April 2006

MARITIME REPORTER
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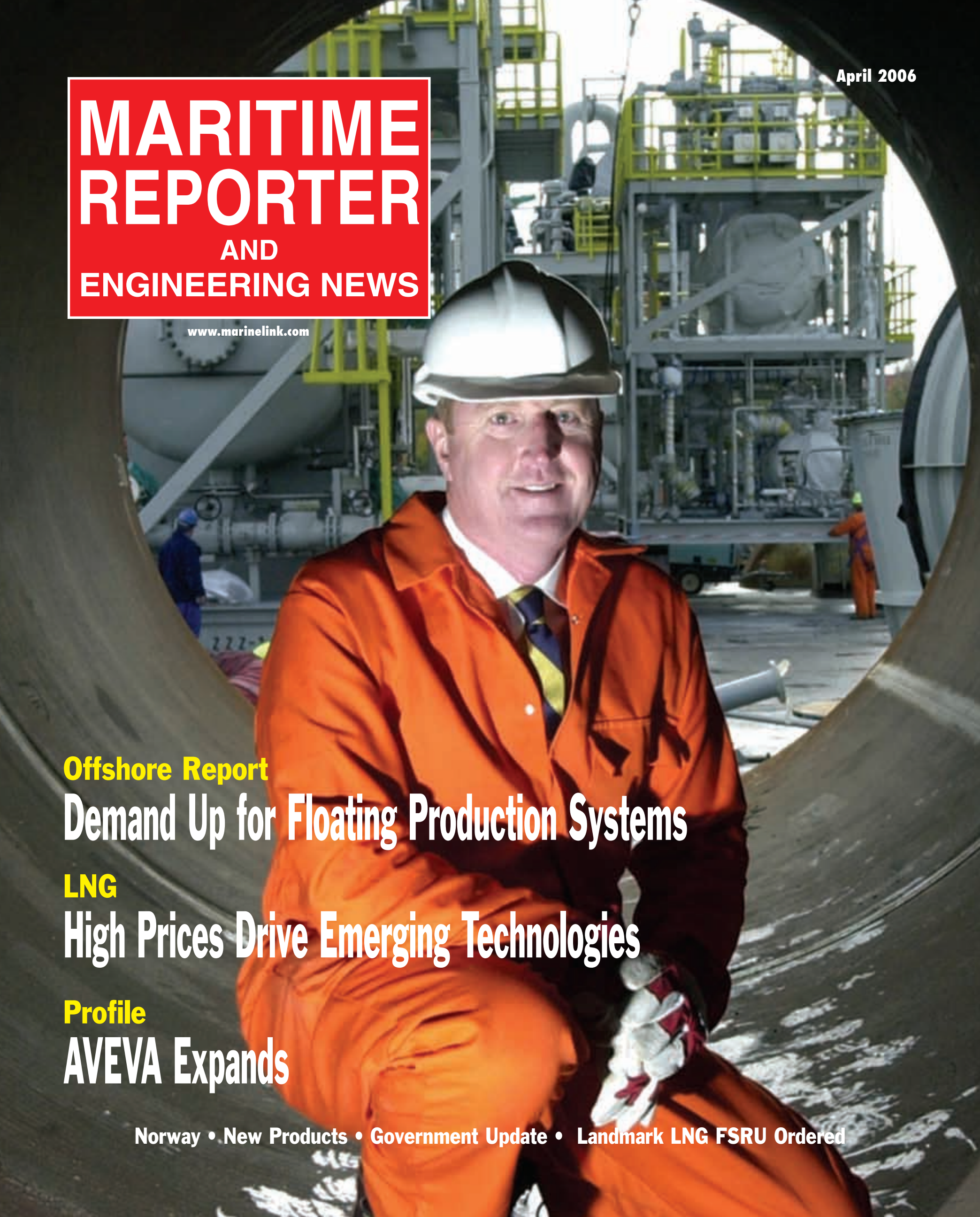

Offshore Report

Demand Up for Floating Production Systems

LNG

High Prices Drive Emerging Technologies

Profile

AVEVA Expands

Norway • New Products • Government Update • Landmark LNG FSRU Ordered

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With all of the pieces in place, AVEVA seeks to become the ship production systems of choice.

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Over the last 10 years there has been a 203% increase in demand for floating production systems. A new report from International Maritime Consultants shows projects future demand. — by **James R. McCaul**

28 Get a SLICE

An innovative design boat was launched by Lockheed Martin, the first of two SLICE Crew Transport Vessel to operate in service for PEMEX.

33 A First for FRSU

Golar LNG signed a $55.6m contract with Keppel Shipyard for what is called the first conversion of an existing LNG carrier into a LNG Floating Storage and Regasification Unit (FSRU).

MARITIME REPORTER AND ENGINEERING NEWS

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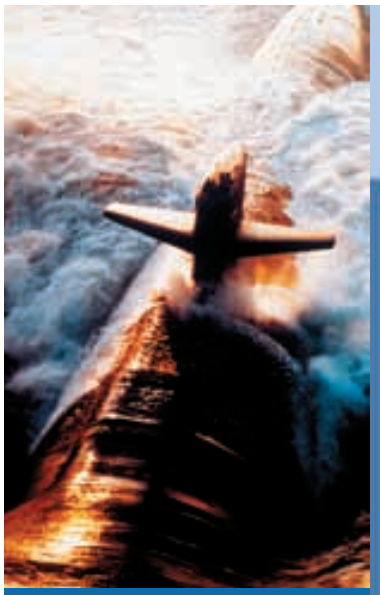

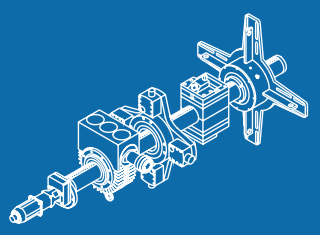

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NASSCO, Daewoo Team to Build Jones Act Ships

General Dynamics NASSCO and Daewoo Ship Engineering Company (DSEC), a wholly owned subsidiary of Daewoo Shipbuilding and Marine Engineering (DSME) based in Busan, Korea, announced a formal teaming agreement to build ships for the U.S. market under the Jones Act. Under the agreement, DSEC will provide the detail designs, support services and some of the material necessary for ship production. NASSCO will also procure material and will provide the labor and facilities to construct the ships here. "NASSCO is teaming with a world-class ship design and construction support company to address an important market for this shipyard," said Frederick J. Harris, president of General Dynamics NASSCO. "This extraordinary partnership with DSEC will help NASSCO retain its position as a leading builder of ocean-going Jones Act ships."

"We are very much impressed by NASSCO's naval ship-based advanced technology, management system and well-organized personnel, as well as its business strategy," said In-Sung Lee, president and CEO of Daewoo Ship Engineering Company. "We believe this collaboration could be a cornerstone for U.S.-Korean shipbuilding partnerships as well as build upon both companies' remarkable records in the market."

DSEC was founded to contribute to the shipbuilding industry in accordance with the global network business plan of DSME. It supplies an integrated shipbuilding engineering package that is composed of ship design, procurement and inspection services to overseas shipyards, based on DSME's experience.

The Motor Vessel Hyundai Fortune burns in the Gulf of Aden, approximately 43 miles off the coast of Yemen. The Royal Netherlands Navy ship HNLMS De Zeven Provincien (F802) and the command ship of Combined Task Force 150, rescued 27 people from Hyundai Fortune while conducting maritime security operations (MSO) in support of Operation Enduring Freedom in the area. (Photo courtesy of the Royal Netherlands Navy)

Maritime Meanings

Dingbat

Also “dingbats.” A sailor’s slang term for a mop made out of old rope-ends and used for swabbing the deck and other areas. The origin of the phrase is obscure; it is used today to describe a condition of being rather eccentric or uncontrolled in speech or actions, to be silly or dopey. The allusion is probably to the more or less uncontrollable teased-out fag-ends of rope being slapped around by the action of the mop. American usage is similar: the reference is to someone who is flightly and foolish, especially women. It is revealing of our values that the English language contains a disproportionately large number of slang terms that describe wit — or, rather, the lack of it — in our fellow man.

***Source**: An Ocean of Words: A Dictionary of Nautical Words and Phrases, by Peter D. Jeans; Birch Lane Press , 1998*

Iran Claims “World’s Fastest” Torpedo

Iran has reportedly test-fired a sonar-evading underwater missile that can outpace any enemy warship, the Washington Post reported.

Iran officials claim to possess a missile which goes as fast as 100 meters per second and that the boats that can launch this missile have a technology that makes them stealthy and undetectable. State television described the missile as the world's fastest.

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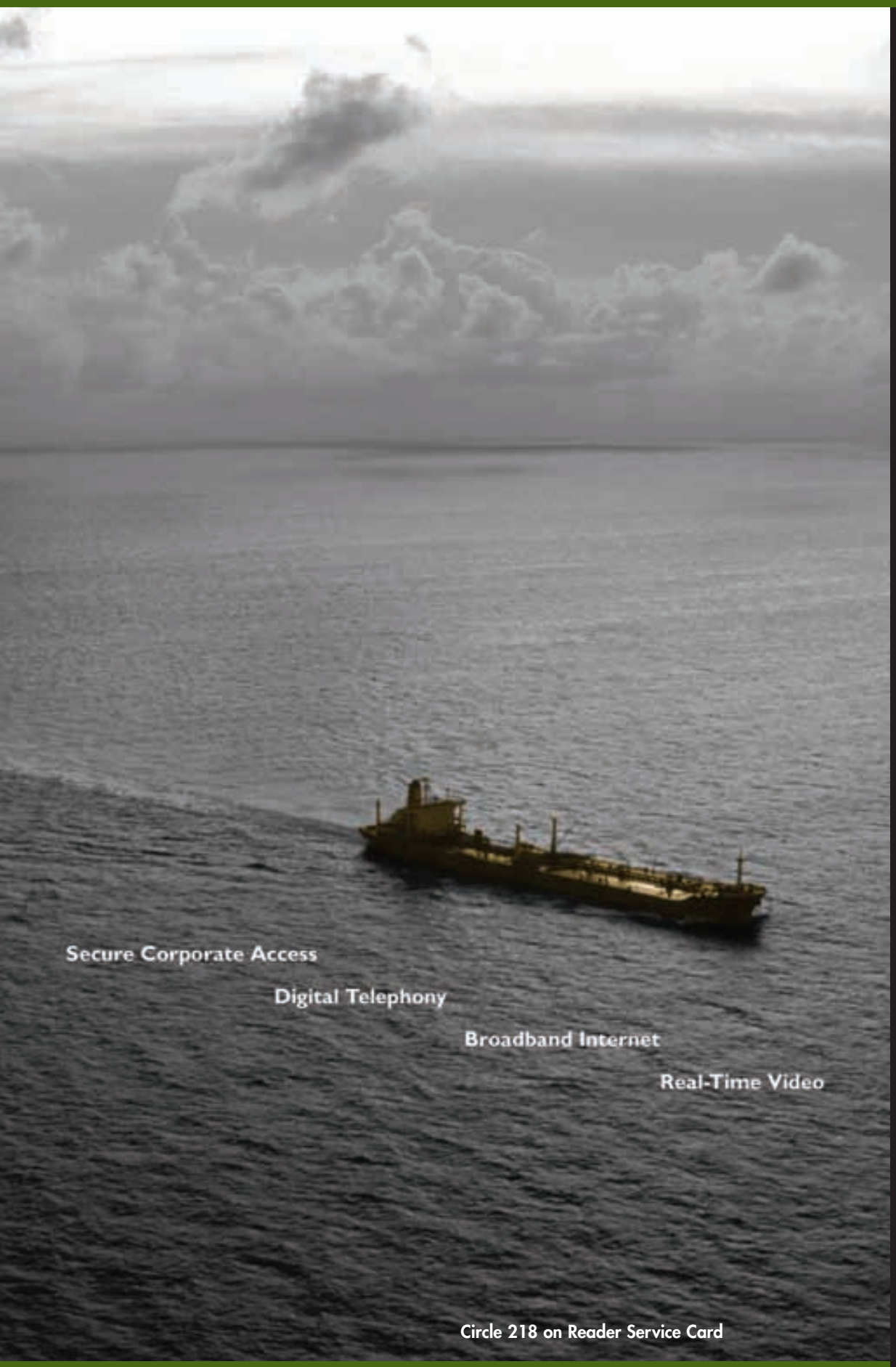

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Editor's Note

After covering the marine industry for nearly 15 years, there are certain words and phrases that routinely get sent "to the island," with the intent of never appearing in print on my watch again. One of those words is (or shall I say, was) "boom." As in headlines such as "The _(fill in the blank)_ Market is Booming."

In discussing the recent history and near-term prospects of the offshore Oil & Gas market, however, there simply is no better word. The drive to discover and recover natural resources is increasingly being conducted in deeper waters, which is having a ripple effect felt throughout the maritime industry. The market is ripe for a new generation of bigger, stronger and faster offshore supply vessels, as evidenced by a boom in new orders for such vessels, led by Bourbon's spending spree around the world, a plan which entails investing nearly $1.7 billion in new boats in the next four years.

The trend toward deeper water has been led by a wealth of new and emerging underwater technologies, which is the mainstay coverage of sister publication *Marine Technology Reporter* (**www.seadiscovery.com**). In speaking with the heads of a number of leading companies that provide the workhorses for undersea operations, it is quickly evident that the offshore Oil & Gas boom is driving near term business plans, as production at many manufacturers is running full tilt, which is still not enough.

On the production facility side of the business, there has been a marked increase in the demand for floating production systems, as the need to produce oil and gas has extended beyond the reach of fixed platforms in many cases. According to a recent report by International Maritime Associate's **James R. McCaul**, there are now 179 floating production systems in operation, and another 46 on order. In analyzing the 30-year growth trend, the study notes that demand is up 203% in the last 10 years alone. The story on the boom in floating production systems starts on page 24.

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On the Cover

On the Cover: Pictured on the cover is Richard Longdon, CEO of AVEVA. The company is profiled in this edition, starting on page 17.

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Lloyd's Register

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TEN Buys Nine Tankers

TEN bought nine ice class 1A tankers from Western Petroleum for $530m. The fleet consists of six 53,000-dwt medium range chemical/products carriers delivered by Hyundai Mipo Dockyard last year and three 116,000-dwt coated Aframax product carriers for delivery from Hyundai Heavy Industries in May, August and October this year.

Green Reefers Sells Ship

Green Reefers sold M/V Green Igloo for $2.1m. The vessel is 73,000 cu. ft. and built in 1983. The transaction generates a profit of about $1m and generates free cash of about $800,000.

In 2005 Green Reefers expanded its fleet with a total of nine vessels, whereof seven vessels have been purchased by the company.

TOP Sells 13 Vessels

TOP Tankers sold 13 vessels — nine Suezmax carriers and four Handymax carriers — for $550m, which will be immediately leased back under five- to seven-year contracts. TOP expects cash proceeds of about $240m from the deal. After the sale, TOP will operate 27 vessels, with nine fully owned and 18 chartered and fully controlled.

Crager New CEO of Intec

Heerema Holding and the Supervisory Board of Intec have named **Bruce Crager** chief executive officer of Houston-based Intec Engineering, effective Feb. 14, 2006. Crager was president of ABB Offshore Systems Inc. and previously senior vice president of Oceaneering International Inc., with responsibilities for mobile offshore production systems.

Bollinger Announces Management Changes

As Bollinger Lockport New Construction (BLN) continues to grow, Bollinger Shipyards, Inc. announces changes to its managerial staff. **Dennis Fanguy** has been appointed vice president of quality management system. **René Leonard** has been appointed director of engineering and commercial programs. **Daniel Richardel** has been appointed director of production for Bollinger Lockport New Construction.

MSHS Promotes Boehme, Elsholz

Boehme

Elsholz

Motor-Services Hugo Stamp (MSHS) promoted **Juergen Boehme** to Vice President of Service. Boehme started with MSHS in 1991 and has served as Service Manager for the past 13 years. MSHS also announced the promotion of **Torsten Elsholz** to Service Manager. Elsholz started with MSHS in 1991 and has worked for the past 15 years as a Service Engineer.

Aker Opens Florida Office

Aker Yards Lifecycle Services (LCS) specializes in ship conversion and refurbishment. Aker Yards offers a full range of services: Conversion, Passenger Area and Ship System Services, including consulting, project development, project management, turn-key projects, maintenance and spare parts. To support LCS in North America and the Caribbean, a sales and consulting agency called Aker Yards Ship Service has been established in Ft. Lauderdale, Fla. **Jarmo Seppälä**, the newly appointed President of Aker Yards Ship Service Inc., will head the office.

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Imtech Intends to Acquire Radio Holland Group

Radio Holland Group B.V. announced that Imtech N.V. intends to acquire its shares. The acquisition almost doubles the revenues of Imtech in the maritime market and place it in the global top five of the global marine market. The acquisition fits the Imtech strategy of further international growth in the maritime market. Both parties have signed an agreement regarding the transfer of shares of the current owners, ABN AMRO Capital (56%) and the Foundation Co-Investors Radio Holland Group (44%) in which investors and current RH management participate. It is agreed with the management of the Radio Holland Group that they will continue to dedicate themselves to the organization.

Shell LNG Fleet Earns "Green Passport"

Shell International Trading and Shipping Company (Shell) has obtained Green Passports from Lloyd's Register for all 25 of the liquefied natural gas (LNG) carriers in its managed fleet.

Marine Security Announces Joint Venture

Marine Security Services, a division of York-Mahar, Inc., announced a partnership with MARSAF, Marine Safety Consulting. Offered will be a full range of professional consulting services including maritime security, environmental safety, preparedness training, including NIMS ICS, and contingency planning.

Northrop Grumman to Test SVDRs

The U.S. Coast Guard has certified Northrop Grumman Corporation's Sperry Marine business unit as an authorized annual service provider for shipboard voyage data recorders (VDRs).

Cameron New Thales U.S. Chairman, CEO

Thales appointed **Allan Cameron** to the position of Chairman and CEO of Thales in the United States, effective April 1, 2006, following the retirement of current Chairman and CEO Lawrence Cavaiola, Ph.D. Dr. Cavaiola has led Thales' U.S. operations since 2001.

Faststream Expands

Faststream, a U.K.-based recruitment company opened its first U.S. office, designed to meet the expanding recruitment needs of its U.S. shipping and marine clients. Faststream appointed Senior Marine Executive, Craig Johnson (left), as Vice President to manage this new venture. Mark Charman (right), President of Faststream said "We have successfully recruited on behalf of U.S. companies for a number of years and the response from our clients to our plans to open a U.S. office dedicated to the shipping and marine sectors, has been quite frankly outstanding."

Sperry Marine Wins $40m Navy Deal

Northrop Grumman Systems Corp., Sperry Marine, Charlottesville, Va., is being awarded a $40,305,984 indefinite-delivery/indefinite-quantity, cost-plus-

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fixed-fee contract for engineering and technical services in support of the analysis, repair, alteration, maintenance and product improvement on existing Sperry Marine Integrated Bridge System (IBS) and steering/ship control systems equipment.

Art Anderson Expands Staff

Doron Zilbershtein has joined Art Anderson Associates as Chief Visionary Officer, reflecting the company's commitment to evolving its business. In addition to taking on the traditional responsibilities of a Chief Operating Officer, Zilbershtein will lead strategic initiatives to better align the company with new challenges and opportunities.

New Name for MAN B&W After-Sales Service

The MAN B&W Diesel Group is bringing all its worldwide after-sales services under the brand name MAN B&W PrimeServ. Five new PrimeServ branches will be opening during 2006: in Houston, Dubai, Cuba, Guangzhou and Mumbai.

Bocimar Expands Fleet

Bocimar International has acquired three capesize newbuilding vessels for $188m.

The first vessel, SWS 1028 (Shanghai Waigaoqiao Shipyard) is a 175,000-dwt newbuilding for which Bocimar concluded a three-year time charter contract in April 2005. It was obtained from Teh Hu (Hong Kong). The other two vessels, SWS 1048 and SWS 1049, have been bought from the Golden Ocean group. These two 175,000-dwt newbuilding vessels will be delivered in November 2006 and January 2007.

LIGECS Hosts Seminars

LIG Marine Managers' sister company, LIG Educational & Consulting Services (LIGECS), is holding one-day seminars in 2006 on Commercial Marine Insurance. With the ever-changing marine market place, these seminars are timely, dynamic, and are registered for six hours CE credits in Florida and several southeastern states. Remaining dates in 2006 include:

- May 17th, 2006 in Atlanta, GA - 6 hrs CE Credits in FL, GA, AL, MS
- Sept 12th, 2006 in Tampa, FL - 6 hrs CE Credits in FL

ExxonMobil to Supply Houston

ExxonMobil Marine Fuels has begun supplying marine fuels in Houston, Texas, with immediate effect. ExxonMobil will offer 180cSt, 380cSt and 500 cSt marine fuel as well as marine gasoil (MGO) and marine distillate (MDO).

Detyens Wins MSC Contract

Detyens Shipyard won a $7.3m firm-fixed-price contract for ship repair, overhaul and drydock to support Military Sealift Command's combat stores ship USNS Spica (T-AFS 9). USNS Spica's primary mission is to provide underway replenishment and/or vertical replenishment. This contract includes options that, if exercised, would bring the cumulative value of the contract to $9.8 million.

FD Buys Moose Boat

Moose Boats won a contract from the Northport Fire Department, Northport, N.Y., for a M2-33 outboard response boat. This is a 33.5 ft. all aluminum catamaran powered by twin 250 hp, four-stroke Yamaha outboards. The vessel is designed for a top speed of more than 37 knots, cruise at approximately 28 knots and will meet NY State Ambulance certification standards.

The mission of this vessel is to provide quick response capabilities for marine emergencies in and around Northport's harbor. In the past, the department has responded to boat accidents, tanker explosions, helicopter crashes and medical emergencies. In addition to the boat's fire fighting and water rescue applications, it will be outfitted as a water-borne ambulance with advanced life support capabilities. This vessel will support a scuba team's dive/recovery efforts, and will be additionally equipped with high powered emergency scene lighting for nighttime operations.

Summer Naval Surface Ship Design Program

The Naval Sea Systems Command (NAVSEA) has created a Summer Naval Surface Ship Design program in cooperation with the Department of Naval Architecture and Marine Engineering at the University of Michigan. The program will run from May 1 to June 16 and will include professors from the University of Michigan, the Naval Post Graduate School, Virginia Tech and instructors from NAVSEA's Engineering Future Concepts and Surface Ship Design, Ship Costing, and Combat Systems Groups.

"A large part of the Navy's civilian naval architects and engineers will be retiring in the next decade. We will face a shortage of these skilled professionals and we need to ensure that we recruit a new generation of architects and engineers with the right skills to design and build warships for the 21st Century Navy," said James Webster, a Senior Naval Architect who works in the Future Concepts and Surface Ship Design Group at NAVSEA.

The idea for the course began as the Navy became concerned about the aging of the ship design workforce and the overall health of the naval engineering field. Current education in the field of naval architecture and marine engineering produces excellent candidates for employment in the field of naval engineering, but specific training in the unique aspects of naval ship design, including naval systems design, is either lacking or significantly outdated. A new series of courses is being offered at the graduate level on the unique aspect of naval ship design. The Summer Naval Surface Ship Design program is taught is conjunction with instructors from NAVSEA, Univ. of Michigan, Virginia Tech and the Naval Post Graduate School. The seven courses taught are: Naval Architecture Overview, Naval Ship Design, Warfare Systems, Ship Support Systems, Naval System Architecture/Systems Engineering, Multiple Objective Optimization, ASSET Training, Capstone Naval Surface Ship Design.

"The students in this course will gain real-world experience in working on an actual warship design. They will be taught by professionals who design state of the art surface combatants using the latest U.S. Navy design tools and practices. It is a once in a lifetime opportunity for someone interested in the field," said Webster. The course will be limited to no more than 30 students on first come basis . Candidates for the course can come from a variety of disciplines including: naval architecture, marine engineering, systems engineering, mechanical engineering and civil engineering.

Marine Design Meeting Set for May

The Ninth International Marine Design Conference (IMCD) is to promote all aspects of marine design as an engineering discipline with particular emphasis on issues of synthesis.

The four focus areas of the IMDC are Naval Ship Design, Commercial Ship Design, Offshore Design, and Inland and Great Lakes Design.

IMDC 2006 will be held at the University of Michigan from May 16 to 19, 2006, with the presentation of 50 technical papers, six state-of-the-art reports, an invited opening lecture entitled "The Fascination of Ship Design," and two luncheon speakers from U.S. naval ship design and the offshore design fields.

Complete details of the conference can be obtained from the web site www.umich.edu/~imdc06

2006 Ship Production Symposium Call for Papers

Submissions for the Ship Production Symposium will be accepted in one of two categories:

1. Published paper with a presentation at the conference.

2. Presentation (PowerPoint) at the conference (no paper prepared for publication).

The goal for the SPS sessions is 2/3 published papers with presentations, and 1/3 presentations only. The SNAME Ship Production Committee, composed of the NSRP Ship Production Panel Chairs, will make the determination as to which submissions will be accepted. While any topics related to ship production will be considered, this year's theme is Design/Build and What's In Between! Papers relevant to this theme might include, but are not limited to, the following:

- 3D Modeling - Ship Design Operations (i.e. sortie rates, shipboard firefighting, stores load-out)
- 3D Modeling - Life Cycle Issues (assembly/disassembly/removal/re-install)
- Design for Production Guidelines - producibility in shipbuilding
- Integrated Master Planning and the Role of Simulation
- Pre-production Planning based on Common Constraints - space, time, and labor
- Facility Capacity Issues and Potential Solutions
- Managing Contract Execution and Cost
- Effective Change Management - from Contract Award through Delivery
- Environmental, Safety, and Health Issues and their Impact on New Design
- Modern Design Standards in Naval Ship Classes - HME (Hull, Mechanical, Electrical)

Important Dates

- April 20, 2006 Abstracts due
- May 5, 2006 Authors notified
- June 23, 2006 Rough Draft due for review and comment
- July 21, 2006 Final comments passed onto authors
- August 8, 2006 Final electronic submissions due for publication

Rough Draft papers may be submitted on or before April 20th and are encouraged. For details on submitting papers and PowerPoint presentations, visity www.sname.org/author_instructions.htm. All abstracts, papers and presentations should be submitted to Dolly Pelto at pelto@aticorp.org.

AVEVA: Making a Name in Shipbuilding

While AVEVA may still be an unfamiliar name to some in the shipbuilding world, the Cambridge, England-based company is one of the industry's fastest-growing lifecycle engineering IT solutions and services providers, with a long history serving the offshore oil and gas markets, among others. In May 2004 the company completed its acquisition of Tribon Solutions for $34.2 million, effectively setting its course toward becoming a force in the shipbuilding business.

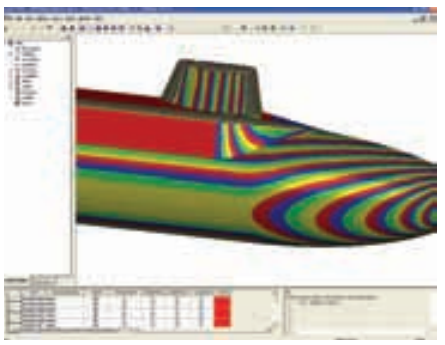
At the time of the acquisition, **Richard Longdon**, CEO, AVEVA Group, said, "In terms of market share, technology and breadth of proposition from conventional 3D approaches by not requiring a drawing engine, but producing graphics directly from a single, coherent data model of the entire plant.

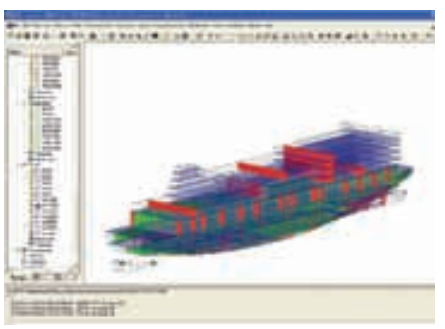
VANTAGE Marine 11.6 (coinciding with the 11.6 release of PDMS) is an advanced solution for shipbuilding and offshore design and production.

While the Tribon name has been a familiar one to shipbuilders, AVEVA's PDMS is a familiar solution for outfitting, and has been used for over 80 percent of all new offshore projects in the last 10 years, according to the company.

VANTAGE Marine 11.6 brings the two systems together, and Longdon explained the synergy. "The heyday of

Richard Longdon, CEO





Tribon is the world's leading solution provider for ship design and construction. Combined with AVEVA's solid product evolution, its history of innovation and its performance in the power, offshore and process industries; we now present the world with its greatest and most powerful engineering IT proposition." Fast forward nearly two years, and the vision is becoming a reality, as AVEVA rapidly expands its position among some of the world's leading shipbuilders, while making significant progress in expanding its position in the burgeoning Chinese market.

AVEVA Vantage Marine 11.6

Last year the company launched Vantage Marine 11.6, its first solution that brought together the company's flagship PDMS technology with that of Tribon, for shipbuilding and offshore design and production. The PDMS, or Plant Design Management System, is a data centric, multi-disciplinary solution for 3D process plant design featuring applications and reference data for every engineering discipline. It differs from conventional 3D approaches by not requiring a drawing engine, but producing graphics directly from a single, coherent data model of the entire plant.

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VANTAGE Marine 11.6 brings the two systems together, and Longdon explained the synergy. "The heyday of mammoth, static oil platforms is all but over and the world is looking to Floating Production, Storage and Offloading (FPSO) vessels and other floating facilities for the future of oil production. They are a fusion of shipbuilding and plant technology, requiring an integration of both technologies."

Design and Production Benefits

The VANTAGE Marine 11.6 system is designed to save time and money in some of the most important phases of the shipbuilding process, allowing work in parallel, both internally as well as externally, due to VANTAGE Marine's coordination capabilities.

The data from all structural and outfitting disciplines required to define a complete design and its production information, are stored in one and the same Ship Model database. The close association between the hull and the outfitting data allows the hull structure and outfit designers to work in parallel, sharing the most up-to-date information during design development and producing well-integrated, clash-free final arrangements with all hull penetrations and supports defined.

With VANTAGE Marine 11.6, a new concept for definition of parametric hull structures was introduced. It is a development of the already existing Reference Surface Objects (RSOs) to which now information about plating and stiffening can be added. This information is in the form of parameters that form a "recipe" for how steel panels will be automatically generated from the RSOs. The recipes can be created via the ordinary interactive user interface of

the Surface/Compartment or Basic Design applications. In this way a preliminary steel structure for a ship can be generated from parameter values in a matter of few hours and several different alternative design and dimensioning approaches can be analyzed for steel weights, surface areas, section modulus etc. In continuing its trends towards system integration and improvement, last December AVEVA presented a range of major new features to VANTAGE Marine 11.6 and Tribon M3, with the aim to improve the integration of basic design and detailed design, contributing to new and more flexible ways of organizing shipbuilding design activities.

For example, there is often a requirement to start cutting steel at an early stage of a shipbuilding project, sometimes even before the final approval has been obtained from the classification societies. The structural engineers work with the overall classification view of the ship while the detailed designers usually are responsible for certain individual hull blocks. This presents a dilemma in creating and maintaining two versions of the design simultaneously, one for basic structural design and one for the detailed design that supports the parts manufacturing tasks.

VANTAGE Marine 11.6 and Tribon M3 now present a potential solution. The systems maintain two parallel views of the design in the Ship Model database: a design view for the structural engineers and a production view for the detailed designers. The structural engineers create and maintain the design panels while the detail designers work with the production panels. The production panels are created from the design panels using the automatic block splitting facilities. After block splitting, the two views of the steel structural model are kept synchronized so that any change to a design panel will automatically impact the corresponding production panel. A late change from the classification society or the ship owner will become available not only in the basic design model but also immediately influence the parts definition work. Likewise a change to an individual part becomes known to the designers.

Many shipyards develop the basic design within their own organization while they often subcontract all or part of the detailed design work. The new features of VANTAGE Marine and Tribon support this work process by synchronizing the design and production panels when the production panel data is being delivered from the subcontractor to the shipyard. In practice, this means that classification drawings can easily be updated with changes made by the subcontractors. In the same way, data for parts manufacture and assembly is updated with any changes made by the subcontractor during detailed design.

With the new features in VANTAGE Marine 11.6 and Tribon M3 it is possible to create alternative block and assembly definitions from the same design using the block splitting function. The alternatives can be analyzed and the choice of production facility can be postponed until late in the process. In this way the work involved in creating the manufacturing information is minimized.

Confirmation

While company proclamation and technical detail are, of course, relevant, nothing speaks to a system's success quite like orders, and AVEVA has enjoyed increasing success in this regard. Last May, prior to the launch of VANTAGE Marine 11.6, Hyundai Heavy Industries (HHI) selected AVEVA's marine products for the design and production of ships and offshore projects at their shipyard in Ulsan, Korea. The contract, worth more than $12.5 million, includes implementation of the current AVEVA marine products with licenses for more than 1,000 designers. In addition to Korea, AVEVA considers penetration in to the China market as a major plank in its platform to dominate the world of vessel design.

"As a country, they are determined to buy their way in" to the shipbuilding market, Longdon said. The company announced several recent contracts that illustrate its move to this end, in late 2005 signing a contract with Dalian New Shipbuilding Heavy Industry (DNS) to extend its application of AVEVA's Marine solutions for both its shipbuilding and offshore businesses. Additionally, AVEVA will provide professional training and onsite consulting services to DNS to ensure efficient and

optimized utilization of AVEVA's Marine software.

"DNS regards AVEVA as a long-term strategic partner that is committed to providing continuous quality service and proven solutions that will contribute to the growth of DNS," said Mr. Ma Yande, Deputy Chief Engineer and Director of the Design Division at DNS. With 4,300 employees and a state-of-the-art production lines, DNS has the capability to build and repair a variety of ships, tankers, bulk carriers under 300,000-dwt class as well as major offshore and marine products, land-based machinery equipment, and steel structures for high buildings and bridges. The company's technical staff are divided into two main divisions, the Ship Design & Research Institute, which is supported by 280 designers, and the Technology & Planning Division.

In order to better service the growing Chinese marine market, AVEVA recently established a China Marine Division.

AVEVA also signed a contract to provide its design and production solutions to China's New Century Shipbuilding (NCS), located southeast of Jingjiang. The shipbuilder — established in August 2001, but is now one of the top 20 shipyards, by dwt, in the world — will use AVEVA's software to enhance its shipbuilding capabilities on its latest project - the design and manufacture of a 4,250 teu containership prototype, for which delivery is expected in 2007.

Following its most successful year, AVEVA is not resting on its laurels, instead investing further in the future, seeking to continue its growth.

The increased investment will see an acceleration of AVEVA's commitment to Microsoft's .Net technology, which has already delivered new levels of productivity, interaction and information sharing to every aspect of industry. The demand for a steady stream of highly qualified, up to date IT professionals has created opportunities worldwide, including the opening of a new development office in Chennai, India to execute a broad spectrum of product development activities. The initial investment in Chennai has capacity for 70 new staff.

"We had a very successful year in 2005 and the trend is not going to stop," said Longdon. "Expanding our operations and investing in new technological developments is the key to maintaining our market-leading status. The expansion in India and investment in Microsoft's .net technology will help us to cement our successful business strategy."

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AVEVA VNET 3.3

AVEVA offers VNET, an internet-based technology that enables common applications to be integrated to create an internet-based information portal. VNET version 3.3 was developed in consultation with new and existing customers, including Jacobs, BP, Shell, Petronas, Woodside, JR McDermotts and Alstom. VNET allows information created by experts in one business function to be used by non-experts in other parts of the business or in different organizations. "VNET delivers information in a simple, low-cost way," said **Richard Longdon**, CEO, AVEVA Group. AVEVA has enhanced VNET, including the addition of new functionality to allow Engineering Procurement and Construction (EPC) contractors and plant owner-operators to interact more effectively without changing their proven systems and existing working practices. "VNET 3.3 offers huge, demonstrable benefits to owner-operators by improving the relationship with the EPC at handover," said Longdon. "Handover has traditionally been regarded as a definitive period at the end of a project but VNET 3.3 brings that process forward, allowing dynamic simulation, plant training procedures and even de-bottlenecking studies to be conducted before commissioning. On a typical large oil facility, for example, this has the potential to bring forward first oil production significantly."

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Government Update

Exon-Florio, CFIUS & Foreigners

Dennis L. Bryant, Senior Maritime Counsel at the law firm of Holland & Knight, Washington, D.C., is a contributing editor of MR/EN.

By Dennis Bryant, Senior Counsel, Holland & Knight LLP

From the earliest days of our independence, the United States has both welcomed and been leery of foreign investment in the U.S. economy. In the immortal words of Yogi Berra, the last several months have been a case of déjà vu all over again.

On February 13, 2006, talk radio's Michael Savage, in his program "The Savage Nation," and Lou Dobbs, in his television show "Lou Dobbs Tonight," complained about the pending acquisition of the Peninsular & Oriental Steam Navigation Company (P&O) by Dubai Ports World (DPW). The concern was that P&O, a British corporation, among its many worldwide holdings, operated six port facilities in the United States and that, with the planned acquisition, those US assets would be operated by an Arab corporation, in which the Government of the United Arab Emirates is a major shareholder.

On February 16, Senator Charles Schumer (D-NY) called a press conference to denounce the pending acquisition. Depending on your favorite metaphor, the issue quickly turned into a feeding frenzy, a snowball rolling downhill, or the perfect storm. Congressional Representatives and Senators, who only weeks before had expressed no interest in maritime security, were drafting legislation, holding press conferences, and appearing on news programs all for the purpose of saving America from the imminent arrival of weapons of mass destruction through foreign-controlled US ports.

The ports of the United States are largely owned by state and local government agencies. The thousands of individual port facilities are leased to thousands of maritime companies. Some of these companies specialize in operating port facilities. Some shipowning companies operate their own facilities in order to ensure convenient access for their ships. Shipping is an international business and the vast majority of ship-owning companies are domiciled outside the United States. Not surprisingly, the majority of port facilities in the United States are now operated by companies domiciled outside the United States. How did a large, but otherwise routine, commercial transaction that included as a minor aspect the transfer of operation of six US port facilities from one foreign company to another foreign company end up in a political firestorm?

With the onset of the Cold War in 1945, it became apparent to persons in the federal government that efforts must be made to keep national defense assets out of the hands of America's enemies (i.e., the Communist countries, such as the USSR and Red China). Initially, this was done on an ad hoc basis. In 1950, Congress enacted the Defense Production Act to provide some guidelines and standards, as well as specific legal authority. In 1975, following the OPEC oil embargo, President Ford issued an Executive Order establishing the Committee on Foreign Investment in the United States (CFIUS) to administer the process of monitoring foreign investment in US industry and assets. Initially, the focus was on companies that manufactured weapons and defense systems.

After an attempt in 1987 by Japan-based Fujitsu Ltd. to acquire majority ownership of Fairchild Semiconductor Corporation, Congress adopted a significant amendment to the Defense Production Act. Known informally as the Exon-Florio bill (after its principal proponents - Senator Exon from Nebraska and Representative Florio from New Jersey), the 1988 legislation formalized the role and authority of CFIUS in the review process. The Defense Production Act of 1950, as amended by the Exon-Florio bill, grants the President authority to block proposed foreign acquisitions of companies engaged in interstate commerce in the U.S. where that acquisition threatens to impair the national security. Review of a proposed acquisition, merger, or takeover is particularly intense where the proposed activity is by an entity controlled by or acting on behalf of a foreign government.

(Photo Credit: Maritime Administration)

The President can suspend or prohibit the proposed activity, but only if there is "creditable evidence" that the foreign investment will impair national security. The statute does not define "national security," but the term is to be interpreted broadly without limitation to a particular industry.

U.S. Department of Commerce records indicate that, as of 2004, foreign direct investment in the United States amounted to more than $1.5 trillion. The United Kingdom is the largest foreign direct investor ($252 billion), followed by Japan ($177 billion), the Netherlands ($167 billion), Germany ($163 billion), and France ($148 billion). In 2004, the direct investment in the United States by companies from the United Arab Emirates was shown to be approximately $24 million, but this data only counts ownership or control, by one foreign resident, of 10% or more of the voting securities of an incorporated US business enterprise or the equivalent interest in an unincorporated US business enterprise. It is estimated that UAE companies have invested approximately $1 billion in US assets, but, because the ownership percentage is generally low, most of these investments do not show up in government statistics. U.S. port facilities are currently operated by companies domiciled in the United Kingdom, Denmark, Japan, South Korea, Taiwan, Singapore, and China, and this listing is far from complete. Ships from virtually every nation enter and depart US ports daily, carrying cargoes from everywhere. The majority of the crewmembers on these ships are from third world nations. All the ships adhere to internationally-agreed security standards and are subject to examination by the US Coast Guard. The cargoes are subject to examination by the US Customs and Border Protection. The crews are subject to examination by the US Immigration and Customs Enforcement. The US port facilities themselves (regardless of the nationality of the operating company) must comply with USCG security regulations, must prepare a facility security plan, must have the plan reviewed and approved by the Coast Guard, and are subject to both regular and random USCG inspections. The proposed acquisition of the six US port facilities by DPW was examined by CFIUS, which found no "creditable evidence" that the transfer would impair national security. While there is certainly room for improvement in maritime security, U.S. ports and U.S. port facilities are significantly more secure today than they were in 2001. That we don't feel more secure is more a matter of perception than reality. That we are comfortable with a British company operating various U.S. port facilities (remembering that a significant percentage of Britons are of Arab descent), but uncomfortable with an Arab company operating those same U.S. port facilities (even though much of the senior management of the Arab company are U.S. citizens), is a reflection of both long-term history and recent experience.

We live in an international community. We are engaged in a global war against terrorism (sometimes called "the Long War"). We need to and have enlisted the cooperation and assistance of many international partners, including Middle Eastern nations. The United States owes it to our international partners (and to the citizens of the United States) to act in a thoughtful, deliberate manner with regard to homeland and international security.

Knee-jerk responses are the opposite of leadership.

Growing Requirement for Floating Production Systems

Keppel Shipyard successfully completed the sixth Floating Production Storage Offloading (FPSO) conversion project from SBM since 2000.

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

Floating production has evolved over the past 30 years in response to the need to produce in water depth beyond the reach of fixed platforms. There are now 179 floating production systems in operation and another 46 on order. They are now routinely producing on fields in the North Sea, Gulf of Mexico and offshore Brazil, West Africa, Southeast Asia, China, other locations. Thirty are producing on fields in water depth exceeding 1 kilometer. The 2 kilometer mark will be passed within the next two years, when the Independence Gas Hub and Blind Faith production semis start producing in the Gulf of Mexico. By any measure, this is a remarkable achievement for a technology that dates only from the mid-1970s.

Growth of floating production

Floating production can be traced to 1974, when Hamilton Brothers converted the semisubmersible drill rig Transworld 58 to a floating production unit for use on the Argyll field in the North Sea. The unit was placed in 79 meters water depth and operated for 16 years. The first ship shape floating production unit is traced to 1977, when Shell converted a 60,000 dwt tanker to an FPSO vessel with 20,000 b/d processing capacity for use on the Castellon field offshore Spain. It operated in 115 meters water depth.

But the commercializing and early expansion of floating production technology can be attributed to Petrobras. The operator saw floating production as an excellent, relatively low cost solution for producing crude in the deepwater fields of Campos Basin. Petrobras began using converted rigs as production semisubmersibles in 1977 - and within ten years had 11 floating production units operating offshore Brazil.

Interest in floating production spread to other operators in the 1980s. Driving this was the successful demonstration of floating system technology on offshore fields between 1984 and 1986. Most notable were Conoco's Hutton tension leg platform, the Golar Nor Petrojarl 1 early production system and BP's Seillean SWOPS vessel. These systems clearly showed floating production to be a practical and economical solution for certain offshore applications. By the end of the 1980s, there were 31 floating production systems in operation.

The tempo of installations continued to build over the first half of the 1990s. More than a dozen FPSOs were installed in the five year period, the bulk of which were placed offshore China, Southeast Asia, Australia or in the North Sea. They included Woodside's Cossack Pioneer, a large FPSO able to process 140,000 b/d oil that was placed on the Wanaea/Cossack field offshore Australia. Seven production semis were installed, including Norsk Hydro's Troll B production semi in the North Sea, which is capable of producing 270,000 b/d oil and 282 MMcf/d gas. The early 1990s saw the take-off of TLPs, with three units being installed, Snorre and Heidrun in the North Sea and Auger in the Gulf of Mexico. By end 1995 there were 57 floaters in operation.

Things really took off in the second half of the 1990s. In the five year period there were orders for almost three dozen FPSOs, including 14 harsh environment units for use in the North Sea and East of Shetlands. They included the sophisticated and expensive Asgard FPSO, capable of processing 200,000 b/d oil and 600 MMcf/d gas, and the Schiehallion FPSO, capable of processing 155,000 b/d oil and 140 MMcf/d gas. During this period a dozen production semis were installed, five of which were placed in the North Sea, five offshore Brazil. The North Sea units included the purpose-built Visund, with processing capacity for 113,000 b/d oil and 350 MMcf/d gas, and the Troll C, with capability to process 190,000 b/d oil and 320 MMcf/d gas. TLP installations grew significantly, with six new TLPs being installed in the Gulf of Mexico.

They included Shell's large deck TLPs Mars, Ram Powell and Ursa and the mini-TLPs Morpeth and Allegheny. This period also saw the first spar installations, when Kerr McGee installed the Neptune spar in 1997, followed a year later by Chevron's Genesis spar. By the end of the decade, there were 112 floating production systems of all types in operation.

Growth has continued unabated during the first half of this decade. Almost 60 FPSOs have been installed, including 20 units off West Africa. Among these have been some huge purpose-built units for multi-billion dollar deepwater developments. They include ExxonMobil's Kizomba A and B, each having 250,000 b/d oil and 400 MMcf/d gas processing capability, Total's Girassol with processing capability of 200,000 b/d oil and 105 MMcf/d gas and Shell's recently installed Bonga with 225,000 b/d oil and 150 MMcf/d

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gas processing capacity. The past five years have seen seven production semis placed in service, including two large gas condensate production semis, Asgard B and Kristin for the North Sea, and the NaKika production semi in the Gulf of Mexico, which at 1920 meters holds the current water depth record for floating production systems. Nine TLPs have been installed since the beginning of the decade, including two wellhead units off West Africa and a unit in Southeast Asia. There has also been significant growth in use of production spars during the first half of the decade. Twelve units have been delivered since 2000, all for placement in the Gulf of Mexico. By end 2006, counting the units to be installed during this year, there will be 194 floating production systems of all types in operation.

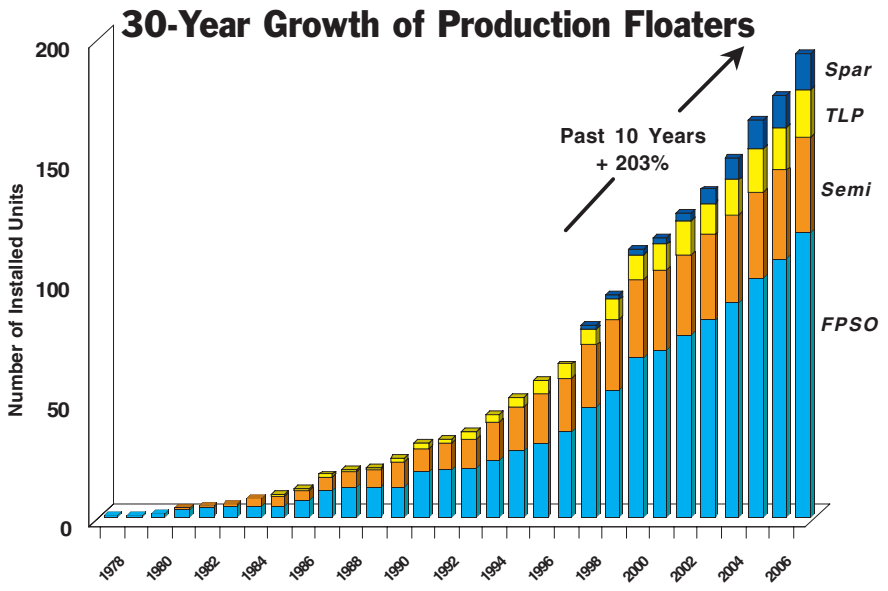
Advantages/disadvantages of various floating systems

FPSOs are the most common type of floating production system. They represent 61 percent of the production units now in operation and 70 percent of the production units on order. They are located in all major offshore areas, except the Gulf of Mexico. FPSOs have the advantage of providing field storage, which enables them to be utilized independent of pipeline infrastructure. They are also less weight sensitive than other types of floating production systems and the extensive deck area of a large tanker provides flexibility in process plant layout. Another advantage is the ability to utilize surplus or aging tanker hulls for conversion to an FPSO vessel, a solution which can be relatively inexpensive compared to building a new hull. The disadvantage is that the subsea tiebacks associated with FPSOs generally bring higher well maintenance costs.

Production semis comprise the second largest segment of floating production systems. They represent 21 percent of all production floaters in operation and 13 percent of the current floater order backlog. This type production system was a popular solution during the early years of floating production. A large number of surplus drill rig hulls were available that could be fitted with process plants and converted relatively cheaply into production units. But when the availability of surplus hulls dried up in the 1990s, the semi as a production facility became less attractive than FPSOs. However, their popularity has rebounded over the past several years as development has moved to ultra-deepwater, dispersed fields. Production semis have the advantage of being able to operate on complex deepwater fields involving a large number of wells over a disbursed area. Recent orders have included very expensive purpose-built units such as Thunder Horse, P 51, Kristin and Atlantis. But a new range of significantly less expensive light deckload production semis capable of operating in ultra-deepwater are attracting considerable industry interest. There has also been a recent project, Gomez, where the operator converted an old drill semi hull to a small production semi.

TLPs are the third most common type of production system. The 18 TLPs now in operation represent 10 percent of all floating production units and the 3 TLPs on order account for 7 percent of the order backlog. All TLPs have been purpose-built for the field on which they operate. Full size TLPs had been a popular production option in the Gulf of Mexico and North Sea. But Shell's Brutus in the Gulf of Mexico marked the end of the full size TLP period. These types of production floaters are not suited for use on ultra-deepwater fields. Tendon weight grows exponentially with increasingly deeper water and the potential use of full size TLPs is generally considered to be no more than 1800 meters. Mini-TLPs however remain very popular in the Gulf of Mexico. Like full size TLPs, minis have the ability to support dry trees, which is a particularly desirable feature in the Gulf of Mexico. The disadvantage is they lack storage and though they can operate in deeper water than the full size unit, they still appear to have depth limitations. The deepest to date is the Moses TLP now on Marco Polo, which is in water depth of 1310 meters. Conceptually, there are designs for mini-TLPs to operate in water depth to 2700 meters, but no unit has yet been ordered for such an application. Wellhead TLPs work in conjunction with an FPSO or production barge. They are positioned directly over the well and enable the trees to be at the surface. Production facilities are on an accompanying FPSO, barge or platform. They range significantly in size, complexity and cost.

Spars are relative newcomers to floating production. Production spars have the ability to accommodate dry trees, a feature liked by operators in the Gulf of Mexico where well maintenance is a particularly important issue. Water depth does not seem to be a limitation. Spars have been utilized in water depth to 1710 meters (Devil's Tower) and theoretically can be employed in water depths to 3000 meters and beyond. A spar is currently earmarked for the Great White field, which at 2260 meters would be the deepest application yet for this type production system. The original classic spar design based on a full length cylinder has been superceded by the truss spar, comprised of an upper hard tank and lower truss structure. Hoover/Diana, the largest classic spar, supports a 26,500 ton payload. Holstein, the largest truss spar, is able to support almost the same payload on a hull that is half the weight of Hoover/Diana. Payload up to 40,000 tons can theoretically be provided on a spar, but only with substantial increase in hull diameter. Spars can provide storage but to date no spar has been used in this capacity. A smaller version known as a cell spar has been used as a production system on gas fields. The Red Hawk cell spar in the Gulf of Mexico has a bundled hull with an overall diameter of 19.5 meters and is able to support 4,700 tons topsides payload. A spar design was recently selected as a floating wellhead facility for offshore Malaysia. It will work with an accompanying FPSO. This is the first application of a spar as a wellhead facility and the first contract for a spar outside the Gulf of Mexico.



Outlook for floating production

Underlying market drivers for floating production are very strong. World energy demand is growing at a rate of 1.6 percent annually, driving the need to find and develop new oil and gas sources. Deepwater fields are one of the few remaining untapped sources for new production. The futures market is forecasting crude prices in the $60+/bbl area and natural gas in the $8-9/MMbtu range at the end of the decade, providing incentive for undertaking new capital expenditures. It's not surprising that most oil companies are planning to significantly increase capex budgets for E&P activity over the next several years. Further evidence of the strong underlying market is provided by drill rig demand. Rig utilization is extremely high, pushing 100 percent in some areas, and rig rates are going through the roof as field operators try to secure equipment for exploration and development drilling.

We believe this market has a long way to run before losing steam. In our recent study of the floating production market, we forecast orders for 103 to 130 production floaters over the next five years. This figure includes 75 to 95 additional units that will be purpose-built or converted from existing hulls and 28 to 35 redeployments of existing units. These orders are expected to generate capital expenditures of $35 to 44 billion over the five year period. In addition, orders for 25 to 35 floating storage units will generate another $1.5 billion in capital expenditures for conversion or construction.

International Maritime Associates (IMA) was formed in 1973 to provide strategic planning, business development and project implementation support to clients in the marine and offshore sectors. IMA has completed over 300 business consulting assignments for more than 130 clients in 38 countries. In addition to consulting assignments, IMA prepares multi-client studies of specific business sectors that have general industry-wide interest. These studies size and profile the business sector, evaluate underlying market drivers and forecast the available market. Among our multi-client projects have been more than 25 studies of floating production systems. The floater reports have become a popular industry reference document and most major players in the floater sector are among our clients. Further information about IMA and our multi-client studies is available on our website:

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Mexican Rigs First to be Serviced by SLICE

An innovative design crew boat was recently launched by Lockheed Martin. Líder is the first of two SLICE Crew Transport Vessels (SCTV) the company is building for Hotelería y Servicios Petroleros, S. A. de C.V. (HSP) of México. HSP in conjunction with Consultoría y Servicios Petroleros, S.A. de C.V. (COSEPE) will operate the two vessels, under contract with Mexico's national oil company, Petróleos Mexicanos (PEMEX), to transport workers and limited cargo from Ciudad del Carmen to the Gulf of Mexico's Campeche Basin Oil Field, approximately 90 miles offshore.

Built at the FBMA shipyard in the Philippines, Líder and its sister ship, Tenaz, which is scheduled to be launched later this spring, feature Lockheed Martin's innovative SLICE design. The company first used this innovative design for a vessel it developed, built and tested for the United States Office of Naval Research. Based on Small Waterplane Area Twin Hull (SWATH) design, the SCTV hull form is designed to improve the operational efficiency and lower the costs for PEMEX by enabling Líder and Tenaz to operate faster in more challenging sea conditions and still provide a safer, more comfortable ride. Following the dock and sea trials over the next several months, Líder and Tenaz will be transported together to Mexico for final delivery to HSP this summer.

"Today, and even more so in the future, oil exploration and production demands support vessels to go farther from shore and into deeper waters, often exposing passengers to rougher seas and for longer periods of time. By incorporating the latest technological advancements in offshore marine crew transportation in decades, Líder and Tenaz will enable HSP to better serve PEMEX by providing safer, more cost-effective, swifter and more comfortable transportation." said Carlos Alfaro, chief executive officer of HSP. "We are extremely pleased to launch Líder," said Dave Broadbent, vice president and general manager of Lockheed Martin's Littoral Ships & Systems line of business. "Not only are we on budget and on time for delivery later this year, but we are providing HSP with an innovative vessel that meets the demanding needs of the offshore industry. The faster, smoother ride of Líder and Tenaz will enable workers to arrive sooner, healthier and ready to work." The development of the detailed engineering and construction work for Líder and Tenaz took place in Baltimore, Md.; Sunnyvale, Calif.; Cebu, Philippines; and Southampton, U.K. In 2004, Lockheed Martin was awarded a contract for more than $25 million to perform detailed design, construction, test and delivery of two Small Waterplane Area Twin Hull (SWATH). Awarded by Hoteleria y Servicios Petroleros, S. A. de C.V. (HSP), the crew transport vessels will provide service to Mexico's national oil company, PEMEX. The two SWATH crew transport vessels will safely and swiftly transport people and limited cargo from Ciudad del Carmen to the Campeche Basin Oil Field 90 miles offshore. HSP will operate the two Lockheed Martin SWATH crew transport vessels for PEMEX for five years after delivery. The Lockheed Martin design is based on its SLICE Small Waterplane Area hull form.

Main Particulars

Length, o.a.	93 ft. (28 m)
Beam	53 ft. (16 m)
Draft	10 ft. (3 m)
Full load displacement	184 long tons
Passengers	150
Crew	6
Main engines	2 x Cummins KTA-50 @ 3,600 bhp
Propellers	2 x CPP

Circle 16 on Reader Service Card

Ulstein Design Wins Big in China

Bourbon signed a contract with Zhejiang Shipbuilding Co. in China for the construction of four Ulstein P105 platform supply vessels (PSVs). The vessels are scheduled to be delivered between September 2007 and September 2008. Bourbon has already taken delivery of two type Ulstein P105 vessels from Ulstein Verft. "We have decided to contract four additional equivalent vessels because of the market's response to those vessels and our positive experience with them," said Trond Myklebust, managing director of Bourbon Offshore Norway. "The (Chinese) yard has proved to us that it can build sophisticated vessels with diesel electric propulsion and DP2. This experience was absolutely vital vis-à-vis this new project," said Myklebust.

Sembawang Wins Historic FPSO Conversion Contract

Sembawang Shipyard won a $53.5 million contract from Bergesen Worldwide Offshore to convert the Ultra Large Crude Carrier, BW Enterprise to an FPSO (Floating, Production, Storage & Offloading). Bergesen Worldwide Offshore will own and operate the FPSO in the Gulf of Mexico under a 15-year term agreement with Pemex. This is the first FPSO to be deployed in the Gulf of Mexico and will serve as a hub in the area and act as an export terminal.

The contract calls for the 360,000-dwt tanker to be converted into an FPSO with 600,000-bpd handling inclusive of 200,000-bpd processing capacity with gas export capability. The shipyard will carry out detailed engineering, procurement of bulk materials, vessel's repair and conversion, installation of topside modules and the internal turret as well as pre-commissioning work. Major conversion and upgrading work include the coating of all tanks slop and ballast tanks, installation of various systems and equipment such as a new and modified cargo system, submerged pumps in tanks and a new ring main fire water system. The accommodation will also be upgraded and refurbished to house 110 persons. The shipyard will install all the pre-assembled topside modules including the process plant with capacity of 200,000-bpd oil, gas compression module with capacity of 120 MMSCFD and a flare system. Upon completion, the FPSO will have the third largest oil production capacity of the existing FPSO units in the world as well as having the largest throughput of oil of any FPSO unit.

The vessel is scheduled for delivery in the fourth quarter of 2006. On completion, the facility will be stationed at the Ku- Maloob-Zaap field in Mexico's Bay of Campeche, located 105 km northwest of Ciudad del Carmen.

"As part of the project strategy, Sembawang Shipyard was selected by Bergesen Worldwide Offshore to be our partner shipyard during the challenging tender process," said Svein Moxnes Harfjeld, CEO of Bergesen Worldwide Offshore. "The shipyard has demonstrated its ability to work in tandem with us right from the project's initial phase, showing dedication and commitment to resolve challenges as a team. We are confident that this partnership will be the blueprint of a successful conversion project and we thank the shipyard for their enthusiastic and spirited effort thus far. Besides being a large and complex conversion, it is a fast track project. The way ahead will be challenging and both partners are committed to make this project yet another FPSO delivered on time from Bergesen."

Chevron Affiliate Signs Contract with Kongsberg

Star Deep Water Petroleum Limited, an affiliate of Chevron Corporation has awarded Kongsberg Maritime a contract for performing a Cargo Off-loading Dynamic Simulation Study, for the Agbami Project in Nigeria.

Kongsberg Maritime will establish an offloading and export dynamic simulator model based upon the current marine and offloading system specification. The model will be used to evaluate the offloading and export system design and it will be configured by use of the Kongsberg Maritime dynamic process simulation tool, called ASSETT.

Agbami Field, located in 1500 m water depth, is about 112 km offshore Nigeria. It is spread across two blocks, OMLs 127 & 128. A 300 m newly built FPSO vessel will be used to produce the field. The vessel will have processing capability for 250,000 b/d oil, 450 MMcf/d gas and storage of 2.15 million barrels. Topsides will weigh 38,000 tonnes. The field will be developed via 38 subsea production, gas injection and water injection wells.

Rowan Reports Record Quarter

For the three months ended December 31, 2005, Rowan Companies, Inc. generated income from continuing operations of $69.5 million, compared to $16.4 million in the same period of 2004. Revenues were a record $317.4 million in the fourth quarter of 2005, compared to $190.7 million in the fourth quarter of 2004. The current period results included gains on asset sales and insurance recoveries in excess of hurricane losses that together contributed approximately 14 cents per share, net of tax. The company generated income from continuing operations of $217.8 million, or $1.97 per share, on revenues of $1.07 billion during the year ended December 31, 2005, compared to income from continuing operations of $27.5 million, or 26 cents per share, on revenues of $679.7 million during 2004. Net income was $229.8 million, or $2.08 per share, in 2005, compared to a net loss of $1.3 million, or 1 cent per share, in 2004.

Rowan's offshore rig utilization decreased to 93 percent during the fourth quarter of 2005, from 99 percent during the comparable 2004 period, as three rigs entered the shipyard in December in preparation for their relocation to Saudi Arabia.

The company's average Gulf of Mexico day rate was a record $92,100 during the fourth quarter of 2005, up $17,700 from the third quarter of 2005 and up $41,400 from the fourth quarter of 2004. As previously reported, during Hurricanes Katrina and Rita, Rowan lost four jack-up rigs and had one jack-up severely damaged. During the fourth quarter, the company recognized the excess of insurance proceeds received over the carrying value of the lost equipment of approximately $23 million.

The company experienced 71 fewer rig operating days in December as a result of shipyard modifications made to three rigs contracted to Saudi Aramco prior to their January 2006 departure for Saudi Arabia. Rowan will receive $44.7 million in fees for shipyard time, modifications and mobilization of the three rigs.

"Our drilling and manufacturing businesses continue to reach new heights and our near-term outlook remains very favorable," said Danny McNease, Chairman and CEO. "Our drilling fleet is effectively fully utilized and our backlog of contracts continues to grow. Nine of our 20 offshore rigs currently have commitments that extend into 2007 or beyond, and we are aggressively pursuing additional long-term drilling assignments at favorable rates. Rowan's average offshore day rate worldwide is currently around $134,000 or more than 28 percent higher than our average during the fourth quarter. Absent a significant change in market fundamentals, we believe that the global competition for quality rigs will intensify in 2006 and that the upward pressure on day rates will continue."

BP Selects Telenor for Global Communications

Telenor Satellite Services signed a three-year communications agreement with British Petroleum (BP) for global broadband services over satellite. The two-part agreement, including Telenor land-based and Sealink at-sea broadband communications services, is one of the largest of its kind in terms of numbers of sites, vessels and systems included. The contract establishes the terms and conditions for upgrading the communications systems of ships and production facilities, as determined by BP, and has the potential of providing cost-efficient and highly reliable very small aperture terminal (VSAT) equipment and services to BP's entire fleet, which will surpass 80 deep sea vessels by the end of 2006, and several offshore rigs and land-based production facilities. Approximately 20 vessels are slated to have Telenor's Sealink services by the end of 2006. The pact with Telenor is part of BP's modernization and fleet expansion program. As part of this program, BP is providing all of the company's vessels and production facilities with state-of-the-art, always-on voice and data communications for business operations as well as for crew morale and welfare. Incorporating a variety of global satellite communications technologies, satellite systems, and commercially available equipment, Telenor will deliver a wide range of broadband solutions that operate using fixed installation and transportable very small aperture terminal (VSAT) equipment for BP's ships and facilities at speeds up to 2 megabits per second and beyond.

Telenor will use its teleport facilities in Norway and the U.S. to support this global communications agreement with British Petroleum.

Kongsberg Wins Offshore Contracts

Kongsberg Maritime won a contract to deliver integrated control systems for safety and automation to the floating production vessel being used to operate BP Norge's Skarv and Idun fields on the Haltenbanken. The field is scheduled to come online in 2010 for oil and gas production. The contract initially covers a FEED (Front End Engineering and Design) study conducted jointly with BP Norge and Aker Kværner, where Kongsberg Maritime will be responsible for the safety and automation systems (SAS). The study is part of the material to be submitted for final approval by the authorities in spring 2007. Kongsberg contract will potentially have a duration of five years.

GOM Lease Sales Up 38 Percent

Near record oil and gas prices led to robust bidding in an offshore federal lease sale recently. The Central Gulf of Mexico Lease Sale 198, garnered $588,309,791 in high bids from 82 companies for oil and natural gas leases in the Federal waters of the Gulf of Mexico. The total of all bids was $978,310,887. This represents a 38 percent increase over last years Central Gulf Sale. The sale was held in New Orleans and conducted by the Minerals Management Service. In Sale 198 the agency received 707 bids on 405 tracts. Johnnie Burton, Director of the Minerals Management Service, spoke briefly at the sale. "The Department is committed to working with all interested parties to enhance energy development in an environmentally responsible manner in available areas of the Gulf," she said. In this sale, 4040 blocks comprising approximately 21.3 million acres offshore Alabama, Louisiana, and Mississippi were offered.

While interest in deep water production continues, the large number of tracts receiving bids in shallow water is of particular note, indicating industry interest in deep gas in shallow waters, as well as deep water oil and gas production. Amerada Hess Corporation submitted the highest bid on Green Canyon Block 287 for $42,789,994. Newfield Exploration Company and Anadarko Petroleum Corporation submitted the second highest bid on Green Canyon Block 551 for $33,989,760. Each of the high bids on a block will go through an evaluation process to ensure the public receives fair market value before a lease is awarded.

Top 5 Companies by Number of High Bids:

Company	Total High Bids	Sum of High Bids
BP Exploration & Production Inc.	73	$22,276,118
BHP Billiton Petroleum Inc.	26	$7,661,284
Hunt Oil Company	23	$10,943,280
Dominion Exploration & Production Inc.	16	$41,417,099
Hydro Gulf of Mexico, L.L.C.	14	$20,117, 740

Top 5 Companies by Amount of High Bids:

Company	Total High Bids	Sum of High Bids
Amerada Hess Corporation	13	$62,593,922
Woodside Energy (USA) Inc.	12	$47,162,990
Dominion Exploration & Production Inc.	16	$41,417,099
Newfield Exploration Company	6	$32, 208,909
Samson Offshore Company	10	$27,109,326

Keppel Wins $270M GlobalSantaFe Contract

Keppel FELS Ltd won a contract with GlobalSantaFe Corporation (GSF) to build an ultra-deepwater drilling rig for $270 million. GSF will supply the drilling and sub-sea equipment while Keppel FELS provides the design, engineering and construction of the hull as well as the accommodation quarters for 180 and marine equipment. The rig, to be named the GSF Development Driller III, is scheduled for delivery in the first quarter of 2009. The semisubmersible will be built to the proprietary design, DSS-51, jointly designed and developed by Keppel's Deepwater Technology Group (DTG) and Marine Structure Consultants (MSC). According to ODS-Petrodata's 12-monthly rolling forecast between February 2006 and January 2007, the demand for semisubmersibles is expected to rise from 141 to 167 units while the marketed supply remains inelastic from 152 to 153. Even as utilization levels approach full capacity, global demand for the mobile offshore drilling units shows no sign of slowing down. The DSS-51 rig is designed to be maintenance-friendly with safety features suited for both exploration and development drilling.

Golar to Build LNG Floating Storage and Regasification Unit

Golar LNG Ltd. signed a $55.6 million contract with Keppel Shipyard for what is being billed as the first ever conversion of an existing LNG carrier into a LNG Floating Storage and Regasification Unit (FSRU). Moss Maritime of Norway has prepared the conceptual specification for the FSRU and will carry out the design and engineering. When the conversion is completed in the second quarter of 2007, it will be the first of its type in the world.

Golar LNG will work with Keppel Shipyard in the engineering, procurement and construction for the project. The scope of work includes installation of new forward turret, side-by-side mooring system, LNG loading arms, aft thruster with compartment, a regasification plant and replacement of cargo pumps. There is also upgrading of the existing steam power electrical and marine systems.

"Golar LNG has been developing this Floating Energy Solution as part of our strategy to diversify into other parts of the LNG value chain," said Graeme McDonald, group technical director of Golar LNG. "It is our belief that no other system can compete with this concept in terms of timing or pricing when satisfying early or extra demand for gas. Our market survey has discovered several specific opportunities for the FSRU, however no fixed employment contract has been signed. The relative pricing differential between LNG and oil and the increased overall energy demand in

Principal Dimensions
Vessel type . .Existing LNG Carrier of Moss design
Owner . . . . . .Golar LNG
Built 1981
Length, o.a. . . . . .289 m
Breadth molded . . . . . .44.6 m
Depth molded . . . . . .25 m
Design draft . . . . . .11.4 m
Draft scantling . . . . . .12.52 m
Water depth . . . . . .50 - 150 m
Complement . . . . . .44 persons
Capacity . .129, 000 cu. m. at -163 °C, 100% filling

Performance
Gas send-out . . . . . .240 tons/hr.
Time for berthing, loading and unberthing .24 hours

Capacities
Cargo tanks (100% at -163 °C) 129,000 cu. m.

Gas send-out
Tons/h 231
M MTPA 2.02
M MSCFD 283
BSCMPA 2.75

Gas send-out can be increased by increasing the onboard vaporization capacity.)

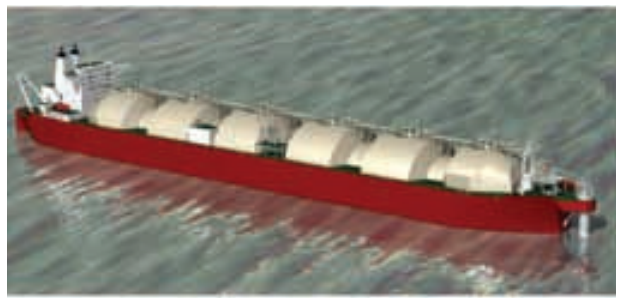
Cargo Containment System . . . . . .Cargo tanks, ...type MOSS spherical type, IMO class B
Number of tanks 5
Internal diameter . . . . . .Tank 1 - 35.50 m . . . . . .Tank 2, 3, 4, & 5 - 37.1 m
Tank volume . . . . . .129,000 cu. m.
Material . . . . . .Aluminum 5083-O
Max. cargo density . . . . . .500 kg/cu. m.
Max. filling ratio . . . . . .99.5% at reference temp.
Insulation material . . . . . .Polystyrene

Cargo Handling System
In-tank cargo pumps . . . . . .1,100 cu. m./hr. - . . . . . .5 sets, 1,400 cu. m./hr. - 5 sets
Spray pumps . . . . . .50 cu. m./hr., 50mth - 2 sets
HD Compressors . . . . . .27,000 cu. m./hr. - 2 sets
LD Compressors . . . . . .6,700 cu. m./hr. - 1 set
LNG vapor heater . . . . . .2,200 MJ/h . . . . . .(7,000 kg/h vapor) - 2 sets
LNG vaporizer . . . . . .7,500 MJ/h . . . . . .(8,800 kg/h LNG) - 1 sets
LNG loading arms . .16 in. - 2 sets on starboard side
Vapor loading arm . . .16 in. - 1 set on starboard side
Inert gas plant . . . . . .5,000 cu. m./hr.
Nitrogen plant . . . . . .60 Ncu. m./hr. - 2 sets
LNG booster pumps . . . . . .267 cu. m./hr., ...1,980 mlc, - 3 sets
LNG Export vaporizers80,000 - 150,000 kg/h - 4 sets

* Two (2) flexible risers are assumed for gas send-out.

Typical calculations for send-out pipeline
Pipe inlet pressure . . . . . .85 bar
Volume flow rate . . . . . .2,750 cu. m./hr.
Pipeline nominal diameter . . . . . .400 mm
Pipeline inner diameter . . . . . .380 mm
Pressure drop per km . . . . . .0.60 bar/km

developing nations gives us some very interesting opportunities. Calculations completed for potential clients show that the Golar terminal can be available approximately three years ahead of a conventional land based terminal and that the annual savings in overall energy production cost can be more than $50 million." Keppel Shipyard has a record of repairing 71 vessels of Moss Rosenberg type LNG vessel. The largest LNG repair yard outside Japan, Keppel has also completed 54 FPSO/ FSO conversion projects to date. The proposed LNG terminal is a steel mono hull with Moss LNG tanks arranged in the middle, with the re-gasification plant in the forward section and crew facilities with control room and utility machinery in the aft section. The LNG offloading tankers will be moored in a side-by-side configuration with the FSRU for efficient replenishment of the terminal. The FSRU will be stationed offshore and, through a subsea pipeline, will be capable of a throughput of 2.75 BSCM per annum at variable gas send out pressures up to 85 bar. The FSRU is to be permanently moored offshore with a 20-year life expectancy, and will export gas to shore through a sub sea pipeline. The proposed terminal is a steel monohull with six Moss LNG tanks arranged in



the middle — with an LNG storage capacity of 129,000 cu. m. — regasification plant in the forward end and crew facilities, control room and utility machinery in the aft end. The terminal will be permanently moored to the seabed with a turret mooring arrangement, and the gas send-out line is arranged through the turret down to the seabed and to shore via a seabed pipeline. The LNG tankers offloading to the floating terminal will be moored in a side-by-side configuration. Berthing, loading and unberthing will take approximately 24 hours.

The turret is to be connected in the forward part of the ship resulting in the need for modification of the bow area. The turret will be configured to provide an essential non-rotating platform for supporting the anchor lines, flexible risers and associated control/service lines. The turret will be equipped with a turntable which allows 360 degrees continuous rotation of the FSRU.

The terminal will allow safe berthing of standard LNG carriers, and there will be no need for modification of the LNG carriers discharging at the terminal. Assuming that the terminal is being serviced by LNG carriers ranging in size from 125,000 to 137,000 cu. m., the arrival schedule will be about every nine days. The side-by-side mooring system shall consist of: primary and secondary fenders; nylon mooring lines, connected to the wire part of the LNG carrier line by special mooring shackles; roller fairleads, for guiding the nylon lines as required; and hydraulic quick release hooks with integrated capstan and adjustable release load.

The terminal will be fitted with an azimuth thruster, for control of the terminal during LNG carrier berthing/unberthing. The approach and berthing operation on the LNG carrier will take place in a way very similar to that currently being used for onshore terminals. During berthing the cargo tanker will need the assistance from two tugs with minimum 50 tons bollard pull. After berthing a combination of transverse mooring lines and spring lines will be used to limit horizontal relative motions.

The FSRU will be provided with standard loading arms to allow side-by-side transfer of LNG and vapor return. The FSRU shall be equipped with three 16-in. loading arms; two for LNG and one for vapor return. Operation with two LNG arms will ensure a loading time of 16 hours. Berthing, loading and unberthing will take approximately 24 hours. The loading arms will be quite similar to the type that is used on onshore terminals however modified to account of relative motions between carrier and FSRU.

The FSRU will also be fitted with equipment for guiding the arms onto the carrier's connection flanges.

This pre-coupling guide operation will be necessary to compensate for relative motion during coupling when the relative motion exceeds +/- 0.5m.

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- **Fuel Line Repairs**
- **Riser Exhaust**
- **Live Leak Repair**
- **Sets in only 30 minutes**
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Donation Helps Fund LNG Training

SUNY Maritime College received a corporate donation of $10,000 from ConocoPhillips Marine to advance Maritime's Liquefied Natural Gas (LNG) training and educational program. Maritime will make upgrades to its liquid cargo simulator, increase the number of student stations within the simulator and purchase software for use in LNG tanker simulations. The program will also be expanded to include product tanker and crude oil tanker operations and training.

Anthony Palmiotti '79, acting chairman of the department of marine transportation (MT) and director of continuing education says this donation is significant "for it provides the seed money we need to develop LNG training and curriculum for our undergraduates, as well as for our adult continuing education students."

A target date of fall, 2006 is slated to launch the program. Captain George P. McShea, Jr., fleet manager, LNG operations for ConocoPhillips in Houston said that "the shortage of qualified LNG mariners due to the rapid expansion globally of the LNG shipping industry, prompted our company to make this philanthropic investment at Maritime. We want to ensure that American mariners are a viable option to meet ConocoPhillips' future mariner needs as our LNG shipping ventures increase around the world."

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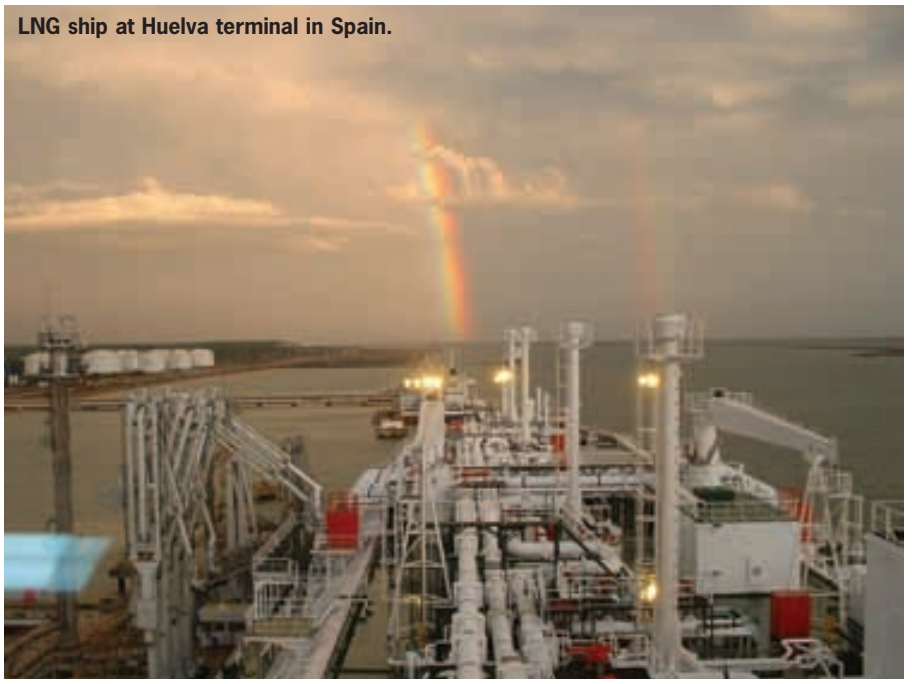
High Prices Drive Emerging LNG Technologies

By Tony Bingham, Global LNG Business Manager, Lloyd's Register

The demand for energy around the world is growing at a staggering pace, with a 60% rise in energy demand projected between the turn of the century and 2025. The importance of natural gas as an energy source is also expected to grow significantly, to nearly 30% of the world's primary energy supply by 2025.

Natural gas often needs to travel a great distance from the point of production to the point of consumption. The efficient and effective movement of natural gas requires an extensive and elaborate transportation system consisting of a complex network of pipelines, process facilities and terminals. Each of these has been designed to transport natural gas quickly and efficiently from its origin to areas of demand.

Currently, the maritime transport of liquefied natural gas (LNG) is the most cost-effective method of moving large quantities of gas, despite the need to convert natural gas to its liquefied form and back again at either end of the journey. The liquefaction and regasification plant required impose capital costs on the gas chain, impacting on the final cost of gas to the consumer. Much of the development in the industry is therefore focused on improving the efficiency of LNG shipping, and developments such as the large-scale exploitation of the Qatari LNG fields are making new LNG ship technologies economically viable for the first time.



LNG ship at Huelva terminal in Spain.

Alternative propulsion

One of the key areas of focus in improving the efficiency of LNG transportation has been the investigation and, in some cases, implementation of alternative methods of LNG ship propulsion.

To date, machinery selection has been driven by the fact that LNG ships must deal with boil-off gas from the cargo in an economic and environmentally friendly manner. As it is not desirable to vent the methane to the atmosphere, the rules governing LNG ships have evolved to permit the boil-off gas to propel the ship.

Until recently, only boilers had been used for burning the boil-off gas on LNG carriers. However, there are now designs for the next generation of large LNG carriers of over 200,000 cu metre cargo capacity, which utilise the boil-off gas in gas-fired diesel main engines. The fuel economy of the latest slow- and medium-speed diesel engines means that they can be considered an attractive alternative to traditional steam turbine propulsion.

Combined Cycle Propulsion

The high thermal efficiency of combined cycle propulsion makes it a popular choice for land-based power generation. This may also make it attractive for some marine applications, although the plant required is fairly complex and costly. The combined cycle plant consists of a gas turbine and a steam turbine. The steam is generated from the exhaust gas from the gas turbine, using an exhaust gas boiler. It is this heat recovery which makes the combined cycle more efficient. The rotational energy from both turbines could be used directly (via a gearbox) to propel the vessel. Alternatively, the turbines could be used as generators, in which case the vessel would be propelled via electric motors.

Dual-fuel Propulsion

The dual-fuel engine is capable of burning both conventional or heavy fuel oil and gas fuel with oil fuel pilot injection. It is capable of changing over between the two modes of operation when required. During the gas operation mode, gas is introduced into the engine cylinder either during the air suction cycle at low pressure, or injected directly into the cylinder at high pressure during the compression cycle. The gas injection sub-system is normally located directly on the engine, and its basic function is to provide timely and accurate delivery of the gas fuel into the cylinder. In the low-pressure system, gas is delivered through an electronically actuated control valve to the engine air inlet ducting. In the high-pressure system, gas is injected directly into the combustion chamber, usually through an electro-hydraulically controlled injection valve. Dual fuel has become both attractive and viable due to the concurrent development of electronically controlled propulsion systems. The dual-

fuel options currently being proposed and adopted use electric power generation to drive electric propulsion systems such as conventional propellers driven by electric motors.

Diesel Electric Propulsion

Diesel electric propulsion systems are considered attractive because they command higher power density than steam turbines and, as a result, provide more flexibility in terms of machinery arrangements, allowing designers to obtain more overall cargo capacity. The high efficiency of dual fuel, combined with its low fuel consumption, further gives owners and operators the opportunity to reduce their operating costs and increase their earnings. Electronically controlled dual-fuel engines also give off less carbon dioxide emissions than steam turbine plant, making them a more environmentally friendly choice. Finally, the ability of dual-fuel engines to operate on gas or on liquid fuel provides increased operational flexibility to support the varying demands of the ship's operating schedule. The use of methane in diesel engines means that the ships can now be propelled by diesel electric systems. These systems usually consist of a number of generators forming one common supply, both for propulsion and general ship use. The main advantages of diesel electric propulsion are the low noise and vibration levels compared to slow-speed diesels, improved fuel consumption compared to steam turbines and flexibility with respect to the engine room layout. The disadvantages are the low power-to-weight ratio and inherent inefficiency compared to a diesel engine propulsion system.

The Reliquefaction Alternative

Reliquefaction is a method of converting boil-off gas back into LNG and returning it to the cargo tank. In this way, the volume of LNG loaded at the loading port is the same as the volume discharged at the receiving terminal. When fitting a reliquefaction plant, a minimum of two of each of the major items of equipment are to be provided to allow the boil-off from stored cargo to be reliquefied without the need to 'flare' cargo with any one major item of equipment out of action. However, the requirement to provide a complete standby unit may be waived provided there is the ability for boil-off gas to be 'flared', burnt in a thermal oxidizer, in the event of a breakdown.

Alternatives to LNG

Although the growth of LNG shipping currently appears unbounded, it is possible that in the future, alternative methods of transport and gas conversion may become both necessary and economically viable.

Gas by Wire

One option being considered by the industry is the 'gas by wire' solution.

Gas by wire uses locally generated DC current transmitted over long distances and converted ashore for AC use. Developments in capability and cost reduction have resulted from developments in semiconductors and insulating materials which, in turn, have contributed to the possibility of energy levels equivalent to 10 billion cubic meters of gas being economically transported over distances of 3,000 km and beyond. Further research has shown that sub-sea high voltage cable capable of transmitting up to 500 MW can be safely installed. Despite the promise of this

solution, the number of suitable gas fields around the world which would make this solution viable has, to date, been found to be limited.

Compressed Natural Gas

Compressed Natural Gas (CNG) offers some advantages over LNG, as it immediately removes the need for liquefaction, regasification and the complex materials needed to contain cryogenic fluids. However, the high pressures involved in storing the gas result in thick-walled pressure vessels which add significantly to the ship's lightweight and to the project cost. In the CNG scenario, it is the cost of the ships that will comprise up to 80% of the project capital cost. The subject of gas handling on CNG ships is an area which needs to be considered carefully. With potential loading pressures in excess of 300 bar, the systems and procedures put in place need to carefully consider and account for the risks involved. Failure of a compressed gas containment system during the early years of CNG development would not only slow down progress; it could effectively put an end to the concept. The cyclic high pressures involved will almost certainly create fatigue issues in all areas of the system and adequate and reliable data on the performance of the cargo handling systems will be required to ensure that effective maintenance programs are used to prevent sudden failure of a component of the CNG system. The fatigue analysis of any proposed system will need to be carefully examined by a regulatory body to ensure a satisfactory level of confidence can be achieved.

Many of the proposed designs envisage offshore loading/unloading and hence the mooring of the vessels and the manifold connections need to be considered for harsh environments. The operating envelope of the entire system will need to be considered carefully to maximise the time a tanker can spend alongside loading and discharging.

The interface between the ship and the loading and receiving terminal will also need to be documented to achieve the desired level of safety.

Drawing from the LNG industry, there will need to be adequate arrangements for communication, emergency shutdown procedures, fire fighting and emergency departure. In this respect, it would be an effective way forward for the industry to identify a uniform coupling arrangement to ensure flexibility in the system, allowing any ship to connect to the loading and discharging facility without the need for major rework of the available facilities.

The gas industry has always been an innovative one, resulting in one of the most high-technology and safest sectors of the shipping industry. LNG shipping will continue for some time to be the preferred method of transport, and the future will be the largest LNG ships ever seen, of over 250,000 cu metre cargo capacity, employing new technologies and plying new trades.

While there are still plenty of opportunities for LNG ships, alternative forms of gas transportation will start to emerge while gas prices remain high. New methods of getting the gas to market will complement the demands for LNG tonnage.

LNG Solutions Group Launches First Service

Det Norske Veritas (DNV), Sutherland Asbill & Brennan LLP, and Ziff Energy Group have formed the LNG Solutions Group to provide a range of integrated services for LNG stakeholders that face the opportunities and challenges of bringing natural gas supply to North America.

LNG Solutions Group members have served numerous key natural gas and LNG stakeholders, from the wellhead to the burner tip, such as AES, Alaska, BP, Chevron, Dominion, Duke, Enbridge, El Paso, ExxonMobil, Gas Metro, HydroQuebec, Iroquois Pipeline, Irving Marathon, Morgan Stanley, Rhode Island, Shell, Statoil, Tractebel, TransCanada and Williams.

From the top: **Paul Ziff**, CEO, Ziff Energy; and **Jake Dweck**, Sutherland Asbill & Brennan LLP.

"Our law firm often is asked to advise LNG clients about the business, market, operational and risk management implications of regulatory and contractual issues," said **Jake Dweck**, LNG Group chair of Sutherland Asbill & Brennan LLP. "With the LNG Solutions Group, we are now in a position to ensure that our clients receive the best integrated advice regarding every project or issue."

The LNG Solutions Group aims to provide comprehensive guidance and insight in the fast evolving LNG environment. "While the adequacy of LNG infrastructure here has been the focal point until recently, we now anticipate more than adequate North American regasification capacity, primarily in the Gulf of Mexico, supplemented by strategic facilities in Mexico and Canada feeding nearby US markets," said **Paul Ziff**, CEO of the Ziff Energy Group. "The major challenge for the U.S. today involves the timing and availability of liquefaction sources abroad, including the anticipated supply draw and price competition from European and Asia Pacific markets. Other factors affecting the US market include the newly announced deal for Alaskan gas, the fits and starts of the emerging global short-term and spot trade, and continuing interchangeability concerns."

Chinese Yards to Build More LNG Tankers

Chinese shipbuilders are gearing up to build liquefied natural gas (LNG) tankers as the government approves more projects to import the fuel.

China's first home-built LNG tanker will be completed in November by Shanghai's Hudong-Zhonghua Shipbuilding Company, which has orders for three more at about $200 million apiece.

Teekay Pursues FPSO Projects

Teekay Shipping announced an agreement with PGS Production AS to form a joint venture company called Teekay Petrojarl Offshore that will focus on pursuing opportunities in the market for Mobile Production Solutions with emphasis on developing solutions through Floating Production Storage and Offloading (FPSO) units.

Offshore Success: Look to Norway

Multifunctional offshore construction vessel and anchor-handler Normand Installer, built by Ulstein Verft to a Vik-Sandvik design. The picture was taken before installation of the stern roller and stern A-frame.

By David Tinsley

If ever a country were to seek a template for maximizing the economic and technological benefits of an offshore energy resource across the industrial spectrum it would do well to examine the Norwegian model. A prodigious output of designs, equipment and ships to support offshore production and exploration activities in very difficult environments provides just one example of the manner in which Norway's industry has advanced in concert with the tapping of oil and gas reserves in its adjacent waters. The particular demands of the national market have fostered a technological level and diversity that is finding ever-wider application overseas.

Through prudent recourse to hull construction in low wage cost areas of eastern Europe, coupled with productivity-related investments at home, the availability of key trade skills, and innovative, higher value-added design, Norwegian shipbuilders have remained pre-eminent in the more sophisticated types of offshore support vessel. The strength of the indigenous maritime cluster with regard to equipment, machinery, and systems has undoubtedly helped ensure critical mass, such that the west coast is dotted with premises turning out ships built to serve the evolving requirements of the offshore oil and gas industries.

The character of the sector is amply illustrated by recent completions such as the multifunctional deepwater construction vessel and anchor-handler Normand Installer. Built by Ulstein Verft to a design drawn up by Vik-Sandvik, she is truly state-of-the-art, combining a broad range of construction and installation competencies with a bollard pull capacity of some 275-tons. The measure of the Normand Installer, at nearly 124-m in length, may be gauged from her incorporation of two working decks, 4,300-ton deck load capacity, 250-ton pedestal crane, 350-ton stern A-frame, Class III dynamic positioning, ROVs (remote-operated vehicles), moonpool, helicopter deck, and the largest anchor-handling winch ever supplied by Rolls-Royce Marine.

Delivered into a joint venture of Norwegian support vessel specialist Solstad Shipping and Monaco-based Single Buoy Morrings (SBM), the diesel-electric Normand Installer has been despatched to duties off West

Africa. The vessel is equipped to install any of the various offshore systems designed and built by the SBM Group, including floating production, storage and offloading units (FPSOs), catenary anchor leg mooring buoys (CALMs), spread moorings, tension-leg platforms(TLPs) and semi-submersible units in deep and ultra-deep waters, as well as undertaking subsea work associated with the development and maintenance of deepwater fields.

Aker Yards' recently-secured contract from DOF for two large construction ships underscored both the group's increasingly prolific output of offshore support vessel tonnage, and the capability of Norwegian builders to meet the new challenges posed by the offshore industry's shift to deeper waters and requirement for more versatile and more complex support ships. The extensive construction program in hand at Aker's yards on the Norwegian west coast and

Aker OSCV 06L design of offshore construction vessel just ordered by DOFCON from Aker Yards.

abroad demonstrates an eclectic approach, since it involves designs from Vik-Sandvik, Skipsteknisk, Marin Teknikk and Rolls-Royce Marine's UT-Design, as well as Aker's own project division. DOF's order for construction vessels of 153-m and 138-m in length, respectively, will showcase in-house design skills. The larger ship for the owner's DOFCON subsidiary will use Aker's OSCV 06L blueprints, and feature a 400-ton offshore crane, DP Class III, ice class and an 18-knot maximum speed, while the other, somewhat shorter newbuild will be of the OSCV 06 design, with a 250-ton crane and DP Class III categorization.

While the bigger ship will come from the group's Soviknes premises, the OSCV 06 has been assigned to Aker Yards in Brazil, providing the internationally re-emergent Brazilian shipbuilding industry with a milestone reference in the offshore construction vessel field. Ulsteinvik-based Island Offshore is a comparatively young company which has emerged as one of the champions of innovative support ship design, responding both to its own reading of the market's unfolding requirements and to the needs of particularly discerning charterers such as Norwegian energy group Statoil. Current investment includes a number of vessels from Aker Yards employing Rolls-Royce UT designs and Det Norske Veritas' toughest environmental criteria, expressed in the society's Clean Design (CD) class notation criteria.

Island Offshore's UT767CD-type, 8,200-dwt newbuild Island Wellserver is scheduled to be delivered from Aker's Langsten yard in January 2008, and will take over responsibility for a contract with Statoil to provide light well intervention services on the Norwegian continental shelf.

Her range of tasks will include production logging, plugging and gauging operations, perforation, re-perforation and downhole mechanical work, and ROV operations. Among the tools of the trade embodied in the diesel-electric Island Wellserver will be a module han-

dling tower, heavy-duty deck crane and large working deck area to enable containerized tanks and equipment to be transported.

Well intervention and ROV activities translate into a substantial shipboard complement, such that accommodation will be provided in single staterooms for 95 personnel. Stringent Norwegian safety regulations have stipulated that two free-fall lifeboats must be carried on each side of the vessel.

Also equipped with diesel-electric power and propulsion, a pair of newbuilds of the UT787CD-type contracted by Island Offshore at Aker Langsten will each combine a deepwater anchor-handling capability with the strictest environmental class.

Offering a bollard-pull capacity of 230-tons, the design includes a moonpool and A-frame, and will allow the positioning of items of equipment of 150-tons at depths as great as 2,000-m. Precise placement of equipment and anchor spreads will benefit from onboard facilities for ROV inspection, and an integral hangar will accordingly be provided for a work-class ROV.

An impending 2006 entrant to the Norwegian fleet, a type UT712L anchor-handler contracted by Fosnavaag-based Olympic Shipping, features a host of new Rolls-Royce solutions, including improved deck working arrangements, DP2 dynamic positioning, V-type Bergen main engines, and the seminal installation of a rim-drive electric tunnel thruster.

The 12,000-kW design has been configured and engineered to undertake mainstream duties in deepwater anchor-handling and towing, along with supply and standby work.

Her station-keeping and vessel motion properties are of an order that reflects the industry's most demanding stipulations. Rolls-Royce's endeavors in developing highly mechanized and comprehensive systems for handling ropes, wires, chains and shackles, which can be under great tension, have found new expression in Olympic's new ship, which is taking final shape at Aker's Soviknes yard. She has been specified with the equipment supplier's Safer Deck Operation package, embracing cranes and manipulators, towing pins, shark jaw, centering system and pennant wire coiler.

The UT712L newbuild will provide an early reference for the powerful Bergen B32:40V12P long-stroke, medium-speed engine. The installation comprises two such engines, driving twin, nozzled propellers, to give an anticipated bollard pull of some 180-tons, and an economic free-running speed in the range of 13-15 knots. The 883-kW swing-up azimuth thruster fitted forward will not only enhance station-keeping and maneuvering performance but also augment bollard pull, to give a maximum of approximately 190-tons.

Olympic Shipping is the first owner to apply Rolls-Royce rim drive technology in the shape of the RT1600 Kamewa Ulstein Rim Drive thruster. The 800-kW unit will be installed in the aft skeg, complementing a conventional tunnel thruster.

The owner was attracted by the promise of operational benefits in terms of improved overall efficiency, reduced noise and vibration, and easier servicing. The technology has been developed in Norway over a period of several years by Rolls-Royce in Ulsteinvik in collaboration with Smartmotor of Trondheim, and will be used for a widening range of rim tunnel thrusters and other types of propulsors.

Norway Ships: Offshore Activity Drives Business

The trend of the past few years towards an ever smaller Norwegian foreign going fleet, measured in dwt, has continued through the whole of 2005, according to the Norwegian Shipowner Associations most recent quarterly report. On January 1, 2006, the fleet totalled 37.1 million dwt. This was a decline of 0.6 million dwt since October 1. From January 1, 2005 the fleet has decreased by 3.8 million dwt (9.3 percent). The decline in the tonnage in the NIS-register was 12 percent over the past four quarters, however, throughout the last quarter of 2005 the tonnage in NIS only declined marginally.

While overall tonnage is on the decline, the picture is rosier in regards to the number of ships. During the fourth quarter of 2005 the number of ships in the Norwegian fleet increased by 22 to a total of 1,642. Over the past 12 months, the fleet increased by 28 ships. Over the past few years there has been an increased concentration on offshore service vessels. While the ships are small in tonnage, they are technically advanced and quite expensive.

Fifty-three percent of the ships in the foreign going fleet are now flying the Norwegian flag. This is a decline of four percentage points from a year earlier, continuing a trend that has persisted for some years. The number of Norwegian mobile offshore units increased by one to 57 during the fourth quarter of 2005. On January 1, 2006 the fleet consisted of 26 semi-submersibles, 14 floating production vessels, 10 tenders, 5 drillships and two jack-ups.

The high oil price continues to stimulate the activity both on the Norwegian shelf and in other offshore areas. If the oil price remains as high as the market for forward oil contracts suggests, the activity will probably increase further and remain high for several years. As of January 1, 2006 eight units were inactive - six of them undergoing maintenance or upgrading. One year earlier the number inactive was eight, including five that were laid up. The utilization rate for the Norwegian fleet was 86 percent as of January 1, 2006, while the corresponding utilization rate for the world fleet was 91 percent. Of the 49 active Norwegian mobile offshore units, 14 (29 percent) were employed on the Norwegian shelf; 11 (23 percent) were working offshore Africa; nine (18 percent) worked off Asia; seven (14 percent) worked in the U.K, sector, and the same number were in American waters. One worked outside Australia.

Building orders of ships for Norwegian account increased by 28 during the fourth quarter of 2005 to 212. Over the past four quarters the increase is 42 percent. In addition 20 mobile offshore units were on order as of January 1, an increase of one during the fourth quarter, and as much as 15 over the past four quarters. On January 1, Norwegian orders for mobile offshore units amounted to about one third of the world's order book. The largest category in number of ships on order was offshore service vessels, with 79 (67 as of October 1 2005). The other categories of ships on order are 40 chemical tankers (35), 29 gas tankers (21), 26 other dry cargo ships (26), 18 oil tankers (15), 15 bulk carriers (17), and five passenger vessels (3).

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Over the past quarter there has been a very strong increase in the total value of the ships and rigs on order, and on January 1, 2006 the total value was $14.5 billion. This is an increase of 140 percent since January 1 last year. This is partly due to a very strong increase in the value of rig orders. However, in the same period there has also been a strong increase of 77 percent in the value of ship on order. Norwegian yards accounted for the largest number of vessels on order, with 59 ships. This is an increase by 7 since October 1, 2005. One year ago Norwegian yards were ranked second with only 32 ships. On January 1, 2006 South Korea and China shared the second position with 32 ships each. Japan will deliver 30 ships and Spain 13. Poland will deliver 10 ships. Nine other countries will deliver 36 ships. The total of the twenty mobile offshore units on order will be delivered from yards in Asia.

Norwegian-owned foreign-going fleet - development (Ships over 100 gt)

	Norwegian flag						Foreign flag		Total	
		NOR		NIS		Total				
January 1	**No**	**Mill.dwt**	**No**	**Mill.dwt**	**No**	**Mill.dwt**	**No**	**Mill.dwt**	**No**	**Mill.dwt**
2000	283	4.1	757	30.2	1040	34.3	620	15.8	1660	50.1
2001	261	4.3	767	28.4	1028	32.7	702	17.3	1730	50.0
2002	240	3.7	775	29.4	1015	33.1	703	15.6	1718	48.7
2003	233	3.2	750	28.4	983	31.6	687	14.3	1670	45.9
2004	231	3.1	722	25.9	953	29.0	669	14.2	1622	43.2
2005	225	3.1	692	22.6	917	25,7	697	15,2	1614	40,9
2005 1/4	229	3.0	648	21.4	877	24.4	719	15.2	1596	39.6
2005 1/7	231	2.9	640	21.2	871	24.1	747	14.7	1618	38.8
2005 1/10	236	2.9	629	19.9	865	22.8	755	14.9	1620	37.7
2006 1/1	242	2.8	6291)	19.8	871	22.6	771	14.5	1642	37.1

1)Includes 55 foreign-owned vessels of 2.8 mill. dwt.

Norwegian-Owned Foreign-going Fleet
Average age of vessels
Weighted by gt

	Norwegian flag			Foreign	Total
January 1	NOR	NIS	Total	flag	
2000	10.1	13.6	13.2	14.2	13.5
2001	10.4	13.5	13.1	13.4	13.2
2002	10.3	13.9	13.5	13.4	13.4
2003	11.5	14.1	13.8	13.3	13.7
2004	11.7	14.5	14.2	13.0	13.8
2005	12.0	14.3	14.0	13.9	14.0
2006	11.6	14.7	14.3	13.5	13.9

Norwegian-owned mobile offshore units
By activity and flag

	Drilling		Accommodation		Total
	Nor.	For.	Nor.	For.	
January 1	flag	flag	flag	flag	
2001	13	33	2	7	55
2002	11	42	1	8	62
2003	8	40	1	9	58
2004	7	41	1	11	60
2005	7	40	1	11	59
2006	6	40	-	11	57

By type January 1, 2006

	Drilling	Accommodation	Total
Semi-submersibles	16	10	26
Jack-ups	1	1	2
Drillships	5	-	5
Floating production units	14	-	14
Tenders	10	-	10
Total	**46**	**11**	**57**

Ships on Order for Norwegian Account
Ships on Order January 1, 2006
By Type

	No	1000 dwt
Ships		
Passenger vessels	5	-143
Gas tankers	29	962
Chemical tankers	40	946
Oil tankers	18	1870
Bulk carriers	15	619
Other dry cargo vessels	26	482
Offshore service vessels	79	298
Total ships	**212**	**5177**
Mobile offshore units		
Jackups/semis/drillships	20	

New 7.5m Patrol Boat from Norway

A single UltraJet 305 waterjet propels the new Hemnes Mek Verksted Patrol Boat , a high performance patrol craft. The patrol boat has been developed from the Hemnes Mek Verksted range of aluminum craft, which have more than 25 years experience in international offshore support services.

The vessel is powered by a single Cummins 370B - diesel engine rated at 265 kW @ 3,000 rpm. During trials speeds of over 40 knots were recorded at 3,000 rpm, at a displacement of 2,7 tons.

The boat has been specially designed for anti terror surveillance of harbors, oil refineries and other vital installations along the Norwegian coastline. Originally it was designed for a crew of two, but the boat is now certified to

carry up to seven people. It is fitted with radar, depth sounder and electronic navigation as standard and can very easily be adapted for other purposes. The design features a deep V mono-hull that is surrounded by a foam-filled pontoon, making the boat virtually unsinkable while giving good stability and load carrying capabilities.

The robust aluminum hull and deck is a maintenance free structure with easy access to all areas for servicing, to ensure maintenance costs are minimal and a high degree of reliability is maintained.

Circle 14 on Reader Service Card

SES Signs New Contracts

Scandinavian Electric Systems AS (SES) in Bergen, Norway has secured orders for more than $30.2 million in 2005 for delivery of Diesel Electric Propulsion Systems to both Norwegian and International Shipowners. In December 2005 SES signed a $5.3 million contract with Volstad Maritime for delivery of the complete Diesel Electric System to a new ROV Offshore supply vessel with an option for an additional vessel.

The vessel design is ST-256 from Skipsteknisk AS and will be built at Fosen Mekaniske Verksted in Norway. This is SES' third contract with Volstad Maritime since 1998.

The SES delivery consists of the complete DE system comprising four generators with a total generated power of 14400 kVA, two main propulsion motors of 3,000 kW each with AFE converters, four thruster motors with converters, starters and switchboards.

Circle 15 on Reader Service Card

Daewoo Shipbuilding Wins $470M Order

Daewoo Shipbuilding & Marine Engineering has won a $470 million order to construct a drillship for the first time.

The order was placed on a turnkey basis by the world's largest offshore drilling contractor, Transocean of the United States. The drillship will be delivered by 2008 for energy giant Chevron Corp.'s oil and natural gas field in the Gulf of Mexico.

ZF Marine, LLC
3131 SW 42nd Street
Ft. Lauderdale, FL 33312
Phone 954-581-4040
Fax 954-581-4099

Circle 289 on Reader Service Card

Autoload 6: New Generation Software For Offshore Vessel Loading Computers

Offshore vessel operations are increasingly more complex. In particular, onboard cargo management including heavy crane operations requires tools for monitoring the vessel's stability and strength. Today, high speed computer systems are available to assist crew and management to meet operational requirements. Autoship Systems Corporation (ASC) with the effective system delivery process of Coastdesign Norway A/S (Coastdesign), offer offshore vessel companies a turnkey solution to loading computer requirements.

From the start, Autoship System Corporation has strived to adopt a simple, sophisticated philosophy for developing Autoload: the program must be simple to use, yet apply the most accurate mathematical analyses to all calculations. Therefore, a brief look at the Autoload screen is designed to provide the user with a quick and accurate picture of vessel's current stability status, loads and important margins. The user can then make critical decisions, while leaving the 3D model based mathematical complexity of the problem to the computer.

Today, this development philosophy has been maintained in the recent release of the new generation of Autoload, Autoload 6. One of the advanced yet simple to use new features in Autoload 6 is a cargo and crane handling module.

Autoload's cargo handling capability was first developed in response to large cargo vessel fleet's (Wallenius Wilhelmsen) cargo planning requirements. This particular version of Autoload includes a direct interface with the company's booking system, advanced stowing, port rotation, cargo tracking, etc.

The Autoload 6 Cargo/Crane Module

The Autoload 6 cargo and crane module was developed for vessels where deck cargo and crane lifts are critical for the vessel's stability. Thanks in a large part to the ASC CAD software development, the cargo and crane handling module has a powerful 3D graphical interface for cargo editing and visualization. The new graphical user interface permits the operator to edit the deck cargo and carry out crane operations in 2D and 3D graphical interfaces. The crane geometry and capacity, and cargo deck(s) are hard-coded in the 3D vessel model. Any movement of cargo or crane(s) updates the vessel's floating position and stability margins each time the mouse button is released. Even the weight of the crane boom itself is taken into account when moving the crane.

The operation is designed to be simple. The operator can simply drag and drop cargo onto the deck, drag the cargo inside the crane's operational range, left click the crane, select/hook the cargo, and move the crane with the mouse. The left mouse button controls the cranes topping and slewing angle, whereas the right button click moves/controls the knuckle jib angle (or telescope length).

The operator can create any cargo item, and place it on deck by use of a

drag and drop process. Any cargo item placed inside a crane's operation range can be hooked to the crane by a right click of the crane, followed by selecting the cargo. Dual lift is possible, as long as two cranes can reach the same cargo item.

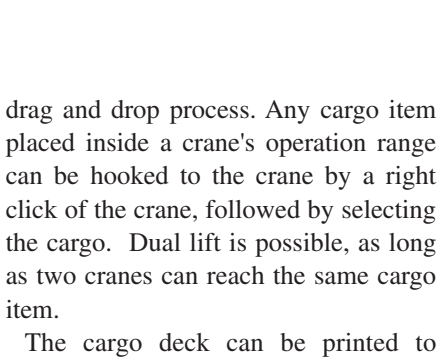
The cargo deck can be printed to report, showing the deck layout, correct cargo properties, and all cargo details (cargo manifest). Standard cargo shapes like 20- and 40-ft. containers are saved in a cargo shape library. The program user can add any new shapes to this library.

The program has many features that are designed to allow safe crane operation. Once a cargo item is hooked, the crane's operation range will be color coded. Green means that the lift is safe, red means that the crane is overloaded. In addition, the crane graphical user interface allows the operator to check the feasibility of the crane lift. Conflicts such as clearance to ship's side, height of cargo item versus height of boom, or clearance to any part of the vessel (or any other cargo on deck) are indicated. Finally, the operator can simulate a break in the crane cable simply by unhooking the crane load. The weight of hooked cargo will be removed, however the weight of the boom in correct position will be included in the calculation of floating status. The crane sequence window allows the crane operation to be planned in detail, step by step. Each step will record the position of all cargo, the crane(s) position and load, and the ballast water distribution.

The Autoload crane module handles crane types including telescope, knuckle jib, and A frame cranes.

The 3D Vessel Model

The vessel model, as the basis for all calculations, is 3D. It includes all volumes (tanks, holds, empty spaces, wind areas, etc). The 3D model allows first principle mathematical treatment. The result is a true simulation of any floating condition, including real shift of CG for slack tanks, wind heeling moment, and accurate damage simulation (loss of buoyancy method). In addition, with the



Autoload 6 screen layout with cargo module, as installed onboard Ulstein BN 271, Normand Installer, owned by Solstad Shipping. The main screen shows all the important parameters, including alarms. In the upper-right of the screen, the most important margins: to max allowable VCG, bending moment and shear force, are shown as green bars when within limits, changing to red when limits are exceeded. All graphical windows can be edited directly on screen. Release the mouse button and all images automatically update with the correct floating position and margins.

Normand Installer 3D vessel model. The model includes hull & appendages, all tanks, all voids and engine rooms (for damage), superstructure (for wind), cargo deck(s) and cranes.

vessel's cranes and cargo decks hard-coded into the same 3D vessel model, the operator has a unique tool for exact simulation of any critical vessel operation. The Autoload 3D vessel model is exactly the same model as used for calculations in approved stability booklets.

Vessel loading is a combination of input from tank sensors and manual input. Manual input includes tanks not online and manually entered (solid) loads.

When tanks are online, Autoload will load the model tanks precisely in accordance with sensor reading and vessel trim and heel.

A key feature of Autoload is the draft survey. In the Draft Dialogue, the user can compare Autoload calculated drafts with "real drafts" - obtained either from manually observed drafts or from draft sensors. A "constant weight", equal to the sum of unknown weights onboard, is determined from the difference between calculated drafts and real drafts. A draft survey report can be printed directly from the Draft Dialogue.

Circle 18 on Reader Service Card

Carbis Signs Agreement with Kanon

Carbis Inc. USA announced an agreement with Kanon Loading Equipment B.V. as its U.S. representative for the supply of Kanon Marine Loading Arms. Kanon has more than 25 years experience in the design and manufacture of Marine Loading systems and is Global leader in the industry. The Kanon loading systems are in operation for the widest range of liquid and gases, from cryogenic to high temperature applications, including the most hazardous and corrosive fluids. A wide range of standardized loading arm concepts can be offered. "Carbis has partnered with Kanon to bring their extensive knowledge and capabilities in Marine Loading arms to U.S. shores," said Pete Singleton the VP of Market Development for Carbis Inc.

Circle 6 on Reader Service Card

Hatlapa Helps Upgrade CSO Deep Blue

When the pipe layer CSO Deep Blue underwent a major dry-docking, modification work carried out by Hatlapa included the upgrading of the existing Hatlapa mooring system to allow spooling of pipe under extreme conditions. This work included: changing the rope drums from non split type to split type; hanging the original manually operated dog clutches to hydraulically controlled friction clutches; and converting the original manually operated spindle band brakes to hydraulically actuated band brakes; and upgrading the hydraulic power packs to provide high redundancy (including providing each winch unit with its own power supply).

Rapp Mareq Wins Contract for its Two Largest Winches Ever


Fugro's M/V Bucentaur, working off Brazil.

Rapp Mareq LLC (an affiliate of Rapp Hydema U.S.) marked a historic achievement early this year with the signing of a contract for the two largest winches in company history. Rapp's MHW-200 design for the larger winch handles 11,000 ft. of three-in. wire at nearly 300 tons line pull first layer. The second winch, Rapp's MHW-140 design accommodates 2.375-in. wire at nearly 200 tons line pull first layer. Both DNV-certified winches will be utilized in deep-sea ROV support and other operations, and will be delivered this year.

Rapp also won two other contracts with another international deepwater firm late last year. A first order in Houston was closely followed by another deepwater/ROV-related order with the Houston firm's Norwegian counterpart office.


Rapp deepwater designs, and a general drawing of the MHW-200.

Rapp winches for the first project are five-speed and designed to make pinpoint stops, with full loads, at great working depths. Rapp's own multi-motor gearboxes provide powering, so that if one motor fails, remaining ones can still operate the winch, albeit at a lower capacity. Rapp's module-based design allows for substitution of drums, drive units, and braking assemblies, allowing for adaptation to different applications-instead of purchase or rental of a different winch. Rapp's PTS Pentagon system, which is proven on VT Halter's NOAA FRV project, is also to be installed, and Rapp is providing enclosed Hydraulic Power Units (HPUs) for the winches.

Rapp Hydema U.S. chairman Tor S. Andersen said that "these deepwater contracts are quite significant, not only because of their high value, but because of the prestige and exposure that arises from projects of such breadth." He added that these orders will move Rapp toward first-time development of winches deploying sophisticated equipment for oil installations, at greater depths than ever before. Also of note, the Rapp winches are DNV-certified for lifting appliances.

Rapp Mareq LLC is a new affiliate of parent company Rapp Hydema U.S., headquartered in Seattle. Incorporated in 2003, the new firm is specifically tasked with development of the U.S. Gulf Coast market, and is increasingly active in the offshore oil and workboat industries. For this reason, a Houston office was opened in May 2005, and other local facilities are under consideration.

SPI/Mobile Pulley Works Climbing Back

In January 2003, Steel Processors, Inc. merged with SPI/Mobile Pulley Works, Inc. to form the present company, and in that same year purchased all of the assets of the old Mobile Pulley and Machine Works. This acquisition allowed SPI/Mobile Pulley to inherit 100 years of engineering and patterns. In November, 2004, SPI/Mobile Pulley Works, Inc. (SPI-MPW) moved its heavy machine and fabrication manufacturing business to Mobile at the site of the old Mobile Pulley at 905 South Ann Street. From its early beginnings in 1892, the old Mobile Pulley had an international reputation for quality and volume of production. When it ceased operations in 2003, Mobile Pulley closed its large foundry, once the world's largest producer of ball joints and a leading producer of individual castings.

SPI-MPW will be building a new fabrication department beginning in the near future, and the existing foundry is currently being refurbished and getting back into operation.

Navy Ship Superstructure Placed using SyncHoist

Only one crane was available for placing the 600-ton superstructure onto the hull of the Tenix, a multifunctional ship under construction for the New Zealand Navy. Merwede Shipyards was looking for an alternative to the traditional two-crane operation and it found Enerpac, which offered a solution that was the combination of a single floating crane plus Enerpac's hydraulic SyncHoist positioning system.

Lifting and positioning this superstructure to precise geometric tolerances in both the vertical and horizontal planes normally requires the use of two floating cranes. The superstructure was constructed of sheet steel and care had to be taken so that the structure would not deflect when it was lifted, otherwise unacceptable stresses could occur within the superstructure.

"The weight of the structure is no problem for a single crane. It's the volume that makes it awkward," said Johan van Vuuren, project manager at Merwede Shipyards. "You can compare it to lifting a flexible cardboard box. That's why we intended to lift the superstructure using two cranes."

The SyncHoist system, developed by Enerpac, allowed the load to be maneu-

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The bridge is positioned on the Tenix to a tolerance of 1 mm.

vered precisely using just a single crane. Furthermore, it is designed to keep the interplay of forces under tight control so that the risk of deflection and the consequent stresses can be reduced.

To be able to position the superstructure using the SyncHoist and one crane, a special hoisting frame was made. As Van Vuuren explained, "By using the lifting frame, we were able to keep all the parts that we had constructed intact."

A total of eight lifting points were used. Four of these were provided on two heavy-duty beams on the underside of the superstructure, with lifting cables that ran through the superstructure. The other four cables were attached to the outside of the superstructure to keep it properly balanced. The double-acting hydraulic (lifting) cylinders of the SyncHoist system were integrated into the four outermost cables. These cylinders allow both lifting and lowering corrections in each cable to be controlled precisely. These four cylinders, each with a capacity of 85 tons, were placed in the right position before the lift, so that a pre-loading was achieved. While lifting and positioning the superstructure, the interplay of forces in the cylinders, and the movements, are monitored by sensors and a computerized system, and corrected if necessary, to the predefined values.

Circle 2 on Reader Service Card

Techcrane for Vane Bunkering Barges

Techcrane installed two API monogrammed model F10-60 cranes for the handling of petroleum product for Vane Bunkering barges. Installed port and starboard, the cranes were customized for Vane to include a line payout system that is activated only under gross overload to prevent damage to the crane. Special brackets were mounted underneath the boom to handle product pipe, which prevents the product hose from chaffing. The barges were built at Trinity Marine shipyard in Tennessee.

Circle 5 on Reader Service Card

Lantec Winches

For more than 20 years, Lantec has produced winches with great success, offering each with a full two-year warranty. The Lantec Model 200 Hydraulic Planetary Winch includes a hydraulic gear motor, a spring applied and hydraulic pressure released multidisc brake with overrunning clutch, and two planetary gear reductions. The Model 200 is a power in/power out winch with equal speed in both directions. This winch offers line pulls to 45,000 lbs

The Lantec Model 750 Hydraulic Planetary Winch includes a hydraulic gear motor, a spring applied and hydraulic pressure released multidisc brake with overrunning clutch, and three planetary gear reductions. The Model 750 offers a line pull to 136,000 lbs., is fully hydraulic, with single lever control, and sports a fabricated steel cable drum and winch base.

Circle 9 on Reader Service Card

Markey Debuts New Electric Mooring Winches

Markey Machinery introduced a new line of low-cost Electric Mooring Winches. Its new DESM-series of mooring winches is designed specifically for the next generation of coastal and ocean-class general-purpose barges, ATB's, and short-haul barges, and

include features which simplify installation and long-term maintenance. Two models are available within the DESM-series, including:

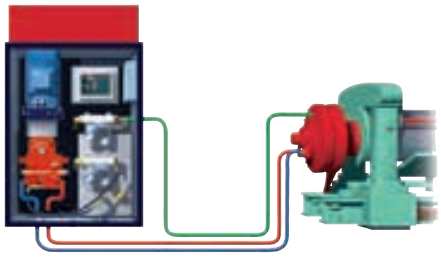
- DESM-18 single-drum mooring winch with hp electric-motor with a drum-capacity of 400 ft. of 1.125-in. line and a 60,000 lb. brake-capacity.
- DESMG-18R single-drum mooring winch featuring a warping-head, drum-clutch, and band-brake, with 20 hp electric-motor, available in both right-hand and left-hand configurations. This model also has a drum-capacity of 400 ft. of 1.125-in. line and a 60,000 lb. brake-capacity.

Circle 8 on Reader Service Card

Direct Hydraulic Drives for Deck Equipment

Hydraulic systems for deck equipment such as provided by Hagglunds eliminate gearboxes, and are designed for simplicity and better performance, as well as improved tension control and response. Weight and space is saved so the winches can be positioned better to suit the function and the safety of the crew. The power pack can be positioned anywhere, including below decks on smaller vessels, freeing up more space for deck operations. Lower noise levels are also evident and brakes are DNV approved. Power levels are optimized because a common pump can supply several functions and flow is directed to needed equipment only. A second pump provides standby facilities.

Circle 10 on Reader Service Card



Cruise Passenger Traffic Up 3.5 Percent in 2005

North American cruise passenger traffic increased by 3.5 percent in 2005, with more than 9.7 million passengers carried on 4,463 cruises by the 17 largest cruise lines, according to preliminary figures from the U.S. Maritime Administration (MarAd). Growth figures were lower than in recent years, due in part to last year's hurricanes, but occupancy rates remained high, reaching nearly 110 percent. (Note: A double stateroom with two passengers is considered 100 percent occupied. Since many double staterooms can accommodate three or four people, occupancy can be more than 100 percent.) Ports that escaped hurricane damage last year showed the most dramatic growth in 2005: Los Angeles departures rose 41.5 percent; Honolulu grew 37.9 percent; and Jacksonville increased 20.5 percent. Even Galveston, TX, which was temporarily closed due to Hurricane Rita, showed 22.5 percent growth during 2005. New Orleans had been showing strong growth in the first two quarters, with departures up 23.7 percent over the same period in 2004, but after the devastation of Hurricane Katrina, New Orleans experienced a 22.2 percent decline for the year. "The cruise industry's continued strength shows us how robust the American economy is," said Acting Maritime Administrator John Jamian. "In spite of the hurricane season, the industry keeps on growing. The Port of New Orleans will be back in the picture in a big way soon," added Jamian, noting that New Orleans expects to have most of its cruise business back by the end of this year.

North American Cruise Statistics, 2003-2005

Year	Cruises	Passengers	Normal Capacity	Occupancy (%)	Passenger-Nights	Avg. Nights
2003	4,094	8,348,719	7,875,665	106.0	53,533,841	6.41
2004	4,465	9,418,317	8,724,434	108.0	61,627,535	6.54
2005	4,463	9,747,188	8,885,612	109.7	63,730,903	6.54

(Source: MarAd)

Recent Ship Sales

Date Reported	Vessel Name	Vessel Type	Dwt	Yr. built	Sale Price (M)
2/10/2006	Theodor Oldendorff	Bulker	17789	99	$16
2/16/2006	Bright Star	Bulker	27887	89	$14
2/7/2006	Darya Devi	Bulker	28234	85	$8.50
2/22/2006	Cora	Bulker	34996	77	$3
2/28/2000	Denise C	Bulker	46500	99	$23
2/22/2006	Thomas C	Bulker	46500	99	$22
2/7/2006	Gallant Picer	Bulker	48913	99	$23
2/7/2006	Lake Tega	Bulker	50271	2001	$25
2/16/2006	Medi Manila	Bulker	52239	2002	$28
2/28/2006	Stella Bulker	Bulker	52544	2002	$28
2/22/2006	Corato	Bulker	64282	89	$16
2/10/2006	Hebei Prosperity	Bulker	65281	85	$8
2/7/2006	Denak-a	Bulker	69993	97	$25
2/16/2006	Bulk Patriot	Bulker	70003	94	$21
2/10/2006	Cic Horizon	Bulker	70003	94	$21
2/16/2006	Bulk Pheonix	Bulker	70029	94	$21
2/10/2006	Sd Triumph	Bulker	70029	94	$21
2/3/2007	Maritime Kapar	Bulker	74222	2002	$31
2/7/2006	Cleopatra Dream	Bulker	149989	90	$20
2/3/2006	Hebei Pheonix	Bulker	173000	2005	$66
2/3/2006	Hebei Peacock	Bulker	173000	2005	$66
2/7/2006	Mineral Beijing	Bulker	176000	2004	$60
2/16/2006	Med Sea	Bulker	183316	87	$18
2/22/2006	Paul Gilmore	Tanker	17654	84	$3.30
2/22/2006	Al Bahah	Tanker	47204	98	$41.50
2/3/2006	West Point	Tanker	50930	2006	$53
2/3/2006	South Point	Tanker	50930	2006	$53
2/3/2006	Vicotry Iii	Tanker	68150	90	$29
2/3/2006	Hesnes	Tanker	68150	89	$29
2/3/2006	Bregen	Tanker	68150	89	$29
2/16/2006	Ottawa	Tanker	70296	2003	$46.50
2/16/2006	Tamar	Tanker	70362	2003	$46.50
2/28/2006	Rudolf Schulte	Tanker	72000	2004	$62
2/28/2006	Everhard Schulte	Tanker	72000	2004	$62
2/3/2006	Pacific Venture	Tanker	96106	91	$23.50
2/16/2006	Kamari	Tanker	96174	96	$52.60
2/16/2006	Taipan	Tanker	96759	2002	$40.50
2/22/2006	Aegean Spirit	Tanker	112661	2002	$69
2/22/2006	Ionian Spirit	Tanker	112661	2002	$69
2/22/2006	Chios Spirit	Tanker	112679	2002	$69
2/16/2006	Super Lady	Tanker	147253	92	$32
2/7/2006	Europe	Tanker	255087	88	$40
2/22/2006	Formosapetro Forever	Tanker	281000	2005	$125
2/7/2006	Formosapetro Ace	Tanker	281395	2001	$110
2/22/2006	Astro Leon	Tanker	285767	92	$52.50

Source: Shipping Intelligence, tel: (212) 997 0966; email: spl@panix.com

This Month in U.S. Navy History

April 1
1893 - Navy General Order 409 of 25 February 1893 establishes the rate of Chief Petty Officer as of this date.
1942 - First Naval Air Transportation Service (NATS) squadron for Pacific operations commissioned
1945 - Over 1200 Navy ships and Army troops begin invasion of Okinawa

April 2
1781 - Frigate Alliance captures 2 British privateers, Mars and Minerva
1827 - First Naval Hospital construction begun at Portsmouth, VA
1951 - First Navy use of jet aircraft as a bomber, launched from a carrier, USS Princeton.

April 3
1797 - CAPT Thomas Truxtun issued first known American signal book using numerary system
1942 - ADM Nimitz named Commander-in-Chief, Pacific Ocean Areas, a joint command, and retained his other title, Commander-in-Chief, Pacific Fleet

April 4
1776 - Continental Navy frigate Columbus captures HM Tender Hawke, first American capture of British armed vessel
1898 - Appointment of first Civil Engineering Corps officer, Mordecai Endicott, as Chief, Bureau of Yards and Docks
1949 - Establishment of NATO

April 6
1776 - Sloop-of-war Ranger, frigate Queen of France and frigate Warren capture British Hibernia and 7 other vessels
1862 - Naval Gunfire from Tyler and Lexington help save Union Troops at Battle of Shiloh
1909 - Commander Robert E. Peary reports reaching the North Pole
1917 - U.S. declares war on Germany
1945 - First heavy kamikaze attack on ships at Okinawa.
1968 - USS New Jersey recommissioned for shore bombardment duty in Vietnam
1989 - President orders DOD to assist in Exxon Valdez oil spill cleanup

April 7
1776 - Continental brig Lexington captures British Edward
1917 - Navy takes control of all wireless radio stations in the U.S.
1945 - Carrier aircraft defeat last Japanese Navy sortie (Battle of East China Sea); Yamato, world's largest battleship, and five other ships sunk
1979 - Launching of first Trident submarine, USS Ohio (SSBN-726) at Groton, CT

April 8
1925 - First planned night landings on a carrier, USS Langley, by VF-1

The Trident ballistic missile submarine USS Ohio (Blue) (SSBN 726) manuevers through Hood Canal Bridge as she returns to her homeport in Bangor, Wash. Ohio was the first Trident submarine ever launched, on April 7, 1979. (U.S. Navy photo by Photographer's Mate 3rd Class Shawn Handley)

April 9
1941 - Commissioning of USS North Carolina, which carried 9 16-inch guns

April 10
1941 - USS Niblack, while rescuing survivors of torpedoed ship, depth charged German submarine; first action of WW II between U.S. and German navies
1963 - During diving tests, USS Thresher lost with all hands (112 crew and 12 civilians) east of Cape Cod, MA
1966 - River Patrol Boats of River Patrol Force commenced operations on inland waters of South Vietnam

April 11
1783 - Congress declares end of war with Great Britain
1900 - Navy accepted its first submarine, USS Holland
1970 - Launch of Apollo 13, commanded by CAPT James A. Lovell, Jr., USN. Former naval aviator Fred W. Haise, Jr. was the Lunar Module Pilot. While 200,000 miles from Earth there was an explosion on board which forced Apollo 13 to circle the moon without landing. Mission duration was 5 days, 22 hours, and 54 minutes.

April 12
1861 - Civil War begins when Confederates fire on Fort Sumter, SC
1911 - LT Theodore Ellyson qualifies as first naval aviator
1962 - U.S. Navy demonstrates new landing craft with retractable hydrofoils, LCVP (H)
1993 - Aircraft from USS Theodore Roosevelt and NATO forces begin enforcing the no-fly zone over the Bosnia in Operation Deny Flight

April 13
1847 - Naval Forces begin 5 day battle to capture several towns in Mexico
1960 - Navy's navigation satellite, Transit, placed into orbit from Cape Canaveral, FL and demonstrates ability to launch another satellite

April 14
1898 - Commissioning of first Post Civil War hospital ship, USS Solace
1969 - North Korean aircraft shoots down Navy EC-121 reconnaissance aircraft from VQ-1 over the Sea of Japan
1989 - First Navy ship arrives on scene to assist in Exxon Valdez oil spill cleanup

April 15
1885 - Naval forces land at Panama to protect American interests during revolution
1912 - USS Chester and USS Salem sailed from MA to assist RMS Titanic survivors
1918 - First Marine Aviation Force formed at Marine Flying Field, Miami, FL
1961 - Launching of first nuclear-powered frigate, USS Bainbridge, at Quincy, MA

April 18
1848 - U.S. Navy expedition to explore the Dead Sea and the River Jordan, commanded by LT William F. Lynch, reaches the Dead Sea.
1942 - USS Hornet launches Doolittle's Army bombers for first attack on Japan
1988 - Navy destroys 2 Iranian surveillance platforms, sinks one frigate and one patrol ships, and severely damages a second frigate in retaliation for attack on USS Samuel B. Roberts

April 19
1783 - George Washington proclaims end of hostilities
1861 - President Lincoln orders blockade of Southern ports from SC to Texas

April 20
1796 - Congress authorizes completion of 3 frigates
1861 - Norfolk Navy Yard abandoned and burned by Union forces.
1964 - USS Henry Clay (SSBN-625) launches a Polaris A-2 missile from the surface in first demonstration that Polaris submarines could launch missiles from the surface as well as from beneath the ocean. 30 minutes later the submarine launched another Polaris missile while submerged.

April 21
1861 - USS Saratoga captures slaver, Nightingale.
1898 - U.S. at war against Spain.
1906 - Commander Robert Peary discovered supposed Arctic Continent did not exist.

April 22
1778 - Captain John Paul Jones of Ranger led landing party raid on Whitehaven, England

April 23
1918 - USS Stewart destroys German submarine off France
1934 - In first Navy movement through Panama Canal over 100 ships transitted
1945 - In only U.S. use of guided missiles in WW II, 2 BAT missiles release at Balikiapan, Borneo
1956 - Project Vanguard, earth satellite launching program, assigned to DCNO (Air)

April 24
1778 - Continental Navy sloop Ranger captures HMS Drake
1862 - Battle of New Orleans; Union Navy under David Farragut runs past forts into Mississippi River
1884 - USS Thetis, Bear, and Alert sailed from New York to search for Greeley expedition lost in Arctic
1906- Ceremonies at Naval Academy commemorate John Paul Jones; President Theodore Roosevelt delivers speech
1981 - RCA delivers to the Navy, NOVA I, the 1st production unit of the improved navigational satellite.

April 25
1862 - Union naval forces occupy New Orleans, LA

April 26
1952 - USS Hobson sinks after colliding with USS Wasp; 176 lives lost

April 28
1944 - U.S. LSTs attacked during Operation Tiger

April 29
1814 - USS Peacock captures HMS Epervier
1898 - U.S. warships engage Spanish gunboats and shore batteries at Cienfuegos, Cuba

April 30
1798 - Congress establishes Department of the Navy

(Source: www.history.navy.mil)

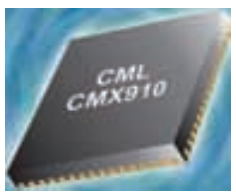
Insulation Resistance Monitors

MSE of Canada Ltd., manufactures and distributes insulation fault detectors, which are designed as a preventative maintenance device to operate automatically, and measure insulation resistance in the megohm range and provide early warning of insulation deterioration. It was recently specified by Alstom and ABB for LNG owners/operators such as BP, BG Group, Ceres, and TeeKay, for monitoring cargo pump motors.

Circle 33 on Reader Service Card

CMX910 AIS

As a highly integrated baseband signaling processor IC, for class A and class B Marine Automatic Identification System (AIS) applications, the CMX910 is positioned as a new, low-cost marine AIS. Half duplex in operation, the CMX910 comprises two parallel I and Q Rx paths, and one Tx path, all configurable for AIS or FSK (DSC) operation.



Circle 34 on Reader Service Card

Software-defined Marine Receiver

WiNRADiO Communications debuts the WR-G33EM, a marine receiver with numerous built-in demodulation types and marine signal decoding facilities. The compact brick type receiver operates from 12V DC power sources and features USB connectivity to PC-compatible computers, which allows for both, stationary and mobile, applications.

The WR-G33EM belongs to the new generation of software-defined receivers (SDR), where demodulation and decoding of radio signals is handled entirely in software. This allows for flexible and cost effective updates to new demodulation and decoding types, which may be defined in future products.

Circle 36 on Reader Service Card

Miller's New TIG Inverters

Miller Electric's new Dynasty 700 AC/DC TIG/Stick inverter features Independent AC amperage control and four AC waveshaping options. It is designed to increase travel speeds while decreasing cycle times and the need for rework. Miller Electric introduced its Dynasty 700 and Maxstar 700 inverters, two new TIG/Stick products. These inverters are designed to deliver new arc shaping options, 5 to 700 amps of weld power and new high-speed pulsed TIG weld controls. They can dramatically increase travel speeds, eliminate inclusions, eliminate weld flaws related to poor arc starts, permit using smaller diameter electrodes, eliminate the need for exotic gas mixes and reduce cycle time defects and rework.

Circle 38 on Reader Service Card

Hernis Camera Stations Get Type Approval

Hernis Scan Systems recently received DNV type approval for its camera systems, fulfilling all requirements for cameras intended for onboard installations on vessels or on oil platforms. The increased use of cameras for safety applications results in a demand that the products should continue to function satisfactory also in any extreme condition, which easily may occur onboard a vessel or an oil platform.

The requirements are very strict and include operating at ambient temperatures varying from -25° C to +70° C, depending on the intended location onboard. The vibration test is carried out in the x, y as well as the z-axis in frequencies ranging from 3 to 100Hz.

Circle 39 on Reader Service Card

Safer Personnel Transfers

Transferring personnel by crane between vessels and offshore installations is a high-risk operation. Reflex Marine offers what it calls a revolutionary transfer device - The Frog Personnel Transfer Capsule - to address the four main risks associated with crane transfers. The seats and seatbelts virtually eliminate the risk of personnel falling mid-transfer; the feet and the suspension under the seats protect against heavy landings; the frame protects against lateral impacts; and the buoyancy ensures that the Frog is self-righting and floats if immersed in water.

Circle 35 on Reader Service Card

Life-Safer Gets USCG Approval

Life-Safer, Inc. has received approval from the U.S. Coast Guard for its Personal Retriever, as a Type V Personal Flotation Device. The Personal Retriever is now an authorized substitute for the orange or white 20-in. and 24-in. Type IV ring buoys used onboard commercial vessels. The Personal Retriever is an aerodynamic disc made of soft, durable, expanded polyethylene foam and offers 11.24 pounds of buoyancy - enough to support a distressed person in the water. The device can be deployed by hand out to 100 ft. in 10 seconds or less, even in winds of up to 15 knots. In less than 45 seconds, the Personal Retriever can be retrieved and redeployed using its integrated, 650-pound-test polypropylene line.

Circle 37 on Reader Service Card

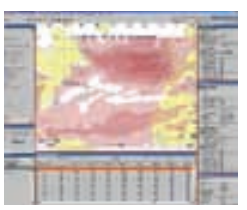
New Fixture for Cardan Shaft Alignment

The Fixturlaser Cardan Fixture is a set of fixtures to be used together with the laserbased shaft alignment systems. The new cardan fixture is rigid and can be mounted anywhere on the machine's flange. Its features result in high measurement accuracy and repeatability. The fixture can be used on all types and sizes of cardan shafts. It weighs 9.6 kg, including the case, which makes it easier to handle.

Circle 40 on Reader Service Card

Seaware EnRoute Live on PCTCs

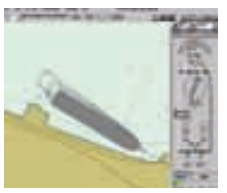
Wallenius Marine installed EnRoute Live, an onboard seakeeping guidance system that is designed to help bridge personnel navigate safely around and through bad weather, on an additional three PCTCs. The system is supplied by Seaware. "EnRoute Live is a decision support tool that complements the master's own seamanship and professional skills. We're considering installing the system on all the vessels in our fleet," said Per Croner, President of Wallenius Marine AB.



EnRoute Live is a multi-feature system, focusing primarily on seakeeping. Its main purpose is to increase the safety level for the crew, and to prevent and reduce damage to ship and cargo that may arise due to bad weather. Unlike competing systems, EnRoute Live combines three tools in one fully integrated piece of software: Advanced Route Planning, At Sea Seakeeping Guidance and Decision Support, and Post Voyage Analysis.

Circle 41 on Reader Service Card

Adveto's New ECDIS systems



Adveto Advanced Technology launched three versions of its new type approved ECDIS-4000. The new systems are based on Adveto AECDIS system. A new feature has been added to the ECDIS-4000, a feature which is designed to allow easy presentation of the new free chart format, S-63, acquired directly from the source with an opportunity to receive electronic charts online, resulting in less administration and reduced costs.

Circle 42 on Reader Service Card

NLB 605 Convertible Pump

The 605 Series water jet pump units from NLB Corp. offers up to 600 hp and 143 gpm (447 kW and 541 lpm). A simple conversion kit lets users operate at any of five pressures to suit their applications: 6,000, 8,000, 10,000, 15,000, or 20,000 psi (414 to 1,400 bar). Since the conversion can be completed with just six parts (and no manifold change), operating efficiency is high and maintenance is easy. Corrosion-resistant stainless steel is used throughout the pump, instead of carbon steel. Minimum flow is 34 gpm (129 lpm).

Circle 43 on Reader Service Card

Inspection Reveals Series of Cracks

Hydrex was called recently to repair a crack at the port of Rotterdam on a former Russian navy vessel and ice class ship, a vessel which is currently used for transportation - a 262 m barge carrier. After consultation with the ABS surveyor, an external inspection was done on the area of the crack - on the starboard side of the vessel. The crack was on the landing bar (a connecting plate between the bilge keel and the hull) and was easily visible. However, after checking the location of the known crack, Hydrex's diver inspected the remainder of the bilge keel on both the starboard and port sides and found what looked like a two hairline cracks on the port side. To confirm the visual finding, ultrasonic testing was done from the inside of the vessel. While inconclusive, it gave indications that there was a problem. It was therefore decided to do another underwater check using 'eddy current' testing, which showed there were two additional cracks to be repaired before the vessel could continue on its schedule. The exact location of the two cracks was determined by further testing from inside the hull. Mobdocks were then put in place on the hull over the cracked areas. On the starboard side the 200mm crack was visible from within the hull and there were no obstructions blocking access to the work area. The repair here was straightforward. However, on the port side, structural framework blocked access to both cracks and so this had to be cut away in order for the repair work to be started.

As there was no visible damage to the internal hull surface, the area was ground out at the places already marked and determined by the ultrasonic testing. In fact, it was found that the two cracks of 200mm and 150mm had penetrated only around 5mm of the 20mm hull plating. Hydrex's standard and approved techniques for permanent repair were then executed and then tested by ultrasonic and MPI methods to satisfaction of ABS surveyor.

Circle 44 on Reader Service Card

Preparing the area for welding.

BUYER'S DIRECTORY

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

ACCOMMODATION LADDERS & GANGWAYS
Generon IGS, 11985 FM 529, Houston, TX 77041

AIR CONDITIONING & REFRIGERATION
Cospolich Refrigeration, 14695 Highway 61, Norco, LA 70079
RW Fernstrum, 1716 11th Avenue, Menominec, MI 49858, 9068635553, 9068635634, seanf@fernstrum.com, Contact: Sean Fernstrum, www.fernstrum.com
Stork Bronswerk Inc., 3755 C Boul. Matte, Brossard, Quebec J4Y 2P4, Canada

AIRHORNS/SIGNALING EQUIPMENT
Airchime Manufacturing Co., 5478 267th St., Gloucester Industrial Estate,, Langley, BC V4W 3S8, Canada
Kahlenberg Brothers Co., P.O. Box 358, Two Rivers, WI 54241

ALARMS, FACTORY-MUTUAL APPROVED
NREC Power Systems, 5222 Hwy 311, Houma, LA 70360

ALUMINUM BOATS
Island Boats, 6806 Highway 90 East, New Iberia, LA 70560
Metal Craft Marine Inc., 347 Wellington St., Kingston, Ontario K7K 6N7, Canada
William E. Munson Co., 18130 Sunset Way, Edmonds, WA 98026

ANCHORS & CHAINS
GJ Wortelboer Jr. B.V., P.O. Box 5003 , 3008 AA Rotterdam, Netherlands

AUTOPILOT SYSTEMS
AG Marine Inc., 5711 34th Avenue, Gig Harbor, WA 98335-8548
ComNav Marine Ltd., 13511 Crestwood Pl., Ste 15 15, Richmond, BC V6V 2G1, Canada
Mackay Communications, 2721 Discovery Dr., Raleigh, NC 27616-1851

BALLAST
Ballast Technologies, 4620 S. Coach Dr., Tuscan , AZ 85714
Redland Genstar Inc., 300 E. Joppa Rd. Suite 200, Towson, MD 21286

BEARING- RUBBER, METALLIC, NON-METALLIC
Craft Bearing, 5000 Chestnut Ave., Newport News, VA 23605
Duramax Marine LLC, 17990 Great Lakes Parkway, Hiram, OH 44234, 440-834-5400, 440-834-4950, Contact: Richard Spangler
Thordon Bearings, 3225 Mainway, Burlington Ontario L7M 1A6, Canada

BOATBUILDER
AMERICAN MARINE HOLDINGS GOVERNMENT SERVICES, 1838 Turnbull Lakes Drive, New Smyrna Beach, FL 32168
Blount Marine, 461 Water St., Warren, RI 02885
Gladding Hearn, 1 Riverside Ave., Somerset , MA 02725
Washburn Doughty, P.O. Box 296, E. Boothbay, ME 04544

BOLLARDS
Maritime International, Inc., 204 Ida Rd., Broussard, LA 70518

BRIDGE SUNSCREENS
Martek Marine Blinds, Unit 46, Century Business Centre, Maversway, Rotherham, South Yorkshire S63 5DA, UK

BROKERS
Merrill Marine Services, Inc., 7909 Big Bend Blvd, Webster Groves, MO 63119, 800.394.6674, 800.230.5377 , pete@merrillmarine.com, Contact: Peter C. Merrill , www.merrillmarine.com

BULKHEAD SEALS/PANELS
CSD North America, 880 Candia Rd., Unit 10, Manchester, NH 03109
Thermax, 3115 Range Rd, Temple, TX 76501

CAD/CAM SYSTEMS
Autoship Systems Corp.,, 611 Alexander Street, Suite 312, Vancouver, BC V6A 1E1, Canada, 604-254-4171, 604-254-5171, sales@autoship.com, Contact: Ross Muirhead, www.autoship.com
Cadmatic , Ostra Strandgatan 72 (Vita Huset), FI-20810 Turku, Finland
Creative Systems Inc., P.O. Box 1910, Port Townsend, WA 98368

CAPSTANS
Superior Lidgerwood Mundy, 1101 John Ave., Superior , WI 54880

CARGO MANAGEMENT
Autoship Systems Corp.,, 611 Alexander Street, Suite 312, Vancouver, BC V6A 1E1, Canada, 604-254-4171, 604-254-5171, sales@autoship.com, Contact: Ross Muirhead, www.autoship.com

CARGO MONITORING & CONTROL SYSTEM
Hermatic Inc., 4522 Center St., Deerpark, TX 77536

CAST IRON REPAIR
In-Place Machining, 3811 N. Holton St., Milwaukee, WI 53212

CFD SOFTWARE
CD-Adapco, 9401 General Dr., Ste 131, Plymouth, MI 48170

CHAINS
G.J. Wortelboer, Postbus 5003, 3008 AA Rotterdam, Netherlands

CLASSIFICATION SOCIETY
American Bureau of Shipping, 16855 N. Chase Drive, Houston, TX 77060

CLOSED CIRCUIT TELEVISION
Hernis Scan Systems A/S, Postboks 619, NO_4809 Arendal, Norway

CNC PLATE CUTTING
Advanced Fabricating Inc, PO Box 3721, Galveston, TX 77552

COATINGS/ CORROSION CONTROL/PAINT
Chugoku Marine Paints, P.O. Box 73, , 4793 , Netherlands
Ferro Corp., 1301 North Flora St., Plymouth, IN 46563
Flow International Corp., 23500 64th Ave., South Kent, WA 98059
International Paint Co., Stoneygate Lane, Felling, Gateshead, Tyne and Wear NE10 OJY, UK
Mascoat Products, 4310 Campbell Rd, Houston, TX 77041
NAPASCO, INC., 213 Main Project Road, Shriever, LA 70395, 985-449-0730, 985-449-0740, napasco@napasco.com, Contact: Pam Bartell, www.napasco.com
Soken Trade Corp./ Noxudol, 15934 S. Figueroa Street, Gardena, CA 90248

COMMUNICATIONS
David Clark, PO Box 15054, Worcester, MA 01615
Inmarsat Ltd, 99 City Rd., London EUY 1AX, UK
L-3 Communications, 6000 Fruitville Road, Sarasota, FL 34232
Mackay Communications, 2721 Discovery Dr., Raleigh, NC 27616-1851
Pipeline Communications and Technology, Inc., 2800 Woodlawn Dr. Ste. 264, Honolulu, HI 96822
World-Link Communications, 74 Main St., Framingham, MA 01701
Xantic, PO Box 30012 , 2500 GA The Hague, Netherlands

COMPOSITE SHAFTS
Centa Corp., 815 Black Hawk Drive, Westmont, IL 60559, 630-734-9600, 630-734-9669, bobl@centacorp.com

COMPUTER/ COMPUTER SOFTWARE
Creative Systems Inc., P.O. Box 1910, Port Townsend, WA 98368
Omega Engineering, One Omega Dr., Stamford, CT 06907
Spec Tec , Professor Koth's Vey, 1366 Lysaker, Norway

CONSOLE- GMDSS
Mackay Communications, 2721 Discovery Dr., Raleigh, NC 27616-1851

CONSULTANTS
Captain R.J. Underhill & Associates, P.O. Box 1030, Groves, TX 77619
Elliot Bay Design Group, 5301 Shishole Ave. NW, Ste. 200, Seattle, WA 98107
Hornblower Marine Services, P.O. Box 112476, Campbell, CA 95011-2476

CONTROL SYSTEM-MONITORING/STEERING
Amot Controls, 8640 N. Eldridge Parkway, Houston, TX 77041
Electronic Marine Systems, 800 Ferndale Pl., Rahway, NJ 07065
Electrowave U.S.A., 6125 W. Sam Houston Pkwy., Ste 406, Houston, TX 77041
G.R. Bowler, 2261 Lake Rd., Ontario, NY 14519
Kobelt Manufacturing Co., Ltd., 8238-129 Street, Surrey, BC V3W0A6, Canada
L-3/TANO-EDI, 759 Hill Street, New Orleans, LA 70121, 504-831-9800, 504-833-4119, guy.hardwick@l-3com.com
MMC International, 60 Inip Dr, Inwood, NY 11096
Omega Engineering, One Omega Dr., Stamford, CT 06907
Prime Mover Controls, 3600 Gilmore Way, Burnaby, BC V5G 4R8, Canada
Totem Plus Ltd, P.O. Box 164 , Herzliya 46100, Israel

CORROSION CONTROL
Furuno USA Inc., 4400 NW Pacific Rim Blvd, Camas, WA 98607
Ultra Strip, 3515 SE Lionel Terrace , Stuart, FL 34996

COUPLERS- TUG & BARGE
Intercontinental Engineering , PO Box 9055 , Kansas City, MO 64168

COUPLINGS
Centa Corp., 815 Black Hawk Drive, Westmont, IL 60559, 630-734-9600, 630-734-9669, bobl@centacorp.com
Mapeco Products, 91 Willenbrock Rd., Unit B, Oxford, CT 06478
MMC International, 60 Inip Dr, Inwood, NY 11096

CRANE - HOIST - DERRICK - WHIRLEYS
Davit Sales, PO BOx 232, Jefferson Valley, NY 10536
DMW Marine, LLC, 1123 Street Matthews Road, Chester Springs, PA 19425, 610-827-2032, 610-827-1199, dw@dmwmarine.com , Contact: Douglas M. Weidner, www.dmwmarine.com/
E. Crane, 241 Executive Dr., #3, Marion, OH 43302

CRANKSHAFT REPAIR
In-Place Machining, 3811 N. Holton St., Milwaukee, WI 53212
Walz & Krezner, 91 Willenbrock Rd., Oxford, CT 06478

CUTTING & WELDING MACHINES
Bug-O-Systems, 3001 W. Carson St., Pittsburgh, PA 15204
ESAB Cutting Systems, 411 South Ebenezer Road, Florence, SC 29501

DECK MACHINERY- CARGO HANDLING EQUIPMENT
Burrard Iron Works Ltd., 220 Alexander Street, Vancouver, BC V6A 1C1, Canada, 604-684-2491, 604684-0458, sales@burrardironworks.com
Coastal Marine Equipment, 20995 Coastal Parkway, Gulfport, MS 39503-9517, 228-832-7655, 228-832-7675, sales@coastalmarineequipment.com, Contact: Ralph Waguespack, www.coastalmarineequipment.com
Davit Sales, PO BOx 232, Jefferson Valley, NY 10536
DMW Marine, LLC, 1123 Street Matthews Road, Chester Springs, PA 19425, 610-827-2032, 610-827-1199, dw@dmwmarine.com , Contact: Douglas M. Weidner, www.dmwmarine.com/
Global Incorporated, P.O. Box 24, 160 Cannery Road, Somerset, PA, PA 15501
Intercontinental Engineering , PO Box 9055 , Kansas City, MO 64168
Markey Machinery, P.O. Box 24788, Seattle, WA 98124
Nabrico Marine Products, 1050 Trinity Road, Ashland City, TN 37016
Norwegian Maritime Equipment AS, BOX 244, NO-5480 HUSNES, Norway
Smith Berger Marine, 7915 10th Ave. S., Seattle, WA 98108
Superior Lidgerwood Mundy, 1101 John Ave., Superior , WI 54880
W.W. Patterson, Inc, 3 Riversea Rd, Pittsburgh, PA 15223

DESALINATION - REVERSE OSMOSIS
Reverse Osmosis of South Florida, Inc., 2860 W.State Road 84, Suite 108, Fort Lauderdale, FL 3331633312

DIESEL ENGINE OVERHAUL
Detroit Diesel Corporation, 13400 Outer Drive West, Detroit, MI 48329-4001
Fincantieri Marine Systems, 800 Principal Court, Suite C, Chesapeake, VA 23320
Motor-Services Hugo Stamp, 3101 S.W. 3rd Ave., Ft. Lauderdale, FL 33315

DIESEL ENGINE- SPARE PARTS & REPAIR
Chris Marine AB, Box 9025, 200 39 Malmo, Sweden
Man B&W Diesel, 17 State St., NY, NY 10004
Man B&W Diesel A/S, Telglholmsgade 41, Copenhagen SV DK-2450, Denmark
Man B&W Diesel AG, Stadtbachstrasse 1, Augsberg D-86153, Germany
Marine Exhaust Systems of Alabama, P.O. Box 698, 757 Nichols Ave., Fairhope, AL 36533
Marine Turbo & Diesel Inc., 1090 7th St., Richmond, CA 94801
Mariso USA, Inc., 12783 Capricorn Dr., Stafford, TX 77477
Motor-Services AB, Box 2115 , Ronninge S- 144 04, Sweden
Motor-Services Hugo Stamp, 3101 S.W. 3rd Ave., Ft. Lauderdale, FL 33315
Scardana Americas Bkg., 502 Empire St. , Greenfield Park J4V 1V7, Canada
Wartsila Diesel, 201 Defense Hwy, Annapolis , MD 21401

DIESEL FUEL DECONTAMINATION
Algae X International, P.O. Box 4011, Fort Myers Beach, FL 33932

DIESEL FUEL INJECTORS
Interstate Diesel, 4901 Lakeside Avenue, Cleveland, OH 44114-3996, 800-321-4234, 216-881-0805

DIGITAL TORQUE METER SYSTEMS
Instruments, Computers & Controls, 78 Londonderry Tpke, Hookset, NH 03106

DISPLAY TECHNOLOGY
Barco Simulation, 600 Bellbrook Avenue, Xenia, OH 45385

DOOR LOCKS
The Brass Works Inc., P.O. BOX 566, DeLand, FL 32721, 386-943-8857, 386-943-8810, info@marinedoorandcabinethardware.com

DOORS- MARINE & INDUSTRIAL
Diamond/Sea Glaze, 19372-94th Ave, Surrey, BC V4N 4E4, Canada
Joiner Systems, 1925 52nd Avenue, Lacine, Quebec H8T 3C3, Canada
Juniper International, 72-15 Metropolitan Ave., Middle Village, NY 11379
Manly Marine, P.O. Box 86788, N. Vancouver, BC V7L 4L3, Canada
Mapeco Products, 91 Willenbrock Rd., Unit B, Oxford, CT 06478
Seaclear Industries, 220 Maltby Rd., Suite 131, Bothell, WA 98012
USA Sliding Doors, Inc., 801 Hosmer Road, Churchville, NY 14428, 585-538-4160, 585-538-2806, info@usaslidingdoors.com, Contact: Mr. Robert Weiland, www.usaslidingdoors.com
Walz & Krezner, 91 Willenbrock Rd., Oxford, CT 06478

DRILLS
Anchor Lamina, 38565 Country Club Drive, Farmington Hills, MI 48331

DRIVESHAFTS
The Cline Company, 600 Buncombe St., Greenville, SC 29602

DRUG TEST KITS
Sun State Specialty K-9s, 1500 Beville Road, Daytona Beach, FL 32114

EDUCATION
Massachusetts Maritime Academy, 101 Academy Drive, Buzzards Bay, MA 02532

ELECTRICAL EQUIPMENT
MMC International, 60 Inip Dr, Inwood, NY 11096

ELECTRICAL SERVICES
QCI Marine Offshore, 6754 Willowbrook Park Dr, Houston, TX 77066

EMPLOYMENT
All American Marine, P.O. Box 191237, Tillman's Corner, AL 33619
Military Sealift Command, PO BOX 120, CODE APM-124, VIRGINIA BEACH, VA 23458-0120, 1-888-SEALIFT , webmaster@msc.navy.mil, Contact: Audra Lamb, www.msc.navy.mil/

ENGINE ROOM LIGHTING/ MONITORING & CONTROL
GMT Electronics, 171 Main St., South River, NJ 08882

ENGINES
Fairbanks Morse, 701 White Avenue, Beloit, WI 53111
Fincantieri Marine Systems, 800 Principal Court, Suite C, Chesapeake, VA 23320

EQUIPMENT FINANCING
AIG Commercial Equipment Finance, Inc., 5700 Granite Parkway, Suite 850, Plano, TX 75024, 972-987-3708, 972-987-3700, kirk.phillips@aig.com

EVAPORATORS
Alfa -Laval Separation, Inc., 955 Mearns Rd., Warminster, PA 18974
Sasakura Engineering , 7-32 Takeshima, 4-Chome, Nishiyodogoaw KY Osaka555, Japan

EXHAUST
Marine Exhaust Systems of Alabama, P.O. Box 698, 757 Nichols Ave., Fairhope, AL 36533

EXHIBITIONS/TRADE SHOWS
CMA Shipping, 62 Southfield Ave, Stamford, CT

EXPANSION JOINTS
Silex Inc., 6659 Ordan Dr., Mississauga, ON L5T 1K6, Canada

EXTRUDED RUBBER PRODUCTS
Clean Seal Inc., PO Box 2919, South Bend, IN 46880

FASTNERS
Superbolt, PO Box 683, Carnegie, PA 15106

FENDERING SYSTEMS/ BUOYS - DOCK & VESSEL
Duramax Marine LLC, 17990 Great Lakes Parkway, Hiram, OH 44234, 440-834-5400, 440-834-4950, Contact: Richard Spangler
Maritime International, Inc., 204 Ida Rd., Broussard, LA 70518
Schuyler Rubber Co., 16901 Woodred Rd., Woodinville, WA 98072
Trelleborg Engineered Products, P.O. Box 98, Clearbrook, VA 22624
Urethane Products, 9076 Rosecrans Ave, Bellflower, CA 90706

FILTERS/FILTER SYSTEMS
Algae X International, P.O. Box 4011, Fort Myers Beach, FL 33932
Boll Filter, 9822 General Drive. Ste. 180, Plymouth, MI 48170
Hellan Strainer, 3249 East 80th St., Cleveland, OH 44104
US Filter , 2 Milltown Ct., Union , NJ 07083

FIRE & SAFETY PRODUCTS
Brookdale International, 1--8755 Ash St., Vancouver, BC V6P 6T3, Canada
IFSTA/Fire Services Program, 9030 N. Willis, Stillwater , OK 74078-8045
IMSSCO Corporation, 2040 Harbor Island Drive, Ste. 201 A, San Diego, CA 92101
Western Fire & Safety, 2446 NW Market Street, Seattle, WA 98107

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

FLOW CONTROLS
EIM Controls, 13840 Pike Road, Missouri City, TX 77489

FUEL INJECTORS
Interstate Diesel, 4901 Lakeside Avenue, Cleveland, OH 44114-3996, 800-321-4234, 216-881-0805

GALLEY EQUIPMENT
AR Larsen Co., 15040 NE 95th St., Redmond, WA 98052
Cospolich Refrigeration, 14695 Highway 61, Norco, LA 70079
Jamestown Metal Marine Sales, Inc., 4710 Northwest 2nd Ave. , Boca Raton, FL 33431

GANGING & SAMPLING
Hermatic Inc., 4522 Center St., Deerpark, TX 77536

GAS GENERATION SYSTEMS
Air Products AS, Box 8100, Vagsbygd, NO-4675 Kristiansand S, Norway

GENERATOR CONTROLS
Detroit Diesel Corporation, 13400 Outer Drive West, Detroit, MI 48329-4001

GLASS
Garibaldi Glass, 7344 Winston Street, Burnaby, British Columbia V5A 2G9, Canada
ProCurve Glass Technology, LLC, 3535 Davisville Rd., Hatboro, PA 19040

HATCHES & DOORS
Juniper International, 72-15 Metropolitan Ave., Middle Village, NY 11379
Manly Marine, P.O. Box 86788, N. Vancouver, BC V7L 4L3, Canada

HEAT EXCHANGERS
Alfa -Laval Separation, Inc., 955 Mearns Rd., Warminster, PA 18974
Duramax Marine LLC, 17990 Great Lakes Parkway, Hiram, OH 44234, 440-834-5400, 440-834-4950, Contact: Richard Spangler

HEAVY FUEL TREATMENT
Algae X International, P.O. Box 4011, Fort Myers Beach, FL 33932

HIGH SPEED FERRY BUILDERS
Incat Australia Pty. Ltd, 18 Bender Marine, Hobart 7009, Australia

HMI CONTROLS DISPLAY
Azonix-Dynalco, 3690 NW 53rd St., Ft. Lauderdale, FL 33309

HORNS/WHISTLES
Airchime Manufacturing Co., 5478 267th St., Gloucester Industrial Estate,, Langley, BC V4W 3S8, Canada
Kahlenberg Brothers Co., P.O. Box 358, Two Rivers, WI 54241

HOSES/HOSE FITTINGS
JGB Enterprises, Inc., 115 Metropolitan Dr., Liverpool , NY 13088

HVAC
Jamestown Metal Marine Sales, Inc, 4710 Northwest 2nd. Ave., Boca Raton, FL 33431
QCI Marine, 6754 Willowbrook Park Drive, Houston, TX 77066, 281-885-1300, 281-885-1349, Lbobbit@qcimarine.com

HYDRAULIC SYSTEMS
Anchor Lamina, 38565 Country Club Drive, Farmington Hills, MI 48331
Wooster Hydrostatics, 4570 West Old Lincoln Way, Wooster, OH 44691, 330-263-6555, 330-263-4463, carlrobinson@woosterhydrostatics.com, Contact: Carl Robinson, www.woosterhydrostatics.com

IMAGING EQUIPMENT
EMX, Inc., 4200 Dow Road, Suite C, Melbourne, FL 32934

INFRARED IMAGING EQUIPMENT
Flir Systems, 16505 SW 72ND AVE, Portland, OR 97224

INSPECTION EQUIPMENT
Staveley Instrument, 421 N. Quay St., Kennewick, WA 99336

INSULATION
Superior Energies, 3115 Main Ave., Groves, TX 77619
Superior Energies Inc., 3115 Main Ave., Groves, TX 77619

INSURANCE SERVICES
WQIS, 80 Broad St., 21st Floor, New York, NY 10004

INTERIORS
Jamestown Metal Marine Sales, Inc., 4710 Northwest 2nd Ave. , Boca Raton, FL 33431

Lit Industries, 516 Costner School Rd., Bessemer City, NC 28016-9801
QCI Marine Offshore, 6754 Willowbrook Park Dr, Houston, TX 77066, 281 885 1300, 281 885 1349, Lbobbit@qcimarine.com, Contact: Larry Bobbit, www.qcimarine.com

JOINER- WATERTIGHT DOOR-PANELING-CEILING SYSTEM
Joiner Systems, 1925 52nd Avenue, Lacine, Quebec H8T 3C3, Canada
Walz & Krezner, 91 Willenbrock Rd., Oxford, CT 06478

JOYSTICKS & POTENTIOMETERS
Feteris Components USA, 4703 Murat Place, San Diego, CA 92117

K-9 DETECTION
Sun State Specialty K-9s, 1500 Beville Road, Daytona Beach, FL 32114

KEEL COOLERS
Duramax Marine LLC, 17990 Great Lakes Parkway, Hiram, OH 44234, 440-834-5400, 440-834-4950, Contact: Richard Spangler

RW Fernstrum, 1716 11th Avenue, Menominec, MI 49858, 9068635553, 9068635634, seanf@fernstrum.com, Contact: Sean Fernstrum, www.fernstrum.com

LASER ALIGNMENT
Ludeca, Inc., 1425 NW 88th Ave, Miami, FL 33172

LEAK REPAIR
Indumar Products Inc., 2500 Tanglewilde, Suite 260, Houston, TX 77063

LIFEBOAT TESTING
Water Weights, Inc., 5139 Brook St., Ste E, Mont Clare, CA 91763

LIFEBOATS/RAFTS
DBC Marine Safety Systems, 101-3760 Jacombs Rd., Richmond, BC V6V 6T3, Canada
Viking Life Saving Equipment, 1400 NW159th Street Suite 101, Miami, FL 33169
Willard Marine Inc., 1250 N. Grove St., Anaheim, CA 92806
Wolong International, 151 Chin Swee Road #03-14, Manhattan House, 169876, Singapore

LIFESAVING EQUIPMENT
C.M. Hammar AB, August Barks Gatan 15, 421 32 Vastra Frolunda, Sweden
Viking Life Saving Equipment, 1400 NW159th Street Suite 101, Miami, FL 33169

LIGHTING SYSTEMS/ EQUIPMENT
ACR Electronics Inc., 5757 Ravenswood Rd., Ft. Lauderdale , FL 33310-5247
L.C. Doane, P.O. Box 975, Essex, CT 06426

LINE & NET CUTTERS
Spurs Marine, 201 S.W. 33rd St., Ft. Lauderdale, FL 33315

LOAD CELLS
Omegadyne Inc, 149 Seltzer Ct, Sunbury, OH 43074, 740 965 9340, 740965 9438, info@omegadyne.com, Contact: Alfred Friere, www.omegadyne.com

MARINE ELECTRONICS
ACR Electronics Inc., 5757 Ravenswood Rd., Ft. Lauderdale , FL 33310-5247
GMT Electronics, 171 Main St., South River, NJ 08882
Hatteland Display, Bogstadveien, 19, , N-0355 Oslo, Norway
Jotron Electronics, Box 85 , NO-328OT Jodalyng Norge, Norway
Marine Electronic Solutions, 1522 Crabapple Cove, Jacksonville, FL 32225
Saab Marine Electronics, Box 13045, 402 5Goteborg, Sweden

MONITORING
Martek Marine Ltd., Century Business Park Manvers Way, Rotherham, South Yorkshire 560 5DA, UK

MARINE ENGINEERING
Delta Marin, Kurokatu 1, Raisio FIN-2100, Finland
Elliot Bay Design Group, 5301 Shishole Ave. NW, Ste. 200, Seattle, WA 98107

MARINE EQUIPMENT
Scardana Americas Bkg., 502 Empire St. , Greenfield Park J4V 1V7, Canada
Tidewater Skanska, Inc., PO Box 57, Norfolk, VA 23501, 757-547-2153, 757-547-4806, sby@tidewaterskanska.com
Waterman Supply, P.O. Box 596, Wilmington, CA 90748

MARINE HARDWARE
HMS Marine Hardware, 333 W. Merrick Road, Valley Stream, NY 11580-5219

MARINE HAZARD RESPONSE
Marine Respose Alliance LLC, 1102 SW Massachusetts St., Seattle, WA 98134-1030

MARINE MANAGEMENT
Hornblower Marine Services, P.O. Box 112476, Campbell, CA 95011-2476

MARINE POWER PLANT SYSTEMS
Auramarine Ltd., Box 849 , FI-20101 Turku, Finland

MARINE PRESSURE TRANSDUCERS
Omegadyne Inc, 149 Seltzer Ct, Sunbury, OH 43074, 740 965 9340, 740965 9438, info@omegadyne.com, Contact: Alfred Friere, www.omegadyne.com

MARINE TRANSPORTATION
SEACOR Marine, Inc., 5005 Railroad Ave., Morgan City, LA 70380

MARITIME TRAINING & SCHOOLS
Marine Safety International, Marine Terminal , Laguardia Airport, NY 11371

MONITORING SYSTEMS
Bulldog Technologies Inc., 11120 Horseshoe Way - Suite 301, Richmond, BC V7A 5H7, Canada
Mackay Communications, 2721 Discovery Dr., Raleigh, NC 27616-1851
Prime Mover Controls, 3600 Gilmore Way, Burnaby, BC V5G 4R8, Canada

MOORAGE FACILITY
Sea Ark Marine, P.O. Box 210, Monticello, AR 71655-0210

MOTOR PROTECTION
Marine Safe Electonics, 261 Milway Ave. #12, Concord, Ontario L4K 4K9, Canada

NAMEPLATES AND PLACARDS
Horizons ISG, 18531 South Miles Road, Cleveland, OH

NAV/COMM EQUIPMENT
C- Map Commercial, 133 Falmouth Rd, Mashpee, MA 02649
Chartco, New North Road, Hainault, Ilford Esex 166 2UR, UK
Electronic Marine Systems, 800 Ferndale Pl., Rahway, NJ 07065
Furuno USA Inc., 4400 NW Pacific Rim Blvd, Camas, WA 98607
Mackay Communications, 2721 Discovery Dr., Raleigh, NC 27616-1851

NAVAL ARCHITECTS, MARINE ENGINEERS
A.K. Suda, Inc., 3004 19th St., Metairie, LA 70002-4989
Band, Lavis, & Associates, Inc., 900 Ritchie Hwy, Suite 203, Severna park, MD 21146
Bay Engineering, 253 N. First Ave., Sturgeon Bay, WI 54235
BMT Fleet Technology, 311 Legget Dr, Kanata, ON K2K 1ZB, Canada
Bristol Harbor Group, Inc., 103 Poppasquash Rd., Bristol, RI 02809, 401-253-4318, 401-253-2329, design@bristolharborgroup.com, Contact: Greg Beers, P.E. - President, www.bristolharborgroup.com
C. Baxter & Associates, P.O. Box 9006, Mobile, AL 36609
CDI Marine Co., 9550 Regency Square Blvd, Ste 400, Jacksonville , FL 32222
Computer Sciences Corporation-Advance Marine Center, 1201 M St. SE., Washington , DC 20003
Delta Marin, Kurokatu 1, Raisio FIN-2100, Finland
Jamestown Marine Services, Inc., 1084 Shennecossett Road, Groton, CT 06340
JMS Naval Architects & Salvage Engineers, 1084 Shennecossett Rd., Groton, CT 06340, 860-448-4850, 860-448-4857, jms@jmsnet.com, Contact: Blake Powell, VP, www.jmsnet.com
John J. McMullen Associates, 4300 King St., Suite 400, Alexander, VA 22302
John W. Gilbert Associates, 75 Terry Drive, Suite 200, Hingham, MA 02043
Kvaerner Masa Marine Inc., 201 Defense Highway, Ste 202, Annapolis, MD 21401
MCA Engineers, Inc., 2960 Airway Ave., #A-103 , Costa Mesa, CA 92626
MIL Systems, 200-1150 Morrison Drive, Ottawa, Ontario K2H 8S9, Canada
Nautical Designs, Inc., 2101 S. Andrews Ave., Ste 202, Fort Lauderdale, FL 33316
The Glosten Associates Inc., 600 Mutual Life Bldg., 605 First Ave., Seattle, WA 98104
Vizag marine Consultants, 8913 Riverview Park Drive, Raleigh, NC 27613
VUYK Engineering, P.O. Box 204, , 9700 AE Groningen, Netherlands
Washburn Doughty, P.O. Box 296, E. Boothbay, ME 04544

NAVIGATION
AG Marine Inc., 5711 34th Avenue, Gig Harbor, WA 98335-8548
ComNav Marine Ltd., 13511 Crestwood Pl., Ste 15 15, Richmond, BC V6V 2G1, Canada
D & B Technologies, 1458 OCEAN SHORE BLVD #132, ORMOND BEACH, FL 32176-3613
Nauticast AG, Mariahilfer Strasse 50/211, A-1070 Vienna, Austria

OFFSHORE SERVICES
SEACOR Marine, Inc., 5005 Railroad Ave., Morgan City, LA 70380

OIL SPILL RESPONSE
Marine Response Alliance, 1102 SW Massachusettes St, Seattle, WA 98314-1030

OIL/WATER SEPARATORS
Alfa -Laval Separation, Inc., 955 Mearns Rd., Warminster, PA 18974
MMC International, 60 Inip Dr, Inwood, NY 11096

PAINTS AND ANTI FOULANTS
International Paint Co., Stoneygate Lane, Felling, Gateshead, Tyne and Wear NE10 OJY, UK

PIPE FITTINGS/CUTTINGS/CONNECTING/ SYSTEMS
W & O Supply, 3485 Evergreen Ave., Jacksonville, FL 32208

PIPE LEAK REPAIR
CSD North America, 880 Candia Rd., Unit 10, Manchester, NH 03109

PNEUMATIC LINE THROWERS
Restech Norway A/S, Box 624, NO-8001 BODO, Norway

PORT DEVELOPMENT
Sasakura Engineering , 7-32 Takeshima, 4-Chome, Nishiyodogoaw KY Osaka555, Japan

PORTABLE FOAM APPLICATORS
IMSSCO Corporation, 2040 Harbor Island Drive, Ste. 201 A, San Diego, CA 92101

PORTABLE VENTILATORS
Americ Corp, 785 Bonnie Lane, Elk Grove Village, IL 60007

PREVENTATIVE MAINTENANCE
Marine Safe Electonics, 261 Milway Ave. #12, Concord, Ontario L4K 4K9, Canada

PROFESSIONAL SOCIETY
SNAME, 601 Pavonia Ave, Jersey City, NJ 07306

PROPULSION EQUIPMENT
ABB Turbocharger, Inc., 1460 Livingston Ave., North Brunswick, NJ 08902
Alstom Power Conversion, 3 Ave. Des Trois Chenes, 90018 Belfort Cedex, France
Brunvoll A/S, P.O. Box 370, N-6401 Molde, Norway
CWF Hamilton Co., P.O. Box 709 , Christchurch, New Zealand
Fincanteri, Diesel Engine Div., GMT, Bagnoli della, Rosandra 3334 Trieste, Italy
Harbormaster Marine, Inc., 31777 Industrial Rd., Livonia, MI 48150
Kawasaki Heavy Indust., World Trade Center Bldg., 4-1 Hamamastu-cho, 2-chome, Minato-ku Tokyo 105-6116, Japan
LA.ME Srl. Marine Division, Via della Fornace 4, Opera (MI), Italy
Man B&W Diesel, 17 State St., NY, NY 10004
Man B&W Diesel A/S, Telglholmsgade 41, Copenhagen SV DK-2450, Denmark
Man B&W Diesel AG, Stadtbachstrasse 1, Augsberg D-86153, Germany
Mapeco Products, 91 Willenbrock Rd., Unit B, Oxford, CT 06478
Napier Turbochargers, P.O. Box 1, Waterside , South Lincoln LN5 7FD, UK
Nya Berg Propulsion AB, Box 1005, 430 90 Ockero, Sweden
Rolls-Royce Commercial Marine, 10255 Richmond Ave., Ste 101, Houston, TX 77042
Ultra Dynamics Marine, LLC. (UltraJet), 1110A Claycraft Road, Columbus, OH 43230
Voith Schiffstechnik GMBH & Co., P.O. Box 2011, 89510 Heidenheim, Germany
Wartsila Corporation, Box 244, FI-65101 Vasa, Finland
Wartsila Lips, 3617 Koppens Way, Chesapeake, VA 23323
ZF Marine Group , Ehlerst. 50, 88046 Friedrichshafen, Germany

PROPULSION MONITORING
Azonix-Dynalco, 3690 NW 53rd St., Ft. Lauderdale, FL 33309

PUMP-REPAIR-DRIVES
Scardana Americas Bkg., 502 Empire St. , Greenfield Park J4V 1V7, Canada

PUMPS
Mack Boring & Parts Company, 2365 Rout 22, Union, NJ 07083

RADARS-ARPAS
Furuno USA Inc., 4400 NW Pacific Rim Blvd, Camas, WA 98607

REFUELING EQUIPMENT
Global Incorporated, P.O. Box 24, 160 Cannery Road, Somerset, PA, PA 15501

REMOTELY OPERATED VEHICLES
VideoRay LLC, 580 Wall St, Phoenexville , PA 19460, 610-458-300, 610-524-9846, info@videoray.com , Contact: Chris Gibson, www.videoray.com/

RIGID INFLATABLE BOATS
Willard Marine Inc., 1250 N. Grove St., Anaheim, CA 92806

ROPE-MANILA-NYLON-HAWSERS-FIBERS
Atlantic Cordage, PO BOX 30, Avenal, NJ 07001-0030
Marlow Ropes, South Road, Halisham, East Sussex BN27 3JS, UK

ROTATING EQUIPMENT
Seatworthy, 22 Main Street, Centerbrook, CT 06409

RUDDER BEARINGS & BUSHES
Duramax Marine LLC, 17990 Great Lakes Parkway, Hiram, OH 44234
Thordon Bearings, 3225 Mainway, Burlington Ontario L7M 1A6, Canada

SAFETY PRODUCTS
Brookdale International, 1--8755 Ash St., Vancouver, BC V6P 6T3, Canada
D & B Technologies, 1458 OCEAN SHORE BLVD #132, ORMOND BEACH, FL 32176-3613, 407-647-7500, 407-647-7505, HOTEYE@HOTEYENOW.COM
DBC Marine Safety Systems, 101-3760 Jacombs Rd., Richmond, BC V6V 6T3, Canada
Lalizas SA, 21 Haidariou St., 545 Piraeus, Greece
Stearns Mfg. Co., PO Box 1498, St. Cloud, GA 56302-1498
Viking Life Saving Equipment, 1400 NW159th Street Suite 101, Miami, FL 33169
Walport USA , 39-5A Dover Rd South, Toms River, NJ 08757
Western Fire & Safety, 2446 NW Market Street, Seattle, WA 98107

SALVAGE
American Salvage Association, 801 North Quincy Street, Arlington, VA 22203
Titan Maritime Industries Inc., P.O. Box 350485, Ft. Lauderdale, FL 33004

SALVAGE ENGINEERS
Jamestown Marine Services, Inc., 1084 Shennecossett Road, Groton, CT 06340

SANITATION DEVICE- POLLUTION CONTROL
Envirovac Inc, 1260 Turret Dr., Rockford , IL 61111
Hydroxl Systems, 9800 McDonald Park Rd, Sidney, BC V8L 3S8, Canada
Microphor, 452 E. Hill Rd., Willits, CA 95490
Severn Trent Da Nora, LLC, 1110 Industrial Boulevard, Sugar Land, TX 77478

SATELLITE COMMUNICATIONS
Eurocom Industries AB, Box 7071, DK-9200 Aalborg SV, Denmark
Furuno USA Inc., 4400 NW Pacific Rim Blvd, Camas, WA 98607
KVH Industries Inc., 50 Enterprise Center, Middletown , RI 02842
Nera Satcom AS, Box 91, NO-1375 Billingstad, Norway
Seawave, 76 Hammarlund Way (Tech 3), Middletown, RI 02842
Stratos , Donovan Business Park, St. Johns, NL Canada A1C 5X3, Canada

SCARIFIERS
Desmond-Stephan, P.O. Box 30, Urbana, OH 43078

SEALS
Duramax Marine LLC, 17990 Great Lakes Parkway, Hiram, OH 44234
Orkot Composites, 2535 Prairie Rd, Unit D., Eugene, OR 97402

SEATING
H.O. Bostrom, 818 Progress Ave., Waukesha, WI 53186, 262.542.0222, 262.542.3784, johnbostrom@hobostrom.com, Contact: John Bostrom, www.hobostrom.com

SECURITY
Bulldog Technologies Inc., 11120 Horseshoe Way - Suite 301, Richmond, BC V7A 5H7, Canada
EMX, Inc., 4200 Dow Road, Suite C, Melbourne, FL 32934

SENSORS
Electronic Marine Systems, 800 Ferndale Pl., Rahway, NJ 07065

SHAFT SEALS
Duramax Marine LLC, 17990 Great Lakes Parkway, Hiram, OH 44234

SHAFTS
Centa Corp., 815 Black Hawk Drive, Westmont, IL 60559, 630-734-9600, 630-734-9669, bobl@centacorp.com

SHIP DESIGN
AVEVA, Inc, 10370 Richmond Ave, Houston, TX 77042
SNAME, 601 Pavonia Ave, Jersey City, NJ 07306

SHIP MANAGEMENT
Eurasia Group , 22A Floor Chinachem Exchange Sq., , 1 Hoi Wan St., Quarry Bay, Hong Kong

SHIP REPAIR
Manitowoc Marine Group, 1600 Ely St., Marinette, WI 54143-2434
OCEAN TECHNICAL SERVICES, MILITARY OCEAN TERMINAL BAYONNE UNIT #8-FOOT OF 32ND STREET, BAYONNE, NJ 07002
United Marine Services, Po BOX 22077 , Beaumont, TX 77720, 4098330744, 4095473815, Lrichardson@ATT.net

SHIP SIMULATORS
Kongsberg Maritime AS, PO Box 1009, 3194 Horten, Norway

SHIPBUILDING-REPAIRS, MAINTENANCE, DRYDOCKING
Atlantic Marine, Inc., P.O. Box 3202 , mobile, AL 36652
Austal USA, 100 Dunlap Dr., Mobile, AL 36633
Blount Marine, 461 Water St., Warren, RI 02885
Bollinger Lockport & Larose, P.O.Box 250, Lockport, LA 70374
Cotecmar, KM 9 VIA A MAMONAL ZONA INDUSTRIAL, CARTAGENA, BOLIVAR 6911, Colombia
Curacao Drydock Co., Box 3012 , Wilmestad, Curacao, Netherlands Antilles
Detyens Shipyards Inc., 1670 Drydock Ave., Bldg 236, North Charleston, SC 29450
Fincantieri Canterieri Navali Italiani Spa, Merchant Shipbuilding Div., 34123 Trieste, Italy
In-Place Machining, 3811 N. Holton St., Milwaukee, WI 53212
Leevac Industries, LLC, P.O. Box 1190, Jennings, LA 70546
Lindenau GmbH, P.O. Box 90 93, Kiel D - 24157, Germany
Manitowoc Marine Group, 1600 Ely St., Marinette, WI 54143-2434
Motor-Services AB, Box 2115 , Ronninge S- 144 04, Sweden
Newport News Shipbuilding, 4101 Washington Ave., Newport News , VA 23607
United Defense, 1525 Wilson Blvd., Ste 700, Arlington, VA 22209-2444
United Marine Enterprises Inc., P.O. Box 22077, Beaumont, TX 77720
United Marine Services, Po BOX 22077 , Beaumont, TX 77720, 4098330744, 4095473815, Lrichardson@ATT.net
VT Halter, PO Box 3029, Gulfport, MS 39505
Washburn Doughty, P.O. Box 296, E. Boothbay, ME 04544

SHIPYARDS
Alabama Shipyard, P.O. Box 3202, Mobile, AL 36652
Atlantic Marine, Inc., P.O. Box 3202 , mobile, AL 36652
Cotecmar, KM 9 VIA A MAMONAL ZONA INDUSTRIAL, CARTAGENA, BOLIVAR 6911, Colombia
Derecktor Shipyard, 311 E. Boston Post Rd., Mamaroneck, NY 10543
Detyens Shipyards Inc., 1670 Drydock Ave., Bldg 236, North Charleston, SC 29450
Leevac Industries, LLC, P.O. Box 1190, Jennings, LA 70546
Lindenau GmbH, P.O. Box 90 93, Kiel D - 24157, Germany
Offshore Inland, 3521 Brookdale Dr. S., Mobile, AL 36618
United Defense, 1525 Wilson Blvd., Ste 700, Arlington, VA 22209-2444

SIGNS & LABELS
Horizons ISG, 18531 South Miles Road, Cleveland, OH

SILENCERS
EM Products & Cowl Silencer Div. Phillips and Temro Ind., 5380 Cottonwood Lane, Prior Lake, MN 55372, (952) 226-8105, (952) 440-3400, hentig@phillipsandtemro.com, Contact: Bob Hentig, Sales Mgr. Marine Products, www.phillipsandtemro.com
Silex Inc., 6659 Ordan Dr., Mississauga, ON L5T 1K6, Canada

SIMULATION TRAINING
Barco Simulation, 600 Bellbrook Avenue, Xenia, OH 45385
Calhoon MEBA Engineering School, 27050 St. Michaels Road, Easton, MD 21601
Marine Safety International, Marine Terminal , Laguardia Airport, NY 11371
Maritime Institute of Technology, 5700 Hammonds Ferry Rd., Linthicum Heights, MD 21090
Poseidon Simulation AS, Box 89, NO-8370 Leknes, Norway
Transas Marine Overseas Ltd., 12 Obukhovskoy, Oboroni, St. Petersburg 193019, Russian Federation

SLIDING DOORS
Walz & Krezner, 91 Willenbrock Rd., Oxford, CT 06478

SOFTWARE
AVEVA, Inc, 10370 Richmond Ave, Houston, TX 77042
CD-Adapco, 9401 General Dr., Ste 131, Plymouth, MI 48170
Loadmaster International , St. Varvsgarten 11B SE, 211 19 Malme, Sweden
Pipeline Communications and Technology, Inc., 2800 Woodlawn Dr. Ste. 264, Honolulu, HI 96822
Resergence Software Inc. ., 2021 Lakeshore Dr., Ste 21D, New Orleans, LA 70122

STEERING GEARS/ STEERING SYSTEMS
Kobelt Manufacturing Co., Ltd., 8238-129 Street, Surrey, BC V3W0A6, Canada
Offshore Inland, 3521 Brookdale Dr. S., Mobile, AL 36618

STERN TUBE BEARINGS/ BUSHES
Duramax Marine LLC, 17990 Great Lakes Parkway, Hiram, OH 44234, 440-834-5400, 440-834-4950, Contact: Richard Spangler
Orkot Composites, 2535 Prairie Rd, Unit D., Eugene, OR 97402
Thordon Bearings Inc., 3225 Mainway, Burlington, Ontario L7M 1A6, Canada

STERN TUBE SEALS
Superbolt, PO Box 683, Carnegie, PA 15106

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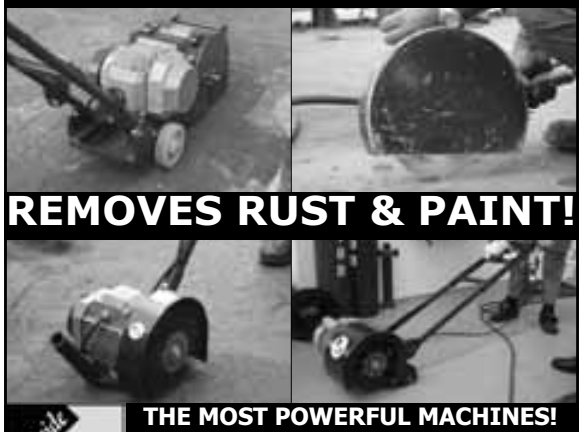

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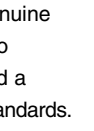

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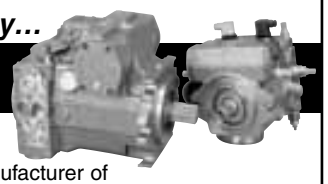

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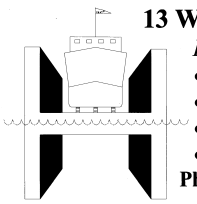

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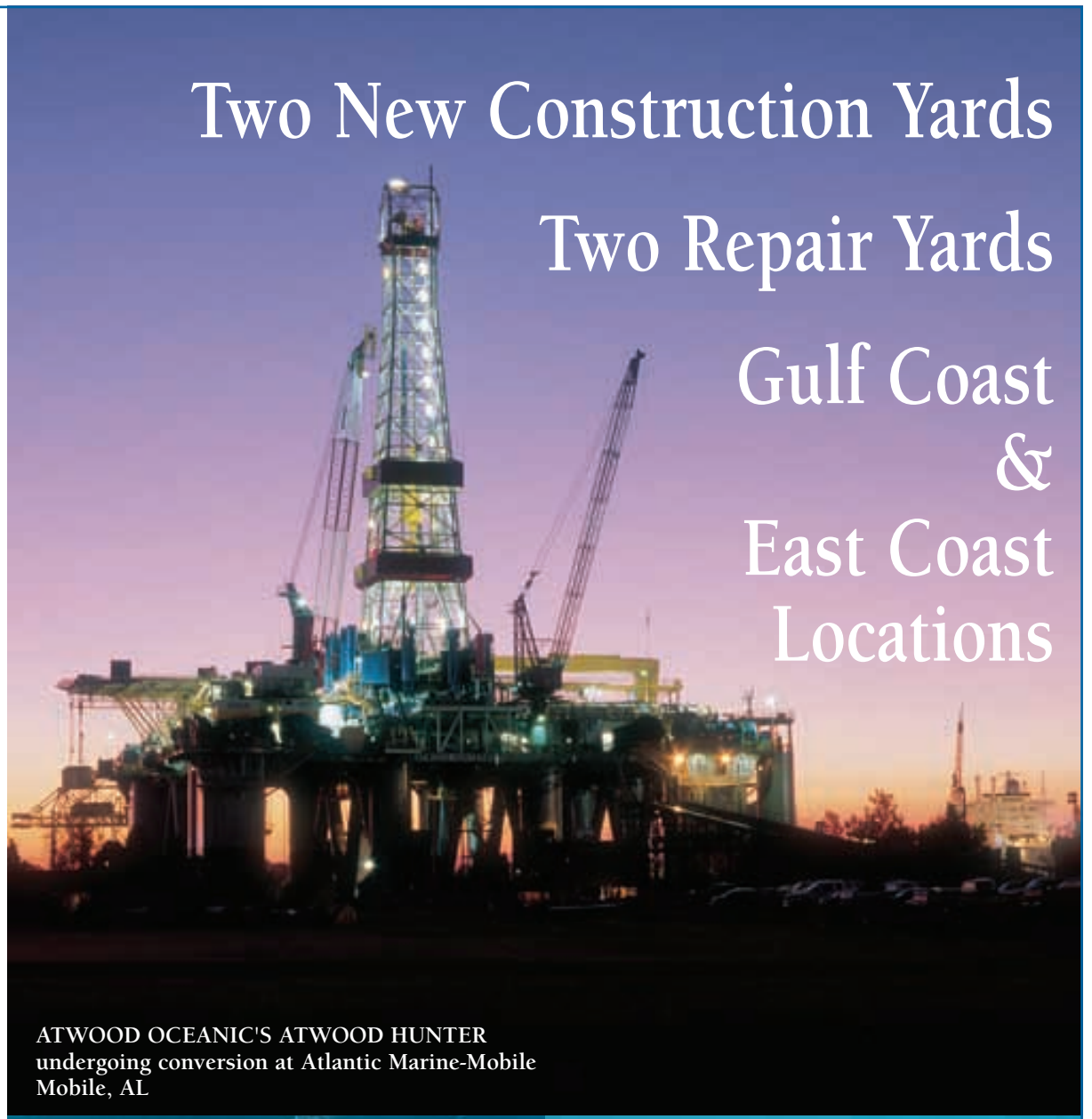

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