RESEARCH VESSEL ARCTICUS DELIVERED TO USGS

ARCTICUS: Delivered

The U.S. Geological Survey celebrated the newest addition to its 5 vessel fleet of large research vessels during a commissioning ceremony in Cheboygan, Michigan on August 31st. The state-of-the-art research vessel ARCTICUS replaced the oldest vessel in the USGS fleet, the R/V GRAYLING, which was the primary research platform on Lakes Michigan and Huron since 1977. The new vessel will offer greater research capabilities, increased fuel efficiency, improved health and safety features, and lower maintenance costs than its predecessor. Acting USGS Director Suzette Kimball christened the vessel during the ceremony attended by members of federal, state, city, and tribal governments as well as the science community. JMS Naval Architects provided the concept through contract level design and oversaw the vessel’s construction at Burger Boat Company in Manitowoc, WI.

The 78-foot ARCTICUS is a state-of-the-art, steel monohull research vessel capable of oceanographic research and fisheries assessment across the Great Lakes. The vessel is designed to conduct lake-wide bottom trawl surveys, acoustic surveys, gill net surveys, and a variety of over-the-side science operations. Its ice strengthened hull can operate year-round across three state boundaries, Canadian waters, and treaty waters of Lakes Huron, Michigan, and Superior.

Propulsion is provided by twin Caterpillar 454 BHP C12 C-Rating Tier II diesel engines and a tunnel bow thruster providing excellent maneuverability and station-keeping.

Engineering & Design is continued on page 2...

Letter from the President

Dear Readers,

JMS has been involved in a wide variety of projects during the past year providing naval architecture, marine engineering and marine surveying services to assist ship owners in the management of their fleets. Our professional staff travelled from the southern tip of Chile to Alaska delivering innovative and cost-effective solutions to customers representing all corners of the maritime industry from historic wooden sailing ships to research vessels employing the latest cutting edge technology. Some of our current designs are a 7,380 ton capacity floating dry dock in Canada, a Research Vessel for Virginia Institute of Marine Science, and a man-lift vessel for bridge inspection. Despite the diversity of our projects, we maintain a consistent philosophy of providing maritime engineering solutions using a unique combination of high-end analytical engineering expertise and practical deck plate experience.

Although we are proud of our past accomplishments, we realize that our continued success depends on a commitment to continuous improvement. We strive to back up our reputation with pragmatic results that bring real value to our customers every day and we continue to bring aboard new engineers who embrace this philosophy. This year’s newsletter describes many of our naval architecture, marine engineering, and marine surveying projects. I hope you enjoy reading about them and I welcome you to send me your comments at blake@jmsnet.com or, better yet, visit us in our new waterfront office located on the Mystic River.

Best regards,

T. Blake Powell
arrangement includes a wet lab, dry lab, retractable transducers, ample working deck areas, large pilot house with excellent visibility, and comfortable accommodations and working areas for a 3-person crew and 6 scientists.

The ARCTICUS was selected by WorkBoat Magazine as one of the 10 Significant Boats of 2015 and is the first vessel built from JMS’ new Coastal Class Research Vessel · Fisheries Series design. This design was intended to remain flexible and support a wide range of coastal fisheries research science missions, outfitting, accommodations, and geographic areas. It is also designed to be affordable to build and operate. At only 78 feet long, it belies its size; it rides and handles like a much larger vessel and provides an extremely versatile platform.

JMS has extensive experience specifically related to research vessel design and operation. In addition to providing entire designs of research vessels, JMS has provided engineering support for weight handling system design, structural modifications, mission mobilization, repowering, and systems integration to a variety of research vessels. Customers include NOAA, National Science Foundation, Office of Naval Research, U.S. Coast Guard, the Department of Interior, Environmental Protection Agency, Woods Hole Oceanographic Institution, Virginia Institute of Marine Science, University of São Paulo, and other major oceanographic institutions in the United States and around the world. In addition to providing naval architecture and marine engineering services, JMS conducts inspections and condition assessments for on-going fleet maintenance or long term fleet replacement planning. JMS naval architects understand the importance of defining the science mission requirements of a research vessel and balancing them with its operational, regulatory, and budget constraints.

JMS Naval Architects designed a 93 foot ABS Load Line research vessel for Virginia Institute of Marine Science of Gloucester Point, VA (www.VIMS.edu) to replace their current research vessel, R/V BAY EAGLE. A solicitation will be issued to shipyards by the end of the year.

The primary mission of the Institute’s fleet is to provide inshore and offshore work platforms for the support of fisheries related oceanographic research projects. The new vessel will be capable of conducting fisheries assessments of greater capacity in deeper waters and with a larger science complement than the BAY EAGLE. In addition, the new vessel will greatly expand VIMS’ capability to perform general oceanographic research in the Chesapeake Bay and the mid-Atlantic near coastal waters. This design is intended to remain flexible and support a wide range of science missions, oceanographic outfitting, and geographic areas. It is also designed to be affordable to build and operate.

Propulsion is provided by a pair of 660 BHP tier III diesel engines coupled to a two-in-one-out marine gear driving a controllable pitch propeller shrouded within a nozzle. This unique arrangement will provide the capability to operate the vessel efficiently on a single propulsion engine when on station or during slow speed transits. This system will reduce overall engine hours and thus reduce the cost of operation and improve fuel efficiency minimizing its environmental footprint. It also powers a very robust hydraulic system required to support the suite of deep water trawl winches and load handling equipment. The electrical system is comprised of a pair of 99 ekJ generators which provide redundant capability or can be run in parallel during peak power demands. LED lighting will reduce both power consumption and heat emitted into the accommodation spaces.

A high lift rudder and 250 HP azimuthing water jet bow thruster provide excellent maneuverability. The vessel’s capabilities are further enhanced by the installation of a state-of-the-art dynamic positioning system for station keeping.

The arrangement includes very large Wet and Dry Labs which have been designed for maximum flexibility to accommodate the many types of science that the vessel is expected to conduct. The 1,000 square foot main working deck allows for a 20 long ton science payload and provides a significant working platform for conducting fishing operations, over-the-side sampling and coring activities. There is also ample room and services to install a 20 foot science van for specialized science missions. The new research vessel will take advantage of the latest technology through an extensive array of acoustic instrumentation for the gathering and processing of data in support of fisheries research, oceanography and geophysical sciences.

The aft deck is fitted with a stern A-Frame with an 8,000 lb safe working load and side J-Frame for conducting CTD operations. The principal fishing arrangement consists of a pair of trawl net reels and a pair of trawl winches with 15,000
Engineering for the NOAA oceanographic and fisheries research ships, and small vessels. The vessels range from large oceanographic research vessels capable of exploring the world’s deepest oceans, to smaller ships responsible for charting the shallow bays and inlets of the United States. The fleet supports a wide range of marine activities including fisheries research, nautical charting, and ocean and climate studies. JMS has previously provided engineering services to NOAA for Acceptance Test of NOAA Fisheries Survey Vessel OSCAR DYSON, Ship Structure Machinery Evaluations, Post Shakedown Availability Fisheries Survey Vessel BIGELOW, and design support for various vessel modifications to support mission requirements.

On The Drawing Board

7,380 Long Ton Floating Dry Dock

JMS has been selected to design a floating dry dock for Groupé Océan, based out of Quebec, Canada that will allow them to dock a variety of vessels, including CCGS Amundsen, a T1200 class, medium icebreaker. JMS designed the dry dock to comply with Bureau Veritas Rules for Floating Dry Docks, and the dry dock will be built and operated under class from BV.

The dry dock will be constructed in three phases; an initial 200 ft x 123 ft section is under construction that will be capable of docking vessels up to 3,740 LT with a keel blocking load of 35 LT/ft. The dry dock will have a clear width between the wing walls of 100 ft, and maximum depth over the pontoon deck of 26 ft 8 in. Two additional sections will be built and permanently joined to create a complete dock with a length on the pontoon deck of 420 ft, and a lift capacity of 7,380 LT.

The dry dock will have a total of 16 compartments, each with its own pump and seachest. Valves will be manually operated from the top deck and ship positioning will be provided by 8 capstans installed on the top deck. The dry dock will operate on both shore power, and on a generator located in a machinery space on the safety deck.

COLONNA’S SHIPYARD, INC.

8,200 Long Ton Floating Dry Dock

JMS performed several tasks for Colonna’s Shipyard in Norfolk, VA in support of a design for a new floating dry dock. JMS reviewed a preliminary dry dock design for compliance with Mil Std 1625d, and provided recommendations on modifications to the design needed to bring the dry dock into compliance with Mil Std 1625d.

JMS also completed a design for a 400 foot x 129 foot dry dock designed meeting ABS rules for floating dry docks. The dry dock has a clear width of 105 feet and a rated load of 8,200 LT. The design includes aprons at each end as well as provisions to add cranes on the wing wall at a later date if required.

350 Long Ton Floating Dry Dock

JMS designed a small floating dry dock for Dorchester Shipyard, in Dorchester, New Jersey. The floating dry dock measures 100 foot x 71 foot overall with a clear width between the wing walls of 60 feet. The dry dock will be used to lift fishing boats and small barges, and has a lift capacity of 350 LT. JMS also provided a design for spud guides and a lifting system to allow the dry dock to be anchored in deep water away from the pier, as well as aprons to increase the working area of the pontoon deck. Dorchester Shipyard selected Steel America, in Norfolk, VA to build the dry dock and construction is nearing completion.
Senesco Marine is nearing completion of their JMS designed floating dry dock. JMS provided drawings and structural calculations for a 200 foot x 80 foot dry dock capable of docking vessels up to 2,500 LT. The dry dock was designed with an opening in the wing wall at midships to allow easier access to the dock and to reduce steel used in the construction. 5 ballast tanks are provided on each side as well as centerline tanks that will be used for ballast and wash water containment. JMS designed a set of modular, removal aprons to increase the working deck space while still allowing the dock to be used for land transfer and ship launching when required.

JMS was competitively awarded a contract to design a crane barge for the State of Rhode Island. The crane barge will be used for stevedoring operations at ProvPort Inc., a nonprofit public-private partnership formed in 1994, which owns and operates the municipal port of the City of Providence, RI. ProvPort is New England’s premier deep water multimodal facility for international trade and domestic distribution and one of the busiest ports in America’s northeast. JMS engineered and designed a barge that will be suitable to carry and operate a Liebherr LHM 550 mobile harbor crane. The 300-foot long x 72’ wide rake/box barge has a deck rating of over 6,000 pounds per square foot and is designed to support the rubber-tired mobile harbor cranes that will operate from the deck of the barge. The design allows for the easy loading and unloading of cargo from ships to the dock or from ship to ship. The barge is ABS classed A1 with notation “Deck Barge”, uninspected and unmanned. JMS also prepared the technical specification documents to utilize in the solicitation of bids and is overseeing the construction of the barge currently underway at Conrad Industries in Amelia, LA. The contract was funded by the state’s Transportation Investments Generating Economic Recovery (TIGER) II grant program award managed by the Rhode Island Commerce Corporation.

JMS developed a detailed design package for a bridge inspection work boat. The vessel is outfitted with a fixed aerial man lift for efficient and mobile inspection work. The 32 foot barge will be outfitted with a pair of retractable outriggers. These outriggers will extend 7 feet from either side of the barge when deployed and will have a 20’x3’ inflatable pontoon attached to them. The inflatable pontoons will have a length of 25’ with a diameter of 3’ and will be constructed out of 60 ounce/yard, Mil-C14505 Type 7 material commonly used in commercial grade sponsons for RIB crafts and whitewater rafts. The work boat is powered by twin 90HP outboards and a Vetus 6 HP electric bow thruster. The barge will be outfitted with a Socage T360 lift that has a vertical reach of 60 feet and a working load of 550 lbs. The lift will be hydraulically powered by an 8 kW Hydraulic Power Unit (HPU). The HPU will also power all other hydraulic systems such as the bow thruster, spud and outriggers. A 13.5kW
Research Vessel Inspection Program

JMS has a long history of supporting the National Science Foundation in the management of the academic research vessel fleet and ensuring the ships and scientific systems are both fully operational and state-of-the-art. This experience has given JMS a unique insight and understanding of the specific needs of the marine science community. With broad expertise in naval architecture, JMS can relate theoretical designs on paper to the practical implications of how the ship can best serve the science mission effectively and safely.

JMS has conducted hundreds of research vessel inspections since 1997 specifically for the National Science Foundation to insure that vessels in the Academic Research Fleet are fully operational.

Generator directly drives the HPU and provides electrical power for services onboard. The barge is designed to be easily on/offloaded to a trailer at boat ramps of opportunity.

JMS Helps Put the Whaling Ship CHARLES W. MORGAN to Sea

The CHARLES W. MORGAN is the last surviving wooden whaling ship and the United States’ oldest commercial vessel still afloat. The National Historic Landmark was built in 1841 and served an 80-year whaling career embarking on 37 voyages between 1841 and 1921. The whaleship measures 106 feet, 11 inches length on deck with her beam measuring 27 feet, 9 inches. Her main truck is 110 feet above the deck; fully-rigged, and she carries 7,134 square feet of sail.

Following a five-year restoration, the CHARLES W. MORGAN sailed on her 38th Voyage to New England ports-of-call, raising awareness of America’s maritime heritage and calling attention to issues of ocean sustainability and conservation. JMS provided engineering assistance to the shipyard to prepare the MORGAN for her historic voyage. The goal was to keep the MORGAN as historically accurate as possible, while installing the modern safety systems: a generator, electric bilge pumps, a diesel-powered backup pump for dewatering and fire-fighting, a new electrical system, fire and safety alarms, and a water and marine sanitation system. JMS also provided engineering support for launching the vessel on the Seaport’s Synchrolift. In addition, JMS performed inclining tests to develop a preliminary ballasting plan. Once all the ballast and rigging was in place, a final inclining test and stability analysis as a sailing passenger vessel were completed.

JMS engineers were fortunate enough to take part in the vessel’s sea trials in Fishers Island Sound, sailing aboard a vessel that had not been underway since 1921. No one alive, let alone aboard, had even sailed an American whaleship before.

MARINE SURVEY & INSPECTION

Research Vessel Inspection Program

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JMS has conducted hundreds of research vessel inspections since 1997 specifically for the National Science Foundation to insure that vessels in the Academic Research Fleet are fully operational.
Vessel Fleet are maintained in a high degree of operational readiness and are able to meet current and emerging oceanographic research objectives. The multidisciplinary team of JMS engineers understands the importance of identifying the science mission requirements of the vessel and balancing them with the operational, regulatory, and budget constraints. The survey ensures that the fleet serves the science community effectively and safely and that the research vessels in the academic fleet are capable of effectively conducting NSF-sponsored research cruises.

The missions supported by these vessels range from water-quality monitoring in the Great Lakes to deep-ocean drilling for geophysical research to ice capable research vessels operating in the Southern Ocean. The multidisciplinary oceanographic fleet includes global vessels that are able to work worldwide, regional vessels which carry about 20 scientists for up to a month, and smaller local vessels under 130 feet. The JMS inspection team surveys each vessel on a biennial basis and has traveled from Alaska to New Zealand to the southern tip of Chile during this inspection cycle. Each research vessel is surveyed pier-side and underway during a multi-day inspection. JMS provides NSF with reports that assist in the evaluation of vessel condition and in developing funding objectives for maintaining the vessels and the scientific equipment in a high degree of operational readiness to meet

<table>
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<tr>
<th>Vessel</th>
<th>Length</th>
<th>Location</th>
<th>Operating Institution</th>
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<tr>
<td>RV BARNES</td>
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JMS Naval Architects has unique expertise in naval architecture, marine engineering, shipboard operations, salvage engineering, towing, and shipyard construction. JMS maintains a full time staff of naval architects and engineers with sea-going and vessel operations experience. This combination of high-end analytical engineering expertise and practical seafaring experience allows JMS to deliver rapid and innovative solutions to complex problems, only a few of which are described in this year's newsletter. Other recent projects include:

**Customer** | **Project**
--- | ---
Mystic Seaport | Whaling Ship CHARLES MORGAN Sys. Design & Stability Analysis
US Navy Supervisor of Salvage | Towing Manual Update
Virginia Institute of Marine Science | Research Vessel Design
Maritime Attorney | Construction Barge Casualty Expert Witness
Marine Construction Firm | Crane Barge Stability Analysis
Reinauer Transportation | Tug Repowering Engineering and Design Support
Sailing Vessel NIAGARA | Gray Water Tank Design
Univ Washington | Research Vessel Concept Design Review and Cost Estimate
Dorchester Shipyard | Floating Dry Dock Design
ProvPort | 300 foot Stevedoring Crane Barge Design
Tank Barge Operator | Tug Salvage Engineering Support
Coastline Consulting & Dev | Dredge Scow Stability Analysis
Just Ducky Tours | Amphibious Passenger Vessel Plan Review
EMR | Fuel Barge Conversion Concept Design
Walsh Construction Co. | Excavator Barge Stability Analysis
Senesco Marine | Tank Barge Double Hull Modification Concept Design
Northeast Work & Safety | Bridge Inspection Vessel Design
Ride The Ducks International | Amphibious Passenger Vessel Stability Review
National Crane Inspection | Crane Barge Stability Analysis
SpaceX | Recovery Vessel A-Frame Design
Boston Towing & Transportation | Tug Fire Detection System Review
Colonna’s Shipyard | 8,200 ton Floating Dry Dock Design
Calwell Marine | Cable Laying Barge 23 ton A-Frame Design
Reinauer Transportation | 140’ Deck Barge Design
National Science Foundation | USCGC POLAR STAR Operation Deep Freeze Engineering Support
National Science Foundation | NATHANIEL B PALMER Service Life Extension Feasibility Study
NOAA | FSV BIGELOW Exhaust Stack Structural Analysis
Great Lakes Shipyard | EPA Vessel RV LAKE EXPLORER II Bulbous Bow Design
Reinauer Transportation | Tank Barge Computerized Loading Program
New York Marine Towing | Tug REALIST Upper Pilot House Design and Stability Analysis
Applied Physical Sciences | Mach. Found. Structural Analysis for MSC Prepositioning Vessel
Maritime Attorney | Wooden Sailing Vessel Repair Expert Witness
Marine Construction Firm | Crane Barge Stability Analysis
Cetacean Marine | Research Vessel Computerized Loading Program
Tank Barge Operator | Tank Barge Salvage Engineering Support
Poling Cutter | Tug EVELYN CUTLER Bollard Pull Analysis
Walsh | Marine Construction Barge Loading Analysis
Patriot Marine | Crane Barge Stability Analysis
Feeney Enterprises | Structural Engineering for Hull Module Lifting and Fabrication
BTT Marine Construction | Crane Barge Stability Analysis
Reinauer Transportation | Tank Barge Longitudinal Strength Analysis
National Park Service | Tour Boat Deadweight Survey & Stability Analysis
Ocean New Brunswick | 7,380 ton Floating Dry Dock Design
Marine Construction Firm | Marine Construction Barge Loading Analysis
Caddell Dry Dock | Tank Barge Longitudinal Strength Analysis
Maritime Attorney | Wooden Sailing Vessel Casualty Expert Witness
McNally Construction | Horizontal Submergence Platform Design
Maritime Consultant | Ore/Oil Carrier Forensic Engineering
Senesco Marine | Tank Barge Launching Procedure
Waco Products | Embarkation Ladder Structural Analysis

Diving Operations at Bath Iron Works

JMS Naval Architects has been providing on site supervision and project management support for all diving operations at Bath Iron Works for over 20 years. This accident-free operation has supported the construction of dozens of Arleigh Burke Class AEGIS Destroyers and now the ZUMWALT Class Destroyer for the US Navy. The dive team conducts underwater hull inspections, sonar dome inspections, and hull commissioning tasks prior to and following sea trials. In addition, one of the core missions of the BIW dive team is to maintain and inspect the infrastructure. This includes pier/piling maintenance, sacrificial/cathodic anode inspection and fire pump inlet cleaning. JMS maintains an underwater camera and digital recording capability to document quality assurance of the dive tasking and provide evidence of needed repairs. Since the shipyard is situated on the Kennebec River in Maine, extreme seasonal climatic variations coupled

**USCGC POLAR STAR dry docking and sea trial support**
Alex Donaldson joined JMS in July 2015 as a Naval Architect and Marine Engineer. Prior to JMS, Alex worked as a Naval Architect and Marine Engineer at the Department of Defense, Rapid Reaction Technology Office. The project was intended to develop unmanned underwater vehicles (UUVs) for various applications, including research and development. During his time at JMS, Alex has continued to work on similar projects, focusing on the design and construction of unmanned underwater vehicles.

Alex Donaldson is a graduate of Stevens Institute of Technology, where he received a Bachelor's degree in Marine Engineering in 2013. After graduating, Alex joined JMS in September 2013 as a Naval Architect. During his time at JMS, Alex has been involved in a number of projects, both in the office and at the shipyards. He has been responsible for the design and construction of various unmanned underwater vehicles, including the Underwater Vehicle (UUV) project at JMS.

Outside of work, Alex enjoys spending time with his family and participating in various outdoor activities. He is an avid golfer and enjoys spending time on the water, particularly sailing and fishing. In addition, Alex has been involved in various community service projects, including volunteer work at local schools and organizations.

While at JMS, Alex has been responsible for the design and construction of a number of unmanned underwater vehicles, including the NAVSEA UUV project. His work has been recognized by his peers and has led to several publications in the field of marine engineering.

In conclusion, Alex Donaldson is a talented and dedicated marine engineer with a strong background in naval architecture and marine engineering. His expertise and experience make him a valuable asset to JMS and the marine engineering field as a whole.