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US Army Corps of Engineers
Marine Design Center

US Army Corps of Engineers MARINE DESIGN CENTER

Marine & Floating Plant Newsletter

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Floating Plant Highlights

The following are the projects recently completed and in construction:

Delivered:

2620 Dredge WHEELER Repowering was completed at Signal International, Inc. Mobile, AL August, 2013.

2733 Crane Barge for CEMVM (Buoy Barge) completed at Patti Enterprises, Pensacola, FL April 2014.

2806 Foil Assisted Aluminum Survey Catamaran for CESAJ completed at All American Marine in Bellingham, WA April 2013.

3001 26' Catamaran Survey Vessel for CESAJ completed at Armstrong Marine in Port Angeles, WA April 2014.

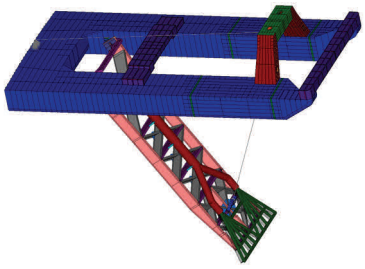
2919 CENAN Fuel Oil Barge Conversion. Converted former CEMVN Fuel Oil Barge BG 6010 to a debris storage barge for use with the New York Drift Collection mission. Removed ullages, diesel driven pump, meters, etc… and installed a deck cargo box with poured concrete pad at May Ship Repair. Placed in service April, 2014.

CESAJ Catamaran Surveyboat FLORIDA II

2946 CEMVR Deck Barges and Spuds. Two 150'x35'x6'-4-3/8" deck barges with spuds for use on the Illinois Waterway. Barges 937 and 938 were done at Basic Marine in Escanaba, MI and placed in service October, 2013.

Drydocked two CENAN District Drift Collection (Con't on Page 6)

EEY Corner



JADWIN New Ladder and Gantry

Ensley Engineer Yard (EEY), Memphis District's Marine Maintenance Facility, is a major inland river shipyard.

EEY is currently working several projects in partnership with MDC. One is the JADWIN Bow, Ladder, and Gantry. Another project is the HURLEY Ladder-Mounted Dredge Pump. MDC is leading the engineering of both projects.

The JADWIN project consists of replacing the A-Frame with a space frame gantry integrated with the upper sheave block; integrating the HURLEY dustpan head, trunion, and lower sheave block into the new ladder; and incorporating fiberglass (FRP) suction pipe and fittings. This will be USACE's first dredging application of FRP pipe of this size (38" dia).

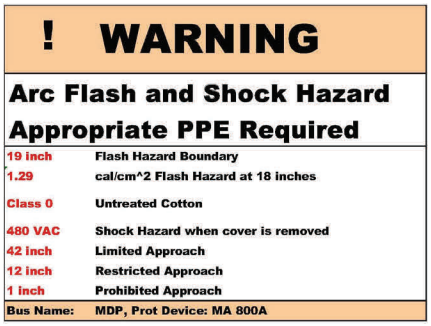
The HURLEY project consists of strengthening the previously lengthened ladder; mounting the new submersible dredge pump, piping, (Con't on Page 7)

Environmental Update — LNG

The Marine Design Center conducted a feasibility evaluation for the use of liquefied natural gas (LNG) as an alternative fuel for the U.S. Army Corps of Engineers Fleet. LNG is an emerging source for vessel fueling in the Maritime Industry. There are several organizations investigating the use of LNG, both Washington State Ferries (http://www.wsdot.wa.gov/Ferries/Environment/LNG.htm) and Staten Island Ferries have plans in development for conversions to LNG. In addition, Harvey Gulf International Marine is building several LNG powered vessels and a LNG fueling terminal (http://harveygulf.com/green.html).

MDC's evaluation looked at several different types of motor vessels and options for repowering with duel fuel engines or converting existing engines to duel fuel. OEM options for duel fuel engines are limited; however most of the major marine engine manufactures are developing duel fuel engines. There are several options for aftermarket kits to convert conventional diesel engines to duel fuel. One option is to use air fumigation kits to supply natural gas to the air intake. This option allows for the engine to either operate normally on diesel or run on a mixture of diesel and natural gas. The other option is to convent a diesel engine to spark ignition setup; this however prevents the engine from running 100% on diesel fuel. Another major (Con't on Page 6)

Arc Flash on USACE Floating Plant



Arc Flash Hazard (AFH) regulations, ER 385-1-100 and EP 385-1-100, apply to all Corp facilities that contain electrical equipment with AC or DC voltages of 50 volts to ground or more, where the potential for arc flash hazard exists. This includes floating plant and vessels. This regulation is currently being signed. Implementation of the Arc Flash Program is to begin immediately with full implementation as soon as possible, but no later than two years from the date of publication. AFH analyses are performed for all new floating plant contracted through MDC.

ER 385-1-100 requires floating plant and vessels to have a Detailed Incident Energy (IE) Analysis performed by a qualified engineer. The detailed IE Analysis is to consist of three analyses: a short circuit analysis, a protective device coordination study, and an AFH analysis.

Since the marine regulatory bodies, USCG and ABS, have yet to address the Arc Flash topic on floating plant, the ER and EP require the IE Analysis to be based on IEEE Std. 1584 – Guide for Performing Arc Flash Calculations. NFPA 70E is one of the specific Arc Flash (AF) standards referenced in the ER/EP, but is not directly applicable to floating plant. NFPA 70E provides reference for generalized AF safety precautions and methods for reducing the hazard risk category, however these methods may be infeasible on floating plants due to plant configuration and tight clearances.

MDC recently attended an AFH Analysis training conference, which combined lecture-based training classes with hands-on courses using EasyPower software. The lecture-based classes were instructed by the secretary of IEEE 1584, Jim Phillips, P.E., and provided the background for the IEEE Std. 1584 as well as the development of the equations used to perform the AFH calculations. MDC has purchased EasyPower and is now able to perform AFH analyses in addition to short circuit and protective device coordination studies. For more information on the training or arc flash requirements, contact Isaac Smith at MDC (215-656-6167).

USACE Hopper Dredge Fleet Careers — 1970

A little history - The US Army Corps of Engineers used to perform almost all of the dredging done on U.S. navigable waters. Below is a link to a recruiting brochure that the Corps published to incentivize merchant marine officers to consider the Corps as a viable alternative to deep sea sailing.

The brochure is 24 pages and lists the 16 USACE hopper dredges and their owning Districts. It appears to be dated circa 1970 since the McFARLAND (1967) is listed but WHEELER, ESSAYONS, and YAQUINA are not.

The full brochure is saved to MDC's website. See the link to our site on P.7. Once there, click on "Newsletters and Articles."

Dredge WHEELER Repowering

The Dredge WHEELER home ported in New Orleans, LA recently underwent a repowering and major repairs in a joint effort between the Marine Design Center and the New Orleans District. The contract for the work was administered by the Philadelphia District, and engineers from both MDC and MVN worked closely together to complete the repowering and repair. The work on the WHEELER was conducted at Signal Ship Repair in Mobile Alabama from 30 July, 2012 through 29 August 2013.

Marine Design Center engineers served as resident engineers and managed the repowering. The work on the WHEELER comprised of removing the original Cooper Bessemer propulsion and dredge generator engines and replacing them with new Tier II Caterpillar C280-16 propulsion engines and C280-12 generator engines. New Reintjes marine gears were installed for all four engines, and new alternators for the three ships service generators were installed. A new Integrated Control and Monitoring System from Electronic Marine Systems, Inc. was installed upgrading the old TRACOR system, and the ships auxiliary systems supporting all the engines were upgraded. A new Oily Water Separator system from Alfa Laval was installed during the repowering as well.

The new engines in the WHEELER have greatly increased the operational readiness of the WHEELER, lowered the ships annual maintenance cost, improved fuel efficiency, and reduced the ship's NOx footprint thereby readying the ship for future work in support of the nation in any part of the world.

To get ahead of the VGP curve, MVN agreed to replace the HPU's for the CPP system with units designed to work with an Environmentally Acceptable Lubricant (EAL) in order to prevent environmental damage caused if any leakage occurred (Con't Page 6)

USACE Hopper Dredge WHEELER In Drydock

Safety — Several Short Stories

Surveyboat Capsized

Surveyboat Trailer Accident

Shackle from China

Many times MDC does not hear details when safety problems occur. No one wants their problems aired publicly, but it's hard to learn from other's mistakes if you don't hear about them. The following safety short stories are written without judgment for our collective edification.

Ground Fault Detection: In the last Floating Plant Newsletter (#19 December 2013) was an article on Ground Fault Detection (GFD) systems. Recently there was an accident on a floating crane that may have been partially attributed to a faulty GFD system. Below is a list of electrically powered floating cranes that we know of. Please contact MDC if you know of any others in the Corps:

1. BROWNLEE (CEMVN)
2. SEWELL (CEMVS)
3. WOODIE WALDEN (CELRH)
4. PAUL BUNYAN (CELRE)
5. HENRY SHREVE (CELRL)

Surveyboat Capsized: In Jan 2014 a surveyboat capsized while doing near-shore surveys for a beach nourishment project. The primary cause was a larger than normal wave that broke over the stern of the boat (see photo). No one was hurt. An after action report was performed. Contact MDC if you would like a copy.

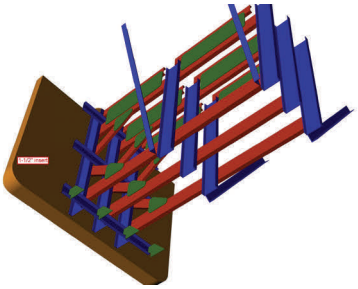
Surveyboat Trailer Accident: The boat operator had just filled the 23 ft. boat with gasoline. He left the service station and the boat slid off of the side of the trailer as he turned onto the outside lane of the highway.
Direct cause of the accident was failure to deploy a tie-down strap. The indirect cause was ice on the bunks.

Foreign Shackles: The new EM385-1-1 Section 15.E.06 has sought to clarify shackle requirements.
"All shackles shall be manufactured according to ASME B30.26.
a. Only shackles marked by manufacturer with name or trademark of "manufacturer (country is not acceptable)", WLL and size shall be used. Shackles shall be maintained by the user so as to be legible throughout the life of the shackle." See photo.

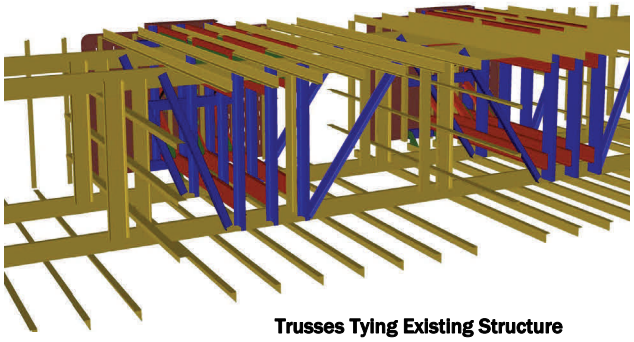
Load Handling Equipment on Barges: Recent and pending changes to the Safety Manual EM-385-1-1 are requiring additional planning and engineering analyses for load handling equipment being used on barges. This equipment includes crawler cranes, rough terrain cranes, cherry pickers, man-lifts, etc. When renting, leasing or purchasing any of this type of equipment, be sure to notify the leaser/manufacturer of the intended use (on a barge) and request load charts and operating procedures for operating on a floating platform. Obtaining this information can often be difficult after the fact. With this information in hand, the required naval architecture analyses can be completed in an efficient manner.

HERCULES Strengthening

The Rock Island District requested assistance from the MDC to design structural transom reinforcements on the Floating Crane Hercules. The Floating Crane Hercules was designed to be transported via towing, not to be pushed by an inland river towboat. As such, the structure in way of the transom is light and easily damaged by a towboat. The goal for MVR was to have MDC develop the design for reinforcing the transom, with the work to be accomplished while afloat by MVR personnel. To minimize the work, it was preferable that the design not require access cuts in the main deck of the barge. MDC utilized AutoCAD and the 3D CAD program, Rhinoceros 4.0, to complete the design effort. Trusses were designed to tie into existing barge structure, and also match the towknees of several MVR towboats. In addition, the structural members were sized so that they could be brought through existing manholes. Rhinoceros was used to verify clearances, perform interference checks, and to provide MVR with 3D views to fully visualize the modifications. For more information please contact Tim Keyser at (215) 656-6850.



MVR Floating Crane Hercules Transom Structure at Towknee



Trusses Tying Existing Structure To New Reinforcement

Revolving Fund and The Plant Replacement and Improvement Program (PRIP)

Each spring MDC along with the District and Divisions are faced with the budget cycle process for the FY two years out (in May and June of FY 14, the FY16 funding was planned) to have projects placed upon the approved program and funded by the PRIP. Any project for plant replacement then must begin the planning two years before the expected need for funding. MDC will be presenting a short webinar to inform District and Division personnel about that process and the need to coordinate the project submittals. In the past MDC has witnessed a regular turnover in the PRIP contacts which has resulted in a loss of institutional knowledge. Since MDC is routinely involved with the PRIP planning process, we believe we can fill the gap. The power point slide presentation PRIP 101 on the MDC website (see link p.7) gives a quick overview. More information will be out soon about the PRIP webinar. As always, feel free to contact Ed Vollberg in MDC at (215) 656-6175 with any questions.

Floating Plant Highlights (Con't from page 1)

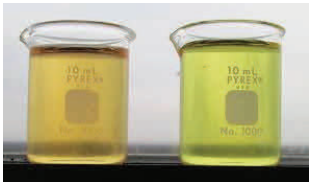
NASA Barge PEGASUS

Vessels for USCG/ABS inspection and maintenance:
3006 MV HAYWARD completed in the fall, 2013 at Thames Shipyard, New London, CT.
3035 MV DRIFTMASTER completed in the Spring, 2014 at May Ship Repair, Staten Island, NY.
In Construction:
2892 Three Flat Deck Barges for CESAM, one with a ramp boarding system at Basic Marine, Inc. in Escanaba, MI.
2916 Flat Deck Barge for CENWS launched at Jessie Engineering in Tacoma, WA.
2623 MV BRETON Replacement 48' V-hull survey vessel for CEMVN at Silver Ships Inc. in Theodore, AL.
2800 CEMVM SNAG Barge, 200'x50'x9' at Steelways Inc. in Newburgh, NY, estimated delivery December, 2014.
2986 CENAN two steel pontoon drift collectors, 36'x26'x5'-6" outfitted with a net at May Ship Repair. Estimated delivery February, 2015.
2991 NASA Barge PEGASUS Modification at Conrad Shipyard, Amelia, LA.

Environmental Update (Con't from page 2)

consideration for conversion to LNG is onboard storage. LNG requires pressure tanks and double walled piping. Consideration also must be taken for ventilation of gas boil off from the tank.
MDC's evaluation looked at engine conversion, tankage, storage and availability of LNG for each vessel. Considerations for vessel operations, crew training and regulatory requirements were also evaluated. The evaluation found that several of the vessels were suitable options for conversion to LNG.
The **LNG Feasibility Evaluation for USACE Alternative Fuel Initiative** report is available upon request.
(Note: CNG was also considered, however current USCG regulations prohibit the storage of compressed gas as a marine fuel on vessels. See http://www.uscg.mil/hq/cg5/cg521/docs/CG-521.PolicyLetter.01-12.pdf)

WHEELER Repowering (Con't from Page 3)



PAG Fluids for Hydraulic and Gear Lubricants

through the propeller hubs. The fluid was an anhydrous Poly Alkaline Glycol (PAG) from ACT.
During the commissioning of the equipment, the starboard CPP system experienced water ingress. Samples were pulled and the results revealed that the Starboard system had 18,000 ppm of water in the fluid. A head space dehydrator (large desiccant breather) was purchased to drive the water levels down as best they could. Although it took a little over 3 months the maximum upper limit of water (7,500 ppm) was reached. It is important to note the hydrolytic stability of the water soluble PAG chemistry. Since the water was soluble into the PAG fluid, rust and corrosion was not a concern. Had any other petroleum-based or synthetic EAL been used in this system, corrosion and wear would have been a huge issue.

EEY Corner (Con't from page 1)

shaft, gear, and motors onto the ladder; installing new VFD and controls; and building a new dredging console in the pilothouse. The HURLEY will also have an emergency ladder retrieval system should the existing ladder hoist winch have a problem.

Procurement of parts and supplies is being split between MDC for specialty components and EEY for steel.

Both dredges are purchasing velocity and density measuring instruments for dredge monitoring and control. Contact Vint Bossert at (215) 656-6162 if you have any questions.

HURLEY Bow View from Pilothouse

Follow MDC on TWITTER

The Marine Design Center is on Twitter. Follow us at @USACE_MDC.

We have been using Twitter to communicate the latest information and photographs of new, ongoing and completed projects, new solicitations and to more broadly disseminate our newsletters. You can also go to our website to see recent projects, past newsletters, and other articles. http://www.nap.usace.army.mil/Missions/MarineDesignCenter.aspx.

Please pass this information along to others in your organization.

US Army Corps of Engineers Marine Design Center

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- Marine Electrical Systems
- Thermal Imaging
- Drydock and Blocking
- Hull Thickness Surveys (In-water and on drydock)
- Model Testing
- Dredging Systems
- Design & Construction of Floating Plant
- Arc Flash Hazard (AFH) Analysis

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