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

MARS 201122

Hazards of under-declared cargo weights

Case 1: Timber loading

A tween-decker cargo ship was chartered for a voyage from West Africa to load a mixture of logs in the lower holds, packaged sawn timber and plywood in the tween decks and several containers of coffee and cocoa beans on the hatch covers. As is common in these regions, the logs were floated down-river in the form of large rafts. These were marshalled by small tugs and secured to the vessel while anchored in estuaries and coastal lagoons. A gang of stevedores commenced loading the vessel, skillfully standing atop the floating logs and slinging them in ones or twos, depending on the size of the logs and capacity of the ship's cargo gear. They, along with winchmen, signalmen and tallymen worked in 12-hour shifts and the tugs would ferry them to and from land twice daily.

The master received very scant information on the quantity and types of logs to be shipped, partly due to non-existent or unreliable communications with the forestry plantations in the interior, inland hauliers, stockyards up-river and shippers. A historic table of stowage factors for common species was handed to the vessel. The stevedores could not communicate in English and the ship's crew could not understand their rudimentary French and local dialect. The charterer's port captain stationed himself ashore after the initial visit at the first loading port. As it later turned out, the ship's managers and crew lacked detailed knowledge about this trade while the charterer's super-cargo wrongly assumed that the ship's crew was fully conversant with the nuances of timber loading in West Africa and offered no advice to the vessel.

The ship's crew accepted the stowage factors as stated in the list, not realising that the data was only for 'dry timber' and accordingly prepared a rudimentary stowage plan and stability condition. They were unaware of the fact that in most timber loading operations, a 'surcharge' or extra weight will affect the stowage factor, often caused by water absorption when logs are floated down-river, inaccuracies in the measurement of each log and deliberate under-declaration of weights by shippers. Such surcharge can sometimes be 35 per cent in excess of manifested cargo weight. Cargo was worked day and night and the tallymen handed a daily summary of cargo loaded figures at 0800 every morning. This process was repeated at two anchorage ports.

The holds were duly filled with logs and the vessel berthed at a wharf to load the sawn timber and plywood in the tween decks and the containers on the hatch cover. It was at this late stage that the master noted excess deadweight from daily draught surveys. A revised stability calculation showed that after loading the containers on the hatch covers, the vessel would fail to meet Solas minimum stability criteria. When the master refused to load these containers, a lot of commercial pressure was put on the owners and vessel, and finally, a scheme was worked out whereby all double-bottom (DB) tanks were pressed up with sea water ballast. Despite this, the vessel had insufficient stability and two empty DB fuel tanks were also filled with sea water to ensure the vessel met IMO stability criteria without being overloaded. At the discharge port, a slop barge was hired and the contaminated ballast from the fuel tanks was duly disposed ashore.

Case 2: Containers

A large container vessel was loading at the final load port before commencing a trans-ocean voyage. The exit channel from the terminal had a draught restriction and sailing was subject to a narrow tidal window. Pre-arrival loading information listed some 350 containers, most of them going on the deck stacks. Being a regular vessel at the port, the terminal's computer system provided a departure stability condition with the sailing draughts allowing for adequate under-keel clearance (UKC) as per company's SMS. However, during the latter half of the 12-hour loading period, the chief officer realised that there was substantial under-declaration in the manifested container weights (later estimated to be an average of 12 per cent). This meant that after loading the manifested boxes, the ship was in serious danger of grounding in the channel. Thanks to quick thinking by the master, a total of about 850 tonnes of ballast was discharged before sailing from the twin auto-heeling tanks, which due to their high location and narrow width resulted in a safe even-keel trim and an acceptable stability condition. The ballast was restored in the heeling tanks after reaching deep waters but unfortunately, it was realised after sailing that stack-weight limits had been exceeded in many deck stacks.

Lessons learnt

1. Shore cargo weights must always be treated with caution. Accurate draught surveys and evidence of draught and stability calculations must be preserved by the vessel;

2. Charterers/terminals must be issued a written note of protest immediately once under-declared cargo weights is suspected;

3. The vessel's officers must fully familiarise themselves with the cargo types before arriving at the load port(s). Shore management must actively communicate to the vessel, expert advice obtained from industry sources, P&I club etc. Guidance documents such as the publication *Thomas' Stowage* must be carried by and consulted by the crew on board every dry cargo vessel;

4. With timber cargoes, a careful investigation must be made in the early stages of loading to establish the 'surcharge' or excess weight of cargo, especially if the logs are floated down-river;

5. Container terminals must be queried about the accuracy of manifested weights of loaded containers. Nevertheless, the ship's officers must work out displacement calculations frequently to monitor the 'missing' cargo weight;

6. Such excess weights may impose unsafe stresses on the tanktops, tween decks and hatch covers;

7. On modern container vessels, if the excess weight on hatch covers is not accounted for, the deck cargo lashing configuration as determined by the on-board software may prove to be insufficient.

MARS 201123
Improper use of tank venting system

An aframax tanker of 115,000 tons dwt was loading crude oil with 3 x 16" arms connections. The hourly loading rate was about 10,000 cu m/hr and six cargo tanks were receiving the cargo simultaneously: two tanks per connection. Each cargo tank was fitted with a P/V high velocity valve of a through capacity of 3,000 cu m/hr at the opening set point of 1400 mmwg. The secondary venting system consisted of a P/V breaker and a mast riser.

As per terminal regulations, the vessel was required to use the Vapour Emission Control System (VECS), the vapour being sent back to shore. The high pressure alarm on the VECS line was set to 1260 mmwg (90 per cent of the P/V set opening pressure).

Before starting the loading operations, the master held a meeting with all the personnel involved in the cargo transfer operations. Among other instructions, he emphasised that at no time during the cargo transfer should vapour be released to the atmosphere. Accordingly, close monitoring of the pressure in the IG/vapour return line was required.

About an hour after loading commenced, the pressure on the VECS line was observed to be 650 mmwg, but a pumpman on deck noticed that the P/V valve of No 5 starboard cargo tank was open on the pressure side and was releasing vapour to the atmosphere. He immediately took a rope, climbed on the top of the P/V valve support and secured the P/V in the closed position and reported via radio to the chief mate. The master, who was in his cabin at that time, listened in on the radio conversation and without delay, rushed to the No 5 cargo tank to inspect the P/V valve for probable malfunctioning.

The P/V valve was still leaking even though it was lashed. The master immediately removed the lashing and the P/V valve opened fully on the pressure side. Investigation revealed that the IG isolating valve of that particular tank was locked in the closed position and obviously being isolated from the vapour return system, the tank was being pressurised, causing the P/V valve to lift.

Root cause/contributory factors

1. The day before arrival at the loading terminal, as planned, the chief mate ordered the pumpman to ensure all the IG isolating valves of the tanks were freed and operating properly and to lock them in the fully open position. Due to oversight, the pumpman had left the IG isolating valve of No 5 starboard tank locked in the closed position.

2. The chief mate failed to do a final check and the wrong status of the tank's IG isolating valve went unnoticed.

Immediate corrective actions

1. The master ordered the terminal to stop cargo transfer;

2. The master together with chief mate and pumpman reconfirmed that all the tanks were lined up properly and that all the IG isolating valves were locked in the correct open position;

3. While the loading was suspended, the crew was briefed about the potentially catastrophic consequences that can result from improper line up of the cargo transfer systems;

4. After cargo transfer was resumed, the master, the chief mate and crewmembers closely monitored all the P/V valves and the pressure in the vapour return line and the loading was completed without further incident;

5. After the vessel's departure from the load port, a special safety meeting was held during which the master explained to the crew the forces that tank boundaries can be subject to due to over-pressurisation.

Preventive actions

1. The incident has been communicated to the fleet;

2. The DPA has supplemented this notification with simplified data for easy reference highlighting the hazards arising from incorrect line-up of the venting/VECS system;

3. The incident will be discussed in future company seminars;

4. Improved training programmes to be delivered to crew;

5. Management to consider retro-fitting of pressure sensors in cargo tanks on all vessels in the fleet.

MARS 201124
Main engine failure

One of our vessels was manoeuvring with pilot on board during a routine berthing operation. Without warning, the main engine suddenly failed and could not be re-started from the control room or from the emergency stand. The problem could not be identified or rectified immediately, hence the berthing operation was aborted and vessel re-anchored safely.

On further investigation, it was found that the pneumatic direction control slide valve of the manoeuvring system was sticking due to excess moisture in the system. It was further noticed that the pneumatic control air bottle contained a lot of water.

Root cause

Lack of compliance: Engine room crew neglected to follow routine procedures for regularly draining water from the main air bottle.

Lessons learnt

1. Clean and dry air is vital for the smooth functioning of any pneumatic control system;

2. Regular draining of control air bottle as well as main air bottle is to be included in the regular watch routine;

3. Control air drier or dehumidifier if fitted in the system must also be checked and maintained at all times;

4. Improper maintenance of pneumatic controllers can lead to their sudden failure and can seriously affect ship's safety and commercial operations;

5. Such incidents will cause the vessel to undergo increased scrutiny by flag and port state authorities, charterers and other inspectors.

MARS 201125

Injuries to lathe operators

A crewmember was engaged in lathe work in the ship's workshop. In violation of standard operating procedures, he was wearing tight-fitting cotton gloves during the operation. The chuck was rotating at high speed when suddenly, it caught the right glove and in an instant, the crewmember's hand was caught and severed two fingers and a third finger was fractured. The ship was in port and the seaman was evacuated for emergency medical treatment.

■ **Editor's note:** Numerous serious accidents involving lathes and drilling machines have been traced to:

1. Improper mounting of work piece and tightening of chuck

2. Undone or loose-fitting cuffs

3. Oversize coveralls

4. Loosely worn watches or jewellery

5. Uncovered long hair

The speed with which these accidents occur will quickly disable the operator and in most cases, preventing him/her from accessing the emergency stop button.

MARS 201126

Incidents with lifeboat lowering devices

Recently, several incidents involving trouble with the lifeboat lowering device have been reported by our fleet vessels.

Case 1: Breakdown of lifeboat brake unit

During a routine drill, the lifeboat could not be controlled by the brake unit. The brake unit was dismantled and the thrust bearing was found to have completely broken, with the thrust shaft worn out and bent. The cause of this brake failure could not be positively identified, but the manufacturer advised that this type of damage could occur if excessive (> 15 kgf) downward force is applied on the brake counterweight by the operator, usually in a panic response to the lifeboat lowering out of control, often caused by a poorly adjusted or maintained brake system.

During the last annual inspection, which took place 5 months earlier, a dynamic winch brake test could not be undertaken, because, at that time the vessel was alongside at berth, preventing the full requirements of the test being carried out.

Case 2: Parting of lifeboat self-lowering control wire

An attempt was made to swing out the lifeboat, but the remote control wire suddenly parted just after starting the swing out. The remote control wire had recently been renewed but wound the wrong way round the auxiliary drum by a person trained and certified by the manufacturer at the last inspection.

Recommendations

1. When tests cannot be completed during an annual inspection due to circumstances such as those described above, the outstanding tests must be completed at the earliest opportunity without fail;

2. In addition to authorised service personnel, crew have equal responsibility for ensuring lifeboats are in good working order and are maintained and operated properly. Therefore ship's crew should take the utmost care to check and ensure lifeboat equipment remains fit for proper operation at all times;

3. An arrowed line on the drum is a simple and effective measure for ensuring it is wound in the correct direction.

Manufacturers have reminded us of the following operational safety information:

General

1. Do not apply a downward force of more than 15 kgf to the counterweight of the brake lever, as this may damage the thrust bearings. If properly maintained and adjusted, the brake is designed to operate solely by the force applied by the counterweight.

2. Confirm the home position of the brake lever is in the horizontal position. The ideal position for the lever is in slight contact with the stopper pin. The allowable clearance between the stopper pin and brake lever is 10 mm.

Before operation

1. Check braking efficiency by slightly lifting the suspension block (sling block) from the davit by davit handle without releasing the davit arm stopper (cradle stopper).

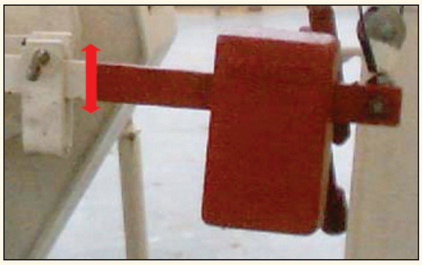
2. Adjust the limit switch so that the davit arm (cradle) stops just 50 to 100 mm from the stowing position. Check that the brake holds the boat in the position. If the winch is wound with the davit arm (cradle) touching the upper stopper because the limit switch is incorrectly set, the davit will become overloaded.

During operation

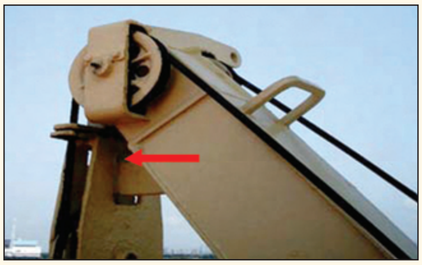
1. When stowing the boat, it is important to equalise the length of the fore and aft boat falls. Stop hoisting just before the wire guide comes into contact with the suspension block (sling block), and check clearance between the fore and aft. If clearance balance is uneven, adjust the end turnbuckles to make the clearance uniform.

After operation

After setting the davit arm stopper (cradle stopper), raise the brake lever of the winch slowly and unwind the boat fall wire to allow the boat to lower slightly. Mount the suspension block (sling block) onto the horn of the davit in order to release the load from the boat fall wire.

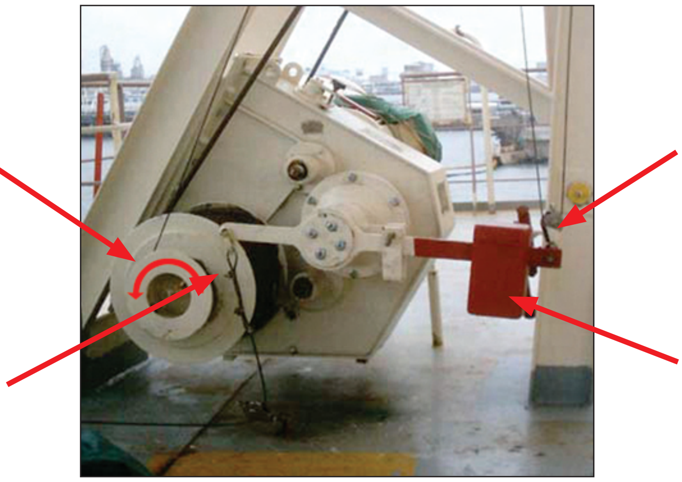


▲ Clearance between stopper pin and brake lever must be in accordance with maker's specification



▲ After housing the boat, unwind the boat fall wire and allow the boat to lower slightly so that the suspension block (sling block) is resting on the horn of the davit.

▼ Typical lifeboat winch showing properly reeved self-lowering wire and brake lever in correct position



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

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