CICA – Vic / Tas Branch
Crane Safety Bulletin
#314 February 2023

Greetings all. Today's Bulletin is about the use of land-based mobile cranes (both wheeled and tracked, with lattice or telescopic boom) on floating vessels such as barges.

Using a crane in this way presents a number of challenges and risks. To help you manage this risk, the International Crane Stakeholders Assembly recently released a Guidance Note "Working with Land-based Mobile Cranes on Floating Vessels", available for download from the CICA Website.

As always, proper planning will help to identify risk factors and avoid unintended consequences that may affect the crane and/or vessel. If using a crane on a vessel extra precaution is required as water is unstable. Things to be mindful of include: excessive listing of the vessel, shifting the load and/or crane, vessel movement, material storage and vessel layout.

Let's look at some of these in greater detail.

The size of the crane, the crane configuration, and the loads to be handled in relation to the size of the vessel.

Crane and vessel combinations are subject to movements, as a result of waves, wind action, tides, flow and the ballast configuration of the vessel.

The frequency and range of movement depends largely on the condition of the vessel, and whether it is free floating (during transport), anchored, moored or beached.

Before loading the crane, a conditional inspection of the vessel should be conducted. This quantifies the vessel condition before the crane is installed and lifting commences.

Project supervisors need to be mindful of class and local regulations and consult with a specialist such as a Naval Architect, Marine Engineer, or local regulators for requirements.

The sensitivity of the crane configuration to vessel movements or inclinations, when using longer boom systems with luffing jib and/or suspended counterweight.

Crane manufacturers may have or may create special capacity ratings for their cranes when being operated on floating vessels that permit the crane to operate at a greater incline than when operating on land.

Special attention should be paid to the fact that slewing the crane can also influence the radius. If, for example, the loaded crane slews from a position with the boom parallel to the longitudinal vessel side (more stable side) to the transverse side (less stable side), the crane radius increases.

This sometimes means that when working at a high rated capacity utilization, the limitation of the crane's rated capacity system could be activated during rotation.

For cranes that have slew limiting available, there is also a risk that crane functions such as the slew motion, boom hoist or load hoist may cease due to a rated capacity system limitation.

Indications from the rated capacity system should be monitored, and corrective actions taken when necessary. All changes in inclination caused by the operated crane should be adjusted appropriately to minimise side and/or longitudinal pull that could result in a possible load pendulum during lift off (as seen in Figure 3 below)

If a crane manufacturer's capacity ratings are unavailable, a qualified person should be consulted to provide appropriate capacity reductions and any changes to the allowable configurations of the land-based capacity charts.

The tendency of the 'crane and vessel combination' to respond to load displacement and outside environmental influences such as wind and water movement.

The static and dynamic behaviour and more specifically the stability of the 'crane and vessel combination' consisting of the floating body, the crane and any intended loadings is of vital importance for the safe operation and transport or transit including the installation of the crane on the vessel.

It is important to analyse and approve the 'crane and vessel combination' as an individual case by persons with adequate knowledge and experience in naval architecture or marine engineering.

This analysis should take into account the forces and loadings that will arise during lifting operations, but also during transport and installation of the crane on the vessel and as a result of environmental factors, such as wind, tide and water flow forces.

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The impact of stored materials, ancillary plant and equipment, and fixed plant and equipment on list and trim values during operations.

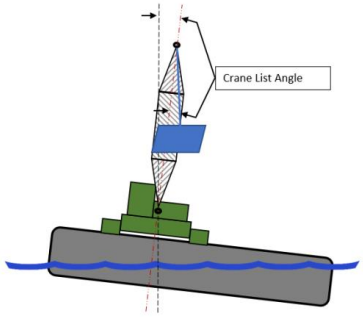

Figure 1 – Example of list causing an offset load

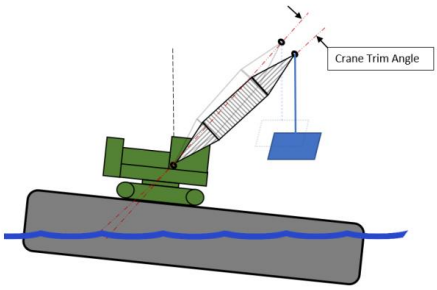

Figure 2 – Example of trim causing an increase in load radius

During planning, it is important to analyse the result of the list and trim changes to the vessel and the crane.

A list/trim measuring and indication device can ensure the crane is not operated outside of the allowable inclinations as given on the special capacity chart which should be visible to the operator.

Crane operation, i.e., lifting/lowering load, slewing, etc. impacts list and trim angles of the vessel. This also has an influence on the actual crane radius. If the inclination of the vessel increases, although the luffing gear is not operated, the crane radius increases and vice versa.

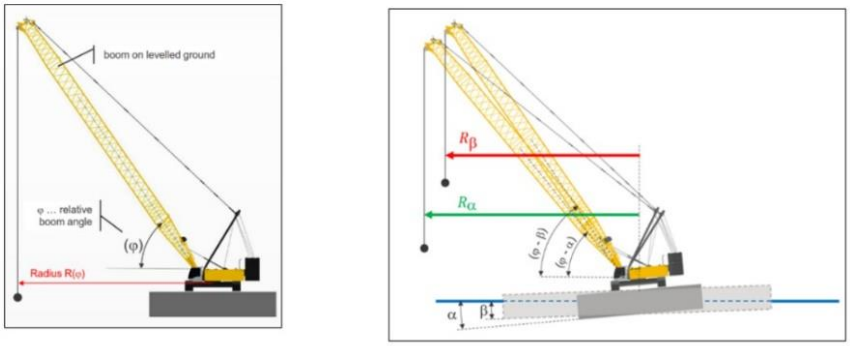

Figure 3 – Relation between radius and vessel heel

This Safety Bulletin only touches on some of the many considerations and implications of using a land based mobile crane on a floating vessel.

For a more comprehensive analysis, go to the newly released ICSA Guidance Note "Working with Land-based Mobile Cranes on Floating Vessels", available for download from the CICA Website.

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