

This RightShip Insights series provides industry partners with key learnings from industry incidents, identified gaps and leading practices to improve standards and mitigate risk.

This paper discusses issues around **Mooring Operations and Safety Issues**, and:

- Observations on avoidable issues related to mooring.
- Insights from Terminal Feedback Reports.
- Insights from the RISQ inspection outcome.
- Where to find further information.

## Observations

Mooring forms an integral part of critical shipboard operations. It can be viewed as routine or non-routine depending on the type of mooring operations. Incidents related to mooring do not occur often. However, when they occur, they frequently result in a permanent disability or fatality. Besides, other mooring incidents which includes line parting incidents, breaking away from a jetty, ranging along the wharf, and premature rendering of lines are some of the critical issues which lead to significant downtime with added risk of cargo spills and damage to vessels, wharf, etc.

As per data available on the RightShip platform, there were a total of 542 mooring line incidents in the last 10 years from Jan 2015 till Mar 2025. This comprised predominantly mooring line parting incidents, vessels moving away from wharfs and other incidents related to mooring safety issues.

In a period of three years from Jan 2022 till Jan 2025, 4349 negative feedback responses were submitted by terminals worldwide, of which about 16% were related to mooring line issues.

RISQ inspection data for the period from Jan 2022 till Jan 2025 shows 11390 findings related to mooring issues in 7057 inspections. Details of some of the most common findings are given below:

## Common Findings under RISQ:

Section 10 (Mooring Operations) of the RISQ questionnaire includes 23 questions covering all aspects of mooring and anchoring operations. Below five questions had the most number of findings, which clearly shows some serious shortcomings around crew understanding some critical aspects of mooring equipment and its safe operation.

These questions are:

10.4 Do mooring lines and mooring tails comply with industry guidelines and are they in good order?  
2471 findings.

10.5 Is there a procedure for testing the winch brake rendering setting and is it tested regularly? 2050 findings.

10.15 Are the controls, linkages, operating levers, brake drums, brake linings and pins of the winches, as well as the working access arrangement to the winches in good working order? 1334 findings.

10.1 Has the company established guidelines and procedures for the inspection, maintenance and wear zone management of the mooring lines and are they being implemented? 1260 findings.

10.14 Are appropriate stoppers in use and are the mooring ropes turned up to bitts correctly? 1063 findings.

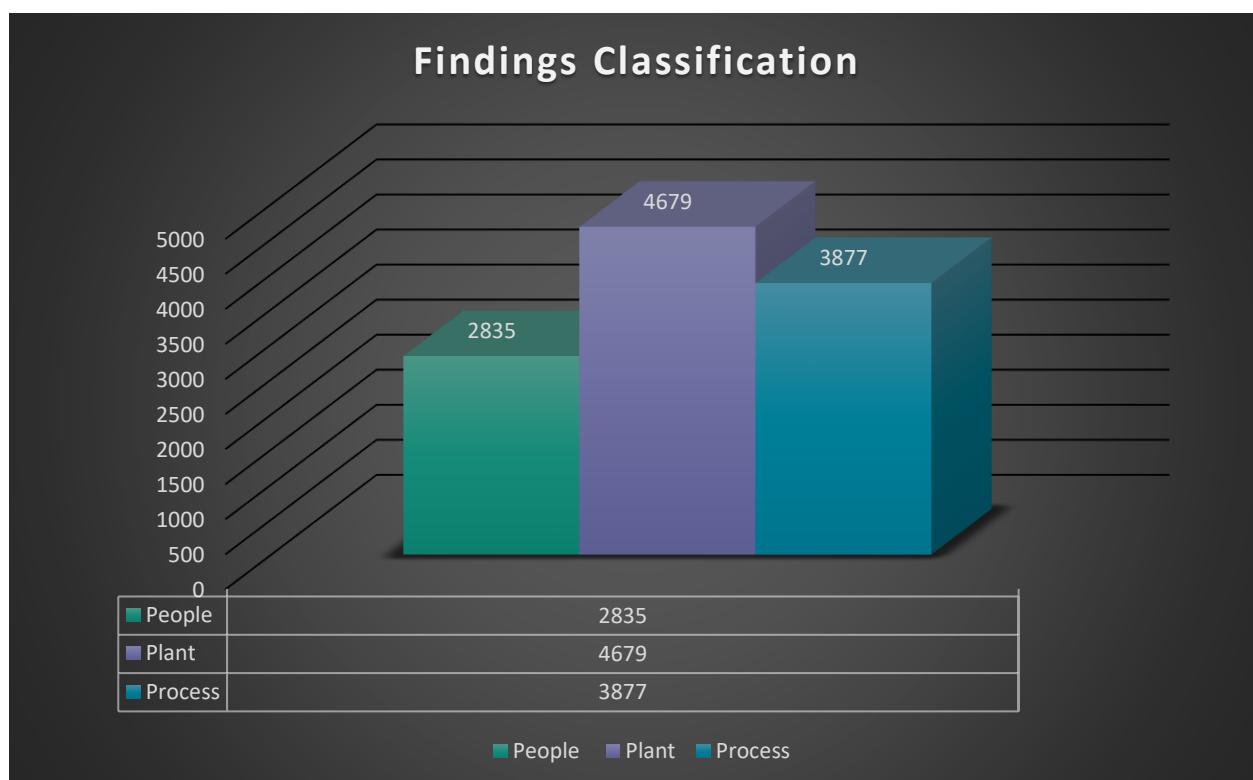
Besides the above, other areas of concern were noted, including the correct deployment and tending of mooring lines; issues with maintenance of windlass, anchors, and locking bars; and the management of mooring lines and mooring tail certificates.



## **RISQ Findings Classification:**

Each finding resulting from a RISQ inspection is attributed to one of the following categories:

- People.
- Plant (equipment), or
- Process.



The chart reveals that the highest number of findings was linked to:

1. Plant, totaling a remarkable 41 % of findings.
2. Following closely was Process, with 34% of findings.
3. People came in third place with 25% of the findings.

The figures above indicate that the human factor is not the sole contributor to these findings; the processes (SMS procedures and guidelines) and the plant (equipment maintenance, OEM maintenance instructions, and the use of OEM spare parts) also significantly contribute to the high number of findings in these areas.

Managers must consider all these aspects when enhancing the SMS guidelines, developing crew training modules for mooring safety, maintaining mooring equipment, and implementing design improvements for new buildings.

#### **Common Findings raised by terminals through FBRs:**

1. Incorrect brake rendering tests.
2. Mooring line parting incidents.
3. Moving away from wharf due to unattended mooring lines.
4. Creeping forward or aft along the wharf.

5. Poor condition of mooring lines.
6. Tightening of mooring lines on shared dolphins when shore personnel are present and in line of fire.
7. Mooring line dug into winch drums when shore boat is pulling the line.

Of the large number of terminal feedback reports submitted in the past two years, 481 were related to the ship's mooring lines, equipment and crew handling skills. Mooring line management while at berth is critical for safe vessel operations at the port. Terminals take these issues very seriously and want to minimise any impact on terminal productivity due to the inattentiveness of crew members, incorrect line management procedures and poor conditions of mooring lines.

A vessel moving away from the wharf incurs significant costs, including the need for tugs and, in some cases, a pilot to safely bring the vessel alongside again. The same applies when a vessel shifts forward or aft of the initial berthing position, making it difficult for ship loaders to distribute the cargo in the extreme hatches and creating the need to reposition the cargo. Any stoppages due to these delays add to the loss of terminal productivity.

Managers need to identify the common mooring-related issues at the terminals and address them through appropriate training, reinforcing strong and efficient mooring practices, and verification of these practices by development of standalone mooring audits.

## Case Studies:

### Case 1:

The incident occurred when a vessel was headed to the pontoon to moor alongside her regular berth. As the vessels' aft port quarter came alongside the pontoon, the deckhand used the boat hook to pick up the 'in-situ' mooring line and began the process of feeding the spliced eye through the fairlead. He then began placing the line over the bitts, this is where the deckhand's fingers on his right hand became trapped, and serious injuries were sustained to three fingers.



## Lessons learnt:

- Ensure that sufficient slack is allowed when handling mooring lines.
- Where practicable, the vessel should be stopped before mooring lines are placed over bitts, bollards, or cleats.
- Ensure new personnel (persons who are not yet experienced on a particular vessel) are appropriately familiarized.
- The use of single-ended lines or the use of small rope extensions on the spliced eyes would avoid exposing fingers and hands to risk.

## Case 2

A deck officer was killed during mooring operations when a mooring rope parted and struck him on the head. Cargo operations had been suspended due to very strong winds of over 50 kts and the Master had taken the precaution of posting a crew member at the vessel's forward and aft mooring stations to monitor and adjust its lines. A deck officer was inspecting the safety and security of the vessel and on reaching the forecastle, went forward of the mooring winches to inspect the lines. While the officer was in this exposed position, standing close to a mooring line, a strong gust of wind hit the vessel, and the rope parted close to the bollard ashore. On board, a bight of the mooring line flew up as the tension was released, striking the deck officer's head. The ship's crew quickly raised the alarm and paramedics attended the vessel. The injured deck officer was taken to hospital but died a few days later.

## Lessons learned

- Snapback of mooring lines can be dramatic and result in fatalities. Such risks need to be managed, and operations should cease immediately should the risk of snapback become apparent. The entire mooring area is to be identified as a snap-back zone.
- The use of mooring lines with snap-back arrestor technology could have reduced the impact. Additional measures to reduce risk could include fitting snap-back arrestors to mooring lines. These arrestors absorb the force within a parted line.
- The vessel operator in this case also introduced a campaign to encourage crew members to challenge colleagues who they observed as about to put themselves at risk.

## Case 3

The vessel was moored at a berth adjacent to a creek. Following a cyclone the previous week, torrential rains had significantly increased the water level in the creek, further exacerbated by spring tides. Consequently, the vessel drifted nearly 3 meters off the berth due to strong ebb tides. This situation went unnoticed by the crew until the ship loader operator alerted them. As a result, cargo operations had to be suspended, and tugs and a pilot were required to reposition the vessel alongside the berth, leading to considerable delays, production losses, and additional expenses.

## Lessons Learnt:

- Mooring watches are critical to ensure the vessel stays safely alongside.
- Impact of tides: passing vessels should always be considered when planning the mooring operations.
- Correct brake settings are essential to keep the lines tight to securely keep the vessel alongside.

## Case 4:

While loading gypsum on the vessel, both inner winch brakes on the Aft mooring deck of the vessel unexpectedly rendered, causing the ship to move forward. This was recorded by the shore tension monitor that registered a load of 14 MT on each line prior to the brake render then 0 MT after the brakes rendered. The loss of line tension on the stern lines resulted in an uncontrolled vessel movement causing contact between the ship hatch cover pad eye and the ship loader that was stationary at the time.

The 2 x shore side personnel that were in position at the loading hatch heard the ship contact the boom. They took immediate emergency action to move the ship loader away from the hatch cover and minimize damage to vessels and terminal assets.

Pilot and port authorities were informed, and a Tug arrived at the vessel in readiness to assist if required.

Pilot arrived at the jetty head and observed the two stern lines slack in the water and vessel position approximately 10 to 12m forward of its loading position. The stern lines were brought back up to full tension and the vessel was heaved Aft under the direction of the Pilot.

## Lessons Learnt:

- Winch brakes failed at less than half of the ship's design brake holding capacity.
- Vessel was berthed with an incorrect or invalid Brake Test Certificate. BHC was unknown to the vessel.
- There is no regulation to ensure Bulk Carrier winch brakes meet a standard. This incident is consistent with multiple similar incidents across the Marine and Ports industry every year.
- There is no regulator to ensure Winch Brake Tests are completed to a standard.
- A detailed examination of the brake assemblies when compared to ships design drawings, identified several adjustment and alignment problems with the Forward brake linkages and tensioning spindle.
- Brakes could not perform to design specifications in this state.

## What do good managers do

RightShip data shows there is scope for significant improvement in procedures and practices related to mooring operations, mooring equipment maintenance, mooring training and further enhancements, which can reduce incidents and issues related to mooring safety. Some of the suggested measures are listed below:

1. Safe mooring campaigns: A proven and effective way to share the lessons learnt from across the industry-wide incidents or near misses. Some examples include "Stop,

Think and Stay Alive” campaign, which highlights factors influencing human performance during mooring and emphasizes the importance of situational awareness.

2. Training in mooring operations: Comprehensive training on various aspects of mooring, such as supervision, handling of mooring lines, and maintenance of mooring equipment in conjunction with guidelines provided in the onboard line management plan.
3. Mooring audits: These are essential for ensuring safe and efficient mooring operations. They involve a thorough evaluation of current practices, equipment, and compliance with industry standards such as the Mooring Equipment Guidelines (MEG4). These should include an evaluation of current mooring practices, condition of mooring equipment, compliance with international guidelines and company-specific procedures.
4. Use of anti-snap-back mooring lines. Many ship managers are moving to the use of such lines, which have proven to be a game changer in reducing the incidents related to snap-back injuries.
5. Effective implementation of the Line management plan to manage the maintenance, inspection and retirement of mooring lines.
6. Guidance for carrying out BHC tests and compliance with MEG4 guidelines: Well-written, systematic and clear procedural guidelines on carrying out BHC tests. It is strongly recommended that senior onboard management and technical/marine superintendents are involved in mentoring onboard staff to ensure correct understanding and procedures are applied.
7. Design improvements for winches, including enhanced brake systems, drum design, Automatic control systems, spooling devices, and improved rendering systems.
8. Implementing a Behavior-Based Safety (BBS) approach for mooring safety focuses on identifying and modifying unsafe behaviors to prevent accidents and injuries. Key aspects of the program include regularly observing mooring operations to identify both safe and unsafe behaviors and conducting comprehensive training programs to educate crew members about the importance of safe practices. Additionally, collecting data on mooring operations helps identify trends and areas for improvement, which can be used to develop targeted interventions and measure the effectiveness of safety programs. Regularly reviewing and updating safety procedures based on feedback and data analysis ensures that the BBS program evolves to address new challenges and continuously improve overall safety.
9. Establish clear communication channels for reporting safety concerns, near misses, and incidents without fear of reprisal. Encouraging a culture of open dialogue where crew members feel empowered to voice their safety concerns.
10. Enhance crews’ risk assessment training while involving not only senior officers but also junior and the ratings who are involved in carrying out the task.

#### **Additional Information/Resources:**

1. **RISQ version 3.1 Section 10**
2. **RightShip website for guidance on BHC tests**
3. **OCIMF/MEG Guidelines**