MINISTRY OF JUSTICE OF THE REPUBLIC OF LITHUANIA
TRANSPORT ACCIDENT AND INCIDENT INVESTIGATION DIVISION

Serious accident with Finish flag split hopper barge Boann, IMO 9808792 occurred on 8 April 2019 in Klaipeda State Seaport

SAFETY INVESTIGATION REPORT

No. (L-19/04) 1A-63
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FOREWORD

The safety investigation is conducted in accordance with Casualty Investigation Code, adopted by IMO resolution MSC.255(84), Commission Regulation (EU) No. 1286/2011 of 9 December 2011 adopting a common methodology for investigating marine casualties and incidents developed pursuant to Article 5(4) of Directive 2009/18/EC of the European Parliament and of the Council, Article 48 of Maritime Safety Law of the Republic of Lithuania and Description of the procedure on drawing up and submission of reports and safety recommendations for safety investigations into maritime accidents and incidents, approved by the Order No. 1R-386 of the Minister of Justice of the Republic of Lithuania on 30 December, 2015.

The purpose of the safety investigation is to prevent the occurrence of accidents and incidents in the future, rather than establish blame or liability. The safety investigation is conducted independently of any judicial or administrative proceedings, to apportion blame or liability, are not related to them, and have no impact thereupon.

Each safety investigation shall be concluded with a report in a form appropriate to the type and seriousness of the accident or incident. The report shall contain, where appropriate, safety recommendations, which shall in no case create a presumption of blame or liability for accident or incident.

The safety investigation report shall not be used as evidence in a judicial or administrative process seeking to apportion blame or liability, because this was not established in the course of the safety investigation and it is not compatible with the objective of the safety investigation.

The information is published to inform the maritime industry and the public of the general circumstances of the accident or incident. Extracts may be published without specific permission providing that the source is duly acknowledged, the material is reproduced accurately and it is not used in a derogatory manner or in a misleading context.

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General information about accident

Date of the accident	8 April 2019	
Time of the accident[1]	23:54	
Place of the accident	Klaipeda State Seaport	
Name of seagoing ship	Boann	
Type of seagoing ship	Split hopper barge	
Flag of seagoing ship	Republic of Finland	
IMO number	9808792	
Owner and operator of seagoing ship	Wasa Dredging Oy Ltd	
Voyage type	Coastal	
Damage to ship	Hull penetration damage	
Persons on board	Crew – 5	Passengers – 0
Injuries	Crew – 0	Passengers – –

[1] Local time is used in the report.

Synopsis

On 8 April 2019, at 23:54, split hopper barge Boann, IMO 9808792, registered in Finland, while proceeding towards berth No 52 in the Klaipeda State Seaport, contacted the floating dock PD-408, registered in the Register of inland waterways craft of the Republic of Lithuania, which was moored at berth. Boann and PD-408 sustained hull penetration damages. No damage to the environment nor to people was sustained.

Safety investigation

On 9 April 2019, 9:02 Lithuanian Transport Safety Administration notified Investigator-In-Charge of Maritime Accidents and Incidents, appointed by the Minister of Justice of the Republic of Lithuania (hereinafter – Investigator-In-Charge) about the accident. On the same day Investigator-In-Charge notified Safety Investigation Authority of Finland (Onnettomuustutkintakeskus) about the accident and started a preliminary assessment of the accident. On 12 April 2019, Safety Investigation Authority of Finland, as flag state of the seagoing ship, appointed an authorised representative.

On 25 April 2019, it was decided to start safety investigation into the serious accident. This investigation was conducted in close cooperation with the Safety Investigation Authority of Finland.

1. FACTUAL INFORMATION

1.1. Narrative

The circumstances of the accident are described on the basis of information, gathered by interviewing crewmembers, using AIS[2] historical data, CCTV and radar data records, ship's logbook and Safe Sea Net Ecosystem graphical user interface (SEG).

1.1.1. Course of the accident

Split hopper barge Boann provided services for backhoe dredger Optimus, bringing dredging masses from the Klaipeda state seaport area out to the dumping area[3], situated in about 19 km from shore in the Baltic Sea. Boann rendered such services in the Klaipeda State Seaport from the beginning of January 2019.

On 8 April 2019, at 23:00 Boann was in the Baltic Sea, in ballast, on her way from the dumping area. According to the Boann crew, the weather was getting too heavy to be able to proceed comfortably to the dumping area and back. It was decided to proceed to layby berth at Klaipeda State Seaport. The dredger Optimus continued dredging operations with another bigger barge.

At the time of the accident the weather conditions in the harbour were – Northerly wind 5.6-7.1 m/s, water current 0.6 kt from the sea, passing showers with mixed rain and snow. It was dark period of the day, visibility was good.

23:32 ship, in ballast, while returning from the dumping area in the Baltic Sea, passed Klaipėda State Seaport entry breakwaters. Master was on the bridge alone and was acting as helmsman. Autopilot mode was switched on to keep ship's constant track.

23:51:52 ship passed estuaries of Dane river in Klaipėda state seaport. Ship's speed was 6.6 knots, course[4] 150.2°. The speed of the ship was constant.

[2] Automatic Identification System.
[3] Defined area to dump dredged mass.
[4] Speed and course of ground is used in the report.

23:52:28 ship‘s speed was 6.6 knots, course 145.8° (position 1, Fig.1). Master started to prepare for manoeuvring and berthing to the berth No 52. Master took steps to change steering mode from automatic to manual. He pressed the STBY button in the steering control system unit. Then turned the steering mode selector lever clockwise and heard the switch click. The master was sure he switched the steering mode from automatic to manual.

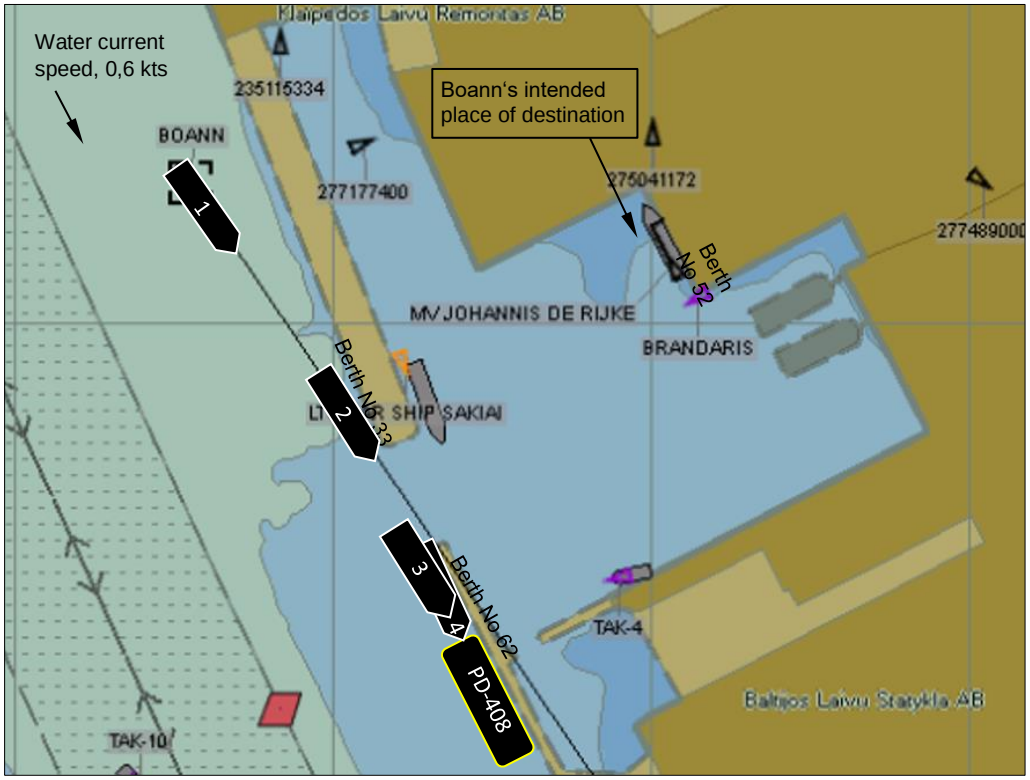

Fig. 1. Boann position before and at the moment of contact to the floating dock PD-408 (AIS data)

At the same time he reduced ship‘s speed for the safe turn into shipyard basin to the berth No 52. Ship still was on the right course.

23:53:08 Ship’s speed was 5.7 knots, course 145.3°. By using port side and starboard side steering levers, master attempted to turn the ship to starboard side. He noticed that manual steering do not follow and ship is dangerously approaching too close towards berth No 33. To avoid contact with berth No 33, master deployed bow thruster and took steps to stop the ship by rotating port side and starboard side steering levers by 180° and by increasing power of the main engines.

23:53:24 Ship’s speed was 5.8 knots, course 146.9° (position 2, Fig.1), bow thruster in operation. Ship had port side contact with berth No 33. No damage to berth nor to ship was sustained. Ship’s speed started to increase.

23:53:48 Ship’s speed 6.6 knots, course 152.3° (position 3, Fig.1). Ship had port side contact with berth No 62. No damage to berth nor to ship was sustained.

23:53:52 Ship’s speed was 6.6 knots, course 154.5°

23:54 Ship contacted with her bow the floating dock PD-408, which was moored at berth (position 4, Fig.1). Master shifted engines’ revolution levers to neutral position.

Only after the contact with the floating dock master realised, that steering mode selector lever has not been switched. It remained in the AUTOPILOT position.

After the accident, Boann master moored ship to the berth No 52. No shore assistance was used.

1.1.2. Shore authority involvement and emergency response

Not applicable.

1.2. Ship's particulars

Particulars of split hopper barge Boann (Fig. 2) are provided in Table 1.

Fig. 2. Split hopper barge Boann (photo provided by the operator of seagoing ship)

Table 1. Boann particulars

Flag, registration	Flag of the Republic of Finland. Registered in the Republic of Finland.
Classification society	Bureau Veritas (BV)
Identification	International Maritime Organisation (IMO) number: 9808792 Call sign: OJRT Maritime Mobile Service Identity (MMSI) number: 230085710
Main characteristics	Gross tonnage: 1001 Length: 66,5 m Breadth: 11,36 m
Building yard of ship	Waterhuisen Shipyard, Kingdom of the Netherlands
Year of build	2017
Minimum safe manning	Number of crew, indicated in the minimum safe manning document - 5
Cargo allowed	Dredged mass

1.3. Data about the crew

Ship's crew consisted of the master, chief mate, able seaman (deck), rating (deck / engine) and chief engineer officer.

Master was STCW[5] II/2 qualified. He was alone on duty of navigational watch on the bridge before the accident. Master had experience from 2010 on different seagoing ships as a master. From September 2018, he served as chief mate on board Boann. In the checklist of 26 September 2018 "Shipboard familiarization" is provided that, among others, equipment and watch procedures which the crewmember is to operate on a routine basis, were explained to him. There is no more detailed information or record on the content of this part of the familiarization. He was appointed as a master on board Boann on 26 March 2019.

[5] STCW – International Convention on Standards of Training, Certification and Watchkeeping for Seafarers 1978, as amended.

In accordance with the requirements of clause 23 of the Regulations of Navigation of Klaipeda State Seaport (hereinafter - the Regulations of Navigation), on 18 February 2019 the master attended a briefing on Regulations of Navigation and the peculiarities of navigation in the seaport.

1.4. Data about propulsion and steering systems

According to data provided by the operator of seagoing ship, Boann's propulsion system consists of two main engines (port and starboard side), power of each engine was 469 kW, revolutions – 1750 rev/min. Engines via shafts are connected to port and starboard fixed pitch screws (Fig. 3), and operates independently from each other. Bow thrusters are arranged in the sides of the fore part of the hull and powered by the 200 kW internal combustion engine, placed in the bow compartment.

Type of the ship's steering system - Schottel SRP 300/2. Ship is steered by changing position and rotation speed of the screws. Ship's maximum speed in ballast – 9.7 knots. Fig. 4 shows the arrangement of the Boann's steering equipment in the bridge.

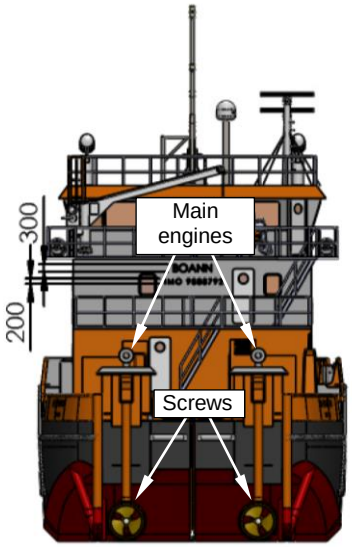

Fig. 3. Ship's propulsion and steering system elements, view from the aft (extract from the scheme, provided by the operator of the seagoing ship)

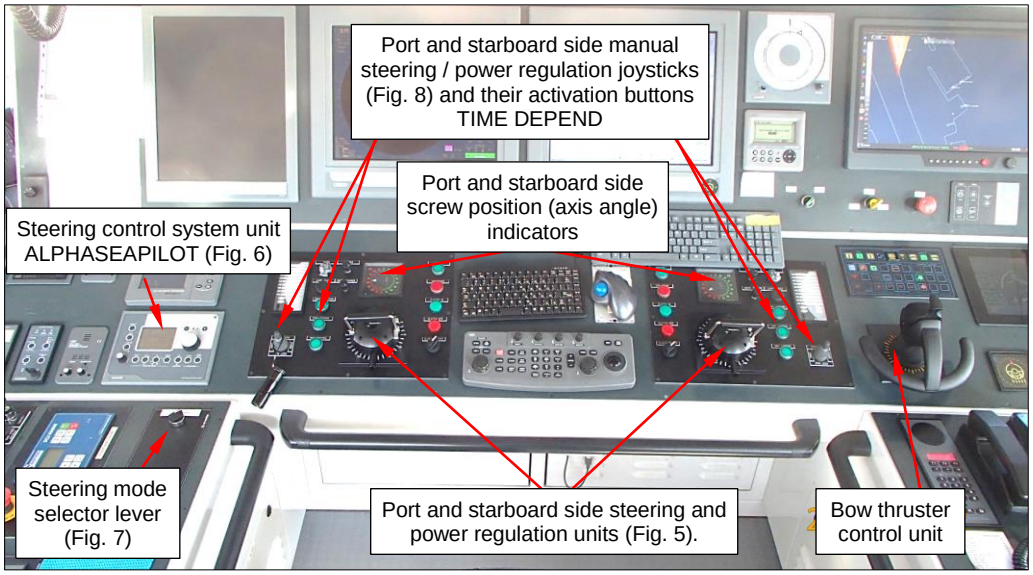

Fig. 4. Arrangement of the steering equipment on the bridge

No malfunctions of the steering system were identified during the safety investigation. The safety investigation did not establish any non compliance of the steering system or any other navigation system or equipment installed on the bridge with the applicable requirements.

1.5. Data about the steering modes

1.5.1. Automatic steering mode

Automatic steering mode is active when steering mode selector lever is set in the position AUTOPILOT (Fig. 4).

To maintain a predefined course of the ship an automatic steering control system unit ALPHASEAPILOT was used on board (Fig. 4), which was certified in accordance with the requirements of the International Maritime Organization and the European Union. There are no requirements to have such a system on board Boann.

1.5.2. Manual steering modes

According to the information provided by the operator of seagoing ship, Boann could be steered by using three different further described manual steering modes.

The Boann crew routinely used the first steering mode, described in section 1.5.2.1. The Boann crew did not use the manual steering mode described in section 1.5.2.2 because, according to the crew, the first manual steering mode was more accurate and more comfortable.

1.5.2.1. First (routinely used) manual steering mode

Ship is steered by rotating the two (port and starboard side) steering levers (Figs. 4, 5), which controls (rotates) the position of the port side and starboard side screw shafts and by changing the power of the main engines. When the steering lever is rotated by 180°, the position of the screw axis also rotates by the same angle to the horizontal plane and the propulsion force is applied in the opposite direction. The speed of the ship is controlled by the engines‘ power regulation levers (Figs. 4, 5).

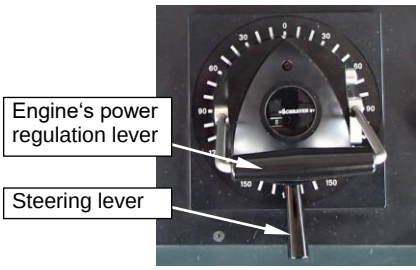

Fig. 5. Steering and power regulation unit

When the automatic steering mode is enabled, the following steps are required to switch on the manual steering mode: 1) Press the STBY button on the steering control system unit ALPHASEAPILOT (Figs. 4, 6); 2) Turn the selector lever (Figs. 4, 7) clockwise from the position AUTOPILOT to the position MANUAL.

Fig. 6. Steering control system unit ALPHASEAPILOT in standby (STBY) mode

Fig. 7. Steering mode selector lever in position AUTOPILOT

The position of the steering mode selector lever (Fig. 7) is changed by turning it with fingers. The selector lever has to be released when it is in the required position. Click is heard when switching. After the accident the test was carried out and it was found that a similar click was heard when the selector lever was released by not turning it all the way (not to the right position) but only at the angle of 30° to 40°. In the latter case, the lever returns to its initial position.

The steering mode selector lever was not clearly visible at night. There was no other signal, such as a beep, to indicate selector's position change. There are no mandatory requirements for the installation of such arrangements on Boann-type vessels.

1.5.2.2. Second manual steering mode

Manual steering and speed change can also be performed using port and starboard side manual steering / power regulation joysticks (Figs. 4, 8). These are activated by pressing the green TIME DEPEND buttons (Fig. 4), which activates the steering / power regulation joysticks irrespectively of the position of the steering mode selector lever (Fig. 7).

Fig. 8. Manual steering / power regulation joystick

1.5.2.3. Third (emergency) manual steering mode

The third alternative of manual steering is emergency steering mode, which is conducted in accordance with the emergency steering procedure. In order to use this steering mode, it is necessary for one of the ship's crew to be at the local engine control post on the engine deck and to follow the instructions from the bridge.

1.5.3. Checking the operation of the selected steering mode

According to the information provided by the operator of the seagoing ship, it was not customary to check in advance on it's ships, the selected steering mode is working.

Prior to manoeuvring, Boann master did not verify, that the manual steering mode he intended to use, was working.

1.6. Protection against human error

To establish the actual position of the Steering mode selector lever (Fig. 7) during the dark hours of the day, great efforts should be made. There were no any other safety features installed on board, eliminating possibility of an error, which could occur when selecting the manual steering mode.

1.7. Information about human factor

The master did not complain of fatigue or lack of rest. The safety investigation did not identify other factors that may have contributed to the accident, such as a medical condition, an inappropriate master's psychological status, or alcohol or drug abuse.

1.8. Data about the damages

Fore part of the Boann hull sustained substantial indentations, hull penetration damages. Due to the impact, the floating dock‘s bar was broken, part of which stuck in the Boann’s hull (Fig. 9). There was no water ingress into the ship’s hull after the accident.

Fig. 9 Damages to the fore part of the Boann hull after the accident

The floating dock PD-408 sustained penetration damages, constructive parts were damaged (Fig. 10). Three steel mooring ropes, holding floating dock, were broken due to the impact.

Fig. 10. Floating dock PD-408 after the accident

1.9. Safety actions after the accident

Following the accident, the operator of seagoing ship carried out an internal investigation and in order to reduce the risk of similar occurrences in the future, took safety actions, about which on 17 December 2019 informed Investigator-in-Charge:

1. As a temporary safety measure, on Boann steering equipment console placed memo, indicating which steering controls has to be checked before manoeuvring (Fig. 11).

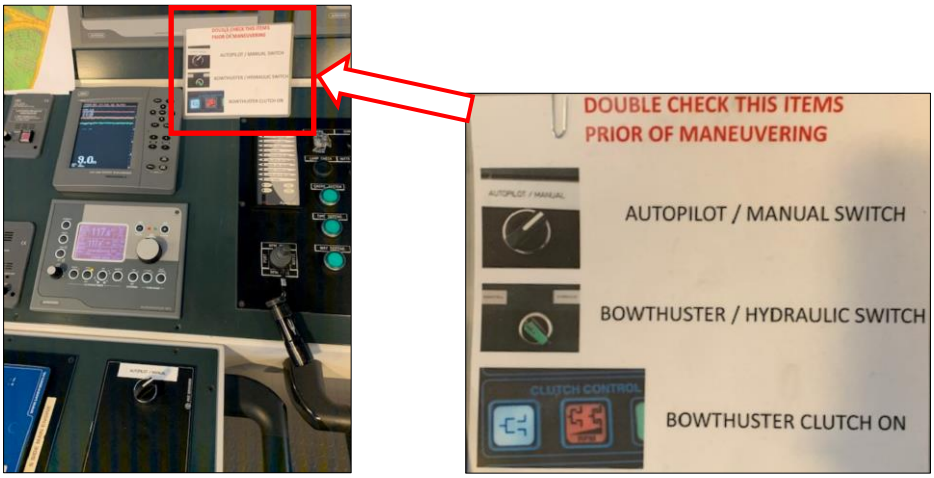

Fig. 11. Memo placed on the Boann steering equipment console (photos provided by the operator of seagoing ship)

2. On 5 November 2019 modified section "Familiarisation" in the Safety Management System Manual, which is applicable to all it's ships and adopted checklist „Familiarization for Bridge Officers – Equipment". The "Familiarisation" section of the Safety Management System Manual supplemented by the new statement:

'For bridge officers additional attention shall be given to familiarization of all equipment related to safe navigation and manoeuvring of the vessel. This to ensure a safe and proper routine of navigational duties.' (Reference is given to the newly adopted checklist 'Familiarization for Bridge Officers – Equipment').

The newly adopted checklist 'Familiarization for Bridge Officers – Equipment' requires to tick the box, containing the statement, that bridge officer is familiar with autopilot (functions, settings, limits, how to switch auto – hand steering – auto). The joining crewmember (bridge officer) shall be familiarised by instructor.

1.10. Additional information

1.10.1. Ergonomic criteria for bridge equipment and layout

The International Maritime Organization has adopted non-mandatory guidelines on the ergonomic criteria for bridge equipment and layout[6], which include:

'5.3. Workstation Layout

<…>

5.3.6.1 Adjustable Lighting

Adjustable lighting (dimming control) should be provided for controls and visual displays, including display, control, and panel labels and critical markings, that must be read at night or under darkened conditions. <…>.

5.3.6.3 Individual Lighting Adjustment

Each device should be fitted with an individual lighting adjustment. In addition functional groups of devices, displays and controls should be equipped with common light adjustment.'

[6] Guidelines on the Ergonomic Criteria for Bridge Equipment and Layout, adopted on 20 December 2000 by International Maritime Organization by circular MSC/Circ.982.

1.10.2. On board familiarization

Section A-I/14 of the STCW Code[7] provides requirements concerning the familiarization of newly employed seafarers:

'2. The company shall provide written instructions to the master of each ship to which the Convention[8] applies, setting forth the policies and the procedures to be followed to ensure that all seafarers who are newly employed on board the ship are given a reasonable opportunity to become familiar with the shipboard equipment, operating procedures and other arrangements needed for the proper performance of their duties, before being assigned to those duties. Such policies and procedures shall include:

1) allocation of a reasonable period of time during which each newly employed seafarer will have an opportunity to become acquainted with:

1) the specific equipment the seafarer will be using or operating;

2) ship-specific watchkeeping, safety, environmental protection, security and emergency procedures and arrangements the seafarer needs to know to perform the assigned duties properly;

2) designation of the knowledgeable crew member who will be responsible for ensuring that an opportunity is provided to each newly employed seafarer to receive essential information in a language the seafarer understands.'

2. ANALYSIS

2.1. Actions before the accident

When switching the steering mode from automatic to manual, the master rotated the steering mode selector lever (Fig. 7) and released it when it was not in the required MANUAL position. For this reason selector lever returned to its original AUTOPILOT position. Upon hearing the switch characteristic click, the master did not suspect that the steering mode selector lever may not have been switched.

When master started to steer the ship with disabled manual steering levers (Fig. 5), he realized that the routinely used manual steering mode does not work. As ship was quickly approaching towards berth No 33 and after 16 sec contacted it, master did not have sufficient time to determine and eliminate the cause of that non operation. Therefore master attempted to avoid contact by trying to steer the ship to the starboard side using a bow thruster. At that time, the ship was moving at a speed of 5.7 knots, so the thrust generated by the bow thruster had a very slight effect on the ship's course: within 16 seconds, the ship changed her course only by 1.6° to starboard. Further action - an attempt to engage the reverse mode by turning the steering levers by 180° and increasing the power of the engines with engines' power regulation levers (Fig. 5) had no impact to the course of the ship, but increased the ship's speed.

The ship's route segment before mooring was selected with a sharp turn to the port side (Fig. 1). As Boann navigated this segment at a speed of about 6 knots, there was no time reserve to solve the emerging steering problems.

2.2. Early check of manual steering and speed reduction

In ships operated by the operator of seagoing ship, it was not customary for a helmsman to check in advance that the steering mode of his choice is working. In preparation for maneuvering, the vessel's speed was reduced from 6.6 to 5.7 knots and no further reduction was made.

[7] Seafarer's Training, Certification and Watchkeeping Code, which is mandatory according to the requirements of the STCW Convention.
[8] STCW Convention.

This accident demonstrates that early checking the operation of the planned manual steering mode and further ship's speed reduction would have allowed more time to identify the cause of the problem and find solution. Taking this into account:

SR-2020-L-01

It is recommended to Wasa Dredging Oy Ltd to take measures on the ships it operates, that officers-in-charge of navigational watch check in advance the operation of the steering in the manual mode and reduce the speed accordingly prior to commencing manoeuvring.

2.3. Protection against human error while activating manual steering mode

The position of the steering mode selector lever (Fig. 7) was not easily seen during the dark hours of the day, as it was not illuminated. There was no other signal (such as a beep), indicating lever switching. As a result, the master, after he rotated the lever, could not see and understand that the lever had not been switched.

Following the accident, the operator of seagoing ship, as a temporary measure, placed memo on Boann's steering equipment console, indicating which steering controls shall be checked before manoeuvring (Fig. 11).

Although the human error protection measures mentioned here are not mandatory, they are likely to have warned the master about not enabled routinely used manual steering mode. Therefore, the operator of a seagoing ship should enshrine safety culture and not merely limit himself to mandatory safety standards for the ships it operates. Taking this into account:

SR-2020-L-02

It is recommended to Wasa Dredging Oy Ltd, on its Boann-type vessels, to implement permanent arrangements, which enable proper evaluation of the steering mode engaged.

2.4. Use of the second manual steering mode

The use of the second steering mode – manual steering / power control levers (see section 1.5.2.2) was not utilized, because there was no custom practice to use this steering mode on board. The master did not have sufficient experience to use this steering mode quickly and efficiently in an emergency and with little time. This indicates that the crew should use this steering mode periodically. The operator of seagoing ship could address this issue through safety management system by including the requirement on regular training for deck officers on changing steering modes.

3. CONCLUSIONS

3.1. Cause of the accident

The accident occurred due to unaccomplished steering mode switching from automatic to manual and attempting to manoeuvre the ship with the not enabled manual steering levers.

3.2. Safety deficiencies and safety issues

1. The actual position of the steering mode selector lever (Fig. 7) was not easily visible for the master during the dark hours of the day. There was no other safety features installed to prevent the occurrence of a human error – for example audio signal, to warn about the lever switch. Although the human error protection measures mentioned here are not mandatory, they are likely to have warned the master about not enabled routinely used manual steering mode.

2. It was not customary on board for a helmsman to check in advance whether the steering mode of his choice is working. In preparation for manoeuvring, no early check of the selected manual steering mode was carried out, while the ship's speed was 5.7 knots. Once the manoeuvring with the disabled manual steering levers at a sufficiently high speed and short distance to the intended sharp turning point to the intended place of destination (Fig. 1) was started, master had too little time to determine the cause of the problem and to rectify it.

3. Ship was not routinely steered by using manual steering / power control levers (section 1.5.2.2). As a result, in critical situation and in the lack of experience, no attempt was made to use this manual steering mode.

4. SAFETY RECOMMENDATIONS

Safety recommendation means a proposal of a safety investigation authority, based on information derived from a safety investigation or other sources such as safety studies, made with the intention of preventing accidents and incidents

Safety recommendations shall in no case create a presumption of blame or liability for an accident or incident.

The following safety recommendations are made in this report:

SR-2020-L-01

It is recommended to Wasa Dredging Oy Ltd to take measures on the ships it operates, that officers-in-charge of navigational watch check in advance the operation of the steering in the manual mode and reduce the speed accordingly prior to commencing manoeuvring.

SR-2020-L-02

It is recommended to Wasa Dredging Oy Ltd, on its Boann-type vessels, to implement permanent arrangements, which enable proper evaluation of the steering mode engaged.