MARS – Lessons Learned

MARS Report No 382 August 2024

MARS 202441

Securing heavy cargo – details matter

As edited from the Dutch Safety Board report issued July 2022
https://tinyurl.com/MARS202441

➔ A multi-purpose cargo vessel was transporting six azimuth thrusters in its hold, each thruster weighing 60 tonnes. Stowage calculations based on the voyage instructions and stowage plan were made by an officer and checked by the Master before loading. The results were sent to the office for approval.

According to the calculations, each thruster would require 10 lashings. To be on the safe side, the Master and crew decided to use 12 or more lashings for each thruster. Based on the load capacity of the lashings, it was decided that 'cargo stoppers' (metal plates placed tightly to the underside of the cargo and welded to the deck to help prevent shifting) were not required.

During the voyage, the weather conditions were in line with the forecasts. On the day of the occurrence the northwesterly wind was up to 40 knots. The measured wave heights were a bit higher than predicted, at 7.5 metres early in the day, reaching 10.8 metres by late afternoon. The vessel reduced speed and changed course into the swell, keeping the vessel's rolling manageable.

The next morning, a bilge high level alarm (HLA) for the cargo hold sounded twice within 30 minutes. The bilge pumps were activated, and the bilge was visually inspected. There was a significant amount of water in the hold, but it was unclear what had caused the water ingress.

An officer and the cargo superintendent went together to check the cargo hold. They found a large quantity of water and noticed that the three forward stowed azimuth thrusters had been dislodged. One of these three had come loose first and had caused a domino effect, causing the other two to shift as well. The thrusters had punched a hole in the port side anti-heeling tank. This had originally been full, but its contents were now running into the hold.

Measures to dewater the hold were not successful and soon the vessel was listing to about 30 degrees. The Master, concerned for the safety of the vessel, broadcast a Mayday and eight of the twelve crew members were evacuated. The remaining four crew members tried to keep the vessel in a stable condition but late in the afternoon they too were evacuated.

The following day the list was now about 45 degrees, and the wind was causing the vessel to slowly approach the coast. As the vessel neared the coast a tug line was secured and the vessel safely towed to a nearby port of refuge.

The report notes that the information about the cargo of azimuth thrusters provided by the freight broker to the operator did not contain any specific instructions for loading, unloading, lashing or any detailed information on lashing points. The chartering department did not request more detailed and specific loading instructions and presumed that the information it had received was sufficient to perform proper lashing of the azimuth thrusters. The discrepancy between the available information and the required information made it difficult to devise an adequate and symmetric lashing system.

Six azimuth thrusters as stowed and lashed

Lessons learned

- Even though 'extra lashing' was used, one azimuth thruster nonetheless broke free and caused others to also come adrift. Lashing can only do so much when cargo pieces are extra heavy, as in this case. In hindsight, cargo stoppers should also have been welded at the bases.
- An inland route would have been a safer alternative to sailing across open sea under the predicted weather conditions.
- Heavy cargo items deserve extra attention and detailed lashing plans. For quality assurance, the final lashing state could be observed by a qualified third party.

MARS 202442

BRM failure while docking results in a costly bump

➔ In daylight and good weather conditions, a loaded tanker was being conned into port by a pilot. Also on the bridge were the Master, helmsman and OOW. The berthing plan had been discussed. With the help of two tugs, the vessel was to be swung 180 degrees off the dock and secured port side to.

When the vessel was off the dock and almost stopped, it started pivoting to port with the assistance of two tugs as planned. The forward tug was pushing the bow to port and the aft tug was pulling the stern to starboard. During the manoeuvre, the officer at the aft mooring station reported to the bridge that the distance between the vessel and the dolphin was now about 15 metres and steadily decreasing. The pilot immediately ordered the helm hard to port and gave a number of engine orders in quick succession including dead slow ahead, slow

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ahead, half ahead and finally full ahead as well as the helm order. About two minutes after the start of the pilot's ahead orders a muffled noise was heard astern. The vessel was subsequently safely moored.

Later, an underwater inspection revealed no damage to the dolphins but the sand around the base of the dolphins was slightly disturbed. The vessel's rudder was found to be about eleven degrees offset to starboard, presumably due to the bottom contact. It was later found that the rudder stock was fractured. Repairs required dry-docking the vessel including installing a new rudder stock. The vessel was off-hire for more than two months.

The incident investigation found that the pilot had misjudged the current. At that time, the pilot reportedly considered that the current was running away from the berth (in a westerly direction), yet the current was actually acting towards it. The investigation also concluded that the pilot was essentially working alone during the docking manoeuvre, thus indicating a Bridge Resource Management (BRM) failure.

Contact with the bottom at red circle

Lesson learned

- Even local experts, such as a pilot, can make mistakes. They are human too! Have the bridge team fully engaged with the people doing the manoeuvring and set up agreed distance parameters and speeds when in confined waters.
- Be prepared to challenge the person with the con if the manoeuvre is not going as planned.

MARS 202443

Broken procedure – broken life

As edited from the TSIB (Singapore) report TIB/MAI/CAS.092
https://tinyurl.com/MARS202443

➔ A bulk vessel was underway when the main engine's alarm panel sounded; the exhaust gas temperature on one cylinder was not normal. The engine crew went to investigate and it was determined that the fuel oil injection valve (FOIV) of number 4 cylinder needed replacement. The job was estimated to take about 1-2 hours. The chief engineer and the Master were informed.

The main engine control was transferred to the Engine Control Room (ECR) and the second engineer (2E) briefed the engine crew on the plan for the FOIV replacement. The engine crew began to prepare the necessary tools and the OOW on the bridge was informed that the main engine would have to be stopped. Meanwhile, the 2E instructed the engine personnel to close the main start air valve and then remove the fuel oil high-pressure pipe of the cylinder.

Two engine crew removed the fuel oil high-pressure pipe. The pipe outlet to the engine was covered with rags and a general cleaning of the area was carried out. One crew left the engine repair area to fetch another FOIV, leaving the other crew at the repair location. A few minutes later a loud bang was heard and the crew that had remained at the repair site was seen lying on the deck.

The crew in the vicinity rushed to help; they found the victim's face badly injured near the right temple with profuse bleeding. The FOIV from the cylinder was on the deck beside the victim. This valve is fitted to the cylinder cover by two securing nuts with a spring housing for each nut. The securing nuts had been removed and residual pressure within the main engine had ejected it with force.

Three hours after the accident the victim's vital signs ceased and the victim was declared deceased.

The investigation found that the victim had probably prematurely removed the securing nuts of the defective FOIV, as several steps to prevent injury had been missed prior to removing these nuts. Apparently, the engine RPM had not yet reached zero. It is also probable that the engine start air valve was not closed nor was the engine turning gear engaged. These lock-out measures, as prescribed in the engine maintenance manual, would have prevented the tragedy. There was no system in place to ensure that all the safety precautions stipulated in the engine manual had been performed prior to the replacement of the FOIV.

Also of note, the investigation found that there was a general understanding on board that the Company might penalise the ship's crew for undue delays or taking too much time in repair work.

Probable position of the victim just prior to the accident

Lessons learned

- Any system that has stored energy needs a lock-out/tag-out (LOTO) safety procedure and strict compliance.
- Senior vessel officers must ensure safety compliance and procedural integrity, but so too must each and every crew member.
- Time pressures are usually self-imposed. Even if time pressures are overt the proper mindset should be 'Safety First'.

MARS 202444

No procedure – major consequences

➔ A tanker was underway and normal maintenance activities were being accomplished. An engine room crewmember was tasked with opening the steam valve that leads to the deck in order to recirculate excess steam. This had been common practice on board for the last nine years, ever since one of the heavy fuel oil (HFO) bunker tanks had been modified to Marine Gas Oil (MGO). Since that modification, the excess steam could not be sufficiently cooled by the existing dump/drain cooler when the vessel was running at maximum RPM. The practice of recirculating it through the deck steam piping had been adopted as a solution.

The valve was located in the engine room in an area that required the crew to climb up and into a restricted space. When the crew was in position he began opening the valve, and was suddenly exposed to copious amounts of steam. It was later discovered that the valve gasket had failed, probably due to 'water hammer' effect.

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The victim suffered from severe skin burns on his face, leg, and arm. He was immediately transferred to the ship's hospital and first aid treatment was provided. The Master communicated with radiomedics and the victim was transferred ashore for medical care the same day. After 11 days of hospitalisation he was repatriated home for further treatment and recovery.

The company investigation found that the instructions on how to accomplish line draining prior to opening the steam valve were inadequate. The crew completed the task as best they remembered based on their own knowledge. Ultimately, formalised instructions are needed to ensure that the steam supply line is free of water before opening the valve to avoid the water hammer effect.

Victim's burns

Lessons learned

- New hazards can emerge when modifications are undertaken. In this case it took nine years for the hazard to be revealed.
- New hazards or old (hidden) ones need careful analysis. Then, a procedure should be written and dutifully practised.

MARS 202445

Deck tank overloaded

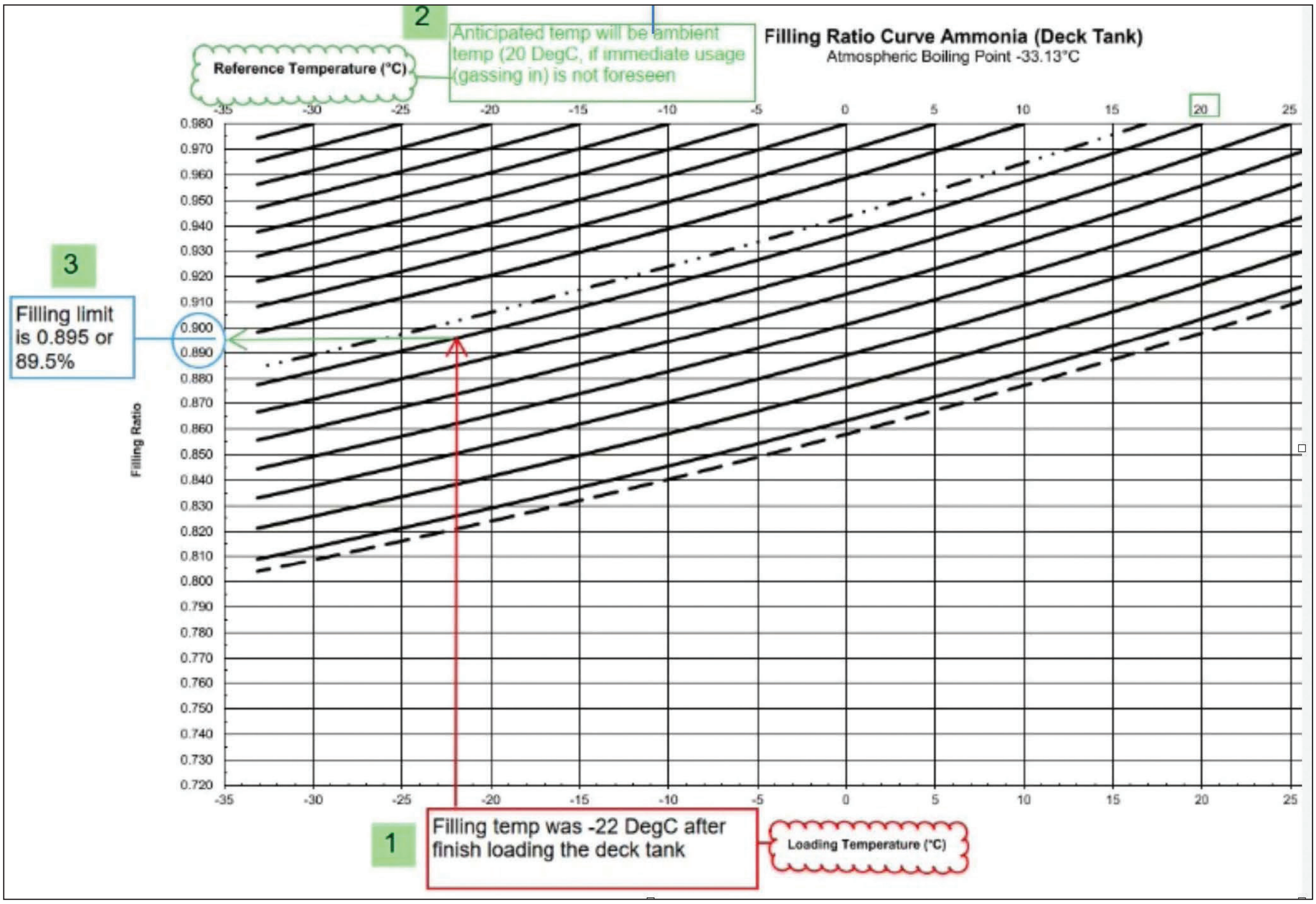
→ During a company audit it was noticed that the deck tanks used for ammonia storage had been loaded up to 98% at a loading temperature of -22°C. The expected ambient temperature later in the voyage was 20°C.

Deck tanks are high pressure vessels that require strict adherence to the cargo manual. In the case described above, the deck tanks should have been loaded to 89.5% to allow for increased pressure when ambient temperatures increased.

Further inquiries identified that the cargo manuals had the appropriate loading curves, but their usage had not been properly explained to crew. Alternatively, the filling limits can be obtained through the formula as mentioned in IGC code, Par.15.5.1.

Lessons learned

- Be familiar with your cargo manual and don't hesitate to ask questions.
- Audits are invaluable tools in quality assurance, not exercises in finding fault.



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