Report of investigation into the fatal accident on board the Hong Kong registered cargo ship "*Thorco Africa*" at Ploce, Croatia on 24 January 2018

The Hong Kong Special Administrative Region
Marine Department
Marine Accident Investigation Section

10 November 2020

Purpose of Investigation

The purpose of this investigation, conducted by the Marine Accident Investigation Branch (MAIB) of Marine Department, is to determine the circumstances and the causes of the incident with the aim of enhancing the safety of life at sea and avoiding similar incidents in future.

It is not intended to apportion blame or liability towards any particular organization or individual except so far as necessary to achieve the said purpose.

The MAIB has no involvement in any prosecution or disciplinary action that may be taken by the Marine Department resulting from this incident.

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Summary

On 24 January 2018 at about 0930 hours, a fatal accident happened on board the Hong Kong registered general cargo ship "*Thorco Africa*" (*the vessel*) at Ploce, Croatia.

The vessel completed the discharge of cargo at the berth at Ploce in the morning on 24 January 2018. At around 0800 hours, a safety meeting was carried out for the replacement of the motor of the port side monorail hoist (the port hoist) installed under the longitudinal cargo hold hatch coaming inside No. 1 cargo hold. At 0900 hours, the chief officer and the second engineer went inside No. 1 cargo hold to discuss the steps required for the replacement. The chief engineer joined them later in the cargo hold and left after discussion.

At about 0930 hours, the chief officer and the second engineer heard a scream from the forward lower hold. The chief officer found the chief engineer lying on the bottom of the lower hold. He immediately reported the incident to the master by his portable radio. At about 0942 hours, an ambulance arrived at the shipside. The chief engineer was sent to a local hospital and was declared dead at 1030 hours.

The investigation identified that the crew did not follow the company's SMS to carry out the required procedures and issue the entry into enclosed space permit. Even for the issuance of permit-to-work of working aloft, risk assessment had not been carried out thoroughly given due attentiveness to the proper fencing for the opening on the tween deck.

The investigation also identified that there was no chin strap attached to the safety helmet worn by the chief engineer.

1. Description of the vessel

Ship name	:	*Thorco Africa* (Figure 1)
Flag	:	Hong Kong, China
Port of registry	:	Hong Kong
IMO number	:	9543926
Type	:	General Cargo Ship
Year built, shipyard	:	2010, Honda Heavy Ind. Co.,Ltd.,Japan
Gross tonnage	:	9,721
Net tonnage	:	4,069
Summer deadweight	:	12,845 tonnes
Length overall	:	120.00 metres
Breadth	:	21.20 metres
Engine power, type	:	3,900 kW, MAN B&W 6L35MC
Classification society	:	Nippon Kaiji Kyokai
Registered owner	:	Thor Ship II K/S
Management company	:	Clipper Fleet Management A/S

Figure 1 *The vessel*

2. Sources of evidence

2.1 The statements of the crew of *the vessel*.

2.2 The information provided by the management company of *the vessel*.

3. Outline of events

(All times are local time UTC + 1 hours.)

3.1 In the morning of 24 January 2018, *the vessel* finished discharging of 10,500 tonnes of calcined anode pet coke at Ploce, Croatia. Due to cargo dispute, *the vessel* was arrested by the port authority and stayed in the port.

3.2 On 24 January 2018 at about 0800 hours, a safety meeting was conducted to discuss the replacement work of the port hoist's motor with a new one. A permit-to-work of working aloft was issued by the master.

3.3 At about 0900 hours, the chief officer and the second engineer entered the cargo hold to discuss the steps required for the replacement of the motor. When the second engineer was checking the port hoist motor, the chief engineer entered the cargo hold from the aft entrance and asked them about the work. The chief officer replied that they were still trying to work out a solution and the chief engineer then left by himself.

3.4 After the chief engineer left, the chief officer and the second engineer decided to check the electrical connections of the starboard hoist, which was working in good order. After checking the electrical connections, they decided to postpone the job as the multi-meter was not working. When leaving the cargo hold, they heard a scream from the forward lower hold. The chief officer used his torch for spot searching and found the chief engineer lying on the bottom plating of the lower hold which was about 7.91 metres vertical height from the tween deck. He immediately reported the accident to the master by his portable radio and it was at about 0930 hours. The chief officer and the second engineer then went down to the lower hold. At that time, the chief engineer was still conscious and told them that his right arm and right leg were painful.

3.5 At 0933 hours, the master requested urgent medical assistance from the Ploce Port Control using very high frequency (VHF) radio call.

3.6 At about 0936 hours, the cargo hold foldable covers were fully opened. At the same time, first aid was applied to the chief engineer. At about 0942 hours, an ambulance arrived at the shipside. A doctor boarded *the vessel* and examined the chief engineer after the chief engineer was transferred out from the cargo hold by a basket. At that time, the chief engineer was still conscious and could advise the doctor of his name.

3.7 At about 0954 hours, the chief engineer was landed ashore and sent to a local hospital.

3.8 At about 1030 hours, the chief engineer was certified dead by the local hospital.

4. Analysis

Certification and experience of the crew

4.1 The master held a valid Class 1 Licence of the Deck Officer. He had served the management company for two years and joined *the vessel* on 15 October 2017.

4.2 The chief officer held a valid Class 1 Licence of the Deck Officer. He had served the management company for two years and joined *the vessel* on 15 October 2017.

4.3 The chief engineer held a valid Class 1 Licence of Marine Engineer Officer. He had served the management company for 15 years and joined *the vessel* on 6 January 2018.

4.4 The second engineer held a valid Class 2 Licence of Marine Engineer Officer. He had served the management company for two years and joined *the vessel* on 22 September 2017.

4.5 The crew's certification and experience met the mandatory requirements.

Working hours and alcohol abuse

4.6 There was no evidence to show that any crew involved, including the chief engineer, had suffered from either fatigue at work or alcohol and drug abuse.

Weather and sea condition

4.7 At the time of the accident, *the vessel* was berthed alongside at Ploce. The wind was easterly of force 3 and the sea was smooth. Weather should not be a contributory factor of the accident.

Coroner's Report

4.8 The Coroner's report of the deceased indicated that the cause of death was polytrauma with signs of posttraumatic shock. The chief engineer had facial injuries, injuries at the right upper arm, the right side of the chest, stomach, and right upper leg. The injuries were accompanied by internal bleeding into chest, abdominal cavity and stomach. Due to internal bleeding, the vein flow was blocked and heart failure occurred. Attempts of reanimation were unsuccessful, and the chief engineer was declared dead on 24 January 2018.

Accident scene of the cargo hold

4.9 The cargo hold was fitted with an eight-panel folding type hatch cover, and the tween deck was covered by 11 pieces of pontoon covers. At the time of the accident, No. 2 to No. 4 (counting from the ship's front) tween deck pontoon covers were removed and stacked on the surface of No. 6 pontoon cover (Figure 2). As such, the forward part of the tween deck was left open. Meanwhile, the first forward panel of the cargo hold hatch cover was also folded upward, making partial opening through which direct natural daylight illuminated the forward-most part of the cargo hold (Figure 2). In other words, the forward part of the tween deck was under the daylight and this would exclude the possibility that the falling of the chief engineer through the opening on the tween deck on to the bottom plating of the lower hold was due to total darkness.

4.10 Two monorail electric hoists with each installed at port and starboard sides respectively inside the cargo hold under the longitudinal hatch coaming. On the day of the accident, the chief engineer organized a work team to replace the electrical motor of the port hoist with a new one (Figure 2). There was no electrical lighting installed in the cargo hold. The natural daylight beamed from the opening at the forward-most of the cargo hold hatch was insufficient to illuminate the aft part of the tween deck. As such, the aft area of the tween deck was relatively dim but this was not considered as a contributory factor in connection with the accident (Figure 2).

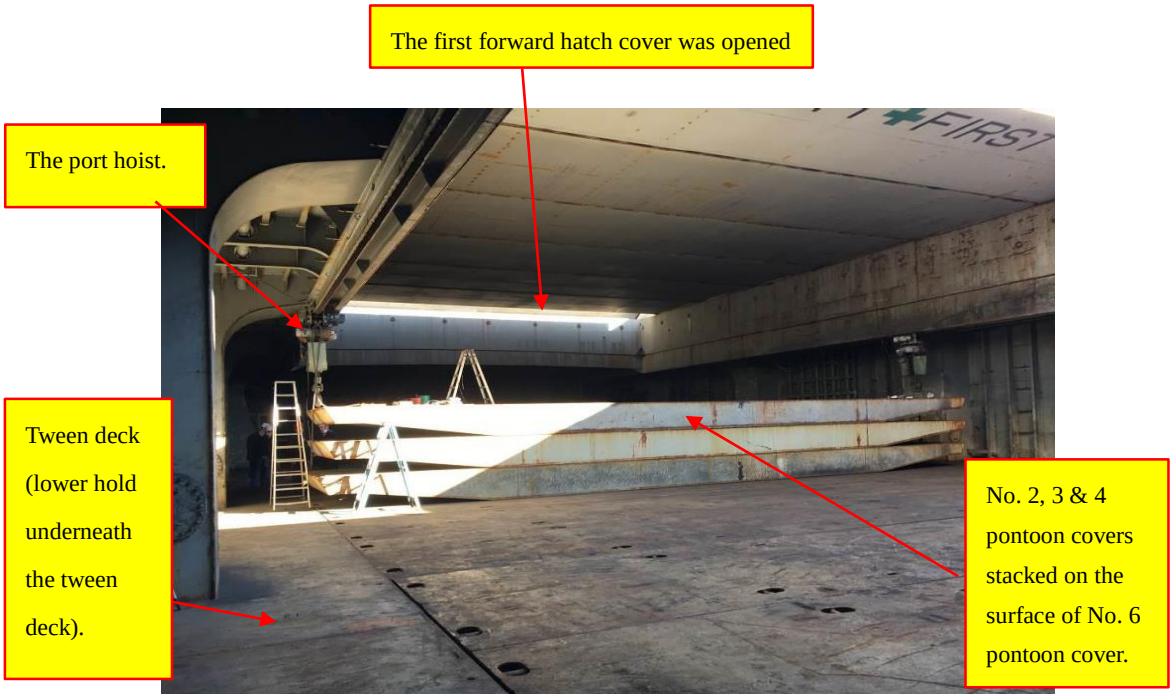

Figure 2 No. 1 cargo hold tween deck

4.11 The opening at the forward end of the tween deck was fenced by ship's crew to prevent any person from falling. The investigation, however, revealed that the fencing was only done by using a slack sagging fencing rope running through widely separated stanchions which were less than 1 metre in height. As a result, the rope went slack in almost touching the tween deck floor. In addition, there was no mid-height intermediate rope across the stanchions (Figure 3). The fencing arrangement did not meet the requirements of paragraphs 11.6.3 and 16.2.9 of the "Code of Safe Working Practices for Merchant Seafarers"[1] (the Code) which state that:

(a) Paragraph 11.6.3: *Guardrails or fencing should consist of an upper rail at a height of 1 metre and an intermediate rail at a height of 0.5 metres. The rails may consist of taut wire or chain*; and

(b) Paragraph 16.2.9: *when hatches are open, the area around the opening and in the hatchways should be appropriately illuminated and guardrails erected where necessary. Guardrails should be tight, with stanchions secured in position, and properly maintained*.

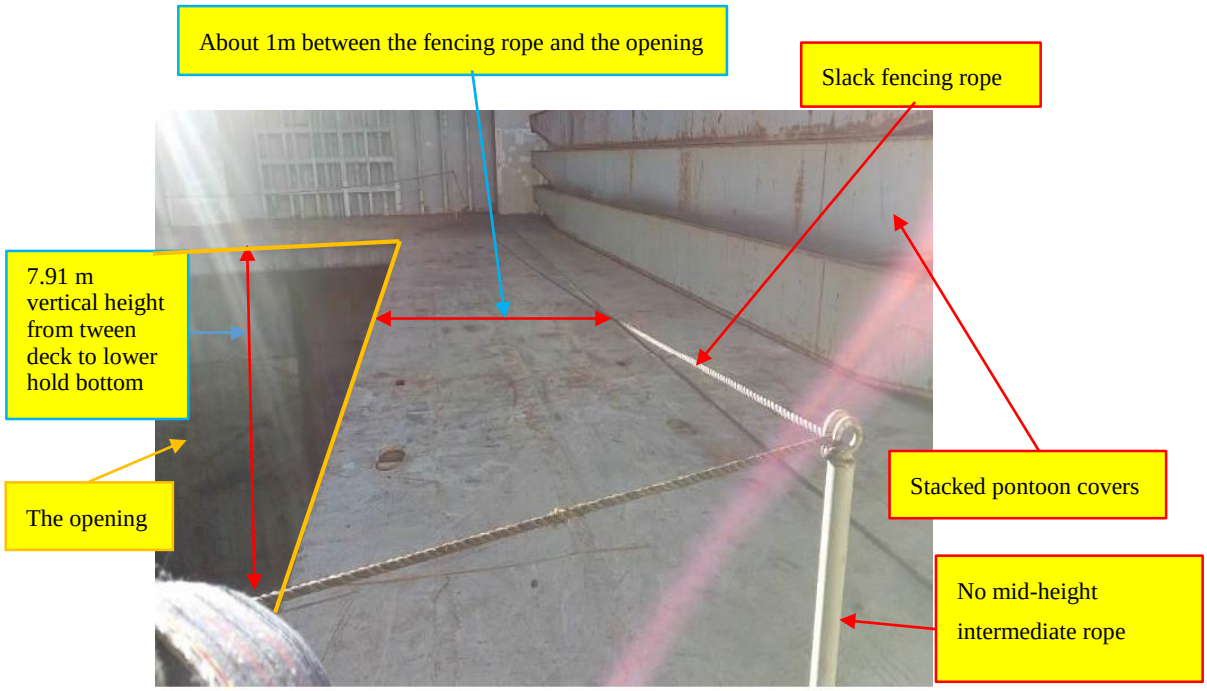

Figure 3 The fencing arrangement of the opening

[1] A publication that is required to be carried on board Hong Kong ships pursuant to the Merchant Shipping (Seafarers) (Code of Safe Working Practices) Regulations (Cap. 478M).

4.12 The photograph taken at the bottom of the cargo hold showed that there were a few pages of maintenance manual drawings, a safety helmet, a portable radio and blood stain (Figure 4). The helmet, seemingly without chin strap, was away from the blood stain. It was likely that the safety helmet might have fallen off from the chief engineer's head before he hit the bottom of the hold. Although the Coroner's report did not mention that the chief engineer had sustained head injury, it should be a safety issue that safety helmet should always be provided with chin strap.

Figure 4 The accident scene

Probable cause of the accident

4.13 There was no eyewitness for the accident. From the evidence and statements collected, the cause of the accident could be deduced as shown in Figure 5. The chief engineer entered the cargo hold from the aft entrance and walked on the tween deck. He went to the port side forward to meet the chief officer and the second engineer to enquire about the motor replacement plan of the port hoist. He then walked across the tween deck to the starboard side and continued walking towards the middle of No. 5 pontoon cover. For unknown reason, he might be tripped over by the slack sagging fencing rope and fell into the lower hold from the edge of the opening.

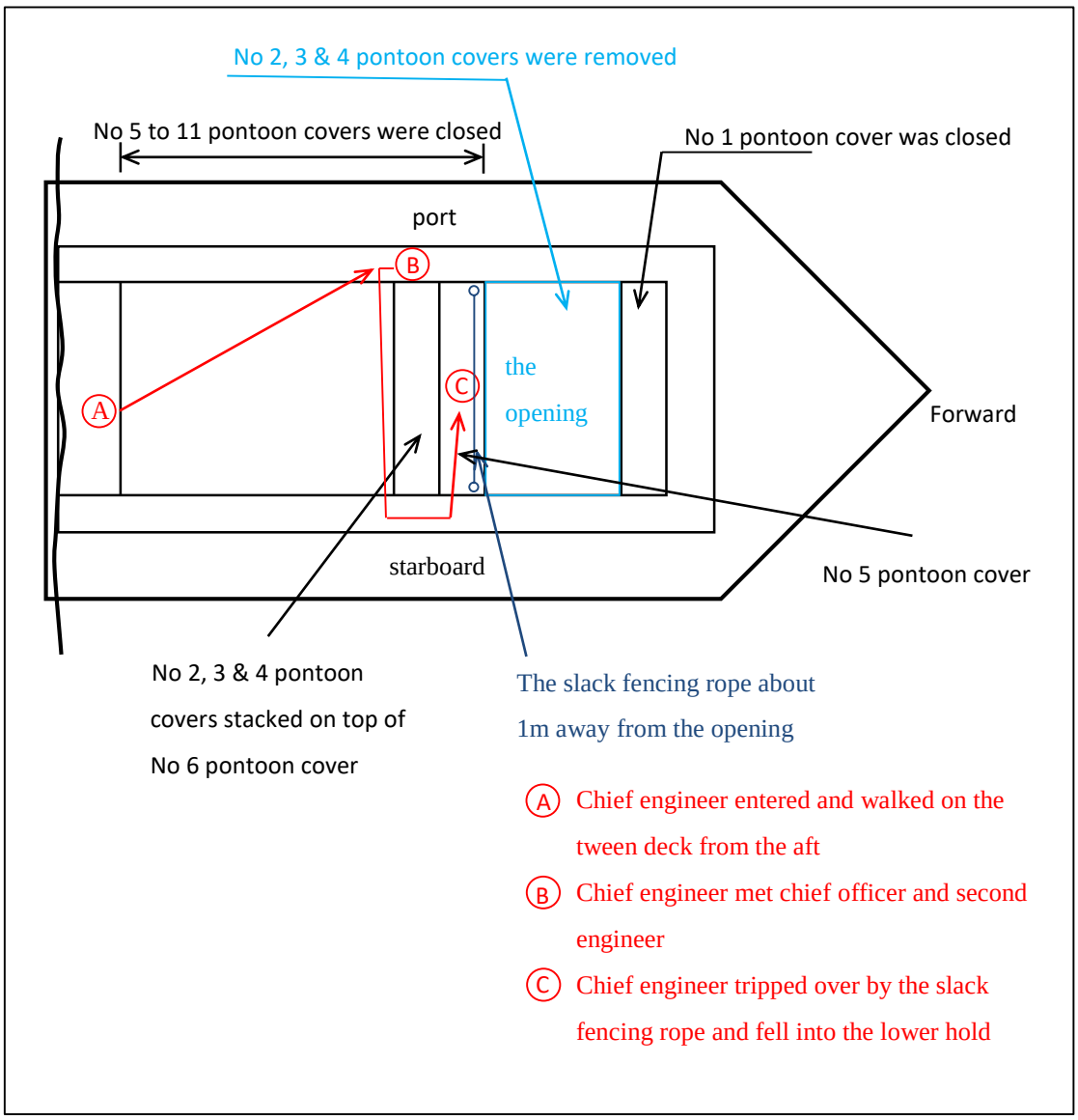

Figure 5 The deduced walking path of the chief engineer

Safety Management System

4.14 In accordance with the company's safety management system (SMS) with further reference made to the Code, the cargo hold was an enclosed space and a permit-to-work of enclosed space entry should be issued prior to commencement of the work. For entering an enclosed space, the SMS manual had provided the relevant procedures and guidance such as the provision of adequate ventilation; lighting; clear passageway and other safety measures required for the work surroundings etc. However, none of the above had been followed.

4.15 *The vessel* only carried out permit-to-work system of working aloft for the motor replacement work of the port hoist. According to the SMS's permit-to-work system, the master was the authorized officer of issuing the permit and the chief engineer or the chief officer was the competent person. Referring to Annex 14.1 "Permit to Work" of the Code, an authorized officer should ensure all measures specified as necessary have in fact been taken, or procedures are in place. Moreover, the competent person responsible for carrying out the specified work should countersign the permit to indicate their understanding of the safety precautions to be observed. Given the master issued the permit-to-work of working aloft, it would be reasonable to believe that:

(a) the chief engineer should have supervised the safety precautionary measures and found acceptable for the work till the end; and

(b) the master should have verified and confirmed that all safety precautionary measures as supervised by the chief engineer were satisfactory.

4.16 However, the safety meeting conducted before the commencement of the work and the issue of permit-to-work of working aloft did not reflect that a proper risk assessment in identifying the potential risks associated with the work environment as well as supervision of proper placement of safety measures had been carried out due to following findings:

(a) the risk assessment form of the working aloft checklist could not be found;

(b) the lack of sufficient illumination at the aft part of the cargo hold; and

(c) the fencing arrangement placed around the opening on the tween deck (see paragraph 4.11) did not meet the requirements of the Code.

4.17 The risk of falling through an opening was a common risk on board ships. If a proper risk assessment for entry into enclosed space and working aloft had been carried out with due attentiveness given to the placement of safety measures, the accident would have been avoided.

5. Conclusions

5.1 On 24 January 2018 at about 0930 hours, a fatal accident happened on board *the vessel* at Ploce, Croatia. The chief engineer fell from a height of about 7.91 metres from the cargo hold tween deck to the lower hold bottom resulting in his death.

5.2 The investigation identified that the crew did not follow the company's SMS to carry out the required procedures and issue the entry into enclosed space permit. Even for the issuance of permit-to-work of working aloft, risk assessment had not been carried out thoroughly and due attentiveness had not been given to the proper fencing for the opening on the tween deck in accordance with the Code.

5.3 The investigation also revealed that there was no chin strap attached to the safety helmet worn by the chief engineer. All safety helmets should be attached with chin straps and be tightened to prevent them from falling off.

6. Recommendations

6.1 The management company should issue circulars informing all masters, officers and crew of its fleet of the findings of the investigation, and the lessons learnt from this accident and instruct them to –

(a) always conduct a full risk assessment with the issuance of entry into enclosed space permit before entering a cargo hold in accordance with the requirements of the company's safety management system;

(b) restrict entry into tween deck space when some of the pontoon covers have been removed. If necessary, safety measures must be in place to prevent persons from falling; and

(c) arrange relevant safety training to enhance the crew's personal safety awareness including the use of personal protective equipment; familiarization with the permit-to-work system; and the capability to arrange an effective safe guardrail/fencing system.

6.2 The management company should also conduct internal audits on *the vessel* to ensure that the crew on board follow the permit-to-work system strictly.

6.3 A Hong Kong Merchant Information Note is to be issued to promulgate the lessons learnt from this accident.

7. Submission

7.1 The draft investigation report, in its entirety, had been sent to the management company and the master of *the vessel* as well as the International Safety Management Section of the Marine Department for their comments.

7.2 By the end of the consultation, no comment was received from the above mentioned parties.