MARS – Lessons Learned

MARS Report No 390 April 2025

MARS 202515

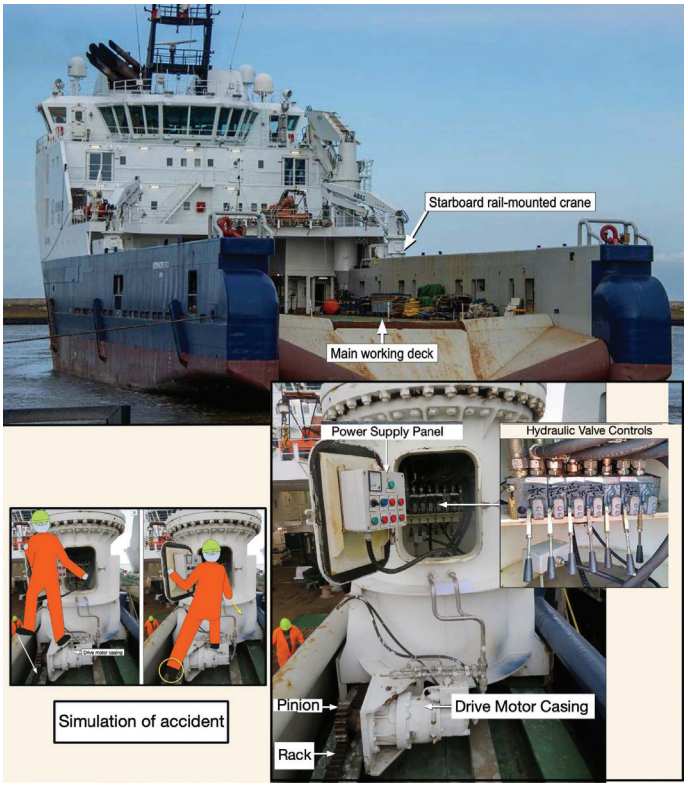
Hazard in plain sight causes catastrophic injury

As edited from MAIB (UK) report no. 11/2024

➔ A survey/supply vessel was alongside preparing for a contract, for which several items of deck gear and machinery had to be moved. A lifting plan and permit to work had been completed and the deck crew informed of the work to be done.

A deck officer and a fitter went on deck to move several heavy items using the starboard rail-mounted crane. The officer climbed up the ladder to access the crane and used the local hydraulic valve controls in the crane pedestal to manoeuvre the crane. This was the only way he knew how to operate the crane and was the way he was shown in his arrival familiarisation training.

After repositioning two loads on the main deck, a third lift was initiated. In order to see both the fitter and the load to be moved 4m below on the main deck, the officer stood with his left foot on the inboard bulwark and his right foot on the crane drive. At one point, he shifted his left foot from the bulwark to the crane's travel rack. He felt something pulling at the left leg of his overalls, which unbalanced him.



He held onto the crane travel lever for stability, but this caused him to unintentionally pull it further backwards, which increased the speed of the crane's traverse on the rack, and his left foot and leg were dragged into the rack and pinion drive. He let go of the travel lever, which stopped the crane.

The fitter climbed up to the crane's rail and found the victim lying on his back with his left leg trapped between the rack and pinion. The victim, still conscious, instructed the fitter to move the crane forward; this action freed his leg, which was severely mangled below the knee. The alarm was quickly raised, and the vessel's first aid team was activated. Soon after, a helicopter transferred the victim to hospital, where his leg required amputation below the knee.

The investigation found that the crane manufacturer's operations manual, which was available on board, stated that the local controls in the crane pedestal were for emergency use only. Normal operation was to use either the bridge control station or the crane's remote-control unit. The company's Safety Management System (SMS) made no reference to ship-specific operating instructions as there were none. The practice of operating the crane with no guardrails or restraints while working at height, and near the unguarded rack and pinion gearing, was a clear sign that the process was flawed. The crew indicated that they had the freedom to challenge on board practices, but they did not raise the issue of the operation of the cranes using the local controls as they considered it 'normal'. This demonstrated not only an ignorance of the manufacturer's instructions but a certain blind eye to unsafe acts or unsafe conditions.

Lessons learned

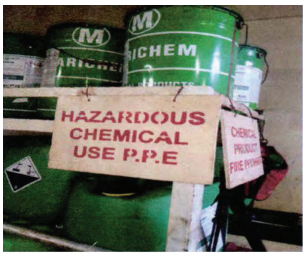
- Why is it so easy to see a hazard after an accident? Seeing hazards where you habitually work is not effortless – you have to work at it. Open your mind and look 'with new eyes' at each task. Is there danger?
- Although generic instructions and practices in a company's SMS are a good first layer of protection, every vessel should have ship specific procedures that address the specific hazards of that vessel. No one knows the ship better than the crew, so get to work on your ship specific procedures

■ **Editor's note:** Over ten years ago, when I first boarded a small dredger I have since helped operate as Master, there was only one ship-specific procedure. Over the years, we have added to our library of ship specific procedures (we now have a total of 32) and have also developed several ship-specific 'hazards' that we use for familiarisation training and continual reference. These things take time and are a matter of continual improvement.

MARS 202516

Chemical hazards need PPE

➔ An engineer was inspecting the chemical locker. He found that although there was a notice in place instructing crew to use proper Personal Protective Equipment (PPE) when handling the chemicals stored there, there was no easy access to specialised PPE equipment in place. He advised the Master and Chief Engineer and PPE was placed in easy access to the chemicals.



Before

After

Lessons learned

- This is a good example of seeing a hazard that was in plain view for some time.
- Each chemical has its own specific risks. While specific PPE should be easily accessible, so too should an information matrix that shows what PPE must be worn for each chemical.

MARS 202517

Ferry car deck collapses

As edited from SHK (Sweden) report 2024:13

➔ A ferry was in port loading vehicles and passengers. The ferry was equipped with mobile decks that could be raised or lowered to load cars above the main deck. At the time, the automation for operating the mobile car decks was not functional so these decks had to be raised and lowered by manually operating the levers in proper sequence. The crew member performing the task on this day had not done so for some time and the written instructions were not in the working language of the crew.

The crew member pulled in the locking wedges for the platform too early, an 'out of sequence' manoeuvre. This resulted in the platform falling freely for a short distance, putting high stress on the lifting cables and mechanism. One of the sheaves of the lifting cables was torn loose by the increased stress. The spacer plates that were supposed to hold the two steel plates of the line sheave together broke under the load. Now, there was nothing to hold the cables in place and one side of the mobile deck fell to the main deck. A car with a trailer was crushed and two people suffered minor injuries.

The investigation showed that there are no requirements for independent inspections of platforms for suspended (mobile) decks. However, requirements do apply to ramps that are defined as 'lifting devices'. Mobile decks have a similar technical design to lifting ramps and the risks associated with construction and use are similar. The disparate regulatory requirements for mobile decks versus lifting ramps do appear to be justified from a safety perspective. Similarly, there was no requirement for protection against wire breakage for suspended decks, whereas there is such a requirement for ramps.

The investigation also found that there were no technical measures to prevent the locking wedges from being pulled in before the platform had been raised. Finally, there was nothing to prevent people from being under the mobile decks during operation. This aggravated the consequences of the accident.

Lessons learned

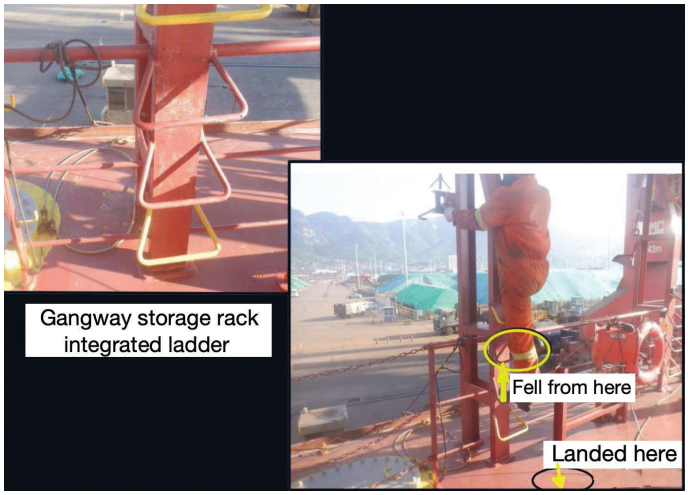
- There is no substitute for good training and complete familiarisation with the equipment being used. In this case the crew member's training in the operation of the mobile deck was less than adequate.
- Allowing people to remain under the mobile decks when the decks were being operated is a sign that better risk assessments are in order on this vessel and possibly others of similar design.

MARS 202518

Hazard in plain sight

➔ Crew were preparing the gangway prior to arrival as the vessel approached port. As part of this process, crew had to climb several steps on the gangway stowage rack integrated ladder and release the stowage cleats fore and aft.

A crew member accomplished this well-established routine, but while stepping down from the ladder he slipped from a height of about 1.2m, falling on the deck and landing on his right leg. The impact caused a fracture of the right knee.



Lessons learned

This common and well-practised procedure did not appear to be hazardous. Crew had accomplished this task innumerable times without incident. But after the accident, we can see that the integrated ladder, as installed, poses several 'safety traps'.

- The ladder gives good access to the gangway securing cleats but also gives a false sense of security. One hand is needed to hold yourself steady on the ladder, while one hand is free to work the cleat.
- The relatively low height of the access ladder adds to the false sense of security, after all, what can happen at such a low height? This accident proves that even a fall of 1.2m can cause a serious injury.

MARS 202519

Strong currents require strong berthing measures

As edited from TSB (U.S.A.) report MIR 24-25

➔ A bulk carrier had arrived at a river berth, bow upstream, to load coal. Light draft was close to 9.3m aft and the water depth at the berth was near 15.5m, which gave an UKC of 6.2m. The river was at recognised high water levels, which increased the strength of the river current, so extra lines were installed fore and aft and two 'hold-in' tugs were positioned on the outboard side.

The mooring lines were monitored during loading to ensure the vessel was always tight to the berth. During the loading process, the port captain boarded and informed the Master that the river water height was now below a critical level and falling. This made the loading terminal's high-water loading plan unnecessary, so hold-in tugs were now not required. The port Captain asked the Master to release the aft tug, and the Master agreed.

Later that day, the ship's agent contacted the Master, stating that 'the terminal no longer requires your vessel to have any hold-in tugs alongside.' The port captain also communicated to the Master that if the tug was retained it would be solely for the shipowner's account instead of the charterer. Given this information, but against his intuition, given that the strength of the river current was now at between 3 and 4 kts, the Master released the forward tug at 15:00.

At 00:50 the next morning, cargo loading shifted to the final hold. At about that time the draft readings from the dock were 11.3m forward and 14.7m aft.

About one hour later, the crew found that the lines forward were very tight, and the bow had come away from the dock slightly. The crew tried to heave on the breast lines, but because the lines were already very tight, the vessel's electrohydraulic mooring winches could not heave in. The Master was informed that the bow had come off the dock by about 1.5 metres and they could not bring the bow back alongside with the winches.

The Master went to the bridge and called for immediate tug assistance. The velocity of the current was now approaching 4.5 knots. Within minutes, the vessel's bow began to move farther to port, away from the dock, while the stern remained alongside. At 02:10, the Master summoned all crew on deck. On his way to the bow, an officer saw the forward mooring lines paying out; smoke and sparks could be seen coming from the port side winches, so he stopped as it was no longer safe forward.

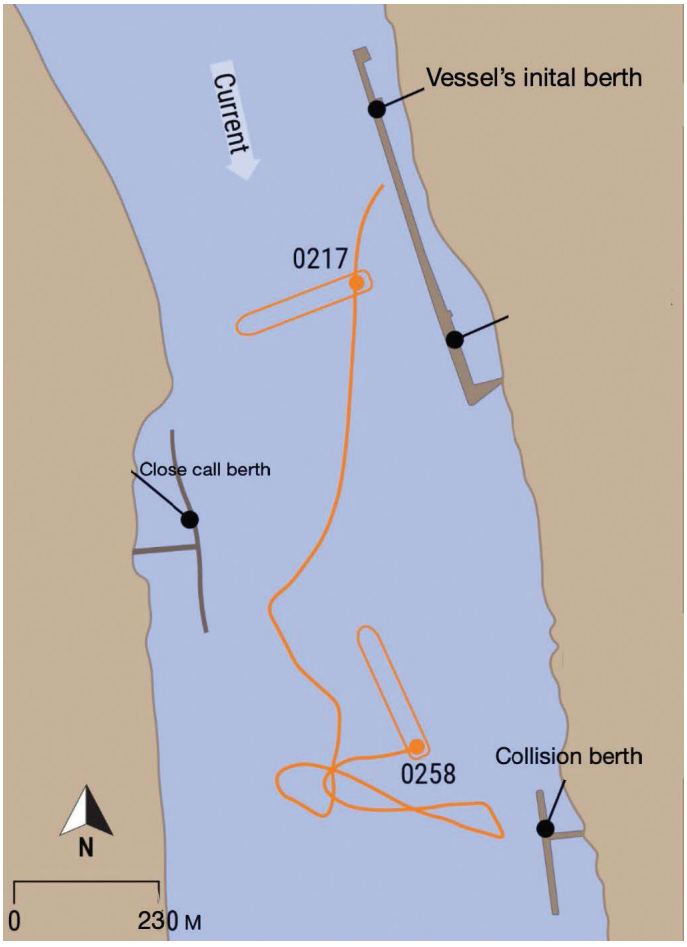
The Master asked for immediate engine readiness, but as the bow continued to move out into the river, greater tension was now being placed on the stern lines which began to part. The vessel then broke away from the dock and the Master ordered the anchors away. At 02:16, main engine propulsion control was transferred to the bridge. Once safe to do so, crew went to the bow and released the starboard anchor, which was already hanging out of the pocket. The anchor was let go to one shot (27.5m) on deck.

Two tugs had now approached. Given the parted lines in the water on the vessel's starboard side, they were unable to approach the side of the vessel for fear of fouling their propellers, but were able to keep the vessel from drifting onto an unoccupied dock downstream.

Soon, the port anchor was in the water. The brake was applied at 4 shots (110m), but the brake could not hold the chain, and the port anchor continued to pay out under heavy tension until the brake held the chain at 5 shots on deck, still under heavy strain.

By 02:48, the bulker was drifting downriver about 4 knots and closing on another berth. Both tugs continued efforts to stop the vessel's drift downstream, but the bulker nonetheless collided with some barges tied up at this berth. After the collision, a third tug arrived, and the bulker was brought under control until a river pilot arrived and the vessel conducted to anchorage.

The investigation found that the probable cause of the breakaway of the bulk carrier from the dock was the bow coming off the dock during cargo loading, thereby exposing more of the vessel's underwater hull to the strong river current.



Lessons learned

- The force of a current on the hull of a vessel increases in a non-linear fashion in relation to the current speed (ie to the square of the velocity). Beware of this hazard!
- It is important to ensure that berthing lines are kept well taut as a vessel loads and sinks lower. This increases the surface area of the hull to the current and hence the force acting on the hull.
- The increase in the force on the hull as the speed of the current increases is non-linear. A reduced UKC adds a multiplying factor to the resultant force. In this case, approximately 1.2X (source: Capt S S Chaudhari at https://captsschaudhari.com/2020/07/02/how-do-you-go-about-anchoring/)
- In such conditions, it is good seamanship to keep propulsion, thrusters, and steering systems on short standby and have anchors ready for immediate use, even if not required by the loading facility.

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