

[MSI Report 2022-002]



Marine Safety Investigation Report on Containership Sawasdee Bangkok – Fatality of a crew member –

Date of Accident: 31 December 2017

Date of Publication: 24 Aug. 2022



**Korea Maritime Safety Tribunal
Marine Safety Investigation Team**

Note

This marine safety investigation report aims to identify the causes of the marine accidents and prevent similar marine accidents or incidents in the future under Article 18.3 of the Act on the Investigation of and Inquiry into Marine Accidents. It is therefore advised that this report not be used for assigning blame or determining liability.

The names of the relevant acts and agencies described in this report were quoted at the time of its writing.

This investigation report was originally written in Korean, and was subsequently translated into English. In the event of any discrepancy between the two versions, the Korean text shall prevail.

Contents

1. Executive Summary	3
2. Findings of Fact	7
2.1 Ship particulars	7
2.2 Shipowner and operation	9
2.3 Ship surveys	9
2.4 Crew composition	10
2.5 Ship structures	11
2.6 Bosun store small hatch	12
2.7 Weather conditions	13
2.8 Damage	14
3. Development of Accident	17
3.1 Operation before the accident	17
3.2 Accident occurrence	17
3.3 Ship sailing after the accident	19
4. Analysis	23
4.1 Cause of the OS's death	23
4.2 Weather conditions	23
4.3 Structure of the bosun store small hatch and cause of its closing	25
4.4 Deck maintenance	26
4.5 Work safety assessment and supervision on safety management	26

5. Conclusions 31

6. Lessons Learned 35

6.1 Strictly carrying out maintenance and repair of the deck equipment 35

6.2 Reinforcing work safety assessment and safety management
supervision 35

6.3 Improving the boson store small hatch 36

section

1

Executive Summary

1. Executive Summary

- 1.1 The containership, Sawasdee Bangkok, arrived at Ho Chi Minh Port in Vietnam at 00:40 (LT; the same hereinafter) on 30 December 2017. After completing container loading/discharging, the ship set sail for Busan Port in Korea at 15:30 on the same day.
- 1.2 The second officer (2/O), who was on a navigational watch, believed that one of the containers stacked on board was open and reported it to the master at 15:40 on 31 December, one day after departure.
- 1.3 At 15:45, The master ordered the 2/O to check whether any of the containers considered to be open on the forecastle deck had suffered damage. At 15:51, he also told the same to the chief officer (C/O) who arrived on the bridge for a navigational watch.
- 1.4 The C/O directly ascertained that none of the containers on the forecastle deck had been damaged. Apart from that, however, he identified a crack in the bow shell plating, causing water to leak into the boson store. He returned to the bridge and reported it to the master.
- 1.5 After receiving the report, the master ordered the C/O to take temporary measures to make the cracked area watertight. At 16:30, despite relatively high wind and waves, the master determined that it would be possible to carry out repair operations. He altered the course from 040° to 006° to mitigate the impact of the waves.
- 1.6 The C/O went to the bosun store on the forecastle deck, accompanied by the bosun, able seaman (AB), and ordinary seaman (OS), and opened up the small hatch and placed tools inside the bosun store before entering. At that moment, huge waves struck the ship twice, causing hull slamming. Thus, the small hatch suddenly closed.

- 1.7 As a result, the OS, who was holding the small hatch, had his head trapped between the closed small hatch and the hatch coaming, ending up dead.

- 1.8 The bosun store small hatch was originally equipped with an automatic door lock, along with a backup safety pin, to prevent the small hatch from closing by itself. When the accident occurred, however, the door lock was worn out, and the safety pin was missing. Given these circumstances, the small hatch was determined to have suddenly closed as a result of the impact of huge waves, causing the accident to occur.

section

2

Findings of Fact

2. Findings of Fact

2.1 Ship particulars

2.1.1 Principal particulars of Sawasdee Bangkok

Ship Name	SAWASDEE BANGKOK
Flag State	Republic of Korea (ROK)
Port of Registry	Jeju
IMO No.	9122526
Ship Type	Containership
Owner	Sinokor Merchant Marine Co., Ltd.
Safety Management Company	Korea Shipmanagers Co., Ltd.
Max. No. of Crew (Pers.)	30
Builder	Blohm & Voss
Date of Keel Lay	18 May 1995
Date of Launch	4 Dec. 1995
Classification Society	Korean Register of Shipping (KR)
Gross Tonnage (t)	15,859
Length (m)	166.62
Beam (m)	27.40
Depth (m)	13.20
Deadweight Tonnage (t)	20,084
Main Engine	Diesel engine
Max. Output	12,355 kW × 100 RPM
Propeller	1 (Solid screw-type)
Rudder	1
Bow Thruster	480 kW × 1

2.1.2 Sawasdee Bangkok is a containership with a gross tonnage of 15,859 tons, a length of 166.62 meters, a beam of 27.40 meters, and a depth of 13.20 meters. She was built at Blohm & Voss in Germany.

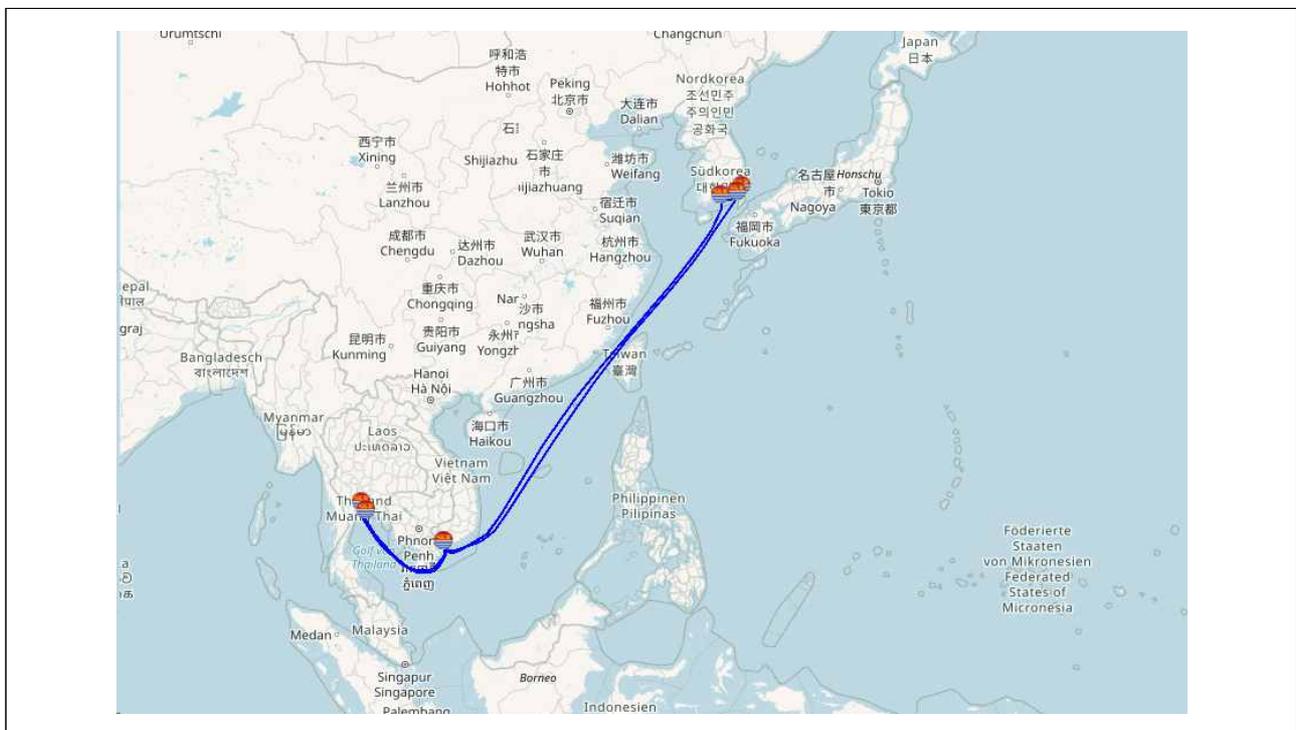


<Figure 1> General arrangement and photo of Sawasdee Bangkok

2.2 Shipowner and operation

2.2.1 This containership, launched on 4 December 1995, was owned by Sinokor Merchant Marine Co., Ltd. at the time of the accident. The ship has been operated under the name, Sawasdee Bangkok, since her registration in the Republic of Korea (ROK) on 21 May 2012. The safety management of the ship was entrusted to Korea Shipmanagers Co., Ltd.

2.2.2 Sawasdee Bangkok has transported containers mainly in the waters of Northeast and Southeast Asia: including Busan Port, Pohang Port, and Ulsan Port in Korea; Ho Chi Minh Port in Vietnam; and Laem Chabang Port and Bangkok Port in Thailand.



<Figure 2> Shipping routes of Sawasdee Bangkok

2.3 Ship surveys

2.3.1 Sawasdee Bangkok was classed by Korean Register of Shipping (hereinafter KR). At the time of the accident, she was holding ship survey certificates¹⁾ valid till 31 May 2021.

1) Cargo Ship Safety Construction Certificate (SC), Cargo Ship Safety Equipment Certificate (SE), Cargo Ship Safety Radio Certificate (SR), etc.

2.3.2 This containership had received seven port state control (PSC) inspections at ports in Vietnam and Thailand between 2015 and 2017. These inspections identified several deficiencies, such as the poor condition of the mooring lines and the C.S.W (cooling sea water) P/P gauge. However, no problems were identified with respect to the bosun store on the forecastle deck.

2.4 Crew composition

2.4.1 At the time of the accident, 22 crewmembers were on board: nine Koreans, including the master, officers, the chief engineer, and engineers; eleven from Myanmar; and two from Thailand.

2.4.2 The Sawasdee Bangkok master had about five years and three months' boarding experience as a master. The accident occurred about ten months after he boarded this containership for the first time.

2.4.3 The C/O had about 11 months' boarding experience in his position. He had never served aboard Sawasdee Bangkok before, and the accident occurred 19 days after he arrived.

2.4.4 The crewmember who died in the accident was the OS from Myanmar. Prior to the accident, he had served onboard a total of four ships²⁾, and this was his second boarding experience on Sawasdee Bangkok. The accident occurred about one month and a half (43 days) after his boarding.

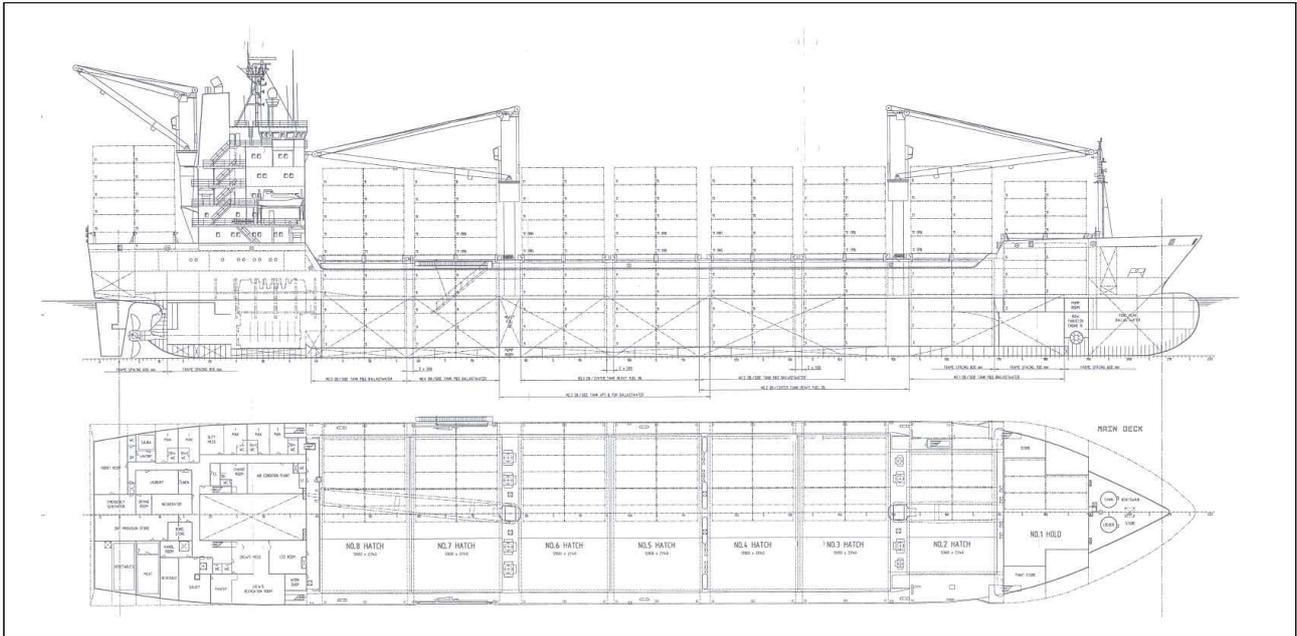
2.4.5 The deck ratings normally work in the daytime from 08:00 to 17:00 on weekdays. The C/O manages and oversees their work (i.e., deck maintenance).

2) Service experience of the OS

Ship Type (Ship Name)	GT	Rank	Date of Embarkation	Date of Disembarkation
Chemical tanker (Anonymous)	7,591 t	O/S	30 Jan. 2014	12 Jan. 2015
Containership (<i>Sawasdee Bangkok</i>)	15,859 t	O/S	16 Dec. 2015	1 Dec. 2016
Containership (Anonymous)	9,030 t	O/S	1 Feb. 2017	6 Jun. 2017
Containership (<i>Sawasdee Bangkok</i>)	15,859 t	O/S	18 Nov. 2017	31 Dec. 2017

2.5 Ship structures

2.5.1 The Sawasdee Bangkok bridge is located in the stern area, and eight cargo holds are located forward of the bridge. The ship can carry up to 1,519 containers.³⁾



<Figure 3> Structure and layout of cargo holds

2.5.2 The forecastle deck of Sawasdee Bangkok is equipped with a windlass, winch, and other machinery. The bosun store is located under the forecastle deck. Crew have to lift the small hatch to open and enter the bosun store.



<Figure 4> Photo of the forecastle deck and the bosun store

3) The calculation is in TEUs, the size of one 20ft container (6.096 meters).

2.6 Bosun store small hatch

- 2.6.1 The hatch coaming of the bosun store stands about 80 centimeters above the forecastle deck. The square small hatch measures about 140 x 140 cm, and this steel cover weighs about 100 kilograms⁴).
- 2.6.2 The bosun store small hatch is equipped with two devices to prevent it from closing by itself: an automatic door lock and a safety pin. Both are installed inside the small hatch.
- 2.6.3 When the small hatch for the bosun store is open, the automatic door lock, located inside the small hatch, comes down by itself and holds the small hatch open, even if a person does not grasp it by hand. Once the small hatch is secured to open, if the safety pin is inserted into a hole below the holding mechanism, the door lock cannot be released.



<Figure 5> Inside of the bosun store small hatch on the forecastle deck

- 2.6.4 To close the small hatch, meanwhile, the locking devices are released simply by removing the safety pin from the hole and lifting the automatic door lock. The small hatch automatically closes from its own weight. If the safety pin is still in the hole, the automatic door lock cannot be released, making it impossible to close the small hatch.

4) The statement given by the C/O

2.6.5 In addition to these locking devices, a spring on the outer hinge of the small hatch controls the closing speed of the small hatch so that it does not shut too fast on account of its weight.



<Figure 6> The opened bosun store small hatch and its access ladder

2.7 Weather conditions

2.7.1 The following [Tables 14] lists weather conditions recorded in the Sawasdee Bangkok logbook.

<Table 1> Weather conditions recorded in the logbook⁵⁾

Date and Time (LT)	Wind and Waves						Air	
	Wind Dir.	Beaufort Scale	Wind Speed (m/s)	Wave Dir.	Beaufort Scale	Wave Height (m)	Weather	Temp.
2017.12.30. 24:00	NNE	5	8.0 ~ 10.7	NNE	4	1 ~ 1.5	Cloudy	27
2017.12.31. 04:00	NNE	5	8.0 ~ 10.7	NNE	5	2 ~ 2.5	Overcast	25
2017.12.31. 08:00	N	6	10.8 ~ 13.8	N	5	2 ~ 2.5	Overcast	27
2017.12.31. 12:00	N	6	10.8 ~ 13.8	N	5	2 ~ 2.5	Cloudy	28
2017.12.31. 16:00	N	6	10.8 ~ 13.8	N	5	2 ~ 2.5	Cloudy	29
2017.12.31. 20:00	NE	6	10.8 ~ 13.8	NE	5	2 ~ 2.5	Overcast	27
2017.12.31. 24:00	NE	6	10.8 ~ 13.8	NE	5	2 ~ 2.5	Cloudy	26
2018.01.01. 04:00	N	6	10.8 ~ 13.8	N	5	2 ~ 2.5	Cloudy	25
2018.01.01. 08:00	NNE	6	10.8 ~ 13.8	NNE	5	2 ~ 2.5	Cloudy	25

5) The wind speed (m/s) and wave height (m) are based on the Beaufort Scale.

section

3

Development of Accident

3. Development of Accident

3.1 Operation before the accident

3.1.1 Sawasdee Bangkok arrived at Ho Chi Minh Port in Vietnam at 00:40 on 30 December 2017. After completing loading/discharging operations, the ship set sail for Busan Port in Korea at 15:30 on the same day.

3.2 Accident occurrence

3.2.1 At 15:40 on 31 December, the 2/O, who was on a navigational watch, believed that one of the containers on the forecastle deck was open and reported it to the master.

3.2.2 At 15:45, the master went up to the bridge, and directed the 2/O to check whether any damage had occurred to the containers on the forecastle deck along with the bosun and the OS.

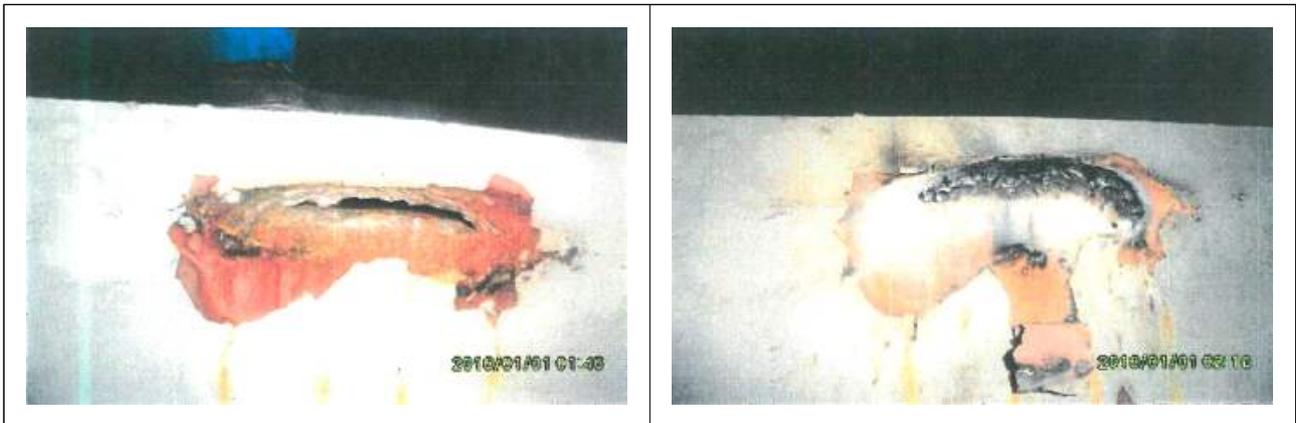
3.2.3 After reaching the forecastle deck, the 2/O confirmed that the containers were fine. However, he noticed that the port anchor was not tightly secured and housed, causing its anchor crown to bang against the hull. Thus, he discovered a crack in the hull⁷⁾ and the leakage of seawater into the bosun store through this crack.

3.2.4 Meanwhile, at 15:51 on the same day, the master said to the C/O who had arrived on the bridge to take over the navigational watch, "Just now the 2/O went out to check on damage on the forecastle deck. Go along and check with him."

7) The C/O stated that he had slightly lowered the anchor to prepare for emergency anchoring when departing from Ho Chi Minh Port on 30 December 2017. After departure, however, the anchor was not properly housed. When the hull was rolling, so was the anchor, and its crown hit the hull. He stated that the crack could have been made at that moment.

3.2.5 The C/O arrived on the forecastle deck at 16:05, and the 2/O informed him about the crack in the hull structure and the flooding of the bosun store.

3.2.6 At 16:10, the C/O opened the bosun store small hatch to look closely at the cracked area. The bosun went inside and identified a crack 7 centimeters long.



<Figure 9> Cracked area (before & after repair)

3.2.7 At 16:27, the C/O and the other crewmembers completed their work on the forecastle deck and moved to the quarter area. The C/O went up to the bridge and reported to the master that the hull had been cracked and the seawater was flowing into the bosun store through the cracked area.

3.2.8 At 16:30, the master checked the conditions of wind, waves, and hull roll. Despite relatively high wind and waves, he determined that it would be possible to repair the hull, and he ordered the C/O to take temporary measures to plug up the cracked area with wedges and cloths.

3.2.9 As the containership encountered waves on the bow, the master altered the course to port from to 040° to 006° to minimize the impact of the waves.

3.2.10 Meanwhile, the C/O, under the master's order, moved to the forecastle deck along with the bosun, the AB, and the OS. Upon arriving, they opened the bosun store small hatch. The C/O was holding the right side of the small hatch, and the AB and the OS were holding its left, as the bosun placed tools inside the bosun store.

- 3.2.11 Huge waves struck the bow area of the ship twice at this time. After the second hit, the ship experienced a huge slamming. As the waves washed the crew over the bulwark, they lost their balance and fell down. And, the small hatch they had been holding slipped out of their hands.
- 3.2.12 At that moment, the C/O heard someone screaming, “Argh!” He discovered that the small hatch had closed and the head of the OS was trapped between the small hatch and the hatch coaming. The C/O opened the small hatch immediately, laid the OS down, and checked his injury. The OS had a long and diagonal cut (cleaver wound) on his face down to his nose.
- 3.2.13 At 16:50, the C/O reported⁸⁾ to the master on the bridge via radio communications, “The OS seems to be dead.” The crew brought a stretcher, a first-aid kit, and bandages and attempted first-aid treatment and cardiopulmonary resuscitation (CPR). However, the OS had stopped breathing and had no pulse.



<Figure 10> Reenactment of the accident

3.3 Ship sailing after the accident

- 3.3.1 At 16:55 on 31 December 2017, the master reported the OS’s fatal accident to the company’s designated person (DP).

8) After being informed by the C/O, the master asked, “What happened to the OS?” The C/O said, “The waves slammed against the bow and the bosun store small hatch suddenly closed. It seems that the OS had his head trapped inside, and he ended up dead.”

- 3.3.2 At 17:00, the master changed course to the coastal waters of Vietnam to get medical assistance. At 17:07, he called the Vietnam Coast Guard via VHF but heard no response. Instead, he contacted a shipping agent in Vietnam and asked the agent whether the closest Maritime Rescue Coordination Center (MRCC) could offer rescue operations.
- 3.3.3 At 17:18, the crew transported the OS to the ship's hospital. At 18:25, they called the 119 Maritime EMS Center in Korea. As doctors at the center determined that the OS was dead, the crew stopped CPR at 18:47. The deceased OS was taken to the port of Busan, the Republic of Korea, onboard this ship.⁹⁾
- 3.3.4 At 10:00 on 6 January 2018, Sawasdee Bangkok arrived at Busan Port. And at 12:25 on the same day, the OS was sent to the hospital. The doctors examined him and concluded that he had died from a head injury.

9) At 20:44, the master judged that the vessel would be better to go to Korea as the local shipping agent in Vietnam told the master on the phone that the agent was not sure when the injured crewmember could be transported even if the vessel arrives at a nearby port.

section

4

Analysis

4. Analysis

4.1 Cause of the OS's death

4.1.1 The doctor who examined the deceased OS confirmed that the immediate cause of his death was a head injury (rupture). The injury presumably occurred when his head was trapped and pressed between the bosun store small hatch and its hatch coaming after the small hatch slammed shut.

4.2 Weather conditions

4.2.1 In this report, investigators analyzed weather conditions at the time of the accident to figure out why the small hatch suddenly closed. According to Sawasdee Bangkok's logbook, wind blew northerly at about 20 to 26 knots (10.3-13.4 m/s) and the waves were 2 to 2.5 meters high.

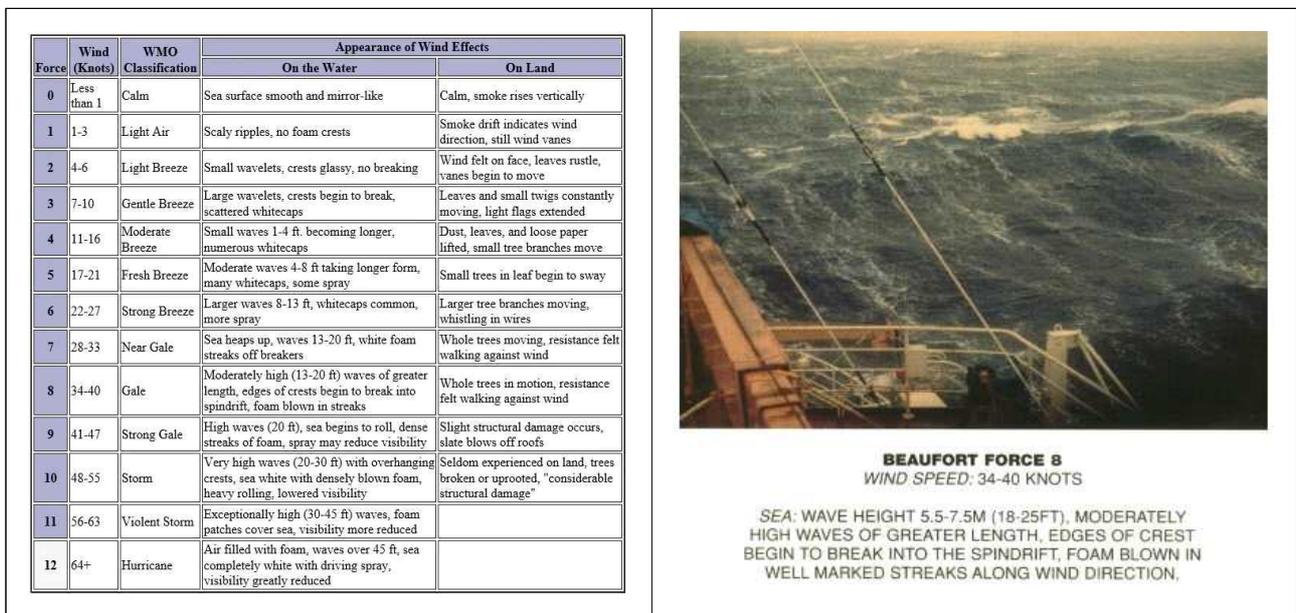
4.2.2 The logbook entries were based on the true wind speed (TWS). Thus, the relative wind speed (RWS)¹⁰⁾ should be calculated to figure out the wind speed that was experienced by the crew when they were working on the forecastle deck. Since the wind direction (north) and the containership's heading were almost equal, the RWS was calculated at 30.5 to 36.5 knots (15.7-18.8 m/s), equal to the sum of the TWS (20-26 kn) and the ship speed (10.5 kn).

4.2.3 In the post-casualty investigation, the master stated that the wind speed had been at about 50 knots (25.7 m/s) and the waves had been about 2-2.5 meters high when the accident had occurred. It is determined that he indicated the RWS, as he would have checked the wind speed on the anemometer at that time.

10) The RWS is composed of the TWS, the ship's heading, and speed.

4.2.4 Given those meteorological records and statements, the crewmembers are presumed to have worked on the forecastle deck while withstanding wind speeds of about 30 knots (15.4 m/s) or higher,¹¹⁾ meaning wind strong enough to shake trees and cause a person difficulty in walking against.

4.2.5 Also, the waves are assumed to have been 2 to 2.5 meters high. Considering that the wind wave advisory is issued at a significant wave height (Hs) of 3 meters, it is presumed that the sea surface would not have been calm.



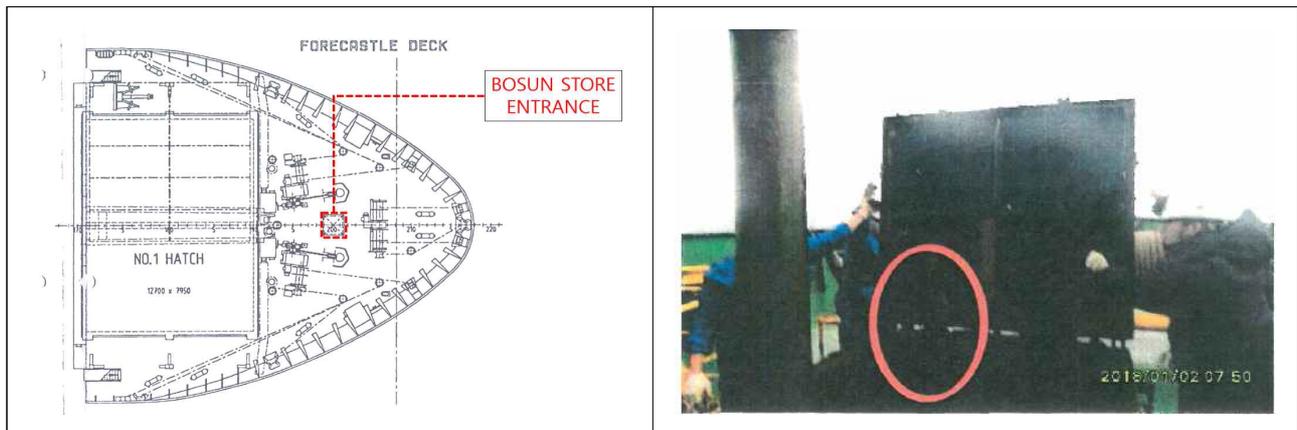
<Figure 11> Beaufort Wind Scale

4.2.6 It seems inappropriate for the crew to have proceeded with the maintenance operations on the forecastle deck under the weather conditions at the time of the accident, including the wind speed and the wave height. If such operations had been urgent and inevitable for the containership to avoid flooding through a crack in the hull, there should have been sufficient assessment and preparations for the impact of the weather on the operations.

11) Given the master’s statement, it is determined that the crew would have experienced the wind speed of up to 50 knots during the maintenance operations on the forecastle deck, which is the level of speed where roofs are blown off buildings, according to the typhoon intensity scale defined by the Korea Meteorological Administration (KMA).

4.3 Structure of the bosun store small hatch and cause of its closing

4.3.1 The bosun store small hatch of Sawasdee Bangkok is a lifting type which requires persons to lift the small hatch to open and go down via the access ladder.



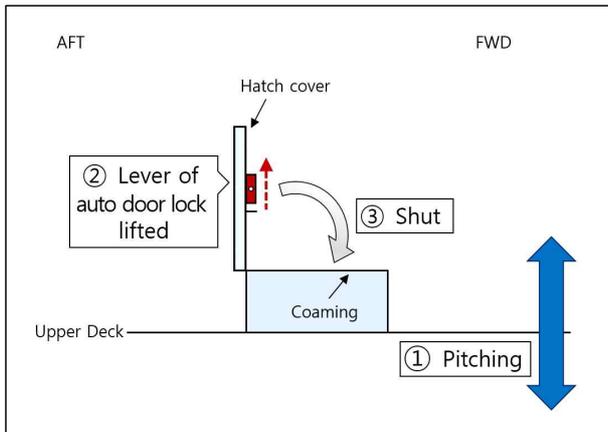
<Figure 12> Location and entrance of the bosun store on the forecastle deck

4.3.2 The small hatch is installed with dual locking devices: once persons open the small hatch by lifting it, an automatic door lock keeps the entrance open mechanically; and then, if they manually insert a safety pin, the automatic door lock cannot be released. However, it is assumed that the Sawasdee Bangkok crew used only the former without knowing the fact that the latter was missing when the accident occurred.

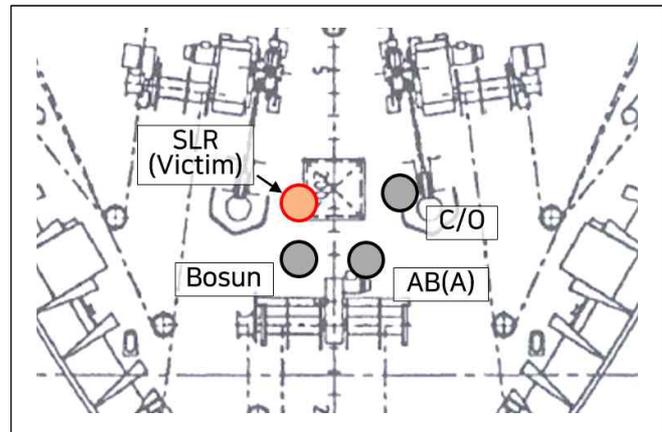
4.3.3 The C/O stated that the automatic door lock was rusted from long-term corrosion at the time of the accident. That is why the lock functioned only loosely, not tightly.

4.3.4 He added that the small hatch's spring was very old and completely lost its capability to slow down the closing action of the small hatch.

4.3.5 All things considered, including the structure of the automatic door lock and the statements given by the crew, it is determined that the small hatch was held open only by a slack automatic door lock, while the safety pin had not been inserted. Thus, the hull slammed by the waves and the impact of the waves over the bulwark could have released the automatic door lock. In addition, the worn spring did not function properly and failed to slow down the closing speed of the small hatch.



<Figure 13> Closing procedures of the bosun store small hatch



<Figure 14> Positions of the crew during the accident

4.4 Maintenance of the deck fittings

- 4.4.1 The Safety Management System (SMS) Procedures (Crew Management - Appendix. 4 Standard Personal Job Description) of Sawasdee Bangkok define the C/O as the chief mate of the deck department, who is in overall charge of performing the deck department operations and responsible for the deck and hull maintenance.
- 4.4.2 The deck maintenance includes checking the conditions of the automatic door lock and the safety pin of the bosun store small hatch, which fall under the duties of the C/O. When the accident occurred, the automatic door lock was rusted and loosely secured, and the safety pin was missing.
- 4.4.3 It indicates that the C/O neither had a proper understanding of the structures and functions of the deck fittings nor regularly checked their conditions thoroughly.
- 4.4.4 In addition, Korea Shipmanagers Co., Ltd., a company in charge of safety management of this vessel, should inspect the safety management of its vessels in accordance with the ISM Code and take appropriate corrective measures for negligence, but it is judged to have been insufficient.

4.5 Work safety assessment and supervision on safety management

- 4.5.1 The Sawasdee Bangkok master is the overall supervisor of the ship's safety management. He is authorized and responsible for making final decisions related to the ship's safety and environmental protection at sea as well as having overriding responsibility and authority to ask the company for support.
- 4.5.2 In the event that the ship sustains damage which may have a direct impact on her safe operation, such as a crack in the hull, during the voyage, the ship can conduct internal repairs. However, it seems appropriate that the crew should have conducted the maintenance operations after assessing work safety sufficiently under dangerous conditions, such as strong wind and high waves.
- 4.5.3 At that time, wind was significantly strong, and the waves were high. Still, the master ordered the crew to proceed with the operations without going through the proper discussion procedures with the company and crewmembers responsible.
- 4.5.4 As in the ship duty description, the Sawasdee Bangkok C/O is in overall charge of repairing the cracked area inside the bosun store on the forecastle deck where this accident occurred. Thus, he was responsible for directing and supervising the deck department so that the operations could be safely completed.
- 4.5.5 Given the fact that the crewmembers were told to hold the left and right side of the small hatch, it seems that the C/O was somewhat aware that the automatic door lock was slack, and thus, the small hatch might shut on its own. Still, he did not take additional actions, such as putting in the safety pin or lashing the small hatch with a rope.
- 4.5.6 Therefore, the investigators determine that the containership neither conducted sufficient review or assessment on work safety before starting to repair the crack nor supervised work safety properly during the operations.

section

5

Conclusions

5. Conclusions

- 5.1 This is a fatal accident onboard Sawasdee Bangkok, where the OS died as the bosun store small hatch suddenly slammed shut on the forecastle deck of the ship while his head was trapped under the small hatch.
- 5.2 When the accident occurred, the automatic door lock, designed to keep the small hatch open, was old and loosely secured, while the safety pin was missing. The safety measures installed on the small hatch did not function properly.
- 5.3 Under such circumstances, the crew opened the small hatch and were conducting maintenance. While doing so, the hull was slammed by waves, releasing the automatic door lock. At the same time, the crewmembers were knocked down by the seawater as washing over the bulwark on the bow, losing the small hatch they had been holding. Thus, it is determined that is why the opened small hatch suddenly slammed shut.
- 5.4 The major causes of this accident are (1) deck fittings, such as the automatic door lock; have been poorly maintained (2) work safety assessment was insufficient prior to the operations; and (3) additional safety measures were not taken for risk factors during the operations.

section

6

Lessons Learned

6. Lessons Learned

6.1 Strictly carrying out maintenance and repair of the deck fittings

- 6.1.1 The steel-made deck fittings are susceptible to corrosion due to their exposure to seawater, degrading their function. And, if the corroded fittings are neglected for a long time, parts can go missing.
- 6.1.2 Therefore, the person responsible for their maintenance and repair should regularly maintain the deck fittings in accordance with their maintenance plan, and in particular, check whether their safety devices function properly.
- 6.1.3 Also, the crew responsible should take immediate action, such as reporting to the company the need for repairs, if any deck fittings are aged or broken. And, the company should actively support the ship for her safe operation.

6.2 Reinforcing work safety assessment and safety management supervision

- 6.2.1 The master and the crewmembers in charge should take time to review work safety when they plan to conduct operations on the deck under bad weather conditions. And, to remove on-site risk factors, it is necessary to tighten supervision on safety management for operations by laying out additional safety measures.
- 6.2.2 The company should constantly provide training programs for crewmembers so that they do not let their experience, practices, and work efficiency concerns override the need to check safety.

6.3 Improving the bosun store small hatch

6.3.1 It is difficult for one crewmember alone to lift and open the small hatch of the bosun store, like the one on Sawasdee Bangkok, instead of entering the bosun store through the door on the upper deck, as the small hatch is heavy. Also, when the automatic door lock gets old, it may become a hazard.

6.3.2 Therefore, if possible, it is necessary to consider changing the small hatch of the bosun store from the current lifting type to the hinged door, which swings in and out when a person pulls it, in order to lower such risk and facilitate safer work environment.



<Figure 15> Example of the hinged door

표 목차

<Table 1> Weather conditions recorded in the logbook	13
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그림 목차

<Figure 1> General arrangement and photo of Sawasdee Bangkok	8
<Figure 2> Shipping routes of Sawasdee Bangkok	9
<Figure 3> Structure and layout of cargo holds	11
<Figure 4> Photo of the forecastle deck and the bosun store	11
<Figure 5> Inside of the bosun store small hatch on the forecastle deck	12
<Figure 6> The opened bosun store small hatch and its access ladder	13
<Figure 7> Logbook of Sawasdee Bangkok (quoted)	14
<Figure 8> Track and accident position of Sawasdee Bangkok	14
<Figure 9> Cracked area (before & after repair)	18
<Figure 10> Reenactment of the accident	19
<Figure 11> Beaufort Wind Scale	24
<Figure 12> Location and entrance of the bosun store on the forecastle deck ..	25
<Figure 13> Closing procedures of the bosun store small hatch	26
<Figure 14> Positions of the crew during the accident	26
<Figure 15> Example of the hinged door	36

내일을 위한 정부혁신
보다 나은 해양수산부



Ministry of Oceans and Fisheries

Korea Maritime Safety Tribunal