HANDS-ON

The Newsletter of JMS Naval Architects & Salvage Engineers

2008 Volume 14

Tug Fleet Modernization Underway at Reinauer

Reinauer Transportation's tug Stephen *after conversion to ATB and other major modification work.*

ENGINEERING & DESIGN

JMS is providing engineering, shipyard management, and owner's representation services to Reinauer Transportation Companies during a major tug fleet modernization project. The project entails converting traditional, 30-year old tugs to articulated tug-barge units (ATB's) with the installation of JAK-400 pin systems. The tugs will push RTC's new 80,000 barrel tank barges currently under construction.

Additional work includes removing the existing towing winches and replacing with towing bitts and capstans for emergency towing operations.*Continued on page 2...*

Reduction gear removal as part of the repowering of the R/V Lake Guardian*...read more on page 4.*

Letter from the President

Dear Readers,

Our latest newsletter reflects the diverse range 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 as diverse as 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 jack@jmsnet.com or (860) 448-4850 ext 12.

Regards,

Capt. Jack Ringelberg

Also inside...

ENGINEERING *continued...*

JMS also designed raised pilot houses for each tug to allow increased ranges of visibility when pushing the barge from the notch. In several cases a third ship's service generator was added as well as additional crew accommodations to handle the barge crew. JMS is also designing fairings to be fitted to the JAK-400 blisters to aid water flow around the fore body of the vessel. The fairings will provide additional waterplane to the vessel, improve stability characteristics, reduce bow wave generation and improve fuel efficiency.

JMS performed an initial vessel inclining test on each vessel to establish the baseline lightship prior to the vessels entering the shipyard and determine if the vessels' stability characteristics would be adversely affected by the pin system installation. In each case it was determined that the vessels would not be able to comply with the current USCG stability requirements for towing vessels without significant modifications being made. JMS designed innovative ways to ensure each vessel would pass the stability criteria while still providing a safe and efficient vessel to operate. Some of the modifications entailed the addition of deckhouse structure, extending the existing foc's'le decks and providing an enclosed poop deck over the steering flat aft to provide additional reserve buoyancy. Fuel, water and ballast tanks also had to be reengineered.

JMS obtained reduced freeboard assignments, conducted the final inclining test and stability assessment, and obtained the final Load Line certificate for the 3,000 hp *Stephen* which was put into service in June 2007. Work on three additional tugs is in progress including the *Joanne*, *Dace*, and *Lucy*. All shipyard work is being completed at Feeney Enterprises in Kingston, NY.

Complex Tug Launching Operation For U.S. Shipping Tug *Freeport*

Mammoet Canada Eastern Ltd contracted JMS to provide engineering support for a complex launching operation of the ATB tug *Freeport* being constructed for US Shipping. The 12,000 HP tug is 150 feet long and weighed over 1,200 long tons. The tug had to be moved approx. 300 feet across the shipyard from where it was being built and transferred onto a floating barge.

JMS worked closely with Mammoet to develop a cradle design to be used with the heavy lift hydraulic transporters. The transporters used for the operation presented unique challenges to the design of the cradle which is comprised of a series of eight saddles. The saddles are positioned along each side of the vessel with no transverse structure tying the system together. The saddles were positioned to support the tug via transverse bulkheads and deep frames.

Reinauer's tug Dace *floats free of the dry dock after her ATB conversion work is completed.*

With the structural plans for the newly fabricated tug, and the input provided by Mammoet regarding the anticipated loadout procedure, JMS developed a 3D model for each saddle to be located along the hull. The models were then imported into finite element analysis software. Loads were derived based upon the information regarding the loadout schedule, and a series of checks were performed. Further, only four of the saddles could be used for jacking points in the first and final phase of the loadout. This resulted in much higher load concentrations for the four saddles than the remaining eight saddles. The scantlings for four jacking saddles were necessarily adjusted to reflect the increased stresses associated with the jacking operation.

Most of the saddles were fabricated onsite, while several were fabricated offsite in order to expedite the aggressive schedule. JMS performed inspections during the fabrication. The individual saddles were fitted to the tug while JMS was simultaneously tasked by Mammoet to assess the existing site's dry dock to the satisfaction of US Shipping's insurance underwriter. JMS performed a detailed analysis of the dry dock in conjunction with the underwriter to determine if an alternate approach would be necessary.

The assessment determined that the dry dock structure would not be adequate for the loadout procedure. The concentrated loads imposed by jacking the tug from the transporter height to the blocking height would be too great for the existing structure. JMS explored options to strengthen the dry dock but the vessel owner's time line necessitated an alternative approach.

Mammoet and JMS proposed chartering a suitable deck barge and modifying the loadout procedure to load the tug onto the deck barge. The barge would then be towed to a suitable graving dock where the barge would be docked. The cradles would be removed from the tug allowing other work to be continued to make the tug ready for service. The barge would then have scuttling holes cut and the graving dock flooded, allowing the tug to float free and towed out of the graving dock. The graving dock would then be pumped dry and the barge would be made tight and re-floated again. This proposal, while expensive, would ensure a safe loadout and launching of the tug and better suit the needs of the US Shipping. US Shipping accepted the proposal.

Tug Freeport *arrives at the graving dock for the final phase of her complex launching. JMS designed transport cradles are still attached.*

Mammoet modified the loadout procedure to suit the available deck barge as well as having a bathymetry survey performed of the loadout site to ensure a safe operation. JMS developed a sea fastening arrangement to make use of the existing cradles in accordance with the underwriter and US Shipping's requirements. The loadout was completed in early January 2007. JMS inspected the deck barge with tug loaded aboard, prior to its tow to the graving dock in Bayonne, NY. JMS determined the proposed sea fastening arrangement would be suitable for the coastwise transit. The barge with tug onboard was

towed to NY where the operation was completed as designed.

Load Testing New Lift Dock For Mystic Seaport Preservation Shipyard

At the request of Blakeslee Arpaia Chapman (BAC), and their client, Mystic Seaport Museum, JMS developed the loading procedure for the newly constructed Henry B. Dupont Preservation Shipyard Lift Dock Replacement Project. A Syncrolift system was selected and lift system designed to handle the docking of the Seaport's 133-foot, 313-ton flagship vessel, *Charles W. Morgan*. The system consists of four pairs of synchronized winches designed for a maximum platform load capacity of 696 long tons. The Syncrolift articulated platform ensures that ship loads are determinately distributed to respective hoists.

The purpose of the load tests was to subject the platform, foundations, hoists, wire ropes, power supply and control system to the maximum permissible load to prove the integrity of the design and construction. The test was conducted to satisfy the Lloyd's Register Code for Lifting Appliances in Marine Environments. The platform and lifting mechanisms were tested at 50% load and at 100% load.

JMS developed a procedure to use a 90' x 30' x 8' BAC deck barge on the lifting platform and partially filling compartments of the deck barge with fresh water to generate sufficient deadweight. JMS developed a blocking plan to support the deck barge during the load test. It was necessary to provide sufficient blocking to support the barge structure adequately with the considerable weight of water that would be contained in the barge compartments during the 100% load test. The deck barge was then re-floated after each test and relocated on the lifting platform. In this way, the test weight, comprising the deck barge lightship and the water ballast, could be shifted where necessary to test all the lifting apparatuses.

JMS personnel were on site for the test to address variations in the load test procedure as circumstances required. Due to variations in tank contents and the blocking height over the platform, obtaining the required test loads on the individual winches was challenging. The actual onsite test required large variations in tank contents as well as using the concrete blocks to obtain the desired loads on individual winches and beams. In several instances reducing the blocking height at peak load locations was required to better distribute the deadweight. The test was completed in June 2007 and since that time Mystic Seaport has been successfully using the lift dock to perform routine maintenance on Seaport vessels.

Mystic Seaport Preservation Shipyard 's new lift dock undergoing a load testing procedure designed by JMS.

Freedom Schooner *Amistad*

JMS performed an inclining test on the Freedom Schooner *Amistad*, in preparation for her 18 month "Atlantic Freedom Tour." An inclining test was conducted to ensure that the vessel's stability characteristics were not adversely affected by recent modification work. Freedom Schooner *Amistad* set sail this past summer from New Haven on a 14,000-mile transatlantic voyage to Great Britain, Lisbon, West Africa, and the Caribbean to commemorate the 200th anniversary of the abolition of the Atlantic slave trade in Britain (1807) and the United States (1808).

JMS conducted the inclining test with the schooner docked at Mystic Seaport where the vessel was built in 2000. She had been undergoing final outfitting there prior to setting sail on her voyage. Because of her size and configuration, the *Amistad* presented a special challenge to the JMS inclining team. One of the two pendulums had to be hung high in the tall ship rig in order to obtain the required deflection needed for accurate results. *Amistad's* deck required additional support from below because of the concentrated weight of the lead bricks used for inclining weight. In addition to the pendulums, JMS utilized an electronic inclinometer to measure test angles of heel. The instrument was set up on deck on a cabin top. Although the 80 foot long *Amistad* weighs over 130 tons, she was prone to movement during the test due to breeze and Mystic River currents.

Freedom Schooner *Amistad*, a replica of *La Amistad*, was built in Mystic Seaport, Mystic, Connecticut, using traditional skills and construction techniques common to wooden schooners built in the 19th century. *La Amistad* became a symbol in the movement to abolish slavery after a group of African captives aboard revolted. Its recapture resulted in a legal battle over their status. The story is well documented in the Steven Spielberg movie, "Amistad". The *Amistad's* Atlantic Freedom Tour is retracing the infamous slave industry triangle with stops at nearly 20 ports that played a significant role in the trade. The *Amistad* hopes to complete her voyage in August 2008. Go to www.amistadamerica.org for more information.

Freedom Schooner Amistad *on inclining day. JMS performed the test in preparation for her 18 month "Atlantic Freedom Tour."*

PSA Support For NOAA FSV *Bigelow* Nears Completion

JMS has completed most of the Post Shakedown Availability work on board the new National Oceanographic and Atmospheric Administration (NOAA) Fisheries Research Vessel *Henry B. Bigelow*. The *Bigelow* is 208 feet long with diesel-electric drive that is designed to eliminate virtually all radiated noise. The purpose is to closely monitor and sample populations of fish without disturbing them in their natural habitat.

The vessel arrived dockside at the Atlantic Marine Operations Center in Norfolk, VA in December 2006 after delivery

from VT Halter Marine in Pascagoula, MS where she was built. Beginning in January 2007, JMS coordinated and managed close to $4 million of work performed by several commercial marine repair firms primarily in the Norfolk area. Some of the more involved work items were modification of the vessel's anti-roll tank, reconfiguring portions of the sophisticated fish handling system, installing high-tech fish data collecting equipment in the Fish Lab, installing the internal electronics of the state-of-the-art sonar system, and adding features to the ship's scientific computer system. JMS met the challenge of completing all work items in time for end of February departure.

The *Henry Bigelow* will be home ported in the northeast. Currently the ship is docked in Newport R.I. for final tests being conducted on the trawl fishing system as well as the onboard operations and scientific systems. As the ship gains fishing and operating experience, new modifications have become apparent. Several modifications and repairs have been performed in Newport under JMS oversight including trawl hydraulics and net gear stowage modifications. Additional work will be completed in Norfolk, VA during the winter of 2007-2008.

Repowering The *R/V Lake Guardian*

JMS is currently providing naval architecture, marine engineering and shipyard management support to the Great Lakes Research Vessel *Lake Guardian*. The vessel is to be re-powered and will undergo extensive deckhouse modifications to enlarge the science laboratories. JMS has already provided the preliminary design and wrote the technical specifications for the project.

The 180-foot *Lake Guardian* is the largest research and monitoring vessel in the US EPA Great Lakes fleet. She is operated by Cetacean Marine and her science missions are carried out by the Chicago-based Great Lakes National Program Office of EPA. GLNPO monitors the state of the Great Lakes ecosystem through sampling of water, aquatic life, sediments, and air.

R/V Lake Guardian is to be re-powered from two CAT D399 main propulsion engines to two Cummins QSK-38M Tier 2 12-cylinder engines with modern electronic controls and instrumentation. JMS was initially hired to consult with EPA and Cetacean Marine to evaluate various engine options. When the selection was finalized, JMS wrote the shipyard technical specification for the installation of the Cummins engines and engineered the interface between these engines and the existing systems

NOAA's new Fisheries Research Vessel Henry Bigelow *during sea trials.*

and structure including shaft and propellers, fuel and coolant piping, and foundations.

Currently the vessel operates with four temporary lab vans installed on the aft deck. While the temporary nature of these vans is meant to provide flexibility, (labs may be changed out for different missions) they are treated as permanent. These vans are being removed, and a permanent lab is being erected in their place. This will allow the vessel to have one large laboratory space with permanent structure, electricity, plumbing, and climate control. In addition, the new deck space over the laboratory provides a platform for two winches: a SeaMac winch currently installed on the aft deck will be relocated and a new Triaxus winch is being added. JMS designed the structure of the new deckhouse and prepared plans for submittal to ABS along with specifications for shipyards to bid.

Great Lakes Towing in Cleveland, OH was awarded the shipyard contract to perform these modifications. JMS is assisting Great Lakes Towing by providing shipyard engineering support and completing as-built drawings. Following completion of the modifications, JMS will also perform an inclining experiment and stability calculations for submittal to ABS and provide and CargoMax loading program for the crew to perform loading calculations while underway.

Ship Structures Committee

JMS continues revising the educational section of the Ship Structures Committee (SSC) website: www.shipstructure.org/case_studies.shtml.

This section of the SSC website was developed by JMS in April 2000. The goal of the site is to increase appreciation of structural issues that are unique to the shipbuilding industry and provide a forum for the dissemination of information to universities and practicing naval architects. However, the website has not been updated in 5 years. Particular "failure" incidents are continuing, form a predictable pattern in some cases, and further, seem preventable in

JMS performed a pre-purchase survey of the Lloyds Classed yacht M/V Savvy.

various ways. The following case studies are examples of the technical issues being pursued for inclusion in the educational case studies section of the SSC website:

- MSC *Carla*, a containership that was midbody lengthened, failed and broke in two in the modified area.
- Examination of the oil tanker *Prestige* that failed and broke in two off the coast of Spain.
- Structural failures of SWATH vessels.
- Double hulling of existing, older single hull tank barges. Some recurring stress fractures and structural weakening have been discovered and repaired repeatedly on some designs.
- Patterns in bulker designs that are repeatedly leading to failures. Over one hundred bulkers have failed over the past decade, resulting in over 300 lives lost.

If you are interested in being a contributor, contact Susan Salancy: susan@jmsnet.com.

JMS Works with History Channel on New *Titanic* Documentary

Last fall, JMS was approached by Roger Long Marine Architecture (RLMA) and Lone Wolf Documentary Group to work with their team on a documentary program for the History Channel. The project involved detailed engineering analysis of new theories developed about the true break up sequence of the *Titanic*. The results of JMS' work formed the conclusion of the team's two-part documentary program.

Many have attempted to determine the *Titanic*'s flooding and breakup sequence over the years but according to RLMA, no one with JMS' level of salvage engineering expertise has been involved in the previous studies. Long held assumptions of water overtopping the low bulkheads had never been confirmed and seemed unrealistic. The boiler rooms were hot, smoky, and noisy places. RMLA believes the builders would have made every effort to isolate

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. In addition to those discussed in this newsletter, the following is a sampling of a few projects recently completed or currently underway.

Customer	Project
American Bureau of Shipping	• Non tank vessel salvage engineering computer models (7)
Allied Transportation	• Tug deadweight survey
AMISTAD	• Sailing vessel inclining test
ARGONAUT	• Sailing vessel stability review
Bath Iron Works	• Diving program management
Blakeslee Arpaia Chapman	• Crane barge stability and load charts
	• Synchrolift load test
Boston Duck Tours	• Expert witness
	• Amphibious passenger vessel stability assessment
Cetacean Marine	• Research vessel repowering and deck house redesign
Columbia University	• 240-foot seismic research vessel survey
Crofton Diving Industries	• Crane barge stability assessment
Dominica Registry	• Admeasurement survey
	• Supply vessel plan review
Feeney Enterprises	• Steel lofting/nesting
	• Crane barge stability assessment
FloatLogic	• Buoyancy feasibility study
Great Lakes Towing	• Tug admeasurement survey
	• Shipyard engineering support
Industria Studios	• Photo studio vessel conversion and engineering
LMS Shipmanagement	• 821-foot Container & Roll-on/Roll-off vessel stability
Lone Wolf Documentary	• TITANIC documentary support
Mammoet	• Tug launching engineering support
Overseas Shipholding Group (OSG)	• Tank barge fleet computer loading program support
	• Tug fleet salvage engineering computer modeling
Mass Fabricating & Welding	• Scallop vessel inclining test and stability assessment
	• Scallop vessel admeasurement survey
Mobile Bay Ferry	• Passenger vessel prepurchase survey
National Crane Inc.	• Lifting beam structural assessment and design
NOAA	• Fisheries Research Vessel shipyard engineering support
	• Research vessel crane design support
National Response Corp.	• Tank barge salvage engineering computer modeling
Natioanl Undersea Research Center	• ROV tether strength analysis
NUSTAR Energy	• Tank barge salvage engineering computer modeling
Poling & Cutler Marine Transportation	• Tank barge salvage engineering support
	• Tank barge structural assessment
Portman & Raley	• Expert witness
Winslow Marine	• Crane barge design
Reinauer Transportation	• Tank barge structural assessment
	• Tug ATB conversion engineering support
	• Tank barge ballast plan
	• Tank barge fleet computer loading program support
	• Tank barge salvage engineering support
	• Tug stability assessment
	• Tank barge Benzene stability assessment
SAVVY	• Yacht survey
Turner Construction	• Governors Island Ferry survey
	• Vessel maneuverability study
US Alliance	• NASA liftboat survey
US Geological Survey	• Research vessel accident investigation
	• Research vessel stability assessment and ballast plan
Valero	• Tank barge stability assessment and deadweight survey
WF Magann	• Crane barge design

Titanic's *double bottom was studied as part of JMS' forensic engineering work for the History Channel.*

those fumes from passenger areas so those boundaries would have been actually tighter than watertight. Water was not going to flow over bulkheads and down into boiler rooms as had been suggested. The hull attitudes during the sinking seem to explain the patterns seen in the steel debris which indicate quite a bit more residual buoyancy in the bow than typically envisioned. Lone Wolf hired JMS to see if they could substantiate RLMA's theories with a thorough forensic engineering examination.

JMS began by developing a digital model of the *Titanic's* hull and superstructure using HECSALV salvage engineering software. The computer model would be used for the calculation of hydrostatic and stability characteristics, as well as hull bending moments. Both the main and secondary watertight compartments in the forward half of the vessel were modeled for determination of damaged compartments volumes, flooded weight and free surface.

Using a range of "design waves", JMS then determined the hull girder bending moment with the design wave crest at various locations along the hull. The hull girder bending moment was also calculated for steps of progressive flooding according to the scenarios specified by RLMA and up to a trim angle of 10 degrees forward. The "design" bending moment and actual flooded bending moment were then compared. A great deal of time and effort was spent to resolve differences between flooding conditions based on various historical research.

JMS investigated multiple progressive flooding scenarios in order to determine the most likely trim angle at which maximum hull girder bending moment would equal the design wave condition and the angle at which the bending moment exceeded the design wave condition.

JMS also examined transverse and longitudinal reserve stability at the 10 degrees trim under all the progressive flooding scenarios. Under all these scenarios JMS determined the point at which the vessel lost longitudinal stability.

It was found that the predicted flooded bending moments exceeded the predicted "design" bending moments in excess of two times. If damage to the hull girder occurred as a result of the flooding condition and associated bending moment, this would not necessarily indicate the vessel was insufficiently designed, disproving the hypothesis of the documentary.

Two days of filming took place at JMS offices in Groton, CT that included both one-on-one interviews with JMS engineers and round-table panel discussions between them and experts from around the country and the world. JMS engineers demonstrated the results of their work with real-time calculations performed using the computer models they developed.

The second of this two-part documentary aired internationally this past June on the History Channel.

VESSEL OPERATIONS SUPPORT AND MARINE SURVEYS

JMS Awarded U.S. Polar Program Review Contract With NSF And USCG

In July, JMS was awarded a contract to review and provide technical service support to the National Science Foundation (NSF) and U.S. Coast Guard (USCG) Annual Program Plan for the U.S. polar icebreaking fleet. In 2006, the $70 million USCG budget for the polar icebreaking fleet was transferred to the NSF by executive order. The fleet consists of three vessels: *Polar Star, Polar Sea* and *Healy*.

Under this contract, JMS will evaluate and make recommendations to the proposed Intermediate and Depot Maintenance plans and budgets. Recommendations will indicate whether they are relevant to achieving short- or long-term availability or both.

USCG icebreaker Polar Star *sits hove-to outside McMurdo Station Antarctica.*

USCG icebreaker Polar Sea *dry docked in Seattle, WA.*

JMS has already conducted a series of ship surveys in Seattle and interviews with US Coast Guard engineers in Oakland, Baltimore and Washington DC to determine recommendations that identify primarily what is needed to keep the ships safe and in an operating status throughout the vessels' remaining planned life cycle. JMS is advising NSF and the USCG on reasonableness and necessity of planned maintenance using established USCG naval engineering business rules and maintenance procedures. The maintenance objective is to preserve the inherent design levels of reliability, performance and safety with respect to cost practicality, system down-time, manpower, tools and materials. JMS is also advising NSF and the USCG on areas that require investment beyond the current budgets to insure operational reliability and safety and also where savings and efficiencies may be gained. JMS will also consider how any recommended changes to the planned maintenance or proposed budget may impact safety and/or the ability to meet environmental and operational requirements.

The United States has enduring national and strategic interests in the Arctic and Antarctic and the importance of these regions is growing. In the north, the United States has territory and citizens above the Arctic Circle. In the south, the U.S. maintains three year-round scientific stations to assert U.S. presence and assure U.S. leadership among the nations that are signatories to the Antarctic Treaty. To achieve national purposes in both polar regions, the nation needs to be able to access various sites throughout these regions at certain times of the year, reliably and at will. Assured access to the polar region requires polar icebreaking ships capable of operating in a variety of challenging ice conditions. Over the past several decades, the U.S. supported its polar interests with a fleet of four icebreakers. The current fleet includes three multi-mission ships that support USCG missions as well as science and one single-mission ship operated by the NSF that is solely dedicated to scientific research.

The *Polar Star* is currently in "caretaker" status and is expected to remain so for the foreseeable future. The *Polar Sea* is currently operational, and is expected to remain so for the foreseeable future. The *Healy* is currently operational, and is expected to continue to support Arctic operations through 2030 and possibly beyond.

Polar Sea's three shafts are turned by either a diesel-electric or gas turbine power plant. Each shaft is connected to a 16-foot(4.9-meter) diameter, four-bladed, controllable-pitch propeller. The diesel-electric plant can produce 18,000 shaft horsepower (13,425 kilowatts) and the gas turbine plant a total of 75,000 shaft horsepower (56 MW). With a sturdy hull and high power to back it up, the 13,000-ton *Polar Sea* is able to ram her way through ice up to 21 feet thick and steam continuously through six feet of ice at three knots. *Polar Sea* holds three notable records. It is one of only three ships that has ever completely transited the Arctic Ocean and circumnavigated North America. She was also one of only two North American surface vessels to reach the North Pole.

USCGC *Healy* is a research icebreaker put into commission in 1999. Designed to conduct a wide range of research activities, Healy provides more than 4,200 square feet (390 m²) of scientific laboratory space, numerous electronic sensor systems, oceanographic winches, and accommodations for up to 50 scientists. Healy is also designed to break 4.5 feet of ice continuously at three knots and can operate in temperatures as low as -50 °F (-45 °C).

DIVING SUPPORT

DIT Receives Education Industry Award

In October 2007, Divers Institute of Technology (DIT) in Seattle was a recipient of the School of Distinction Award from the Accrediting Commission of Career Schools and Colleges of Technology (ACCSCT). This award recognizes member schools that have demonstrated a commitment to the expectations and rigors of ACCSCT accreditation, as well as a commitment to delivering the highest quality educational programs to their students. Through this award it is the Commission's intent to recognize the importance of this significant achievement, including completing the accreditation process without stipulation and DIT's timely submission of reports and fees required of an ACCSCT accredited institution. The 2006 - 2007 School of Distinction Award recognizes institutions that successfully completed the accreditation process and were reviewed by the Commission from May 2006 through May 2007. Congratulations to all the staff and faculty who continue to deliver the highest quality education to commercial divers in training.

Other news:
DIT is now offering Kevin Griffeth Scholarship awards to qualifying students. The top scoring

graduate in every class will receive a $1,000 scholarship award at graduation.

Class sizes at DIT are always on the rise. New classes start every month and average between 25-28 students each. DIT expects to graduate 250 students in 2007. New classrooms have been built on DIT's waterfront campus to accommodate the growing student population. DIT work placement is currently averaging 92% secure employment before students graduate. Every student has job offers upon graduation from the seven-month curriculum.

BIW Dive Team Marks Their 15th Year

Another busy year has passed for the Bath Iron Works (BIW) dive team. JMS has been fortunate to have provided and maintained a consistent professional safe advisory and supervisory role of both surface supplied and scuba diving at BIW. At this writing we are into our 15th successful year without incident! The 2006/2007 underwater operations once again supported the manufacture of three new Arliegh Burke destroyers and the shipyard infrastructure to launch and maintain these modern and highly sophisticated warships.

The majority of the diving for the past few years has been centered around the upkeep and maintenance of the 15-acre land-level transfer facility (LLTF) and the 750-foot long floating dry-dock. Numerous dives were required to inspect, clean and retrofit the capabilities of the pump-house that provides fire main pressure to these facilities. Additionally, pier/piling, cathodic anode, and pier cell inspections, along with pressure washing of the dry-dock's 18 sea suction grates, compromised most of the diving support at BIW. Underwater hull inspections, sonar dome inspections and hull grooming tasks, conducted prior to and following sea trial inspections, made up the rest of the diving work.

Back in 1992, JMS was contracted by BIW to provide commercial diver certification to the original six BIW divers. A few years later the need to train an additional 6 divers was again accomplished. Today out of those twelve, nine still are employed when needed away from their primary trades to support diving operations. Through the years they have honed their underwater skills together to provide a wide range of capabilities both in surface supplied and scuba diving. Due to the wide range of environmental conditions experienced in Bath, Maine, coupled with changing work demands, the ability to shift from one diving capability to another has evolved into a smooth working relationship with all concerned.

BIW has been given the opportunity to build the first of a new class of DDX-1000 destroyers and is currently in negotiation to possibly build ships for the US Coast Guard. A former sulfur carrier is currently in dry dock. The bow has been removed and replaced, new keel coolers, fore & aft bow thrusters and auxiliary propulsion units have also been installed. An additional sulfur carrier is slated for the same modifications once the first one is complete.

The ability to adapt to and safely execute whatever underwater task may develop, coupled with 15 successful years of commercial diving experience provides an invaluable tool for any shipyard. JMS will continue to provide a round-the-clock diving capability that oversees the safe and professional execution of all diving operations to BIW.

From the main lab of Oceanus, *Phoenix Int. pilot Evan Tanner "flies" the ROV* Sea Falcon *during the* Bonhomme Richard *expedition.*

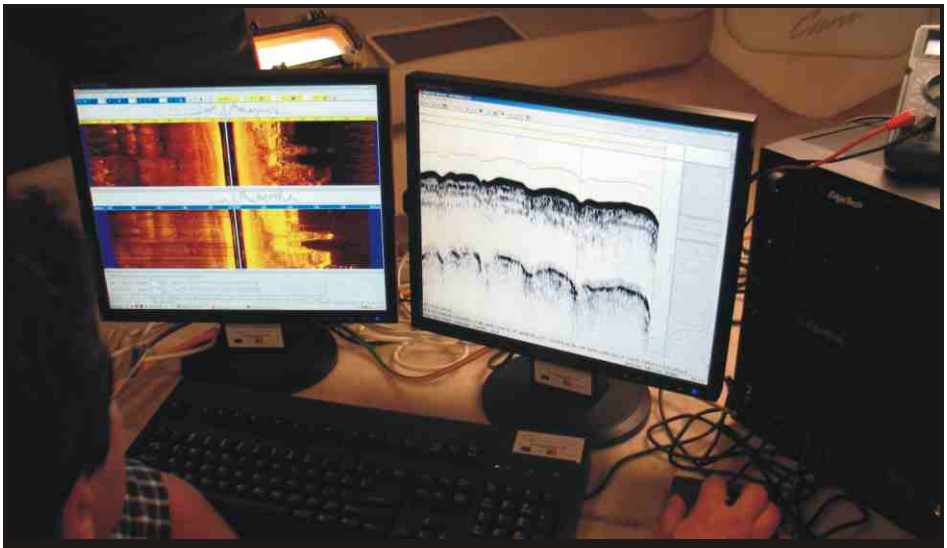
MARINE SCIENCE & TECHNOLOGY

OTF Completes Second Expedition To Find *Bonhomme Richard*

The *Bonhomme Richard* (BHR) was the flagship of the American Revolutionary naval war hero, John Paul Jones. The BHR sank on 25 September 1779 during a ferocious three-hour battle off the Southeast coast of England with the better-equipped and better-manned British warship HMS *Serapis*. Jones is best known for this fight, which is considered the greatest single-ship engagement of the war, and for shouting the legendary battle cry, "I have not yet begun to fight!" Although he was victorious and captured the enemy warship *Serapis*, the badly damaged *BHR* eventually sank after drifting for 36 hours and all efforts failed to save her.

The Ocean Technology Foundation (OTF) and its partners have completed Year Two of the Search for the *Bonhomme Richard*, conducting Remotely Operated Vehicle (ROV) operations aboard the *R/V Oceanus* in August. Vessel time was generously provided by the Office of Naval Research. The US Navy's Office of the Supervisor of Salvage conducted the ROV operations onboard the *Oceanus*. In spite of some adverse weather conditions and a relatively short three days at sea, the cruise was very productive in that the team was able to definitively eliminate two of their four highest probability sites. One wreck site appeared to be a cargo of large blocks of cut stone and another was a well head which marks an offshore drilling site. The search team also visited a third target that was completely buried by a sand wave and was not conducive to exploration by an ROV. Due to the very dynamic North Sea environment, it is not unusual for objects on the seabed to become covered and uncovered by sand waves. In addition to conducting work from a floating offshore platform in a harsh environment, even from a state-of-the-art research vessel such as the *Oceanus*, a seabed in constant flux adds an extra layer of challenges to delicate, deep water archeological work.

According to the archeologists on the expedition, several other targets were ruled out because they appeared to be modern shipwrecks. Data gathered from



Real-time side scan & sub-bottom profiler data during OTF's archeology expedition in Portugal.

the expedition has allowed the team to further narrow their search area as they continue moving forward with the project. They will continue their efforts with the aim of mounting another expedition next summer to conduct additional remote sensing operations.

The Ocean Technology Foundation (OTF) is a non-profit 501-(c) 3 organization whose mission is "to foster excellence in ocean exploration, marine research, and education, and to promote commercial development with an emphasis on underwater activities." JMS provides marine engineering, technical expertise, and staff support to the foundation. OTF together with JMS and other organizations continue to develop national and international programs. OTF is seeking sponsorship for next year's expedition. For more information, or if you would like to become a sponsor, please visit www.bonhommerichard.org or call OTF at (860) 405-1198.

JMS and OTF Complete Seventh Archeology Expedition In Portugal

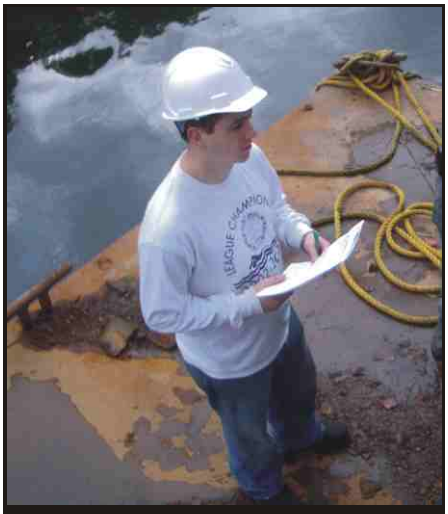
In November 2007, JMS once again supported the Ocean Technology Foundation (OTF), along with institutions from the U. S. and Portugal, on its 7th expedition for the Science, Education, and Marine Archeology Program in Portugal (SEMAPP). Building on work accomplished in 2005 and 2006, the international team of researchers and students conducted sub-bottom profiling at the site of a 17th Century fort currently in ruins and underwater. Fort de Sao Lourenco was built in 1653 in order to protect the entrance to a harbor city called Olhao, an important community for trade and commerce. The fort was destroyed during a major storm event in 1824, and archaeological remains lie underwater in 0.5 to 2.5 meters depth, approximately three kilometers from the mainland. Three cannons and a 2.5 meter diameter, circular stone structure are prominent features at the site.

In 2006, remains of Fort de Sao Lourenco at the sediment/water interface were investigated and mapped. In 2007, analysis of sub-bottom profile data is expected to provide information about remains buried in the sediment that are not otherwise visible. In addition, JMS and OTF are facilitating a formal agreement between the University of Connecticut (USA) and the University of The Algarve (Portugal) that will include cooperation and exchange among professors, researchers, and students while using SEMAPP as a catalyst for the agreement.

"Leaders & Inventors for Tomorrow" summer campers race the boats they designed and built.

JMS And OTF Introduce 8th Graders To Careers In Naval Architecture

This past summer, OTF and JMS worked with the Science and Technology Magnet High School of Southeastern Connecticut on their "Leaders and Innovators For Tomorrow" (LIFT) residential summer camp for eighth graders. More than ninety students were introduced to various ocean technologies, including research vessels and underwater vehicles. Jack Ringelberg, President of OTF and JMS, recognized the value in this opportunity to help train the next generation of naval architects and ocean engineers by working one-on-one with students during a hands-on seminar. After several presentations on basic naval architecture principles and a few physical demonstrations on "how does a boat float", the seminar students split into five-member design teams. Each team designed and constructed a model sailboat. The teams got to test their designs by competing against each other in a racing competition. Awards were given for the fastest boat and aesthetic appeal. The LIFT camp gave students an opportunity to interact with naval architecture and ocean engineering professionals, and several of the presenters spoke about their careers and the types of education needed to work in those fields. Bill Foster explained to students how he used the architectural plans of the *Titanic* to help with a portion of a History Channel documentary. Rick Fernandes spoke about the use of advanced visuals and computer simulations in forensic engineering studies.



Noah Lacy already "in the field".

OTHER NEWS...

JMS Hires Another Sea-going Naval Architect

Noah Lacy joined JMS in October of 2007 as a naval architect. He graduated from State University of New York Maritime College at Fort Schuyler with a Bachelor of Engineering in Naval Architecture. He also holds a United States Coast Guard 3rd Assistant Engineer's License. He is originally from the greater Buffalo, NY area where he grew up spending time on the water between Lakes Erie and Ontario as well as on the Erie Canal. During his education as a ship's engineer, he had the opportunity to travel to over a dozen countries in Europe and Asia onboard the training vessel *Empire State VI*. In addition to the required sea time, he also sailed for Interlake Steamship as a cadet on the ATB *M/V Dorothy Ann / Pathfinder* whose route covered the entire Great Lakes area. By working closely with the vessel crew, he gained practical hands-on skills and background knowledge of self-unloading ATBs. Prior to joining JMS, he worked as a naval architect for M. Rosenblatt & Son/AMSEC in Washington D.C. Lacy brings a well-rounded skill set to JMS. His extensive at-sea experience is coupled with proficiency in hydrostatic and finite element analysis software as well as nearly ten years of AutoCAD experience. He is currently involved in several design and analysis projects and is continuing to further his knowledge of HECSALV and AutoCAD. He is also gaining more hands-on experience working 'in the field' at our customers' waterfront locations conducting inclining experiments and vessel surveys.