Bundesstelle für Seeunfalluntersuchung
Federal Bureau of Maritime Casualty Investigation
Federal Higher Authority subordinated to the Ministry of Transport,
Building and Urban Development

Summary
Investigation Report 548/08

Serious Marine Casualty

Collision between MV BELUGA SENSATION and MV JEROME H while moored at the pier in the Kiel Canal on 26 October 2008

16 November 2009

www.bsu-bund.de

The investigation was conducted in conformity with the law to improve safety of shipping by investigating marine casualties and other incidents (Maritime Safety Investigation Law - SUG) of 16 June 2002.

According to this the sole objective of the investigation is to prevent future accidents and malfunctions. The investigation does not serve to ascertain fault, liability or claims.

The present report should not be used in court proceedings or proceedings of the Maritime Board. Reference is made to art. 19 para. 4 SUG.

The German text shall prevail in the interpretation of the Investigation Report.

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1 Summary of the marine casualty

On 26 October 2008 at about 0600[1], the container vessel BELUGA SENSATION lost control in the first siding area after the Kiel Canal's Kiel locks. To begin with, her stern collided with the pier in the Nordhafen and then with the JEROME H, a bulk carrier moored there. In the process, the lines of the JEROME H broke and the vessel drifted into the embankment on the opposite side of the canal below the Holtenauer Bridge, from where she later freed herself under her own steam.
There were no injuries and no pollutants escaped.

[1] Unless otherwise stated, all times shown in this report refer to local time = Central European Summer Time = UTC + 1

2 Scene of the accident

Type of event: Serious marine casualty
Date/Time: 26 October 2008
Location: Kiel Canal, Kiel
Latitude/Longitude: φ 54°22.2'N λ 010°06.7'E

Excerpt from nautical chart 3009, Federal Maritime and Hydrographic Agency

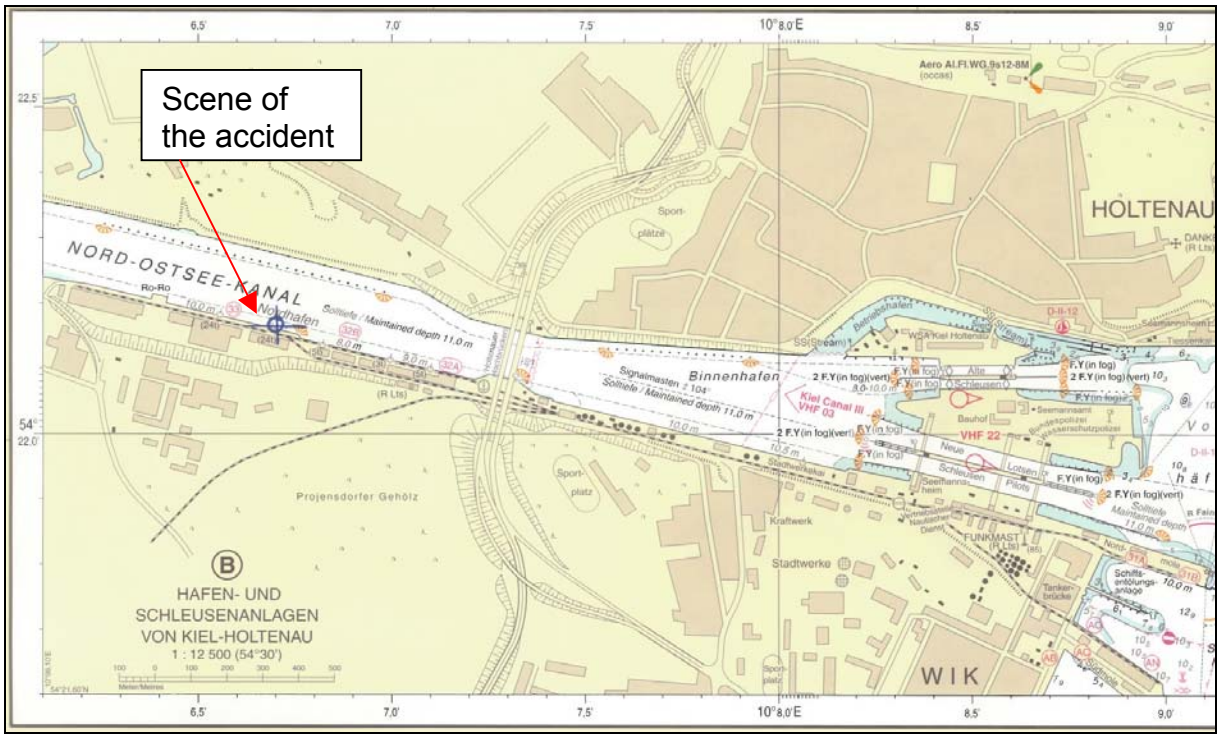

Figure 1: Nautical chart

3 Vessel particulars

3.1 Photo

Figure 2: Photo

3.2 Particulars

Name of the vessel:	BELUGA SENSATION
Type of vessel:	Container vessel
Nationality/flag:	Gibraltar
Port of registry:	Gibraltar
IMO number:	9255763
Call sign:	ZDGD2
Vessel operator:	Beluga Shipping GmbH & Co. KG
Year built:	2004
Shipyard/yard number:	Volharding / DMHI / Hoogezand, No. 543
Classification society:	Germanischer Lloyd
Length overall:	134.62 m
Breadth overall:	21.50 m
Gross tonnage:	7660
Deadweight:	9163 t
Draught at time of accident:	Fore = 5.40 m, aft = 6.00 m
Engine rating:	7200 kW at 500 rpm
Main engine:	Caterpillar, 8 M 43
(Service) Speed:	18 kts
Hull material:	Steel
Number of crew:	13
Number of other persons on board:	1 pilot, 2 canal helmsmen

4 Course of the accident and investigation

4.1 Course of the accident

The BELUGA SENSATION was sailing from Rauma, Finland to Hamburg. After leaving the Holtenauer locks on 26 October 2008, she was to wait in the Nordhafen siding area to enable vessels approaching from the west to pass.
The Chief Officer, who was 33 at the time of the accident, a 50-year-old pilot and a 45-year-old canal helmsman were on the bridge. After consultation with the pilot, the 50-year-old Master had briefly left the bridge.
After entering the siding area, the pilot requested that the Chief Officer switches over the engine control from the main steering position in the middle of the bridge to the conning position on the starboard bridge wing. This was to make it easier to observe the row of dolphins, which was situated at about half the vessel's beam on the starboard side.
To transfer the control to the wing, the Chief Officer pressed a push button on the starboard wing control station.
According to the ECS records, the speed ahead at 0558 was approx. 2 kts.
Immediately after pressing the button, the propeller pitch switched to 'full astern'. Renewed activation of the button had no effect. The Chief Officer then hurried to the conning position on the bridge and tried in vain to gain control of the steering from there.
At 0559, the pilot requested that the Chief Officer use the 'crash-stop' to bring the main engine to a standstill because the vessel would not move forward and was moving astern. Rather than complying with this request, the Chief Officer hurried backwards and forwards between the starboard wing and the main conning position and attempted to regain control of the steering by pressing various buttons. Meanwhile, the Master came to the bridge, spoke with the Chief Engineer in the engine control room by telephone and after that regained control of the vessel. However, the subsequent collisions were no longer avoidable.
At 060059, the speed astern was 3.8 kts. At 0601, the port aftship collided heavily with the quay installation of Messrs Voith. The vessel then propelled herself along the pier with increasing speed and after reaching approx. 4.4 kts collided with the JEROME H while she was moored at the Voith Pier. The force of the impact was so great that all six mooring lines broke and the JEROME H drifted with her stern foremost to the opposite side of the Kiel Canal, where she came to a halt with her aftship against the sheet piling just west of the Holtenauer Bridge. The crew of the JEROME H was below deck at the time of the accident and was able to start the main engine and move to a berth in front of the silo in the Nordhafen unaided. At 0603, after the steering problems were no longer evident, the BELUGA SENSATION was also able to moor at this pier without further problems.

4.2 Damage

Figure 3: BELUGA SENSATION, damage to stern

Figure 4: JEROME H, damage to stem

Figure 5: JEROME H, damage to stern

Figure 6: Damage to the pier

4.3 Wind and weather

A south-westerly wind prevailed at the time of the accident with speeds of 3-5 Bft. Visibility was clear, there was occasional drizzly rain and the air temperature was approx. 9 °C.

4.4 Accident records

The ECS data recorded on board and the AIS data recorded by the Kiel Canal Vessel Traffic Service were available for the marine casualty investigation. In addition, the video recordings of two surveillance cameras located in the site of Messrs Voith were analysed.

4.4.1 ECS data from on board the BELUGA SENSATION

A Navi Sailor 3000 electronic chart system made by Transas was installed on board the BELUGA SENSATION. The data recorded by the ECS was downloaded on 28 October 2008 by the BSU with the assistance of the vessel operator and analysed.
At the time of the collision with the pier at 0601, the speed was approx. 3.8 kts. The course of the voyage is marked green.

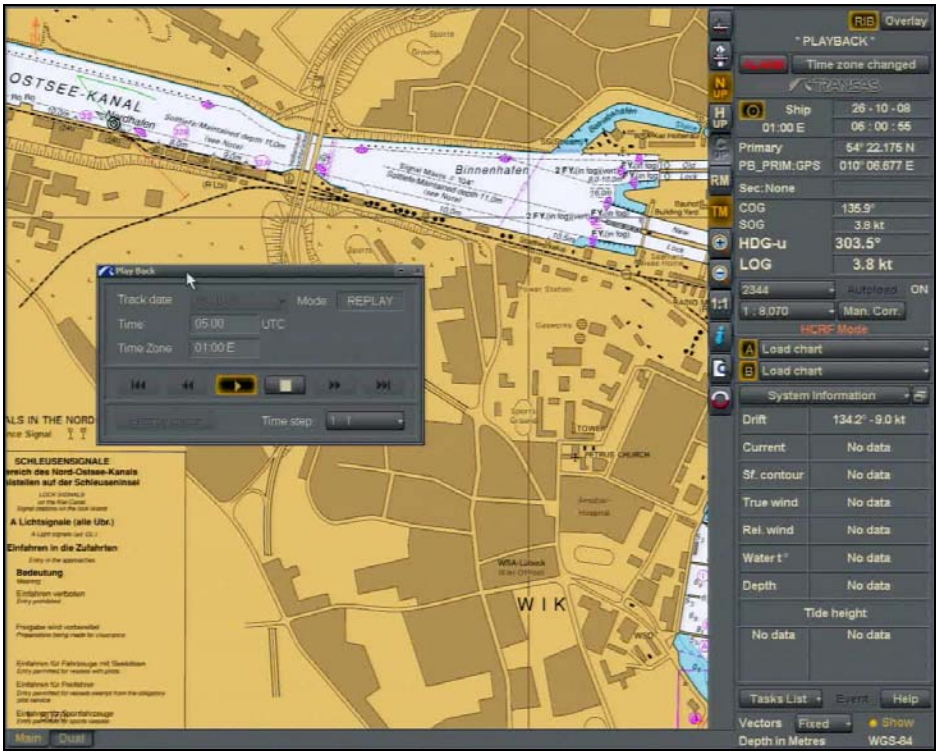

Figure 7: Data from the Electronic Chart System (ECS)

4.4.2 AIS data recorded by the Kiel Canal Vessel Traffic Service

The Automatic Identification System (AIS) data are recorded for the whole of the Kiel Canal by the Vessel Traffic Service in Brunsbüttel. Said data were available for the investigation by the BSU.
In the following figure, we see the MV MARE following the BELUGA SENSATION and the JEROME H securely moored alongside the pier.

The first recording of the BELUGA SENSATION moving astern was logged at 0559.

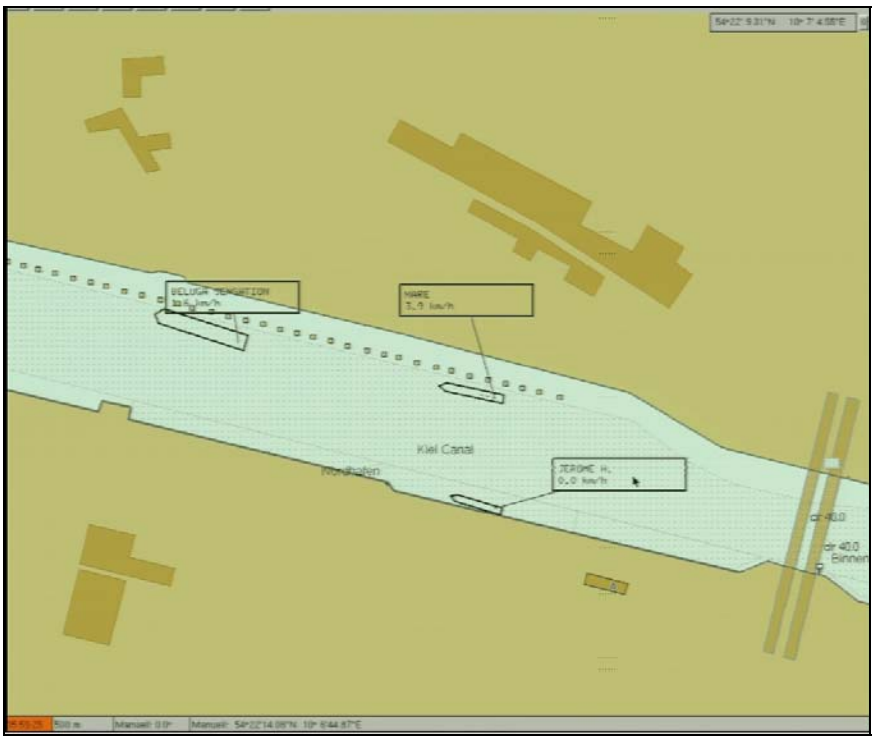

Figure 8: AIS data from 055925

The BELUGA SENSATION continues to move astern unabated. The approaching MV CASSANDRA stops, as does the MV MARIA SCHEPERS, a vessel proceeding in the same direction situated under the bridges in the Kiel inland port. The collision with the pier is recorded at 0601.

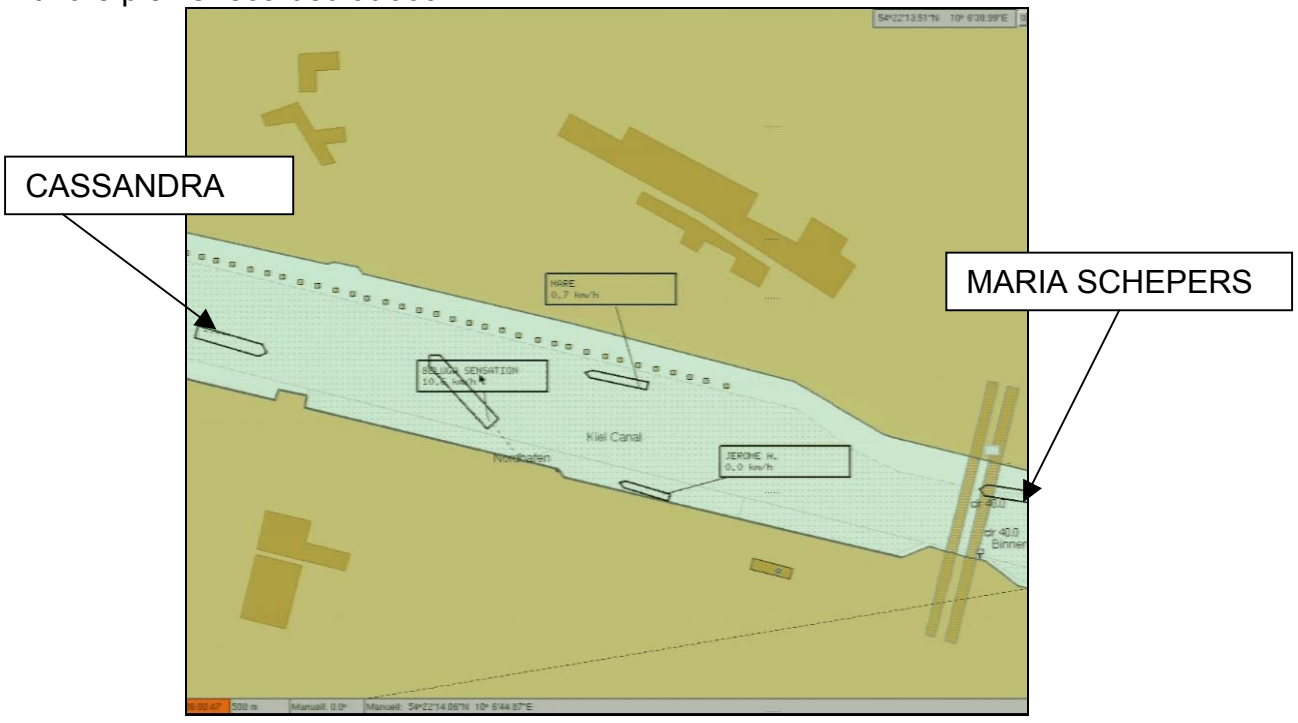

Figure 9: AIS data from 060047

Due to being struck by the BELUGA SENSATION, the MV JEROME H is torn from its mooring and drifts at approx. 3 kts to the northern side.

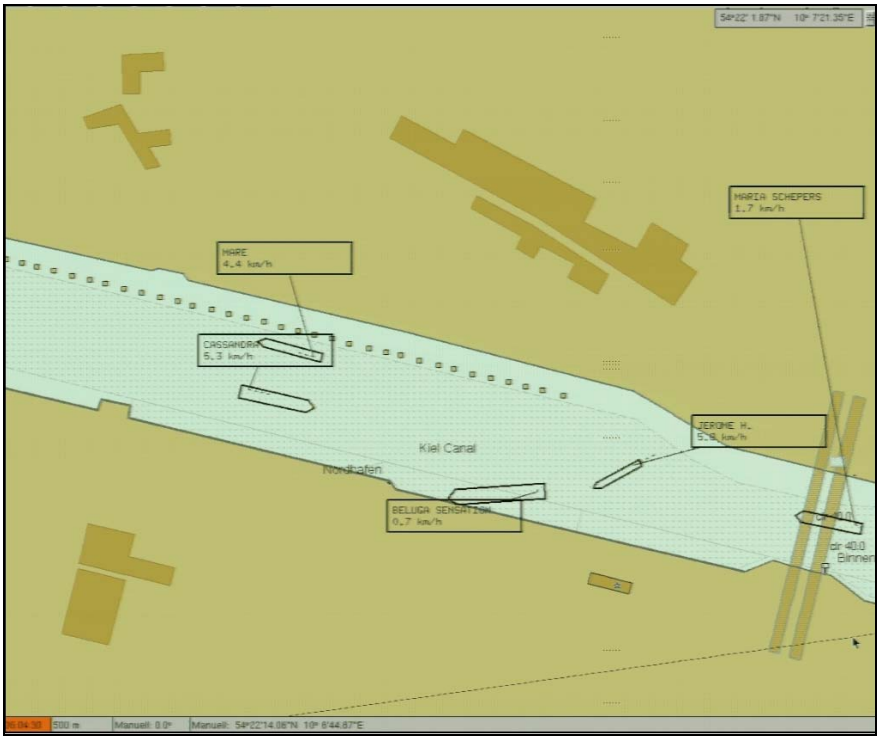

Figure 10: AIS data from 060430

With no one at the helm and no propulsion, the MV JEROME H drifts stern foremost against the sheet piling on the northern side of the canal.

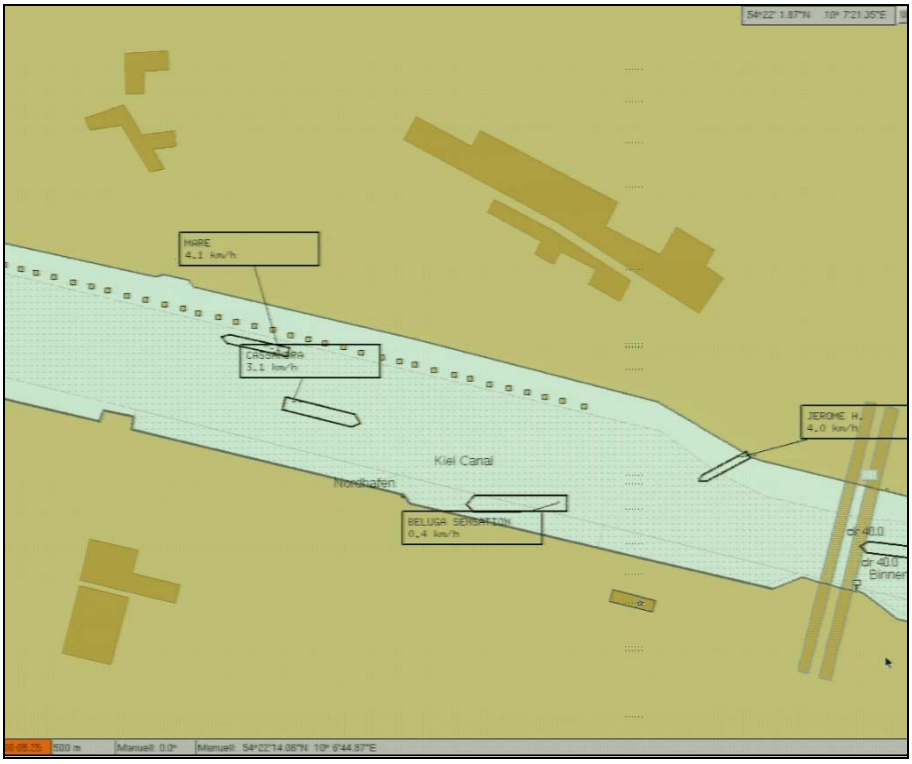

Figure 11: AIS data from 060825

4.4.3 Video camera recordings

The collision with the pier was recorded by two video cameras at 060340 (time does not coincide with the shipboard GPS time as the time recording of the camera was entered manually and is not modulated).

Figure 12: Camera recording

4.5 Investigation on board

Two systems that are totally independent of one another are available for steering the vessel electronically; these are integrated in the conning position in the middle of the vessel's bridge and in the two conning positions in the bridge wings. The main system, the 'RESP CHANGE' system, for which the steering can be transferred from one position to another, is commonly used. The second system, the 'BACK-UP' system, is an emergency system that can be used to adjust the propeller pitch by means of a joystick if problems arise with the normal steering system.

To transfer the steering to either conning position, the 'RESP CHANGE' push button on the main system must be pressed and the propeller pitch synchronised. This 'RESP CHANGE' push button is at the above centre of a switch block consisting of six buttons. The 'BACK-UP ON/OFF' push button is located at the bottom left of this switch block. This button is pressed in order to steer the vessel in an emergency in 'back-up mode' by means of the joystick if the systems fail. The 'BACK-UP ON/OFF' push button must be pressed once again to return to normal mode. Beyond that, it is possible to switch back to the normal steering mode directly from the steering station in the engine control room; this has priority over the other systems.

The Chief Officer stated that he probably pressed the 'BACK-UP ON/OFF' push button instead of the 'RESP CHANGE' push button without realizing it at the conning position in the starboard bridge wing, where it was dark. Following that, the controllable pitch propeller switched to 'full astern'. It was not possible to switch the steering system back to normal mode by operating the joystick and re-pressing the 'BACK-UP ON/OFF' push button as well as other buttons on the conning positions. Only later, after the main system ('RESP CHANGE' system) was reactivated in the engine control room, was it possible to operate the vessel in the normal steering mode.

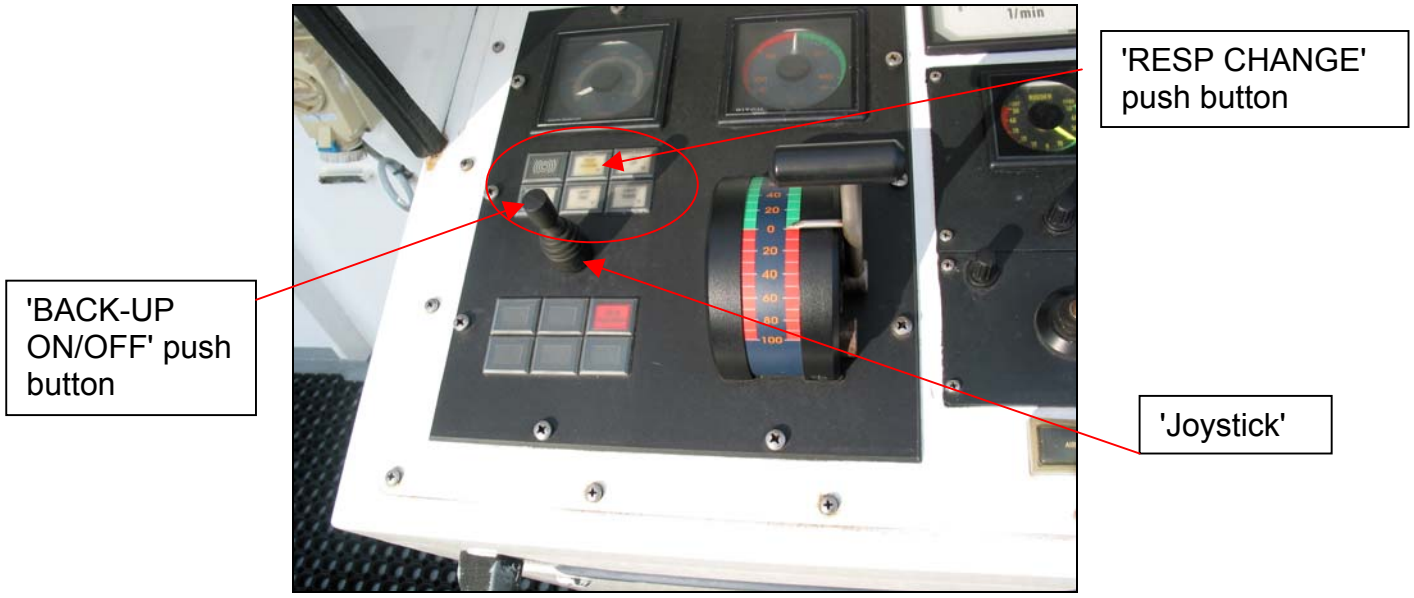

Figure 13: Starboard bridge wing conning position

During the shipboard investigation by the BSU on 28 October 2008, it was found that the 'BACK-UP ON/OFF' push button on the control panel in the port bridge wing was masked with adhesive tape. The Master stated that he stuck this adhesive tape on the push button after the accident only in the port bridge wing to prevent anyone from pressing it again erroneously.

Figure 14: Port bridge wing conning position

At the main conning position amidships, a piece of copper sheet approx. 1 cm in height was fitted around the 'BACK-UP ON/OFF' push button and the 'FIXED SPEED' button.
It was not possible to determine why this was done.

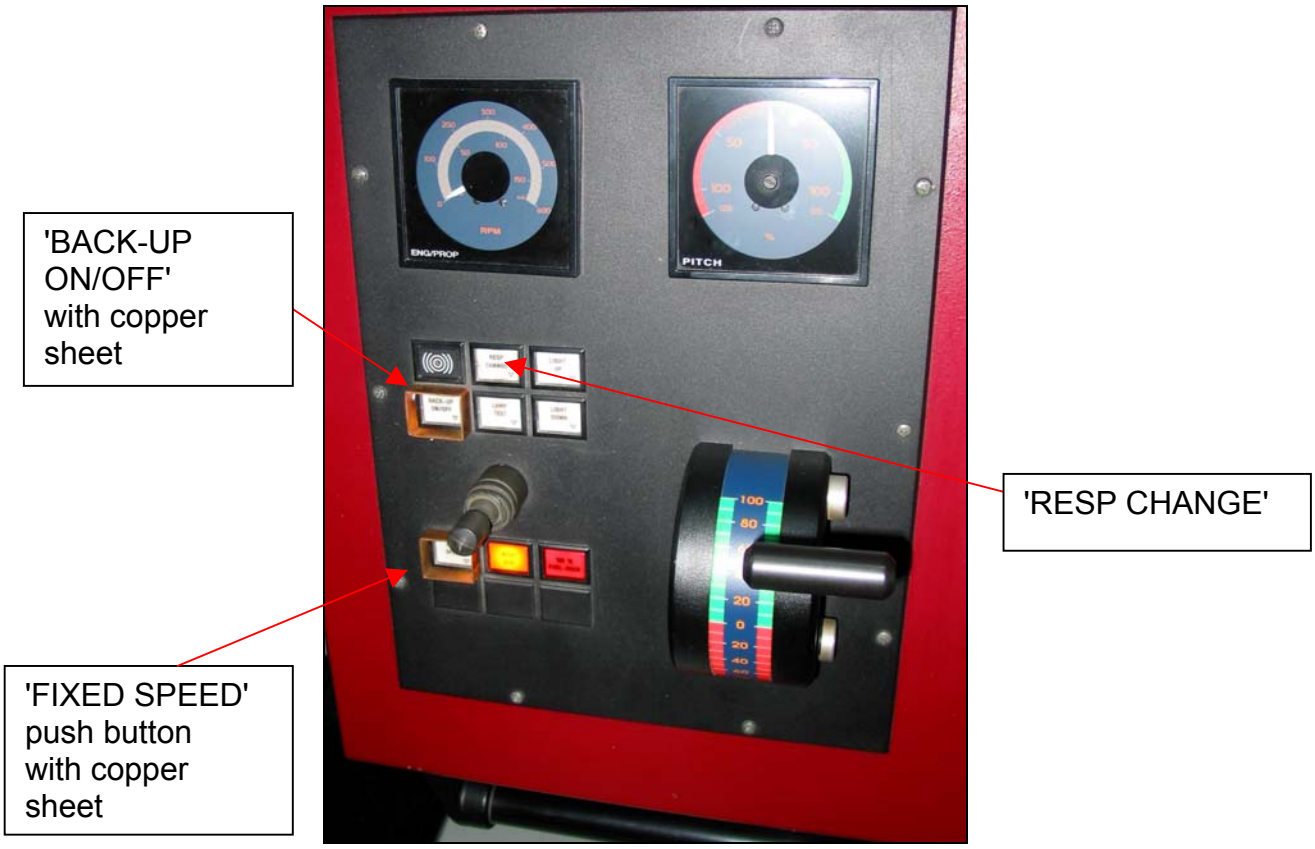

Figure 15: Conning position amidships

4.5.1 Investigation of the steering

On 28 October 2008, a technician from Messrs Wärtsilä was brought in for the investigation of the electronic steering system. The technician found that all the functions of the main system (in 'RESP CHANGE' mode) were working properly in the two bridge wings and in the conning position amidships.

When the 'BACK-UP' system was activated, the pitch of the controllable pitch propeller moved to 'full astern' independently (about 110-120% AS) rather than assuming the current pitch; moreover, it was not possible to control it using the joystick. An inspection of the electrical components revealed that a short circuit on a board in the port bridge wing between the connection points No. 31 (24 V to Back-up) and No. 32 (Back-up Astern) was responsible for this malfunction.

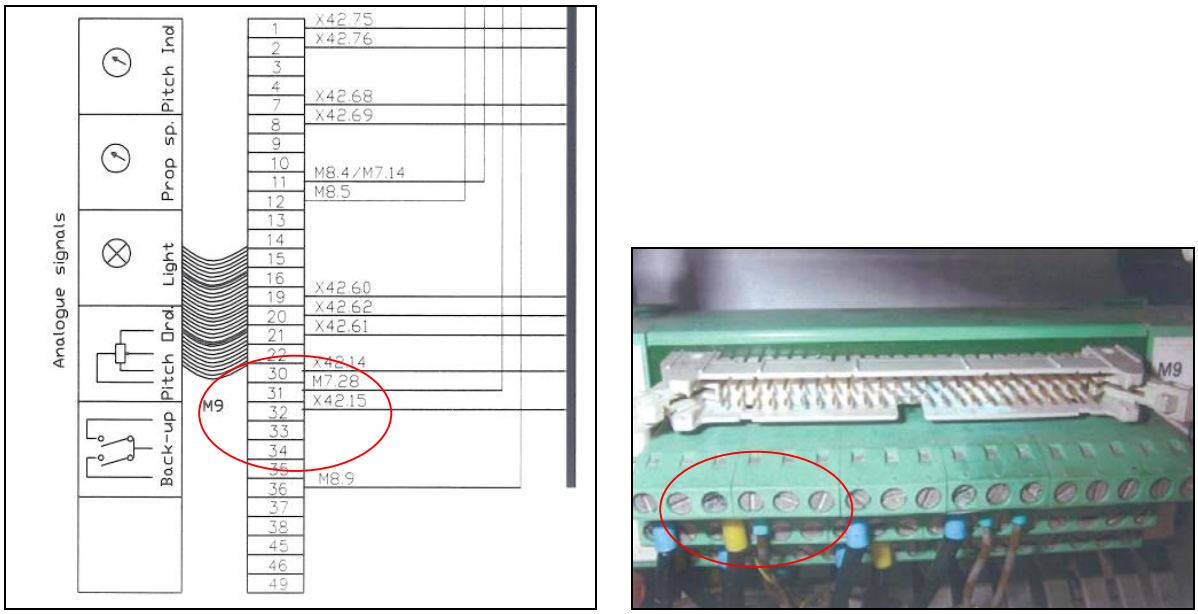

Figure 16: Wiring diagram and board in the port bridge wing conning position

The switching system for the 'BACK-UP' mode is designed so that all three cables of the conning positions converge in the board of a control box on the bridge. The consequences of a short circuit would therefore have always occurred regardless of which of the three 'BACK-UP ON/OFF' push buttons had been pressed.

The short circuit was undoubtedly caused by moisture entering the console in the port bridge wing. Due to the corroded contacts, it is assumed that a concealed defect had been progressing gradually for some time. According to the crew, the 'BACK-UP' system was routinely checked when setting sail. However, the fault only became apparent after the coincidental activation of a 'BACK-UP ON/OFF' push button.

4.6 Activities during the accident

Due to the unsuccessful attempts of the Chief Officer to correct the malfunction of the control, a period of approx. 2 minutes passed until the collision with the pier.

Shortly after noticing the fault, the pilot recommended that the main engine be brought to a standstill by means of a crash-stop.
Had the Chief Officer complied with this recommendation, the main engine would have stopped within a very short time and the vessel would have lost her propulsion.
However, it is only possible to restart the main engine after the propeller shaft comes to a complete standstill. Under these circumstances, a crash-stop may have led to the vessel being uncontrollable for an extended period. Operation of the crash-stop would only have been likely to be successful if an anchor manoeuvre was executed immediately after the fault was detected. According to Steering Rule art. 21 (3) of the German Traffic Regulations for Navigable Waterways, in a fairway bow anchors must be ready to drop immediately. The BELUGA SENSATION had anchored off Holtenau prior to entering the Kiel Canal and the port bow anchor was therefore still partially lowered and ready to drop. Prompt anchoring, which would have brought the vessel to a standstill, would not have been possible in spite of the partially lowered port anchor, because after leaving the lock none of the crew was situated in the forecastle in order to immediately operate the anchor(s).
Therefore, under the given circumstances it is questionable whether a collision with the pier would have been avoidable or the impact energy to which the pier was subjected reduced through operation of the crash-stop in combination with an anchor manoeuvre.

5 Conclusion

"Even the smallest error can lead to high costs."

Several ideas for excluding malfunctions and/or improper operation in the future emerged during discussions with the technician and the crew.

The following was proposed:

- Installation of indirect lighting in the conning positions of the bridge wings to avoid confusion between the control buttons.
- Signal leads should not be arranged directly adjacent to one another on the terminal strip.
- Change the position of the heating elements that prevent condensation.
- Periodic functional check of the electrical systems.

The vessel operator, Beluga Shipping, informed the BSU in writing that the following measures had been taken to prevent future incidents and accidents:

- An 'All Vessels Instruction (AVINS)' was issued to every vessel in the vessel operator's fleet; this gave notification of the incident and once again gave instructions to test the CPP backup system before sailing into and out of port, but at least once a week.

- The crew of each vessel was instructed to inspect the terminal strips and heating in the wing conning positions and report accordingly to the vessel operator. Similarly, the seals and the condition of the wing conning positions are to be inspected regularly. The scheduled maintenance system for the vessels has been supplemented by this paragraph, which requires regular testing and inspection of the wing conning positions. A prescribed inspection and further assurance of the proper state are thus additionally ensured.

- Vessels of Beluga Shipping that are fitted with the same CPP backup system and wing conning positions have had additional heaters installed in the wing conning positions to prevent oxidation to the greatest possible extent. The wing conning positions of every other vessel in the fleet were also inspected and upgraded where necessary.

- In the vessel operator's internal monthly training for the crews and at briefings of the ship's commands, these problems along with the correct measures/actions to avoid such problems will be discussed before every deployment.

6 Sources

- Investigations by the waterway police (WSP)
- Written statements
  - Ship's command
  - Vessel operator
- Witness accounts
- Expert opinion/technical contribution
- Nautical charts and vessel particulars, Federal Maritime and Hydrographic Agency (BSH)
- Records of the Maritime Safety Services/Vessel Traffic Services (VTS)
- Documents of the Marine Insurance and Safety Association (See-BG)
  - Accident Prevention Regulations for Shipping Enterprises (UVV-See)
  - Guidelines and codes of practice
  - Ship's documents