VACUUM MOORING SYSTEMS

SAFER AND MORE EFFICIENT MOORING?

MOORING OPERATIONS HAVE ALWAYS BEEN SUBJECT TO SIGNIFICANT RISKS TO THE PERSONNEL INVOLVED. AS PORTS MODERNISE, VACUUM MOORING IS EMERGING AS A PRACTICAL SOLUTION THAT CAN REDUCE CREW WORKLOAD AND MITIGATE THE RISKS TRADITIONALLY ASSOCIATED WITH MANUAL LINE HANDLING.

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To date, vacuum mooring systems have mostly been seen within the shortsea ferry and container ship trade where repetitive berthing cycles and quick turnaround times make automation especially valuable. Also, in ports with severe weather conditions, such as heavy swells, a vacuum mooring system may be an efficient and safe alternative.

While the use of vacuum mooring systems may not completely remove the need for conventional mooring lines during a port stay, it has significant safety benefits, such as:

- **Reduced use of conventional mooring lines – these will mainly be used for back up in case of failure, heavy weather, and to ensure a smooth disengagement from the vacuum system and controlled departure of the vessel.**
- **With the vacuum system holding the vessel in place, securing the backup mooring lines can be done with less stress and does not require the same tension on the lines – two of the most common factors leading to mooring incidents.**
- **Reduced need for manual handling of mooring lines and removing crew and the shore mooring gang from potential snap back hazards.**

From an operational perspective the vacuum mooring system can also have benefits:

- **May reduce berthing time**
- **Minimising surge and sway impact on the ship due to the constant active force provided by the vacuum system**
- **Reducing the need for monitoring and adjusting mooring lines during port stay, freeing up deck crew to focus on other tasks**
- **While mooring lines may still be deployed as backups, they will be exposed to less load than in conventional mooring arrangements potentially extending the mooring lines lifespan and reducing the need for maintenance of the mooring winches.**

Depending on manufacturer, the system normally performs best on smooth, flat surfaces. Therefore, when mooring using a vacuum mooring system there are certain system and vessel specific characteristics which may impact the efficiency of the system for the master to consider when deciding on back up mooring arrangements:

- **Large or uneven weld beads on the hull and surface corrosion can reduce suction efficiency.**
- **A bent or deformed hull, whether from age, allision, or design, may reduce suction. Therefore, regular hull inspections at and near the vacuum system interface area are recommended.**
- **If the vessel heels excessively while connected, the vacuum may weaken which may lead to the vacuum system not being able to hold the vessel alongside if the heel exceeds its design tolerances. Therefore, crews must monitor the vessel's heel to keep this within the vacuum system's tolerances.**

One of the concerns often raised about vacuum mooring systems is the impact of a sudden power failure. Depending on system design, most systems when fitted correctly and in working condition will not lose their vacuum instantly. Instead, the vacuum may decrease over time, allowing the crew to tighten the backup mooring lines and, if necessary, deploy more lines to hold the ship alongside. The terminal operators should advise the crew of the anticipated decay time of the system if a power outage occurs. The terminal must also notify the ship in the event of a power failure promptly, as while the vacuum does not disappear, the system's ability to move along with the ship may be compromised.

Particularly if vacuum mooring systems are not regularly used, in advance of mooring, the area on board where the vacuum system will be connected should be visually inspected for anything that may compromise the effectiveness of the system. Upon arrival at berth, crew should observe the condition of the vacuum system before and during engagement to check that the vacuum sealing pads appear intact with no visible sign of damage. If anything appears abnormal, evidence should be preserved by taking photographs to defend a potential claim later.

Any departure from a standard mooring configuration should be risk assessed to understand and identify the hazards that may be present when using a new system. Companies are therefore encouraged to confirm that their safety management system and procedures address the use of new and novel mooring systems.

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