BRITANNIA LOSS PREVENTION

B GUIDANCE

DECEMBER 2025

IMPORTANCE OF SHIP MAINTENANCE: ENHANCING SAFETY, EFFICIENCY AND COMPLIANCE

SHIP MAINTENANCE IS ESSENTIAL TO ENSURING THE SAFETY, OPERATIONAL EFFICIENCY AND LONGEVITY OF A VESSEL.

Neglecting maintenance can lead to severe consequences such as accidents, detentions, and costly repairs. Nearly three quarters of all marine incident reports received by the Australian Maritime Safety Authority (AMSA) between 2019 and 2021 involved deficiencies or failures with on board equipment, systems, or structure.

WHY A SHIP MUST BE MAINTAINED?

SAFETY: Regular maintenance ensures that all components of a ship are intact and functional, minimising the risk of accidents caused by loose parts or mechanical failures.

COMPLIANCE: Ships must adhere to international and local regulations such as the SOLAS (Safety of Life at Sea) and ISM (International Safety Management) Code. Maintenance ensures that ships comply with these standards and avoid detentions or penalties.

LEGAL REQUIREMENTS: Shipowners must ensure their vessels are seaworthy. Failure to maintain the ship can lead to legal ramifications. If a ship fails to meet seaworthiness standards, there may be claims against the ship from cargo interests or charterers.

OPERATIONAL EFFICIENCY: Maintenance ensures that all systems are functioning optimally, reducing the chances of equipment failure and minimising operational disruptions.

FUEL CONSUMPTION: Regular maintenance helps identify inefficiencies, such as engine performance issues, which can affect fuel consumption. Rectifying these inefficiencies can lead to significant fuel savings.

OPERATIONAL COSTS: Preventive maintenance reduces the likelihood of major equipment failures, which can lead to expensive repairs and operational delays.

EQUIPMENT QUALITY: Proper maintenance can extend the lifespan of ship equipment, reducing the need for premature replacements and enhancing long-term cost efficiency.

SAFETY OF LIFE AT SEA CONVENTION (SOLAS)

The SOLAS Convention (Chapter I, Regulation 11) mandates that a ship and its equipment must be maintained in accordance with regulations to ensure the vessel remains seaworthy.

INTERNATIONAL SAFETY MANAGEMENT (ISM) CODE

Clause 10.1 of the ISM Code stipulates that vessel and equipment maintenance is mandatory. Clause 10.2 further requires companies or operators to report non-conformities and take corrective action. Non-conformities include technical deficiencies, which refer to defects or failures in the vessel's structure, machinery, equipment, or fittings.

Operators must address deficiencies promptly and tackle the underlying issues within the maintenance management system that caused the problem. Poorly designed procedures such as those that are unclear, outdated, inaccessible, or not suited to the task, can lead to deviations and non-compliance. It is essential to align procedures with actual tasks and involve seafarers in their development whenever possible.

An effective maintenance management system stems from a comprehensive risk assessment. During this assessment, operators should consider:

- Manufacturer's maintenance recommendations and specifications
- Equipment history, including past failures, defects, damage, and remedial actions taken
- Results from third-party inspections
- The ship's age
- Critical equipment or systems identified
- Potential consequences of equipment failure on the vessel's safe operation.

WHAT IS A PLANNED MAINTENANCE SYSTEM (PMS)?

"A planned maintenance system allows shipowners and operators to plan, perform and document vessel maintenance at intervals complying with Class and manufacturer requirements. The objective is to ensure safe and reliable vessel operations, including equipment, in addition to compliance with all applicable regulations." (DNV, 2025)

There are different ways of achieving this, depending on the size and complexity of the shipping company and the types of vessels in operation. In all cases, a systematic approach to maintenance is based on risk assessment and begins with the establishment of a complete database of machinery, equipment and fittings.

An effective PMS not only helps meet safety and environmental objectives laid out in the ISM Code, but it is also an investment in the protection of the assets and optimisation of their management.

Between 15 January and 28 February 2022, AMSA conducted a focused inspection campaign (FIC) on planned maintenance. The campaign has revealed a high number of ships failed to comply with the planned maintenance requirements.

271 ships were inspected during the FIC; AMSA detained 17 ships during the period of the FIC campaign, 7 of which were detained as a direct result of planned maintenance deficiencies.

IMPORTANCE OF PLANNED MAINTENANCE

Due to the complex nature of the maritime working environment, maintenance-related issues are often a result of interactions between organisational factors and latent conditions.

Fast turnaround times in ports put crew under immense pressure, leaving little or no time to complete critical checks and verifications. This can lead to gaps in maintenance due to time constraints. Scarce resources mean crew and operators must make a trade-off between the time and effort taken to prepare for a task, and the time and effort expended doing it. Trade-offs involving shortcuts may allow the ship to be operational more quickly, but at the expense of thoroughness and safety.

A well-structured PMS, incorporating regular inspections, operational tests, and manufacturer-recommended procedures, can significantly reduce the risk of machinery failure. Maintenance and testing plans should include specific instructions to meet these requirements.

Our internal survey results show that defects relating to the PMS account for 1/3 of all defects, making it the top weakness identified in the onboard management systems. Despite having a PMS onboard, we've encountered some issues that slipped through the cracks during our condition survey program. However, these are exceptions, as most of the ships were found to be in good condition.

Some of the common findings are discussed below highlighting areas where maintenance efforts may need more attention.

CORROSION

Corrosion can weaken structural integrity, resulting in leaks, reduced load capacity and safety hazards for crew members. It typically affects critical areas such as the deck, hull, walkways, pipelines and hatch covers.

On container ships, poor maintenance of securing points can lead to container block collapses, damaging adjacent containers and heightening the risk of cargo shifting or being lost at sea.

FIGURE 1 Corroded container securing points

If left unchecked, corrosion in ballast tanks can lead to structural failure, undermining the vessel's stability during ballast operations. Corrosion on walkways, particularly crossing bays on container ships, presents a safety hazard, as weakened structures increase the risk of accidents. The corrosion of railings on cranes and emergency escape ladders also poses significant safety concerns.

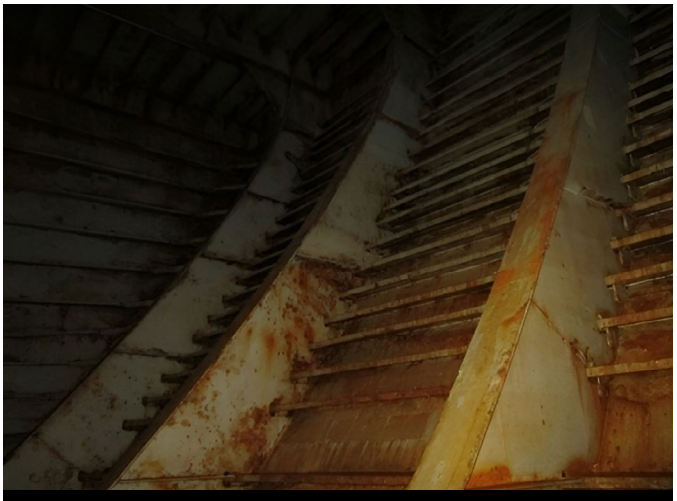

FIGURE 2 Ballast tank corrosion

Ventilator corrosion can impact cargo claims due to poor ventilation or ineffective sealing, which can also hinder firefighting efforts. Corrosion in pipelines not only affects safety but can also lead to pollution and cargo damage.

It was noted that on one occasion a sounding pipe passing through a cargo hold leaked while ballasting, the other sounding pipes were also found in a rusted condition.

Water ingress, for instance, can spoil cargo, and in tankers, corroded pipelines may cause cross-contamination, off-spec cargo claims, oil leaks, or spills.

FIGURE 3 Corroded Ventilator

FIGURE 4 Holed Fireline

FIGURE 5 Crane emergency escape ladder

FIGURE 7.2 Deck grating and steps

FIGURE 6 Railing around the crane ladder

FIGURE 8 Corroded pipes

FIGURE 7 Deck grating and steps

FIGURE 8.2 Corroded pipes

FIGURE 9 Corroded grating/deck

FIGURE 9.2 Corroded grating/deck

FIGURE 10 Holed Deck

Similarly, corroded hydraulic pipes can cause pollution, and any breach in firefighting pipelines can become a critical issue during emergencies, putting lives at risk. Corroded electric conduit and refer sockets on container ships can bring large cargo claims. Additionally, we've observed corrosion in hydraulic consoles, which can lead to both pollution and malfunction of the systems they control.

MITIGATION

Regular inspections, the application of protective coatings, and diligent maintenance are crucial for preventing corrosion and preserving the structural integrity of ships.

MOORING

Mooring lines on ships are a critical component for ensuring the vessel remains securely berthed. One of the common issues we encounter during surveys is the poor condition of mooring lines. When these lines are compromised, the risk of parting increases, which can have serious consequences.

A parted mooring line can cause the ship to move unexpectedly or surge alongside the berth, potentially leading to damage to the quayside, shore cranes or even vessels.

FIGURE 11 Mooring line degradation

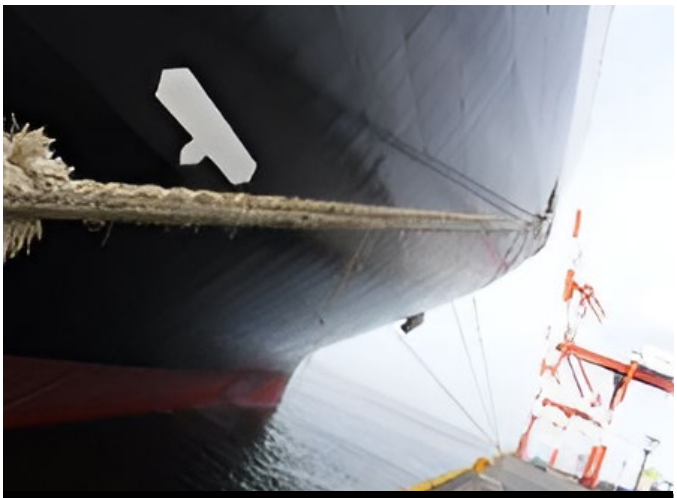

FIGURE 11.2 Mooring line degradation

All deteriorated or damaged mooring lines should be immediately discarded and replaced. A robust policy for the inspection and maintenance of mooring lines should be clearly outlined in the company's Safety Management System (SMS).

Regular inspections, both by the crew and during formal inspection by the ship managers, are essential to ensure that mooring lines remain in good condition and to prevent accidents or damage.

Other common mooring issues we often observe include the deterioration of key equipment such as winches, windlasses, brake linings, and associated fittings:

CORRODED WINDLASS:

The windlass is prone to corrosion due to exposure to the harsh marine environments. Corrosion can compromise its functionality, affecting both mooring and anchoring operations. A malfunctioning windlass can potentially lead to delays or safety risks during mooring operations.

BRAKE LININGS:

Winch brake linings wear down over time, especially if not maintained properly. Thinned brake linings reduce the winch's ability to secure the ship during mooring. If the brakes fail to hold, the ship could drift or surge during docking.

FIGURE 12 Worn brake lining

ANCHOR CHAIN:

Anchor chains are exposed to constant friction and saltwater, resulting in thinning over time. Chain links that are excessively worn out or thinned can fail during anchoring operations. A weakened anchor chain may snap under stress, leading to a loss of anchoring capability and possibly grounding the vessel or causing it to drift.

FIGURE 13 Anchor chain

FROZEN CAPSTAN/FAIRLEAD:

Capstans and fairleads can seize or freeze due to lack of lubrication, corrosion, or mechanical wear. When this happens, they no longer rotate smoothly, which makes mooring operations difficult or dangerous. A frozen capstan or fairlead can prevent proper control of mooring lines, increasing the risk of parting lines or mishandling the vessel during mooring.

FIGURE 14 Fairlead in poor condition

MITIGATION

FREQUENT INSPECTIONS:

Regularly inspect winch and windlass brake linings, mooring lines and other mooring equipment for signs of wear and tear.

TIMELY REPLACEMENT:

Any worn brake linings, corroded equipment, or thinned anchor chains must be replaced immediately to ensure safe operations.

LUBRICATION AND MAINTENANCE:

Ensure capstans, fairleads, and other rotating equipment are well-lubricated and free from corrosion or mechanical issues to prevent operational hazards.

A winch braking test should be conducted as per SMS. Ensuring the upkeep of mooring equipment is critical for safe docking and anchoring procedures, reducing the risk of accidents and operational delays.

SAFE MOORING OPERATIONS INCLUDING THE SAFE USE OF MOORING EQUIPMENT (MSC.1/ Circ.1620)

IMO - SAFE MOORING

LEAKS

The most common leaks occur in the engine room. This is a sign of poor maintenance which can lead to mechanical failure /loss of power, delays etc. Often the cause is the condition of gaskets, o-rings, and seals.

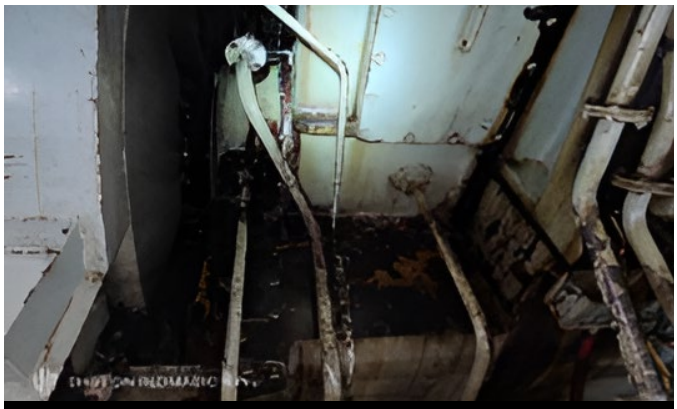

FIGURE 15 Oil leaks in engine room

FIGURE 15.2 Oil leaks in engine room

On one occasion, oil leaks were reported in the engine room, with significant leakage from the main engine units. Fresh oil was also observed in the bilge, indicating ongoing issues with sealing or worn components which can lead to reduced efficiency and potential damage to critical systems.

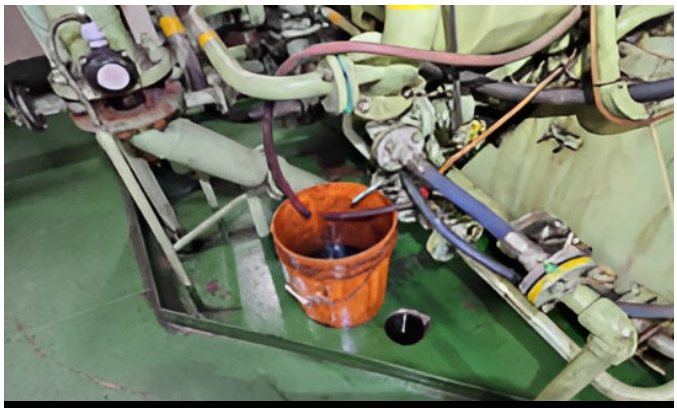

FIGURE 16 Oil leaks in engine room

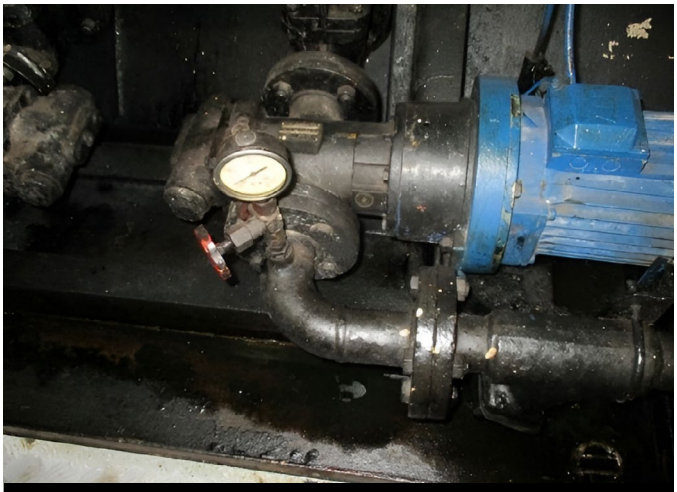

FIGURE 16.2 Oil leaks in engine room

The biggest risk from oil leak is fire in the engine room.

HYDRAULIC OIL LEAKS:

Hydraulic oil leaks were observed in multiple areas, including crane systems, steering gear system, ramp control station on RORO ships and hydraulic jacks for hatch covers. These can lead to disruption and delays.

FIGURE 17 Saveall containing oil

Hydraulic oil leaks can reduce the efficiency of crucial systems, impair lifting operations, compromise steering control and increase the risk of pollution. Hydraulic fluid levels and condition should be monitored regularly, and fluid replaced according to manufacturer recommendations or upon signs of contamination.

EXHAUST GAS LEAKS:

Leaks in the exhaust gas system can occur in engine rooms. Exhaust gas leaks decrease engine performance but also produce extreme temperatures near the leak, creating a fire or burn hazard. These issues emphasise the consequences of deferred or inadequate maintenance, which can lead to operational inefficiencies, potential safety hazards and expensive repairs.

FIGURE 18 Signs of exhaust leak

MITIGATION

FIGURE 19 After cleaning in engine room

PROMPT REPAIR:

All leaks, particularly in hydraulic systems and engine components, must be identified and repaired swiftly to prevent contamination, mechanical failure and environmental damage. Any remaining oil water mix must be cleaned and removed immediately.

ROUTINE INSPECTION:

Regular inspections of hydraulic jacks, cranes, engine room components, and steering systems are essential for early detection and repair of leaks. Check for signs of fresh oil in the engine room bilge should be as part of daily operational checks.

OIL MANAGEMENT:

Ensure proper containment and cleanup of any leaked oil to avoid pollution.

HATCH COVER MAINTENANCE

The condition of hatch covers is a critical aspect of our surveys for bulk carriers and general cargo ships, as they protect the cargo from water ingress and weather damage. While most ships were found to be in good condition, a few required immediate repairs. A common issue observed was the deteriorated state of the rubber packing.

FIGURE 20 Gaps in rubber packing

FIGURE 21 Packing coming off

In one case, a booby hatch entrance cover was found with a hole, heavily wasted due to corrosion. Additionally, the channels which hold the rubber packing of several void spaces were severely corroded and degraded. Quick-closing cleats were occasionally found rusty and frozen, making it difficult to secure the hatch covers properly.

FIGURE 22 Non return valve temporary patch work

Non-return valves from the drain channels were also identified as either ineffective or non-functional, which could lead to water accumulation and potential cargo damage.

Comprehensive guidance should be provided for hatch covers in conjunction with manufacturer recommended methods and tolerance and testing. An ultrasonic test will provide advance indication of the deterioration, therefore early intervention is possible.

Britannia Loss Prevention Guidance on HATCH COVER MAINTENANCE.

CONCLUSION

Ship maintenance is an ongoing, complex task that requires coordinated effort between technical staff and management. Proper maintenance not only ensures safety and compliance but also reduces operational costs, optimises fuel consumption and extends the lifespan of the ship's equipment.

The consequences of neglecting maintenance, ranging from corrosion, equipment leaks, and leaking hatch covers, can be severe, leading to detentions and increased operational costs.

By implementing robust maintenance strategies and adhering to ISM guidelines, shipowners and operators can prevent costly repairs, improve safety, and ensure the smooth operation of their vessels.

REFERENCES

Det Norske Veritas. (2024). *Planned maintenance system for technical ship management - ShipManager Technical* [online]. Available from: https://www.dnv.com/services/planned-maintenance-system-for-technical-ship-management-shipmanager-technical-1509/#:~:text=A%20planned%20maintenance%20system%20allows,compliance%20with%20all%20applicable%20regulations [accessed 9 October 2024].

FOR FURTHER INFORMATION

Members requiring any further guidance are advised to contact the Britannia Loss Prevention Department: lossprevention@tindallriley.com.

DISCLAIMER