The Nautical Institute
Marine Accident Reporting Scheme
MARS Report No 178 August 2007

This edition highlights the causes and consequences of some recent hand injuries and poor onboard and onshore practices in carrying out hot-work operations.

MARS 200749
Never hold the work piece

While working in the engine room workshop, the vessel's fitter, who was engaged in drilling a hole through a small square metal sheet, suffered serious lacerations on his left hand due to a failure to follow safe working practices.

Despite having been given many training sessions, and being fully aware of the hazards involved in working with power tools, the fitter attempted to drill a hole in the work piece while holding it in his left hand instead of securely fixing it in a vice or other appropriate clamping device. Inevitably, the drill bit 'caught' the work piece, causing it to suddenly rotate in the fitter's hand, with the sharp edges cutting through his protective glove and into the flesh of his left hand. He was given urgent medical treatment onboard and ashore, and was off work for several days.

Root cause/contributory factors

1. Improper risk assessment/briefing;
2. Poor work practices;
3. Inadequate supervision at the work site by senior officers;

Lessons learnt

1. Safe working practices must be continually followed and actively reinforced by officers at the management level.
2. Irrespective of rank, each person on board has a collective responsibility for safety and safe working practices.
3. If any person becomes aware that an individual is not working safely, the work should be immediately halted and the matter should be brought to the attention of the safety officer, head of department and the master. The onboard safety and health committee must then analyse the incident, determine the causes and implement appropriate corrective actions.

MARS 200750
Hand injury during casting off

Two tankers were involved in a ship-to-ship (STS) operation. Due to rough weather, it was decided to suspend operations. The crew of the mother vessel quickly terminated the cargo transfer, and while the chief officer and second mate were disconnecting the hose, the master called stations fore and aft. It was intended that after disconnecting the hoses, the chief officer would go forward and the second mate aft. During this time, a fitter and an AB arrived at the aft station and observed that one of the daughter vessel's sternlines had parted. The daughter vessel's crew requested the fitter and AB to transfer the broken end back to it. The rope was entangled with the remaining taut sternlines and its broken end was in the water. The fitter attached the messenger on the eye and the two men warped it inboard to obtain sufficient slack before casting it off the bitts for the daughter vessel to then heave in the detached length.

However, before the eye was sufficiently slack to be removed from the bitts, the messenger's hitch failed and the AB hastily attempted to reattach the messenger to the mooring rope's eye. With his right hand still positioned between the slack eye and the bitts, the two vessels surged, imposing a sharp load on the sternlines, causing the fouled mooring rope also to suddenly tense. The slack eye snapped back tight, trapping and crushing the AB's right hand against the bitt. As a result, the AB lost the ends of the ring and little fingers and suffered serious crushing of the middle finger.

Root cause/contributory factors

1. Crew members working unsupervised and taking orders from daughter vessel;
2. No communication link with the bridge: fitter and AB did not inform the bridge of the situation and their attempt to free the broken end of the daughter vessel's mooring rope;
3. Poor seamanship: entangled mooring ropes, perhaps caused by passing them through the same fairlead and fitter's initial hitch on the mooring rope's eye was unreliable due to lack of expertise;
4. Late suspension of STS operations: casting off earlier under less adverse conditions would certainly have prevented the series of events. Parting ropes were a clear indication that the safety comfort zone had been breached.

Lessons learnt/corrective actions

1. The area nominated by the charterers for the STS operation was initially considered to be exposed; however due to pressure from some of the parties involved it was reluctantly agreed by managers to go ahead with the operation. With hindsight, managers should have pressed for an alternative operational area. Geographical position of any future STS operations to be thoroughly appraised and discussed with all participating parties (commercial operators included).
2. The safety familiarisation checklist used in this operation does not consider the limitations of the non deck ratings involved in mooring operations.
3. The 'cut off' point for STS operations to be suspended due to deteriorating weather has been amended to 20 knots with hose disconnection, and casting off set at 25 knots.

4. Ratings should not attempt any mooring operations without the presence and supervision of a responsible officer and consent from the bridge. The officer is not expected to operate any machinery or handle any equipment himself. She/he is there to supervise the operation and act as a link between his party and the bridge (master). The officer is responsible for the mooring party and is also expected to watch out for all hazards which his team is likely to encounter and safeguard them by stopping, redirecting, warning members of her/his team.

5. The safety familiarisation checklist is to include a paragraph stressing limitations of the non deck ratings being used during mooring operations.

6. This investigation report is to be circulated among the company vessels and shipping industry.

- Investigations confirmed that the fitter and AB had been resting immediately prior to the incident; the fitter for 1.5 hours and the AB for 3.5 hours. Fatigue was not considered to have contributed to this accident.

MARS 200751
Index finger crushed

A deckhand was casting off a barge's wire ropes when the boat and barge surged, causing the wire ropes to tighten with a jerk, crushing his right index finger in the process. He was very lucky not to have his finger broken or even chopped off completely and required only three sutures.

Before the task, the master had briefed the crew about the casting-off operation. However, this relatively inexperienced deckhand attempted to complete the task in a hurry and made the mistake of placing his hand between the cleat and the eye of the wire rope.

It is clear that the deckhand listened to the master's instructions but due to a mixture of ignorance, nervousness and haste, had completely forgotten everything told him.

At some point in time, every one of us was green. For some of you, this was a very long time ago. Sometimes, just explaining something to someone doesn't always work. We have actually to show someone how to do something. This incident may not have happened if the deckhand was shown exactly where to grab the wire rope. The wire rope should have been grabbed at the bottom part of the eye, closer to where the splice would be. This way, his hands and fingers would not have been in a pinch point next to the bit or cleat, making it less likely to smash a finger. Also, take your time and wait until the captain's command before carrying out a critical task.

■ **Editor's note:** Under the ISM Code, it is required to report and record all incidents', document the results of investigations and produce evidence to show the effectiveness of corrective actions. Often, the effectiveness of a ship's or company's safety management system can easily be gauged by the frequency of injury-causing incidents. Incident-free operations can never be achieved without an all-round consciousness and commitment towards safe working practices. It is well known that, over a period, prevention of 'minor' incidents can potentially avert a major accident.

MARS 200752
Unauthorised hot work causes burn injuries

Source: Thomas Miller Bulletin 514 - 3/07

This incident involved two crew members tasked with general maintenance of hatch cover hydraulics while the ship was at sea. They had difficulty in removing bolts from a flange and so decided to cut them off, using gas cutting equipment. As can be expected, once the flange was free there was a spray of hydraulic oil which ignited. Both crew members were burned in this incident but were lucky enough to have not suffered serious or life-threatening injuries. It is important to note that the master, chief officer and chief engineer had not issued any hot work permit for that day – the crewmembers took it upon themselves to use gas cutting equipment without first informing senior management on board. This is yet another incident that highlights the need for hot work to be planned and supervised and crew should be briefed in this respect and must be fully aware of the permit to work system as recommended in the Code of Safe Working Practices.

MARS 200753
Hot work in vicinity of hydraulic systems

Compiled from: CHIRP feedback 1/2007: Issue no 14

On a vessel in drydock, a contractor was discovered carrying out hot work in the vicinity of the vessel's steering compartment whilst aft mooring hydraulic system was in operation. Had there been a hydraulic leak, there could potentially have been a fire and/or explosion. The conflicting work had been discussed at the daily work planning meeting, however it had been misunderstood by the contractor foreman.

The ship's safety officer suspended the hot work immediately and reported the near miss to the yard safety officer and master.

Root cause/contributory factors

1. Defective systems: the yard's permit to work system allowed hot work to be carried out in the vicinity of active hydraulic systems, without special precautions;

2. Poor communication: the venue of the daily work planning meeting was congested and the contractor foreman was too far away from the discussion to clearly understand the instructions.

Lessons learnt

1. Changes should be made to the safety management plan for vessel refits, or to the HSE elements of the contractual documents between owner and shipyards where they exist, to ensure that actuation of hydraulics, or transfer of other flammable fluids, forms part of the yard's permit to work system.

2. Consideration should be given to the venue of daily work planning meetings, including but not limited to, general location, noise levels, seating arrangements, essential attendees, policy on disturbances etc. Where these are able to be modified, it must be ensured that any key messages resulting form the daily work planning meeting are adequately

passed to the yard workers and subcontractors. The use of daily toolbox talks would seem to be the best method.

Conclusion

In conclusion, the importance of adequate communication must be the significant root cause of this near miss – whether this is verbal or via posted information (including hot-work permits). The challenge is to ensure that all those involved in the repair of vessels in a shipyard are fully aware of the work of others and the systems still in operation. The efficiency of the permit to work system used by shipyards must also be vetted thoroughly, possibly as part of the HSE inspections already carried out to keep them on the approved list, and measures put in place to ensure that the recommendations are implemented.

MARS 200754
Grounded on foul sea bed

While berthing at a shipyard lay-by berth, the ship grounded on an uncharted foul sea bed, and remained with a list of 5° for three hours, until she successfully refloated on the rising tide. Investigations revealed that the berth had been in use for considerable time for offloading grit from small ships by means of grabs. Over time, the spilt grit had piled up on the sea bed and the charted depth had reduced substantially.

■ **Editor's note:** Such fouling can also be expected at many bulk cargo terminals. Caution must be exercised, especially if the fendering is of limited projection, and the minimum depth alongside must be confirmed from the pilot or dockmaster, or from other sources. It is also prudent to sound around the vessel with a hand lead after berthing and determine the least depth under prevailing tides. Sea suctions and discharges must be changed to the offshore side, if possible.

MARS 200755
Powerful eddies

I was keeping the night 12-to-4 watch as we were traversing the Straits of Gibraltar from west to east, keeping close to the North African coast.

The vessel was on hand steering and was steaming at full ahead, when it suddenly swung a full 90° turn to starboard. My first thought was that the helmsman had fallen asleep on the wheel and I turned round and shouted at him, hoping to awaken him. But when I saw him fully awake and alert, I asked why he had turned the wheel to starboard and he replied that he had not done so. I then ordered hard-a-port rudder but despite this, the ship's head did not respond for quite some seconds, although eventually I managed to bring the vessel back on course. I was still wondering what had happened when the helmsman told me in our native language that he had heard of 'water catching the vessel and causing unexpected swing', in narrow straits.

I went into the chartroom and had a look at the chart – and there were numerous symbols of eddies in the vicinity of our position. I had seen these markings earlier but had not bothered to post a warning note for the bridge team. This incident gave me some idea about the power of the sea and what can happen if one is caught unawares. Fortunately, when this incident occurred, traffic in the Straits of Gibraltar was light, otherwise the consequences could have been serious. I also realised that out at sea, you should be humble enough to learn from even a rating.

MARS 200756
Wood pellets – fire hazards/CO_2 emissions

Compiled from: UK P&I Club Bulletin 524 - 5/07 by Dr J H Burgoyne & Partners

There have been several recent incidents of stevedores being overcome by fumes associated with the carriage of wood pellets. This cargo mainly originates in North America and Scandinavia.

The pellets are produced by drying sawdust and wood shavings and then milling them into particles of up to approximately 2mm particle size. The particles are then compressed to approximately a third of the original volume into pellets which are typically 10 - 20 mm long and 3 - 12 mm in diameter. The compression leads to an increase in temperature and stored bulk piles of wood pellets can self-heat in parts with high moisture contents and it is reported that this process can lead to the spontaneous combustion of the material after a period of time.

Due to transport movements and physical handling, some breakage of the pellets occurs and this means that the material loaded aboard a ship consists of pellets, pieces of broken pellets and wood dust. Further, the wood pellets are readily combustible and can be ignited by a range of ignition sources, while the dust associated with the pellets, when dispersed in the air and ignited, can give rise to a dust explosion.

In addition to the combustion hazards, wood pellets also undergo oxidation to produce carbon monoxide and carbon dioxide. In a closed space such as an unventilated ship's hold, this can lead to a dangerous reduction in the oxygen concentration in the hold as well as the development of a dangerous concentration of carbon monoxide which is toxic (and flammable). In a recent case a carbon monoxide concentration of approximately 1 per cent was measured in a sealed cargo hold of a ship containing wood pellets some 18 days after the cargo was loaded. The oxygen concentration at this time was less than 1 per cent.

The commodity has previously sometimes been classed as 'wood pulp pellets', which is entered in Appendix B of the solid bulk cargoes (BC) Code. However wood pulp is not normally formed into pellets and the wood pellets are not pulp. Furthermore, the entry for wood pulp pellets, while referring to oxygen depletion and the generation of carbon dioxide, does not refer to the formation of carbon monoxide. As a result, in the 2005 Edition of the BC Code, a new entry for wood pellets refers specifically to the hazard associated with the generation of carbon monoxide. Accordingly, ships' officers must ensure that both stevedores and ships' crews and others who may need to enter a cargo hold which has, or had recently contained wood pellets, are made fully aware of the dangers and that all appropriate precautions are taken.

MARS 200757

Signs of flow state in concentrates

(Source: Brookes Bell Marine Consultants)

1. Warning Signs: Such heavy splattering on the hold bulkhead during loading is an indication that at least some of the cargo has experienced 'flow state' due to impact.

2. Nickel ore sample taken from a grab during loading from a barge prior to a shipboard can test.

3. Showing the same sample but after 25 strikes of the can on a hard metal surface. Note the flat surface and free moisture visible in the surface layer, indicating that the sample has liquefied.

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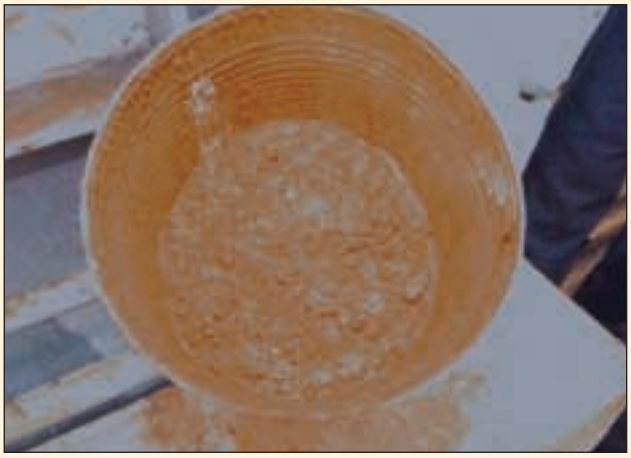

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Can you save a life, prevent injury, or contribute to a more effective shipping community? Everyone makes mistakes or has near misses but by contributing reports about these events to MARS, you can help others learn from your experiences. Reports concerning navigation, cargo, engineering, ISM management, mooring, leadership, ship design, training or any other aspect of operations are always welcome.

MARS is strictly confidential and can help so many – please contribute.

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