The Nautical Institute
Mariners' Alerting and Reporting Scheme
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Providing learning through confidential reports – an international cooperative scheme for improving safety

Editor's note: The first two reports show yet again that lack of due diligence and failure to follow well-established procedures cause unacceptable loss of lives. Attention is drawn to the lessons to be learned from both.

MARS 200955

Fatalities arising from cargo of steel turnings (swarf)

Official Report; edited from Marine Accident Investigation Branch (MAIB) Safety Bulletin 2/2008

Two seamen collapsed in a store on board a general cargo ship. The chief officer entered the store to try and rescue them but was soon forced to leave when he became short of breath, with blurred vision due to low oxygen levels. The two seamen had been asphyxiated. The store was adjacent to the vessel's forward cargo hold containing 'steel turnings' in bulk.

The terminal managers in the loading port did not consider the cargo to be hazardous, and the wet cargo was loaded in rain without trimming or measuring the cargo temperature. The correct bulk cargo shipping name (BCSN) for the International Maritime Dangerous Goods (IMDG) class 4.2 cargo was 'ferrous metal borings, shavings, turnings, or cuttings in a form liable to self heating (UN No. 2793)' and the BC Code lists the special precautions to be taken with this cargo, including the need to keep the cargo dry, monitor cargo temperature during and after loading. It was also noted that the ship's document of compliance – special requirements for ships carrying dangerous goods (DoC), did not permit this type of cargo to be carried.

In order to provide a means for draining sea water and to remove cargo residues, the crew had made cuts in the bellows pieces on the cargo vent trunk on either side of the fan motor in the store. This allowed a path for the air from the self-heating cargo, to enter the store. When tested, the air in the cargo hold contained only six per cent oxygen.

Lessons learned

1. Owners, managers and masters should ensure that crew are:

- aware of the location and dangers of enclosed spaces, including spaces adjacent to a known hazard. This may include the posting of appropriate signage at the entrance to these spaces; and are
- fully familiarised with the ship's enclosed space entry procedures, including the correct emergency response when persons are found collapsed in such spaces.

2. Owners, charterers and managers of vessels on which a prospective shipment of steel turnings or similar cargoes is being considered should ensure that the vessel's document of compliance (DoC) permits the carriage of the same.

3. Shippers, shipbrokers and cargo brokers and terminals that are involved in the shipment of steel turnings or similar cargoes should ensure that their personnel are aware of the dangers of this cargo; that it is stored and loaded in accordance with the BC code; and that masters receive the required documentation with the correct BCSN, IMDG class and UN number.

4. Masters of vessels which have been fixed to load cargoes of steel turnings or similar cargoes should ensure that:

- the potential cargo is compatible with the vessel's DoC;
- the cargo is loaded in accordance with the BC Code and they receive the correct documentation;
- all necessary precautions are taken on board prior to loading, including the briefing of the crew; and
- if necessary, the master should refuse to load the cargo pending further advice from the vessel's owner/manager.

▲ Steel turnings or swarf

▲ Fan bellows cut by crew, providing a path for oxygen deficient air from the hold to enter store room.

MARS 200956
Fatalities in enclosed spaces

Official report; edited from MAIB Safety Bulletin 2/2008)

Three experienced seamen died inside the chain locker on board a vessel. The first two were overcome while tying off an anchor chain to prevent it from rattling in the spurling pipe. The third to die was the first rescuer who entered the chain locker wearing an emergency escape breathing device (EEBD). He was soon constrained by the device and removed its hood. All three men died as a result of the lack of oxygen inside the chain locker caused by the ongoing corrosion of its steel structure and anchor chain.

- An experienced seaman died on board a cruise ship after he entered an almost empty ballast tank. The tank's manhole cover, which was inside a small cofferdam accessed from within the engine room, had been removed and the seaman had been instructed to confirm the tank's contents. As it had not been intended that the seaman would enter the tank, no permit to work was issued.

When the seaman was found to be missing, an experienced motorman was sent into the cofferdam to check on his wellbeing. He found the seaman lying at the bottom of the empty tank and raised the alarm. The motorman then entered the tank but collapsed when trying to recover the seaman.

After the ship's emergency response team provided air to the stricken crew via in-line breathing apparatus, the motorman recovered and was able to leave the tank. However, the seaman never regained consciousness. He had been asphyxiated in the oxygen-depleted atmosphere of the tank, which had not been inspected for several years and was heavily corroded. It is not certain why the seaman entered the tank but it is likely that it was to determine whether a small quantity of water in the tank bottom was salt or fresh.

Lessons learned

Tragically, accidents in enclosed/confined spaces continue to be one of the most common causes of work-related fatalities on board ships today. This is due to:

- Complacency leading to lapses in procedure;
- Lack of knowledge;
- Potentially dangerous spaces not being identified; and,
- Would-be rescuers acting on instinct and emotion rather than knowledge and training.
- While the holding of breath might seem a logical step to a person entering a tank 'for a few seconds' or to a would-be rescuer, it is all too frequently the last life-sustaining breath he or she ever takes.

MARS 200957
Collision in TSS

Official report; edited from MAIB accident flyer 5/2009

A general cargo vessel was on passage from the Thames estuary to Antwerp. She was crossing the NE traffic lane of the Dover Strait TSS when she was in collision with a bulk carrier which was heading NE in the Sandettie deep water route. No lookout was posted on either bridge at the time of the collision. The vessels both had fully operational radars, fitted with Automatic Radar Plotting Aids (ARPA), although no radar targets had been acquired by either vessel before the collision. The general cargo vessel was the give-way vessel, but, on a clear, dark night with good visibility, neither vessel saw the other until moments before the collision. The watchkeeping officer on the bulk carrier, after seeing the other vessel very close to port, put the helm hard to starboard just before the collision occurred.

A fuel tank was breached on the general cargo vessel, causing pollution, while the damage to the bulk carrier, although less severe, took more than a week to repair on arrival at her next port.

Root cause/contributory factors

1. The lookouts on both vessels were allowed to leave the bridge in an area of high navigational risk.

2. In the absence of a dedicated lookout, neither OOW made best use of the available navigational aids (radar, AIS) visually to maintain an effective appreciation of the traffic situation.

3. The bulk carrier, despite having a draught of less than six metres, was using a deep-water route, which is meant for vessels with a draught of 16 m or more.

4. Although neither master was on the bridge, standing/night orders were not used to alert the watchkeepers to the risks they were likely to encounter during their bridge watch.

5. There was no encouragement for the lookout to become an integral part of the bridge team of either vessel.

Lessons learnt

1. Complacency continues to be a recurring safety issue in accidents investigated by the MAIB. Shipowners should recognise the risks posed by complacency and ensure that their vessels operate with effective bridge teams at all times.

2. Masters should make best use of standing/night orders to set operational benchmarks and heighten bridge watchkeepers' awareness of risk when appropriate.

3. Masters must lead by example. Ships' crews are unlikely to apply the high professional standards demanded if these are not observed by the officer in overall command.

4. The use of designated lookouts is an essential requirement for safe navigation, but continues to be regarded as a low priority on some vessels.

5. The use of navigational aids is not a substitute for maintaining a visual lookout.

MARS 200958
Inefficient door fittings and joinery

On too many ships, I have noticed that hydraulic door closers are defective, improperly mounted or adjusted and sometimes, in very crucial doorways, missing altogether.

1. Defects: Oil has leaked out of the cylinder, causing no delaying action and the door slams instantly with great force, especially if assisted by circulating air. In many instances, repeated violent motion has torn away the actuating lever, putting the equipment beyond repair.

2. Improperly mounted: Most doorway frames are of pre-fabricated, powder-coated mild steel sheet, typically 2-3 mm

▲ Figure 1: Failed door closer: hydraulic oil has leaked and repeated, unsuccessful attempts have been made to anchor the actuating lever.

▲ Figure 2: The actuating lever anchor has worked loose from a new position and will soon fail.

▲ Figure 3: Door closer missing on a very crucial doorway

▲ Figure 4: A painful consequence of a door that closed too quickly

thick. The door closer cylinder unit is mounted on the door shutter and made of similar material or, for, non-class A doors, may even be laminated 'particle board'. Fasteners are usually self-tapping or machine screws with very minimal grip. Not surprisingly, things start to come apart a few months after leaving the shipyard. To compound the problems of poor joinery, the countersunk machine screws holding the hinges have a tendency to slip or loosen and drop off. Finally all this 'work and play' puts a wobble in the highly-stressed anchoring point of the hydraulic closer's actuating lever, the screw hole expands and the screws get dislodged and the closer's components begin to droop and acts as an obstruction, preventing the door from closing at all.

3. Poorly adjusted: Most sensible manufacturers provide some means to control the initial swing and the final closing rates. These must be adjusted optimally to give a smooth and controlled speed of closing, and fail-proof latch activation. A door that shuts with the speed of a falling guillotine poses an unacceptable safety hazard to persons.

4. Missing: Often due to frustration, the ship's crew removes the ill-fitting and malfunctioning door closer and even more hazardous arrangements are improvised like tie-back ropes, hooks, wooden wedges, and packaged items from the stores.

On a different subject, interestingly, on the vessel on which I am currently serving, built for unlimited world-wide trading, all drawers are provided with super-smooth ball-bearing mounted rails but no thought has been given to fitting a spring catch or stopper arrangement to secure them at sea. Consequently, as soon as the ship leaves the wharf, all the drawers slide in and out, like so many ghost cash registers. Considering the number of times one's rest is disturbed in order to stuff another wad of paper to hold a rogue drawer shut, I wonder whether this might constitute a violation of ILO 2006 crew accommodation standards.

Suggestions for improvement:

1. Shipowners, shipyards, classification societies and P&I clubs must jointly ensure that doors, drawers and associated fittings are robust and suited to the marine environment in which they are to be used.

2. Automatic door closers must be fitted on all doorways meant for public access and through which persons are likely to carry objects.

3. Doorway frames and shutters should be made of thicker gauge and door closers should be fixed using rivets or through bolts with backing plates and self-locking nuts.

4. The proper fitting and operation of door closers must be included in every safety audit.

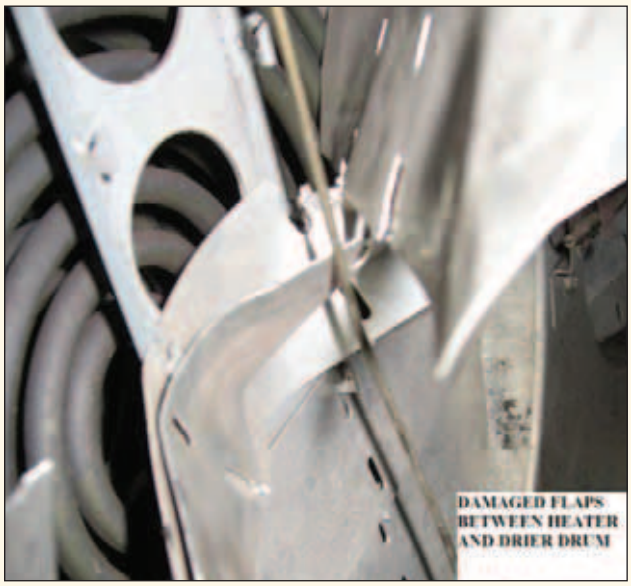
MARS 200959
Laundry fire

Shortly after a messman had placed some bed sheets into the ship's tumble drier, an alarm for main switchboard low insulation was activated. At the same time, the messman noted smoke originating from the tumble drier.

What happened

Investigation by the ship's staff determined that an increase in the operating temperature of the heater element, caused by lack of air circulation, led to ignition of the surrounding

cabling and gasket material. On observing smoke, the messman removed the bed sheets but could not identify the location of the fire. A passing duty AB on fire patrol informed the OOW of the situation, which was further investigated by off-duty second officer before the alarm was raised and personnel mustered. Shortly afterwards, the fire detector head in the passageway was activated.



▲ Figure 5: Damaged flaps between the heater and drier drum.

What went wrong

1. Close examination identified that a previously undetected failure of the 'jalousie' mechanical vents resulted in poor air flow and increase in operating temperature of the element.

2. On detecting the fire, the laundry was not evacuated and door was not closed. This allowed smoke from the fire to enter the passageway.

3. The manufacturer's instructions in respect of inspection and servicing the equipment was lacking in the detail that might have prevented this type of incident.

Root cause analysis

Lack of standards: Although in the company's planned maintenance procedure, washing machines, tumble and spin driers, irons and small electrical items are subject to a three-monthly general check/inspection, it was accepted that this was insufficiently detailed to identify the jalousie vent arrangement or its importance to the continued safe operation of the equipment.