MARS – Lessons Learned

MARS Report No 367 May 2023

MARS 202321

Keep an eye out for hazards in plain view

➔ During a safety check on deck, the name-plate of an engine room escape trunk was found to be partially detached. This unsafe condition could easily have caused a serious injury. The name-plate was quickly repaired.

Lessons learned

- Do a safety round on your vessel; try to look with 'new eyes' to see if there are hazards hiding in plain view.
- Even seemingly small defects can have potentially terrible consequences. This nameplate was an accident waiting to happen.

MARS 202322

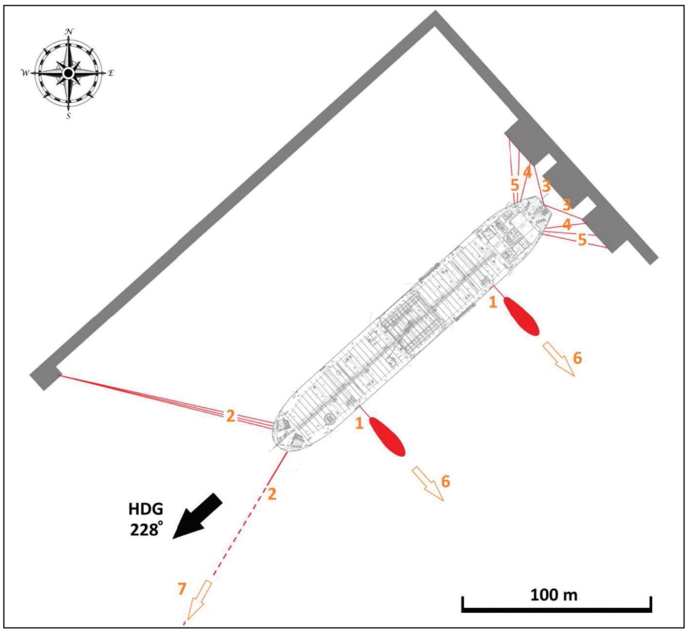
Stern line failure while departing causes fatality

As edited from HBMCI (Greece) report 01/2018

➔ A tanker in ballast was departing berth under pilotage with the assistance of two tugs on the port side. The vessel was berthed 'Mediterranean style,' with lines running astern to the pier and to starboard on another pier in combination with an anchor on the port side, as shown in the diagram.

The Master and the pilot agreed on the unberthing sequence as follows:

1. Both tug boats to be secured port side fore/aft.
2. The three mooring lines from the starboard side forecastle deck to be released and the anchor to be engaged.
3. The two mooring lines not under tension at the aft bitts to be released from the pier and collected through the stern centre chock.
4. The two aftermost ropes to be released and collected on their drums.
5. The four remaining ropes aft (two starboard and two port) to be released and collected on their drums.
6. Both tug boats to pull the vessel sideways to clear her from the pier.
7. Heave up the anchor.



When the three lines forward on the starboard side were released and brought on board (step 2 in the plan), the vessel began to yaw to port due to a light breeze on the starboard bow. This may have caused some consternation on the bridge. Having no view of the afterdeck, the Master asked about the distance of the vessel's stern from the berth. The officer replied it was about seven metres.

The Master then requested the Officer astern to engage all six remaining lines (three from each side) and bring them on board. Meanwhile, the two tugboats on the port side were already beginning to pull the vessel to port. With so many lines aft to bring in at once, the operation was not easy at the aft mooring station. One line to starboard remained taut as the others were being brought aboard.

Before the tension could be released, the line parted and whiplashed on deck. The end of the broken line hit a crewmember on the back and he collapsed. Despite resuscitation efforts both onboard and later on shore, the victim succumbed to his injuries.

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The official investigation found, among other things, that the stern line had probably failed at a tension that was less than the indicated amount on the Test Certificate, even though it was in good condition. Upon further investigation the Test Certificate was found to be non-authentic.

Lessons learned

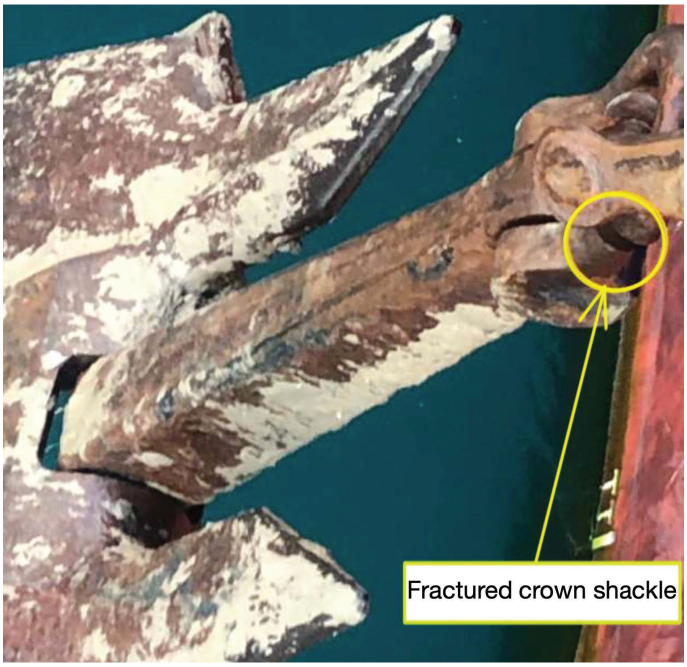
- Good plans can quickly fall to pieces if there is miscommunication or a change in planned sequence. In this case the aft mooring team was overwhelmed, as steps 4 and 5 of the original plan were combined into a single operation, and the tugboats started to pull too early.
- Acute situational awareness around lines under tension is a critical attribute to avoid bad consequences at mooring stations. Crew should be aware of snapback risks and have training on how to predict snapback areas depending on where a line may fail.
- Non-authentic documentation is not easy to spot. Efforts should be made to use credible suppliers and transparent supply chains.

MARS 202323

Fractured crown shackle spotted

➔ The crew were heaving anchor on a tanker in ballast. As the starboard anchor came into sight above the water the officer noticed something was not right. He stopped the operation and informed the bridge team. Upon closer viewing it could seen the anchor crown shackle was fractured.

The port anchor was released and arrangements were made to have the starboard anchor disconnected and a new crown shackle installed. The investigation could not establish a cause for the fracture. The crown shackle had been installed only five years earlier and was duly certified by a recognised classification society.



Lessons learned

- Proper certification for ship's equipment is a first layer of safety. In this case, in contrast to MARS report 202322, the certification was authentic. But wear and tear will obviously decrease initial specifications and any hidden defects, if present, can become critical.
- Anchor gear is subject to brutal forces and good practice would include a close inspection of the chain and anchor on each recovery.

MARS 202324

Hi-Fog fire suppression system in suppressed state

As edited from official report of the Bahamas Maritime Authority issued 30 November 2021

➔ A passenger/RoRo ferry was underway in a restricted waterway when the fire detection system alarm sounded. The bridge fire panel indicated a fire on deck 1, zone 4. Less than 30 seconds later, the fire detection system began to identify further alarms in multiple locations in the engine rooms.

The chief engineer left the engine control room and opened the watertight door to the aft engine room, and found it filling with thick black smoke. At approximately the same time, the vessel's Hi-Fog fire suppression system activated at the thermal oil circulation pumps. The incident was announced on the PA system, and crew were directed to muster for firefighting and control. About four minutes later the vessel briefly lost electrical power but maintained propulsion. The bridge team reduced speed and manoeuvred to drop anchor, stemming the wind and tide. Local VTS and Coastguard were informed of the situation and a lifeboat and two tugs were tasked to stand by.

About 12 minutes after the initial alarm the first firefighting team entered the aft engine room wearing breathing apparatus (BA). They had two objectives: identify the source of the smoke and restore electrical power. Visibility was severely limited and no fire could be seen. The team proceeded with restoring power. In parallel, further teams were shutting down ventilation, isolating electrics and checking for hot spots.

BA team one attempted to reset breakers in the high voltage room, and then withdrew after a final visual check for flames. BA team two then entered the aft engine room and located fire in the vicinity of the thermal oil boiler six minutes later. The bridge was informed and preparations were made to release CO_2 into the space, as the Hi-Fog fire suppression system had clearly not functioned as desired.

With all crew and passengers mustered and the quick closing valves and fire dampers closed, the chief engineer and chief officer made final preparations for release of CO_2 into the aft engine room. Once all ventilation was confirmed closed, CO_2 was released, some 45 minutes after the alarm first sounded. Decreasing temperatures were monitored on all accessible sides of the space, confirming that the fire was extinguished. The lifeboat and one of the tugs were stood down.

After the CO_2 was released and the fire was extinguished, the engineering team continued their attempt to restore power and ensure the vessel could return to port under its own power.

The official investigation found, among other things, that:

- Damage to the pumps was consistent with a bearing failure and fire originating at pump #1. The pattern of damage to pump #1 indicates that the impeller end bearing failed first and the drive end bearing collapsed shortly afterward. This collapse led to the outer race of the drive end bearing rotating in the bracket housing, generating extreme frictional heating in the order of 1,200°C – well in excess of the autoignition temperature of the thermal oil.
- The Hi-Fog system was supplied from a water tank of 426 litre capacity, refilled by a domestic fresh water pump that was not part of the fire suppression system. For continuous operation of the Hi-Fog system, the pump refilling the tank had to remain in operation. After a blackout, this pump had to be reset and restarted locally because it was not fed from the emergency switchboard. This was compliant with requirements, but was not captured in the vessel's contingency plans. When the pump was not reset, the tank was emptied within two minutes of the Hi-Fog restarting.
- The Hi-Fog output pressure was further compromised by a prevalence of smoke detector heads and activation zones. As the smoke spread, Hi-Fog zones were activated well away from the fire itself.

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Lessons learned

- Fire suppression systems installed in machinery spaces before 2010 may not be as effective as those installed later. Operators should check that the system design meets their operational requirements and ensure that contingency plans reflect any limitations of the system.
- Fire suppression systems that are not connected to the emergency power supply do not work when the vessel loses mains power. Water mist systems do not work if their water supply is compromised. If the system is dependent on separate feed pumps, these should be connected to the emergency switchboard and activate automatically.
- Thermal imaging cameras are an excellent tool for identifying the seat of a fire, especially in reduced visibility.

202325

A berthing plan fails

As edited from TSB (Canada) report M20C145

➔ A bulk carrier was approaching its assigned berth under pilotage. The Master and a helmsman were on the bridge. The pilot explained his berthing plan to the Master and the Master informed the pilot of the vessel's manoeuvring particularities, among other things that the vessel was equipped with a left-handed controllable-pitch propeller. There was a flood current of between one and two knots, with very light winds in the same direction as the flood current. Given these conditions, and that it was daylight with good visibility, it was decided that no tugs were needed for the berthing.

The pilot was monitoring his Portable Pilot Unit (PPU) and providing helm orders to the helmsman and propulsion orders to the Master. From his position, the Master was able to see the ECDIS display. As the vessel approached the berth it was necessary to turn the vessel to port. At one point the pilot ordered hard to port and the bow thruster to full port. The pilot then asked the Master to reduce speed.

The vessel completed half of its turning circle toward the berth. Its speed at that time was 2.2 knots. Shortly after, the pilot noticed visually and on the PPU that the vessel's approach trajectory had changed; the predicted trajectory was no longer parallel to the berth as planned, but would result in contact with the berth. The vessel's rate of turn had noticeably slowed, and the vessel's speed had increased to 2.7 knots.

The vessel continued to turn slowly to port as it approached the berth, now at a speed of 3.2 knots. The vessel was now positioned in such a way that the forward part of the vessel was lined up with the berth, while the aft part of the vessel extended past the berth. The vessel continued to advance toward the berth at a speed of about three knots, but had stopped turning to port. Collision with the berth was now unavoidable, and the pilot ordered the Master to set the propeller pitch to full astern; however, the Master had already done so shortly before hearing the order.

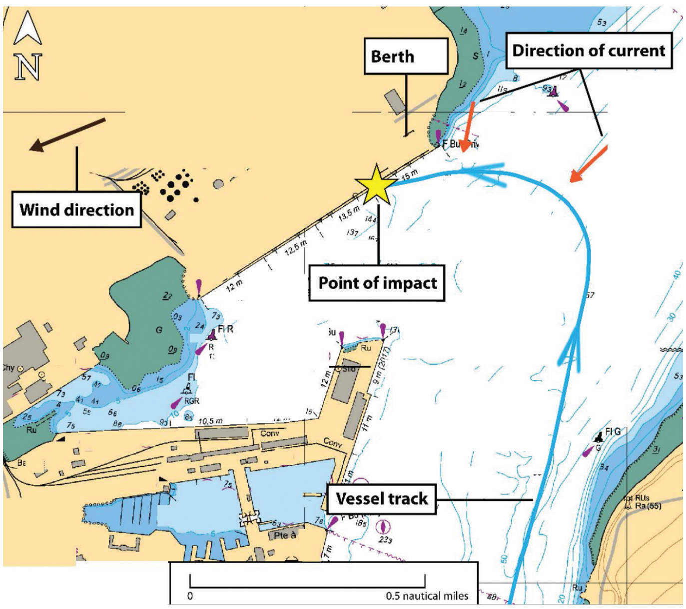
Shortly afterwards the vessel's starboard bow hit the berth at a speed of 2.1 knots, striking between two pneumatic floating rubber fenders at an angle of approximately 30°. One of the berth's D- shaped rubber fenders punctured the vessel's starboard bow. After the impact, the pilot asked the Master to complete the docking.

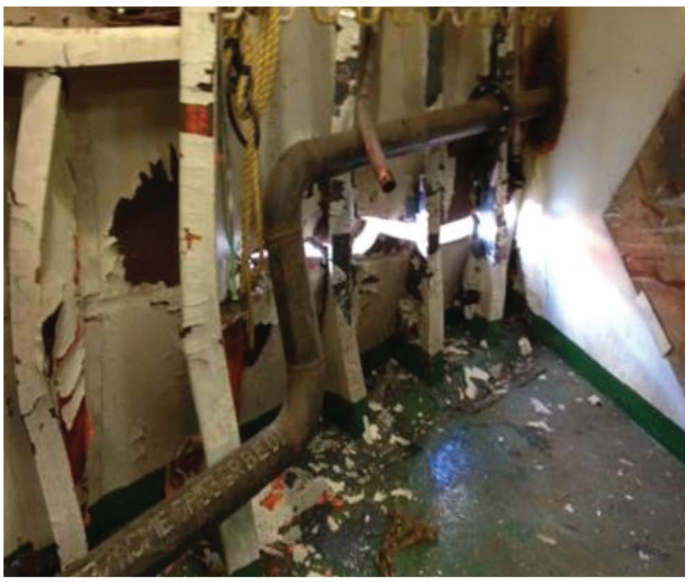
The official investigation found, among other things, that:

- The flood current acted against the port turning moment, reducing the vessel's rate of turn. Consequently, the vessel was not parallel to the berth as it made its final approach.
- As a result of the incomplete turn to port and the combined effect of the current and wind, the vessel approached the berth at a speed of about 3 knots, limiting the time available for the crew to take effective corrective action to prevent the vessel from striking the berth.

Lessons learned

- Bridge team members must consistently communicate to establish a shared understanding of a vessel's status, to ensure that crucial manoeuvres for safe navigation are adequately planned, coordinated, and executed.
- If a passage plan does not include a realistic berth approach that integrates actual conditions and vessel characteristics, there is a risk that bridge team members will not establish a shared mental model and therefore be unable to effectively monitor and anticipate the vessel's progress during the berthing manoeuvre.
- Even when wind and current conditions are seemingly benign, berthing a large bulk carrier without tugs is a tricky affair , especially turning across a current and then having it astern.





Allision damage as seen from inside the vessel

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