US ARMY CORPS OF ENGINEERS
MARINE DESIGN CENTER

MARINE & FLOATING PLANT NEWSLETTER

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Marine Design Center's New Staff

After reaching a low in FTEs in 2019 the MDC team has been adding staff members with key skill sets to help execute mission driven workload by providing support for both new and ongoing projects. The newest additions to our team cover multiple facets that sustain the efficiency that is expected from the MDC.

Joining the team are two Budget Analysts: Aislinn Staaby and Caroline Jackson. Aislinn brings vast experience as she has supported both Europe District and Philadelphia District prior to her position with the MDC. Caroline joins us from outside of USACE where her experience with budgeting, finance, and accounting have transitioned seamlessly to the team.

MDC has welcomed a new Cost Estimator, John Beinlich. John joins us from Philly Shipyard, where he worked his way up through Philly Shipyard's apprenticeship program, learning the various trades and held the position of production foreman for the last several years.

Additionally, three Engineering Technicians have also joined the MDC. Jason Santana's experiences at the Philly Shipyard provides a wealth of knowledge to the Marine Design Center. Michael Schiavo joined us from private industry bringing a skill set with over 15 years of Solid Works experience and CADD management. Kevin DeStefano is a Navy Veteran with a degree in engineering technology from Drexel University and formerly held the title of Outfitting Engineer at the Philly Shipyard.

A Naval Architect has also joined the MDC: Matthew Eayre is a registered Professional Engineer with over 20 years of experience in Naval Architecture and his extensive knowledge makes him a great addition to the team.

Also having joined the organization is Project Manager, Keith Bromke. Keith comes from a background in engineering as well as project management having prior experience as a Project Manager supporting the Navy, which fit in well with the mission of the Marine Design Center.

Over the course of the past year, one of our recently hired Naval Architects, Ilya Mouravieff, has held a new temporary position as a Resident Engineer with the MDC. The position has established a longer term presence along the Gulf Coast region supporting various ongoing projects. Ilya's shipyard background and overall skill set made him an ideal candidate for the position.

Lastly, we are proud to announce our new team members do have the guidance of Subject Matter Experts in our four Rehired Annuitants. We are glad to welcome back Bill Gretzmacher providing key advisement on vessel procurement assisting with the dredging fleet recapitalization, Greg Lee with prowess in Naval Architecture, vessel safety, and stability, Joe Cieslak an expert on vessel construction, and Rich McMullen an expert in design and drafting. Their knowledge and mastery remains unmatched as they have continued to be an asset to the Marine Design Center.

FLOATING PLANT & LOAD

The USACE High Hazard Working Group safety focus for the month of July 2021 was on Load Handling Equipment (LHE).

Naval architecture analyses (NAA) for load handling equipment was included in the July 14 – Planning for LHE session. EM 385-1-1, Chapter 16 Part L covers the requirements for all LHE on floating plant. Since the 2014 revision of EM 385-1-1, naval architecture analyses have been required for LHE on floating plant.

(continued on page 2)

Inside the Issue:

MDC NEW STAFF 1

FLOATING PLANT & LOAD HANDLING EQUIPMENT 1

NOTES FROM THE FLOATING PLANT PROGRAM MANAGER 3

GLM 3

VESSEL HIGHLIGHT 4

ECONPACK 4

MDC DELIVERS 5

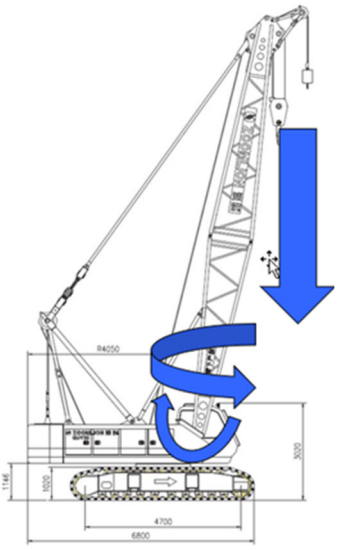
FLOATING PLANT & LOAD HANDLING EQUIPMENT

(continued from page 1)

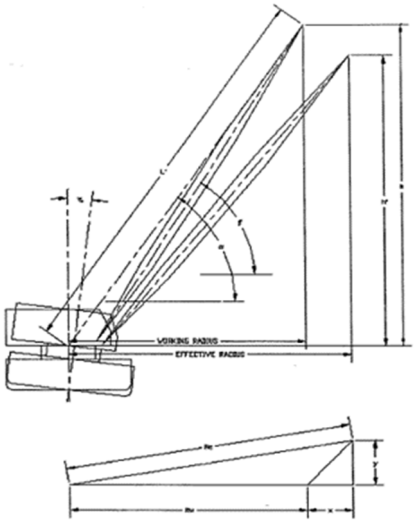
Focusing on traditional LHE (pedestal cranes, crawler cranes, knuckle boom cranes, RT cranes, extendable boom cranes, boat davits, etc.), the purpose of the NAA is to ensure the safety of the barge AND the LHE. Each component, barge and LHE, need to be evaluated together against vessel stability limits and criteria, and the LHE limitations.

For example, many land-based cranes are placed on barges for lift and dredging operations. The manufacturers of all land-based cranes stipulate the load chart is only applicable when the crane is on a flat level surface. The moment the crane is placed on the barge, the surface is no longer level. Therefore, the manufacturer can typically provide a floating/barge chart for the machine, with out of level limits between 1 degree and 5 degrees.

When LHE is operating on a non-level surface, the hook load may not be directly under the boom tip, and in line with the boom foot. This can create side loading on the boom (which booms are not designed for). Further, the operating radius is impacted (may be increased beyond the intended distance) which may place the hook load capacity outside the listed radius capacity. Lastly, the out of level conditions cause additional stress and strains on the swing motors, brakes, drives, etc. that can impact the durability of the equipment.



So, what does the typical 3-degree machine list/trim limit provided by the crane manufacturer mean? It does not mean the heel and trim the barge sees; it is what the crane experiences. What the crane experiences all depends on the azimuth/rotation of the crane. The NAA is required to look at lifting operations over the full 360-degree swing azimuth. The barge reaction from the crane lifting a load over the side is different than when the hook load is over the corner or the end of the barge. The NAA will analyze each position, determine the barge reaction (heel and trim), and through geometry determine the machine list and machine trim (side lead and off lead angles). If the check determines that the barge reaction, and subsequent machine list and trim at a specific radius, capacity and azimuth do not exceed the manufacturer's limit, we know the crane is safe to operate.



While the crane may be safe to operate, the NAA must perform freeboard and stability (righting energy) checks for each radius, capacity and azimuth combination as well. Per EM 385-1-1, the floating plant must maintain 1 foot of freeboard during all lifting operations and satisfy the 46 CFR Subpart B – Lifting criteria. This requires righting arm calculations to determine if the minimum requirement is met. If the freeboard and stability analysis, along with the machine list/trim calculations are all within the limitations, the manufacturer's floating service load chart (FSLC) can be utilized. If any condition fails, the naval architect will have to develop a derated load chart to satisfy all the operating conditions.

Following the development, or verification of the FSLC, another critical part of the NAA includes the development of Naval Architect's Notes. These notes, along with the manufacturer's operating manuals and requirements, detail all the parameters the LHE is safe to use on the specific floating plant. It should cover the ready-to-lift floating plant maximum draft, heel, trim, wind, waves, crane configuration and more (all spelled out in EM 385-1-1.16.L).

The NAA requires the structure of the floating plant to be checked, ensuring it can safely support the LHE during all lift operations. This will be discussed in a later article. The last part of the NAA process is to have the analysis stamped by a registered professional engineer.

To ensure the safety of all personnel and equipment, the placement of any LHE on floating plant requires the highest level of planning, including an NAA for each LHE on each floating plant platform. Load Handling always has a level of risk, and once the machine is placed on floating plant, the risk quickly elevates. Assuming a crane or other LHE can safely work on a barge (or other floating plant) with the proper analysis is the wrong assumption. Contact a naval architect to prepare the necessary analyses in accordance with EM 385-1-1, Chapter 16 Part L.

NOTES FROM THE FLOATING PLANT PROGRAM MANAGER

Keith Jones, HQ Navigation Branch, Floating Plant Program Manager (Retired)

A significant accomplishment over the past year was replacing the 1969 'Vessel Inspection and Certification Agreement' between USACE and the U.S. Coast Guard with a Memorandum of Understanding (MOU) signed in November 2020. The MOU commits the Coast Guard to performing COI (Certificate of Inspection) inspections and issuing COIs for a growing number of Corps vessels. To aid in scheduling, HQ USACE will provide to HQ USCG at the start of the fiscal year a list of vessels requiring COI inspections in the coming year. Inspections are coordinated and scheduled locally between Corps districts and the Coast Guard sector Officer in Charge, Marine Inspection.

The MOU described above is integral to the USACE Subchapter M Towing Vessel program the Corps voluntarily established in October 2019 (under 46 CFR Chapter I, Subchapter M, the national towing vessel regulation). The program goal is to have 57 Corps towing vessels operating under COIs by August 2022. The initial step toward this goal was having districts conduct or contract for an initial assessment for each towing vessel under the Sub. M criteria by 20 July 2020. This was complicated by the unexpected challenges brought with the COVID-19 pandemic and mostly met by September. As of this writing, twelve (12) Corps towboats had gained COIs under Sub. M, including the M/V KENT (New Orleans), M/V GEORGE C GRUGETT (Memphis), M/V KENNETH EDDY (R3F, Huntington), M/V GENERAL WARREN (St. Paul), and the M/V IROQUOIS (LRN). An additional thirty-seven (37) Corps towing vessels are scheduled to be COI compliant by July 2022, with the remainder of the 57 towing vessels in our fleet gaining COIs by December 2022. Benefits of the Corps Sub. M program include: i) enhanced attention to vessel condition and systems (fire protection, electrical, etc.), ii) greater focus on safety, including equipment, training and drills, iii) safeguarding the licenses of our masters, pilots and mates operating Corps vessels, and, iv) a demonstration of the 'world class' nature of the Corps towing vessel fleet.

Implementation of the Facilities and Equipment Maintenance (FEM) system software for floating plant advanced significantly in recent months. The first of its kind "FEM for Floating Plant" training was held virtually by the FEM National Support Center (NSC) on 7 and 9 December 2020, with the same content offered both days and 160 managers, engineers, operators, mechanics and FEM technicians in attendance. Also in December, several 'vessel attributes' were added to FEM, including MMSI#, vessel and engine manufacturer, a PRIP or Project funded field, and others. In mid-December, 1-hr trainings on vessel classifications and attribute field entries were provided by the NSC with 60 attending. A placemat of vessel definitions was developed and distributed in March 2021 to assist FEM users with properly classifying floating plant assets and the NSC has followed up with technical support on classifications and attributes. When accurately entered, this information helps districts manage their fleets and provides MSCs and HQ with useful information that helps limit data calls to the field.

Last but not least, the COVID-19 virus certainly had an impact on floating plant activities Corps-wide over the past 15 months. Beginning in April 2020, regular phone and web conferences have been held for the Floating Plant Community of Practice to share the latest guidance and policies on preventing illness and for overall coordination and information sharing. The diligence and care taken in the field by those of you who manage, operate and maintain our vessel fleet has kept COVID illnesses and operating downtime to a minimum.

GLOBAL LOAD MANAGER

In recent days, MDC has been tasked with several stability analyses that didn't conform to the typical formats of MDC naval architectural analyses or required a very in-depth stability booklet. These cases included large crane barges (like the Floating Cranes Quad Cities and Shreve) and the Hopper Dredge Essayons. Vessels such as these have the ability to work under highly varied loading and ballast conditions which would require voluminous stability analyses that would be impractical for an end user to effectively interpret and utilize. To solve this issue and simplify the stability analysis for the end users, MDC teamed with Creative Systems to produce GLM (Global Load Manager) for these vessels.

The purpose of the GLM varies a little bit based on vessel type. For dredges and other large vessels, the GLM mimics the stability booklet and allows users to input current loading conditions (tank loads, deck loads, hopper condition, etc.) and get an instant go/no go analysis of their condition versus the applicable stability requirements. It also allows for the master to run "what if" scenarios of possible loading conditions to see how to optimize the vessel loading and trim to suit the desired purpose.

(continued on page 4)

GLOBAL LOAD MANAGER

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On a crane barge, the GLM has even more utility. It allows for the crane operator to accurately predict the reactions of the barge to a given load. Radius, hook load, wind speed, crane azimuth and more are all user inputs to predict how the barge will react. The Global Load Manager will give you warnings if the load case is outside of the boundaries of the stability restrictions. This allows for accurate determination of the required pre-ballast for extra heavy lifts. Overall, it prevents having hundreds of load charts for different ballast conditions, deck loadings, boom lengths, etc. The GLM is reviewed by the American Bureau of Shipping (ABS) as a supplement to the vessel's stability documentation. If you think that your vessel could benefit from a GLM installation, please call ***Matt Newborn at MDC (215-656-2293).***

VESSEL HIGHLIGHT

KANSAS CITY DOCK BARGE

Vessel Particulars, Equipment, and Special Features

Hull Length (molded):	196'	Freeboard:	8'6"
Molded Beam:	35'	Breadth (Overall, Loading Ramp Raised):	46'
Hull Depth:	11'	Barge Moving Winches:	Wintech
Draft (Unloaded):	2'6"	Mooring Winches:	Wintech
Displacement:	58,000 lb.	Breasting Winches:	Wintech
Fuel Capacity :	500 Gal.	Generators:	Northern Lights M40C3FR Tier III
Max Air Draft:	44'		

ECONPACK – WHAT IS IT AND WHY DO WE NEED ONE?

You may have heard the term "EconPack" floating around in relation to the PRIP program submissions. You may also be wondering "what is it?" and more importantly "why do we need one?" The term "EconPack" is used when describing the economic analysis report produced by the USACE Software EconPack. An economic analysis (EA) is "a systematic method to identify, quantify, compare, and analyze alternative approaches for achieving the most efficient, economical solution to resolve a specific requirement" (Manual for Preparation of Economic Analyses for Military Construction (and Base Realignment and Closure (BRAC)), January 2020). In short, this is an analysis that compares the economic value of different alternatives for a mission related situation.

So why do we need these? EAs are required by the PRIP ER (37-1-29), but they can be used at the start of any project to evaluate various alternatives and lay out the economic case for each. For example, if you have a vessel that is getting close to the end of its useful life, you could create an EA to see what the most economical alternative would be. Alternatives could be making major repairs to the current vessel, leasing a vessel, or replacing the current vessel with a new one. You would then enter the costs associated with each alternative, non-monetary considerations, background information, assumptions, and your alternatives discussion into the EconPack software to produce the report. The EconPack report then takes all this information to produce different financial analyses depending on what type of EA you choose. All EAs produce a Net Present Value (NPV) comparison, along with a Discount Rate Sensitivity Analysis (DRSA). The DRSA produces a table that varies discount rates to see how they affect the ranking of the alternatives. You also have the option of creating multiple Cost Sensitivity analyses. These are "what if" analyses based on changes to components within the alternatives. When using a Cost Sensitivity Analysis, you can set the range of change that may arise (the standard is -100 to 200 percent), then it evaluates how much the component would need to change in order to change the ranking of the NPVs.

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ECONPACK *(continued from page 5)*

While these analyses present the financial data for different alternatives within a project, background on the project, assumptions, and non-monetary considerations/ benefits need to be taken into consideration when making the final decision. Just because an alternative has a lower NPV, it does not necessarily mean that it is the best alternative for the needs of the mission.

What does all this mean for you? To be able to use the EconPack software, you would need to obtain the software and then set up an account with the EconPack team, and then learn how to enter all the data. To alleviate some of this process, the Marine Design Center is now able to assist with the creation of the EconPack EA reports on behalf of the submitting District. This process will be a collaborative effort between the District and the MDC EconPack expert, to produce the report needed for MINS submissions, or to use these reports in the early stages of a project to consider the future options of a project. For additional information on EconPack, please reach out to ***Aislinn Staaby at (215) 656-6921***.

MDC DELIVERS

Annie Moore

Annie Moore – The Marine Design Center delivered to The National Park Service a new utility vessel with the build having been awarded to Technology Associates Incorporated. The USNPS ANNIE MOORE is the namesake of the first immigrant to enter the United States through Ellis Island Immigration Station on January 1, 1892. The vessel is to be used for transporting passengers, supplies, and equipment to the Statue of Liberty and Ellis Island national parks from Battery Park, New York, NY. ANNIE MOORE is ADA accessible and includes a hull reinforced to meet ABS Ice Class designation.

Olmsted Wicket Lifter – The wicket lifter crane barge LD – 810 is located on the Ohio River at the Olmsted Lock and Dam facility on the Ohio River, 17 miles upstream from the Mississippi River near the town of Olmsted, Illinois, at Ohio River Mile 964.4. This vessel is a sistership for the first wicket lifter crane barge KEEN, delivered in 2018. Notable features include a wicket lifter crane mounted on the forward pod, two spuds for positioning, and two sets of runners on port side to hold the barge off of the dam wickets. The vessel features positioning winches aft (P&S), and on the 01 Level Deckhouse roof there are resistors for dissipating heat from winch dynamic braking. On the main deck level is a Fueling Station for the crane located on the forward deck. There is also a deployable work platform located at the port bow and mooring winches are located on all four corners of barge. The 01 Level Control House can operate all winches (except mooring winches).

Pegasus Barge – The Pegasus barge was overhauled at Thoma-Sea Marine Constructors, L.L.C. The Marine Design Center provided the design, quality assurance, and contracting support for NASA. In May 2021 the Pegasus Barge completed a voyage carrying the final piece of the Space Launch System rocket Artemis I from Mississippi to Kennedy Space Center in Florida.

Azerbaijan Dredge – The last publication included an exciting venture supporting the Navy in the procurement of a dredge for the nation of Azerbaijan. The contract was awarded to DSC Dredge. The assembly of the dredge, final testing, and training of the crew took place last summer in-country at the port of Astara. A joint team including one dredge contractor, a representative from NAVSEA, members of the U.S. Embassy and the Azerbaijan Coast Guard were present and able to assemble and complete a successful launch of the vessel.

Azerbaijan Dredge

Dredge Murden – Early 2021 repairs and modifications were finished on Dredge Murden. The MDC along with Thom-Sea Marine Constructors, L.L.C. completed the scope of work consisting of dry docking the vessel, cleaning, and painting the exterior to include the deckhouse as well as interior of the vessel. Additional updates included assisting with ABS and USCG required inspections.