far Efficient Maneuvering

Medium and high-speed diesel engines with narrow operating speed ranges can result in vessel speeds that are too high at engine idle. To reduce ship speed, such as when docking or handling fishing nets, operators are forced to continually shift from ahead to neutral, or ahead to astern, resulting in potentially inefficient methods of speed control.

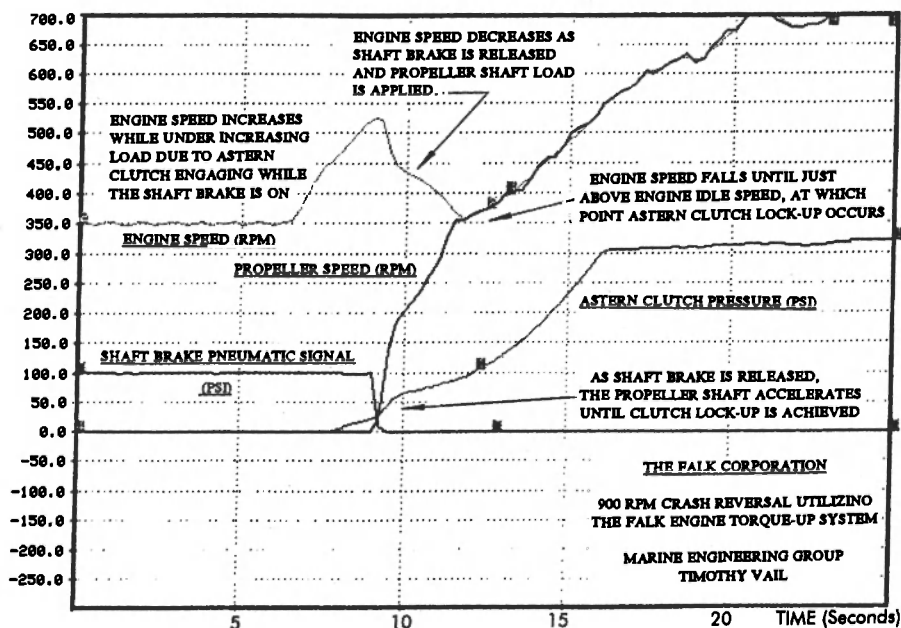


Figure 4 — Crash reversal maneuver at 900 rpm on a tuna seiner, with engine torque-up system.

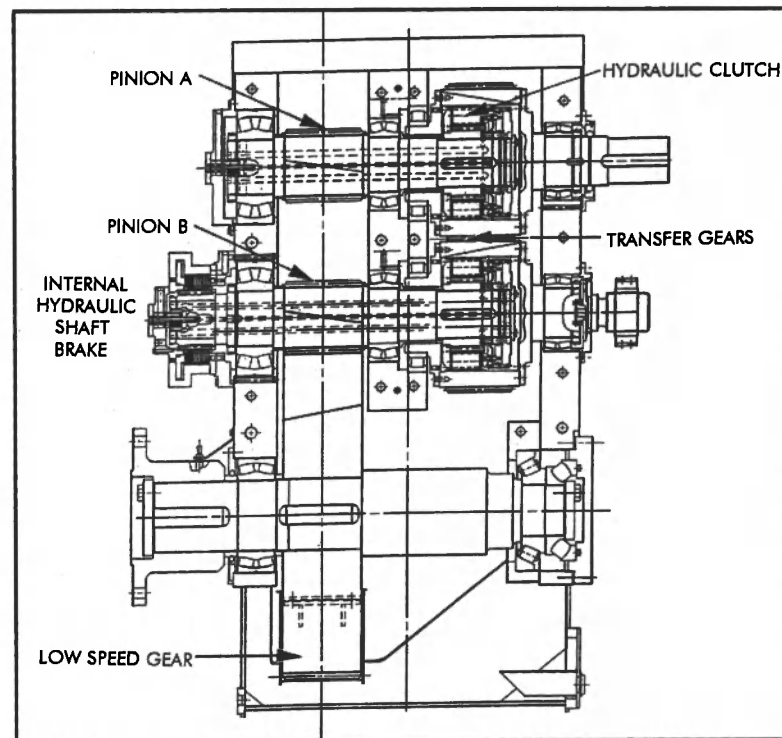


Figure 3 — Reduction drive shown "unfolded." Pinions A and B both engage low-speed (propeller-shaft) gear at all times, but only one transmits torque at any time.

Continuous-slip drives and torque-application controls fix that and enhance the operating speed range of modern propulsion systems.

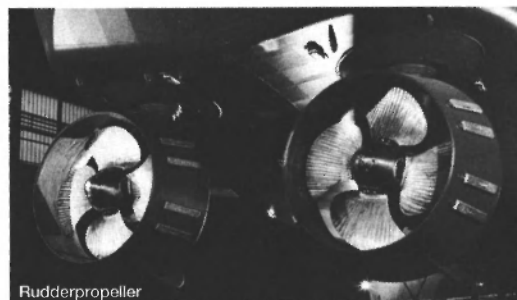
The case for this solution is presented in this paper by **Timothy Vail**, project engineer, Marine Engineering Group, The Falk Corp. By controlling the hydraulic pressure on the ahead or astern clutch, a continuous-slip control marine drive system provides closed loop speed control which increases the propeller shaft speed range from engine idle (Continued on next page)

Australian Mooring Specialist Wins Contracts

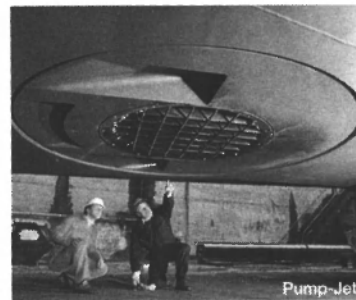
Melbourne, Australia-based mooring specialist Harbour and Marine Engineering Ptd. Ltd. was recently awarded a contract to supply an integrated jetty monitoring package for a new LPG berth being constructed for the Port of Bintulu in Sarawak, East Malaysia. The equipment will include quick release mooring hooks, an emergency remote release system, vessel load monitoring and a laser docking system. The company has also won an order to manufacture ten 650T safe working load capacity chain stoppers for 100-mm diameter stud link chain. The units will reportedly be installed on Tanker Pacific's FSO vessel *Deep Blue*.

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Producing Thrust



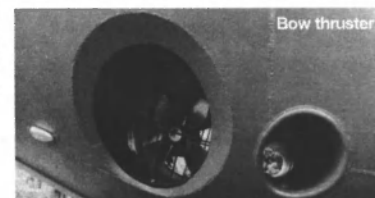
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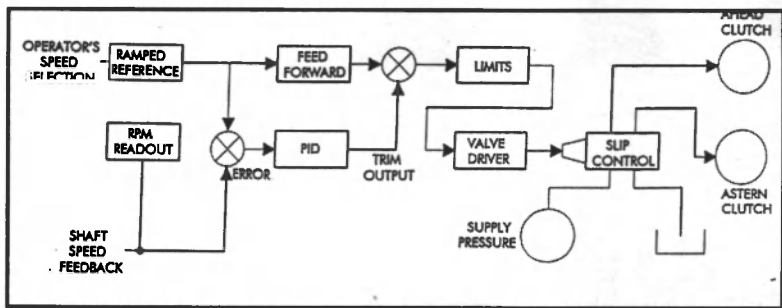


Figure 1 — Slip-system logic schematic shows what controls ahead and astern clutches in marine drive.

to zero rpm. During the slip mode the engine remains at idle while the clutch is slipped to deliver the reduced propeller speed. When a propeller speed above engine idle speed is needed, the pilothouse control handle is moved forward and the slip-control system fully engages the clutch and the engine accelerates. The slip-control system can be operated indefinitely, without damage to

the clutch.

The torque transmitted during the slip mode is accomplished by shearing the oil film between the clutch plates. The heat generated during the slip mode is carried away by the cooling oil as it passes through the clutch and then dissipates through the reduction gear heat exchanger.

Maintaining Control

The closed-loop slip is accomplished by a proportional-integral-derivative (PID) controller, which ensures that the selected propeller speed is maintained regardless of wave, wake or current conditions. The controller compares the error between the operator selected speed and true propeller speed, and adjusts the clutch hydraulic pressure as required through a proportional slip-control valve.

Figure 1 is a control logic schematic for the slip-control system. The programmability of the PID controller allows for the slip-control system to be adjusted for each specific application. This ensures smooth, stable propeller shaft speed control no matter how large or small the system masses and inertias may be. During sea trials the PID controller is programmed to match the propulsion system to the vessel. A small, handheld keypad is plugged into the PID controller program port, and the PID program values are entered. The keypad is removed once the system has been fine tuned.

Marine Drive Includes Propeller Shaft Brake

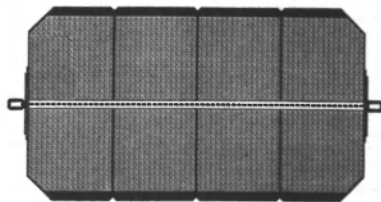
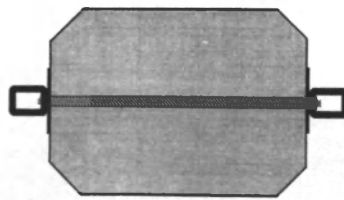
The continuous-slip hydraulic clutch control system is available in Falk's 3000 MRH marine reduction drive line. The Falk 3000 MRH marine drive incorporates surface hardened and ground gearing with internal hydraulic clutches. Also contained with the reduction gear is the oil cooled, air-actuated propeller shaft brake. The location of the internal shaft brake greatly reduces the required shaft brake size since the brake is mounted on the end of the pinion shaft, taking advantage of the reduced shaft torque.

Figure 2 shows the orientation of the gearing in the Falk 3000 MRH marine reduction drive. The marine reduction drive contains two multi-disk, oil-shear clutches, one for ahead mode operation and a second for astern mode operation. Either clutch can be designated as ahead or astern in order to yield the required propeller shaft rotation for each particular application. Both hydraulic clutches are capable of unlimited continuous slip at engine idle speed, and maximum torque transmission at full

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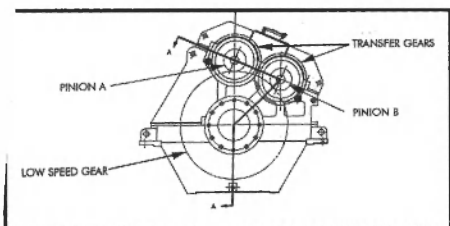


Figure 2 — The orientation of gearing in the Falk 3000 MRH marine drive system is shown.

engine speed. The proportional slip-control valve allows the clutch to slip while at engine idle speed, and fully pressurizes the clutch prior to acceleration of the engine.

Figure 3 (on page 51) is an unfolded or 'roll-out' view of the drive. Pinions A and B both mesh directly with the low-speed (propeller-shaft) gear at all times. Engine input is at the shaft at the upper right in Figure 2. At the right in Figure 2 are two clutches: one on the input shaft; the other on the secondary shaft of the pair of transfer (1:1 ratio) gears. Only one clutch can be engaged at any one time. Thus, power flow can be from the input shaft through Pinion A to the low-speed gear, with Pinion B idling; or from the input shaft through the transfer gears, through Pinion B, to the low-speed gear, with Pinion A idling. In the second case, the low-speed gear turns in the direction opposite that of the first case.

Control System Options

The control of the slip system is through a conventional marine-type control handle, which can be either pneumatic or electronic. The handle is mounted in the pilot-house, and has optional port and starboard bridge wing control. The system can consist of a single control handle which incorporates both the slip control and the locked-clutch control, or it can be comprised of two control handles, one handle for ahead and astern slip, and the second handle to control normal locked-clutch operation.

When using the single handle control system, ahead or astern slip is encountered as soon as the handle is shifted forward or aft, out of the neutral position. As the stroke of the handle is increased, the propeller speed is increased. At approximately 30-degree handle stroke, a second detent is encountered at which point the clutch is fully pressurized ending the clutch slip. As the handle is stroked further, the engine then accelerates to produce the selected propeller shaft speed. If low-speed maneuvering is not desired, the handle is simply shifted out of neu-

tral and immediately to the 30-degree detent position, at which point the clutch is fully pressurized with the engine at idle speed.

In the two-handle system, the first handle is a neutral-center position handle that controls ahead and astern slip while the engine remains at idle speed. The second control handle is also a neutral center position control

handle which fully pressurizes either the ahead or astern clutch when shifted from the neutral position to the first detent. As the operator increases the handle stroke, engine speed increases.

Reversals: Enhanced Maneuverability

To greatly enhance maneuverability during vessel reversals,

Falk marine drives can incorporate the patented engine torque-up system. This feature loads the engine over a controlled rate which greatly reduces the shock to the propulsion system. During a vessel reversal, the control system continues to apply the shaft brake during the initial engagement of

(Continued on page 97)

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Blessey Christens New Boat

Blessey Marine Services Inc. recently christened its 17th boat, *M/V Bill McNeal*. The vessel's role is to push two 30,000-bbl barges on the lower Mississippi River and along the Intercoastal Waterway, or upriver in certain river conditions. Delivered from Verret Shipyard in Plaquemine, La., the vessel measures 72 x 26 x 12-ft. (22 x 8 x 3.6-m). It has an underdeck storage capacity for 23,000 gallons of diesel fuel, 500 gallons of lube oil, 110 gallons of hydraulic oil, 90 gallons of gear oil, 11,000 gallons of potable water and 2,400 gallons of waste oil.

M/V Bill McNeal is powered by a pair of Cummins KTA38MO diesel engines, which produce a total of 1,500 bhp at 1,600 rpm. Its electrical power is provided by two 50-kW



ABOVE: The *M/V Bill McNeal*.

RIGHT: **Bill McNeal** and **Walter Blessey** at the vessel's christening.



M/V Bill McNeal Main Particulars

Length	72 ft. (22 m)
Width	26 ft. (8 m)
Depth	10 ft. (3 m)
Fuel	23,000 gallons
Potable water	11,000 gallons
Lube oil	500 gallons
Hydraulic oil	110 gallons
Gear oil	90 gallons
Waste oil	2,400 gallons
Main engines	Cummins
Generators	Cummins
Reduction gears	Reintjes
Propellers	Kruger
Bearings	Thordon
Radar	Furuno
Radios	Standard
Loud Hailer	Standard
Swing meter	Radio Zeeland
Searchlights	Carlisle & Finch
Airhorn	Kahlenburg
Telephone/Fax	Watercom
Winches	Patterson
Bumpers	M&M Bumpers
Air compressor	Ingersol-Rand
Sewage treatment	Owens Kleen Tank

Stamford-Newage generators driven by Cummins 6B5.9 engines. The Cummins engines and generators were supplied by Cummins Mid-South of Kenner, La.

The main engines are coupled to the Karl Senner supplied Reintjes WAF-561 reduction gears, providing a reduction of 5.947:1. The boat features four-blade Kruger propellers, supplied by Byrne, Rice & Turner, driven through six-in. Thordon cutlass bearings.

For maneuverability, the vessel has two main rudders and four flanking rudders.

Additional maneuverability is provided by tunnels built over the wheels, providing more water to the propellers for greater efficiency and increased performance. Tunnels also provide more clearance under the wheel, minimizing damage in shallow water.

Ensuring a clear path of vision — at any time and in any condition — is considered essential for safe operation.

To this end, there is a 31-in. eye height in the wheelhouse to provide the pilot with excellent vision. Also, the vessel is fitted with two Carlisle & Finch searchlights for added safety. The port side light is a 1,000-watt Zenon light, enabling the pilot to pick up buoys and markers far in front of the tow.

The pilothouse electronics, supplied by Eagle Electronics, include a Furuno 7-61 with a 12-in. display; two Standard Horizon Omni VHF radios and a Standard LH5 loud hailer.

Dehart Marine Electronics supplied the Zeeland Swingmeter radio. The telephone and fax were provided by Watercom, and the airhorn affixed on top of the wheelhouse is a Kahlenberg D2.

Engine instrument gauges and engine monitoring are present in the wheelhouse as well as in the engine room, and on the engines. The main engines have a redundant alarm system — one internal, connected to the engine computer unit, the other through external switches installed by Baton Rouge Marine Electric.

The entire circumference of the hull at the waterline, along with push knees covered by split tire bumpers from M&M Bumpers, reduce wear on the boat and barges.

Donovan Marine supplied the two Patterson 40-ton, electric deck winches, each capable of carrying 100 ft. of one-in. cable. The units can be operated from the deck or wheelhouse.

The vessel has accommodations for a crew of seven.

PGS Acquires Vessels

Petroleum Geo-Services ASA has finalized its acquisition of R/V *American Explorer*, R/V *Ocean Explorer* and M/V *Nordic Explorer*. In addition, it has an agreement in place with the owner of M/V *Atlantic Explorer* to purchase the vessel subject to the owner's board approval. This last acquisition was expected to be closed at press time.

R/V *American Explorer* was built in 1983 for Shell Oil Company. This 300-ft. (91.4-m) vessel was designed and built specifically for seismic research. It has been chartered by PGS since 1993 and is now working in the North Sea. R/V *American Explorer* is classed by DNV and is currently towing six streamers.

R/V *Ocean Explorer* was built in 1979 in Norway. This 266-ft. (81-m) vessel was converted to a seismic research vessel in 1993 at North American Shipbuilding in LaRose, La. The vessel has been chartered by PGS since 1993 and is now working offshore West Africa. It is classed by DNV and is currently towing five streamers.

M/V *Nordic Explorer* was built in 1986 and has been chartered by PGS since 1993. This 269-ft. (81.5-m) vessel is now working in the Asia Pacific region off the Northwest shelf of Australia. It is classed by DNV and is currently towing five streamers.

M/V *Atlantic Explorer* was built in 1987 and has been chartered by PGS since 1994. This 299-ft. (91-m) vessel is now working in the Middle East and will relocate to either the North Sea or West Africa later this year. It is classed by DNV and is currently towing six streamers.

Petroleum Geo-Services is an oil-field service company which principally acquires, processes and markets 3-D and 4-D marine seismic data used by oil and gas companies in the exploration for new reserves, the development of existing fields and the management of producing fields.

Turret Bearing System Installed On FPSO

AmClyde Engineered Products, Inc. has completed the turnkey delivery of a turret bearing system which has been installed in an oil tanker being converted into an Floating Production Storage and

Offloading (FPSO) vessel.

The installation was performed at the FELS shipyard in Singapore last year, and the vessel, *SPU-380*, will be operated by Exxon in the North Sea's Balder field. The turret bearing scope of the project was valued at approximately \$3 mil-

lion.

The AmClyde patented turret bearing enables tankers or other vessels to be reconfigured to floating oil production or storage platforms. The turret bearing design solves the problems associated with anchoring these vessels in

deep water while allowing them to weathervane in the wind and currents as originally designed to do. It also provides a means for attaching the oil production equipment to ocean floor.

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New Design



Hvide Signs \$6 M Deal With Halter Marine To Build New Design

Hvide Marine Inc. signed a contract with the Halter Marine Group, Inc. for the construction of two Ship Docking Modules (SDM) for delivery in early 1998. The SDM is a double-ended ship-docking vessel representing the next generation of harbor tugs.

The company has filed a patent application on the design of the SDM.

"This is the first major breakthrough in tugboat design in nearly 100 years," said Erik Hvide, chairman, president and CEO. "The SDM's rounded shape and twin Z-drives give it unmatched maneuverability and power, making it the safest and most cost-efficient ship-docking vessel in the world. It's the first vessel capable of generating 100 percent of its bollard pull in any direction — forward, backward and sideways. It's so different from a conventional tug that we had to give it a new name," he added.

The contract with Halter provides for the construction of two SDMs at a cost of approximately \$3 million per vessel. Including certain owner-furnished equipment, professional fees and contingencies, the total cost of each vessel is approximately \$4.75 million. The contract also contains options for four additional vessels. When placed in service, the first two SDMs will operate in Port Everglades, Fla., and Mobile, Ala., allowing the continued deployment of two of the company's existing tugs in the offshore sector.

"We're delighted Hvide chose Halter to build these

truly unique tug," said Halter CEO John Dane III after the contract award.

The 4,000-hp SDM will have Z-drives mounted forward and aft and offset from center, providing equal propulsion in all directions. It has been designed to operate with two crew members, thus reducing operating costs below the level maintained by conventional tugs. The SDM measures 76 ft. (23 m) long, with a 50-ft. (15-m) beam.

Elliott Bay Design Group began the concept design of the SDM in early 1995. Several designs were prepared during the evolution of the SDM, and Elliott Bay's James Cole said that the acceptance or rejection of design features brought unique design challenges. Construction of a radio-controlled working model was authorized in October 1995, and model tests were conducted secretly in the Seattle marina in March and April 1996.

Ship Docking Module Specifications

Length	76 ft. (23 m)
Breadth	50 ft. (15 m)
Design draft	16 ft. (4.9 m)
Gross tonnage	Less than 150
Z-drives	Ulstein
Horsepower	4,000
Engines	Caterpillar 3516 "BTA" diesels
Winch	Markey Hawser winch
Bollard pull	In excess of 110,000 lbs. in all directions
Firefighting	One 3,000 gpm fire pump

Schlumberger Records Earnings, Remains Bullish

Schlumberger Limited reported that net income for 1996 was \$851 million, 29 percent higher than the prior year. Operating revenue of \$8.96 billion represented an 18 percent increase compared with the previous year, a record level for the company.

Oilfield Services made substantial gains in the fourth quarter, helping to drive the company's income and revenue. Oilfield Services recorded a revenue increase of 32 percent, while rig count rose 11 percent. The company attributes a portion of this success to technological developments, particularly in the emerging deep-water markets.

"In the fourth quarter of 1996, growth in each of our Oilfield Services businesses continued to accelerate," said Chairman and CEO Euan Baird. "Due to the robust spending plans in exploration and production, which have already been announced by many of our clients, we are confident that our oilfield results will continue to strengthen in 1997." In North America, the rig count jumped 17 percent, and revenue grew 29 percent, representing 18 percent of consolidated revenue. Operating income almost quadrupled. Activity increased most significantly in the Gulf of Mexico and Canada. Outside N.A., rig count grew four percent, and revenue was up 32 percent, representing 51 percent of consolidated revenue.

Datamarine Introduces New LINK Deep System

Datamarine released an upgraded version of its LINK Offshore Instrumentation system. It is now available in two versions: LINK and LINK Deep. LINK comes with a 400-ft. (equivalent meters or fathoms) maximum depth range and operates at 200 kHz. LINK Deep comes with a 1,000 ft. (equivalent meters or fathoms) maximum depth range and operates at 120 kHz. Although LINK Deep has higher performance in the maximum depth range, it is important to note significant performance improvement in the shallow depth range regardless of bottom type.

For more information from Datamarine
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Coastal's Gulf Business Tripled In 1996

Coastal Corp. announced that in 1996, its exploration and production (E&P) subsidiaries more than tripled the company's past daily

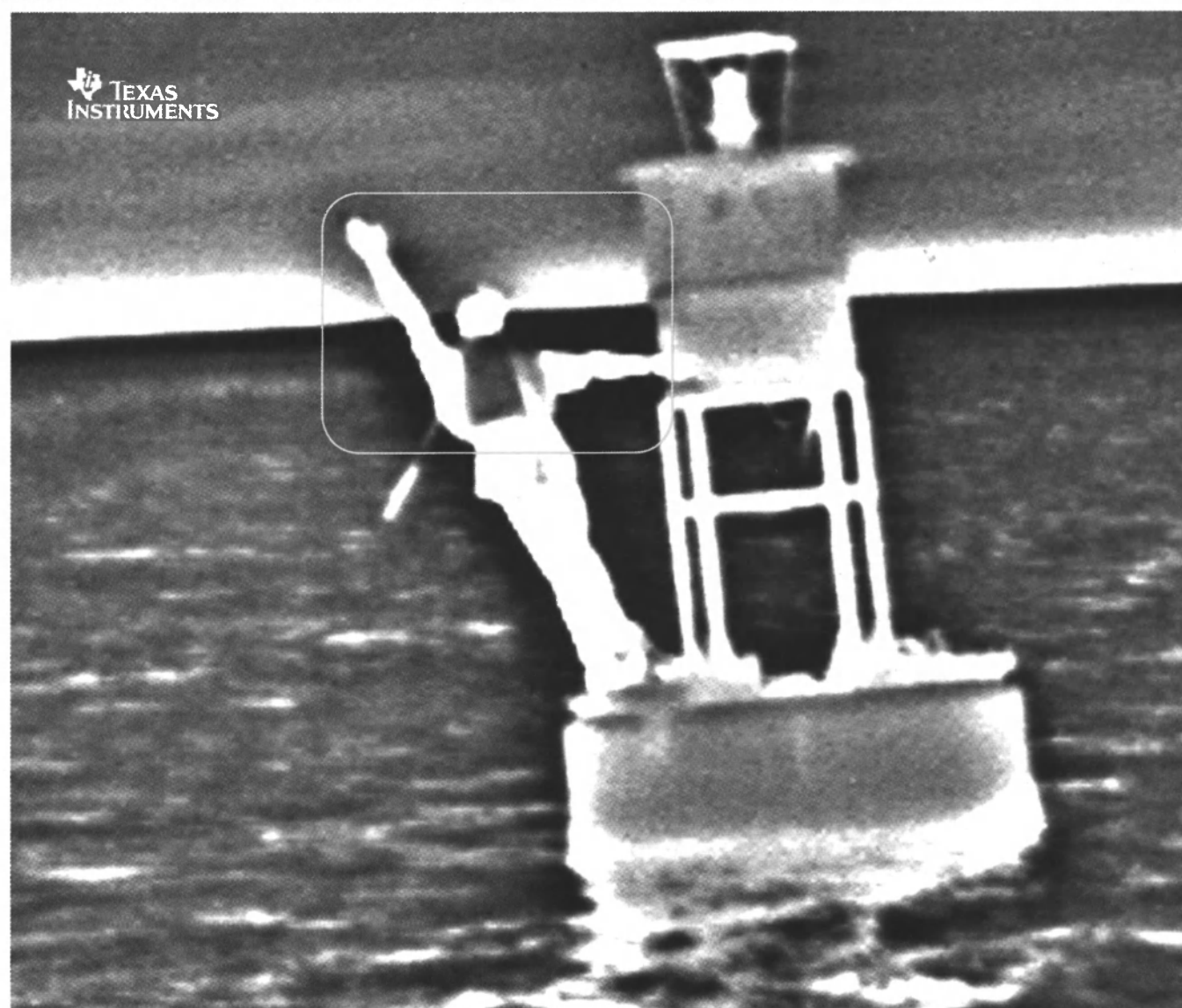
production levels of oil and gas from the Gulf of Mexico.

Cat 3406E Gets Significant Power Boost

Caterpillar's Engine Division introduced a new, totally electronic

Cat 3406E marine diesel engine for workboats, at ratings from 450 to 800 bhp (336 to 800 kW).

The company reports a 38 percent power boost over previous 3406s, with excellent acceleration response, load absorption characteristics, smoke limiting features



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OFFSHORE & SHALLOW DRAFT REPORT

and fuel efficiency.

Caterpillar test engines rated 475 bhp at 1,800 rpm, in two 63-ft. (19.2-m) twin-screw workboats, reportedly showed an average fuel savings of 87 gallons per day.

The new 3406E uses the same 14.6-liter displacement, in-line six-cylinder, four-stroke cycle diesel configuration as the mechanically controlled Cat 3406C.

The 3406E also uses the same electronic control module (ECM) which has proven successful in larger Cat 3500 Series B marine engines. The module features a microprocessor that constantly monitors air inlet temperature, boost pressure, fuel temperature, engine load, engine speed and desired throttle speed. Following programmed parameters, the ECM adjusts fuel timing and duration

accordingly to optimize engine power and torque.

For more information from Caterpillar
Circle 31 on Reader Service Card

Jack-Up To Be Transferred To Caspian Sea

The Marawah jack-up drilling rig is to be moved by Finland's Aker Rauma Offshore from the Arabian Gulf to the Caspian Sea under a \$20 million contract from Khazoil. The job involves transferring the unit from Bahrain to Finland, splitting it into sections, and transporting these along the Russian canal system and down the Volga.

Bazan Carenas Reorganizes Offshore Division

Bazan Carenas has reorganized its Offshore Division to cope with

the market's current challenges.

Bazan consists of three large factories located in Ferrol, Cartagena and San Fernando. A shipyard and a specialized production center are present at each location.

Bazan Carenas is represented by the T.A.S.T. Corp. in the U.S. and Canada for the ship repair industry. T.A.S.T. was recently tapped to market Bazan's interests in the offshore field.

For more information on
Bazan Offshore services
Circle 32 on Reader Service Card

Coflexip Stena Offshore Appoints CSO Leader

Coflexip Stena Offshore (CSO) has appointed **Kevin Peterson** to the position of president and CEO of Houston-Based CSO Inc.

Since 1989, he has been the presi-

dent and CEO of Perry Trittech, a member of the Coflexip Stena Offshore Group. Active in the sub-sea industry from more than 20 years, Mr. **Peterson** has primarily been involved in the development and production of deepwater and remote intervention technology.

J. Ray McDermott Wins \$145 M Contract To Co-Manage Project


J. Ray McDermott has received contracts valued at \$145 million for work in the Gulf of Thailand. The contracts are for the first phase of development in Unocal's Pailin field, and the work will be jointly managed by an integrated team of Unocal and McDermott personnel.

The alliance will provide engi-

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neering, procurement and construction management services for the fabrication, transportation, installation and hook-up of an estimated 17,000 tons of offshore facilities, including central process and living quarters platforms.

Marine Propulsion Profits From Offshore Upsurge

Marine Propulsion of Hammond, La., which distributes a host of power and control products, has seen its business boosted by the resurgence in the offshore business. According to company spokesperson **Ken Robbins**, the company observes rig and OSV utilization in order to gauge market strength.

Marine Propulsion and Schottel North America offer the offshore industry a host of products, including: power transmissions; controls and steering; firefighting systems; coolers; and propulsion products from Schottel, Kort Propulsion, Brunton, Heimdal and Vosper Thornycroft.

For more information on
Marine Propulsion
Circle 35 on Reader Service Card

Jack-Up Barges Decked By Durastic

Two jack-up barges, acquired last year by Noble Drilling International of the U.S., have been completely refurbished and upgraded at the Lamprell Group's Sharjah port facility in the United Arab Emirates. As part of the upgrade, both vessels had 15,000-sq-ft. of existing deck coverings in the accommodation areas removed and replaced using materials supplied by Durastic Ltd.

For more information on
Durastic flooring and decking products
Circle 34 on Reader Service Card

FSU Floated Out In Finland

The Floating Storage Unit (FSU) under construction at Kvaerner Masa-Yards Turku New Shipyard for Norsk Hydro Production was launched in early February. Scheduled for delivery in June, the FSU will be towed out to the Njord field and anchored in a water depth of approximately 330 m

using a submerged turret loading system anchored to the sea bed. Njord will be one of the first fields on the Norwegian continental shelf in which this technology is used. Production in the field is slated for October 1997. The vessel can store 112,000-cu-m, or roughly 10 days

of production. The offloading of stabilized oil to shuttle tankers is arranged through a flexible hose in the stern of the FSU.

The offloading rated is 8,000-cu-m/hr. The FSU will be equipped with a 2.5-MW azimuthing thruster located in the aft, which

will be used for heading control at the offloading phase.

Classed by DNV, the FSU is designed for 15 years of continuous operation.

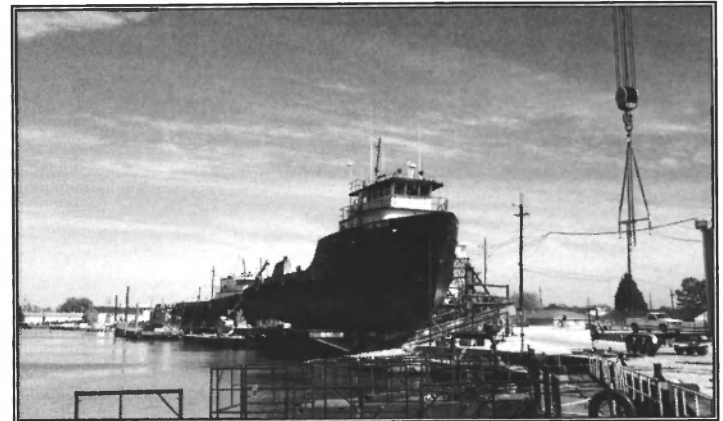
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Kvaerner Masa-Yards
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Marine Deck Hardware and Equipment

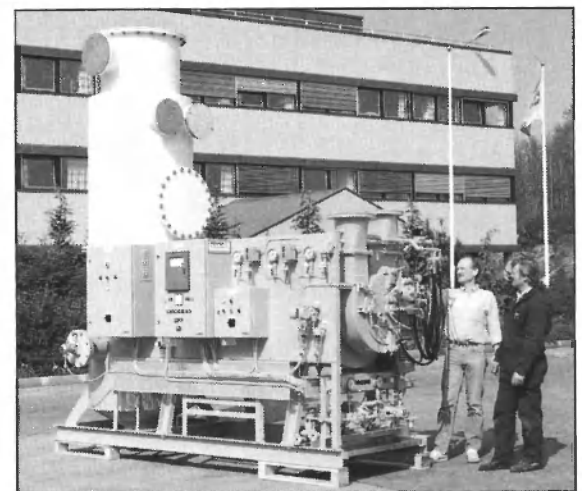
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Circle 288 on Reader Service Card



Production From Thai Field FPSO Commences

Rutherford-Moran Oil Corp., an independent energy company which concentrates its activities in Southeast Asia, announced that production from its Tantawan Field has begun. The natural gas and crude oil production from the two wellhead platforms is being moved to FPSO *Tantawan Explorer* in the field. The natural gas travels from the producing wells to the FPSO and after further processing is exported and sold to the Petroleum Authority of Thailand (PTT). The crude oil is processed and stored on the FPSO where it is periodically offloaded into shuttle tankers and sold. The Tantawan Field is reportedly the first field in the Gulf of Thailand that produces crude oil and condensate as well as natural gas. *Tantawan Explorer* began accepting production on January 28 and initiated shipments of gas to the pipeline three days later. Rutherford-Moran Oil, through its Thai Romo Ltd. subsidiary, owns a 46.3 percent interest in the Tantawan Field. A subsidiary of Pogo Producing Company owns a similar percentage, and the remaining interest owned by a subsidiary of The Sophonpanich Co., Ltd.

Transocean Offshore Awarded \$124 M Drilling Contract

Transocean Offshore Inc. announced that it has been awarded a three-well, turn-key, \$124 million drilling project by Petroleos Mexicanos (Pemex), the national oil company of Mexico. The project was expected to commence by late February, with an estimated duration of two years, including well testing services.

The three-well program includes two delineation wells and one wildcat well, each located in up to 600 fsw in the Bay of Campeche. The wells will be drilled by *Discoverer 511*, a turret-moored drillship owned by Ghana National Petroleum Corporation (GNPC) and bareboat chartered by Transocean Offshore.

The rig was scheduled to be in a Gulf Coast yard undergoing a short refurbishment and upgrade program in February, which was expected to be completed by mid-month. Upgrade and refurbishment costs incurred on *Discoverer 511* will be shared by Transocean Offshore and GNPC, with Transocean Offshore primarily responsible for the installation of an existing top drive system and shipyard supervision.

Amoco And Shell To Develop \$500 M Deepwater Project In Gulf Of Mexico

Amoco and Shell Deepwater Development Inc. announced plans to develop a \$500 million deepwater Gulf of Mexico oil and natural gas discovery located in waters 328 ft. (100 m) deep to the south of Mobile, Ala. The project will utilize a TLP and is expected to produce 250 million cu. ft. of gas and 40,000 bpd of oil, beginning in mid-1999. Dubbed the Marlin prospect, the discovery was drilled in 1993 and is located on Viosca Knoll Block 915 in 3,240 fsw. Amoco is the operator and has a 75 percent interest in the field, and Shell owns the remaining interest.

"The deepwater Gulf of Mexico is a significant,

Space Age Technology

Mobile Docking Aid System for Ships

Laser Communications, Inc. (LCI), the marine division of Laser Technology, Inc. (LTI), has introduced a mobile laser docking aid system with almost all the features of a full-blown, fixed-base laser system. Many of the same ideas and concepts used on the NASA space shuttle project were employed in the development of the Rover mobile docking system. The Rover is built around an electrical, self-powered mobile chassis.

The onboard rechargeable batteries provide power to move and relocate the entire docking system at respectable speeds (about 20 kph). The batteries also power the onboard computer, display sign and transmitter. The Rover is driven to a location estimated to be approximately amidships of the incoming ship. The docking aid system is then activated and left to operate, unmanned.

When the incoming ship comes into view, the Rover measures the closing speeds and distances and records the data on the computer for future reference. The pilot and captain can observe the closing distances and speeds on a display located on the Rover.

As an option, the closing speeds and distances can be relayed to pager-type, handheld receivers on the bridge of the ship and on the dock. Utilizing the latest in communications technology, the docking data can be sent anywhere in the world, if desired. The main purpose

of the system is to provide the pilot with fast, accurate, usable information to help maneuver the ship for a safe, expedient landing without fender damage.

The data generated by the Rover can also be used for training purposes. The data will also be of use to dock owners in situations that warrant investigations of fender damage.

Some ports experience extreme tides, currents and traffic that expose a moored ship to drift-off. Also, as the tides change and the vessel is offloaded, the mooring lines can slacken and expose the ship to drift-off. During the high risk periods, the Rover can be used to monitor the ship for drift-off after it has been moored. The mobility of the Rover allows the docking aid system to be used at several different docks during the day and night. The Rover can also be configured to protect the operator and system from the environment. While waiting for the next landing, the Rover can be recharging its batteries back at the main office.

For more information
Circle 28 on Reader Service Card

The preceding information was excerpted from a presentation given by Dan Grothe, president of Laser Technology.



Laser Technology, Inc. designed and manufactured the laser docking system for NASA's astronauts to help dock the space shuttle with the Hubble Telescope and the Russian Mir in outer space.

strategic growth area for Amoco. Marlin will be the first of many successes in this growth area as Amoco plans to aggressively pursue additional deepwater opportunities it has identified," said David Welch, Amoco vice president for the Gulf of Mexico unit. Two new pipeline systems will transport Marlin production to onshore markets. The Main Pass

Oil Gathering System, an Amoco-operated system installed in 1996, will transport oil into the Empire, La., market. Natural gas will flow through the recently-announced venture Destin Pipeline, a joint venture of Amoco, Shell and Sonat. The Destin Pipeline will come ashore at Pascagoula, Miss., where an Amoco/Shell gas processing facility will be built. The pipeline

will extend northward to interconnect with five interstate pipelines in Mississippi.

Construction of the TLP will begin this year, and plans exist for the hull to be fabricated in Taranto, Italy, and towed to Corpus Christi, where the topside facilities will be built. The hull will be fastened to the seafloor by steel tendons at the Marlin site.



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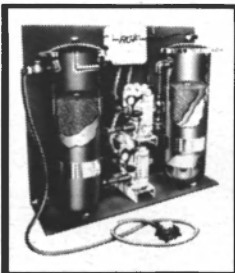
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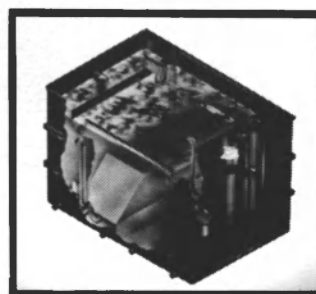
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RCCL Vessel Refit At Bethlehem Shipyard

Sovereign of the Seas recently underwent a significant conversion and refit at the Bethlehem Shipyard in Sparrows Point, Md. James P. Colie & Assoc. was a main contractor for the project.

The largest part of the work entailed the demolition of the existing gift shop area. Along with some previously unused space, it was converted into seven new shops. The work also included adding additional berths and renovating 100 passenger cabins, as well as renovating, upgrading and reconfiguring the ship's two 900-sq-m dining rooms.

For more information on James P. Colie & Assoc. Circle 3 on Reader Service Card



Pictured on top is *Sovereign of the Seas* in drydock at Bethlehem Shipyard. The middle photo shows how empty space on the pool deck was converted by James P. Colie & Assoc. into two hot tubs and a shower, covered by a gazebo. The bottom photo shows workers from James P. Colie & Assoc. installing ceiling panels, lighting and custom-made display cases.

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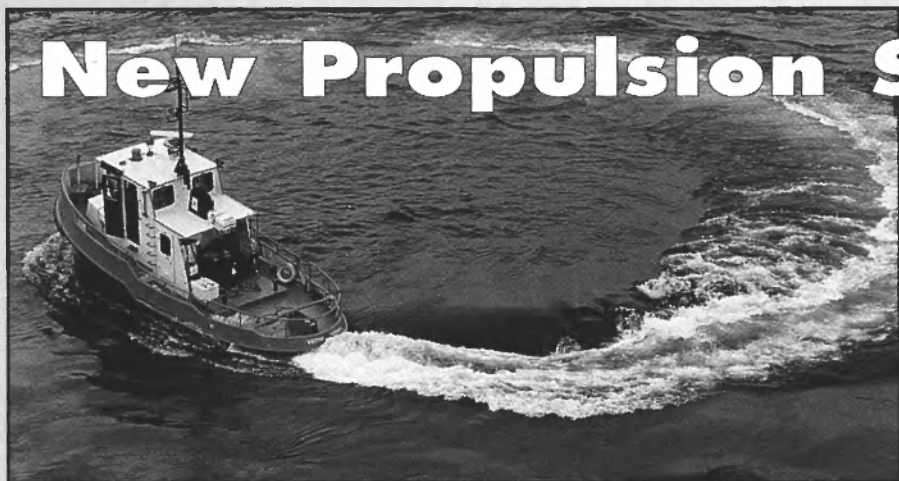
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New Propulsion System Hits Market

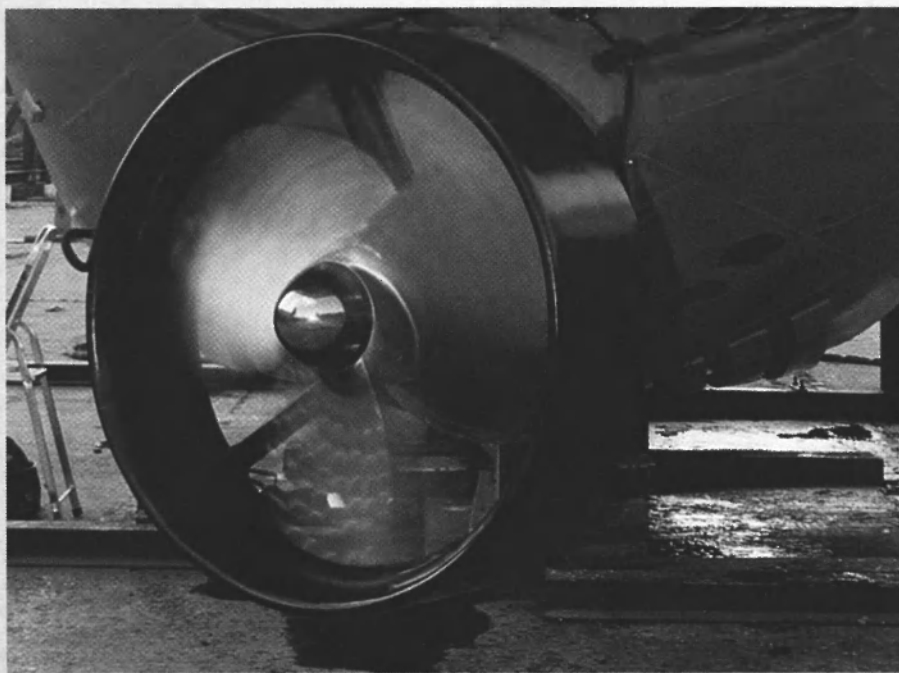


Motala Verkstad of Sweden has introduced the CAP Propulsion system to the maritime market. The manufacturer claims its product is a revolutionary invention that will open new avenues for both shipowners and builders.

The CAP system eliminates the need for a rudder, and is designed to improve maneuvering and steering, as well as lower installation costs and fuel costs.

The Swedish company set out to

provide a unique, yet simple design. The CAP Propulsion unit combines propulsion, steering and steering gear, and thrust bearing into one common unit. It consists of a fixed-pitch propeller with three, four, five, seven or nine blades; thrust and radial roller bearings; CAP position adjusting hubs; a twin cardan joint; an intermediate shaft; a hydraulic CAP position control unit; and a flexible coupling.



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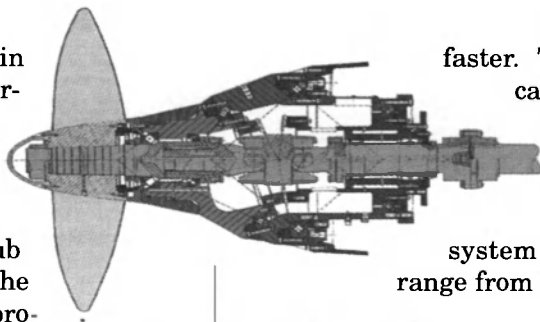
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PROPULSION UPDATE

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faster. The CAP unit is lubricated by oil, under pressure from a header tank located above the waterline. The CAP Propulsion system covers the power range from 200 to 5,000 kW.

Put To The Test

Several model tests were carried out at SSPA Maritime Consulting in Gothenburg in 1994-95. The tests reportedly proved the CAP Propulsion system to be excellent for enhancing maneuverability. The manufacturer reported

that the tests showed that pointing the CAP unit at a steering angle of about seven degrees corresponds to a rudder angle of about 30 degrees. For full-scale tests, Motala bought a 41-ft. (12.5-m) tugboat dubbed *M/T Veitsi*. During autumn 1995 and winter 1996, the vessel was moored in Lake Vattern, the second largest inland lake in Sweden. During this time tests were performed by Bofors Underwater Systems to determine the characteristics of *Veitsi* with its original rudder arrangement and with the CAP Propulsion system. Initial results were reportedly favorable.

For more information from Motala Verkstad
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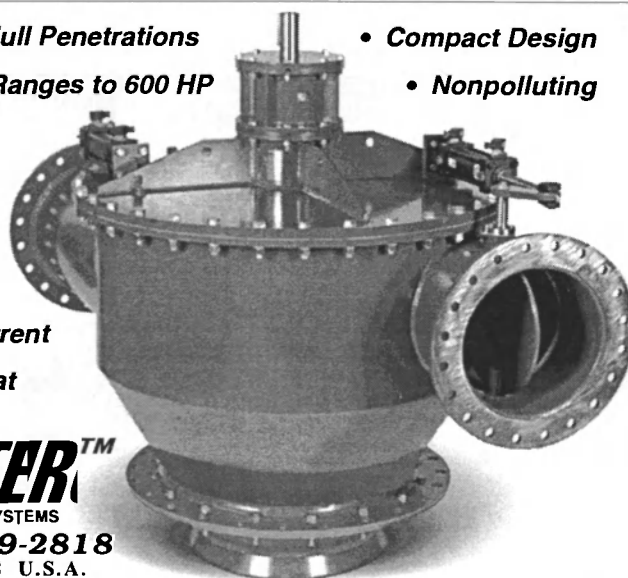
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APS Assists In Product Tanker Conversion



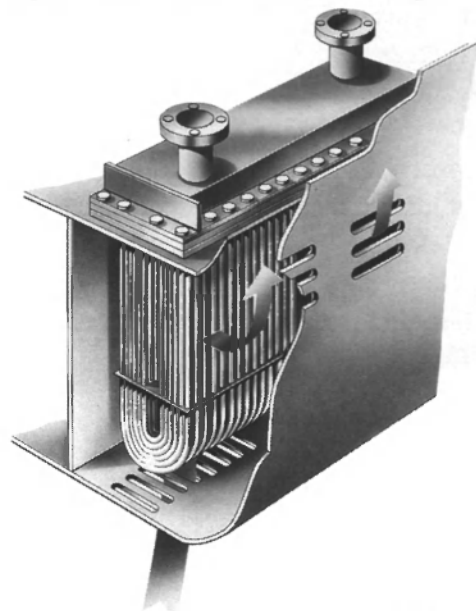
Latvian Shipping Company's 20,000-dwt product tanker *Dzintari* is shown at the Lisnave shipyard, where it was coated with Advanced Polymer Sciences' MarineLine tank coatings.

Latvian Shipping Company recently reached a milestone, when it converted 20,000-dwt product tanker *M/V Dzintari* into a Class 3 chemical tanker. As part of the upgrade, the vessel's cargo tanks and piping were lined with Advanced Polymer Sciences' (APS) MarineLine high performance siloxirane coatings. As a requirement for Class 3 chemical service, APS and MarineLine, as well as *Dzintari*, have received full certification by the Maritime Registrar of Shipping. *Dzintari* has been upgraded to carry phosphoric acid, which involved the application of MarineLine to a total surface area of approximately 30,000 sq m, including the vessel's 14 cargo tanks and two slop tanks. *Dzintari* is the second Latvian Shipping Company vessel to have undergone an application of MarineLine; the first was 28,400-dwt tanker *M/V Indra*, which had its tanks coated in 1994 to enable operation in methanol trade. MarineLine is mainly comprised of siloxirane, a multi-functional polymer which reacts with a catalyst to form a dense, highly cross-linked molecular structure. MarineLine is reportedly resistant to solvents and to 98 percent of all chemicals. This coating has high mechanical strength and is highly resistant to impact, flexural stresses and thermal shocks.

For more information on APS
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Coatings Failures In Water Ballast Tanks

Frequently, the expected service life of a coatings system is not reached due to coatings failures. Various parties involved (shipowner, yard contractor, paint manufacturer) often request TNO Institute of Industrial Technology to investigate the cause of such failures. An investigation begins with inspection of the damage and collection of sample materials.

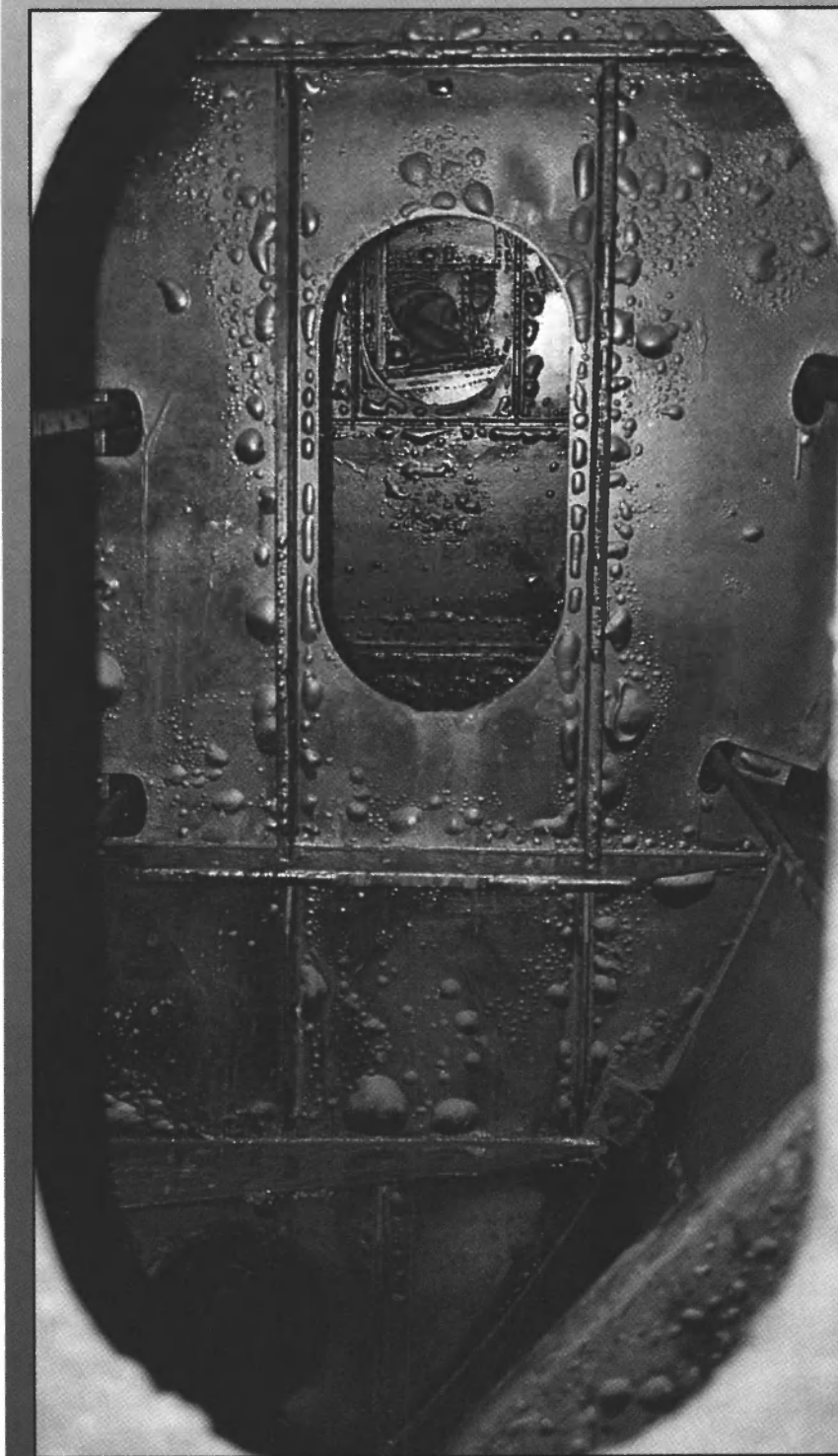
Epoxy or coal tar epoxy coatings are mainly used for the conservation of water ballast tanks. High-build and solvent-free epoxies have increasingly been used to reduce health risks and for compliance with government regulations. The presence of carcinogenic tar compounds in coal tar epoxies has resulted in a ban on these products in several countries. Coatings are mostly applied in one or two layers on top of a shop primer. Some important properties of coatings systems and causes of premature failing are mentioned below.

Shop primer

The shop primer is intended for a temporary protection of steel against corrosion during newbuilding. After primary blast cleaning of the steel, which should remove all dirt and mill scale, the shop primer is applied automatically. Thickness control is a key factor of these automatic installations. Too low a thickness results in premature rusting and extra costs for secondary pretreatment. Too high a thickness increases the risk of formation of pinholes in topcoats due to the escape of entrapped air in some porous shop primers, slows down welding operations, as well as increases the number of pores in welding seams.

Secondary pretreatment

Prior to application of the water ballast tank coatings, the ship primer must be cleaned properly. Oil, fat, dirt, dust, rust, alkali weld deposits and salts must be removed. Oil and fat prevent a proper adhesion; salts attract moisture which initiates blistering.



Pictured is severe blistering in a solvent free coal tar epoxy coating applied in a wing tank, caused by tar exudation, resulting in porosity of the coatings system and an increased water vapor permeability.

Edge coverage

Frequently, corrosion in ballast tanks is first observed on sharp edges. To achieve a proper coatings film on sharp edges, application of a stripe coat using brushes is often used. Alternative methods are chamfering or rounding of

edges. Weld spatter and steel laminations must be removed and welding seams made continuous to guarantee proper coverage.

Dry film thickness

Coatings systems are to be applied in closed films in the cor-

rect film thickness. Coatings applied too thin give insufficient protection and will show rust and adhesion blisters more quickly. A two-coat application decreases the risk of areas with too low a thickness. Solvent entrapment in coatings layers applied too thickly can result in blistering. Excessive thickness can result in sagging of the coatings.

Ventilation

During and after application of solvent-containing coatings systems, tanks need to be ventilated in order to prevent the presence of excessive amounts of solvents. After evaporation of entrapped solvents in a cured coatings system, porosity may occur. Both situations result in a higher water vapor permeability.

Porosity

Coatings layers should be free of pinholes. The entrapment of air in the coatings layer should be prevented as much as possible. In addition, the coatings system must be of such a quality that exudation of components from the coatings, i.e. tar, oils and hardener, does not occur.

Application conditions

The application conditions must be in accordance with the minimum requirements given in the product information sheets of the coatings. Generally, this implies that the steel surface temperature be at least three degrees above dew point. Under-roof application decreases the risk of a too-low surface temperature. The overcoating intervals must be complied with to ensure a good intercoat.

The application of coatings systems has become an extremely specialized task. Various causes can be responsible for premature failing, requiring the execution of costly repairs. In the worst case, a completely new coatings system is necessary, at tremendous cost. Inventories made by TNO have shown that the majority of coatings breakdowns are caused by

MARINE COATINGS & CORROSION CONTROL REVIEW

human failure. More attention during the design of painting specifications and intensified inspections during application of coatings system can save repair and maintenance costs. Once a vessel is in service, inspections by independent experts can disclose possible coatings failures at an early

stage.

TNO Institute of Industrial Technology is a fully independent R&D organization involved in application research, testing, measurement and examination of coatings performance.

For more information on TNO
Circle 39 on Reader Service Card

Ameron And Valspar Sign Acquisition Agreement

Ameron International Corp. has signed an agreement to acquire the maintenance coatings business of major coatings manufacturer Valspar Corp. In turn, Valspar will

acquire Ameron's product finishes business, which includes both liquid and powder coatings. The Valspar maintenance coatings business reported sales of \$18 million in 1996, and the Ameron product finishes business reported sales of \$16 million. Among the Valspar products to be manufactured by Ameron are Val-Chem epoxy primers, enamels and sealers; Dura/Tile water epoxies; MZ series inorganic, zinc-rich coatings; Valkote enamels; Hi-Heat coatings; and moisture-cured urethanes. According to Ameron Chairman, President and CEO **James S. Marlen**, the proposed exchange is in keeping with Ameron's objectives of sustaining growth and continuing to improve profitability. "We continue to seek strategically attractive acquisitions like this one, as well as marketing alliances, in all our businesses," commented Mr. Marlen.

For more information on Ameron
Circle 48 on Reader Service Card

PPI Offers No-Sweat Epoxy Coatings System

Progressive Products, Inc. (PPI), distributors of epoxy coatings, sealers and adhesives manufactured by Thin Film Technology, Inc. (TFT), has released a no-sweat version of its epoxy Bio-Flor system. This system consists of a solvent-free, two-part epoxy base coat with option non-skid quartz under a second coat of the Bio-Flor epoxy. The Bio-Flor system has reportedly been widely used on loading docks and in material handling facilities. The no-sweat version of Bio-Flor uses a modified version of the epoxy for the bottom coat. This version reportedly enhances the flooring system's ability to reduce or eliminate the dangerous sweating of large, concrete masses such as loading docks and bays, when temperatures change.

For more information
Circle 43 on Reader Service Card

Wasser Opens Distribution Center In Midwest

Wasser High-Tech Coatings has opened a distribution center in the Midwest, U.S. The new center

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technology makes it possible to deploy completely automated work modules on large vertical surfaces while eliminating scaffolding and

to wall surface irregularities.

For more information
Circle 63 on Reader Service Card

Sass & Assoc. as its agency of record. U.S. Paint produces marine and aviation coatings that

brightwork protection, Awlstar classic spar varnish and Awlstar anti-fouling bottom coating.

coatings for new construction and maintenance, and lead overcoats for industrial and specialized architectural jobs.

For more information on Wasser
Circle 40 on Reader Service Card

CCI Designs Anti-Vort Riser Wrap

Corrosion Control International, LLC (CCI) has developed a new pilewrap for corrosion protection and vortex shedding, specifically designed for easy retrofit installation for use on subsea pipelines, vertical risers and tension leg platform (TLP) tendons. The Anti-Vort riser wrap is designed to suppress vortex formation by utilizing three spiral strakes which redistribute water force, eliminating vortex formation and accompanying vibration.

For more information
Circle 54 on Reader Service Card

Ferro Makes Additions To Powder Coatings Divisions

Joe King has joined Ferro Corp. as a sales representative for the Powder Coatings division. Mr. **King** will be responsible for sales development in the division's Central Region, primarily handling business in Kentucky and southern Indiana. He has more than 40 years of experience in varying capacities in the powder coatings industry. In addition, **Nancy Arrowood** has been appointed a sales/service representative for the Powder Coatings division. She will be responsible for sales and service in northern Ohio, western Pennsylvania and New York.

For more information
Circle 64 on Reader Service Card

Rust Preventives From Drew Marine

Magnakote Plus cracking rust preventative from Ashland Chemical's Drew Marine Division offers five-year protection against rust in ballast tanks and void spaces. Two-year protection is available with the use of Drew Marine's original Magnakote rust preventative.

By penetrating rusted surfaces to form an electrochemical bond to the base steel, both products inter-

act with oxides to prevent further corrosion.

The chemical barrier created by this bonding action also acts as a descaler on existing rust.

The corrosion inhibitors are applied at a thickness of 75 microns, and cure to a transparent film which makes the underlying

steel clearly visible.

To maximize product effectiveness, Drew Marine offers the Life Preserver Program which provides initial shipboard inspections and, following product application, periodic follow-up inspections.

For more information on Drew Marine
Circle 41 on Reader Service Card

Pentek Demonstrates Wall-Walking Robot

Pentek has demonstrated a new robotic technology called the WallWalker for the Department of Energy's Energy Technology Engineering Center (ETEC). This

The advertisement features a large, central image of a white bucket of Hempel paint. The bucket has a circular logo with the text 'HEMPEL' and 'Estd 1915'. The background is a dark, textured surface, possibly a wall or a large pipe, with the word 'HEMPEL' written in large, bold, white letters across the top. Below the bucket, the words 'WORLD' and 'WIDE' are written in large, spaced-out letters. The overall aesthetic is industrial and professional.

MARINE COATINGS & CORROSION CONTROL REVIEW

technology makes it possible to deploy completely automated work modules on large vertical surfaces while eliminating scaffolding and safety equipment required to protect human workers. The WallWalker is programmable for adaption to walls of unlimited height and width, and can conform

to wall surface irregularities.

For more information
Circle 63 on Reader Service Card

U.S. Paints Appoints Sass & Assoc. As Agency Of Record

U.S. Paint Corp. has appointed

Sass & Assoc. as its agency of record. U.S. Paint produces marine and aviation coatings that include primers and fairing compounds to polyurethane and acrylic urethane topcoats.

The company offers Awlgrip and Alumigrip polyurethane topcoats, as well as Awl-Brite Plus urethane

brightwork protection, Awlsparr classic spar varnish and Awlstar anti-fouling bottom coatings.

For more information on U.S. Paints
Circle 56 on Reader Service Card

NPI Acquires Coatings Division Of Rule Industries

Nautical Paint Industries (NPI) has acquired the marine coatings division of Rule Industries Inc., with product lines consisting of anti-fouling and above-waterline coatings for the recreational and commercial boating industry. The products are marked under Gloucester and KL990 labels.

For more information on
Circle 44 on Reader Service Card

TMT Targets Rust Removal

TMT Services Corp., manufacturer of Rusteco corrosion treatment products, reports that Rusteco — in both gel and liquid form — removes any rust regardless of severity, without harming marine life. Tests were performed on Daphnia magna organisms less than 24 hours old with a reported zero percent mortality rate. Rusteco reportedly does not negatively affect skin, paint, plastic or rubber. Tensile strength tests under MIL-STD-45662A, Amendment 1, reportedly show no significant loss in tensile strength as a result of exposure to Rusteco corrosion treatment.

For more information
Circle 42 on Reader Service Card

Royal Chemical Corp.

Royal Chemical Corp. offers Easy Kote, a water-based, multi-purpose, surface-tolerant coating. The product is reportedly heat-resistant, safe to use and quick-drying. Available worldwide, Easy Kote is classified as a potable water coating under ANSI/NSF Standard 61.

Circle 51 on Reader Service Card

Jotun Valspar Marine Coatings

Jotun Valspar Marine Coatings has introduced Val-Kryl, a high-gloss, water-based acrylic paint. This product is available in Jotun

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Circle 317 on Reader Service Card

Cavi-Tech Hydroblasts U.S. Navy Ship

Based in Atlanta, Ga., hydroblasting equipment developer Cavi-Tech, Inc. is currently working on USS *Belleau Wood* in Sasebo, Japan. According to a Cavi-Tech representative, the company will hydroblast the entire exterior hull from the flight deck down, as well as more than 200,000 sq. ft. of ballast tanks on the vessel. This is reportedly the largest hydroblasting project the U.S. Navy has undertaken.

Of special concern to U.S. Navy port engineers is the use of abrasive blast because of the expense of protecting the local and shipboard environments from dust, and the fact that the coatings system on

the vessel has not broken down enough to warrant total removal.

On the freeboard and catwalk area, Cavi-Tech will remove the silicone alkyd top coat layers and the epoxy 150 and 151 layers will be stressed to ensure adhesive and cohesive soundness. Any corroded areas will be blasted down to bare metal. The underwater hull will be subjected to a sweep blast in order to clean the as yet undamaged anti-fouling coatings. The ballast tanks will undergo a spot blast to bare metal on corroded areas, leaving tight edges, and existing intact coatings will be sweep blasted in preparation for painting. Cavi-Tech is operating



12 x 20,000 psi blast stations in order to complete the scope of this work. Cavi-Tech, Inc. specializes in hydroblasting using 20,000 and 40,000 psi equipment for both

marine and industrial markets. The company offers its own paint crews for turnkey projects.

For more information on Cavi-Tech, Inc.
Circle 46 on Reader Service Card

Valspar's full color range, is compatible with existing solvent-based coatings and is VOC compliant.

Circle 45 on Reader Service Card

Aqua-Dyne, Inc.

Houston-based Aqua-Dyne, Inc. has developed a high pressure water jetting system for cleaning decks, hulls and walls. The Roto-Jet Blaster uses high pressure water with specially-designed rigging and a rotary jet nozzle system to remove rust and damaged coatings on ships while at sea or in drydock. The Roto-Jet

system is a self-powered, high-pressure water jet unit for surface preparation of the hull or deck of a ship. The water jetting system automatically cleans loose paint, rust and scales to meet SA 2-3 standards. The cleaning unit is lowered down a ship's hull to the bottom, moved sideways using on-deck rigging and then bought back up to the deck while cleaning a one meter path with each up and down pass.

Circle 49 on Reader Service Card

S.G. Pinney & Assoc., Inc.

S.G. Pinney & Assoc., Inc. specializes in cor-

rosion control through the proper use of protective coatings. The company's services include specification preparations and review, failure analysis, project management, inspector training, laboratory testing and analysis, independent condition surveys and application inspection. S.G. Pinney & Assoc. distributes inspection instruments through more than 75 manufacturers.

Circle 50 on Reader Service Card

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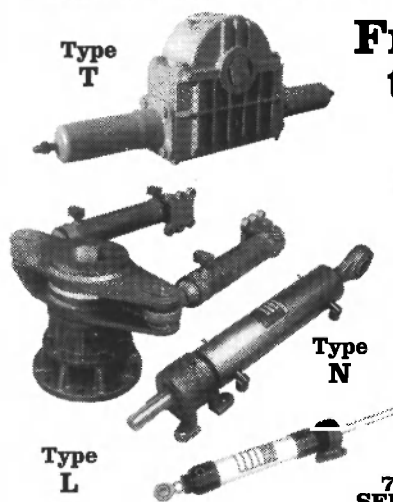


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thicknesses of paint, plating and other coatings on all metal surfaces with a measuring range of .1 to 19,500 microns. The 977 series includes single purpose models for use on ferrous or non-ferrous surfaces and dual purpose models for use on all metal surfaces. The series features a measuring resolu-

tion of .1 microns, as well as user-selectable averages of two to 99 measurements.

Circle 52 on Reader Service Card

Barnacle Ban Corp.

Barnacle Ban Corp. offers HOTBottom antifouling paint, a

product distinguished as one of the top 10 finalists nominated for an NMMA innovation award. The product has a low copper content and is suitable for repelling barnacles, zebra mussels and other marine organisms. The paint is effective in fresh and saltwater.

Circle 53 on Reader Service Card

NACE International

NACE International provides the coatings industry with certification, standards, books and journals, conference papers, educational programs and technical committee information relating to the proper use of protective coatings and linings. NACE offers a new Marine Coatings Inspection Course, a three-day specialty course addressing fundamental issues specific to coatings in worldwide marine environments including: maintenance procedures; ship design and associated coatings problems; marine coatings inspection standards and procedures; surface issues; marine coatings processes; and shipyard environmental regulations and considerations.

Circle 55 on Reader Service Card

Class Instrumentation Ltd.

Class Instrumentation Ltd. has designed the CLASS gauge for reading the thicknesses of steel and paint simultaneously. The steel reading will only indicate the amount of solid steel, and will not be misled by any fake or corroded layers.

Circle 57 on Reader Service Card

Electrocatalytic, Inc.

Electrocatalytic, Inc. offers the Chloropac method for prevention biological fouling. This system produces a dilute solution of sodium hypochlorite for direct injection into the water circuit. Chloropac is suitable for power utility and desalination in petrochemical and offshore markets.

Circle 58 on Reader Service Card

Thortex America West

Thortex America West offers Corro-Tech GP. When coated on refrigeration pipes at -40 degrees F in a chlorine/saltwater environment, this product has reportedly lasted for three seasons. With manual abrading, Corro-Tech adheres at greater than 2,500 psi, eliminating lifting.

Circle 59 on Reader Service Card

Encor (USA) Corp.

Encor (USA) Corp. offers the Isotrol/Isoguard system, a tough, elastic surface which is reportedly impervious to oxygen and moisture. The system can be applied

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with airless spray equipment, rollers, brushes or dipping techniques. Isotrol's low surface tension penetrates rust, bonding firmly to the substrate. Isoguard, the pigmented topcoat, is engineered to meld into Isotrol to form a single coat that will not peel or separate.

Circle 60 on Reader Service Card

E Paint Company, Inc.

E Paint Company, Inc. offers No Foul ZDF Commercial Grade paint. This product is an EPA registered bottom paint and is compatible with aluminum.

Circle 65 on Reader Service Card

Sigma Coatings

Sigma Coatings has provided Cyprus-based Metz Ship's fleet of 10 container vessels with all necessary paint and coatings requirements, including sea stocks and systems for drydocking and maintenance. Metz also anticipates using surface-tolerant Sigma Multimastic self-priming epoxy coatings system for cargo holds and general maintenance onboard Metz *Italia*. Sigma products used onboard the Metz fleet include: Sigmaplane TA; long-life antifouling Sigmapilot; and coal tar epoxy Sigma TCN 300.

Circle 61 on Reader Service Card

Earl Industries

Earl Industries' ultra-high pressure water jetting system removes tightly adhered coatings, paints and deposits from areas including underwater hulls, exterior topsides and ballast tanks. This cleaning method reportedly removes soluble salts, minimizes waste, is dustless and allows other activities to continue while coatings removal is in progress. Surfaces are prepared to a finish which meets industry-wide sanitation criteria, including NACE, SSPC, SIS, the interim NACE/SSPC Joint Standard, U.S. Navy and International Paint standards. Earl Industries provides on-site engineering and repair through its major business divisions worldwide. The company specializes in the removal, containment, collection and application of a wide variety of marine and industrial coatings.

Circle 62 on Reader Service Card

Hempel Coatings Inc.

Hempel Coatings Inc. specializes in providing ballast tank coatings to the marine industry. The company has developed a new line of products designed for aging fleets, as well as newbuildings.

Circle 67 on Reader Service Card

Applied Surfaces, Inc.

Applied Surfaces, Inc. provides a line of coatings products to the maritime industry specifically designed to be easy to use and environmentally friendly. Products include the Neutra-rust line of rust converters and barrier

primers; Durabak, a skid-resistant, ADA compliant, one-part polyurethane with rubber coating; a crumb aggregate; IMCO sealers and hardeners; and chemical resistant, super-tough maintenance coatings.

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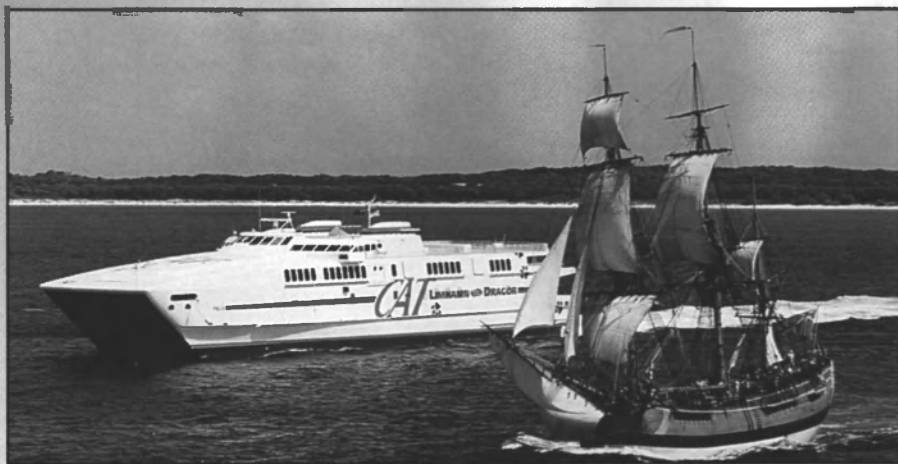
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Unusual Sailing Companions: *Felix the CAT*, a 269-ft. (82-m) vehicle-passenger catamaran built by Austal Ships, sails with the *Endeavor* replica sailing ship. *Felix* was built for the partnership of SweFerry and DSO.

Harbour Intermodal Seeks Capital For Fast Harbor Transport Service

Harbour Intermodal believes it has the blueprints for a fast harbor transportation service that, following its successful implementation in the Greater New York Harbor area, would be applicable and marketable in most any port around the world. Specifically, the company has devised a feeder transportation service which incorporates a new vessel design with electronically controlled floating slips, designed to speed cargo on its way in busy ports.

The company has invested time and money in studying the means needed to meet changing freight transportation needs. Specifically, it has developed a plan — around a vessel dubbed the HILX 404 Intermodal Ferry — calling for a network of waterborne intermodal ferry services linking major railroad and trucking terminals in the Greater New York Harbor area. Intermodal ferry service across the New York Harbor would initially run between a terminal in New Jersey and one in Bay Ridge, Brooklyn. Other terminals would be added in New Jersey, Brooklyn, Queens and the Bronx.

New Vessel Design

The HILX 404 Intermodal Ferry, the backbone of Harbour Intermodal's proposed shuttle/ferry service, offers speed and versatility. The 404-ft. (123-m) vessel was designed by a Finnish company as a double-ended, self-propelled, shallow-draft craft. It will reportedly be able to be loaded and unloaded in 15 to 30 minutes.

Propelled by Aquamaster 360-degree rotatable propulsion units at both ends, the HILX 404 is designed to transport a combination of railway cars, trailers, containers and special freight, with a capacity of 25 to 30 railway cars or five articulated five-section twin-stack railway container cars and five parallel trucks. It can also carry up to 50 over-the-road trailers, and 100 to 150 fully loaded containers. While the company's "testbed" is New York, it is important to note that the system is designed for feeder services between major ports and smaller ports which cannot accommodate deep-draft oceangoing vessels, or those which do not have the volume of freight to justify service by a larger ship. The company plans to build and prove the system in New York, then market it around the world.

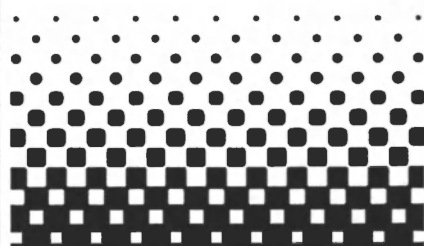
Finnyards Develops New Series Of High Speed Vessels

Finnyards has developed a complete series of both high-speed monohull and multihull vessels to cover the speed range between 25 to 40 knots, with a carrying capacity from 600 to 1,500 passengers and 160 to 350 cars, respectively.

Finnyards has considerable experience in the high-speed vessel segment, having recently delivered the innovative GTS *Stena Explorer* and *Stena Voyager*, the world's largest aluminum catamarans.

For more information from Finnyards
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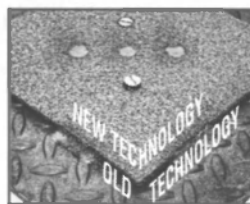
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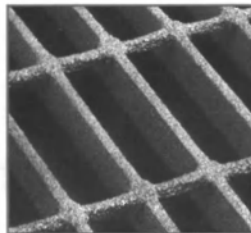
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Condor Express Delivered

Condor Express is a 282.1-ft. (86-m) wave-piercing catamaran built by Australia's Incat for Condor Ferries. The high speed ferry is the 18th built by Incat. The design — born in the early 1980s and continually refined — is characterized by long, slender waterborne hulls, each subdivided into eight watertight compartments, which have very little buoyancy at the bow. As each hull encounters a wave, it tends to pierce through, rather than ride over it.

Condor Express was constructed from marine grade aluminum alloys at Incat's Hobart, Tasmania, facility. The aluminum superstructure is supported on vibration damping mounts.

The vessel is powered by four

Ruston 20 RK270 conventional medium speed diesel engines, each developing 7,080 kW. Each engine drives a transom mounted Lips waterjet through Renk reduction gearboxes. Two Caterpillar generators in each hull feed associated independent main switchboards, which are capable of disconnection in an emergency.

MBS Project Management was commissioned to design the interior outfit of the vessel.

For more information on the companies listed in this story, circle the appropriate number on the Reader Service Card in this edition.

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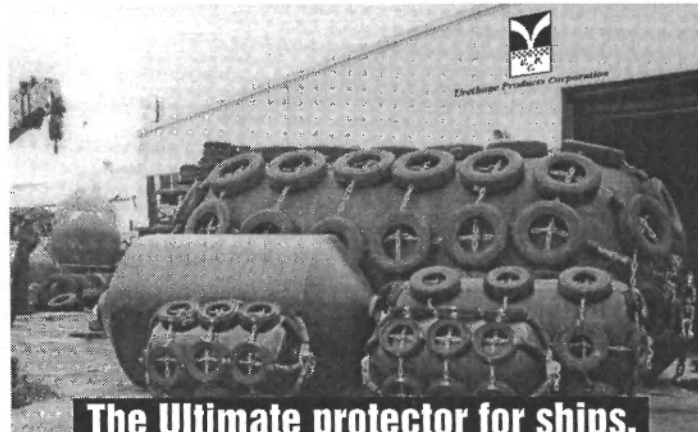
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Geven Supplies Seats For Fast Market

Italy's Geven, a specialized seating manufacturer for the fast ferry market, recently won an order for 5,000 seats from Sea Containers. The seats are scheduled for installation onboard six Pegasus hydrofoil vessels, which are under construction at Fincantieri's shipyards. The order is the latest prestigious contract won in a lucrative three-year stretch for Geven — the entire length of its presence in the maritime market. It first supplied Rodriguez Shipyards with seats for Aquastrada ferries. This was followed by orders from INMA, Leroux and Lotz, Fincantieri and Mediterranean Shipping Group — representing a total of 11,500 units in that time period. Company officials note that Geven is close to acquiring another agreement regarding 5,000 seats. The company's growth plans include consolidating its hold on the European market, while increasing its share in the attractive Australian market. Geven has more than 20 years of experience in the production of seats and interiors, with its origins in supplying the demanding military and civilian aircraft industries. Geven's San Sebastiano al Vesuvio-based plant is divided into two separate production lines — one for aviation, the other for railway and shipping — and its 100 employees are reportedly capable of producing 700 seats per month.

For more information on Geven
Circle 82 on Reader Service Card



Pictured is Geven's Dream, a first-class nautical seat.

"Now is the time to bring back fast ferries..."

This was the assessment of Vice Adm. Albert Herberger, U.S. Maritime Administrator, at a recent luncheon meeting of the International Cargo Handling Coordination Association (ICHCA-USA) in New York. Speaking on U.S. maritime needs, Vice Adm. Herberger said that U.S. landside transportation systems in many places are overwhelmed, and he lauded the ferry systems in place in Scandinavian countries. "The waterborne alternative is becoming more attractive, as federal, state and local funds dwindle for landside developments," said the U.S. administrator.

While the need may be real, capital investment could be scarce, at least from government sources. "The time is right for a resurgence in maritime mode transportation, and it will take some brave souls (to make it happen), because massive help won't be coming from the federal government," added the vice admiral.

He noted that an increase in trade between North and South America should also drive a need for vessels that can transit the Gulf of Mexico as well as the inland waterways.

ABB Stal Helps Power Fastest Ferries

ABB Stal has received many notable orders for its gas turbines for fast ferry installations, including an order for two GT35 gas turbines to be used for the propulsion of the high speed ferry *Buquebus B60*. The ferry, being built at E.N. Bazan in Spain, is designed for a cruising speed of 60 knots. The two gas turbines together develop a shaft power of 34,000 kW (46,000 hp). When completed, the ferry is scheduled to enter regular traffic at the end of 1997 on the Buenos-Aires, Argentina, to Montevideo, Uruguay, run.

For more information on ABB Stal
Circle 84 on Reader Service Card

Finnyards Secures Icebreaker Order

The Finnish National Board of Navigation has ordered a combined icebreaker and offshore construction vessel from Finnyards. Delivery is scheduled for spring 1998.

The vessel was designed as a multi-purpose icebreaker for unrestricted

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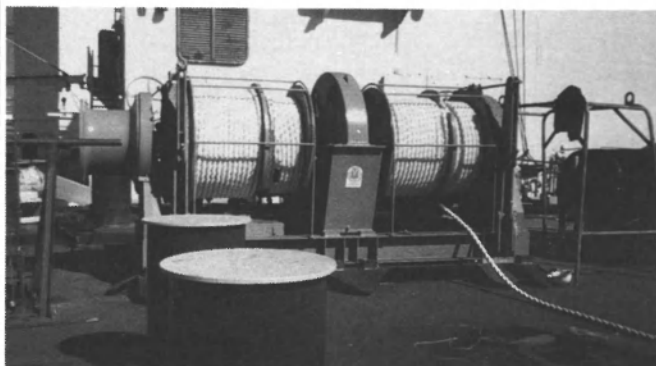
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service. The shipyard built two similar vessels before, namely *Nordica* and *Fennica*, which were delivered in 1993 and 1994, respectively. The new 10-MW vessel is somewhat smaller than its sister-ships, with a length of 318 x 78 ft. (97 x 24 m). However, the design principles and the hull form are the same. The diesel electric propulsion system features two five-MW Azipod stern propeller units, giving the icebreaker a bollard pull of 105 tons and a speed of 15 knots in open water.

For more information on Finnyards
Circle 85 on Reader Service Card

Scandinavian Bunker Companies Merge

Seabunker A/S and Scandinavian Bunkering AS have merged to reportedly become the largest bunkering company in Norway. The new company name is Scandinavian Bunkering AS. It is 100 percent owned by Bunker Holding AS, and located in Tønsberg. According to the company, it holds a strong financial position with eight traders. DNV has also reportedly issued the company an ISO 9002 certification.

For more information
Circle 95 on Reader Service Card

Simplex-Turmar Names Regional Manager

Simplex-Turmar, Inc. has named **Ike Svensson** regional manager for the company's new Seattle office. Mr. **Svensson** has experience in commercial and naval propulsion systems, and has held positions in marine engineering, operations and project management. The company specializes in the sales and service of Blohm + Voss Simplex-Compact sterntube seals, Railko marine bearings and related products, and in addition to its new location, has offices in New York City and Buffalo, N.Y.

For more information on Simplex-Turmar
Circle 199 on Reader Service Card

Kvaerner Masa-Azipod Wins Orders

Kvaerner Masa-Azipod has reportedly received an order to supply electrical propulsion drives for Royal Caribbean Cruises Ltd.'s (RCCL's) Project Eagle ships. The ships will be built at Kvaerner Masa-Yards' Turku New Shipyard, and will each receive a propulsion package comprising three 14-MW electrical azipod units.

For more information
Circle 92 on Reader Service Card

March, 1997

Int'l Defense Companies Initiate Joint Venture

Lockheed Martin Corp. and Australia-based Transfield Defense Systems (TDS) have announced details of a new joint venture company whose focus will be on providing advanced systems engineering and integration, and software development capabilities and technologies throughout Australia and Southeast Asia. Transfield is the main contractor for Australia's largest defense contract, the \$5 billion

ANZAC Ship Project. The new company, presently referred to as RLM Holdings Pty. Ltd. (RLM), is located in Melbourne and is reportedly capable of serving as a prime contractor and executing major defense and high technology civilian projects. In mid-February Telestra selected RLM to manage the \$1 billion Jindalee Operational Radar Network (JORN) defense project through to completion, and the joint venture company then purchased Telestra.

For more information on RLM Holdings
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CIT Group Names Marketing Executive

The CIT Group/Capital Equipment Financing has named **Natalia Cherney Roca** vice president, Marketing. She is responsible for the planning and execution of a comprehensive, integrated marketing program supporting the company's maritime, rail, energy, intermodal and aerospace markets.

OSTS Establishes Snubber Service

Ocean State Technical Services (OSTS) of Cumberland, R.I., has established an on-site program to inspect, repair and test hydraulic

shock and sway suppressors or snubbers. The cornerstone of the program includes a mobile test machine and workshop.

Fleet Tech Ltd. Announces Appointments

Fleet Technology Ltd. of Kanata, Canada, has announced two appointments. **Ernie Aikens** has been named director of the Materials and Welding Technology Centre, and will manage the establishment's expansion. **Robert Walker** has joined the company as a project engineer in the Structural Analysis group, and will be assigned to various tasks in risk and reliability as well as numerical modeling.

DeJong & Lebet Completes SWATH Study; Expands Staff

DeJong & Lebet, Inc., Jacksonville, Fla., has designed a 160 x 65-ft. (48.7 x 19.8-m) SWATH presently under construction at Leevac Shipyard. Additional SWATH-type vessels presently being designed by the naval architecture firm are an 180-ft. (54.8-m) megayacht and a gaming vessel of the same size.

These designs are partly based on studies the firm completed on the first real SWATH ship, which according to DeJong & Lebet, was a 145-ft. (44.1-m) vessel constructed in Bolnes, Holland, in 1969. The firm analyzed the vessel's

structure, arrangements, stability and subsequent suitability for a variety of uses including offshore gaming.

In addition, the company announced that **Robert Hull** recently joined the firm, bringing with him extensive experience in yacht and commercial vessel design.

Raytheon Names Top Executive For North America Segment

Raytheon Marine Co. has promoted **Jeffrey O. Fellows** to president of Raytheon Marine Co. North America. In this position he will provide management direction



and guidance to all organizations within the Raytheon Marine Co. North America business operation. Prior to his latest appointment, Mr. Fellows served as vice president of the same business unit.

Headquartered in Manchester, N.H., Raytheon Marine Co. North America is a leading supplier of marine radars, autopilots, depth sounders, radio telephones, Loran, GPS receivers and other products marketed under the Raytheon, Apelco, Autohelm and Anschutz labels.

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Trinity Appoints New VP

Harry W. Hinkle has been appointed vice president, Specialty Products Group, for Trinity Industries, and will work out of Trinity headquarters in Dallas. In addition to other responsibilities, Mr. Hinkle will supervise Beard operations in Shreveport and the Brighton and Hamilton Kettles operations in Ohio and Arkansas, which combine with the entire group of companies to provide custom engineering and fabrication orientation.

John H. Wawrzeniak, formerly vice president of Engineering at Beard Industries, has been appointed vice president and gen-

Hinkle

Wawrzeniak

eral manager of the same segment.

Beaird is a wholly-owned subsidiary of Trinity Industries, Inc., which manufactures and markets a variety of products in several sectors, including the marine, construction, container and metal component industries.

Yim Joins Private Sector



Joan B. Yim, former deputy administrator of the Maritime Administration, has accepted a position in the private sector, specifically at the Washington, D.C.,

office of Parsons Brinckerhoff (PB), an international engineering, planning and construction management organization. In her new position, she will be responsible for strategic planning and marketing of PB's services worldwide. Ms. **Yim** previously worked for PB as a supervising planner in the firm's Honolulu office, where she was responsible for the preparation of environmental review documents for planning and engineering projects in Hawaii.

The PB group of companies provides multi-disciplinary services in transit systems, tunnels, bridges, highways, airports and marine facilities. The firm is also involved in water and environmental engineering, energy systems and industrial power, as well as urban planning. This fits into Ms. **Yim's** background as a planner with the Hawaii Office of State Planning, where she was responsible for issues relating to natural resources, coastal zone and ocean management and public infrastructure financing.

Navionics Hires New Rep



Chuck Worst has joined the OEM/Dealer Support Team as a manufacturer's representative for Navionics, Inc., a U.S. marine electronics chart supplier. He is a

well-known figure in the industry, and co-owned Northern Marine Electronics for more than 20 years.

Mr. **Worst** will reportedly work closely with North American

marine electronic manufacturers and National Marine Electronics Association (NMEA) dealers throughout the U.S., and will represent the interests of Navionics dealers on the West Coast and in the Gulf of Mexico.

Howden Names New Manager

Howden Air Dynamics, Inc., a leading producer of fans, blowers and compressors for shipboard applications, announced that

Henry Anaya will serve as the company's Marketing manager for navy and marine products.

Board Member Resigns

J. Ray McDermott, S.A. announced that **Lodwick M.**

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PEOPLE & COMPANY NEWS

Cook has resigned from its board of directors. Mr. **Cook**, chairman emeritus of ARCO and a member of several other corporate and civic boards, was a member of the J. Ray McDermott board since March 1996.

"We thank **Lod** for his service to the company. His years of experience gave us useful insight at a time of great change in our company, and we will miss his counsel," said **James L. Dutt**, chairman and CEO.

J. Ray McDermott is a worldwide marine construction company, offering design, fabrication, transportation and installation of offshore platforms and subsea production facilities for the

offshore oil and gas industry. McDermott International, Inc. holds a majority interest in J. Ray McDermott.

AMSC Announces Executive Staff Changes

Robert L. Goldsmith has been named executive vice president and chief operating officer for American Mobile Satellite Corporation (AMSC), assuming leadership responsibility for the areas of sales and marketing, operations, engineering and customer service. He succeeds

Brian Pemberton, who left the company at the beginning of the year.

"As AMSC develops the business marketplace for mobile satellite communications, it is widely acknowledged that effective marketing and selling will be the key challenge. Bob's long and successful sales background at MCI, IBM and Satellite Business Systems ideally positions him to lead AMSC's efforts," said CEO **Gary Parsons**. AMSC has also announced that Chief Financial Officer **Patrick Fitzpatrick** will leave the company to become CFO of DynCorp.

AMSC offers a full range of mobile communications including telephone, digital broadcast dispatch, and data and position reporting services to the transportation, land mobile, maritime, aeronautical and fixed site markets.

Crowley Announces Leadership Appointments

Oakland, California-based Crowley Maritime Corp. announced that **James J. Carey II**, president, Crowley American Transport, has retired and that **P. Elliott Burnside** will become the company's new president.

Mr. **Burnside** most recently served as president and CEO of BMI Transportation Inc. He will now report to **Tom Crowley, Jr.**, CEO of Crowley Maritime.

Crowley American Transport has also promoted **Mike Hopkins** to vice president and general manager of Operations, with responsibility for domestic and offshore land operations, marine operations, equipment, and intermodal and freight services. Before assuming this position, Mr. **Hopkins** served as vice president and general manager, Marine and Offshore Operations, and has been employed by Crowley since 1976.

Centa Corp. Names New Sales VP

The Centa Corp. of Darien, Ill., has appointed **Kurt Niederpruem** to the position of vice president of Sales. He has 14 years of experience in the application, distribution and marketing of marine and industrial couplings, transmissions and hydraulics, and has previously held positions in marketing and sales with The Falk Corp., ITW and Lovejoy, Inc.

LR Awards ISM Certification To Brazilian Interest

Global Transporte Oceanico SA has become the first company in Brazil to receive both International Safety Management (ISM) Code and ISO 9002 certification from Lloyd's Register (LR). This event coincides with Global's 25th anniversary celebration.

Certificates issued include an ISM Document of Compliance (DOC) for the company's Rio de Janeiro office for its safety management systems covering a fleet of RoRos and chemical tankers; a Safety Management Certificate

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H Clarkson Appoints New Board Members

Three new directors have been appointed to the board of international shipbroking firm H Clarkson & Co. Ltd., part of Horace Clarkson plc. **Pia Andersson** of the Tanker Division, and **Mark Mitchell** and **Paul Smeaton** of the Dry Cargo Division are the new members. Ms. **Andersson's** appointment is especially noteworthy, as she is the first female board member in the company's 145-year history.

Gibbs & Cox Opens Tidewater Office

Naval architecture firm Gibbs & Cox, Inc. has announced the opening of a full service design and engineering office in Hampton, Va. The office provides marine, electrical and structural design and engineering services to clients in the Tidewater area. The new office director is **Jerry W. Pinkard**, a Tidewater native, graduate of the Newport News Shipbuilding Apprentice School, and long-time senior manager for Gibbs & Cox.

In addition to its newly opened office, Gibbs & Cox has offices in New York; Crystal City, Va.; and Brunswick, Maine. The company is recognized for its detailed design of complex U.S. naval ships, including the Navy's newest class of surface combatant ships — Arleigh Burke destroyers.

South Carolina Yard Names New Sales Director

Charleston Ship Inc., a ship repair company based in Charleston, S.C., has named **Bill Litchfield** as its Sales director. Yard owner **Carl Beal**, formerly of Philly Ship, appointed Mr. **Litchfield** based on the yard's **March, 1997**

plans for expansion, which were developed after increased success and growth in 1996.

Charleston Ship services several ports, including Charleston and Georgetown, S.C.; Savannah, Ga.; and Wilmington, N.C.; with riding crews available throughout the

U.S. Eastern Seaboard.

Hamworthy Marine Hires Rudder Systems Manager

Hamworthy Marine Technology Ltd. has appointed **Joseph Thomas** as manager of its Rudder

Systems business unit. Leading the company's drive to achieve ambitious sales targets worldwide through product and service excellence, he has

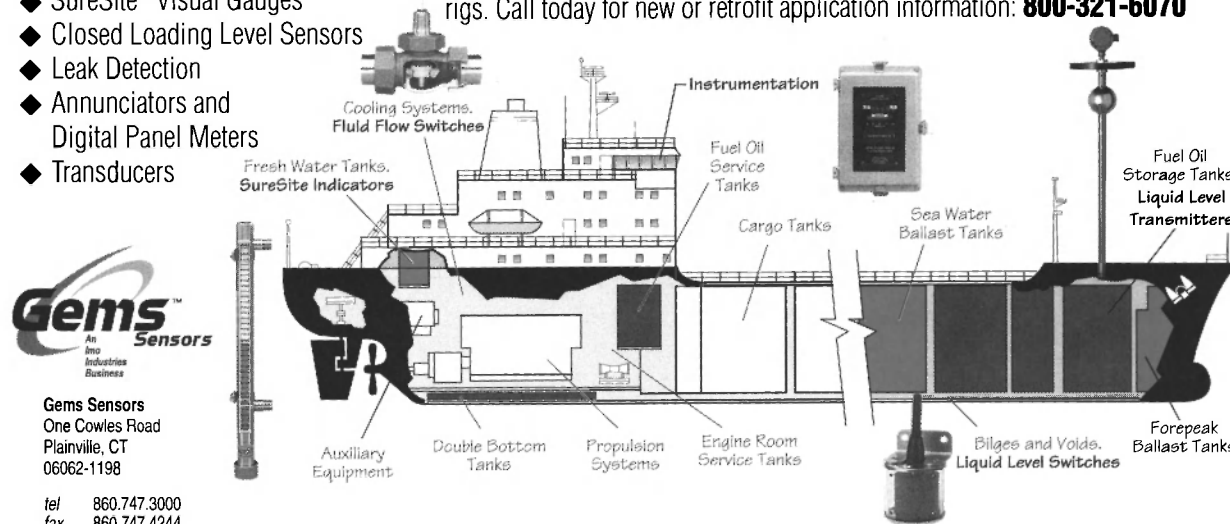


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assumed responsibility for overall management of the unit's activities, including R&D through design, contract and project management, class approvals, quality assurance and sales.

Mr. **Thomas** joined Hamworthy in 1995 as a ship hydrodynamicist working on technical aspects of conventional and high performance Schilling rudders for all types of seagoing vessels.

International Absorbents Secures \$1 M Line of Credit

International Absorbents Inc., a manufacturer and marketer of absorbent products made from waste wood pulp, has announced the completion of a new credit facility totaling \$1 million. "This funding will enable the company to concentrate on its expansion plans and on the further development of its growing customer base. I am pleased by our new management's ability to attract significant new capital without any dilution to current shareholders," said Chairman **Gordon Ellis**.

Since late 1996, several key upper level management positions have been strengthened at the company. **Geoffrey Lawrence**, an executive with extensive international sales and operations expe-

rience, was named CEO of operating subsidiary Absorption Corp. **Jack VonEwegen**, who built Slikwik Sorbents from negligible revenues to \$8 million in sales, became vice president of Industrial Marketing. **Edward Murchie**, former COO of Vernitron Corp. and former CFO and COO of Fairchild Industries, joined Absorption Corp.'s board and has taken an active role in the management of the company.

International Absorbents Inc. develops, manufactures and markets sorbent products derived from recycled materials and used in a broad range of industrial and consumer applications, including oil and hazardous liquid spill cleanup and control, and oil/water filtration.

Salvage Association Announces Changes

The London-based Salvage Association (SA) has announced staff and offices changes. **Stuart Walker**, principal surveyor, Singapore, has retired after 26 years of service. **George Sloss**, who previously served in the Singapore office, has transferred from Southampton to Singapore to succeed Mr. **Walker** as principal surveyor.

In addition, SA's Marseille office has been closed and surveys on the French Mediterranean coast and in Algeria and Tunisia will be covered by the Genoa office. Barcelona will be administered by the Lisbon office and West Africa will be covered from the U.K.

It was found that ship repair activity in the Marseille area has shown a marked decline since the office was opened in 1985 and the volume of instructions no longer justifies its continued operation. **David Burbridge** and **Gordon Murray** from Marseille have relocated to the Southampton office where the former is now surveyor in charge.

NNS Releases Financial Earnings Report

Newport News Shipbuilding (NNS) reported earnings before interest and taxes of \$23 million for the fourth quarter of 1996, compared with \$35 million in the fourth quarter of 1995. For the year, earnings before interest and taxes were \$140 million, compared with \$160 million in 1995. The NNS Tenneco spin-off was effective Dec. 12, and using the 34.3 million shares distributed in conjunction with this event, reported earnings per share were \$.09 for the quarter

and \$1.60 for the year.


"Nineteen ninety-six was a year of transition for Newport News. We continued our transition from a shipyard performing primarily nuclear work to one that is broader-based; we temporarily transitioned out of submarine construction; and we successfully transitioned to an independent, publicly traded company," said CEO **William P. Fricks**.

Earnings before interest and taxes for 1996 were \$20 million below 1995, due mostly to declines in construction earnings which were not completely offset by significant year-over-year gains in earnings from overhaul and repair. The decline in construction income of \$51 million was due to losses in the company's commercial tanker program and to increased costs of sealift conversion work.

Additionally, earnings were lower due to the conclusion of the Los Angeles class submarine construction program. Repair and overhaul income increased \$43 million, driven by the *Eisenhower* overhaul contract and the *Roosevelt* and *Nimitz* planning contracts. Income from engineering was consistent with the prior year. The growth in revenue from 1995 to 1996 was due to commercial construction activities and substantially increased overhaul and repair work.

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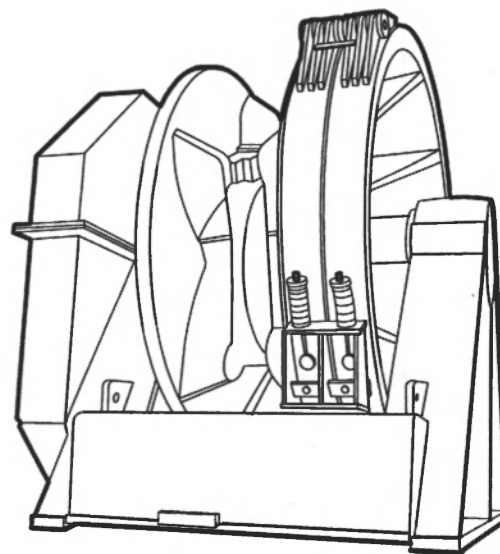


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LEGISLATIVE UPDATE

A Year Of NRDA:

Working Within NOAA's Framework

by Bridget Murphy, senior editor

Already notorious for its role as the host of football's Heisman Trophy ceremonies, New York City's Downtown Athletic Club is also developing a sideline reputation for bringing together maritime heavies for environmental legislation debates.

Tempers first flared at the club in February 1996 during a discussion of natural resource damage assessment (NRDA) guidelines at a post-North Cape oil spill conference. In early 1997, industry and government officials convened — once again under the auspices of the Maritime Association of the Port of NY/NJ — to sort through a year's worth of experience gleaned from the application of the National Oceanic and Atmospheric Administration's (NOAA's) infant guidelines under OPA 90 (Oil Pollution Act of 1990).

For those that need reminding, NRDA guidelines function in the restoration, rehabilitation, replacement or acquisition of equivalent natural resources and services in oil spill disaster areas. Spills characterized by NRDA involvement last year occurred in Point Judith, R.I., after North Cape operations went awry and the ship leaked home heating oil into icy waters offshore New England, and in Portland, Maine, in the wake of the *Julie N* spill.

While efforts to amend OPA 90 in the congressional arena have not posed a serious challenge to NRDA guidelines as currently read, the regulations are scheduled to be reviewed by the U.S. Circuit Court of Appeals, most likely in June. This review was prompted by a petition filed by a group of marine insurers last April which said that the damage assessment guidelines are vague, unscientific and could result in R.P.s (responsible parties) being held accountable for costs not directly related to restoration or assessment of spill areas.

The Players

While the NRDA panel assembled at the podium, 1996-97 conference delegates shared an uncanny sense of deja vu as NOAA's **Terry Garcia**, former general counsel and current acting deputy administrator and assistant secretary of Commerce for Oceans and Atmosphere; **Richard Hobbie, III**, president of Water Quality Insurance Syndicate; and **Mark Barash** from the Department of the Interior Solicitor General's office, took their places. **Marilyn Lytle**, counsel for the NRDA marine insurance petitioners, was also present among distinguished audience members.

To the collective relief of all in attendance, panel members avoided a rehash of last year's mudslinging forum and instead addressed the practical ramifications of working with NRDA. With the final NRDA rule published just days before the conference, Mr. **Garcia** made a point of encouraging industry to collaborate with the government in its role as an environmental trustee. "The goal of NOAA is to expedite restoration, reduce costs and avoid costly litigation," said NOAA's acting deputy administrator. He stressed that companies should

emphasize pre-spill planning methodology, and attested to the fact that MOUs (memorandums of understanding) were helpful in managing time and scaling back financial costs incurred during 1996 spills.

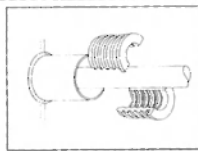
In a spirited dialogue, Mr. **Hobbie**

approached the problems of NRDA in an organized manner, in contrast to his self-acknowledged anti-NRDA rantings of a year ago. He reiterated his conviction that the guidelines violate OPA 90's double recovery clause, adding that R.P.s have the potential to "get burned" by both federal and state governments after spills. "It is not uncommon in the maritime world for a spill to affect more than one state," said the marine insurance executive, who further explained that since NRDA rules are "unquantifiable," even NOAA's reasonable officials could not fairly enforce guidelines which are unprofessional in content.

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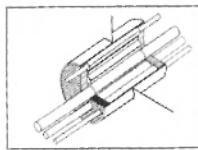
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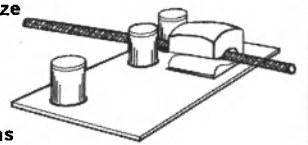
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LEGISLATIVE UPDATE

On the upside, Mr. **Hobbie** encouraged industry to develop scientific ability, saying that such capabilities are necessary in order to interrelate with government personnel at spill sites. He also advised conference delegates to be imaginative in their natural resource rehabilitation efforts: "Try and break the paradigms of restrictions ... There's no correlation between the quantum of damage and how to restore it."

Cooperative Assessments

Mr. **Barash** synergized earlier panel statements as he explained that the next step to advancing the NRDA process lies on the side of the R.P.s. "My basic thesis is that we have not gone nearly as far as we can in CDA (cooperative damage assessment)," said the official.

He said that R.P.s need to work together with government agencies to find common areas of agreement as early as possible during spills, in

order to minimize arguments and cut down on transaction costs. "The goal of cleanup is to minimize injury. We want to find a way not to make it worse," said Mr. **Barash**.

He further stated that greatest potential for advancing the process exists in the restoration, planning and scaling phase, and added that the idea of working off one set of data during the data collection phase has generally been embraced by all parties to the NRDA process.

During the panel rebuttal session, Mr. **Garcia** captured the essence of the NRDA issue and captivated the audience with this bold statement: "I don't care how much the dead bird costs. I don't care how much the oiled seal costs." In fact, the NOAA official explained that his concerns are focused on quantifying the costs involved with restoring natural resources to pre-spill, baseline conditions — a concern he shares with **Richard Hobbie** and countless other maritime personnel whose job it is to

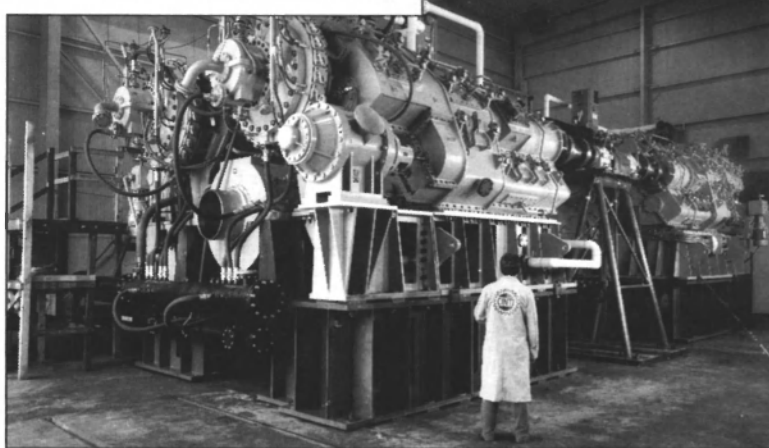
monitor the bottom line. Their advice for working within NRDA guidelines while curbing costs? "Pre-determine booming and protection strategies," warned Mr. **Hobbie**, and as conference delegates nodded their approval, Mr. **Garcia** reminded them to "be involved and be involved early."

Legal Briefs

Regional Risk Assessment Team Makes Safety Recommendations

On Jan. 15, a year after the *North Cape* spill off Rhode Island, a group of leaders from state and federal government, the environmental community and the maritime industry reached a consensus on a set of recommendations aimed at improving marine safety and reducing oil

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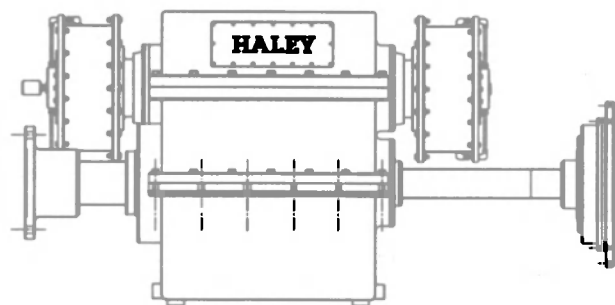
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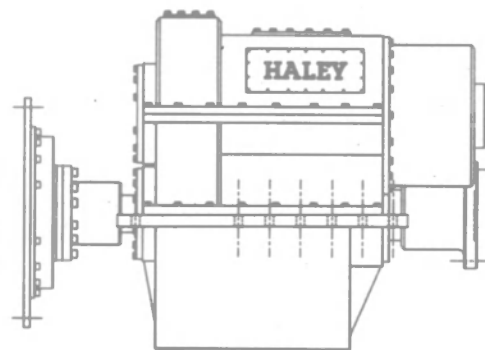
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LEGISLATIVE UPDATE

the introduction of alternative certification, enabling crews to gain training and certification for functions in different shipboard disciplines rather than being confined to one branch such as the engine room or deck.

One of the most important amendments concerns the role of IMO itself in implementing standards. Parties to the Convention will have to submit information to IMO concerning administrative measures taken to ensure compliance, education and training courses, certification procedures and other factors. The STCW Code generally supports the regulations of the Convention itself.

For more information, contact IMO at tel: +44 171 463 4040.

DOT Publishes Final Ruling On 33 CFR Part 157

On Jan. 10, the Department of Transportation (DOT) published its final ruling on the Structural Measure to Reduce Oil Spills From Existing Tank Vessels Without Double Hulls, 33 CFR Part 157, in the *Federal Register*.

The final rule represents the last phase in the U.S. Coast Guard's three-phased effort to establish economically and technologically feasible structural and operational measures to reduce the threat of oil spills from tank vessels without double hulls, as required by OPA 90. No structural measures are contained in this final rule because it was determined that there are no interim structural measures that are both technologically and economically feasible for existing tank vessels without double hulls. The final rule became effective on Feb. 10. For further information, contact LCDR **Suzanne Englebert**, project manager, Project Development Division, at tel: (202) 267-6490.

IACS Council Announces New Bulk Carrier Standards

In late December, the International Association of Classification Societies (IACS) held its final council meeting for 1996, during which discussions were held regarding new strength standards for bulk carriers, the heightened concern over the slow rate of ISM compliance and continuing IACS cooperation with port state control measures.

Although there has been a reduction in bulk carrier losses since 1993 when IACS introduced its Enhanced Survey Programme (ESP), the association has been working closely with IMO in order to consider additional measures. The new measures are based on IACS' belief that

the most important element in avoiding structural loss is the preservation of the integrity of ships' hulls and the hatchcovers forming watertight barriers. IACS has decided to require, as a condition of classification, that the bulkhead between cargo holds No. 1 and 2 and the double bottom structure in that area comply with new standards. They will apply to all single side skin bulk carriers of 492.1 ft. (150 m) in length or more intended for carrying cargo with a bulk density of one ton per cu. m. or greater, or ships of 15 years of age or greater.

On the ISM Code front, IACS announced that its new database shows that ship certifications for SMCs and company certifications for DOCs equal less than five percent of the volume to be certified by July 1998. The IACS Council has urged shipowners and flag administrations to accelerate their work towards certification.

Additionally, for the first time, IACS officials met with the

European Commission Directorate for Marine Safety (DGVII) and exchanged views on matters of mutual interest and concern. Both DGVII and IACS are determined to ensure continuing cooperation on the implementation of the Council Directive on Recognized Organizations and also on Port State Control.

For more information on IACS, contact **James Bell**, permanent secretary, tel: +44 171 976 0660.

U.S. Court Shoots Down Intertanko Suit

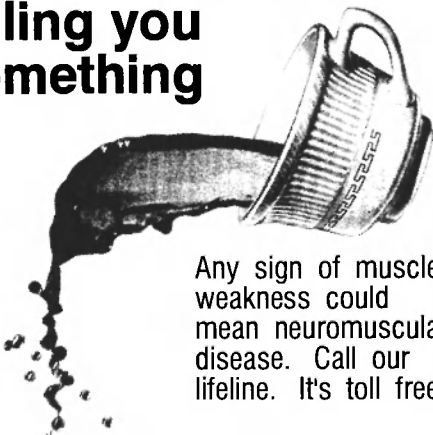
The following is an excerpt of text issued by U.S. District Judge **John C. Coughenour** in his decision regarding the legality of Washington state's oil spill prevention statutes and regulations. Intertanko was the plaintiff in this case, which was brought against the state, certain state officials and four county prosecutors, claiming that certain regulations pertain-

ing to the operation of oil tankers in state waters were unconstitutional.

The court concludes that the Washington oil spill prevention statutes and regulations are constitutionally valid. These statutes and regulations are not preempted by federal law, do not violate the Commerce Clause of the Foreign Affairs Clause of the Constitution, and are not improper extraterritorial restrictions. Rather, the oil spill prevention laws legitimately protect Washington's delicate and valuable marine resources through the exercise of the state's police powers. Therefore, the motions for summary judgment filed by defendants and intervenors are granted and the motion for summary judgment filed by Intertanko is denied. This action is hereby dismissed and the Clerk of the Court is directed to enter judgment accordingly. So ordered this 18th day of November, 1996.

John C. Coughenour
United States District Judge

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UNANSWERED QUESTIONS

by Alan Thorpe, international editor

The main question on most people's minds in Southeast Asia is how Hong Kong will fare once the British colony is transferred back to mainland Chinese control. This subject has been further complicated by the death of China's leader, **Deng Xiaoping**. Visiting Hong Kong, it is clear that the majority of business people, including both Chinese and foreigners, believe that little change will occur. Initial thoughts are that Mr. **Deng's** death will not affect the future that much, although the attitude towards Hong Kong may become even more conservative under the country's new leader, **Jiang Zemin**, if he manages to survive



Pictured is the new 16,000-ton lifting capacity floating dock at Pan United Shipyard. The floating dock measures 615 x 120-ft. (187.5 x 36.5-m), and is able to dock vessels up to 50,000 dwt.

the leadership under a possible threat from either Premier **Li Peng** or head of Parliament, **Qiao Shi**.

Meanwhile, in Hong Kong, the shipping industry is hoping that the appointment of **C.H. Tung**, son of **C.Y. Tung**, as leader from July will be a blessing for the industry as he is a "shipping man."

The two shipyards in Hong Kong — Hongkong United Dockyard (HUD) and Yiu Luan Dockyard — have both undertaken reorganization programs to concentrate on the larger containership market, and move away from the smaller ship repair market, which is increasingly looking to the cheaper

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mainland Chinese yards to carry out such work.

During last year, HUD, which is a 50/50 joint venture between the Swire Group and Hutchinson Group, sold off its Taikoo floating dock to Xianen Shipyard in mainland China and took delivery of the 40,000-ton lifting United floating dock from Far East Levingston (FELS). This floating dock, with a length capability of 981 ft. (299 m), moved HUD into the large containership market. Although there are no definite plans to increase the facilities at HUD, yard management is reportedly considering replacing the Whampoa floating dock with a larger unit that would facilitate a move into the very large containership market.

Meanwhile, it is expected that the United floating dock will, at some stage this year, be relocated to the company's Tsing Yi Island headquarters from Lantau Island; land reclamations and dredging are required for this eventuality. Government permission is also required for this move.

Yiu Luan Dockyard, part of the giant China Merchants Group, operates a total of three shipyards, the largest in Hong Kong and two smaller facilities in mainland China. Two years ago, the yard operated a total of five floating docks in the Hong Kong area, only three still remain. These are docks No. 1 (12,800 tons lifting capacity), No. 3 (36,000 tons) and No. 5 (1,800 tons). Numbers 3 and 5 are both located at Yam O near Lantau Island, and No. 4 is at the company's headquarters on Tsing Yi Island. The No. 2 floating dock (12,500 tons) was recently moved to Yiu Luan's Shekou Shipyard in the Shenzhen Special Economic Zone, just to the north of Hong Kong, and dock No. 4 (8,500 tons) moved to Zhang Zhou Shipyard at Among City on China's coastline opposite Taiwan. The Zhang Zhou Shipyard is a joint venture between Yiu Luan and the Long Jiang Shipyard.

For the future, the company is currently looking on the second-hand market for two additional floating docks, one for Tsing Yi and the other for Shekou. The plan is to improve the Hong Kong facility with a larger dock than No. 3. Plans exist for the No. 3 floating dock to eventually be moved to Tsing Yi Island, although permission from the Hong Kong govern-

ment would have to be sought for this move.

The two main success stories on the international market from mainland China have been Gwangzhou, and Nantong Ocean Ship Engineering Co., located near Shanghai. There is a question of

the technical level of operations in mainland Chinese yards, the main work currently including steel renewal and blasting and coatings operations. However, both of these yards are forming a very good reputation for such work, which will inevitably bring further, more com-

plicated work to the yard.

In March 1995, the facilities at Gwangzhou Wenchong were extensively increased by the opening of a new 200,000-dwt capacity graving dock. This involved a large investment by China State Shipbuilding Corp. (CSSC), which actually owns



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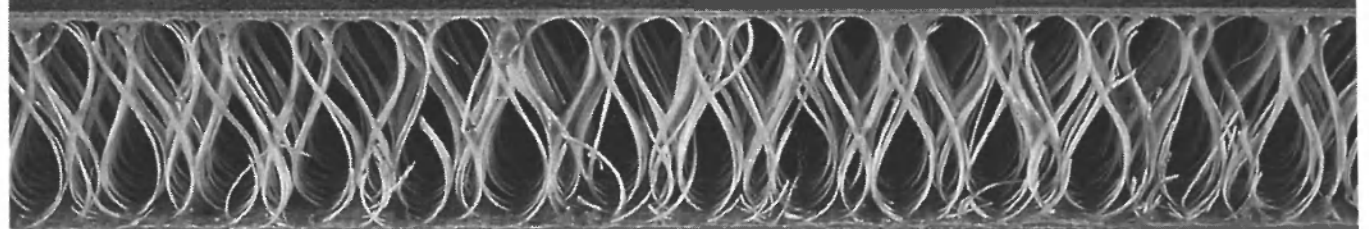
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the yard, although it is operated on a purely autonomous basis. This new drydock complimented the existing two graving docks — with capacities of 15,000 and 25,000-dwt, respectively.

This new drydock is now mainland China's largest repair facility, and it has already drydocked its largest ever ship, Zodiac's 201,227-dwt bulk carrier *Brazil Star*, which entered the yard last year. Also in 1996, the yard carried out its two largest repair contracts onboard ships owned by Tsakos (600 tons of steel renewal) and European Navigation (400 to 500 tons). There are also plans this year to spend \$3.5 million on new equipment, including grit blasting and painting units for the new drydock.

A technical agreement with

Singapore's Sembawang allowed the yard to gain a contract from U.S. oil major Phillips to carry out repairs to FPSO *Nan Hai Kai Tuo*, which is operating off the Chinese coast on behalf of China National Oil Co.

Gwangzhou Wenchong is also a newbuilding yard and its current orderbook comprises a series of four 1,200-TEU containerships for Germany's Leonhardt & Blomberg. This first vessel, which is the owner's design, is due for delivery during July and will be followed every five and a half months by the deliveries of the remaining three ships in the series.

To further its expertise in tank blasting and coatings operations, Nantong Shipyard is prepared to sign a cooperation agreement with

German blasting specialist Mulhearn, most likely in May. The yard is also in the process of gaining ISO 9002 accreditation with DNV.

The yard, which was founded in 1992, has recently become a joint venture, with Japan's Kawasaki Heavy Industries holding a 50 percent share. Facilities include two floating docks with capacities of 80,000 and 150,000 dwt, with the larger unit claiming honors as the largest floating dock in mainland China.

The progress into the international market has been steady with management currently claiming about 60 percent of the ship repairs coming from overseas owners. The largest repair operation carried out involved Seahorse

Shipping's bulk carrier *Oceani Minanoa*, which underwent some 1,700 tons of steel renewal during the latter part of 1995 and early 1996.

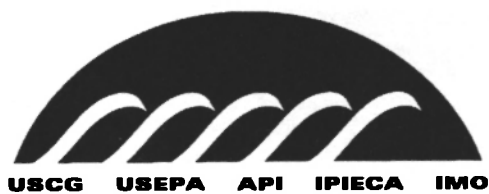
Repair Trends

Competition from both mainland China and the Middle East is slowly taking a toll upon the Singapore area, the traditional world leader in the repair industry. This increased competition for Singapore has come at a time when the area has increased its repair capacity from some 2.8 million dwt during the early 1990s to its present level of more than 4.1 million dwt.

The main consequence of these two factors is that there is now likely to be, for the first time, a

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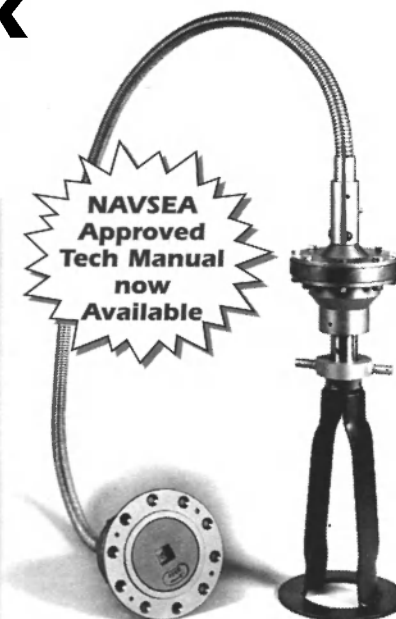
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reduction in facilities following the announcement that two of Singapore's largest yards, Sembawang and Jurong Shipyard (JSL), are to merge. No definite details of the necessary time scale have yet to be released, but it is understood that it will take about five years before the Sembawang facility will close. Meanwhile, the recently commissioned large ULCC dock at JSL will become part of Sembawang's marketing policy. It is also expected that other floating docks, currently at Sembawang Shipyard, will be transferred to the recently-opened PT Sembawang Karimun, in Indonesia.

Meanwhile, Karimun Shipyard is already fully operational; the 65,000-dwt capacity Karimun Perduna Dock, built by Sembawang Bethlehem, has been docking ships since last September.

Keppel has expanded overseas to cheaper labor areas, with projects in Vietnam, Philippines, the Middle East and Australia. Sembawang has commenced projects in Indonesia (Karimun), the Middle East (Albwardy Marine) and mainland China (Sembawang Bohai Shipyard). More recently, Pan United initiated a move to establish a repair yard at Batam in Indonesia. The latest to declare an interest in overseas development is Singapore Technologies Shipbuilding & Engineering (STS&E), which is currently in the process of seeking a joint venture partner to set up a new repair facility in a lower cost part of the region.

Philippines-based Kepphil Shipyard, a member of Singapore's Keppel Group, has announced the start of construction of a new, 40,000-dwt drydock at its Bauan, Batangas, shipyard in the Philippines. Earlier this year, the yard sold its 20,000-dwt floating dock to Singapore's Singmarine Dockyard and Engineering for \$3 million, as part of a rationalization program.

Another FPSO conversion project has now been completed by a Singapore yard. The FPSO contract, involving 136,690-dwt *Tantawan Explorer* (ex-Bayern) at Singapore's Sembawang Shipyard, has been successfully carried out. Owned by Monaco's Single Buoy Moorings (SBM), the vessel was at the yard for six months undergoing

conversion from a 136,960-dwt tanker to a floating production, storage and offloading (FPSO) unit.

Apart from the installation of a single point mooring system, Sembawang also carried out extensive steel work in the installation

of the helideck, process deck support structures, equipment supports and the tandem offloading station, totaling more than 2,200 tons. More than 30 km of pipelines were also installed, and major upgrading and modifications were carried out on the utilities system,

main boiler, accommodations areas and galley. *Tantawan Explorer* is to be stationed at the Tantawan oil and gas field, located around 265 miles south of Bangkok, in 240 fsw.

Sembawang currently has two other FPSO contracts underway. The first involves another unit

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Viet Portex '97 Merges With Maritime Vietnam For Asian Exhibition

Two renowned organizers of trade fairs -- Germany's Hamburg Messe und Congress GmbH, and the Netherlands' Amsterdam RAI -- have agreed to cooperate in the organization of maritime exhibitions in Asia. As a result of this collaboration, Viet Portex '97 -- initially planned for November 1997 -- will amalgamate with Maritime Vietnam in the Maritime Vietnam In Conjunction With Viet Portex '97 exhibition scheduled to be held in Ho Chi Minh City, from April 16 to 18.

According to **Wolfram Diener**, project manager of Viet Portex '97, the events will merge to bring together the buyers and sellers of essential port, shipbuilding and waterway construction equipment and services so that Vietnam can move ahead with its funded \$300 billion Doi Moi investment strategy designated to upgrade and expand its coastal and inland ports and waterways. Projects for the extension and creation of harbors have

already started or are in planning stages, including: the deep-sea harbor Thi Vai-Vung Tau, a \$470 million project scheduled to be completed this year; Sao Mai Ben Dinh, a \$637 million harbor located in Vung Tau; modernization and expansion worth \$40 million in the Port of Saigon; development of harbors Cuo Lo, Xuan Hai, Quy Nonh, Nha Trang and Dam Mon; and the addition of 16 containerships, two crude oil tankers and four bulk carriers worth an estimated \$513 million.

"Our intention is to provide a dynamic marketplace where business can be conducted, shortcutting the long and tedious bureaucratic process of establishing trade outlets in Asia," said Mr. **Diener**.

The maritime industry sectors the show will target include companies involved in port construction, shipbuilding, repair equipment, port facilities administration, container and

freight handling equipment, waterway construction, dredging, engines and propulsion systems, pumps and compressors, dock equipment, auxiliary machinery, navigation systems, electronics, oil drilling and offshore technology. A conference program will be held in conjunction with the three-day trade exhibition, and a seminar of note will feature international and Vietnamese officials reporting on all facets of the Vietnamese port expansion program. Hamburg Messe and Amsterdam RAI expect an increased exhibition volume in Vietnam as a result of their collaboration and plan to extend maritime trade fairs to Asian countries.

For information on Maritime Vietnam In Conjunction With Viet Portex '97 contact: Hamburg Messe und Congress GmbH, Jungiusstraße 13, D-20355 Hamburg, Germany, tel: +49 40 35 69 21 92; fax: +49 40 35 69 21 87.

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(Continued from page 89)

owned by SBM (FPSO 11), which is undergoing extensive upgrading involving 800 tons of steel work, and the second contract involves the refurbishment and life extension onboard BHP Petroleum's 143,814-dwt *Jabiru Venture*.

A number of overseas companies, particularly European interests, have also recently begun projects in Southeast Asia. Norwegian shipbuilder and engineering group Kvaerner has announced plans to acquire one or two shipyards in India or China to build up its shipbuilding activities in Asia.

Germany's Bremer Vulkan (BV) has found two potential buyers for its 51 percent majority stake in Shanghai Edwards Shipbuilding Co. (SESC), according to sources close to the bankrupt Bremen shipbuilding group.

Both are based in Germany, and a decision is likely within weeks. BV gained majority control of the yard in April 1995, when it acquired a \$3.2 million stake from CSSC and its Zonghua Shipyard. The remaining 49 percent in SESC is still held by Zonghua.

There is also a plan by South Korea's Hyundai Mipo Dockyard (HMD) to open a building/repair yard in Vietnam, and a greenfield site has reportedly already been chosen.

ACTIVITIES IN SINGAPORE

Activities At Pan-United

Singapore's Pan-United Shipyard has been awarded a two-ship order, enabling the yard to further underline its commitment to the newbuilding market. The contract, which is valued in the region of \$66 million, involves the construction of two 17,500-dwt, double-hulled tankers for Indonesian oil major Pertamina.

The ships will measure 518 x 85.5 x 38.3-ft. (158 x 27 x 11.7-m). Propulsion includes a low-speed MAN B&W 7S35MC diesel engine, with a MCR or 4,900 kW output directly driving a four-bladed, 4,300-mm diameter NiAlBr propeller. To meet power needs, the ships will be fitted with three MDO-burning Yanmar diesel generators, each rated at 600 kW. In addition to the main alternator, the ships will be fitted with 99-kW emergency alternators.

For cargo hose handling operations, the ships will each be fitted with a Hagglunds crane with a SWL of 10 tons.

The ships, due to be delivered to Pertamina by the first half of 1998, will be the largest double-hulled crude oil tankers to be built in Singapore since applicable International Maritime Organization (IMO) regulations governing pollution prevention came into effect on July 6, 1995.

On the expansion side of the yard's operations, Pan-United is shortly expected to launch its No. 3 floating dock. Built at the yard, the new floating dock has an overall length of 615 ft. (187.5 m), and a lifting capacity of 16,000 tons for vessels up to 50,000 dwt. The dock, designed and classified to ABS standards, will enhance the yard's competitiveness in providing premium service to international shipowners. In November 1996, Pan-United Shipyard was awarded ISO 9001 certification for its whole spectrum of work, including design, newbuilding, and repair and conversion of ships and offshore structures.

Sembawang Completes Major FPSO Conversion

Sembawang Shipyard completed the fast-track tanker conversion of Tantawan Explorer into a Floating Production Storage Offloading vessel for Single Buoy Moorings Inc. of Monaco. Formerly Bayern, the 136,960-dwt tanker was converted in nine months. Major conversion work included the installation of a IMODCO-designed Single Point Mooring Turret system, which will enable the vessel to weathervane freely to take up the position of least resistance to the prevailing winds.

For more information on Sembawang
Circle 87 on Reader Service Card

Techno Fibre Calls For Better Lifeboat, Davit Maintenance

Singapore's Techno Fibre is heavily involved in promoting greater awareness of lifeboat and davit maintenance in the marine and offshore industries. The company -- which has serviced more than 300 lifeboats since its inception in 1993 -- reports that there is an increasing inci-

dence of damage to the units during training exercises, due mainly to improper maintenance and/or training of operating personnel.

As an example, it points to an August 1995 incident in which a vessel, on her maiden voyage, had its officers service its lifeboats. The officers were unfamiliar with the systems and inadvertently activated the "on-load" release mechanism on the lifting hooks, releasing the lifeboat from its davits with the officers onboard. The result...two badly injured officers and one damaged lifeboat.

The company is calling for a proactive stance by owners, classification societies and governmental authorities regarding the improved

maintenance and training on lifeboat equipment. On a recent inspection of eight lifeboats aboard a cruise ship, Techno Fibre found excessive corrosion on the lifting hooks on five of eight lifeboats. The company reports that just one month before, the ship has been subjected to Port State inspection and a safety audit by its classification society, and had passed.

The company is recommending the use of corrosion resistance materials in the manufacture of lifting hooks. Also, it believes it should be mandatory that lifeboat systems be recertified on a two year basis.

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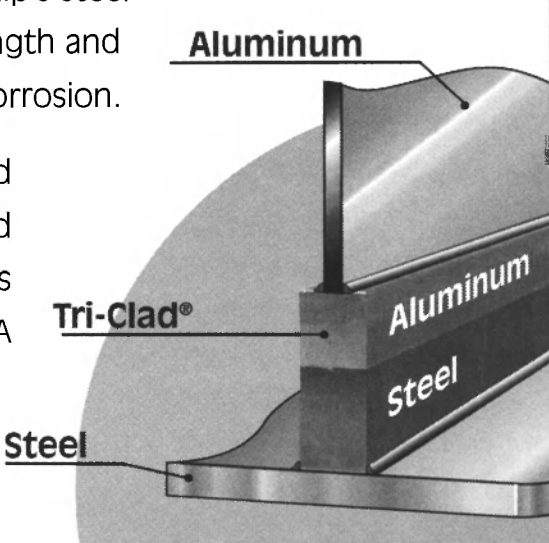


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Sperry Signs Distribution Agreement For Infrared Imaging Systems

Litton-Sperry Marine Inc. and Enhanced Vision Systems have signed an exclusive marketing agreement for the worldwide distribution of AMIRIS (Advanced Maritime Infrared Imaging System). The system is designed to increase safety and navigation at sea by increasing the capability to see through salt spray, fog, high humidity and darkness. AMIRIS is reportedly capable of identifying targets ranging from the smallest of icebergs to wooden fishing vessels to supertankers. Used as a complement to radar, AMIRIS measures temperature differences to a fraction of a degree and electronically displays a television-like image of the scene inside the ship's bridge. Sperry has reported that Conoco Inc. and British Petroleum have placed orders for the system.

For more information on Sperry Marine
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Coastal Oceanographics Upgrades

Middlefield, Conn.-based Coastal Oceanographics, Inc. has announced the incorporation of a Metadata module in its Hypack for Windows hydrographic surveying software program. This module reportedly allows Hypack users to create Metadata files that are fully compliant with the Federal Digital Geospatial Committee content standards for Digital Geospatial Data. Coastal has also incorporated anchor handling and multiple vessel capability in the same Hypack for Windows release.

For more information on Coastal Oceanographics, Inc.
Circle 91 on Reader Service Card

Bogsnes Appointed Head Of Ulstein Støperier

Anne Kverneland Bogsnes has been appointed president of Ulstein Støperier in succession to Jan O. Wolsdal, who has retired after 27 years of service. Ms. Bogsnes has been employed by the company for six years, and previous to this appointment, served as vice president. She is reportedly the first woman to hold the presidency of an Ulstein production company. Ulstein Støperier is a foundry for machine components, and is part of the Norwegian based Ulstein Group, which is involved in the repair, construction and design of vessels.

For more information on the Ulstein Group
Circle 88 on Reader Service Card

DDC, Mobil Introduce Lube Oil

Detroit Diesel Corp. and Mobil Corp. have released a jointly developed lube oil, dubbed Power Guard Gold. The product was made available in March through Detroit Diesel distributors, and is for use in the company's Series 53, 71, 92 and 49 marine engines. The lube oil offers benefits such as: extended periods of operation between oil drain intervals; engine protection at high and low operation temperatures; reduced oil consumption; and improved fuel economy. Power Guard Gold is licensed by the American Petroleum Institute.

For more information
Circle 98 on Reader Service Card

Repair Activity At Hellenic Shipyards Intensifies

At the end of 1996, Hellenic Shipyard's five drydocks were all occupied at the same time. Business in January reportedly followed this pattern as well. Recently completed contracts includes extensive steelwork renewals and external hull blasting performed on M/V Nikolaos. Norwegian company Bergesen's *Berge Spirit* entered the yard

in February for general drydocking, steelwork renewals, coatings work and machinery overhaul.

For more information on Hellenic Shipyards Co.
Circle 99 on Reader Service Card

Schichau Seebeckwerft Launches RoRo

Newbuild RoRo ferry *Ulysse* was launched on Feb. 1 by Schichau Seebeckwerft. The ferry was constructed for Tunisian state operator Contunav. A sistership will follow; and in fact, the keel laying for the second vessel was scheduled for Feb. 5.

Ulysse is 529.8 ft. (161.5 m) long and 84.6 ft. (25.8 m) wide, with a draft of 19.6 ft. (6 m). The ship is propelled by four, medium speed, four stroke, non-reversible engines; two twin reduction gears; and two C.P. propellers with four blades each. *Ulysse* is also equipped with two bowthrusters. The vessel has two MAN 6L 28/32 H diesel generator sets, with one emergency generator and two shaft generators.

For more information
Circle 100 on Reader Service Card

Royal Schelde Wins Newbuild Order

Royal Pearl Shipping Co., Ltd. has contracted with Royal Schelde for the construction of multi-purpose vessels for the transportation of various cargoes. Each vessel will be 465.8 x 70.5 x 30.5 (142 x 21.5 x 9.3 m), with a carrying capacity of 16,000 tons. Each will be driven by a diesel engine with a capacity of 7,800 kW, providing a speed of approximately 15.5 knots.

Royal Schelde Signs Contract For Two Navy Frigates

Netherlands-based yard Royal Schelde has won a contract to build two frigates for the Royal Netherlands Navy. The contract is a follow-on order to the previous contract for the construction of two frigates signed in June 1995. The building of the first and second newly contracted ships will commence in 2000 and 2001, respectively. There will reportedly be close cooperation with Germany and Spain during the design and building phases of the contracts, since these two countries have plans to build similar vessels for their own navies. The vessels will each be equipped with CODOG propulsion systems.

For more information on Royal Schelde
Circle 94 on Reader Service Card

Bids Sought By USACE

The director of the U.S. Army Corps of Engineers (USACE) Marine Design Center has announced issue of Invitation for Bids number DACW61-97-B-0024 for the design, construction, testing and delivery of a steel fuel oil barge for use on the Mississippi River and its tributaries by the Vicksburg District USACE. Contact: U.S. Army Corps of Engineers, Philadelphia District, Wanamaker Building, 100 Penn Square East, Philadelphia, PA 19107-3391; ATTN: CENAP-CT.

Sea Water Intake, Cooling System Designed For Overall Cost Savings

Since JAK-System's introduction to the maritime market two years ago, there have been many improvements. The seawater intake and cooling system is touted by its developer, Acomarin Engineering, as saving both shipyards and owners time and money.

This is due to the fact that the whole suction piping will be avoided, providing for enormous savings. Also, Acomarin points out that corrosion of the sensitive seawater piping will be reduced, and the filtration degree and net filtration area will be better.

The JAK-System allows all ballast water to be taken in via one sea chest. The ballast water is treated with a combined transducer of ultraviolet light and ultrasonics, which has reportedly been proven to be an excellent method of killing bacteria, while possibly destroying barnacles and other water microbes. Acomarin views this point especially vital, as the international maritime community now grapples with the problems of ballast water disposal around the world. Acomarin received a recommendation letter from The Finnish Board of Navigation to use the JAK-Sea Water Intake and Cooling System in the new 10-MW multi-purpose icebreaker/offshore construction vessel.

The system design includes (see diagram below) six diesel generating sets as the main electric power source, with each diesel equipped with individual central coolers. The arrangement will allow individual cooling water controls and balance for each generating set. Due to the frequency controlled cooling pumps — one running, one standby — it is possible to reduce the seawater cooling temperature and quantity used for the cooling of each engine, as the vessel will mostly operate in the Baltic and North Sea. It is, however, important to keep coolers' physical characteristics in optimal working order. This means that it would be necessary to select a special plate heat exchanger having two split sections for sea water and the secondary flow of fresh water flowing at all times through both sections. The SW Flow Controls will be secured by means of the actual flow measuring transmitter and controller, which will be automatically set from the shipboard computer according to the load and valve position conditions.

The flow controller will automatically set the pump capacity via the frequency controller. Ice blocks

and brash are a big problem for vessels operating in heavy ice conditions. As front runners, icebreakers must operate even better than conventional vessels. Both the filter mesh and the form of JAK-Sea Chest act an important role in the ice and air evacuation. Disturbances caused by air in centrifugal pumps increase as vessel

speed increases. In certain conditions air-related problems are encountered in centrifugal pumps on all vessels. In order to remove air from the pipelines, various expansions are made in the pipings with venting pipes led to the funnel through automatic vent valves. However, air still causes problems in the cooling system occasionally.

The JAK-system appears to eliminate air-related problems. As the sea chest is located in the mid-ship area, the water flow rate is extremely low and any air bubbles will rise straight up to the air space without passing through the close-meshed filter plate to the pumps. The rising velocity of the air bubbles is obvi-

(Continued on page 97)



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Ship Repair Guide

(section continued from page 37)

NASSCO Progresses On Sealift Conversion Program

National Steel and Shipbuilding Co. (NASSCO) joined the U.S. Army and U.S. Navy in a joint ceremony to name USNS *Yano*, the second ship to be converted at NASSCO under the Strategic Sealift program.



Ship Sponsor Barry Zlatoper christens USNS *Yano*. Pictured are Richard and Lillian Yano; General David Bramlett; Richard Vortmann, NASSCO president; Ashley Zlatoper; and retired Admiral Ronald Zlatoper.

The USNS *Yano* (T-AKR 297) is the second of three containerships that were bought from Maersk for conversion to Strategic Sealift ships by NASSCO. Two additional conversions are being completed by Newport News Shipbuilding. The ships are being converted into large, medium-speed RoRo and LoLo ships that will carry U.S. Army equipment, vehicles and supplies.

The conversion process is creating an enormous increase in the capability of the ships. The USNS *Yano* has six new cargo decks, internal and external access ramps, new cargo hatches for each deck, two side ports and two twin boom cranes.

For more information from NASSCO
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Unithai Shipyard: Joint Venture Provides Multi-Services

Unithai Shipyard & Engineering Ltd. — a joint venture between IMC Pan Asia Alliance

Group, Namura Shipbuilding and Ming Wah Shipping — is an international ship repair yard in Thailand, located at Laem Chabang, about 120 km southeast of Bangkok. The 500,000-sq-m yard commenced ship repair activities in early 1992 and presently operates a 925 x 154-ft. (282 x 47-m) floating dock, which can accommodate vessels up to 140,000 dwt. The lifting capacity of the dock is 40,000 tons. The yard can accommodate all types of ship repair, however it is known for its steel renewal and hold blasting and coating.

For more information on Unithai Shipyard
Circle 6 on Reader Service Card

Drew Marine Offers New-Generation Portable Inverter Arc Welder

Ashl and Chemical's Drew Marine Division offers two new constant current arc welding machines in four models. All feature an improved inverter design that achieves high levels of output capacity. Both the Amerarc I-400 and the lower output, lower priced Amerarc I-L300 series machines are durable and heavy duty, yet easily transportable to anywhere on the ship. All of the new units are suitable for stick welding and can be used for Tungsten Inert Gas (TIG) welding in the lift-start mode. Technological advances touted by the manufacturer include TIG-pulse

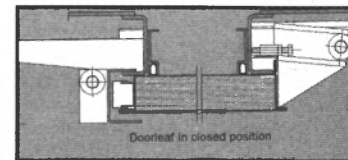


and slope control.

For more information from Drew Marine
Circle 10 on Reader Service Card

Door Specialist Targets RoRo Market

Hellbergs developed and tested a combined A60 fire and semi-water-tight door to fulfill the latest IMO



stability criteria for RoRo ships. While the ingress of water or cargo movement can damage the stability of the vessel, Hellberg doors are designed to protect against such occurrences. The doors feature pneumatic opening and closing control systems from Armbrecht & Partner GmbH.

For more information from Hellbergs
Circle 7 on Reader Service Card

Nylon Sheaves Designed To Help Save Maintenance Costs

DSM Engineering Plastic Products obtained ABS approval for its line of Nylatron GSM nylon sheaves. The corrosion-resistant, low-wear nylon sheaves are designed to replace metal versions currently used on cargo ships, containerships, offshore drilling platforms and cable-laying ships. According to the manufacturer, the nylon sheaves offer a maintenance cost savings in excess of 50 percent in some instances. One of the first shipowners to replace steel sheaves with Nylatron nylon sheaves was Serviocean International Inc. of Miami, which operates a fleet of six cargo ships. "We are replacing the steel sheaves on our booms as part of our regular maintenance pro-

Company Profile: ASRY

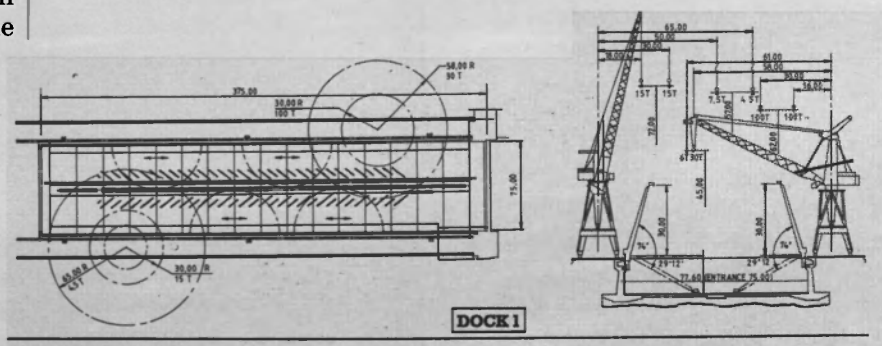
The Arab Shipbuilding & Repair Yard (ASRY) dry dock, reportedly the first in the world specially designed for shallow draft VLCCs, measures 1,230 x 246 ft. (375 x 75 m) and is suitable for double dockings. A special haulage system enables docking operations to be carried out quickly, and with a minimum amount of workers. The dock is served by four dock arms, giving access to almost the entire surface of a VLCC for hull cutting, welding, grit blasting and painting purposes — without the need for scaffolding. Large volume dewatering pumps enable the dock to be dewatered in less than two hours, with a 350,000-dwt vessel in dock. A 100-ton crane with a 200-ft. (61-m) outreach and a 15-ton crane with a 246-ft. (75-m) outreach serve ships in the dock.

ASRY also offers floating docks with lifting capacities of 33,000 and 30,000 tons, which can accommodate vessels of up to 120,000 dwt and 80,000 dwt, respectively. Both docks were built by GHH of Germany and are served by a compressed air station, with a total capacity of 1,200 cfm.

The yard's fleet of six tugboats — each with 32 tons of bollard pull — are specially designed to maneuver large ships in the yard and open sea. Other features of the facilities include the following:

- Eight portable air compressors;
- Welding sets;
- Inert gas generators of 2,000-cu-m per hour aggregate capacity;
- Two 80-ton grit silos,
- Hydraulically operated pumps for sludge removal;
- Portable diesel generators;
- Two 80-ton lifting platforms; and
- Four, 20-ton mobile cranes.

For more information on ASRY
Circle 15 on Reader Service Card



Ship Repair Guide

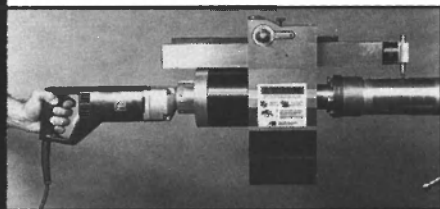
ram," said **Franco Licenzi**, chief maintenance engineer. "We have found that the Nylatron nylon sheaves have excellent corrosion resistance and do not develop sharp edges," he added. Serviocean reportedly was confronted with opposition from shipboard personnel at first, regarding the durability of nylon sheaves during and after rigorous use. Today, the captains and mates are reportedly happy with the nylon sheaves. The sheaves are also self-lubricating, and reportedly feature excellent resistance to salt water.

For more information on Nylatron nylon sheaves
Circle 8 on Reader Service Card

New Portable Lathe Designed To Repair Small Shafts

Climax Portable Machine Tools has introduced a new portable lathe that attaches right on the end of the shaft and rotates around it to re-turn worn shafts or journals. Designated model PL 1100, the machine will re-turn shafts as small as 1.5 in. in diameter, and up to nine in. in diameter. The portable lathe can reportedly be set up by an experienced operator in less than one hour. The mounting flange of the

portable lathe attaches to the end of the larger shafts with four bolts in drilled and taped holes.



For more information from Climax
Circle 9 on Reader Service Card

Belmont Metals Celebrates 100th Year

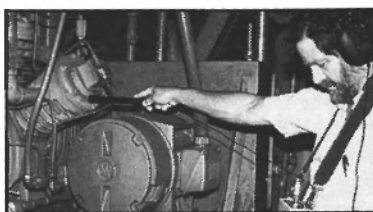
Pictured are Belmont employees gathered for a ceremony commemorating a company milestone. Belmont Metals of Brooklyn, N.Y., recently celebrated its 100th year of operation. Belmont Metals was founded in 1896 by the grandfather of present company President **Robert V. Henning, Sr.** Belmont is a technologically advanced supplier of non-ferrous metals and alloys.



For more information on Belmont
Circle 11 on Reader Service Card

NDT Ultrasonic Equipment Detects Failure Before It Occurs

New Coronal ultrasonic instruments are designed to detect early signs of parts failure. Available, from NDT Intl., the portable data acquisition devices help develop predictive maintenance



nance programs and help to prevent costly repairs and downtime.

For more information from NDT
Circle 12 on Reader Service Card

Bainbridge Protects Ships During Lay-Up

Bainbridge International has focused on supplying high standard, high strength flame retardant temporary protection systems to the international maritime market. Cover Guard, one of its products, is used by major shipyards, naval facilities, cruise lines, ferry operators, ship management personnel and outfitters worldwide to offer maximum protection. The product is available in a range of thicknesses and widths to suit walkways, public areas, stairwells, weatherdecks, furnishings, electrical equipment, machinery spaces, galley areas, control rooms and bridge areas. The Cover Guard offers maximum protection from foot traffic, worker activity, dirt and debris, spillages and paint overspray situations. The company also touts the ease of product installation and removal as a significant contributor to cost savings.

For more information on Bainbridge
Circle 13 on Reader Service Card



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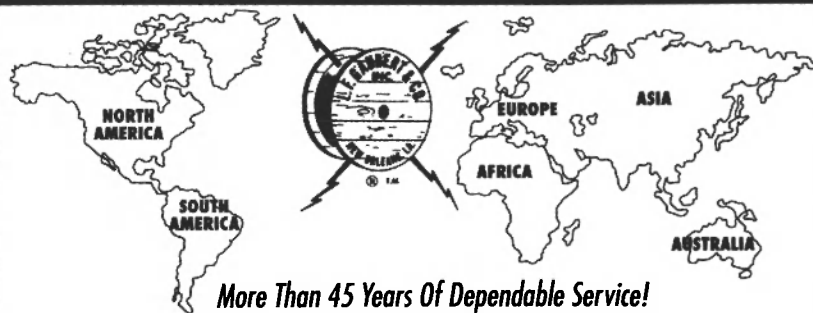
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General Dynamics, NNS To Cooperatively Build New Attack Submarines

Electric Boat Corp., a subsidiary of General Dynamics, and Newport News Shipbuilding (NNS) have — “at the urging of the U.S. Navy” — reached a teaming agreement to cooperatively build the Navy’s new attack submarine, NNSN.

Under the terms of the agreement the companies will be equal team members in construction of

each of the first four submarines in this new class. This requires an alteration to existing law, contained in last year’s Defense Authorization Act, which directs independent submarine construction by the two yards.

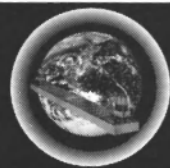
Electric Boat will perform final assembly, testing, outfitting and delivery of the first and third sub-

marines. For all four submarines, Electric Boat will construct the engine room modules, command and control modules, and seven other sections of the ship. Electric Boat will continue its role as lead design yard. NNS will perform final assembly, testing, outfitting and delivery of the second and fourth submarines. For all four

submarines, NNS will construct the sail, the habitability and auxiliary machinery room modules at six other sections. The previous construction plan would have had the two companies working independently, with each building two of the four submarines.

For more information on NNS
Circle 198 on Reader Service Card

For more information on Electric Boat
Circle 197 on Reader Service Card



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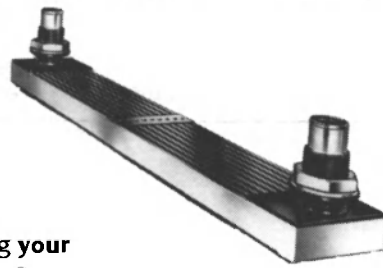
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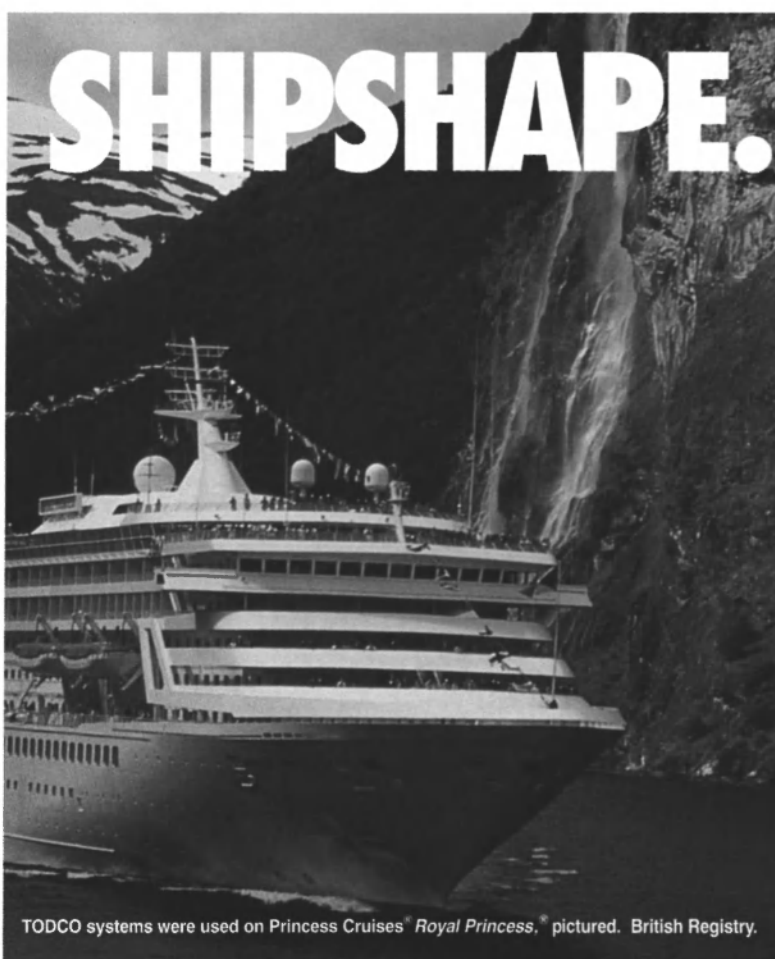
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Circle 296 on Reader Service Card



TODCO systems were used on Princess Cruises' Royal Princess, pictured. British Registry.

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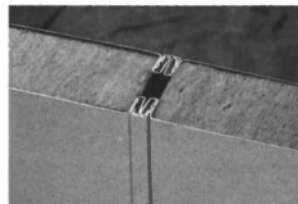
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Ashland Debuts New Combustion Analyzer

Ashland Chemical's Drew Marine Division has introduced the Diesel Performance Analyzer (DPA), a PC-based cylinder and injection pressure monitoring system designed to facilitate timely, accurate diagnosis of engine conditions. DPA is for use on all types of two-stroke engines, as well as four-stroke medium-speed engines with a maximum of 1,500 rpm. The system uses a PC or laptop, with either MS.DOS or Windows version 3.1 or 95 software. Software can also be customized to fit specific needs. Data collection for measuring combustion pressure is accomplished with a pressure sensor and two permanently fitted inductive magnetic sensors that obtain rpm and crankshaft angle data from the flywheel.

For more information on DPA
Circle 196 on Reader Service Card

Maritime Reporter/Engineering News

Falk Gears Propulsion Update

(Continued from page 53)

the astern clutch. The locked shaft against the slipping clutch allows the engine to produce torque over a longer, more controlled duration, while minimizing clutch heat buildup.

Figure 4 (on page 51) shows an example of the astern clutch engagement during a full-speed crash reversal of a tuna seiner using the engine torque-up system. In the example, engine speed is boosted to 500 rpm, and the astern clutch begins pressurization. The accelerating engine comes under load as the shaft brake remains engaged and the astern clutch begins to transmit torque. This initial load on the engine causes the fuel rack to increase the fuel rate to the engine, causing the turbochargers to begin pumping, increasing the torque output of the engine. As the shaft brake is released, the engine speed falls from 500 rpm to engine idle at 350 rpm, and the propeller shaft accelerates in the astern direction. With the turbochargers pumping, the engine is then developing sufficient torque to overcome the reversal.

To overcome the high propeller back-torques in such a short period of time, the engine must be boosted to 580 rpm. As the clutch engages, the propeller

shaft brake is released, prior to the torque transmission within the clutch. The propeller begins to accelerate in the ahead direction, driven by the entrained water within the wheel. As the engaging astern clutch begins to transmit torque, the propeller must be stopped and reversed. The engine struggles to produce sufficient torque, falls to 250 rpm and finally increases speed to complete the reversal.

In a reversal of this type, the engine is loaded so abruptly, that the turbochargers do not begin to increase the engine torque output until well after the clutch has become fully engaged. This forces the engine to overcome the propeller back-torque while in the aspirated mode, causing the engine speed to fall well below idle speed, and possibly stalling and back-driving the engine.

With the engine torque-up system, the reversal is completed with much less shock to the engine, clutch and other propulsion system components. The torque-up system also allowed the reversal to be completed in a much shorter time, and with a shorter time delay.

For more information on the system
Circle 36 on Reader Service Card

Sea Water Intake, Cooling System Designed for Overall Cost Savings

(Continued from page 93)

ously higher than the water flow rate to the pumps at 100 percent loading.

Bottom Gratings:

In the JAK-system, recommended openings (usually 20 x 200 mm) cut directly on the bottom plate increase the net area. The total net area of the chest bottom is selected so that water flow rate through the openings is less than 0.1 m/s at 100 percent loading.

On high-speed vessels, the openings should be located longitudinally to make it easier for the water to flow inside the chest. On icebreakers and other vessels operating in difficult ice conditions, the openings should be located transversely, as experience gained from ice-breakers seems to indicate that the icy slosh is then compressed against the back edges of the openings allowing water to rise in the chest, as the flow rate is very low.

JAK-system does not require docking as all the service and maintenance operations can be carried out from the inside at any time, and all the equipment can be lifted up from the chest. The JAK-system includes no valves, fittings or filters, and is free of holes below the maximum load line.

For more information on Acomarin
Circle 38 on Reader Service Card

The preceding was excerpted from an article authored by Kari U. Laiho, managing director of Acomarin Engineering Ltd.

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BUYERS DIRECTORY

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

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Lo-Rez Vibration Control, Ltd., 186 West 8th Ave., Vancouver, B.C. V5Y 1N2
Mapeco Products, 90 Forest Avenue, P.O. Box 382, Locust Valley, NY 11560

CRANE--HOIST--DERRICK--WHIRLEYS

Bisso Marine Co. P.O. Box 4113, New Orleans, LA 70178

Marine Travelift, Inc., 49 E. Yew St., Sturgeon Bay, WI 54235
McElroy Machine & Mfg Co., Inc., P.O. Box 4454, Biloxi MS 39535-4454

New England Trawler Equipment Co., 291 Eastern Avenue, Chelsea, MA 02150

CRANES

Clarke Chapman Canada, 1075 North Service Rd. West, Oakville, Ontario CANADA

Lakeshore, Inc., P.O. Box 809, Iron Mountain, MI 49801
Tech Crane Int'l., Inc., 61130 Timberbend Dr., Lacombe, LA 70445

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FCS, Inc., 22 Main St., Centerbrook, CT 06409

CRANKSHAFT REPAIR

Goltens Worldwide, 160 Van Brunt St., Brooklyn, NY 11231
In-Place Machining Co., Inc. 1929 North Buffum Street, Milwaukee, WI 53212-3793

CYLINDER LOAD ANALYZER

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

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Markay Machinery Co., Inc., P.O. Box 24788, Seattle, WA 98124-0788

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New England Trawler Equipment Co., 291 Eastern Avenue, Chelsea, MA 02150

Pusnes, PO Box 102, N-4818, Faerвик, NORWAY
Skookum, P.O. Box 280, Hubbard, OR 97032

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Timberland Equipment, P.O. Box 490, Woodstock, Ontario N4S 7Z2 CANADA

Waterman Supply Co., P.O. Box 596, Wilmington, CA 90748

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Lifestream Watersystems, Inc., P.O. Box 634, Huntington Beach, CA 92647

Matrix Desalination, 3295 S.W. 11th Ave., Fort Lauderdale, FL 33315

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Hermont Marine, Inc., 3528 Griffith, St-Laurent, QUEBEC CANADA H4T 1A7

Kiene Diesel Accessories, 325 S. Fairbanks St., P.O. Box 386, Addison, IL 60101

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Hermont Marine, Inc., 3528 Griffith, St-Laurent, QUEBEC CANADA H4T 1A7

DIESEL ENGINE — Spare Parts & Repair

Alaska Diesel, 4420 14th Ave., NW, Seattle, WA 98107

Brigantine Services Ltd, 48 Wang Lok St., Yuen Long Industrial Estate, New Territories, HONG KONG

Caterpillar, Inc., Engine Div., P.O. Box 610, Mossville, IL 61552-0610

Cummins Engine Co., 4500 Leeds Ave., Ste. 301, Charleston, SC 29405-8521

Cummins Mid-South, Inc., 110 E. Airline Highway, Kenner, LA 70062

John Deere, John Deere Rd., Moline, IL 61265
DMI Norshipco Co., P.O. Box 2100, Norfolk, VA 23501-2100

GE Transportation Systems, 2901 East Lake Rd., Erie, PA 16531-0001

GEC ALSTHOM Diesels Inc., 10801 Kempwood Drive, Suite 1, Houston TX 77043-1412

Goltens Worldwide, 160 Van Brunt St., Brooklyn, NY 11231
In-Place Machining Co. Inc. 1929 North Buffum Street, Milwaukee, WI 53212-3793

Kiene Diesel, 325 S. Fairbanks, Addison, IL 60101
Klattenberg Marine, 17 Grandview Ave., W. Orange, NJ 07052

MAN B&W Diesel AG, Stadtbachstrasse 1, D-86153 Augsburg 1, GERMANY

MAN B&W Diesel A/S, Tegholmsgade 41, DK-2450 Copenhagen SV, DENMARK

MAN B&W Diesel, 17 State St., New York, NY 10004
Motor-Service AG, Box 2115, S-144 04 Ronninge, SWEDEN

Motor Service-Hugo Stamp, 3190 S.W. 4th Ave., Ft. Lauderdale, FL 33315

Paxman Diesels, P.O. Box 8, Paxman Works, Colchester, Essex, CO1 2HW, ENGLAND

Ulstein Bergen AS, PO Box 924, N5002 Bergen, NORWAY
Wartsila Diesel, 201 Defense Highway, Annapolis, MD 21401

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H.J. Merrihue, P.O. Box 23123, New Orleans LA 70183

JW Fishers, 65 Anthony St., Berkley, MA 02779
Muldoon Marine Services, Inc., P.O. Box 3221, Terminal Island, CA 90731

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Jameson Metal Marine Sales, Inc., Corporate Plaza, Suite 400, 4710 Northwest Second Ave., Boca Raton, FL 33431

Insulations, Inc., 1101 Edwards Ave. Harahan, LA 70123
Mapeco Walz & Krenzer, Inc., 90 Forest Ave., Locust Valley, NY 11560

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Crandall Dry Dock Engineers Inc., P.O. Box 505804, Chelsea, MA 02150

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

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Semco Marine Inc., 3721 SW 47th Ave., Ste 309, Ft. Lauderdale, FL 33314

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American Vulkan, P.O. Drawer 673, Winter Haven, FL 33882

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

FUEL DECONTAMINATION
Enviro Response Prod., P.O. Box 4011, Ft. Meyers, FL 33932

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Lang Manufacturing, P.O. Box 905, Redmond, WA 98073

GANGWAYS, LADDERS
Wooster Products Inc., 1000 Spruce St., P.O. Box 896, Wooster, OH 44691

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Beaird Industries Inc., P.O. Box 31115, Shreveport, LA 71130

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

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Engine Monitor, Inc., 179 Hickory Ave. Harahan, LA 70123
Hamilton Jet, P.O. Box 709, Christchurch, NEW ZEALAND
Ultra Hydraulics Limited, Cheltenham Road East, Gloucester, GL2 9QN, ENGLAND

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Norderebstrasse 15, 20457 Hamburg GERMANY
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Insulations, Inc., 1101 Edwards Ave., Harahan, LA 70123

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

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Royal Chemical, 2705 Concord Road, Belle Chasse, LA 70037
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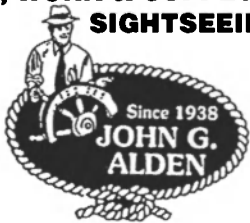
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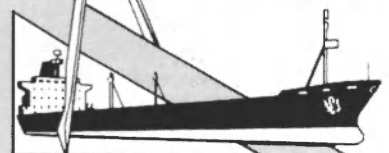
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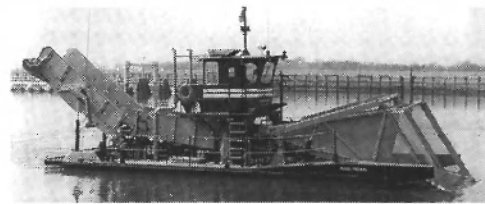
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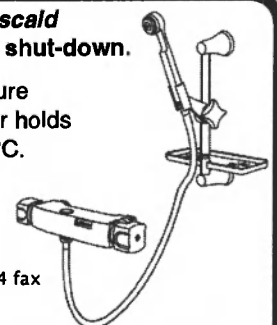
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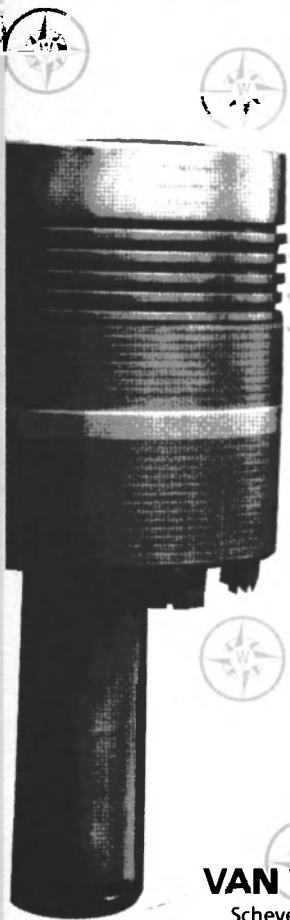
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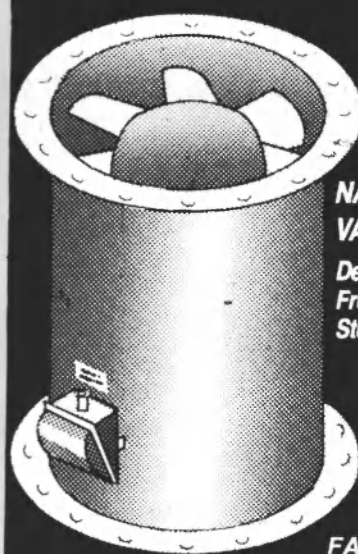
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Director of Human Resources
AMSEC, Dept. HR 94-137
2829 Guardian Lane
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We offer a competitive salary and benefits package. Please send resume and salary requirements to **Box 301, Maritime Reporter, 118 E. 25th Street, New York, NY 10010** EOE Employer (M/F)

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LCMF, Inc., an engineering and project management firm in Alaska, is now accepting resumes for following positions; Dredge Superintendent, Captain, Leverman, Chief Engineer, Deck Captain and Mate. All applicants should have a minimum of 8 years experience working with hydraulic and clamshell dredges. Employees will work a 12 hour shift, 7 days per week, June through September. Operating conditions are severe with cold weather, heavy seas, and floating ice in the remote areas of Northern Alaska. Transportation and camp support are furnished. Send resume to:

LCMF, Inc.

139 E. 51st Ave.

Anchorage, AK 99503

ATTN: Ray Cole

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For consideration, please forward your resume, including salary history and requirements to:

ABB Turbocharger Company

Human Resources
1460 Livingston Avenue
North Brunswick, NJ 08902

Port Engineer

Sause Bros. Ocean Towing Co., Inc. headquartered in Coos Bay, Oregon and a leading West Coast tug and barge transportation provider is accepting resumes for the management position of Port Engineer. Qualifications include, 10 years progressive experience with a USCG Chief Engineer 6000 HP license sailing with EMD and Cat propulsion engines required. Knowledge and ability to operate computer tracking repair and maintenance inventory programs.

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Sause Bros. Ocean Towing Co., Inc.
155 East Market Ave.
Coos Bay, OR 97420
Attn: Leslie Labrousse
Fax 1-541-888-6635



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Please send resume to:

San Francisco Drydock, Inc.
 Human Resources Department
 P.O. Box 7644
 San Francisco, CA 94120

Attention

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AMS is seeking experienced Marine Engineers with USCG License for Port Engineer positions world-wide opening in December.

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 999 Waterside Drive Suite 700
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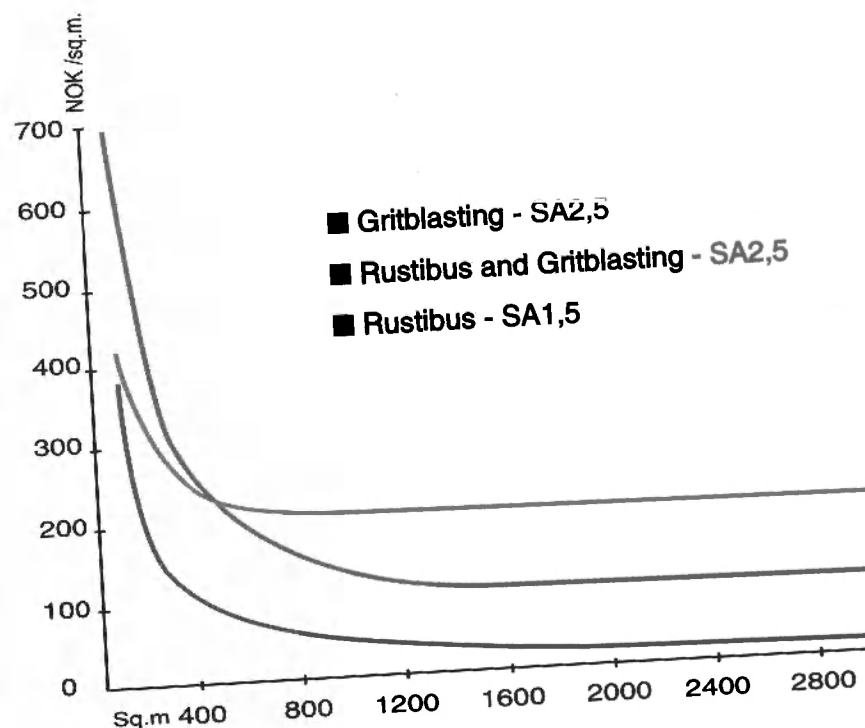
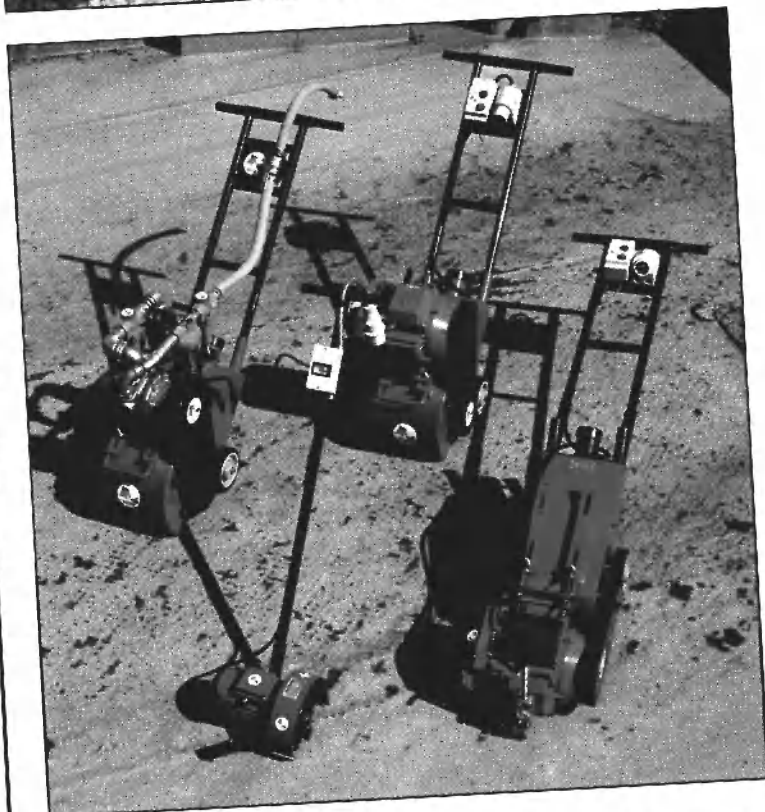
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Effect : 5,5 kW

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Types: Rustibus 200
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