

MA2019-2

**MARINE ACCIDENT
INVESTIGATION REPORT**

February 28, 2019



The objective of the investigation conducted by the Japan Transport Safety Board in accordance with the Act for Establishment of the Japan Transport Safety Board is to determine the causes of an accident and damage incidental to such an accident, thereby preventing future accidents and reducing damage. It is not the purpose of the investigation to apportion blame or liability.

Kazuhiro Nakahashi
Chairman
Japan Transport Safety Board

Note:

This report is a translation of the Japanese original investigation report. The text in Japanese shall prevail in the interpretation of the report.

MARINE ACCIDENT INVESTIGATION REPORT

Vessel type and name: Training ship NIPPONMARU
Vessel number: 128115
IMO number: 8211502
Gross tonnage: 2,570 tons

Accident type: Fatality of a cadet
Date and time: Around 14:25, April 2, 2018 (local time, UTC +9 hours)
Location: Keihin port, Tokyo district 3, No. 10-1 Multi-purpose Terminal M-P
Around 294° true bearing, 1.2 nautical miles from Tokyo Mokuzai Anchorage Breakwater West Lighthouse
(approximately 35°37.5'N, 139°47.7'E)

January 30, 2019

Adopted by the Japan Transport Safety Board

Chairman	Kazuhiro NAKAHASHI
Member	Yuji SATO
Member	Kenkichi TAMURA
Member	Toshiyuki ISHIKAWA
Member	Makiko OKAMOTO

SYNOPSIS

< Summary of the Accident >

When a training ship NIPPONMARU was moored at Keihin port, Tokyo district 3, No. 10-1 Multi-purpose Terminal M-P with the captain, one navigation officer, boatswain, and 49 crew taking 105 cadets onboard, around 14:25, April 2, 2018, during lay aloft training at the foremast, one of the cadets fell from the foremast to the superstructure deck and died.

< Probable Causes >

It is probable that this accident occurred while the training ship NIPPONMARU was moored at Keihin Port Tokyo district 3, during lay aloft training at the foremast, a cadet who declared intent to abandon climbing from the top board to the gallant-top (gern board) was not equipped the life line and harness-typed safety belt which should be used for up/down and in-position works, when Cadet A came down from the top board to the superstructure deck, both of his legs were on the ratline, but both of his hands left the futtock shroud under the top board and he fell backward to the superstructure.

It is probable that the reason why a harness-typed safety belt for up/down and works in a position was not used is that the Japan agency of Maritime Education and Training for Seafarers

and NIPPONMARU did not expect that they let a cadet declaring ceasing of lay aloft training down by himself.

It is somewhat likely that the reason why both hands of the Cadet had left the futtock shroud is that the futtock shroud is an overhang, thus his arms were overworked. However, since the Cadet died in this accident, it was not possible to establish a clear reason.

1 PROCESS AND PROGRESS OF THE INVESTIGATION

1.1 Summary of the Accident

When the training ship NIPPONMARU was moored at Keihin port, Tokyo district 3, No. 10-1 Multi-purpose Terminal M-P with the captain, one officer, one boatswain, and 49 crew taking 105 cadets onboard, around 14:25, April 2, 2018, during the climbing training to the foremast, one of the cadets fell to the superstructure and died.

1.2 Outline of the Accident Investigation

1.2.1 Setup of the Investigation

The Japan Transport Safety Board appointed a supervision investigator-in-charge (Yokohama office) and one other investigator to investigate this accident on April 3, 2018.

Note that the supervising investigator and one other investigator have been replaced by a marine accident investigator.

1.2.2 Collection of Evidence

April 9, and 13, 2018: On site investigations and interviews

April 3, 16, 17, 18, 19, and 20, May 9, and 18, June 13, August 30, October 9, 10, 11, 12, 17, 19, 25, 26, 29, and 30, November 1, 2, 5, 7, 8, 12, 13, 14, 15, 16, and 30, December 3, 2018: Interviews

April 27, May 8, 15, 17, and 21, June 6, and 12, September 10, October 16, November 7 and 16: Collection of questionnaires

1.2.3 Cooperation in the Investigation

Regarding the analysis relative to sports physiology and other conditions, cooperation in the investigation was obtained from Yuji Sano, a former Tokyo University professor of Marine Science and Technology, Marine Sports and Health Science Laboratory (currently a researcher at the same university).

1.2.4 Comments of Parties Relevant to the Cause

Comments on the draft report were requested from parties relevant to the cause of the accident.

2 FACTUAL INFORMATION

2.1 Development of the accident

2.1.1 Events Leading to the Accident

According to interviews with the Captain, navigation officer (hereinafter referred to as “Officer A”), and boatswain of NIPPONMARU (hereinafter referred to as “this Ship”) and the collected questionnaires from the Japan agency of Maritime Education and Training for Seafarers (hereinafter referred to as “the Organization”), this accident had developed as follows;

While the Ship was moored at Keihin port, Tokyo district 3, No. 10-1 Multi-purpose Terminal M-P by starboard aside with the Captain, the officer, the boatswain and 49 crew

onboard, a cadet (hereinafter referred to as “Cadet A”) who belongs to Namikata Maritime Polytechnical College of the Organization (hereinafter referred to as “Namikata College”) and other 104 cadets (hereinafter referred to as “individual cadets”) who belong to Namikata College and other 4 colleges embarked in order to participate in the onboard training from April to June, and the cadets were explained by the crew regarding the outline of inboard life and scheduled training plans subsequent to the embarkation ceremony.

On April 2, individual cadets woke up around 6:30, lined up at the aft. deck to perform physical exercises then inboard cleaning, and breakfast. Around 8:30, the individual cadets had lectures regarding safety in-board by the crew.

Around 9:30, the individual cadets had aligned at the aft. deck to start the mast lay aloft training¹. After a roll-call of the cadets, the individual cadets had a “hanging test” in order to recognize self-grasping power, however, including Cadet A, no one declared no-participation for the mast lay aloft training.

Around 10:05, the style of clothes were explained to the individual cadets, with how to use the safety belt and the postures by the navigation officer (hereinafter referred to as “Officer B”) as well as a demonstration by the crew, and they received a lecture on three-point suspension².

Around 10:40, 35 cadets, 2 officers in charge of mast lay aloft training and 2 or 3 deck crew were deployed per each mast of 3 masts from the stem i.e. foremast, main mast, and mizzen mast. And the lay aloft training up to the top board³ (1st time) started. Note that Cadet A, Officer A, an officer (hereinafter referred to as “Officer C”), and the boatswain were deployed at the foremast respectively. In addition, the captain was observing overall the mast lay aloft training from the flying bridge at the roof of the fore navigation bridge placed at rear of the foremast and gave explanations on the deck regarding the training when necessary.

In the initial plan, the mast lay aloft training up to the top board was scheduled twice in the forenoon, however, since more time was required in order to save a cadet who dislocated his arm during climbing the mizzen mast up to the top board (hereinafter referred to as “Cadet B”) and for explanations before starting the training, the 2nd round of training was rescheduled for the afternoon, and the individual cadets finished the training in the forenoon around 11:30 and started lunch and took a rest.

The individual cadets lined up at the aft deck to begin the climbing training up to the top board (2nd time) around 12:55. After a roll-call and physical exercise, around 13:05, the training started. Cadet A also climbed up to the top board and descended. At that time, Officer C asked Cadet A, however, as Cadet A responded in a loud voice, Officer C felt there was no problem.

The individual cadets finished the training of climbing up to the top board and aligned at the aft deck to begin training of climbing up to the gallant-top⁴. The individual cadets watched a demonstration with the explanation by a crew in addition to the explanations on how to climb up and precautions given by Officer B.

¹ “Lay aloft training” is an on-ship training that climb up the masts for familiarity with works at high place.

² “Three-point suspension” is a mean of moving by holding the body with 3 limbs within 4 limbs and move using one limb

³ “Top board” is a half-moon shape stand placed on the lower side of a mast within the stands placed upper and lower sides of the mast.

⁴ “Gern board (=gallant-top)” is a half-moon shape stand placed upper side of a mast within the stands placed upper and lower sides of the mast.

For the lay aloft training up to the gallant-top, Officer A at the flying bridge, Officer C on the gallant-top, the boatswain at the radar stand near the top board, they took charge of training on the foremast respectively.

Before the lay aloft training up to the gallant-top, Officer C saw that Cadet A had pain in his hands and was visibly frightened.

The individual cadets started lay aloft training up to the gallant-top around 13:40.

Cadet A started climbing up to the gallant-top from the starboard of the deck around 14:05, then around 14:10, Cadet A got on the top board and waited his turn..

Around 14:15, Cadet A started climbing to the gallant-top from the top board, however, when he reached the 5th step of the ratlines⁵, he declared his intent to abandon climbing to the boatswain, and the boatswain instructed Cadet A to take a rest at the top board.

Cadet A returned to the top board around 14:20 and stayed there.

Officer A gave Cadet A a warning for maintaining three-point suspension as well as an indication “down from the port side when you are ready.”

Cadet A took a 5-minute rest, then following another cadet (hereinafter referred to as Cadet C) who was resting at the top board for the same reason with Cadet A, abandoned ascent to the gallant-top, descended from the top board to the superstructure on the port side.

Around 14:25, while Cadet A put both legs on the ratline a few steps down from the top board (the height from the deck was approximately 11 meters), his both hands left the futtock shroud⁶, he fell backward to the port side saying, “Oh!”

2.1.2 Conditions of Cadet A

(1) According to the interviews with some cadets around Cadet A in the collected questionnaires of the organization of this issue, the conditions of Cadet A before the accident were as follows:

At the climbing training to the top board (1st time)

- 1) Cadet A seemed to be scared as his legs were shaking and felt overwhelmed with the difficulty of the task.

At lunch and recess

- 2) One cadet heard Cadet A said “I may have acrophobia.”

At the lay aloft training up to the gallant-top

- 3) A cadet was not sure if it was from the Captain or from Officer A, but the whole training was rushed.

“I remember the Captain said, “More quickly in actual situations.”

- 4) One cadet heard Cadet A say, “Why not get rid of this training?”

- 5) When Cadet A abandoned to climb up to the gallant-top and returned to the top board, Cadet C heard Cadet A say “My palms are too sweaty. When I tried to climb up the gallant-top, I do not know why but I felt it’s too tough. Other cadets may laugh at me because I go down the middle. But I do not care. Let’s go down safely.”

- 6) The Captain and Officer A seemed to be rushing Cadet A to come down while he was taking a rest at the top board.

- 7) It seemed the pace Cadet A took to come down from the top board was not his own, and

⁵ “Ratlines” are rope which constructs a ladder to climb masts by passing through horizontally.

⁶ “Futtock shrouds” are overhung (tilting outside) structurally in order to support a top board, made of reticulum rounded steel wires which construct a ladder to climb a mast with ratlines by passing through vertically.

when the stream of cadets behind him stopped, Cadet A was rushed by Officer A saying, “Now, move, move now”.

- 8) It did not seem Cadet A was rushed especially when an instruction “Come down” by Officer A was given.
- (2) According to the dictation by Officer A, he did not mention the words in (7) in the above “Now, move, move now” with such intention.

2.1.3 Confirmation of the intention to climb up

According to the dictations of the Captain, Officer A, and the officer of the headquarters of the organization of this issue in charge and the questionnaires collected from the organization of this issue, the situation of confirmation of intent to climb was as follows:

- (1) The individual cadets lined-up on the aft deck and took roll-call and “hanging test.” Then Officer B gave instructions to the individual cadets (hereinafter referred to as “confirmation of intent to climb”) as “Tell us if your health condition is poor, or have climbing anxiety” as well as “You do not have to hesitate even during the training.”
- (2) At the beginning of climb training, 35 of the individual cadets were deployed per mast of 3 in total i.e. foremast, main mast, and mizzen mast from the stem.
- (3) During the training in the forenoon, before the beginning of the lay aloft training up to the top board (1st time), the individual officers in charge of all masts confirmed the intent to climb to the individual cadets.

During the training in the afternoon, before the beginning of the lay aloft training up to the top board (2nd time), the individual officers in charge of all masts confirmed the intent to climb to the individual cadets.

During the demonstration by a crew before the aloft training up to the gallant-top, Officer B confirmed the intent of the individual cadets to climb up to the gallant-board on the deck of the stern.

At the beginning of the lay aloft training up to the gallant-top, the individual officers in charge of all the masts confirmed the intent of the individual cadets.

- (4) For the situation at the foremast, according to the dictation of Officer A, during the lay aloft training up to the gallant-top, firstly, before Cadet A reached the top board from the deck, one cadet on the top board declared the intent to abandon the climb. Secondly, after Cadet A reached the top board, Cadet C declared his intent to abandon the climb. Then, while Cadet A was climbing to the gallant-top, he declared his intent to abandon the climb.
- (5) The situation of the confirmation of intent to climb and declaration of intent to abandon the climbing by the individual cadets at respective masts were shown in table 2.1.

Table 2.1 The situation of the confirmation of intent to climb and declaration of intent to abandon the climbing of/by the individual cadets

	Foremast (35 cadets)	Main mast (35 cadets)	Mizzen mast (35 cadets)
After “hanging test” (at aft deck)	According to the questionnaires collected from the organization of this issue, the second officer gave instructions such as “Tell us if your health condition is poor, or have climbing anxiety”, however, no cadet claimed poor health conditions or having any anxiety. In addition, the second officer declared “You do not have to hesitate even during the training.”		
Before starting the climb	According to the	According to the	According to the

training up to the top board (1 st time) (Respective masts)	questionnaires collected from the organization of this issue, the assistant third officer gave instruction “Tell us if your health condition is poor, or have climbing anxiety”, however, no cadet claimed poor health conditions or having any anxiety. In addition, the second officer declared “You do not have to hesitate even during the training.”	questionnaires collected from the organization of this issue, the second officer gave instructions such as “Tell us if your health condition is poor, or have climbing anxiety”, however, no cadet claimed poor health conditions or having any anxiety. In addition, the second officer declared “You do not have to hesitate even during the training.”	questionnaires collected from the organization of this issue, the second officer gave instructions such as “Tell us if your health condition is poor, or have climbing anxiety”, however, no cadet claimed poor health conditions or having any anxiety. In addition, the second officer declared “You do not have to hesitate even during the training.”
During the lay aloft training up to the top board (1 st time) (respective masts)	(No appeal from the individual cadets)	(No appeal from the individual cadets)	According to the dictation of the Captain, Cadet B was put out his arm near the top board. Cadet B declared he cannot come down to the deck by himself, the training was suspended and work for rescue Cadet B was performed. According to the questionnaires collected from the organization of this issue, the crews gathered to around the mizzen mast from every other mast, Cadet B was provided the life line and harness-typed safety belt and etc., then 2 crew attended both sides of Cadet B and he came down to the deck by supported both arm sides. In addition, one cadet abandoned climbing to the top board on the way and came down to the deck by himself.
Before starting the lay aloft training to the top board (2 nd time) (respective masts)	Same as the time before starting the lay aloft training to the top board (1 st time).		
During the lay aloft training to the top board (2 nd time) (respective masts)	(No appeal from the individual cadets)	(No appeal from the individual cadets)	According to the questionnaires collected from the organization of this issue,

			the cadet who quit and came down to the deck by himself during the lay aloft training to the top board (1 st time), again, declared to quit climbing to the top board, and came down to the deck by himself.
During the demonstration by the crew for starting the lay aloft training to the gallant-top (at the mizzen mast)	Same as the time after the hanging test.		
Before starting the lay aloft training up to the gallant-top (respective masts)	According to the dictation of the first officer, the first officer gave instruction to declare for the person who was not in good health or having climbing anxiety, but there was no cadet made such declaration. In addition, the first officer gave instructions to the individual cadet as no hesitation to apply to these requirements even during the training.	Same as the time before starting the lay aloft training to the top board (1 st time)	Same as the time before starting the lay aloft training to the top board (1 st time)
During the lay aloft training up to the gallant-top (respective masts)	According to the dictation of the first officer, firstly, while Cadet A was climbing to the top board from the deck, one cadet made a declaration to quit climbing beyond the top board, then Cadet C made a declaration to quit climbing any further when Cadet A reached to the top board and Cadet C came down by himself. Then, while Cadet A was climbing to the gallant-top, he made a declaration to quit climbing any further.	According to the questionnaires collected from the organization of this issue, it seemed there were about 2 cadets that quit of climbing any of the masts, however, the details were unclear.	According to the questionnaires collected from the organization of this issue, 2 cadets declared quitting climbing beyond the top board and came down by himself.
# of cadets applied for quit climbing	3 cadets	About 2 cadets	4 cadets

2.1.4 Rescue Information

According to the dictation of Officer A and the questionnaires collected from the organization of this issue, the information about the rescue was as follows:

Officer A reported the occurrence of this accident and should report it to the ambulance to the Captain, and an Officer (hereinafter referred to as "Officer E") reported to the ambulance around 14:28.

Senior Professor, Navigation, Deck Store Keeper, and a Sailor hand performed life support first aid. They held the head of Cadet A with a towel until the ambulance came to this accident site.

Around 14:40, the ambulance came to the accident site.

Cadet A was provided emergency treatment by the ambulance crew and taken to a hospital, however, his fatality was confirmed.

The date and time of this accident was April 2, 2018 around 14:25, and the accident site was on this ship, which was moored at Keihin port, Tokyo district 3, No. 10-1 Multi-purpose Terminal M-P.

(See Attached figure 1 Outline of the accident site, Attached figure 2 Condition of the foremast before the occurrence of the accident, Attached figure 3 Condition of the foremast at the time the accident occurred, Picture 1 Condition of Cadet A at the time the accident occurred, and Picture 2: Situation of the deployment of the crews)

2.2 Death and Injury to Persons

(1) According to the dictation by the doctor in charge of the medical institution Cadet A was carried, the condition of Cadet A was as follows;

When Cadet A was taken to the medical institution, he was in cardiopulmonary arrest, his death was confirmed at 15:25.

As Cadet A received parietal retraction, his death was conjectured as due to severe head trauma.

(2) The postmortem certificate stated the cause of his death was unknown.

2.3 Damage to the vessel

No damage to this ship.

2.4 Crew Information

(1) Gender, Age, and Certificate of Competence

1) Captain, Male, 47 years old

First class grade maritime officer (navigation)

Date of issue of certificate: December 1, 1999

Date of grant of certificate: May 30, 2014

Certificate validity expiration date November 30, 2019

2) Officer A, Male, 39 years old

First class grade maritime officer (navigation)

Date of issue of certificate March 13, 2009

Date of grant of certificate February 20, 2014

Certificate validity expiration date March 12, 2019

3) Boatswain, Male, 59 years old

(2) Major boarding and other histories

The questionnaires collected from the organization of this issue stated as follows;

1) The Captain

As an Officer, he has about 19 years of training experience including with some sailing ships belonging to the organization of this issue. Within this, about 8 years on this sailing ship and training ship KAIOMARU (hereinafter referred to as “sailing ship for training”) Since March 2017, he was commissioned as the captain of this ship.

At the time of the accident, he was considered to be in good health.

2) Officer A

As an officer, he has about 12 years of experience training ships including sailing ships of the organization of this issue. Within this, about 7 years on sailing ships for training. Since February 2018, he has been the officer of this ship at the time of this accident.

At the time of this accident, he was considered to be in good health..

3) The boatswain

As a deck hand, he has about 38 years of experience training ships including sailing ships of the organization of this issue. Within this, about 19 years on sailing ships for training. Since February 2018, he engaged in the boatswain of this ship.

At the time of this accident, he was considered to be in good health.

(3) Cadet A information

The questionnaires collected from the organization of this issue stated as follows;

Cadet A was in 2nd grade of the special course of Namikata college. From April to December 2017, he completed classroom lectures at Namikata college. From January to March 2018, he embarked on a training ship belonging to the organization of this issue, GINGAMARU as the First ship for onboard practical training. From April to June, he was scheduled to embark on this ship as the second ship for onboard practical training.

The record of a medical checkup at Namikata college in October 2017 states height: approximately 179 cm, weight: approximately 104kg, grasping power: right 39kg, left 36kg.

He had no anamnesis.

2.5 Vessel Information

2.5.1 Particulars of Vessel

Vessel number: 128115

IMO number: 8211502

Port of registry: Tokyo-to

Owner: The organization of this issue

Gross tonnage: 2,570 tons

L×B×D: 110.09m * 13.80m * 10.72m

Hull material: Steel

Engine: 2 diesel engines

Output: 1,103kW/engine Total 2,206kW

Propulsion: 4 wing fixed pitch propeller * 2

Date of launch: February 1985

Navigation area: Ocean going area (International voyage)
(See picture2.5-1)



Picture2.5-1 This ship

2.5.2 Other Vessel Relevant Information

According to the dictations of Officer A and the boatswain, general arrangement, the questionnaires collected from the organization of this issue, and document source 1⁷, other vessel relevant information is as follows;

(1) Structure of vessel

This ship is a type of superstructure through deck so called 4 masted barque type sailing ship which has foremast, main mast, mizzen mast and jigger mast in the order from the stem. At the rear of the foremast, there was a fore navigation bridge and at the stern, there was a steering wheel.

(2) Individual masts

Individual masts were made of steel. Maximum height from the deck was approximately 44m and supported in abeam direction with several steel wires from the both sides called shroud.

In addition, shrouds and futtock shrouds played a role of ladder for climbing the masts in

⁷ Document source 1: "Training ship NIPPONMARU – Kenzou no kiroku (Construction record) -" (Written by the Institute for sea training, Issued in March 1985)

addition to the ratlines.

(3) Top boards and gallant-tops

At lower area and upper area of the fore mast, main mast, and the mizzen mast, there were half-moon shaped stands called top board and gallant-top respectively and these were installed as a landing for climbing.

The heights of the top board and the gallant-top from the deck were approximately 12m and 24m respectively.

The purpose of the futtock shroud is to keep the top board or gallant-top horizontal, thus multiple steel wires were led from the lower area of the mast to the edge of the individual stands with the angle of overhang against (tilting angle of outside of) the mast.

Due to the structure of the futtock shrouds, arms are burdened when using them as a ladder.

The angle of overhang of the futtock shrouds was approximately 13 degree under the top board, and approximately 17 degree under the gallant-top.

In case of the previous training ship KAIOMARU, which was the former training ship belonging to the organization of this issue, a sea training institute, the angle of overhang of the futtock shrouds under the top boards was approximately 23 degrees, overhanging futtock shrouds were not used, and in order to move up and down the top boards and shrouds directly, rope ladders were installed vertically from the edge of the top boards to the lower shrouds for the purpose of aiding ladders for climbing.

As for the gallant-tops, the overhung futtock shrouds were not used and for the purpose of moving up and down between a gallant-top and a shroud directly, a hole(s) that a person can go through referred to as a "lubber's hole" was installed, however, as for the top boards, since there were more steel wires penetrating it up to the upper area of the mast than the gallant-top, the lubber's hole was not provided.

(See Figure 2.5-1, Figure2.5-2, Figure2.5-3, Picture 2.5-2)

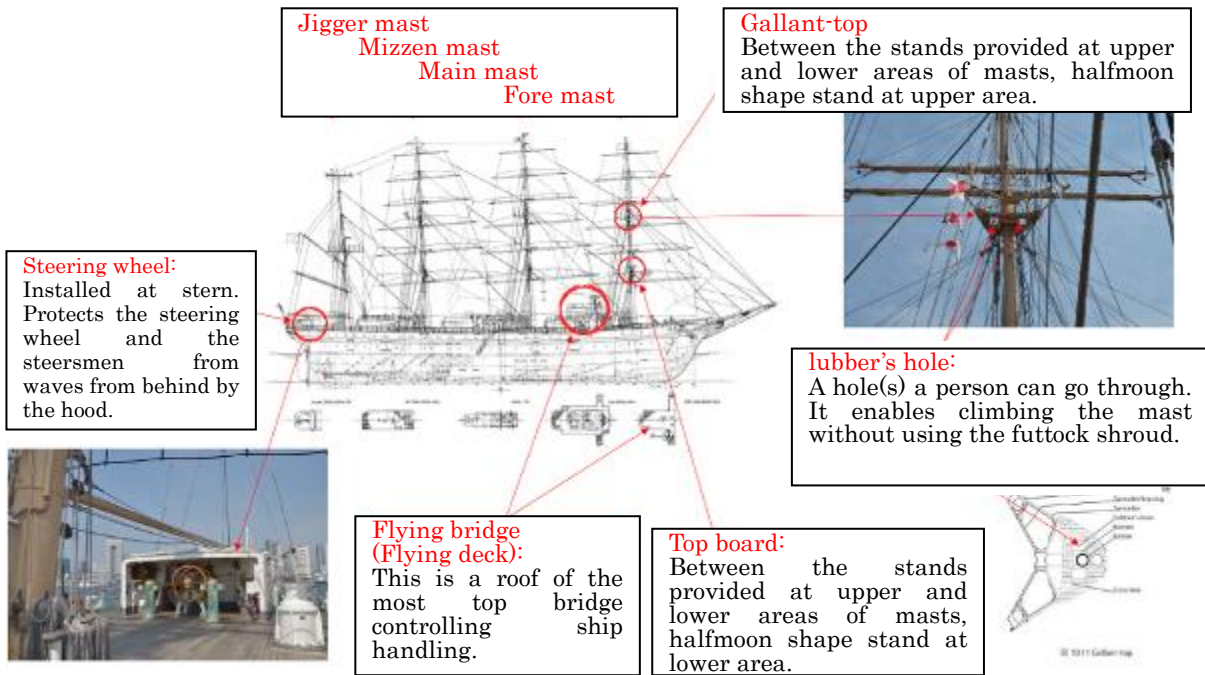


Figure 2.5-1 General arrangement

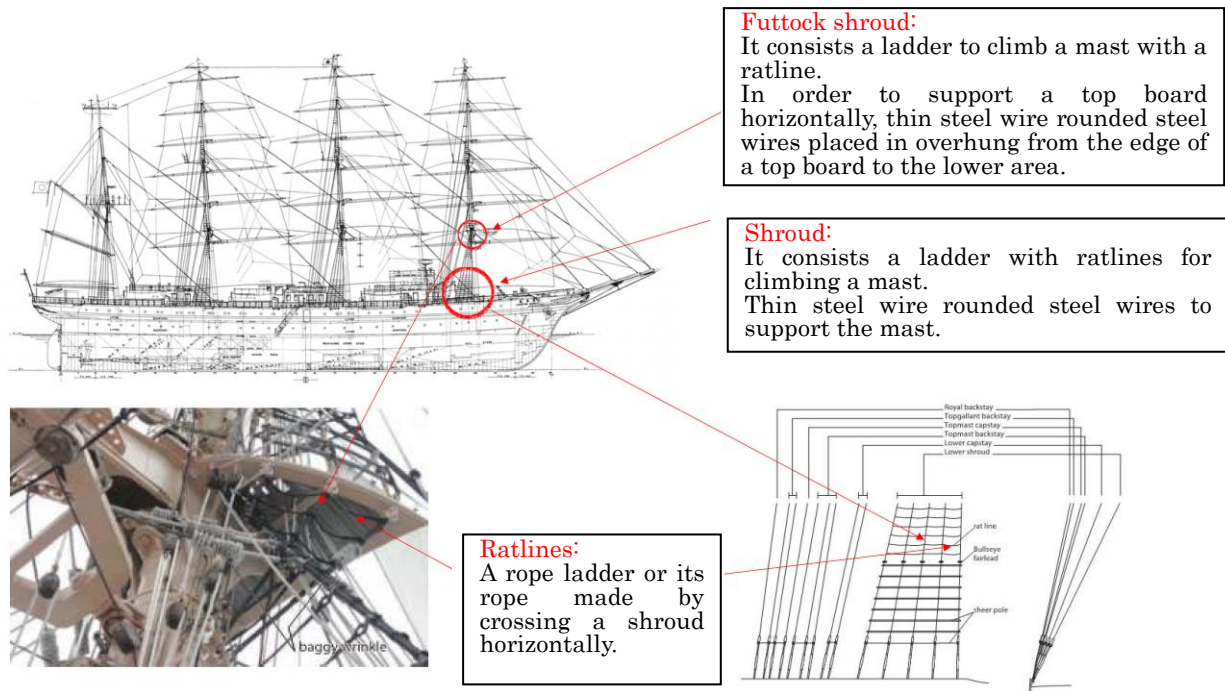


Figure 2.5-2 Shrouds and relatings

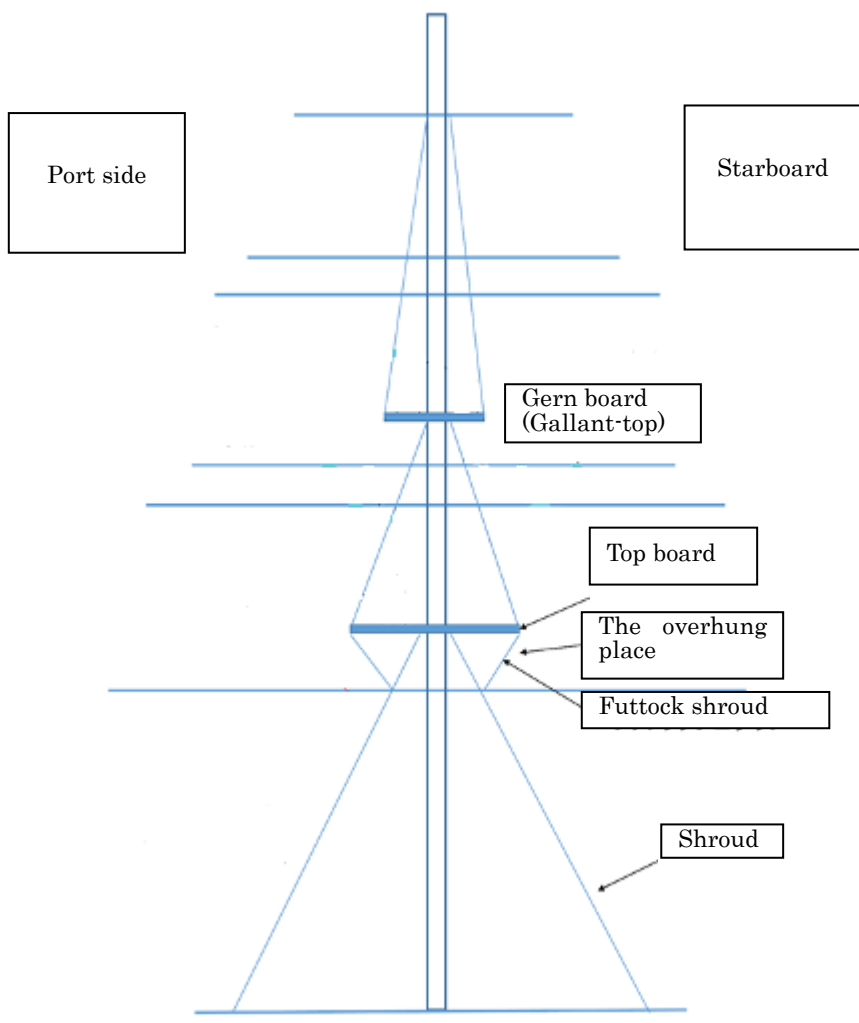


Figure 2.5-3 Overhung futtock shroud



Picture 2.5-2 Rope going through a top board

2.6 Weather and Sea Conditions

2.6.1 Weather and Wave Observations

(1) Weather Observation

According to the Meteorological Observations at the Tokyo Local Meteorological Office, which is located approximately 8.4km north-northwest from the accident site, at the time of the accident were as follows:

14:20 Wind direction: SSE Wind speed 2.9m/s

(peak gusts of 5.4 m/s)

14:30 Wind direction: S Wind speed 2.9m/s

(peak gusts of 4.6 m/s)

(2) Tide Data

According to the tide table published by JCG, the tide at the time of the accident at Keihin port, Tokyo district 3 was in the middle of the rising tide.

2.6.2 Observation by Crews

(1) According to this ship's logbook, the situation was as follows.

April 2 at 12:00, Weather: Clear, Wind force 4, Temperature 17.5°C

April 2 at 16:00, Weather: Fine, Wind force 4, Temperature 20.8°C

(2) According to the dictation by Officer A, no wave and heave at the time of this accident.

2.7 Lay aloft training Information

The contents of "Sailing training course and onboard training instruction guide", document source 2⁸ used for practice on sailing ships, lay aloft training practice plan of this ship (dated April 1, 2018. Hereinafter referred to as "practice plan of this issue"), and the questionnaires collected from the organization of this issue stated as follows;

(1) Purpose of lay aloft training

Since the training on sailing ships requires works in high-places, the lay aloft training is a vital training for persons before engaging in such works.

The purpose of lay aloft training is to learn general principles for work in high places.

(2) Process of lay aloft training

** Understand own chinning power and grasping power by measurement.*

** Physical exercise before climbing a mast is a requirement*

** At first, climb from a side to a top board then come down to the other side. Do this twice.*

** Same as the above, up and down from a gallant-top (gern board).*

** Climb to a Truck⁹ through a Royal shrouds¹⁰*

** Perform the trainings crossing to a Top yard¹¹*

** Repeat the training of crossing different yards, to finish 7 times is the goal of the initial training.*

** It is desirable that the lay aloft training should be done earlier at the beginning or the end*

⁸ Document source 2: "Details of Sailing ship NIPPONMARU/KAIOMARU" Hansen NIPPONMARU/KAIOMARU wo shiru" (Editing and writing: Independent administrative institution maritime technology educational organization, Seizandou shoten, Issued on March 28, 2013)

⁹ "Truck" is a circular crown on top of a mast.

¹⁰ "Royal shroud" is a shroud at the upper part of a gallant-top.

¹¹ "Yard" is a spar to put in a yard and a square sail.

of a lesson in forenoon/afternoon and continue for several days rather than being performed in a short time..

(3) Hanging test

The individual cadets received the “Hanging test,” in order to recognize self-grasping and chinning power by hanging with both hands or one hand and hold their bodies respectively for 30 seconds or more before starting the lay aloft training this accident occurred, however, judgement on the aptitude and propriety of the individual cadets by the crew were not performed.

Cadet A could hold himself for 30 seconds with both hands, however, equal or less than 10 seconds by one hand (right: 10 seconds, left:5 seconds).

Note that same as Cadet A, the cadets whose power was less than 30 seconds by one hand were 51 cadets among the individual cadets (105)

(4) Lay aloft training practice plan

According to the practice plan of this issue, the training schedule is shown in table 2.7-1.

Table2.7-1 Practice plan of this training

	Date	Contents	Officer/cadet Deployment	Deployment at the deck
Day 1	April 2 Forenoon 09:30-	Hanging test Up to top board, twice	Fore: Officer A, Officer C, 35 cadets	2 per mast
	April 2 Afternoon 13:00-	Up to gallant- top, once		Fore: 3 Main: 3 Mizzen: 2
Day 2	April 3 Forenoon 10:00-	Up to gallant- top, once	Main: Officer D, Officer E, 35 cadets	Fore: 3 Main: 3 Mizzen: 2
	April 3 Afternoon 13:00-	Mast track, once		Fore: 3 Main: 3 Mizzen: 2
Day 3	April 4 Forenoon 10:00-	Crossing top yard	Mizzen: Officer B, other officer, 35 cadets	3 per mast
	April 4 Afternoon 13:00-	Crossing gern yard		3 per mast
Day 4	April 6 Forenoon 10:00-	Crossing lower yard		3 per mast

The lay aloft training practice plan of this ship was planned by Officer B, and decided by the Captain.

Note that according to the remaining lay aloft training practice plan of this ship (April 2007 is the oldest remaining record of this plan) and the lay aloft training practice plan of the training ship KAIOMARU (April 2009 is the oldest remaining record up to April 2018), some plans of ascend to and descend from a top board and a gallant-top in the same day of the first day of the lay aloft training are the same with the practice plan of this ship this time. These are shown in Table 2.7-2 and Table 2.7-3 with ` mark.

Table 2.7-2 The situation of this ship

practice plan created period of time		Situation
2006	April	`
	October	`
2007	January	`
	April	
	October	`
2008	January	`
	April	`
	July	`
	October	`
2009	April	`
	July	`
	October	
2010	January	
	April	
	July	
	October	
2011	April	
	October	
2012	April	
	July	`
	October	`
2013	January	`
	April	
	July	
	October	`
2014	April	
	October	
2015	April	
	October	
2016	April	
	October	
2017	April	
	October	
2018	April	` (This accident)

Table 2.7-3 The situation of KAIOMARU

practice plan created period of time		Situation
2009	April	`
	July	`
2010	January	
	April	`
	October	
2011	January	
	April	
	July	`
	October	
2012	January	`
	April	
	July	
	October	
2013	April	
	July	
	October	`
2014	January	
	April	
	July	
2015	October	
	January	`
	April	
	July	
2016	October	
	January	
	April	
	July	
2017	October	
	January	
	April	
	July	
2018	October	
	January	

2.8 Safety management Information

2.8.1 Information on life protective tools used in the lay aloft training

According to the dictation of the personnel in charge of the headquarters of the organization of this issues, the questionnaires collected from the organization of this issue, and document 2, the situation was as follows;

(1) Caps for work in high places

There are work caps for works in high places made of cloth and rigid polyethylene with an inner package that covers the inside entirely.

(See Picture 2.8-1)



Picture 2.8-1 Working caps for high places

(2) Safety belt

The use of safety belts for the prevention of falling when working in high places, a belt with safety hook was worn at the waist. The safety hook was not used at the time of up and down the masts due to danger from the time of put on/off the hook by one hand, so it was used only when waiting at the top board and the ratlines. (See Figure 2.8-2)



On the other hand, an emergency safety hook used in the tasks of mast maintenance of this ship which require personnel to work in the air without scaffolding, a different type from the above was used. The life line and harness-typed safety belt used for both up/down and works in one position was available since changing the safety hook position while up/down is not required. However, in the lay aloft training, if multiple cadets would use the life line at the same time, their life lines would get tangled. Since such situation would be dangerous, the harness-typed safety belt was not used.

(3) Clothes

Clothes were used for the working uniform for the sailing ship navigation course, and under the discipline in order to perceive dangers, the five senses must be the most important, gloves and shoes were not used and the cadet had bare hands and feet.

2.8.2 Laws and regulations related to safety measures

In the Mariners Act (Act No. 100 of 1947) and a Mariners Ordinance on Industrial Safety and Health (Ordinance of the Ministry of Transport No. 53 of 1964), it is prescribed as follows, however there is no law and regulation regarding the standards for protective caps and safety belts based on the seaman labor security hygiene regulation.

(1) Mariners Act

(Safety and Health)

Article 81 The owner of a ship shall comply with any item provided by the Ministry of Land, Infrastructure, Transport and Tourism with regard to maintenance of working tools, equipment of medical goods, instruction of security and hygiene, and protection of any dangers along with in-ship tasks and keeping in-ship hygiene.

(2) Mariners Ordinance on Industrial Safety and Health

(Work in high places)

Article 51 The owner of a ship shall provide the following measures when the tasks of personnel require work in high places 2 meters from the floor, and has possibility of accidental fall.

Item 1 Make a person who engages in such work wear a safety cap and a life line or safety belt.

Item 2 - 6 Omitted

Item 2 Omitted

Dictation of the person of the headquarters of the organization of this issue in charge was as follows;

Our treatment was such that the cadets whom attended onboard training shall be considered equal to the seaman, provide safety measures conforming to the laws and regulations for seaman.

As for the safety belt used in the lay aloft training, the safety belt with hook was used, however, during up/down of a mast, since dangers may follow in on/off the hook by one hand, we decided that safety hook shall not be used.

2.8.3 Information on the safety control for practicing the lay aloft training

The Dictation of Officer A and teachers of Namikata college, practice plan of this issue and document 2 stated as follows;

- (1) We explained thoroughly the three-point suspension for moving up/down masts before this accident occur in the lectures on safety and gave demonstrations by the crew.

In addition, in the classroom lectures at Namikata college which Cadet A attended in the

past, three-point suspension was explained as a basic action for work in high places.

- (2) Before starting the lay aloft training, the captain instructed the individual cadets that a person whose mental or health condition is not good, retire anytime by oneself. In addition, the captain explained even if one does not join the lay aloft training, it does not badly affect one's onboard history.

2.8.4 Information on the safety management of the organization of this issue

- (1) The questionnaires collected from the organization of this issue and its requirements stated as follows;

The organization of this issue disposes the National Maritime Poly-technical School which provide maritime education for seamen (4 schools), National Maritime Poly-technical College (Namikata college and other 2 colleges), and marine technical college, own training ships (this ship and other 4 ships), as well as provides sailing training for the students belonging to every school. In order to enable the students to obtain certificate of seaman (mariner), individual students of Namikata college and other maritime technical colleges must be embarked on different training ships every 3 months to get required onboard trainings for 9 months after completed classroom lectures for 1 year 3 months.

In addition, the headquarters of the organization of this issue establishes the plans, designs, arrangements, basic policy of the navigation training course, planning and arrangement and sailing plan for the education in the respective schools.

- (2) The person of the headquarters of the organization of this issue dictated as follows;

- 1) The organization of this issue stated as follows;

The headquarters of the organization of this issue entrusted this ship for the arrangements of the climbing practice plan based on the processes provided in 2.7 (2), there was no chance to review the practice plan of this accident.

- 2) Namikata college informed that attending the onboard training was a requirement for graduation, however, it was not clear if attendance for all training including the lay aloft training during the onboard training was a requirement for graduation or not was not explained. In addition, there was no opportunity to confirm, or judge if cadets were able to join the lay aloft training.

- (3) Based on the investigation by the third-party committee established in July 2017 along with the issues concentrated in a short time such as attempted suicide, suicide, and the disappearance of cadets in the training ship SEIUNMARU which belong to the organization of this issue, the third-party committee report (as of March 14, 2018) "SEIUNMARU" issue which grasped the fact and problems of practices in the training ship, and improvements in the practice and such were organized to suggest which stated as follows;

7. Suggestion by the third-party committee

7.1 Practical environment, practical contents

7.1.1 Practical contents planning

The planning of the practice is not performed by the organization, instead it seems relying on the personal ability of teachers. In case the teacher in charge does not have enough knowledge/ability, or the current condition of the cadet is unknown, it is difficult to make an applicable plan for individual cadets. This might cause risk for the cadets. Individual cadets cannot get the coaching they need or cannot learn a knowledge/technique they need.

It is recommended, in order to provide applicable learning, the organization should not always rely on the personal ability of the teachers regarding the planning of the practice contents, and establish a structure to decide as an organization.

7.1.2 – 7.1.4 Omitted

7.2, 7.3 Omitted

7.4 Headquarters of maritime technology educational organization

It seems there is rare participation of the headquarters of the organization regarding the items performed in the training ship mainly such as coaching the teachers, planning the practical contents.

Especially for the practical contents mentioned in 7.1.1, there is a possibility that the headquarters of the organization cannot have time to review.

The headquarters of the organization should have the conscious as the headquarters of the educational organization, check any required item, and should have the function of remediation and improvement of the training ship.

7.4.2 Omitted

7.5 Marine Technical Colleges

7.5.1 Demands and cooperative consultation for practical contents

The practical contents are decided by the training ships. Since there is no chance for the Marine Technical Colleges (including Namikata college) to make demands or have cooperative consultations with the headquarters, it is preferable that the Marine Technical Colleges which understand the current conditions of the students best shall be able to show demands to the headquarters of the organization and training ships as well as have the chance for cooperative consultations.

7.5.2 Judgement on attending onboard training

It is assumed that the students who attend the onboard trainings learned required knowledge. In reality, however, as stated in 6.1.3 (statement on the differences of the knowledge of individual cadets), knowledge difference among students are not small. In addition, there may be students who do not hope to follow a ship related career path. Some subjects of practice involve risks, thus the students who do not have the required knowledge or students who do not have enthusiasm may incur severe accidents. In addition, for a student without enough knowledge or enough enthusiasm, there could be a necessity of personal coaching that may be overwork for some teachers.

Therefore, it is preferable to have a chance to confirm and judge that a student has required knowledge, a student is willing to join an onboard training, and so on and decide the student is appropriate or not to attend the onboard training by performing tests and interviews before the implementation of an onboard training.

7.5.3 Omitted

- (4) The personnel in charge of the headquarters of the organization of this issue stated that the organization of this issue established the follow-up committee following the recommendation (3) in the above, however, the organization of this issue operates as below as temporarily.

1) Practical contents planning

The headquarters of the organization of this issue decided to review the daily schedule

which is created by the training ship side belonging to the organization of this issue before starting onboard trainings from April 1, 2018, however, since the lay aloft training practice plan is created in the ship by checking the meteorological conditions based on the procedure stated in 2.7 (2), it was left to the direction of the individual training ships, thus the lay aloft training implementation planning was an exception for review.

2) Demand and cooperative consultation regarding the practical contents

The headquarters of the organization of this issue decided to hold a demand hearing and cooperative consultation regarding the practical contents in the headquarters of the organization of this issue, training ships, and individual colleges including Namikata college which belongs to the organization of this issue (hereinafter referred to as “Namikata College and other colleges”) from April 1, 2018.

3) Judgement of availability of attending onboard training

For the cadets who are scheduled for first time onboard training scheduled in January 2019, Namikata college and other colleges decided to have chance to confirm and judge the availability of attending the practice for the cadets by reviewing individual cadets of their aptitude and desire.

2.9 Sports physiologic information

(1) With the cooperation of former professor Yuji Sano, Tokyo University of Marine Science and Technology, Marine Sports and Health Science Laboratory (currently a researcher at the same university), the following consciousness was obtained regarding the muscle fatigue of the cadets who are going to perform the lay aloft training.

- 1) How muscle fatigue appears strongly depends on a situation of muscle contraction and forge degree, however, cadets without experience of the lay aloft training are low forge degree against up and down the masts. By eccentric contraction¹² in up and down the masts, muscle is likely damaged.
- 2) Cadets who damaged their muscles are considered that the muscles of the arms undergo a pump-up condition¹³.

If pump-up appeared, it is an evidence that the muscle was overworked, contraction and expansion of the muscle (excursion of muscle) lower and muscle strength and power lower temporarily. This negatively affects badly to the body movement.

For recovery from pump-up, it is assumed that it takes 10 – 20 minutes, at most it takes about 30 minutes.

- 3) For cadets with sweaty palms, it is considered as possible that the accentuation of a

¹² “Eccentric contraction” is also known as extensile contraction that means a condition using muscle power as expanding the muscle.

¹³ “Pump-up” is a condition the muscle is stretched tight by repetitive use of the strong muscle power. It is considered that pump-up occurs by muscle movement that pools and interlard muscle fibers with metabolite that makes osmotic pressure high, and in order to attenuate that, moisture is taken into the muscle by exudation of plasma component from the blood.

sympathetic nerve¹⁴ activity due to psychological stress in a high place might cause feelings of exhaustion for the body as well as the psychological perspiration might cause palm sweat appearance.

- (1) The Document source 3¹⁵ stated as follows;
- 1) There are various causes for tiredness by physical exercise such as small scratches which accumulate in the muscle and the development of power in the muscles becomes hard, and accumulation of substances related to tiredness in the muscle, however, it depends on the strength and time of physical exercise, and personal physical strength.
 - 2) Lactic acid concentration in blood is an indicator of fatigue, however, it is assumed that the lactic level returns to base within 30 minutes to 1 hour after a physical exercise. It is considered that later tiredness might be affected by myalgia due to accumulated small tears scratches in the muscle and the amount of muscle glycogen¹⁶ lost by the physical exercise.

2.10 Other required item

According to the answer by the personnel of the headquarters of the organization of this issue in charge, the actual circumstances of the lay aloft training using sailing ships in other countries, the personnel only grasps the fact that individual countries such as Ukraine, Kingdom of the Netherlands, Kingdom of Sweden, Kingdom of Denmark, Federal Republic of Germany, Kingdom of Norway, Republic of Bulgaria, Republic of Poland, Russian Federation and Romania use sailing ships in the seaman training course, however, details of the training performed and information on the countries other than the above are not available at the organization of this issue.

3 ANALYSIS

3.1 Situation of the Accident Occurrence

3.1.1 Course of the Events

From 2.1.1, it is considered as follows;

While this ship was moored at Keihin port, Tokyo district 3, No. 10 Multi-purpose Terminal M-P by starboard aside with the Captain, Officer A, the boatswain and 49 crews onboard, on April 1, 2018, individual cadets embarked in order to participate the onboard training.

- (1) On April 2, Cadet A participated in a lay aloft training up to the top board (1st time) from around 10:40 to 11:30.
- (2) Cadet A participated in a lay aloft training up to the top board (2nd time) from around 13:05 to 13:30.
- (3) Cadet A started climbing up to the gallant-top from the starboard of the deck around 14:05, then around 14:10, Cadet A got on the top board and waited until some intervals between the foregoing other cadets.

¹⁴ “Sympathetic nerve” is a nerve that works at mental agitation and physical exercise to make activity of the whole body higher by secrete saliva, increase blood pressure/blood glucose, constrict blood vessels of skin and viscera to aggregate blood to the muscle/brain and so on.

¹⁵ Document source 3: “Lactic utilized sports training (Nyusan wo ikashita supports training)” (Written by Hatta Hideo, Kodansha, Issued on July 7, 2015)

¹⁶ Muscle glycogen is a kind of sugars stored in muscle that turn to the energy source for muscle constriction.

- (4) Around 14:15, Cadet A started climbing to the gallant-top from the top board, however, when he climbed to the 5th step of the ratline, he declared intent to abandon to the boatswain.
- (5) Around 14:20, Cadet A took a 5-minute rest on the top board, then started down from the port side of the top board to the superstructure.
- (6) Around 14:25, while Cadet A put both his legs at the ratline at few steps down from the top board, both his hands off from the futtock shroud, and he fell backward to the port side superstructure.

3.1.2 Date and place the accident occurred

From 2.1.1 and 3.1.1, the date and the time this accident occurred was April 2, 2018, around 14:25, and the place of the accident was on this ship at Keihin port Tokyo district 3, No. 10-1 Multi-purpose Terminal M-P.

3.1.3 Condition of the fatality

From 2.2, Cadet A was wound parietal retraction, fatality was confirmed at the conveyed hospital.

3.2 Causal Factors of the Accident

3.2.1 Conditions of the crew

From 2.4, it is considered that the captain, Officer A and the boatswain were in good health condition at the time of this accident, and they have experiences of embarkment on sailing training ships and directions.

3.2.2 Analysis of the tiredness of Cadet A

From 2.1.1, 2.2.2, 2.4(3), 2.5.2, 2.7, 2.9 and 3.1.1, the condition was as follows:

- (1) Cadet A was height: approximately 179cm, weight: approximately 104kg, grasping power: right 39kg, left 36kg. In the hanging test, he could hold 30 seconds with both hands, however, less than 10 seconds by one hand (right 10seconds, left 5 seconds). It is considered the health condition before the lay aloft training was good.
- (2) It is probable that Cadet A participated in the lay aloft training (1st time) up to top board on April 2 around 10:40 to 11:30, and from 13:05 to 13:30, he participated in the lay aloft training up to the top board (2nd time).
- (3) It is probable that Cadet A started climbing up to the gallant-top from the starboard of the superstructure deck around 14:05, then around 14:10, Cadet A got on the top board and around 14:15, while Cadet A was climbing to the gallant-top from the top board, he declared intent to abandon the climbing training and took a rest on the top board about 5 minutes and started to down to the superstructure.
- (4) It is probable that Cadet A was aware of his tiredness at the time of this accident.
- (5) It is probable that Cadet A was low forge degree for up and down the mast and there was a possibility that his muscle was damaged, however, the possibility of causing pump-up condition of the muscle of his arms was not clarified because Cadet A died in this accident.
- (6) It is probable that Cadet A's sympathetic nerve activity accentuated due to psychological stress for a high place and the psychological perspiration might cause sweaty palm at the time of this accident.

- (7) It is probable that at the time of this accident, a few steps down from the top board, where the futtock shroud overhung, Cadet A's arms were overworked.

3.2.3 Analysis on safety management

From 2.1.2, 2.1.3, 2.7, 2.8.1, 2.8.3, and 2.8.4, as follows;

- (1) It is probable that the safety belt used in the lay aloft training was not able to prevent a fall down in up and down transition. The safety hook was not used since putting on and off the safety hook by one hand in the up and down transition in going up and down the mast is dangerous.

It is probable that the life line and harness-typed safety belt for tasks without scaffolding, such as maintenance of the masts, can be used for both up/down and works at one position, have the function to prevent falling while moving up and down. However, the life lines of several cadets might be tangled in the lay aloft training which creates a dangerous situation. There is not enough space for multiple cadets to use them simultaneously, therefore such a safety belt was not used in the lay aloft training.

- (2) The decision for the lay aloft training implementation plan of this ship was not sent to the headquarters of the organization of this issue. It is probable that the headquarters of the organization of this issue did not have a chance to review the lay aloft training plan, and measures to ensure safety of the on-ship trainings such as reviewing the timetable to ensure enough time to execute the training plan were insufficient.
- (3) It is probable that the organization of this issue did not consider the "hanging test" as a source to judge the ability of the individual cadets for the lay aloft training objectively, it considered just recognize one's own grasping and chinning powers.
- (4) Namikata college informed that attending the onboard training were required for graduation. However, it was not clear attendance for all training including the lay aloft training while the onboard training was a requirement for graduation. In addition, it is probable that there was no opportunity to confirm, or judge if cadets were able to join the lay aloft training.
- (5) In the lay aloft training, there were multiple opportunities to confirm and judge whether or not the participation of the individual cadets in the lay aloft training was possible or not, and multiple cadets did not climb. It is probable that even Cadet A did not wish to participate in the lay aloft training, however, perhaps due to embarrassment, he hesitated to declare abandon of climbing before the start of the lay aloft training.

In addition, Cadet A declared intent to abandon the climbing training and took a rest on the top board, it is probable that at the start of descent to the superstructure from the port side of the top board, he felt the Captain and Officer A rushed him to start descent, and there is a possibility that unrest occurred in his mind.

As for the declaration of the intent to abandon climbing on the way from the top board to the gallant-top, the clear reason was not established because the Cadet A died in this accident.

3.2.4 Weather and sea condition

From 2.6, it is probable that at the time of this accident, weather was fine, south wind of wind force 4 blew, sea surface was calm, the tide was the middle of high tide.

3.2.5 Analysis on occurrence of the accident

From 2.1.3, 2.8.1, 3.1.1 and 3.2.2, as follows;

- (1) It is probable that Cadet A started climbing the top board to the gallant-top of the foremast, after 5 steps forwarded on the ratline, he declared intent to abandon climbing.
- (2) It is probable that Cadet A took a rest for about 5 minutes on the top board and started his descent to the superstructure from the port side of the top board.
- (3) It is probable that while descending to the superstructure from the top board, Cadet A put his both legs on the ratline but both his hands left from the futtock shroud under the top board and he fell backward to the port side of the superstructure.
- (4) It is probable that the reason his both hands left from the futtock shroud was that his arms were overworked since the futtock shroud overhung. However, Cadet A died in this accident, a clear reason could not be determined.
- (5) It is probable that the reason Cadet A fell down to the superstructure is that the life line and the harness-typed safety belt that can be used for up/down and in-position works were not used.
- (6) During the lay aloft training, for Cadet B who declared intent to abandon due to dislocation of their arm, some measures such as the life line and harness-typed safety belt were equipped, however, for Cadet A who declared intent to abandon climbing, took a rest on the top board, and started descent to the superstructure these items were not provided.
- (7) It is probable that the reason the measures Cadet A to equip the life line and harness-typed safety belt which could be used for both up/down and in-position works was not taken was that there is a possibility the organization of this issue and this ship did not expect the contingency for the cadets who abandoned the climb during the training must come down by himself.

4 PROBABLE CAUSES

It is probable that this accident occurred while this ship was moored at Keihin port Tokyo district 3, during the lay aloft training at the foremast, Cadet A who abandoned the climb on the way from the top board to the gallant-top was because this ship did not let him equip the life line and harness-typed safety belt which can be used for up/down and in-position works when Cadet A descended from the top board to the superstructure. As his both legs were on the ratlines but his both hands left the futtock shroud which was under the top board, he fell backward to the superstructure.

It is probable that the reason why Cadet A was not equipped the life line and harness-typed safety belt which could be used for both up/down and in-position works, there is a possibility the organization of this issue and this ship did not expect the contingency for the cadets who abandoned the climb during the training must come down by himself.

It is probable that the reason why the both hands left from the futtock shroud was that Cadet A's arms were overworked, however, since Cadet A died in this accident, the situation could not be established a clear reason.

5 SAFETY ACTIONS

It is probable that this accident was occurred while this ship was moored, during the lay aloft training at the foremast, Cadet A who aborted climbing on the way from the top board to the gallant-

top was not provided measures such as equipping the life line and harness-typed safety belt which can be used for up/down and in-position works, when Cadet A descended from the top board to the superstructure deck, both legs were on the ratline but both hands left the futtock shroud under the top board. He fell backward to the superstructure.

It is probable that the reason why Cadet A was not equipped the life line and harness-typed safety belt which could be used for both up/down and in-position works was that it was not assumed that such contingency occurred as cadets would abort climbing during the training,

It is probable that the reason why his both hands left the futtock shroud was because the futtock shroud overhung, Cadet A's arms were overworked.

Thus, in order to prevent accidents of the same type, the organization of this issue must take the following measures;

- (1) Lay aloft training must be performed by using the auxiliary rope ladders as stated in 2.5.2(3) against the futtock shrouds under the top boards instead of using the overhung futtock shrouds, and review the training plans and training methods.
- (2) During the lay aloft training, the life line and harness-typed safety belt which can be used for both up/down and in-position works conforming to the ordinances and regulations concerning the works at high places¹⁷ must be used.
- (3) During the lay aloft training, for the cadets who abort climbing, not to rush the cadets to descend to the superstructure deck, the crews must accompany the cadets and return them to the superstructure deck by holding their arms.
- (4) Namikata college and other colleges must confirm the aptitude and the intention of the individual cadets on the onboard training. And they must have a chance to confirm and judge whether the cadets are appropriate or not to participate in the lay aloft training, provide some trainings to increase forge degree of the individual cadets against climbing up and down the masts as well.
- (5) The organization of this issue shall check the plan of lay aloft training and unsafe incidents such as the training plan to ensure plenty of time for training hours, and consider the aptitude and the intention of the individual cadets toward the lay aloft training as well, always confirm their physical abilities, define the conditions for participation in the climb training, cultivate an environment where the students whose ability is not enough shall not be forced to participate to absolutely ensure safety for onboard trainings.

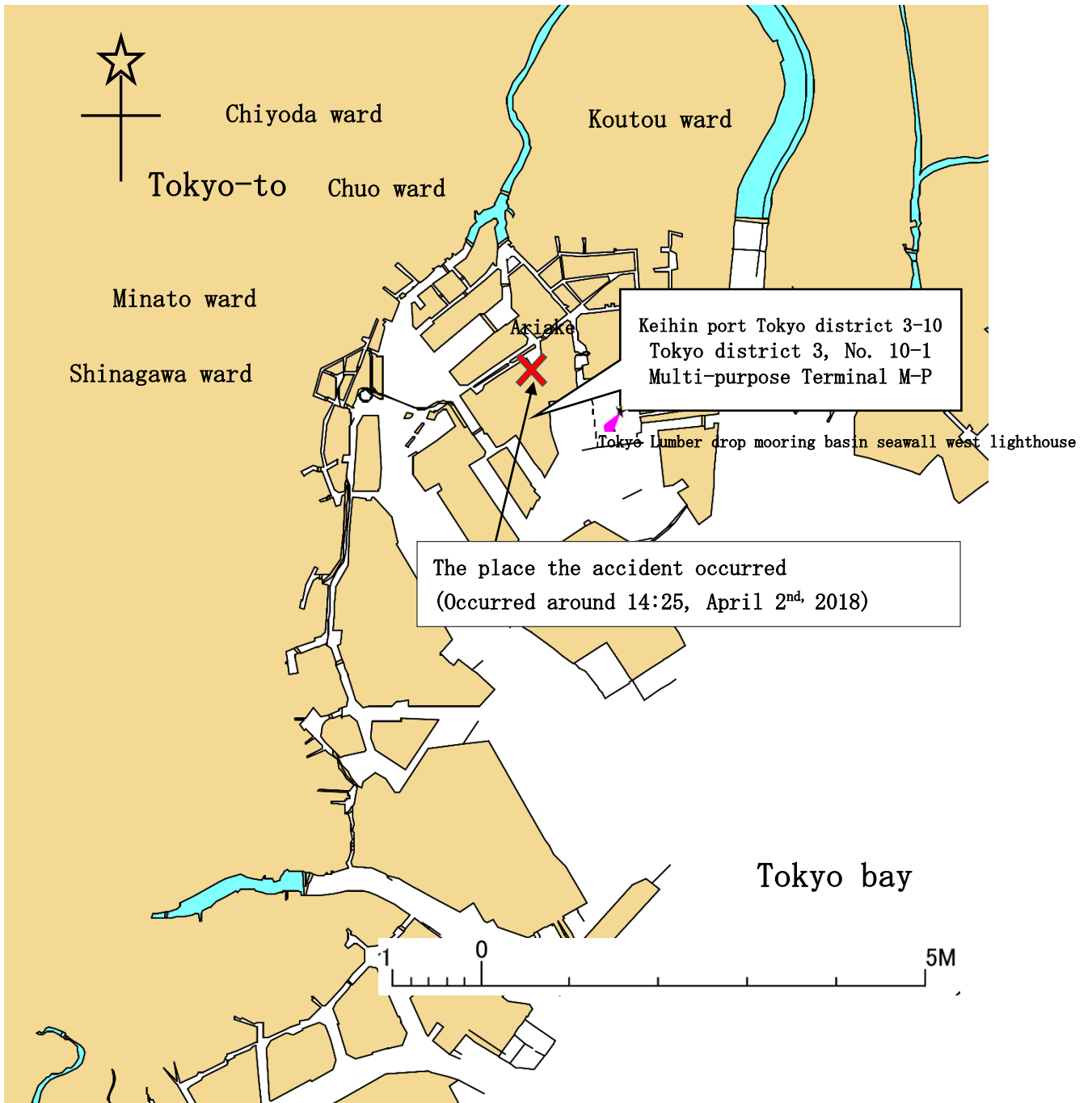
6 REMARKS

The organization of this issue decided to suspend lay aloft training temporarily due to this accident, on April 3, 2018, the organization of this issue established an investigation committee for this

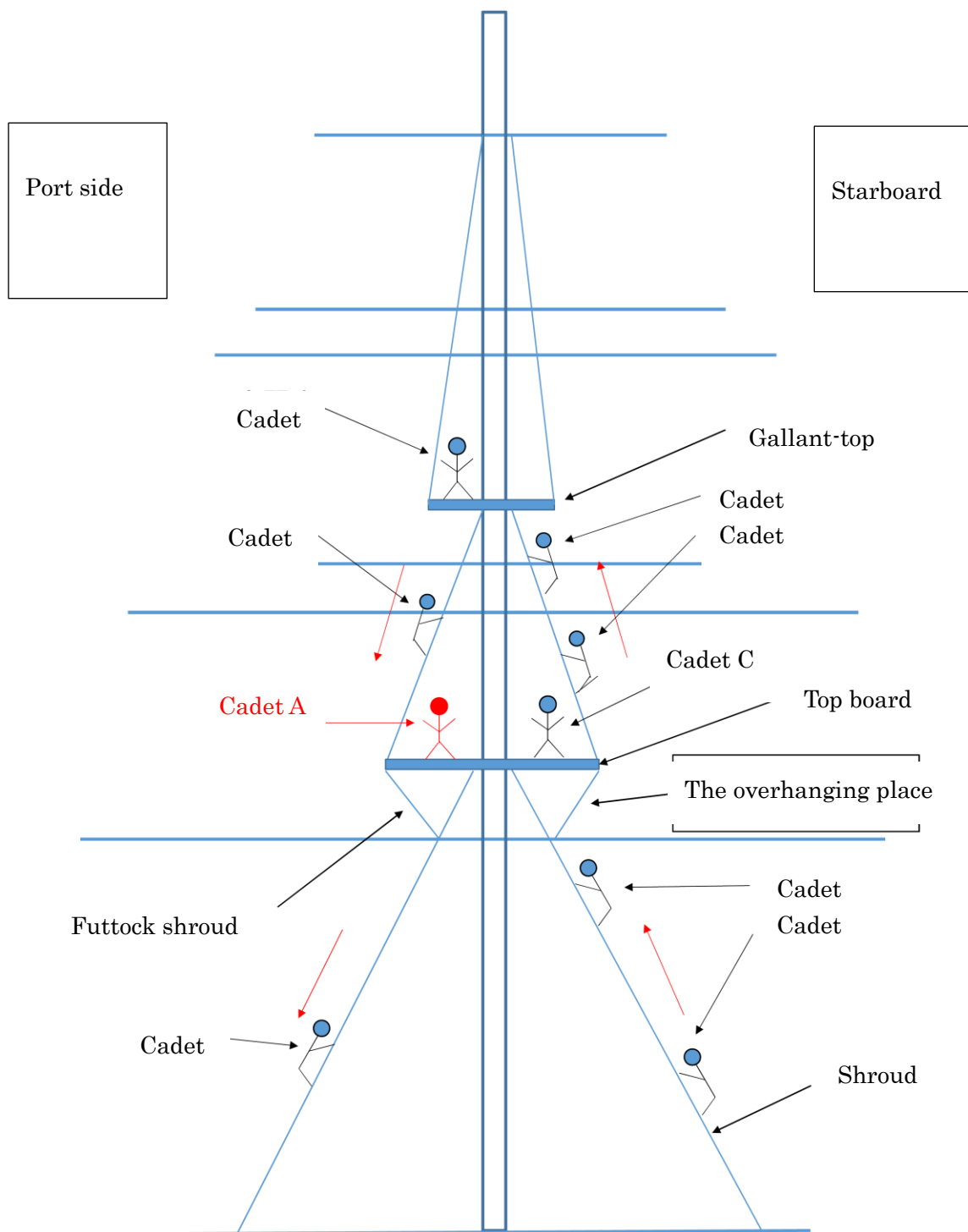
¹⁷ In works at high places on land, since the revisions of the Industrial safety and health law, enforcement ordinance, and such (enforced in February 2018), wearing full harness-typed fixture for stop accidental fall and special coaching for safety hygiene are mandatory.

accident, on July 3, established a discussion committee for recurrence preventive measures which consists of external experts and officers in managerial positions of the organization of this issue to discuss the recurrence preventive measures as a whole organization.

Attached Figure 1 Outline of the place the accident occurred

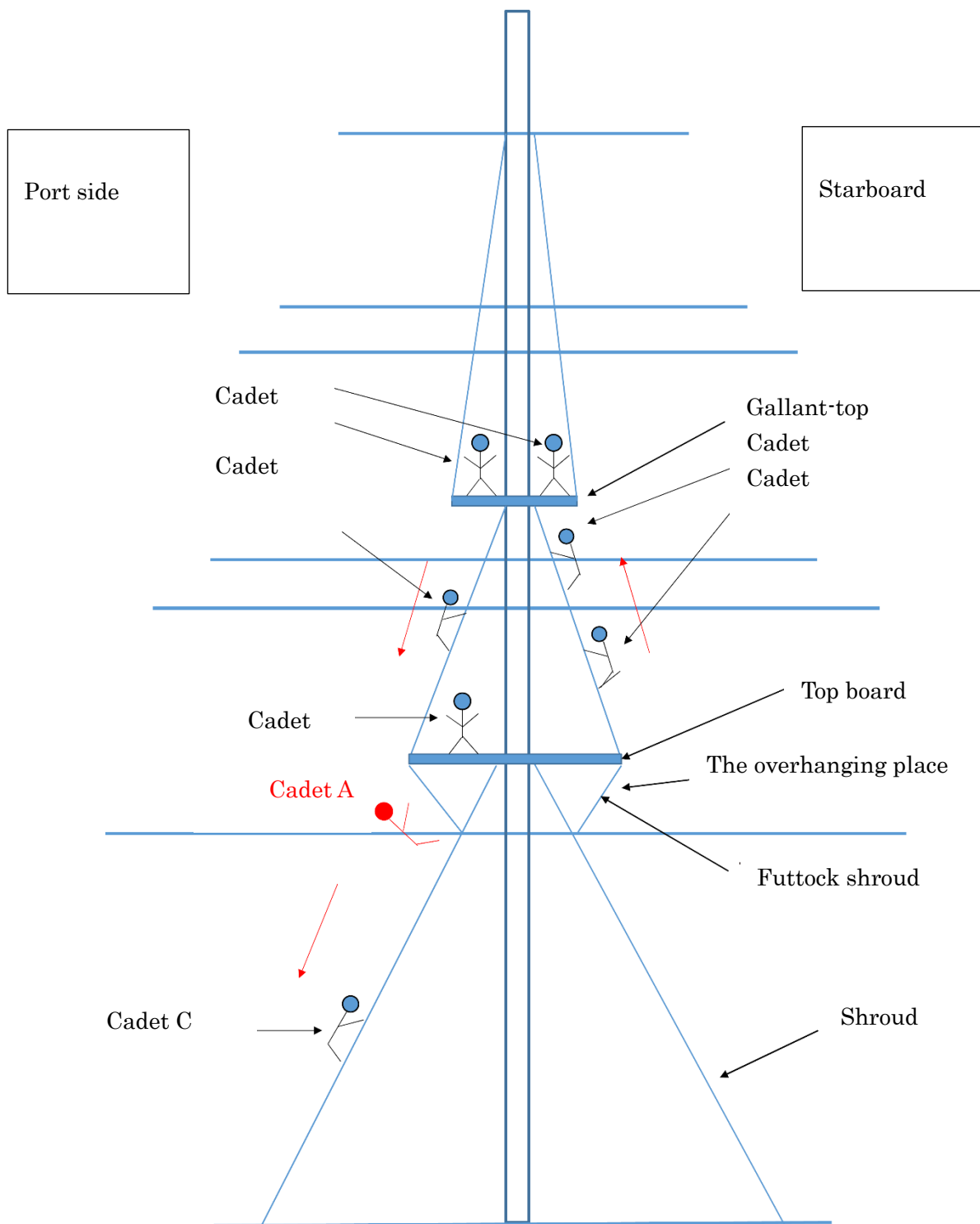


Attached Figure 2 The situation of the foremast before the accident occurrence



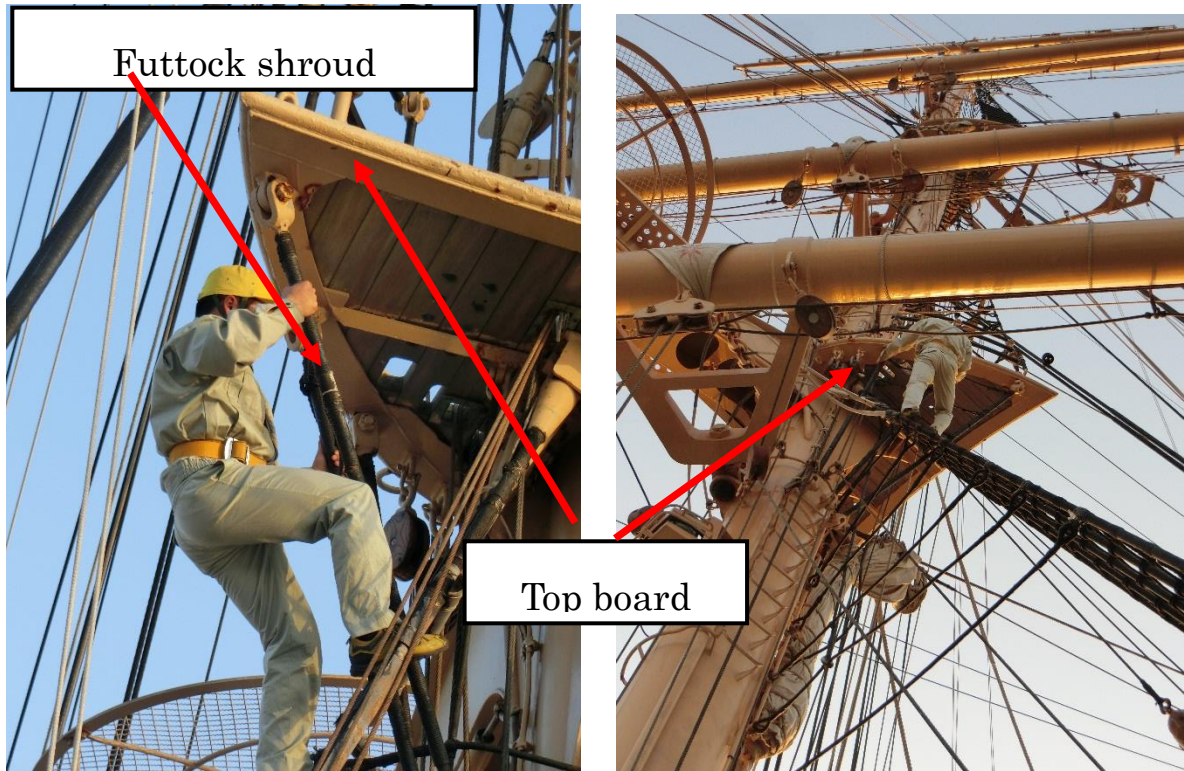
Around 14:20, Cadet A was taking a rest at the top board

Attached Figure 3 The situation of the foremast at the time of the accident occurrence



Around 14:25, at the time the apprentice A fell down

Picture 1 The condition of the apprentice A at the time of the accident occurrence



Picture 2 The deployment of the crews at the time of the accident occurrence

