The Nautical Institute
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Providing learning through confidential reports – an international cooperative scheme for improving safety

MARS 201013
Hydraulic windlass failures

Official report: Edited from Marine Accident Investigation Branch (MAIB) Marine Safety Bulletin 1/2009: www.maib.gov.uk/publications/safety_bulletins/safety_bulletins_2009/safety_bulletin_1_2009.cfm

Since 2007, the MAIB has been made aware of the catastrophic failure of a number of high pressure hydraulic anchor windlasses, notably:

- A tanker in ballast at anchor in a storm began dragging her anchor in Tees Bay, UK. When she attempted to heave the anchor and get under way, the hydraulic windlass motor suffered a catastrophic failure and the cable ran out to the bitter end. The vessel continued to drag her anchor which snagged on a submerged gas pipeline (MAIB investigation report 3/2008).
- In the same location and under similar circumstances, a crude oil tanker's hydraulic windlass motor exploded as the vessel attempted to weigh anchor. The windlass motor was in the 'heave' position but the anchor chain continued to run out. Soon the windlass motor casing shattered, and the windlass operator was seriously injured by flying pieces
- The hydraulic motor casing of a container ship fractured as the vessel was heaving in her anchor in Port Philip Bay, Melbourne, shortly after the anchor had dragged in gale force winds and had ruptured a submerged gas pipeline.
- The Australian Transport Safety Bureau (ATSB) has also identified the failure of the windlass hydraulic motor in the grounding of the woodchip carrier.
- In Florida, USA, a LPG vessel in ballast was weighing anchor in a strong gale when the hydraulic motor of the anchor windlass of exploded. The windlass operator was seriously injured by flying debris.

Preliminary findings suggest that these failures are not the result of metallurgical fatigue, manufacturing defects or impact damage, but rather that the hydraulic motor casings fractured after being subjected to extremely high internal pressures and/or on impact with broken components of the hydraulic motor; events that are likely to occur when heaving in the anchor in adverse sea and weather conditions when the anchor chain has been tensioned beyond the intended safe loading of its windlass.

In order to avoid over-stressing hydraulic windlass systems, mariners are advised to:

1. Closely monitor the predicted weather and sea conditions and ensuring that the anchor is recovered in good time, before the conditions make this difficult to achieve; and

2. Use the propulsion system to manoeuvre a vessel to relieve tension in the anchor chain before 'heaving in', and stop the windlass as soon as any significant tensioning is observed or difficulty is experienced.

Mariners experiencing similar incidents with hydraulic windlasses are encouraged to report in confidence to maib@dft.gsi.gov.uk with the title 'windlass motor fractures'.

■ **Editor's note:** Where fitted, the pressure manometers, high pressure alarm systems and safety relief valves of windlass hydraulic systems should be regularly inspected and maintained as per manufacturers' recommendations.

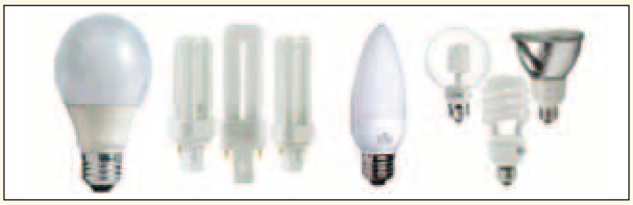
▲ Figure 1: Typical failed components from hydraulic motor

MAS 201014
Radio interference from CFL

Official report: edited condensed from USCG Marine *Safety Alert* 02-09

This *Safety Alert* serves to inform the maritime industry that energy-saving compact fluorescent lights (CFL), sometimes known as radio frequency (RF) lighting devices, may interfere with certain communications equipment.

CFLs employ a RF frequency to excite a gas inside a bulb in order to produce light. Until new standards are adopted to regulate their design and use on board vessels, manufacturers of CFLs/RF lighting devices, particularly those capable of producing emissions in the 0.45-30 MHz band, are advised to warn users that they should not be installed near maritime safety communications equipment or other critical navigation or communication equipment.



▲ Figure 2: Examples of some compact fluorescent lights with different shapes and sizes.

MARS 201015
Piracy off the Horn of Africa

Even an 'incident-free' passage through the piracy-prone area can bring some nasty surprises. After reaching her destination in the Far East, a large vessel was taking on bunkers when it was realised that fuel oil was freely leaking into the sea from a side tank. After overcoming the trauma of dealing with a port pollution incident, the crew were even more shocked when they found the source of the leak – a perfectly round hole in the 25mm-thick side-shell plating, obviously made by a projectile. Luckily, for the ship's crew, the bunkering port was not in a country where the master is put in jail after a pollution incident he could not prevent.

Editor's note: It may be prudent for ships' crews to confirm the integrity of all peak and side tanks, particularly oil tanks, after transiting through piracy-prone areas. Class supervision and management's guidelines will be required to ensure such checks are carried out safely and efficiently.

MARS 201016
Unsafe LNG terminal operation

After berthing at an LNG loading terminal, there was the normal discussion between the loading master and the ship's chief officer about pre-loading and general safety procedures and so on. On completion of the cold emergency shut down [ESD] test, the loading master asked if the vessel were ready to begin loading. The chief officer explained that the pre-cooling operations were still in progress and that warmest part of the system was at minus 28°C, whereas safety procedures required the entire system to be at a temperature of minus 110°C before receiving cargo.

A short time later, the loading master again asked if the vessel was ready to load but still the lines were not cooled to the correct temperature. He left abruptly but returned within minutes and advised the chief officer that loading had commenced at a rate of 1000m^3/hr. At this time, the vessel was not even properly lined up for loading. At the vessel's order, loading was stopped and the terminal was given a strong letter of protest.

Several weeks later, in response to our dogged persistence, we received this statement from the terminal management:

'The procedure for loading of LNG ships at Terminal XXXXXX has not been changed. But during the cooling-down operation and start of loading of your good vessel, the terminal procedure for loading of LNG ships was not followed by the loading master. This issue has been discussed with all loading masters at the terminal and correction done for the future.'

I can't help thinking that if one of our ships had started discharging into a terminal that had not been lined up, a little more may have been made of it, with demands for dismissal, retraining of selected staff, changes in staff selection policy, risk assessment methodology, corrective and preventive actions in great detail, and an abject apology.

MARS 201017
Unsafe deck opening

I have been on quite a few bulk carriers but have never seen a deck opening straight into a hold like this before – see Figure 3. There were no guard rails or warning signs, so that a person walking on deck could have easily fallen through the opening, some 20 metres straight to the bottom of the hold below.

This was a relatively new ship so maybe it was a new design feature to facilitate the removal of hold cleanings. A small davit and air winch combination is designed to fit over the opening, which would make it safer if it was in place. However, when the crew is manually raising/lowering small hand tools and small drums, the opening is unguarded, apart from a loose wooden grating, which could easily be displaced by an unsuspecting person's foot with potentially disastrous consequences. It was actually quite unnerving and frightening to walk near the opening when it was not covered.

■ **Editor's note:** On ships fitted with such openings, it is suggested that deck sockets be welded around them so that portable stanchions and safety lines may be rigged when the covers are removed. In addition, warning signs must be painted on the deck from all possible approach directions, and the perimeter and lids of the openings highlighted in fluorescent paint.

▲ Figure 3: View of unsafe deck opening

▲ Figure 4: Crew members hauling out cleaning equipment through the deck opening

MARS 201018

Colregs violation and AIS wrongly set up

Own vessel: speed 10 knots, course over ground 242 degrees, ship's head 235 degrees. Other vessel: approximately, bearing 65 degrees off the port bow and steady, speed nine knots, heading 282 degrees.

Prevailing environmental conditions: wind 45 kts, direction 140 degrees, visibility three to four nm, swell / sea five metres.

Bearing of the other vessel was steady from approximately 17:30, with an ARPA closest point of approach (CPA) of 0.3 nm, and a bow cross range of 0.34 nm. Time to closest point of approach (TCPA) about 43 minutes. We called the vessel on VHF 16, as to determine its intentions. No response was heard and no alteration noted. Our sound signalling equipment was not used due to the weather conditions. At a distance of 1.5 nm, we made a bold alteration of course to starboard, to ensure our intention was obvious to the approaching vessel, and to avoid a close quarters situation.

The other vessel continued to maintain her course and speed. Eventually, we let the other vessel pass clear at a distance of 1.2 nm, and then we resumed our original course.

It was also noted by the bridge team that the AIS data from the rogue vessel was evidently wrong and misleading.

MARS 201019

Excess water loaded with Middle-East crude

Edited from UK P&I Club *Bulletin* 659-10/09

Many VLCCs have experienced problems in Middle Eastern ports, where substantial quantities of water have been mixed with the crude oil loaded. Pertinent certificates of quality, issued after completion of loading, have drastically understated this water content thereby leading to substantial claims by receivers for alleged outturn shortages in discharge ports.

- **Case 1:** On completion of loading, some 11,911 barrels (bbls) of free water were detected in all cargo tanks, calculated to be nearly 0.6 per cent by volume. However, the cargo documentation provided by the terminal declared a sediment and water (S&W) content of just 0.2 per cent by volume, converting to 3,994 bbls. Charterers were immediately advised of the problem but would not give definite instructions and so, in order to vacate the berth, the master was pressured into signing the bills of lading with the shore figures. He issued a protest to the terminal stating that the water content was in dispute and might increase on the loaded passage.

At the discharge port in the Far East, the arrival measurement survey indicated that free water had increased from 11,911 to 13,144 bbls. This disparity in the water content formed the major portion of claims for alleged outturn shortages.

- **Case 2:** A VLCC loaded parcels of Arab light and Arab medium crude oil from a large export terminal in the Arabian Gulf. Pre-loading onboard quantity (OBQ) was minimal with no free water found.

The Arab light parcel was loaded first followed by a parcel of Arab medium crude oil after a short delay for sea line displacement. Just before completing of the Arab medium parcel, a further line displacement was undertaken to prepare another VLCC for loading.

The 'after loading' measurement survey showed that while there was no free water in the Arab light parcel, some 2,849 bbls of free water were found in the Arab medium nominated cargo tanks. However, the certificates of quality gave a water content of only 0.05 per cent volume (492 bbls) and 0.075 per cent volume (697 bbls) for the Arab light and Arab medium parcels respectively. The master protested the free water loaded in the Arab medium parcel, with the warning that there might be further settlement of free water on the loaded passage.

During the loaded passage, tank dips showed that some 10,953 bbls of free water was present in the Arab medium nominated cargo tanks. This drastic increase in free water was almost certainly due to the fact that Arab medium crude oil could retain free water in suspension for a longer period than the lighter crude oils and hence was not detected immediately after loading. At the discharge port, there was a substantial claim for alleged net outturn shortage of some 9,493 bbls.

- **Case 3:** This VLCC also loaded parcels of Arab light and Arab medium crude oil from the same terminal as in Case 2, after that VLCC had sailed. As with the previous vessel, the Arab light parcel was loaded first followed by a parcel of Arab medium crude oil after a short delay for sea line displacement. OBQ before loading was minimal with no free water found.

The 'after loading' measurement survey indicated that, while only 133 bbls of free water were found in the Arab medium parcel, some 6,228 bbls of free water were found in the Arab light nominated cargo tanks. This translated to some 0.5 per cent volume of the Arab light gross bill of lading quantity, whereas the certificate of quality declared a water content of only 0.05 per cent volume (638 bbls). The master protested the free water loaded with the warning that there might be further settlement of free water on the loaded passage.

It should be noted that on the previously loaded VLCC, the Arab medium parcel was loaded last and contained significant free water, also that after that tanker sailed, the Arab light parcel loaded on the next VLCC carried with it a large quantity of free water.

Once again, at the discharge port, the free water content was found to have increased (6,356 bbls), and there was a large claim for alleged net outturn shortage.

Recommendations

Regarding the above substantial free water loaded incidents, which would inevitably lead to substantial claims for net outturn shortages, the following precautions are recommended:

1. Upon arrival at the load port, ensure that the OBQ survey measures any free water, if found, is accurately recorded by the attending independent inspectors or the loading master.

2. If ballast is to be discharged at that port, ensure that representative samples of each type of ballast to be discharged are taken (in other words, if ballast is taken at more than one port, samples should be taken to represent each quantity of ballast water to be discharged). If inspectors or loading master are onboard at the time, get them to seal the samples, with an accurate description of the contents.

3. As de-ballasting will normally be carried out concurrently with loading, ensure that adequate records are kept of each operation, any segregation adopted and a statement that all de-ballasted tanks contain no oil after completion.

4. If any free water is found in the cargo after loading, advise owners and charterers immediately, with a request for further instructions concerning the signing of the bill of lading. The master should ensure that letters of protest are issued to the terminal and that these are signed by a responsible terminal official. The letter of protest should, of course, also include the statement that the free water found after loading is likely to increase on the loaded passage due to further settlement.

5. If at all possible, sealed samples should be drawn from the free water at the bottom of each tank. If not possible at the loading port, charterers should be requested to arrange for free water to be measured and sampled, by an independent inspector, at a way port like Fujairah, if possible, by which time, most of the free water loaded should have settled to the bottom of each tank.

6. If samples have not been taken prior to arrival at the first discharge port, attending inspectors should be instructed to sample all free water found. Where possible, samples should drawn from at least three levels from each tank so that subsequent analysis can ascertain exactly what water was retained in suspension in the cargo.

7. Particular care should be taken with all measurement and sampling operations during discharge operations. Far Eastern receivers will not normally give owner's surveyors the invitation to monitor the shore sphere of operations and so it is most important that the vessel sphere of operations is accurately recorded.

8. By far the biggest problem, of course, is the free water on board the vessel. The net bill of lading is almost always significantly understated in these cases and, if free water quantities are large, it will always lead to a claim for alleged net outturn shortage. It is important to be able to establish that the free water is of shore origin. Free water samples can be analysed to establish whether it is production water (it must have originated ashore) or sea water (analysis can determine where the sea water is likely to have originated). If it is sea water, then the vessel's ballast water samples can be analysed to give likely origins of each sea water sample analysed.

Further information may be obtained from: http://www.ukpandi.com/ukpandi/infopool.nsf/HTML/LPBulletin659