DUTCH
SAFETY BOARD

Fatal fall overboard during loading operations

Background information	2
Relevant facts	4
Analysis	6
Conclusions and Recommendation	7
The Dutch Safety Board in four questions	8
Credits	8

Introduction

"Falling from heights make up for one of the most frequent kinds of accident on board ships. In the past two years 30 of such accidents have been reported to the Dutch Safety Board. These accidents resulted in five fatalities and a number of severely injured crewmembers. It is therefore of the utmost importance that crew and companies are aware of the risks of falling and take preventive measures as appropriate.

Work should be carefully planned and performed in close mutual agreement. Deviation from established procedures and planning, without a proper reassessment, may leave newly introduced risks unidentified. This investigation into the fatal accident on board mv Azoresborg demonstrates this clearly. The available procedures for the operations to be carried out, were not supportive to the crew and considered as not practicable. With silent consent of the company an alternative working method was established, however the associated risks were not reassessed. In combination with a poor work planning, this created the circumstances under which the accident could take place.

Tjibbe Joustra, *chairman*
Dutch Safety Board

The accident

On Wednesday, 27 February 2013, the chief mate of Dutch motor vessel Azoresborg got fatally injured in Bilbao, Spain. Under the chief mate's supervision, the crew were in the process of moving a tweendeck pontoon so that they could subsequently install the consoles (supports) to support the pontoon in the ship's cargo hold. The ship's crane was used to hoist the pontoon out of the hold so that it could be turned. Shortly afterwards the chief mate, who was standing on a fixed ladder near the hatch coaming, fell overboard. None of the crew members saw how this happened. The crew did manage to pull him out of the water between the quay and the ship, but the medical staff on shore who had rushed to assist found that he had died.

The investigation

The Dutch Safety Board's investigation has established that the chief mate was standing in an unsafe position. The lack of effective fall protection enabled him to fall overboard.
The crew members on top of the pontoon that was to be hoisted and the boatswain in the crane had not been informed beforehand of the working procedure that the chief mate planned to use. The crew did not discuss the activities, for instance, in a safety meeting. It furthermore emerged that the working practice on board did not coincide with the procedures of the Safety Management System (SMS).
The available instructions were experienced as 'unworkable' by the crew. Like on Azoresborg's sister vessels, an alternative working method was used to install the supports. The shipping company was aware of this but subsequently failed to ensure that the risks had been identified for the alternative method. As a result, effective safety measures were lacking.

After the accident the shipping company emphasized to crews that the person issuing hoisting instructions must at all times stand in a safe position, where he can maintain visual contact with the crane driver. In addition, the accident was discussed in the on board safety committee.
The Dutch Safety Board's investigation revealed that the crew and the local stevedores responded immediately and managed to pull the chief mate out of the water. Nonetheless, the chief mate died.

Background information

Ship and crew

Wagenborg Shipping B.V. carries out the International Safety Management (ISM) of mv Azoresborg. The shipping company has around 65 vessels under its management. Mv Azoresborg was built in Shanghai, China in 2010. Prior to the accident the Azoresborg sailed worldwide, carrying different types of cargo. The vessels contains two holds with a total loading capacity of 17,000 tons. On its port side the vessel is equipped with three cranes, each with a safe working load of 66 tons.

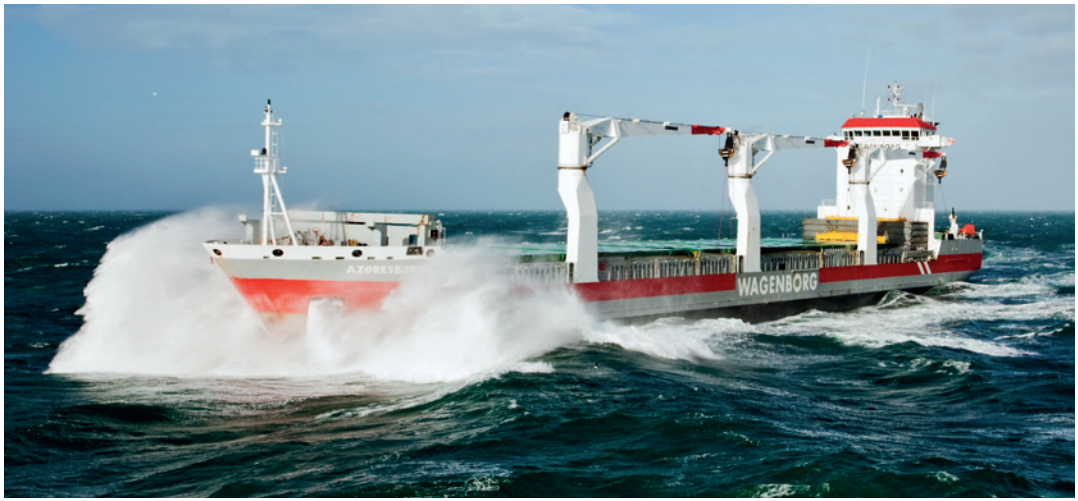
The required minimum safe manning on board the Azoresborg is nine crew members. At the time of the accident, twelve crew members were on board: five of them were Dutch, the remaining seven of Philippine nationality. The official working language on board was English. The majority of the crew had worked for the shipping company for some time. All crew members held the required certificates of competency.
The chief officer was employed by a crewing agency. He held a Master's certificate of competency for all vessels and had extensive experience at sea. Previously he had sailed with Wagenborg, but never on A-type vessels. He joined mv Azoresborg on 13 December 2012.

Safety Management System

The on board safety management system (SMS), certified in accordance with the International Safety Management (ISM) Code, is elaborated in the Shipboard Operations Manual (SOM). The most recent external audit on board before the accident took place on 30 July 2010. A Risk Inventory and Evaluation (RI&E), as required by Dutch legislation, was available on board. Such RI&E sets out the health and safety risks on board as identified by the employer and provides an overview of the measures that have been put in place to mitigate the risks as far as possible. The RI&E was last reviewed by an external company in 2012.

Local conditions

It was dry and cloudy in Bilbao on the morning of the accident. The temperature was three degrees Celsius. There was a moderate easterly wind (Beaufort wind force scale 4). There was no swell in the Port of Bilbao. On 27 February 2013, sunrise was recorded at 07.51 hour. It was light at the time of the accident.



mv Azoresborg

Tweendecks

Mv Azoresborg is provided with tweendecks, in order to be able to divide the hold into multiple compartments and carry different kind of cargoes at the same time. The tweendeck pontoon can be installed at three different heights in the hold and consists of several pontoons, each weighing around 33 tons. Each pontoon is positioned on four supports. These supports, or consoles, each weigh around 45 kg and have to be manually installed by the crew. To avoid shifting of the tweendecks pontoons, locking pins are used.

On board the A-type vessels it is common practice to use a pontoon as a work platform when positioning the supports. After the consoles to be installed are placed on the pontoon, the crew secure themselves between the four hoisting cables, using a safety harness. The ship's crane then hoists the pontoon above the hatch coaming. With the aid of a leading line attached to the pontoon a crew member on deck can turn the pontoon 90 degrees. Then the long side of the pontoon is parallel to hold longitudinal bulkhead. The pontoon is then lowered into the hold and pressed against the hold's side. From this position the crew can position the supports. Ultimately the pontoons are then positioned on the supports, forming the tweendeck. The activities are carried out under the supervision and directions of the chief or second officer.

The ISM manual contains a risk assessment for the operations on board, which include working with cranes and shifting pontoons. To control the identified risks associated with these operations a safety briefing is required to be carried out before starting the job. Furthermore a safety sheet is available, which refers to manufacturer's manual (MacGregor). This manual explains how consoles can be installed from a work cage suspended from the hook of the ship's crane. Before the work cage is hoisted, the crew suspends the console to the same hook using a hoisting sling. After the crane driver has hoisted the work cage (with the console) to the correct working height, the crew member in the work cage installs the console in the hold's side.

Tweendeck with support and locking pin in detail.


The pontoon shortly after the accident and simulated position on the stevedore platform without installed fall protection.

To supervise the loading and unloading operations from deck, stevedore platforms are installed on the hatch coamings. The crew can reach the fold-out platform with a fixed ladder. The platforms contain supports on which removable fall protection can be installed. With the absence of any paint damage it can be concluded that none of the platforms had (recently) been equipped with fall protection.

Relevant facts

Arrival

Mv Azoresborg arrived at Bilbao Roads on 26 February 2013, after a voyage in ballast from Bejaia, Algeria. At anchor the chief mate took his usual watches on the bridge, from 16.00 to 20.00 hours. He then took a break and returned to duty at 04.00 hour on the morning of the accident. At around half past four in the morning the vessel heaved the anchor, and then moored starboard side at the wharf at 06.10 hour. Steel and project cargo destined for Mexico was to be loaded in Bilbao.

Cargo preparation

To prepare the holds for the cargo, the crew needed to take out the stored tweendeck pontoons and place the tweendeck supports, in order to be able to position the pontoons inside the hold later on. The chief mate supervised the third mate, boatswain and two AB's. The boatswain operated the crane. The third mate and the two AB's stood between the four hoisting cables in the middle of the pontoon that was to be moved. The chief mate was on deck, positioned on the rear ladder of the hatch coaming. From there he gave instructions to the boatswain in the crane using hand signals and portable VHF. Standing like this, chief officer's upper body was located above the hatch coaming. The third mate on the pontoon also carried a portable VHF and could therefore listen in to the orders given by the chief officer.

The fall

The pontoon was hoisted out of the hold at 07.52 hour. When the pontoon was positioned above the hatch coaming, the chief officer instructed the crane driver to swing the pontoon to the left and then slowly lower it. Shortly thereafter the AB on watch at the gangway noticed that someone located amidships had fallen overboard. It later emerged that this was the chief officer. The AB grabbed a life buoy, went ashore and ran over the quay to the position where he presumed that the chief mate had fallen into the water.

He also informed the other crew members via portable VHF that he had 'seen something fall' amidships. As the pontoon was positioned too high at that time to climb onto the hatch coaming, the third officer instructed the boatswain to lower the pontoon. Once the pontoon had been lowered down, the third officer stepped off and looked over the railing. He saw the chief officer floating on his back in the water between the quay and the vessel.

The chief officer remained afloat despite the fact that he was not wearing a life jacket. The AB on watch could not bring the chief mate to safety from the quay with a life buoy. The chief officer lost consciousness shortly afterwards. Using a rope ladder, one AB climbed down and, with half of his body submerged in the water, attempted to get the chief mate into the life buoy. However, he was forced to cease his rescue attempt due to the cold. The boatswain then climbed down. He managed to get the chief officer onto a stretcher. With the aid of a shore crane the chief mate was lifted out of the water onto the stretcher.

The Port Authority's medical staff and ambulance staff established shortly afterwards that the chief officer had died. The autopsy report states that he had died as a result of internal bleeding.

Rescue operation

The crew responded adequately to the chief mate's fall overboard. They had, however, limited equipment available to enable them to quickly reach the chief mate and rescue him. Despite the fact that this had no influence on the severity of the accident outcome, it underlines just how important it is for shipping companies and crews to examine the available equipment for reaching and rescuing a man overboard when a vessel is moored at the quay. The International Maritime Organisation (IMO) has meanwhile drawn up additional requirements for the purpose of recovery of persons from the water, which will enter into force on 1 July 2014.

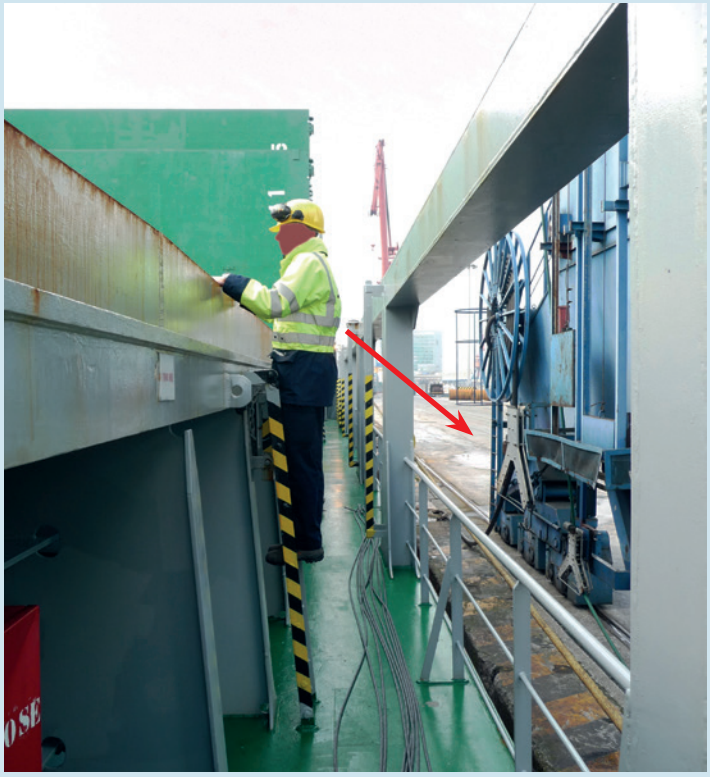
Action taken by the shipping company

After the accident, Wagenborg Shipping B.V. emphasized to the ships' crews that the person issuing instructions during tweendeck operations must stand in a safe position, where he can maintain visual contact with the crane driver at all times. Before an operation to hoist and shift tweendecks pontoons, a leading line should be attached to the pontoon in order to turn it. In June 2012 the shipping company also reiterated the importance of the safety briefing in its circular FleetNews. The accident was discussed in the safety committee on board the Azoresborg.

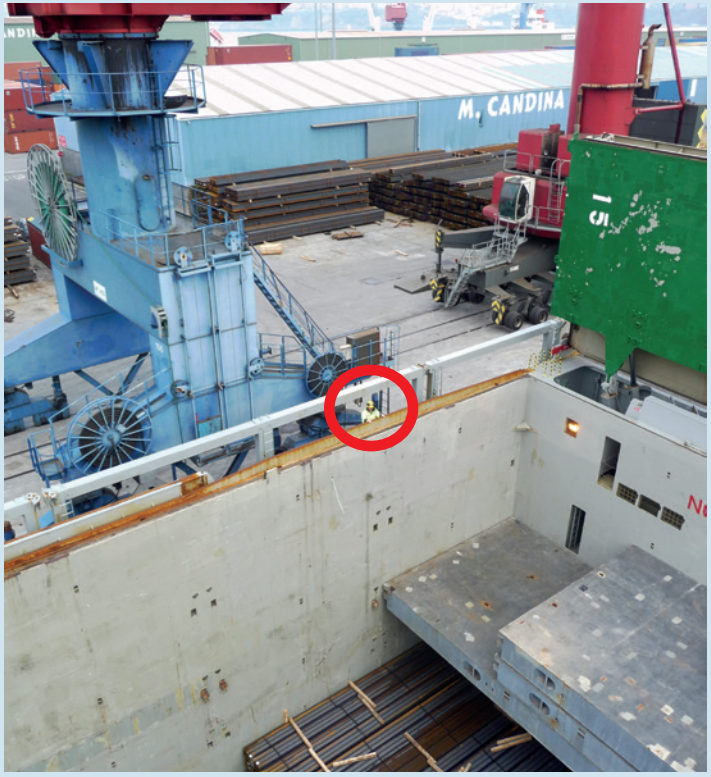
The shipping company stated that it aimed to improve the safety of tweendeck operations. An external company has been hired to evaluate the operations with the pontoons and to work out the possibilities of a more practicable way of shifting the pontoons. On the basis of the advice, the SMS procedures related to tweendecks pontoons will be amended. The adopted working practice of the crew of mv Azoresborg will be taken as basis for the amended procedures. Particularly attention will be paid to the following identified risks:

- Risk of falling from heights of more than 2.5 meters
- Risk of falling from heights of less than 2.5 meters
- The use of leading lines
- Safe positions of crewmembers

The company also formulated a proposal to amend the Risk Inventory and Evaluation with the risks associated with falling from heights of less than 2.5 meters.



Simulated position of the chief officer.



Simulated position of the chief officer from the cranedriver's position.

Analysis

Safety briefing

Though required by the ISM procedures, no safety briefing was held prior to the shifting of the pontoons. The crew did not discuss how to carry out the work. Contrary to the usual working method, this time no leading line was attached to the pontoon or prepared. By failing to discuss the activities in detail, the crew members now had different ideas about the manner in which the pontoons would be installed. Because no briefing was held, the crew had not been given an opportunity to ask questions and raise any objections. Consequently, the crew failed to realise that the chief mate's position was unsafe and that there was no leading line for turning the pontoon before and during hoisting operations.

There are no indications that time pressure on the morning of the accident formed a reason for not holding a (safety) briefing.

The fall

On board the chief officer was known to be safety conscious. According to statements from other crew members, the chief mate emphasized to the crew, both on request and of his own accord, the importance of ensuring safety when performing any activities.

No one actually saw the chief mate fall. But the chief officer's position on the ladder combined with the work carried out most probably indicates a relation between the fall and the activities performed. Probably he lost his balance because he had been hit by the swinging pontoon or, in a startle reaction, tried to avoid this. The exact direct cause, however, could not be ascertained.

During the operation, the chief officer was carrying out two tasks. He acted as supervisor and gave instructions to the crane driver. He was able to perform these tasks from three positions: by positioning himself on the cross deck amidships, by using a ladder at the front of the hold or by using a ladder at the rear of the hold. He chose the latter option. This was the only position from where he could reach the pontoon directly in order to turn it by hand. If he had used one of the other positions, he would still have had to move to the location of the accident in order to turn the pontoon. From this position on the ladder the chief officer could also directly see the crane driver and the hoisting operations, as long as the pontoon had not been lifted above the hatch coaming.

Most probably he did not use the stevedore's platform near the ladder, because it is unsuitable for the work carried out. The chains of the hanging mechanism and, moreover with the removable fall protection installed on the platform, a quick and easy escape would be impossible, once a load would come to close.

When the chief mate was last seen, he was standing on a ladder at a height of about 80 centimetres. It follows from the witness statement and the autopsy report that the chief mate fell over the railing onto the quay and then ended up between the quay and the vessel. The proximity of the hoisted pontoon and his unstable position on the ladder meant that it was all the more relevant to have effective fall protection in place. However, there was no fall protection. Because the chief mate was standing on a ladder, the height of the railing proved to be insufficient.

Risk of falling

In 2012 and 2013 two very serious and 22 serious casualties, at which a person fell to a lower level, have been reported to the Netherlands Shipping Inspectorate. These casualties have resulted in two fatalities, one of them being the chief officer of the Azoresborg. A number of these accidents also resulted in severe injuries, including permanent incapacity. The Dutch Safety Board is also investigation two casualties from 2013 that resulted in falling overboard, leaving three seafarers missing.

Conclusions and recommendation

Conclusions

The chief mate was standing in an unsafe position. Partly because no effective fall protection was in place to prevent him from falling over the railing, he fell overboard. He died as a result of the injuries he suffered during the accident.

The crew members had different views about the manner in which the tweendecks pontoons would be installed and how safety would be ensured while doing so, due to the fact that limited work preparations had been made, which consequently gave rise to ambiguity in carrying out the hoisting operations for the purpose of installing the tweendecks pontoons.

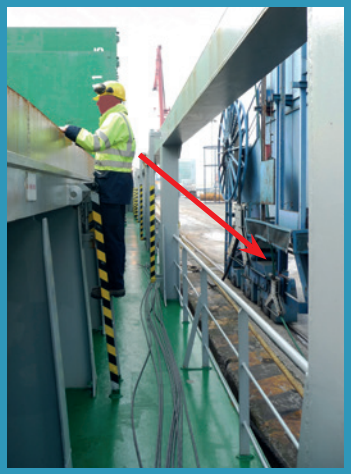
The adopted procedures of the SMS were not followed by the crew for practical reasons. The shipping company was aware of this. The working method that had been followed was not documented and no corresponding risk assessment had been carried out.

The risks of falling overboard had been insufficiently identified. Rather than pro-actively evaluating in what specific situations the risk of falling from a height existed, only a height of 2.5 metres or above was used to identify risks. Consequently, the provisions set out in the Dutch Working Conditions Act were insufficiently implemented.

The crew and the stevedores responded adequately and attempted to rescue the chief mate in difficult circumstances, despite the limited equipment available to them.

According to the Dutch Working Conditions Act 'there is a risk of falling in any event if there are high risk situations, openings in floors or if there is a danger of falling down at least 2.5 metres'. The shipping company only applied the latter criterion in evaluating the risks of the danger of falling. As a result, the risks of falling from a height below 2.5 metres were excluded. While the chief mate was positioned in a vertical line at a height of only 80 centimetres, in view of the narrow width of the gangway and the manner in which he fell overboard from the steep vertical ladder, the railing with a height of about one metre failed to offer effective protection for the tasks being carried out from the ladder.

There is no section on working with tweendecks pontoons and the risk of falling in the Health and Safety Catalogue drawn up by the employers and employees. To date this catalogue only contains safety sheets on 'Hatch Cover Cranes and Gantry Cranes', 'Mooring and Unmooring Operations' and 'Use of small hoists and cranes'.



Recommendation

The Board makes the following recommendation:

To the Royal Association of Netherlands Shipowners and Nautilus International:

Extend the existing Health and Safety Catalogue to include a safety sheet on "Risk of falling", taking into account all risk-increasing circumstances.

The Dutch Safety Board in four questions

1

What does the Dutch Safety Board do?

Efforts are being made in the Netherlands to minimise the risk of accidents and incidents as much as possible. When it nonetheless (nearly) goes wrong, a repetition can be avoided by carrying out a thorough investigation into the cause, separate from determining guilt. It is thereby important that the investigation is carried out independently of the parties involved. The Dutch Safety Board therefore chooses for itself what to investigate and thereby takes account of the independence of citizens from government bodies and companies.

Recently the Dutch Safety Board reported on general aviation accidents, accident fatalities in a manure silo and risks in the meat supply chain.

2

What is the Dutch Safety Board?

The Safety Board is an 'independent administrative body' and is authorised by law to investigate incidents in all areas imaginable. In practice the Safety Board currently works in the following areas: aviation, shipping, railways, roads, defence, human and animal health, industry, pipes, cables and networks, construction and services, water and crisis management & emergency services.

3

Who works at the Dutch Safety Board?

The Safety Board consists of three permanent board members. The chairman is Tjibbe Joustra. The board members are the face of the Safety Board with respect to society. They have extensive knowledge of safety issues. They also have wide-ranging managerial and social experience in various roles. The Safety Board's office has around 70 staff, of whom around two-thirds are investigators.

4

How do I contact the Dutch Safety Board?

For more information and the full report in Dutch and in English see the website at www.safetyboard.nl
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DUTCH SAFETY BOARD

Credits

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