

HANDS-ON

The Newsletter of JMS Naval Architects & Salvage Engineers

2004 Volume 11.1

Re-Powering of 182' Pilot Vessel *NEW YORK*

Letter from the President

Dear Readers,

Our latest newsletter reflects the diversity of projects at JMS over the past year. We have supported our clients in the fields of naval architecture and engineering, salvage, diving, vessel operations, and marine sciences. The work has been diverse as is the list of customers who rely on us. However the common thread through all of our projects is that we provide ship operators and builders with technical engineering solutions with a "hands-on" approach. By making engineering house calls to our ship owner/operator client base, we continue to demonstrate JMS' value as sea-going naval architects. Our naval architects recognize the importance of climbing through bilges as well as sitting in front of a computer in order to provide high tech but practical solutions.

We have provided a snapshot of many of these projects here. I hope you find them of interest and I look forward to hearing your comments on our newsletter or questions about how JMS can assist you.

Contact me at (860) 448-4850, ext. 12 or jack@jmsnet.com.

Regards,



Capt. Jack Ringelberg

ENGINEERING

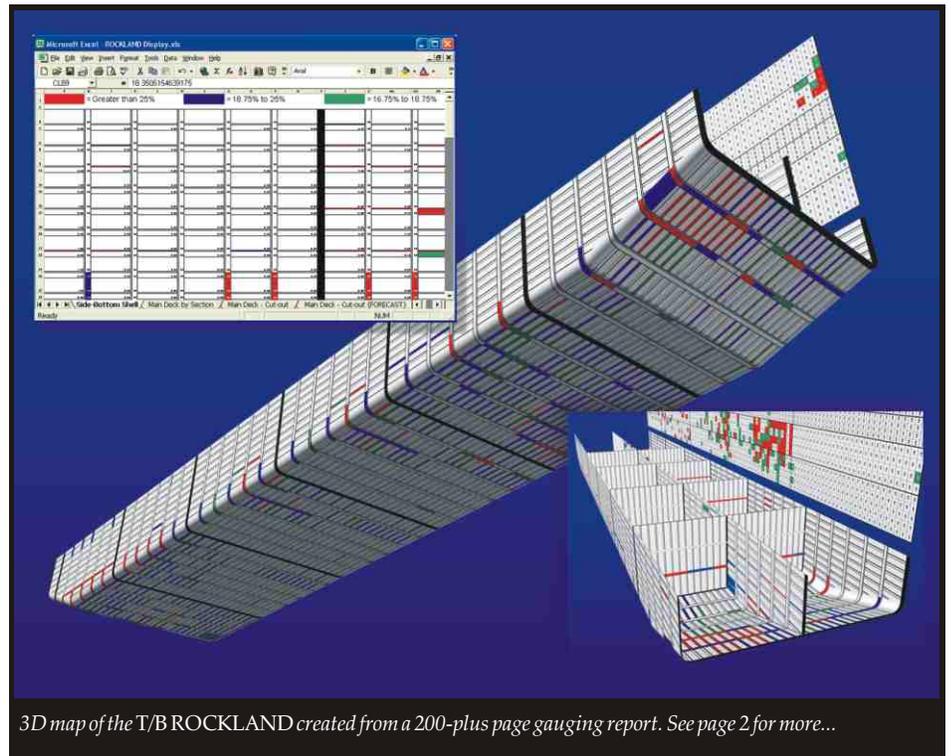
Re-powering the Pilot Vessel *NEW YORK*

The Sandy Hook Pilots provide pilotage service for the ports of NY, NJ, Hudson River, Hell's Gate and Long Island Sound. The 182' *NEW YORK* is the largest vessel in the service and has been in service since 1971. The Sandy Hook Pilots Association intends to replace the main propulsion units and the generators in May 2004. The \$2 million project will extend the vessel's service life considerably and provide state-of-the-art engines with electronic controls and increased efficiency compliant with modern emissions requirements.

JMS will advise Sandy Hook Pilots Association regarding the removal of



engines, gear, and generator sets, provide owner's rep services and shipyard assistance, develop plans, drawings, and calculations for ABS and/or USCG approval, and perform weight and stability analyses and inclining test.



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Steel Replacement Mapping for T/B ROCKLAND

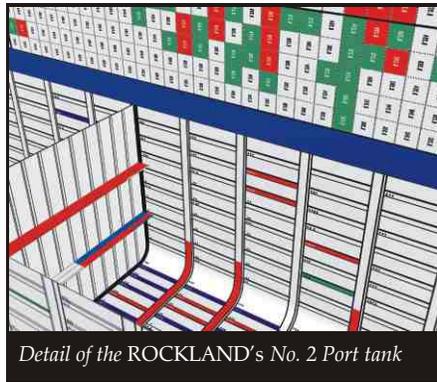
The Reinauer Transportation Companies (RTC) tank barge ROCKLAND underwent a scheduled ABS survey and gauging. ROCKLAND is a 67,000-barrel, ABS classed tank barge. The gauging survey identified a significant number of areas of steel requiring replacement. These included side shell and bottom stiffeners and a considerable portion of the main deck. It was difficult to interpret the 200-plus page gauging report and devise the most efficient plan for steel replacement without a visual "map" of the corrosion.

RTC requested JMS analyze the gauging report and convert the data into an easy to read, color-coded format. The visual format would allow RTC and the shipyard to clearly see the sections of vessel plating and associated stiffeners that required cropping and renewal. This allowed for a quick determination of the scope of work and efficient planning and budgeting by the shipyard.

ABS requirements state that all steel that has been gauged at or below 75% of the rule required thickness must be renewed at the rule thickness. ABS defines substantial corrosion as steel that is gauged between 75% and 81.25% of the required rule thickness but replacement of steel in such areas is not required. However, if not replaced, ABS requires these areas to be gauged annually, which requires the vessel to be removed from service.

JMS developed an excel spreadsheet that used Visual Basic programming to read the gauging report. The JMS spreadsheet arranged the width and height of the columns and rows to visually represent the plating as well as the web and flange of the associated stiffeners. The values from the gauging report were placed into the corresponding locations and each cell was color-coded based on the value of the gauging.

All areas that were gauged less than 75% of the required thickness were colored red and areas of substantial corrosion were colored blue. RTC was also interested in a prediction of the hull condition at the next scheduled survey in five years. JMS highlighted structural members that gauged between



81.25% and 83.25% of required thickness in green. This corresponds to a 2% corrosion rate over five years. If gaugings within this range were located adjacent to sections that are to be removed during the current steel replacement, it would be cost efficient to also remove the extra steel now rather than wait until the next scheduled survey.



Dry Dock Ballast System for Pacific Shipyards International

JMS was selected to design the piping, pumping, and power system to control ballasting and de-watering operations for new dry dock extensions being built for Pacific Shipyards International (PSI) in Hawaii. Heger Dry Dock of Holliston, MA provided the structural design and contracted JMS to provide the detailed systems design. PSI will have the extensions built in China and towed to Honolulu where they will mate them to their existing 53-meter floating dry dock.

Each extension will be 39 meters wide, 13 meters deep, and 20 meters long, significantly increasing lift capacity. The JMS design objective was to produce a system with flooding and pumping characteristics similar to the existing center dock but operating independently of the old ballasting system.

The existing dock pumping system dictated flooding and pumping rates for the new system. Original drawings guided the design of the extension system including the ability to "power flood", pumping water during ballasting operations to augment the gravity flow. The extensions will have their own

machinery rooms in the wing walls for the electric control valve actuators and power distribution equipment. Ballasting/de-watering operations will be controlled from the existing central control room.

JMS recommended the use of submersible pumps to eliminate the need for long pump drive shafts that require bearings, pump room deck stuffing box seals, and alignment considerations. Specifications for pump and valve equipment had to account for equipment suppliers in China where the dock extensions are to be built. Actuators, control, and monitoring functions are to be outfitted with U.S. equipment after delivery to PSI in Honolulu.

JMS supplied general arrangement and one-line drawings for piping, pumps and valves; conducted an electrical load analysis; developed electrical system drawings showing power and control for the system; and provided a detailed specification list of all equipment to be used.

Re-powering Plan for Research Vessel

The CT Dept of Environmental Protection needed to improve the performance of their Long Island Sound research vessel R/V John Dempsey. The vessel does not meet its original design specifications resulting in performance that is not optimal. JMS was hired to assess the problems and provide a plan to correct them. The operator wanted to increase speed and fuel efficiency while reducing vibration, noise, and emissions. They were also interested in increasing maneuverability with the addition of a bow thruster.

JMS conducted a survey of the vessel and discussed objectives with CT DEP representatives. The operator supplied a set of plans and information related to past efforts to correct these problems. JMS then assessed the options for a vessel mid-life refit /overhaul that will achieve the desired goals: 1) increase vessel speed by increasing engine power, 2) improve fuel efficiency and reduce emissions with installation of a newer, cleaner running engine with electronic controls, 3) reduce vibrations with improved (smoother) operating engine and/or soft mounts, 4) improve vessel maneuverability with a bow thruster and, 5) correct excessive aft trim.

A list of tasks was compiled to estimate a project budget. Shipyards and equipment

suppliers were contacted requesting estimates for the anticipated refit work. JMS delivered a report documenting all work and equipment necessary to 1) replace the main engine, considering several engine options, 2) install a bow thruster including the addition of a bow tunnel with a choice of thruster units, and 3) perform the related engineering, documentation, and USCG approval.

Dry Dock Structural Analysis and Tow Plan

JMS is supporting Thames Shipyard & Repair in their acquisition of a 300' X 129' floating dry dock. The 5-section dock is located in Galveston, TX and Thames Shipyard intends to tow it to their facility in New London, CT. Although quite capable of handling docking loads, the dry dock was not designed or built for the loads it will experience during the open ocean tow. JMS conducted a structural analysis of the dry dock to determine its suitability for towing and designed structural modifications in order to increase the longitudinal strength of the dock. In addition, JMS designed towing attachment points and is providing recommendations for the tow plan. Modifications are underway and the dry dock will be towed this spring.

ABS Type Approval for ISOPur Fluid Technologies

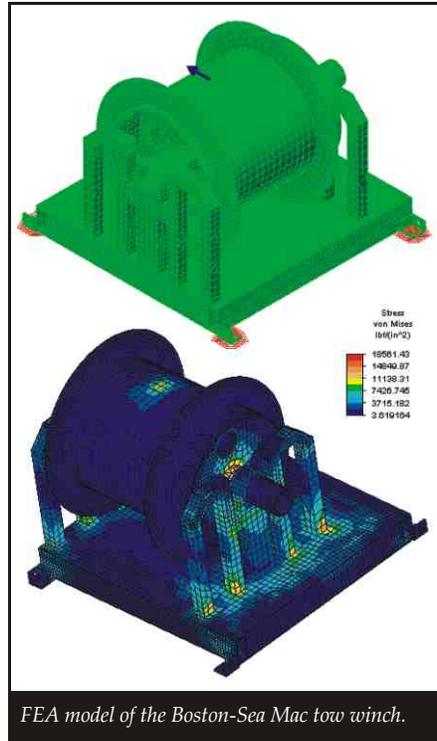
ISOPur Fluid Technologies [www.isopurfluid.com] of Rocky Hill, CT contracted JMS to represent them seeking American Bureau of Shipping (ABS) type approval for their fluid purification system models 50, 101 and 600. As opposed to traditional filtration or centrifugal systems, ISOPur technology continuously purifies oil and fuel to a better than new condition. ISOPur technology achieves higher levels of purity and water reduction than centrifuges, is easier to maintain, and does not have moving parts that frequently break down. ISOPur can provide a dramatic return on investment by improving plant uptime, reducing maintenance costs, extending the life of expensive capital equipment, and reducing fluid consumption and waste disposal.

ABS type approval demonstrates ISOPur's conformance to specific standards and their ability to produce consistent products in compliance with these standards. JMS assisted ISOPur with both the design assessment and the manufacturer's assessment.

During the manufacturer's assessment the ABS inspector examined each ISOPur model and received a thorough demonstration on its use and operation. In addition, ABS audited the manufacturer's ISO 9000 quality system. ISOPur passed the ABS audit with flying colors and received the manufacturer's assessment certificate. JMS will be assisting ISOPur in achieving European type approval during the coming year.

Finite Element Analysis

The efficiency of performing structural analyses of complex structures has been greatly improved with high-speed computers and finite element analysis (FEA) software. JMS has used FEA software for a variety of projects in order to more accurately



define loads and stress distributions in complex structural configurations. Results are also presented in a color format that allows for easy visualization of the stress distribution in the structure. Some of these projects are listed below.

Crane Foundation FEA for D.C.V. GELBERMAN

The U.S. Army Corps of Engineers Marine Design Center desired the existing crane of the Drift Collector *GELBERMAN* to be replaced with a new Effer 44000-3S knuckle boom crane. The vessel is ABS Classed and

Certificated USCG Subchapter I. The Drift Collector *GELBERMAN* lifts and removes debris from the waters of New York Harbor and Newark Bay. The new knuckle boom crane will have comparable lifting capacity as the existing crane but more boom outreach. The knuckle boom crane will be outfitted with a grapple as well as winch and hook. The existing debris collection system uses a hydraulic NAUTILUS crane with a maximum boom outreach of only 26 feet and rated capacity of 5,760 pounds. The crane lifts debris and deposits it on the vessel's fantail and. The knuckle boom configuration will allow direct retrieval of debris by reaching to the water with the boom tip and grapple, as well as retrieval with winch and hook.

JMS previously performed an inclining test and stability analysis on the vessel to determine its over the side lifting capacity. The Marine Design Center additionally contracted JMS to determine the adequacy of the existing crane foundation structure for the new Effer 44000-3S crane and design any necessary structural reinforcement.

JMS had structural plans on file and created a preliminary 3D model using Rhino software that was imported into finite element analysis software. Specific details of the model were confirmed after a ship check at the USACE facilities at Liberty Park, New Jersey. Loads derived from maximum down force and dynamic moment specified on the manufacturer's installation data sheet were applied to the FEA model in 10 degree boom orientation increments. The first analysis showed several structural members would fail under these loads and the structural scantlings would have to be increased. JMS then designed structural reinforcements, modified the FEA model, and reanalyzed the worst case loading scenarios. It was determined that the crane foundation deck insert needed to be replaced with 1-1/2 inch thick plate and the aft bulkhead stiffeners needed to be increased in size. The results and report were submitted to ABS for verification and the USACE is now proceeding with the procurement and installation of the new crane.

UMASS Boston-Sea Mac Tow Winch FEA

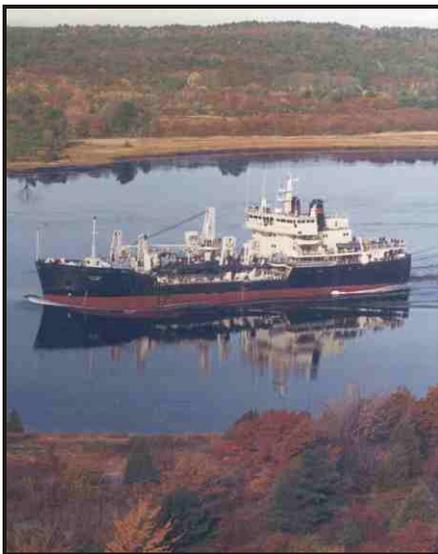
At the request of University of Massachusetts, Boston, JMS conducted a site survey of their Sea Mac oceanographic tow winch. The purpose of the survey was to assess the overall condition and obtain measurements in order to perform a

structural analysis. The winch was designed and built by Sea Mac Marine Products, Inc. but manufacturer plans and documentation related to the structural capacity of the winch were not available. The winch is to be mounted on the deck of a research vessel and must comply with 46 CFR 189.35-9(c) which requires the winch to be able to withstand at least 1.5 times the calculated stresses resulting from application of a load equal to the nominal breaking strength of the wire or rope used.

The entire winch was modeled in 3D, based on the survey measurements, and then transferred to Algor for the FEA analysis. A conservative approach was used for the analysis by placing the load at one point on the surface of the drum rather than distributing the force. Because the tow cable is wrapped around the winch drum in layers, the maximum load was increased to simulate the line pull acting on the top layer of the wire. Nine different load cases were analyzed to model the numerous positions and directions the tow cable would pull. The results of the analysis confirmed that the tow winch exceeded the structural requirements of 46 CFR 189.35-9(c).

FEA of Structural Member in Lieu of ABS Rules

The U.S. Army Corps of Engineers Marine Design Center requested that JMS conduct a stability and structural review of the 350 foot ocean hopper dredge *ESSAYONS*. The objective was to allow the vessel to load beyond its ABS Load Line when operating in protected waters. It was found that the vessel



USACE ocean hopper dredge *ESSAYONS*.

meets or exceeds the stability requirements; structurally however, one member fails to meet ABS requirements at extreme loading conditions. In an effort to minimize the structural modifications that may be required, JMS created a 3D model of the inadequate structure and performed a finite element analysis to gain a more detailed understanding of the loads and stresses acting on this member. The FEA results showed that despite failing ABS rules, the

structure has sufficient capacity for the worst case loading scenario making structural modifications unnecessary.

Other Engineering Projects

Naval architecture remains our core service and we have been involved in a variety of projects for an ever-increasing customer base this past year. The following is a sampling of a few projects recently completed or currently underway.



Bob Tischer getting his hands dirty on a tank barge. Other JMS staff (just south of Bob) getting very dirty.

Customer	Project
Tri-State Ship Repair	Tank barge structural analysis
Caddell Drydock & Repair	Tank barge winch foundation design
Poling & Cutler Marine Transportation	Tank vessel structural and stability analysis
Blakeslee Arpaia Chapman, Inc.	Crane barge loading analysis and lifting plan
Poling & Cutler Marine Transportation	Boat davit structural design and analysis for tank ship
REICON	Deck barge conversion and design analysis
Underwater Hyperbaric Medical Society	Diving History book
Jay Cashman, Inc.	Dredge ballasting and stability plan
U.S. Army Corps of Engineers	Hopper dredge stability analysis
Energy Company	Expert witness and testimony for diving accident
Law firm	Expert witness and testimony for pier collapse
Reinauer Transportation	Tank barge structural analysis
Law firm	Expert witness and computer generated imagery for catastrophic ship structural failure
Reinauer Transportation	Tank barge stability analysis
Law firm	Expert witness and analysis of fishing vessel stability
U.S. Army Corps of Engineers	Crane foundation structural analysis and design for tug
Statia Terminals Group	Salvage engineering computer modeling and response for fleet of 5 tank ships
Maritrans	Marine casualty response drill development and salvage engineering response
Maritrans	Tank barge stability analysis and CargoMax computer loading programs for fleet
Poling & Cutler Marine Transportation	Tank barge structural analysis
U.S. Navy	PSC 8 structural analysis and repair plan
U.S. Geological Survey	Research vessel fleet condition assessment
Reinauer Transportation	Tank barge structural analysis
Reinauer Transportation	Tank barge stability analysis
Reinauer Transportation	Tank barge stability analysis and CargoMax computer loading program
U.S. Dept of Labor - OSHA	Shipyard safety video
Polar Tankers	Salvage training seminar and drill support
U.S. Coast Guard Gulf Strike Team	Salvage training seminar
Reinauer Transportation	Tank barge structural repair plan
Bouchard Transportation Co., Inc.	Tank barge structural analysis
Reinauer Transportation	Tug structural analysis and repair plan
TugZ	On hire surveys for 2 tugs
U.S. Geological Survey	Safety management plan for research vessel fleet
University of Massachusetts	Oceanographic winch structural analysis
Mystic River Partners	Floating structure analysis and business plan

The Dredge *ESSAYONS* is the latest dredge to be built for the U.S. Army Corps of Engineers. Delivered to the Portland District in 1983, the *ESSAYONS* helps to maintain the entrance bars and harbors on the coasts of California, Oregon, Hawaii and Alaska. The dredge has a 6,000 cubic yard dredged material capacity. Because of its size and dredging depth, the *ESSAYONS* is automated for operation with an unattended engine room and semiautomatic dragarm handling system. Sophisticated instrumentation allows constant production monitoring and enables the 23-man dredge crew to maintain maximum dredging efficiency 24 hours a day.

VESSEL OPERATIONS SUPPORT

U.S. Geological Survey Research Vessel Fleet Condition Assessment

The U.S. Geological Survey (USGS) selected JMS to perform a comprehensive assessment of its research vessel fleet and provide USGS with documented condition reports to be used to evaluate the state of each vessel and its funding needs in order to maintain the fleet's advanced state of readiness to meet scientific research objectives of USGS. The USGS owns and operates nine research vessels. The vessels conduct biology, water quality, and fisheries research on the Great Lakes, San Francisco Bay, and in Alaska

The assessments included all vessel machinery, hull and hull penetrations, superstructure, decks, interior tanks & voids, all other spaces aboard the vessel including any accessible equipment and material within, all navigational equipment & aids, and communications, lifesaving and fire fighting equipment. The vessels were surveyed underway in an operational environment observing performance of the vessel's deck machinery, and navigational equipment, and testing propulsion power machinery.

Each final report identified all deficiencies, complete with cost estimates for repair or replacement, which will enable the USGS to plan and budget work required to maintain the satisfactory operation and appearance of the vessels. Vessel modification projects were proposed to ensure the short-term (up to five years) operational continuity of the research vessel for its intended use and to plan for long-term (over five years) major capital reinvestment for long-term utilization.



John Manning says these two pass inspection. Notice the pre-inspected cooking device in the lower left corner.

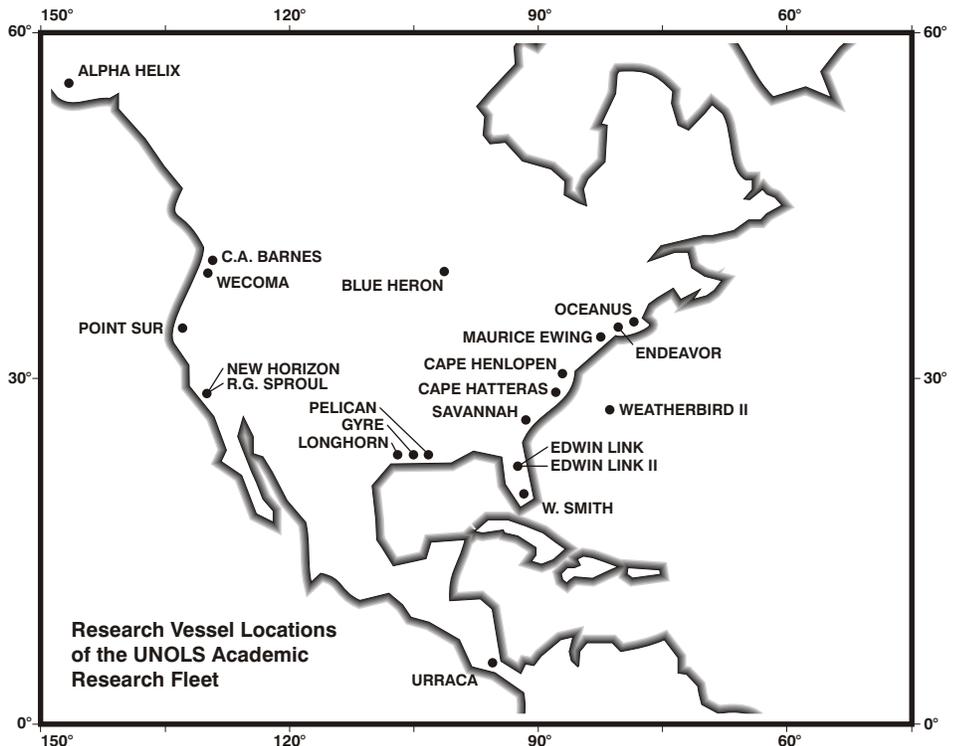
Safety Management Study for U. S. Geological Survey Research Vessel Fleet

In addition to performing a comprehensive condition assessment of the USGS research vessel fleet, JMS is assisting in the development of USGS policy to address the management and utilization of the research vessel fleet. Existing policies addressing safety issues and procedures that ensure shipboard safety vary widely. USGS selected JMS to assess their research vessel operations and develop recommendations to better ensure

safety at sea, prevent the occurrence of human injury or loss of life, and avoid environmental and property damage. In addition, JMS will support USGS in developing a long-range fleet replacement plan to ensure the orderly replacement of aging vessels to meet evolving science requirements and incorporate technological advances in oceanographic outfitting. The vessels range in age from 5 to 77 years old. The oldest vessel in the fleet is a 96-foot wooden yacht converted for use as a research vessel. Vessel age has an unavoidable impact on routine and emergent maintenance costs as well as ship availability. Major upgrades to ship structure, oceanographic outfitting, and machinery systems are necessary to keep research vessels in operation for their nominal 30 year service life and beyond. In addition, there is a constant need for fleet improvement to maintain state-of-the-art research capabilities and ensure the safety of the crew and deployed scientists.

National Science Foundation Research Vessel Inspections

JMS has been conducting scientific, seaworthiness and safety inspections aboard University-National Oceanographic Laboratory System (UNOLS) research vessels since 1997. With a strong emphasis on continuous improvement, the inspection program ensures that the ocean-going scien-





tist can safely and efficiently conduct research at sea. This past summer JMS completed another round of inspections of the fleet. UNOLS is a consortium of 57 academic institutions with significant marine science research programs that either operate or use the U.S. academic research fleet. The 27 research vessels in the UNOLS fleet stand as the largest and most capable fleet of oceanographic research vessels in the world. The vessels range in size from 70 to 280 feet. The UNOLS fleet provides the platforms on which the bulk of American oceanographic research is performed.

JMS provides a team of 3 inspectors to survey the scientific equipment, hull, mechanical & electrical systems, safety equipment, training, operational procedures, and shared-use equipment. The sea-going scientist is the end user aboard UNOLS vessels and the inspections must ensure that the ship can serve the science mission effectively and safely.

JMS personnel have unique qualifications related to research vessels. Our inspectors are degreed naval architects, maintain merchant marine licenses as appropriate, and have extensive experience surveying the UNOLS fleet and other research vessels, uniquely qualifying them to perform scientific, seaworthiness, and safety inspections for NSF.

MARINE CASUALTY RESPONSE

OPA 90 and Homeland Security

Adapted from Workboat Magazine, December 2003, by Rick Fernandes

On Oct. 1, President Bush signed the first ever Homeland Security appropriations bill - \$37.6 billion. A great deal of this money is earmarked to protecting our nation's "critical infrastructures" such as energy and transpor-

tation. One could make an easy case for the need to support and protect critical energy infrastructures such as our waterborne oil transportation system, as our president implores for every other energy infrastructure within our shores.

Experts say that sooner or later it's going to happen. Marine casualties such as oil spills or tanker explosions may be the result of operator error, equipment failure, or terrorism could not only cause massive environmental disasters but also block vital harbors and shipping channels. Regardless of the cause, the response is the same and the success of the response depends on careful planning and prudent engineering.

The new improvements to OPA 90 focus around the need for a credible salvage and firefighting response capability in the U.S. The proposed rule requires that oil transportation companies secure qualified, professional salvors that can respond to marine casualties quickly - in hours, not days. Whether it's a marine catastrophe caused by human error or caused by a terrorist, OPA 90 is essential to Homeland security.

But the Coast Guard has delayed issuing the final rule, and it's now more than a year since they closed the public comment period. They say they need more time to fairly evaluate the large amount of comments they received. Most comments submitted to the USCG on the changes to the salvage requirements of OPA 90 objected to the tremendous financial burden placed, once again, on the individual oil transportation companies. The Coast Guard estimates the cost to the industry will be \$100 million the first year alone, and \$500 million through 2030.

These costs primarily would be the result of salvage companies charging retainers to oil transportation companies in order to respond within the required timeframes. Quicker response times means major salvage companies need to have more equipment (tugs, crews, etc.) essentially prepositioned or at least closer to the companies they will respond to.

Much of the language in the Homeland Security appropriations bill supports the argument to protect this vital energy infrastructure: \$4 billion to our nation's first responders such as firefighters and police, \$9 billion for Emergency Preparedness and Response, \$6 billion to the USCG for security and patrol teams, sensors, equipment, and

research and development for detection. But where is the funding to respond to the off-shore maritime disaster?

Who would respond to a major tanker fire off our coasts today? Many think the USCG, but that is not their mission. There are a few commercial firefighting companies, but that's not enough coverage to get everywhere quickly. If protecting critical energy infrastructures is vital to homeland security, then sooner is better than later to sign off on this much needed regulation. The time is right. The Homeland Security appropriations bill could fund this federal mandate. It could pay to train our nation's local firefighters for marine firefighting, pre-stage salvage response vessels along the coasts, or at least provide incentives for our commercial salvors to do it. It could be done much the same way the Military Sealift Command has commercial companies operating government-owned assets. That's not a new concept. I believe the money to do it can come in the form of grants earmarked in the new appropriation, and the American Salvage Association is the best organization to lead such an effort.



National Strike Force

Salvage Seminar for U.S. Coast Guard Strike Team and ConocoPhillips Marine Emergency Response Team

JMS frequently offers salvage training courses to shipping companies and government agencies. JMS offered two of these salvage seminars in 2003. One seminar was presented to the ConocoPhillips Marine Emergency Response Team. The second was for the U.S. Coast Guard National Strike Force (NSF), which included members of the Gulf Strike Team, the Pacific Strike Team, and the Atlantic Strike Team.

Polar Tankers Inc. manages the marine transportation of ConocoPhillips' Alaska North Slope production. Polar Tankers is based in Long Beach, California, and operates five ships in the Alaska trade. The seminar covered such topics as salvage organization,



surveys and planning, salvage engineering, recovering buoyancy, and strandings. Each of the topics included a discussion on techniques, standard equipment employed, and case studies. In addition to the seminar, JMS assisted with the development of the U.S. Coast Guard oil spill exercise that was run the day after the seminar. Based on the assumed damage, JMS predetermined the amount of flooding that would occur, resulting drafts/trim, ground reactions, damage stability, tide cycle effects, etc.

JMS presented a two-day seminar to the U.S. Coast Guard National Strike Force (NSF). This detailed course covered topics such as tugs and towing, heavy lift and rigging systems, underwater surveys, salvage organization, surveys and planning, salvage engineering, recovering buoyancy, strandings and commercial diving operations. NSF's mission is to provide highly trained Strike Teams and specialized equipment to Coast Guard and other federal agencies to facilitate preparedness and response to oil and hazardous substance pollution incidents. The Strike Teams provide rapid response support in incident management, hazard assessment, oil spill dispersant, in-situ burning, and high capacity lightering and offshore skimming capabilities. JMS invited other company representatives to give presentations in areas of expertise. These companies included representatives from Titan Maritime, Maritime Pollution Control, and Bisso Marine.

DIVING SUPPORT

DIT Curriculum Meets International Diving Certification Standard

This past June, Diver's Institute of Technology (DIT) was audited by the Canadian Standards Association (CSA) and became the first and only U.S. commercial diver training school whose curriculum meets an international diving certification standard: Diving Standards for Unrestricted Air Diving to 50 meters (165 feet), Unrestricted Mixed Gas Diving, and Restricted SCUBA Diving (Z275.4-5). DIT graduates are now qualified for employment anywhere in the world.

JMS Chairman, Bruce Banks, has been working tirelessly to achieve international certification for DIT since JMS purchased the school in 1999. Banks realized that DIT graduates needed to be trained to a well-defined and measurable standard that meets unrestricted international standards. DIT made major modifications to its curriculum and has been training its students to the Canadian Standard since 1999 well before Canada even began its process of auditing and approving schools outside Canada. Banks estimates DIT invested well over 4,000 man-hours in the effort to not only rewrite its entire 30-week curriculum but also convince the Canadian Standards Association that a U.S. school should be considered for review.

The curriculum was revised to meet 2 primary diver competency standards: Restricted SCUBA and Unrestricted Surface-supplied (Air). Aside from the classroom academics and very low student/instructor ratio requirements, the most significant changes involved extending the existing program's deep dive depths and in-water time. The new (Air) diving program alone requires 50 hours total in-water time with maximum depths of 165 feet. The mixed gas dives go to 265 feet.

The result, says Banks, "has been graduates with a more technical and realistic skill set,

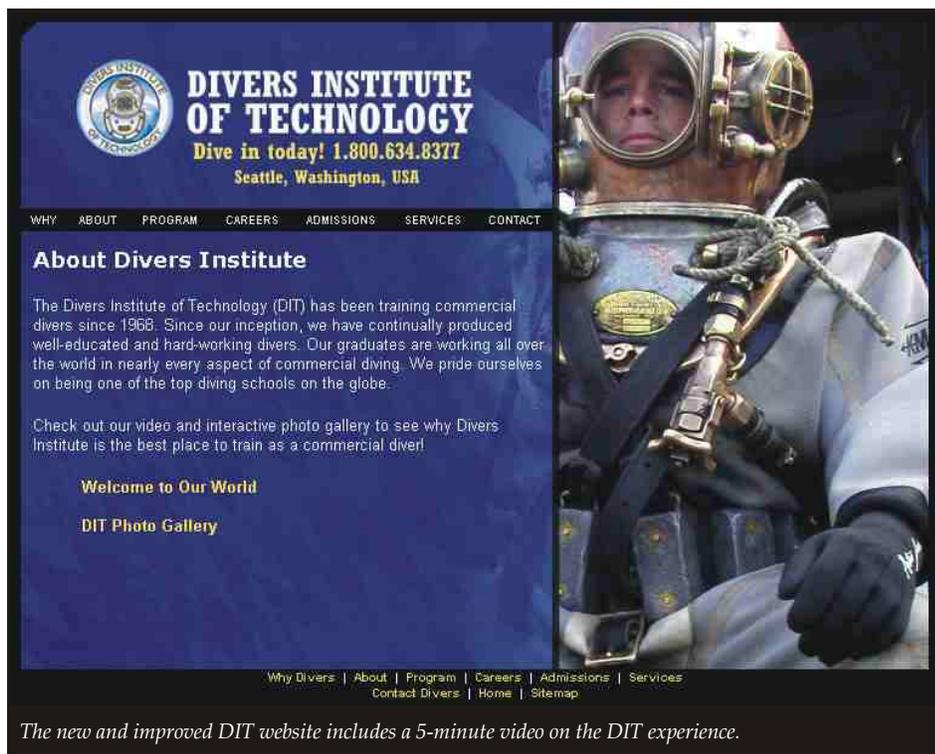


much better than the graduates from any of the other schools in the U.S. This has been noticed by the industry that hires them. They realize our graduates are safer, more astute and ultimately more productive".

DIT is also developing a specialized advanced training curriculum for experienced U.S. commercial divers who wish to receive international certification. This specialized training will be available to past DIT graduates as well as graduates from other U.S. and international commercial diving schools.

New DIT Website Profiles Careers of Commercial Divers

DIT is launching a new web site, promising to be a huge improvement over the last major redesign that took place in 1999. The school's



The new and improved DIT website includes a 5-minute video on the DIT experience.

Director, John Paul Johnston says, "The main focus of the site is to relate to the prospective student in a more personal way and make the web site experience more like what they'll actually experience here at the school and eventually as a career commercial diver." With student and graduate profiles, the site will attempt to convey the very active, hands-on core curriculum at DIT. The school strives to strengthen individual character and impart the best professional credentials every student in order to prepare them for the exciting and challenging career ahead. "There's also this adventure aspect to the job...you can travel the world and have a hell of a time doing it. The web site, hopefully, will make that connection with more young men and women looking for an exciting and rewarding career." The web site also includes a 5-minute video clip about the DIT experience. [www.diversinstitute.com]

DIT Enrolment Up Despite Current Events

Enrollment continues to climb despite students being called away to serve our country in Iraq. DIT is especially proud of our students who have stepped up to defend freedom while placing themselves in harm's way. It says something about the quality and character of the students the school attracts. We wish them well and a safe and speedy return.

Diving Operations at Bath Iron Works

Another successful year has passed with JMS providing on-site supervision and project management supporting all diving operations at Bath Iron Works. During our eleventh year 2002/2003, underwater operations supported the manufacture of three new Arleigh Burke destroyers and the shipyard infrastructure to launch and maintain these modern and highly sophisticated warships. The 15-acre land-level transfer facility (LLTF) and the 750-foot long floating dry-dock now employed in full production require annual preventative maintenance inspections and occasional underwater repair. Since the shipyard is situated on the Kennebec River in Maine, extreme seasonal climatic variations coupled with very large tidal fluctuations and heavy silting require continued underwater maintenance actions. This past year the majority of the dives undertaken at BIW supported pier / piling, cathodic anode, and silt removal operations. Numerous dives employing a water driven 2.5 inch peri-jet eductor connected to a 4 inch flexible discharge hose were conducted to remove large amounts of silt deposited in or around the three sets of underwater grid works that the

floating dry-dock lands on. The remaining dives were in support of new ship construction. Besides the numerous hull inspections on ships following launch and sea trials, some minor ship's husbandry was performed to install rodmeter / pittsword appendages to the hulls following launches. Additionally, sonar domes with their inherent design utilizing rubber windows require frequent inspections and minor grooming repairs.

JMS's diving supervisor and the entire BIW dive team received SuperLite 17 and KMB-18 factory technician training conducted by Diving Systems International. JMS Master Diver, David Baiss, also successfully obtained his national registry as an emergency medical technician. JMS looks forward to embarking on a 12th year of partnership with Bath Iron Works and continued commitment to safety by supporting 24/7 diving operations.

COMPUTER GENERATED IMAGERY

Expert Witness and Litigation Support

JMS provides accident investigation, forensic engineering analysis, expert advice and testimony and all related litigation support including advanced visuals such as 3D computer animation. By bringing together professional engineers, naval architects and professional level technical artists and animators under one roof, JMS has a unique ability to help illustrate complex marine related engineering concepts to technical and non-technical audiences.

Litigation Support for Containership Casualty

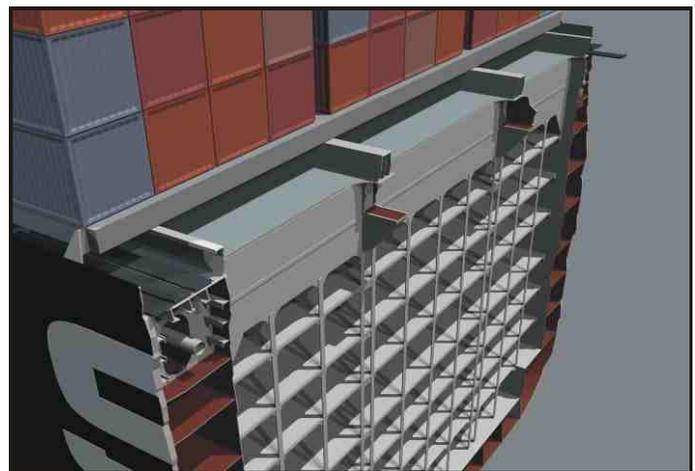
A 937' containership was transiting from France to Boston with a full load of containers when it encountered a storm with 30-foot seas and broke in half. Half of the vessel sank, along with its cargo of French wine. A shipyard had elongated the vessel 13 years earlier by installing a mid-body insert. When the vessel split, it did so near one of the seams joining the origi-

nal hull with the insert. One of the primary issues was whether the modifications had been performed properly and according to the approved design. The concept of the case was simple enough to understand, but the details of the engineering behind the design modification were difficult to visualize. JMS was selected to develop computer animations that would explain the ship's general arrangement, design and construction. The mid-body addition was modeled in detail and the process of dividing the ship and adding the insert was illustrated. Miraculously, the stern portion of the vessel, including engine room, bridge, accommodations and crew, survived the storm and was towed to safety. Metallurgical samples taken from this valuable source of evidence were used extensively in combination with animated "morphing" sequences to show details of the failure.

National Geographic Documentary: OCEANOS

JMS has been developing advanced visuals for documentary broadcasters, major maritime law firms and government organizations since 1995. Some of our clients include the Discovery Channel, The Learning Channel and this latest project for the National Geographic Channel.

In 1991, the South African cruise ship OCEANOS suffered a sea chest failure with 600 passengers and crew aboard. A relatively small problem with respect to the 492' vessel, but it would prove to be the beginning of a progressive flooding sequence that slowly overcame the ship and lead to the vessel's eventual sinking.



An excerpt from a courtroom visual illustrating a detailed structural failure on a containership. 3D animations such as this help explain complex subjects to non-technical audiences.



A snapshot from the National Geographic Documentary: OCEANOS.

The client requested “schematic-style” computer animation sequences for their National Geographic Channel documentary production, “OCEANOS: Cruise Ship Rescue”. JMS developed animated sequences illustrating the ship's arrangement and equipment layout, ventilation and sewage system configuration, and the general concepts that contributed to the ship's sinking. The client desired animations that would have an “engineering” look to them in order to emphasize the animation's technical accuracy beyond simple artistic rendering.

MARINE SCIENCE

Ocean Technology Foundation

Several years ago JMS formed an alliance with the non-profit (501-(c) 3) Ocean Technology Foundation (OTF) [www.oceantechnology.org]. OTF's goal is to develop deep-water technologies and state-of-the-art undersea systems supporting ocean exploration & observatories, marine research, and education. JMS provides marine engineering, technical expertise, and staff support to the foundation. The alliance gives JMS a visionary perspective in the marine industry. With JMS support, OTF is developing national and international programs that include:

April 2004 Expedition with the DELTA Submersible

As part of its Science, Education and Marine Archaeology Program in Portugal (SEMAPP), OTF is planning a two-week expedition in

April to Nazaré and Portimão Canyons off the coast of Portugal. The expedition will include research on submarine canyon ecology and geology, and the investigation of several potential submerged cultural sites. A major objective of the expedition is to locate and identify shipwrecks from the 14th through 18th centuries. Professional development workshops for teachers will be held to introduce SEMAPP concepts and curriculum on marine archeol-

ogy, underwater technologies, and issues such as ghost fishing gear and sustainable fisheries.

“In the Deep Ocean” Exhibit

OTF was selected by Portugal's Centro Ciencia Viva do Algarve to design an exhibit called “In the Deep Ocean”. OTF is the first American nonprofit to work with this satellite office of Ciencia Viva (Portugal's primary science and technology outreach/education organization). The exhibit will be opening in January 2004 and will include interactive hands-on exhibits about marine archeology, current fisheries and biodiversity issues, as well as a major component about ocean technology featuring a large model of OTF's Ocean Base concept (an undersea habitat). The model is 12 feet long by 13 feet tall. The exhibit incorporates a robotic arm and hand-operated activities for an interactive learning experience.

Take a 3-D Tour of the HMS CHALLENGER

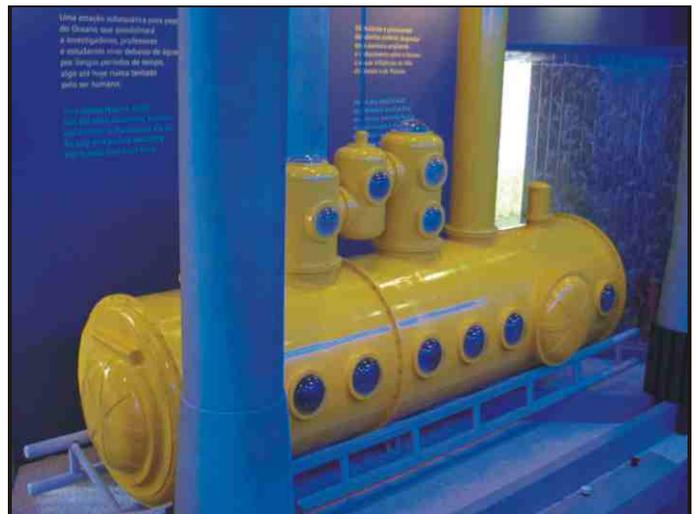
JMS is supporting OTF with computer generated imagery by creating 3-D animations of the HMS Challenger, which sailed around the globe in the late 1800's on what is often

considered the first true oceanographic expedition. This circumnavigation has been accorded enormous significance, yielding a wealth of information about marine life that forms much of the basis of modern marine biology. The Challenger was originally a military vessel that was modified and outfitted to support an extended oceanographic expedition. Fifteen of her seventeen guns were removed to make room for laboratory space, storage space, and the samples that would be collected. Five scientists, one artist, 23 officers and 243 sailors comprised the Challenger's crew. The JMS animations will include an exterior tour of the vessel, and an interior tour that takes the viewer through lab spaces and living quarters. The animations will be part of a larger education initiative on the History of Ocean Exploration that includes an online workshop, teacher resources and lesson plans.

Lobster Restoration Program

The Ocean Technology Foundation (OTF) directs and manages the scientific and logistical aspects of a program to restore American lobsters in the aftermath of the 1996 NORTH CAPE oil spill to Rhode Island waters known as Lobster Management Area 2. The Program entails v-notching about 1.25 million female lobsters for identification purposes and then returning them to the environment. The goal is to both replace lobsters lost after the North Cape oil spill and to promote the long-term health of the lobster fishery.

The core feature of the Restoration Program is the notching and releasing of female non-



The model of the undersea habitat Ocean Base on display in Portugal.



A healthy "egger" with notched tail and "get out of jail free" card.

egger lobsters as they are caught at sea. Trained OTF observers onboard approximately 50 lobster boats perform notching and data recording. Participating lobstermen allow OTF observers to go to sea aboard their boats to v-notch and return non-egger female lobsters to the ocean. This method minimizes the handling of the lobsters and, in the shortest possible time, returns the lobsters to approximately the location where they were caught. Once a lobster is v-notched, it is afforded protection from harvest until the v-notch grows out. During this period of protection the lobster has the opportunity to reproduce and contribute to stock rebuilding.

The Ocean Technology Foundation has conducted the Restoration Program in Area 2 since September 2001. The number of lobsters notched through the OTF program is more than 370,000. Additionally, a previous restocking program in 2000 notched and released approximately 300,000 lobsters in western Area 2.

Oil Spill Investigation and Analysis

At the request of the Ocean Technology Foundation, JMS conducted an analysis and investigation into an oil spill that resulted from an alleged vessel grounding. JMS analyzed oil outflow and trajectory data and used the results to prioritize areas for investigation in order to determine the cause and location of the grounding as well as the extent of environmental damage.

A computer model of the vessel was developed to conduct a damaged stability analysis and calculate hydrostatic oil outflow scenarios. Oil flow trajectories were then plotted

based on the probable oil outflow quantity, reported locations of observed oil on the shoreline, and known currents. This trajectory map was used to prioritize target locations and develop a dive plan to conduct further investigation.

In addition to technical support, JMS provided logistical support that included chartering a dive vessel and overseeing the operation involving 6 dives to depths of 90 feet during the course of two

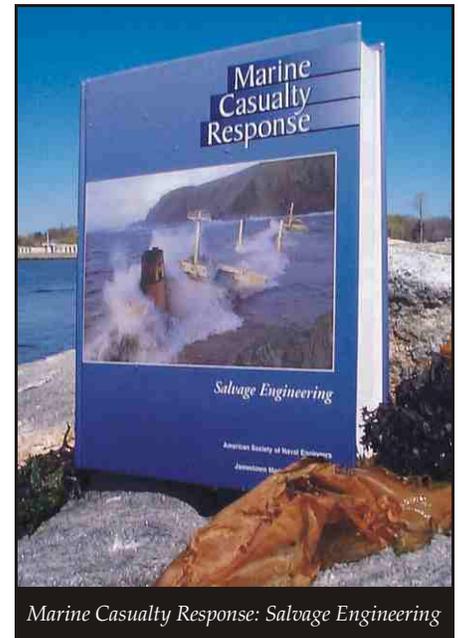
weeks. Underwater video was used to document each location and feed imagery back to the vessel in real time where it was viewed and recorded. Samples were taken at each location to collect both visible oil and sedimentary samples that could be tested for hydrocarbons. A total of 30 samples were collected and analyzed or "fingerprinted" in a lab to determine if they matched the vessel's cargo. Specific positions attained with GPS were documented and correlated with the video imagery and samples taken.

JMS IMPROVEMENTS

JMSNET.COM

If you haven't been there in awhile, be sure to visit our completely redesigned web site: www.jmsnet.com. We've made a lot of improvements to navigation and general organization of content so you can find your way around better...and always know where you are. But more importantly, we rebuilt the site from scratch in order to better define our message and just what exactly separates us from all the other naval architecture firms out there... we're not afraid to get our hands dirty.

With dozens of ship inspections under our belts, and just as many on-site, midnight run, engineering "house calls" to our ship owner/operator client base, we really are "the sea-going naval architects". Our years at sea and on the waterfront taught us the value of work in the trenches...and the bilges. To get you the best bang for your engineering dollar, we have to understand the machinery of your business. We realize that can't be done from a desk.



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JMS Logo Updated

Our logo has been updated too, did you notice? We think it's cleaner, more professional and a little edgier, just like us.



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