Report of investigation into the fatal accident on board the Hong Kong registered oil tanker "*DHT Hawk*" at sea on 29 February 2020

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

9 November 2021

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

At about 1130 hours on 29 February 2020, a fatal accident happened on board the Hong Kong registered oil tanker "DHT Hawk" (*the vessel*) at sea in approximate position 22°12.9'N 061°38.2'E, during her voyage from Mina Al Ahmadi, Kuwait to Kawasaki, Japan via Galle, Sri Lanka, and Singapore.

In the accident, the bosun and an able seafarer were assigned to rig a scaffolding extension to the inboard maintenance platform at the boom of the port side hose handling crane (*the crane*) on the main deck. When the bosun and the able seafarer were working on the maintenance platform at the boom of *the crane*, the platform suddenly collapsed. The bosun fell onto the platform railing and he climbed back to the boom safely. Although the able seafarer wore a safety harness and anchored it to the platform railing, the lanyard of the safety harness snapped and failed to save the able seafarer from falling at a height of about 7.9 metres onto the main deck. The able seafarer was declared dead later on the event day.

The investigation revealed that the securing bolts of the platform support were seriously corroded and failed to support the platform weights acting on it, resulting in the collapse of the platform. The investigation also identified the other contributory factors of poor risk assessment; poor supervision of scaffolding work being carried out by the crew without training record of scaffolding; non-compliance of the configuration of the scaffolding extension including its structural steel rods with a generally recognized standard; insufficient support from the management company of *the vessel*; inappropriate maintenance of the safety harness; and insufficient training on using personal protective equipment.

1. Description of the vessel

Ship name	:	*DHT Hawk* (Figure 1)
Flag	:	Hong Kong, China
Port of registry	:	Hong Kong
IMO number	:	9310159
Type	:	Oil Tanker
Year built, shipyard	:	2004, Nantong COSCO KHI Ship Engineering Co., Ltd
Gross tonnage	:	160,937
Net tonnage	:	95,817
Summer deadweight	:	298,923 tonnes
Length overall	:	320.51 metres
Breadth	:	60.0 metres
Engine power, type	:	22,650 kW, MAN B&W 7S80MC
Classification society	:	Lloyd's Register
Registered owner	:	DHT Hawk Inc.
Management company	:	Goodwood Ship Management Pte. Ltd.

Figure 1 *The vessel*

2. Sources of evidence

2.1 The information provided by the crew and the management company of *the vessel* (the Company).

3. Outline of events

(All times were local time UTC +2 hours)

3.1 On 8 February 2020 and 17 February 2020, when *the vessel* was at Singapore anchorage and in Fujairah, United Arab Emirates respectively, the Company arranged shore technicians to inspect port and starboard side hose handling cranes onboard. The shore technicians detected minor oil leakage from the gearbox seal of the cranes. It was decided that an in-situ repair would be conducted by the shore technicians later during the sea voyage.

3.2 On 26 February 2020, *the vessel* completed cargo loading in Mina Al Ahmadi, Kuwait, and then departed for her discharge port in Kawasaki, Japan, via Galle of Sri Lanka and Singapore.

3.3 On 27 February 2020, in order to facilitate the repair work of the shore technicians who would board *the vessel* at Galle, the master briefed all deck crew about the preparation work of the repair. The bosun and two able seafarers (AB1 and AB2) were then tasked to carry out the preparation work that included pulling out the wire ropes of *the crane* and rigging scaffolding extensions to the outboard maintenance platforms at the boom.

3.4 On 28 February 2020, the bosun, AB1 and AB2 completed the job smoothly (Figure 2).

Figure 2 Scaffolding extension rigged to the outboard maintenance platform (Looking Upward)

3.5 At about 0800 hours on 29 February 2020, the chief officer held a toolbox meeting to brief the crew about the risks of working aloft when rigging a similar scaffolding extension to the inboard maintenance platform (*the platform*) at the boom of *the crane*. A permit to work aloft was signed by the master.

3.6 The bosun and AB1 worked together on *the platform* to rig the scaffolding extension. AB2 on the main deck rendered assistance to pass the required steel rods, aluminum planks and tools from below to the bosun and AB1.

3.7 At about 1130 hours, when *the vessel* was approximately in position 22°12.9'N 061°38.2'E, *the platform* suddenly collapsed together with the scaffolding extension (Figure 3). At that juncture, the bosun stood on the inner side of *the platform* while AB1 stood on the outer side of *the platform* close to the railing. With his safety harness anchored at a strong point of the boom, the bosun was able to climb back onto the boom safely. Although AB1 also wore a safety harness anchored at the railing of *the platform*, the safety harness lanyard snapped and failed to save him from falling onto the main deck. AB1 sustained serious injury.

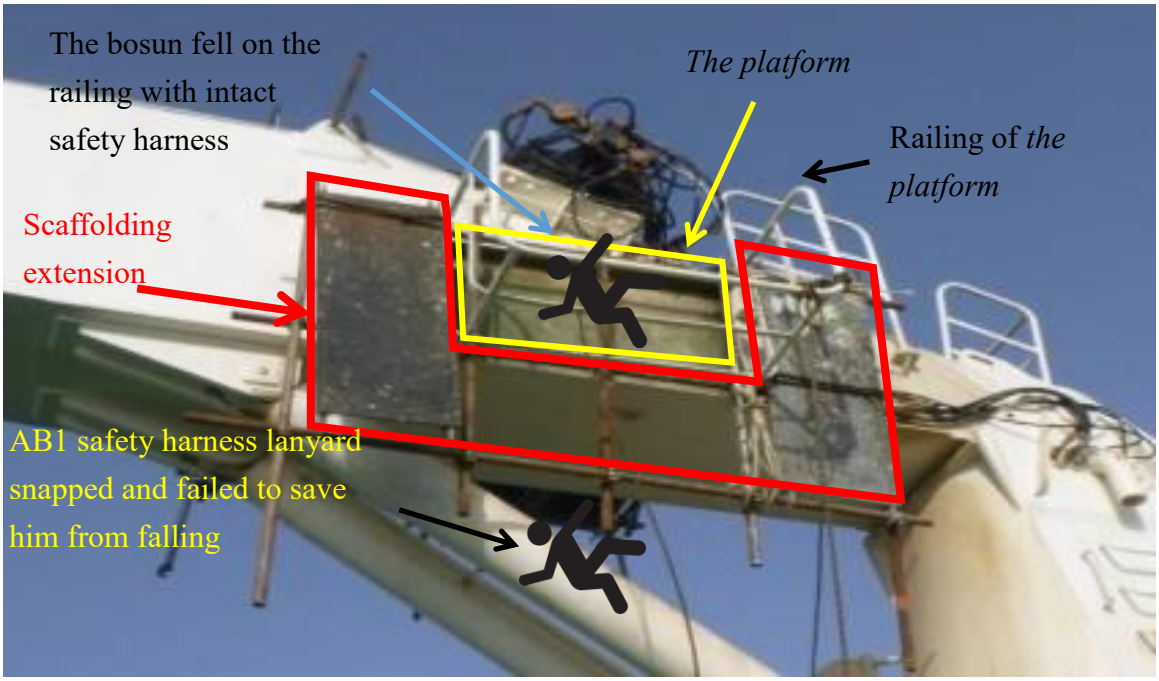

Figure 3 The scaffolding extension together *the collapsed platform* flipped over to the boom of *the crane.*

3.8 AB2 on the main deck spotted the accident and informed the third officer on the bridge via his portable radio. The third officer immediately called the master and summoned the crew for emergency rescue through the public address system. A rescue team was organized and shifted AB1 to the ship's hospital for emergency treatment.

3.9 At about 1140 hours, the master contacted the Company's doctor for medical advice. Although all the medical advices were followed and applied to AB1, it was observed that his pulse rate weakened further and finally stopped.

3.10 At 1800 hours, AB1 had no vital signs anymore. He was placed in a mortuary bag and then shifted to the refrigeration room. Eventually, the remains were landed in Singapore on 9 March 2020.

4. Analysis

Certification, training and experience

4.1 The statutory trading certificates of *the vessel* were valid and in order. *The vessel* was manned by 30 crew, including the master.

4.2 The master held a Class 1 Licence of the Deck Officer issued by the Hong Kong Marine Department (HKMD) valid until 5 December 2024. He had worked as shipmaster for about 2 years and joined *the vessel* about 2 months before the accident.

4.3 The chief officer held a Class 2 Licence of the Deck Officer issued by HKMD valid until 9 October 2021. He had worked as chief officer for about 1 year and joined *the vessel* about 3 months before the accident.

4.4 The bosun had worked at sea for about 10 years and joined *the vessel* about 2 months before the accident.

4.5 The AB1 had worked at sea for about 10 years and joined *the vessel* about 6 months before the accident.

4.6 There were no abnormalities noted with regard to the certification and experience of the crew concerned.

Weather and sea conditions

4.7 The weather was sunny with a north-westerly wind of Beaufort scale force 4. The sea was calm, and the visibility was about 10 nautical miles. The weather and sea conditions were not considered as contributory factors of the accident.

Cause of death

4.8 The autopsy of the deceased was conducted by the Health Sciences Authority of Singapore. The cause of death was due to injuries of the head and chest which were consistent with the accident of falling from

height.

Fatigue, alcohol and drugs abuse

4.9 There was no evidence to show that relevant crew suffered from either fatigue at work, or abuse of alcohol or drugs.

Failure of the platform

4.10 *The platform* was cantilever constructed, and its end was supported by three gusset plates welded onto the sidewall of the boom. Each cantilever arm of *the platform* was secured to the gusset plate by two securing bolts of 12mm in diameter (Figure 4).

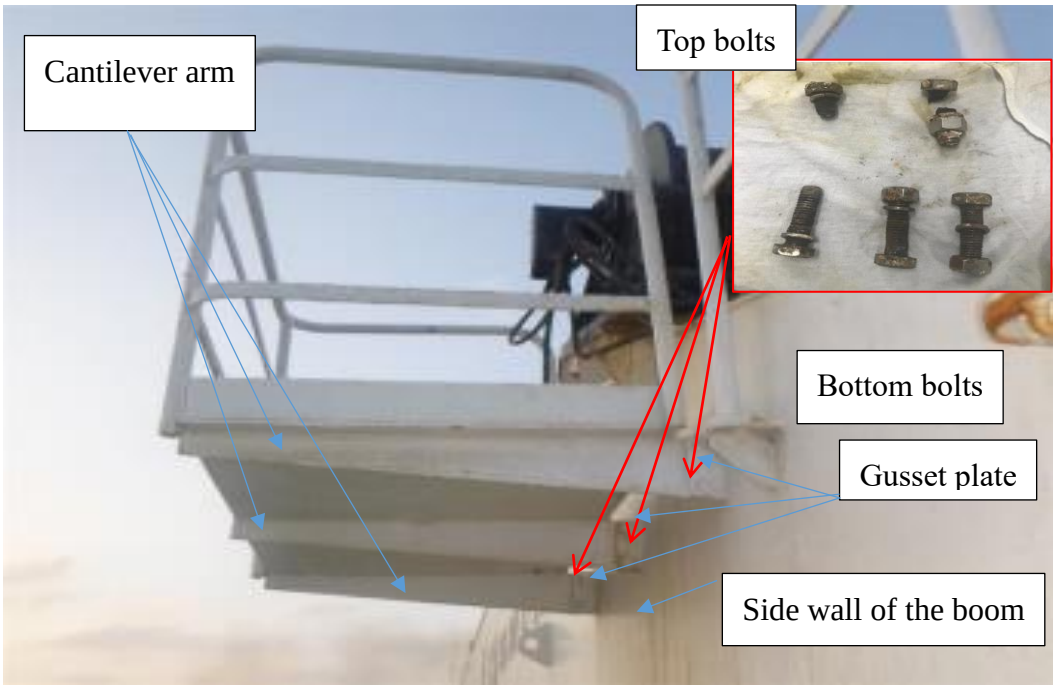

Figure 4 *The platform* was secured by two bolts to each of the three gusset plates on the boom.

4.11 *The platform* was used for routine maintenance and inspection work of the hoisting motor of *the crane*. After the accident, all the gusset plates top securing bolts were sheared, and the bottom securing bolts remained intact in position. *The platform* collapsed to flip over 90 degrees and hung up on the boom by the bottom securing bolts. Examination revealed that all three top securing bolts were severely

corroded (Figure 4). Two out of the three top securing bolts might be parted by corrosion before the accident. The remaining top bolt had a small fresh fracture surface, indicating that a crack had existed inside the bolt and then propagated rapidly by the weight of the scaffolding extension and the crew. It was conceivable that the paint applied on the surface of securing bolts had hampered the discovery of the cracks of the securing bolts by the crew.

4.12 Despite *the crane* had a major repair in 2019, there was no evidence showing that particular attention had been paid to the condition of *the platform* and the securing bolts. If the securing bolts had been diligently checked and renewed before the preparation work, the accident could be avoided.

Safe preparation work at height to rig scaffolding extension

4.13 The rigging of scaffolding was not a routine shipboard operation. *The vessel* occasionally had to conduct repair work on *the crane* through a prefabricated scaffolding tower stored onboard to access *the crane* top.

4.14 Before the accident, the Company instructed *the vessel* to rig a scaffolding tower on the main deck to facilitate the repair of *the crane*. Having discussed with the crew and considered the complexity of following the Company's instruction, the master decided to alter the instruction by rigging a scaffolding extension to *the platform* instead of erecting a scaffolding tower. The master updated the Company verbally of the alternative plan which was accepted by the Company without further advice or instruction given to *the vessel*.

4.15 Chapter 14 "Permit To Work Systems" and Chapter 17 "Work at Height" and its annexes of the Code[1] mentioned the following requirements relevant to working at height to rig scaffolding extension:

(i) planning should include the carrying out of a risk assessment, which may include consideration of potential risks from falling

[1] In accordance with Section 4 of the "Merchant Shipping (Seafarers) (Code of Safe Working Practices) Regulation" (Cap.478M), all Hong Kong registered vessels are required to carry the "Code of Safe Working Practices for Merchant Seafarers" (the Code) on board.

objects or fragile surfaces and planning for emergencies;

(ii) permit to work should be retained by the competent person in charge at the place where the work is being carried out until the work is completed and the clearance section signed. Scaffolding shall be assembled, dismantled, or significantly altered only under the supervision of a competent person and by seafarers who have received appropriate and specific training;

(iii) the scaffolding is assembled in conformity with a generally recognized standard configuration; and

(iv) the company must ensure that such work is properly planned, appropriately supervised and carried out in a safe manner as is reasonably practicable.

4.16 The investigation revealed that the preparation work did not satisfactorily meet the above requirements of the Code, resulting in the collapse of *the platform* as follows:

(i) the crew did not inspect *the platform* thoroughly, in particular the support of *the platform*, to evaluate its strength of supporting the scaffolding extension. Without taking account of any relevant safety guidelines and the total load going to be applied on *the platform* and its physical condition, the risk assessment done on 5 February 2020 could not identify the associated risks. A safe work plan was then not possible to be established and to make well known among the crew involved;

(ii) the chief officer, as the competent person in charge of the scaffolding work, was doing paperwork in the cargo control room at the time of the accident. The work was carried out without sufficient site supervision. Moreover, there was no record to show that the crew had received training relevant to the safe handling of scaffolding. It was deduced that the crew were lack of safety awareness of the associated risks of scaffolding work;

(iii) the crew located some steel rods in the store room to rig an extension to *the platform*. Neither the configuration of the scaffolding extension nor the steel rods had any record of compliance with the generally recognized standards (e.g., BS

1139, BS EN 12810); and

(iv) the Company received an alternative plan from the master, but the Company did not follow up and provide sufficient safety guidelines or instructions to *the vessel*. The Company also failed to ensure that the crew were well trained for rigging the scaffolding.

Safety harness and safety helmet

4.17 The safety harness used by AB1 was a full body harness with a fall arrest attachment D-ring. One end of the lanyard was linked to the D-ring on the safety harness and the other end with a snap hook connecting to an anchor point.

4.18 At the material time of the accident, AB1 made his anchorage on the railing of *the platform*. Since the size of the snap hook was not large enough to connect to the railing directly, AB1 tied the lanyard on the railing in the form of choker hitch.

4.19 Lanyard is a critical link in providing safe fall protection and bears the greatest force during a fall. The investigation revealed that the following factors caused the breakage of the lanyard leading to the fall of AB1:

(i) wrong hooking method of using the snap hook to tie the lanyard on the railing as made by AB1 was not recommended by the manufacturer of the safety harness, since it may reduce the lifting capacity to 75-80%;

(ii) insufficient training of the crew in using lanyard. In case an anchor point is not fit for the snap hook of the lanyard, a separate anchorage connector, e.g., anchorage sling, should be adapted; and

(iii) no safety harness inspection and maintenance record, including the lanyard could be found onboard. Considering the poor appearance of the lanyard, e.g., dirt and oil contaminated (Figure 5), the lanyard was probably out of its service life, and it was picked up by AB1 inadvertently for the work.

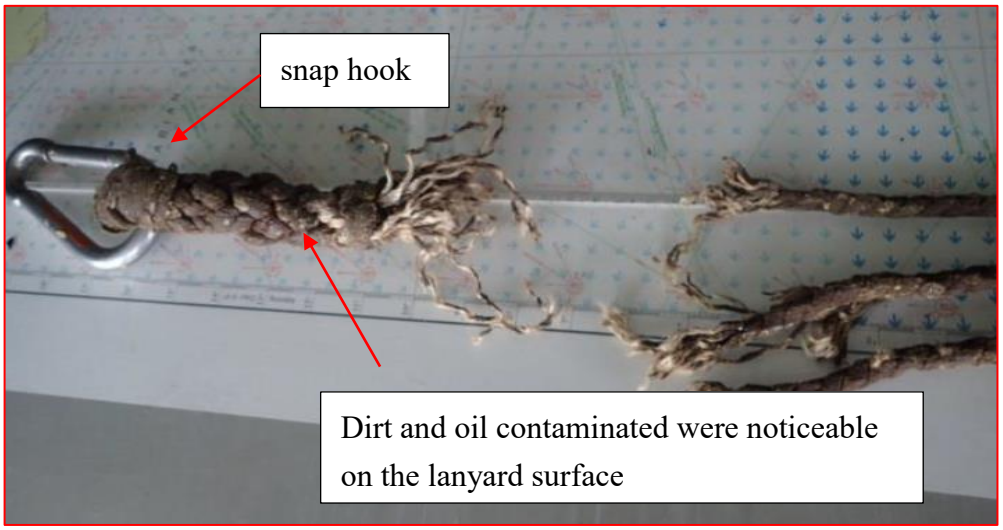

Figure 5 The lanyard of AB1

4.20 Furthermore, the investigation revealed also that AB1 had not been trained properly to wear a safety helmet. As a result, the safety helmet came off his head when falling from a height, causing severe head injury when he landed on the main deck.

4.21 After the accident, the Company informed its fleet to conduct a close-up inspection of existing platforms with a similar securing arrangement; supplied a double snap hook safety harness with an energy-absorbing lanyard onboard; and prepared a safety harness training material to *the vessel* to enhance shipboard safety.

5. Conclusions

5.1 On 29 February 2020, a fatal accident happened on board *the vessel* during the voyage from Mina Al Ahmadi, Kuwait to Kawasaki, Japan via Galle of Sri Lanka and Singapore. The bosun and AB1 were assigned to rig scaffolding extension to *the platform* which was bolted to the gusset plates of *the crane* boom. When the bosun and AB1 were working on *the platform*, *the platform* suddenly collapsed to flip over to the boom. The bosun fell onto the railing of *the platform* and was able to climb back on the boom safely. However, AB1, who was equipped with a safety harness anchored at the railing of *the crane,* was unable to catch the railing of *the platform*. Subsequently, AB1 fell onto the main deck when his safety harness lanyard snapped. AB1 was declared dead later on the event day.

5.2 The investigation revealed that securing bolts of *the platform* were seriously corroded and failed to support the weights acting on it, resulting in the collapse of *the platform*.

5.3 The investigation also identified the following contributory factors:

(i) poor risk assessment without checking the physical condition of *the platform* by considering the total working load for *the platform* and referring to the relevant safety guidelines;

(ii) the rigging of scaffolding extension to *the platform* was done by the crew without training record of scaffolding and was not properly supervised;

(iii) no record of the configuration of the scaffolding extension and its structural steel rods to comply with generally recognized standards;

(iv) the Company failed to ensure the crew capability and did not provide sufficient safety guidelines or instructions of scaffolding work;

(v) the maintenance of safety harness including the lanyard was not appropriate; and

(vi) the training on using the safety harness and safety helmet was not sufficient.

6. Recommendations

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

(i) conduct work at height strictly in accordance with the safety management system (SMS) and the Code, in particular on risk assessment, planning, and safety supervision; and

(ii) ensure effective implementation of the shipboard SMS, particularly, the maintenance of personal protection equipment and deck fittings.

6.2 The management company of *the vessel* should consider revising the SMS documents, if found appropriate, so as to:

(i) enhance working procedures, plans and instructions, including checklists as appropriate, for scaffolding work and working aloft;

(ii) enhance maintenance and inspection procedures, and safety instructions, including checklists as appropriate, for safety harness; and

(iii) enhance training plan of scaffolding work and safe wearing safety harness and safety helmet.

6.3 The Shipping Division of Marine Department should consider to conduct verifications on implementing SMS of the management company and *the vessel*.

6.4 A Hong Kong Merchant Shipping 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 following parties for their comments:

(i) the management company and the master of *the vessel*; and

(ii) the Shipping Division of Marine Department.

7.2 During the consultation period, comments from the Company and the master of *the vessel* were received and the report had been amended as appropriate.