Mariners' Alerting and Reporting Scheme

MARS Report No 351 January 2022

MARS 202201

Gantry crane fatality – stevedore crushed

Edited from official MAIB (UK) report 12/2021

➔ A small general cargo vessel was berthed to discharge a cargo of fine coke. In the early morning five port stevedores boarded the vessel to discharge the cargo; a foreman, a stevedore coordinator, a front-end loader driver and two others. A sixth team member remained ashore to operate the discharge grab crane. It was the role of the stevedore coordinator to liaise between the crane operator and those working in the cargo hold.

The foreman discussed the discharge plan with the vessel's chief officer and then briefed the other stevedores. The foreman explained that the aft end of the hold would be unloaded first and informed his team that hatch covers 7 to 11 would be moved aft once the area was unloaded. The foreman then went ashore while the other stevedores remained on board.

When cargo discharge began, the stevedore coordinator directed the shoreside grab crane operator from the vessel's port side walkway via handheld radio. To see into the hold, he climbed up the vessel's fixed ladders and leaned over the top of the two metre high hatch coaming. The chief officer monitored the cargo operations and the list and trim of the vessel, and ballasted as required.

At one point the gantry crane was needed to handle the stacked hatch covers. The chief officer checked that the crane's path was clear on both sides of the main deck and then climbed up to the crane's control position and began the manoeuvres. At about the same time, the stevedore coordinator went to check on the progress of his colleagues in the aft part of the hold, walking aft along the port walkway.

As the chief officer drove the gantry crane over hatch cover position 10, the crane suddenly stopped. He did not know why the crane had stopped, but the stevedore foreman had seen the stevedore coordinator's head appear above hatch cover 11 on the port side and immediately realised that there had been an accident. He raised the alarm. The stevedore coordinator was found wedged between the aft leg of the gantry crane and hatch cover 11, a gap of approximately 130mm. Although rescue and medical attention were immediate, the stevedore coordinator had suffered extremely severe injuries and was declared deceased at the scene.

The official investigation found, among other things, that:

- The stevedore coordinator almost certainly knew the gantry crane was moving but was probably confident that he could move out of its path in time.
- The ship's gantry crane operator did not stop the crane because he did not know the stevedore coordinator was on the crane track.

Lessons learned

- Gantry cranes, as presently configured and operated on most ships, seem a clear and present danger for crew and stevedores.
- Without a clear view of both tracks in real time or feedback from dedicated banksmen spotting the tracks, driving a gantry crane blind will always be a hazardous endeavour.

■ **Editor's note:** Are gantry cranes a clear and present danger, as the MAIB states? In MARS reports alone, which are probably a subset of all such occurrences, six gantry crane accidents are now recorded. Apart from the present report, these include MARS report numbers 98058, 201460, 201525, 202068, 20222. From these reports, almost all with fatal consequences, the over-riding contributing factor seems to be that the gantry crane operator was not aware of the victim's precarious position. Just as driving a motor car would never be done 'blind', gantry cranes should never be driven so either. Continuous track assessment should be the norm. This can be achieved by dedicated banksmen or, for example, wide-angle camera lenses positioned on the gantry legs and sending images to the crane operator. Clearly, emergency stop buttons alone are proving insufficient to eliminate fatal accidents.

MARS 202202

Boiler over-pressure causes three fatalities

Edited from the BMA (Bahamas) report published 18 March 2020

➔ A drill ship holding position offshore was due to carry out the annual servicing of its two auxiliary boilers. The boilers were used only for well test operations and had not been operated since the last annual service, except for maintenance operations.

The duty engineers brought the boilers up to temperature and pressure specifications in preparation for the annual checks. As this was underway, the pressure safety valves opened. They appeared to open at 1.9 bar for boiler 1 and 5.9 bar for boiler 2; well below the boilers' working pressure of 7 bar. Over the course of the next four hours, the

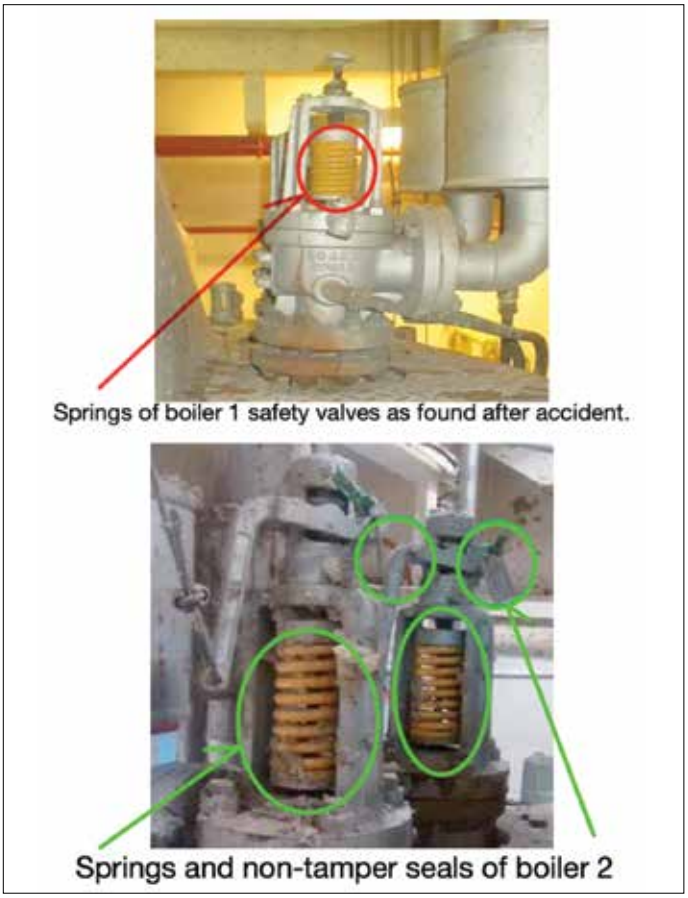
boilers were stopped and restarted a further three times. Each time, pressure safety valves operated at what appeared to be too low a pressure.

Two shore based service technicians had now joined the vessel by helicopter but the boilers were not ready for servicing due to the perceived issues with the pressure safety valves. The ship's engineers, together with the service technicians, again started the boilers to check the operation of the pressure safety valves. They still appeared to be opening below the boilers' working pressure. It was decided to shut down the boilers and allow them to cool so the technicians could then overhaul the pressure safety valves. Once cool, the pressure safety valves of boiler 1 were adjusted in situ by the service engineers so they would open at a higher pressure. This explains why the 'non-tamper' seals were found missing from the safety valves of boiler 1 after the accident.

The next day, the service technicians resumed the work, together with one of the ship's engineering personnel. The boilers were started and almost immediately triggered alarms on the machinery monitoring panel. Over the course of the next 36 minutes at least 20 alarms were acknowledged as the team struggled to find the problem. Then, boiler 1 catastrophically failed from overpressure, filling the boiler compartment with steam. The two service technicians and ship's second assistant engineer who were in the boiler room suffered lethal injuries. The weathertight door was blown open and the pressure vented to atmosphere, injuring another crewmember who was working nearby.

The investigation found, among other things, that the pressure sensors of boiler 1 were not operating as required and were giving false pressure readings. Yet the accuracy of the pressure sensors was never questioned as everyone believed they knew the problem; that the safety valves were opening below their set pressure. It is possible that this led to confirmation bias that then set the stage for the unsafe act of adjusting the safety valves to open under higher pressure.

Further, the service technicians' lack of experience may have contributed to both the confirmation bias and the subsequent unsafe act. Adequate supervision by a qualified professional could have prevented this deviation from established safe practices.



Springs of boiler 1 safety valves as found after accident.

Springs and non-tamper seals of boiler 2

Lessons learned

- In systems that are dependent on several inputs, careful analysis is needed to determine where the real source of the problem lies. In this case the problem was 'upstream' of the safety valves, at the pressure sensors.
- Boilers are inherently very dangerous due to high operating temperatures and pressures. Strict and competent supervision of operation and maintenance should be the norm.
- Safety valve operating parameters should only be set by expert guidance and under test bench conditions, never 'on the fly'. Once adjusted, the valves are then fitted with a non-tamper seal identifying the set pressure, facility that performed the work and the date of adjustment. These seals should not be removed.
- Be aware of confirmation bias, one of the leading factors in many accidents related to human error.

MARS 202203

Accommodation ladder turntable pin failure

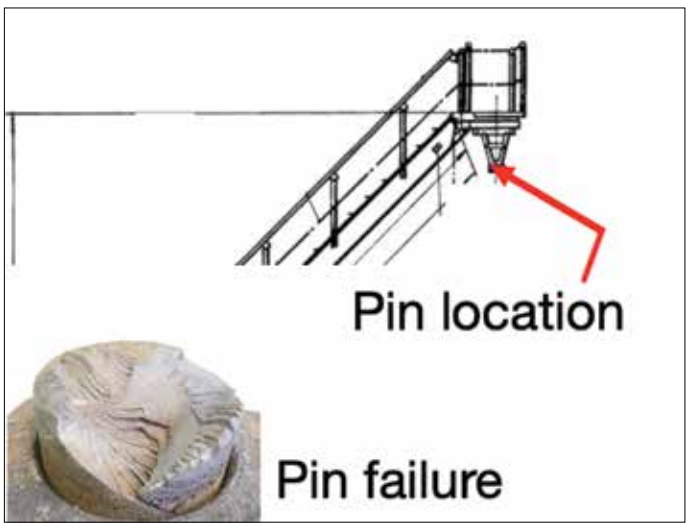
As edited from USCG (USA) Safety Alert 05-21

➔ A recent incident brought to light a potentially dangerous situation involving failure of the turntable pin on accommodation ladders.

The vessel's crew was stowing the accommodation ladder when the turntable pin failed. The victim, who was on the accommodation ladder at the time, fell approximately nine metres and sustained serious injuries.

Currently, there are no established timelines or requirements to replace turntable pins. Without periodic examination (and replacement if needed), corrosion can ultimately lead to structural failure.

After the incident specific inspections were undertaken; local authorities noted that many vessels had accommodation ladder turntable pins that had been in service for more than 20 years without replacement. Notwithstanding the guidelines on the maintenance of accommodation ladders contained within 74 SOLAS (14) II-1/3-9, MSC.1/Circ. 1331, and 74 SOLAS (14) III/20.7.2, none of these references include maintenance guidelines for turntable pins.



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Lessons learned

- While the turntable pin may seem like a minor component, failure can cause significant harm to anyone using the accommodation ladder at the time.
- Periodically inspect the condition of the turntable pins and replace when necessary.
- Revise accommodation ladder maintenance plans to include turntable pins.

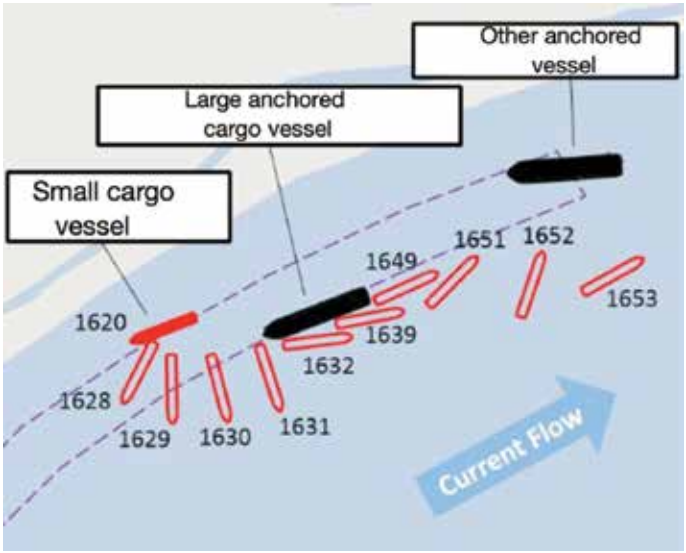
MARS 202204

Anchorage disaster movie

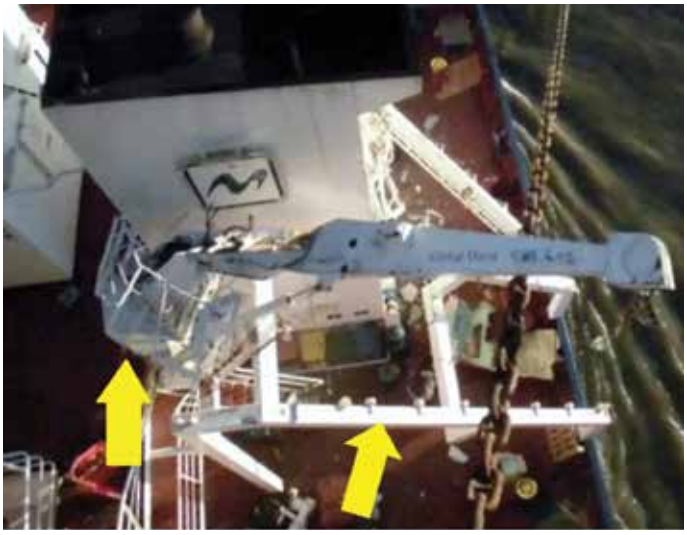
As edited from NTSB (USA) report DCA16FM018

➔ A small general cargo vessel was due to travel downriver. While still on the berth, the pilot determined that he would not be able to reach the end of the daylight-only restriction zone before darkness fell. He discussed a plan with the Master to begin the transit, but go to an intermediate anchorage for the night. The only available anchorage was an area approximately 1.1 miles in length and 100 metres wide. That area already had three vessels at anchorage and river currents were running strong due to high water conditions.

The transit downriver was without incident. With the assistance of two tugboats, the vessel was anchored at 16:00 using both anchors, placed at the ten and two o'clock positions respectively. By about 16:17 the anchor chains had become taut and the stern of the vessel was about 152 metres from the bow of a much larger general cargo vessel anchored astern. At about 16:26, as the pilot boat approached to disembark the pilot, the vessel's bow swung quickly into the river current. By the time the pilot regained the bridge the ship was almost perpendicular to the river. The pilot requested 'half ahead and starboard' but the engines were not able to overcome the force of the river current, and the anchors dragged. A few seconds later the pilot informed the Master that they were going to collide with the bulk carrier anchored astern. The pilot radioed the two tugboats that had been assisting during the anchoring, requesting that they return as quickly as possible. The ship's whistle was used to sound the danger signal and warn of the impending collision.



About 15 minutes after being 'safely' anchored, the vessel was being carried by the current at a speed of 5.5 knots. The vessel drifted until its propeller caught the starboard anchor chain of the larger vessel anchored astern. The entanglement pulled the drifting vessel's propeller shaft outward damaging reduction gears and cracking the gear box.



Stern crane and lifeboat torn off by large anchored vessel's anchor chain

Subsequently, the small cargo vessel drifted toward the port anchor chain and bow of the larger anchored vessel. The anchored vessel's port anchor chain caught and then wrapped around the drifting vessel's stern crane, holding the vessel in place as the current pivoted it around the bow of the bulk carrier. The crane and the stern mounted lifeboat of the drifting vessel were destroyed. The highest point on the drifting vessel's aft deckhouse was well below the main deck of the larger anchored vessel, and the bridge wing of the drifting vessel was torn off.

The larger anchored vessel began to manoeuvre under power as the bridge team tried to mitigate the consequences of the collision. Their initial manoeuvre of coming ahead caused the drifting vessel to list. With no propulsion, the bridge wing torn off, the ship listing, and the anchor chain of the large vessel still wrapped around the stern, the drifting vessel's crew mustered on their vessel's main deck near the cargo hatch covers. The list became so great that it was decided to abandon ship, and the crew transferred onto one of the tugboats that had returned to the scene.

A few minutes later, the anchor chain of the larger vessel broke, freeing the drifting vessel. Once released from the chain, the vessel floated free, and the crew returned to their ship as it drifted down the port side of the larger vessel. The vessel was subsequently corralled by five tug boats and the situation stabilised. Damages to the drifting vessel were confirmed at over two million USD.

The official investigation found, among other things, that the anchorage used was originally designed for three vessels, and was normally occupied by only two. At the time of the accident, there were four vessels anchored there. After the accident, local authorities reassessed the risks of the anchorage for high-water periods and decided to limit occupancy to one vessel.

Lessons learned

- While hindsight is said to be 20:20, we can still learn from this accident that even competent local authorities can underestimate risks in a waterway system. The reassessment of risks subsequent to the accident demonstrates that indeed, lessons were learned.
- In tight anchorages and strong currents, main engines should always be on standby and the vessel's position checked as if the vessel is underway. In this case the vessel went from being anchored to a disaster movie within 15 minutes. Thankfully, no injuries to crew were incurred.

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