Crane Barge Safety Infographic

Cranes on barges:

How to decrease the risk of tipping

Eager.one's Andre van der Steen discusses the safety parameters to be aware of when preparing and executing a crane lift aboard a barge. Naval architecture and changes to a crane's lifting characteristics are the key factors to be aware of. These factors do not exist in a vacuum and breakdowns in the physical and communication interfaces between the two can increase the risks. An integrated approach is required to maximise safety.

The naval architect must perform the standard check on metacentric height (GM) of the barge, when preparing for a crane lift. The GM value can be calculated using the formula: GM=BM + KB–KG, where:

- GM = metacentre to centre of gravity,
- KB = keel to centre of buoyancy,
- KG = keel to COG,
- BM = metacentre to centre of buoyancy.

(See Figure 1. It is not within the scope of this article to go more in depth regarding these mathematics.)

It is well known that GM is not allowed to be negative, or even small. Two things can go wrong here:

- The interpretation of GM value. What is a small value (1 m or 2 m)?
- Not taking into account the worst loading condition of the crane, with respect to GM.

The centre of gravity (CoG) of a suspended load is located in the crane-tip, with a major decrease of the GM value. At the very moment of picking up a load from the deck, the CoG increases and GM value drops. In the case of a small mass ratio 'barge/load' this can have disastrous consequences.

Additionally, the crane specialist must perform its standard checks on the capabilities of the crane in adherence to the required standards (EN13852 for floating cranes). Furthermore, the crane specialist

It is Eager.one's firm belief that integrated crane ratings are the only decisive and safe way to operate a crane on a barge.

must reduce the crane's ratings. A dangerous mistake, which has happened many times, is using land-based ratings.

Crane capabilities

How to determine the reduction of the crane's capabilities is complicated and debatable. The difficult part of the calculation is the elastic 'interaction' between barge and crane, comparable with a land-based crane on a very elastic soil. Besides additional machine list and additional off/side lead, the elastic support of the crane (the barge) must be taken into account in the calculation (second order, nonlinear).

Besides the aforementioned possible mistakes, there is more: two worlds (land and water) act separately, where actually they should meet.

This is a weaving error in the process.

Source: https://eager.one