Guidelines for mobile cranes on barges

Purpose

The following highlights effective methods to consider when planning and managing mobile crane operations (wheeled and tracked) upon floating platforms, such as deck barges and interlocking modular barges. Since various types of vessels can be used to support floating crane operations, each situation should be reviewed for its specific characteristics and construction. **This information is not intended to be used in connection with purpose built, technically designed, crane/ derrick barges where the crane and lifting equipment are permanently affixed to or are considered part of the construction of the barge.**

Objective

Operating non-permanent cranes atop floating equipment may increase risk and exposure to loss. Proper planning and operational procedures should significantly assist with reducing the risk associated with this type of work. A thorough review of the applicable standards should be part of the planning and implementation process. For construction operations involving mobile cranes working atop barges, the United States Department of Labor, Occupational Safety & Health Administration (OSHA) specifically includes the operation of mobile cranes on barges as part of its crane and derrick standard, Subpart CC.

Background

Controlling exposures relies upon understanding the capability of the equipment involved and developing proper procedures for those involved to follow.

The complicated dynamics present during mobile crane operations on barges may require operators to have enhanced training and awareness. This includes specialized emergency training relating to the marine operation. In many cases, basic marine damage control training and knowledge, along with having the proper equipment available and serviceable may help avert costly losses, injuries and loss of life.

Key areas for consideration

The barge

For the purpose of this guide, the term “barge” refers to a suitable platform/vessel, traditionally a “deck barge,” but also includes interlocking modular barges.

Determining the suitability of a barge to support a given mobile crane operation is a critical and often overlooked step in the preparation and planning process. Assessing the barge should include an examination of the internal and external structural condition. This includes an analysis of the barge’s buoyancy characteristics and structural deck capacities in comparison to the foreseeable loads generated by the mobile crane operation. Marine surveyors and naval architects are generally the technical personnel capable of providing this type of analysis.

It is important to retain the services of marine surveyors and naval architects who are experienced in suitability surveys of mobile crane operations on barges. Elements they should review include, but are not limited to:

- Design data provided by the barge builder/owner showing capacity of the barge, both buoyancy and structural, along with other technical characteristics.
- The barge’s actual structural condition should be verified by a marine survey. The surveyor should provide information regarding barge deficiencies such as previous damage and/or conditions of poor maintenance or deviations from the original design data.

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These critical elements factor into the de-rated[1] capacity of the operation and assist in defining safe operational parameters and programs for safely maintaining the operation.

- If the barge's design data is not available then a Qualified Person[2] is required to review the crane and barge combination. This requirement may also apply if the barge has been significantly modified from its original construction.
- If the vessel is required to comply with USCG Load Line Regulations (46 CFR parts 42-47 and 46 USC Chapter 51) this document should be provided and reviewed by a Qualified Person and considered in de-rating and establishing operational guidelines.

In most cases, barges subdivided by one or more longitudinal bulkheads are preferred. This improves the ability of the operator to manage the barge's buoyancy during both intentional and unplanned flooding of the internal compartments.

- If active ballasting is anticipated to stabilize lifting operations, these operations and procedures should be developed with consultation of a naval architect. Improper ballasting and lack of understanding of free-surface effect has resulted in many catastrophic loss events.
- Special attention should be given to the proper maintenance and condition of compartment access/hatch covers. Marine surveyors should include specific reference to these in their report, noting their condition and serviceability.
- Additional notes should be made as to how internal compartments can be inspected for water ingress during the course of operations, e.g., fixed sounding tubes or by removal of access covers.

Mobile crane

- Location and type of securing devices should be certified by a marine engineer, professional engineer, or other Qualified Person. Some common methods consist of installing physical barriers or "corrals," mounting the crane upon fixed rails, installing fixed lashings with chains/wire rope and/or a centerline cable system, etc. The system that is approved should be capable of providing protection at all locations on the barge where the crane is expected to operate.
- The crane manufacturer should be consulted to obtain its de-rating recommendations for the specific model of crane intended to be used on barges. If the crane is not de-rated by the manufacturer then the de-rating of the crane must be calculated by a Qualified Person.

The crane barge combination

Operation

- Written operational and safety procedures, specifically addressing the work site and types of foreseeable operations, should be created and implemented by management. Focus should be placed upon clearly communicating and enforcing, for all personnel, the operational limits of the crane and barge (de-rating).
- Procedures and regular training should include, at a minimum:
  - Weather and sea condition limits for operation

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[1] Derate – to reduce the rated lifting capacities as found in the rated capacity chart, due to environmental conditions not contemplated in the land based chart, such as dynamic loading created by the movement of the crane and barge.

[2] As defined by OSHA, "One who is capable of identifying existing and predictable hazards in the surroundings or working conditions that are unsanitary, hazardous, or dangerous to employees and who has authorization to take prompt corrective measures to eliminate them." 29 CFR 1926.32 (M)

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- Proper movement and relocation of the crane and barge, if required
- Draft restrictions (both water depth and overhead/air draft)
- Barge stability and how to identify improper/concerning conditions and what actions personnel must take
- Lifejacket/work vest policies should be strictly enforced with no exceptions

- It is important for operators to ensure access points to internal compartments are kept clear and properly maintained.
  - Daily inspections must ensure they are clear and accessible.
  - Weekly inspection requirements should include opening and re-securing them; addressing defects immediately.
  - If fixed sounding tubes are not available, weekly checks of each tank should be conducted by visual inspection from the tank top, via the fully opened access points.
- De-rated load charts are to be clearly posted at the crane operator's station.
- Inclinometers and anemometers should be clearly visible to the crane operator
  - Policies must clearly state that the list and trim of the barge should never exceed 5º or the amount specified by the crane manufacturer, whichever is the lesser.
  - If the maximum allowable list is not given by the crane manufacturer then it should be calculated by a Qualified Person.
- The deck of the barge is to remain above the water at all times and the entire bottom of the barge is to remain in the water.

Equipment (inspection and maintenance)

- Included with the operational guidelines should be instructions and maintenance manuals for all of the equipment aboard the barge.
- All cranes should have current inspections as required by OSHA standards and other applicable standards. The majority of the requirements for land-based cranes still apply to mobile cranes being operated on barges.
- Additional safety equipment may be required on the barge; this must be maintained in serviceable condition at all times. (For example, additional pumps and fuel, hoses, additional lashing chain/wire, fire extinguishers, etc.)
- All cranes should include the manufacturer's positive equipment house lock.
- Anti-two-block devices are not required aboard cranes being operated on barges. However, they are required to be used if the crane is lifting personnel and or engaged in lifting loads over a cofferdam or shaft with personnel within. (29 CFR 1926.1437 (e) and (f))

Note: load weighing devices are not required on the crane if it is engaged in dragline, clamshell (grapple), magnet, drop ball, container handling, concrete bucket, and pile driving work.

- Barges should be inspected during each shift, along with more comprehensive examinations weekly, monthly, annually, and every four years.
- Each inspection interval must have written criteria specifying the level of inspection that is required and what conditions require reporting to management and/or corrective action. These should be documented and kept on file.

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The four-year inspection of a barge being used for barge crane operations is supposed to be conducted "…by a marine engineer, naval architect, licensed surveyor[3], or other similarly qualified individual." (29 CFR 1926.1437 (h))

- There is no requirement to dry dock or otherwise remove a barge from the water for inspection prior to the four-year inspection. During the four-year inspection, removal of the barge from the water may be required.
- Inspection records are to be properly maintained and updated. These should be kept readily accessible for review, on site. Records of the four-year inspection are to be retained for at least four years.

Additional resources

- USCG Load Line Regulations (46 CFR parts 42-47 and 46 USC Chapter 51), uscg.mil/hq/cg5/cg5212/loadlines.asp

For more information, log in to the Risk Control Customer Portal at travelers.com/riskcontrol. (Need help? Read our Registration Quick Guide.) You also can contact your Risk Control consultant or email Ask-Risk-Control@travelers.com.

[3] Reference is made to a "licensed surveyor;" however, a surveyor's license criteria does not exist as there is not a national standard for the certification or training of marine surveyors. Independent surveyor's organizations do exist, but these are not mandated or recognized by the Federal Government.

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