



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

Investigation Report 28/06

Very Serious Marine Casualty

**Fatal occupational accident on board
MV “Heinrich S” in the port of Koper
on 25 January 2006**

1 November 2007

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 25 January 2006 the container vessel HEINRICH S, sailing under German flag, approached the port of Koper, Slovenia. Once the ship had moored, the gangway was scheduled to be deployed at approximately 07:30¹. The crew members working on this task were the boatswain and a deckhand. Both were positioned on the already lowered gangway to set up the handrails. Neither the boatswain nor the deckhand was wearing fall prevention gear or a life jacket. It was intended to raise the inboard handrail first. In doing so, the boatswain lost his balance and fell onto the quay from a height of approx. 5 m. From the quay he rolled into the water and sank immediately. He could not be recovered alive.

¹ All times are local times = Central European Time (CET)

2 Scene of the Accident

Type of event: Very serious marine casualty,
fall from gangway resulting in death
Date/Time: 25 January 2006/07:40
Location: Port of Koper/Slovenia
Latitude/Longitude: ϕ 45°33,25'N λ 013°44,3'E

Section of Chart 1068, Federal Maritime and Hydrographic Agency

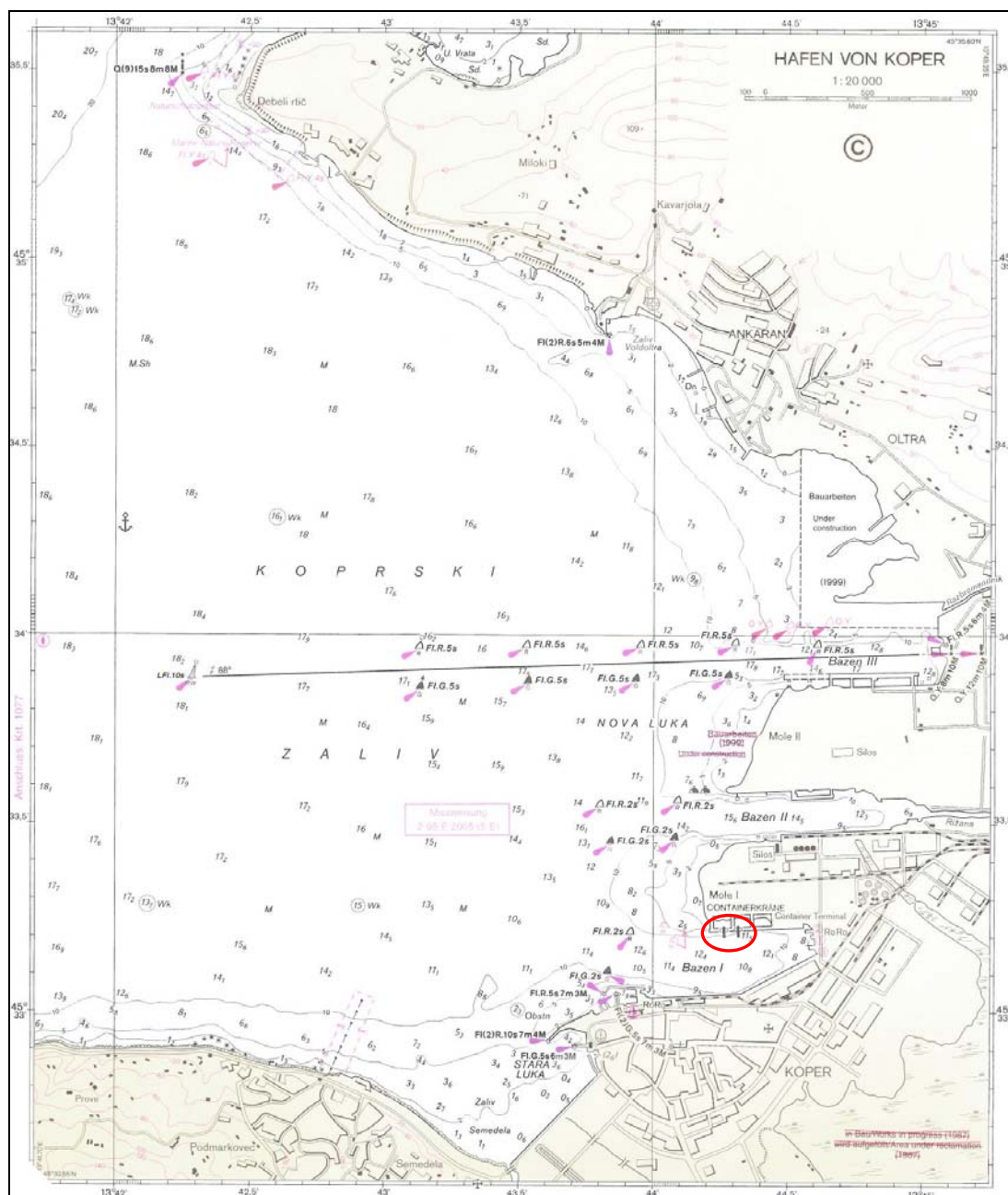


Figure 1: Chart showing the scene of the accident

3 Vessel Particulars

3.1 Photo



Figure 2: Vessel photograph – LIBRA SALVADOR (sister ship)

3.2 Particulars

Name of the vessel:	HEINRICH S (since renamed CCNI CARTAGENA)
Type of vessel:	Container ship
Flag:	Federal Republic of Germany
Port of registry:	Elsfleth
IMO No.:	9158513
Call sign:	DDJE
Shipping company:	H+H Schepers Reederei GmbH & Co. KG MV "Heinrich S"
Year built:	1998
Shipyard/Yard No.:	Volkswerft GmbH Stralsund/420
Classification society:	Germanischer Lloyd
Length overall:	207.44 m
Beam overall:	29.80 m
Gross tonnage:	25,624
Deadweight :	33,938 t
Engine rating:	17,200 kW
Main engine:	DMR 6 L 70 MC
Speed:	20 kn
Hull material:	Steel
Crew:	21

4 Course of the Accident

4.1 Voyage

Arriving from Trieste, the container ship HEINRICH S had initially anchored off the port of Koper. On 25 January 2006 the anchor was weighed at 06:05 and the ship headed for the pilot position. The Pilot came on board at 06:30. The vessel reached berth No. 7 of the container terminal under tug assistance. By 07:30 the ship had moored with its starboard side. The quay was equipped with fenders. As a result the ship lay approx. 1 m away from the quay.

Berth No. 7 is located on a narrow pier set on pilings and connected with the actual port facilities by means of bridges. The berth is separated from the remainder of the port facilities by harbour waters.

4.2 Course of the accident

At the time of the accident the wind was ENE at 5 Bft. The air temperature was -3 °C. The victim worked as a boatswain on board the ship. While mooring in Koper he worked on the forward manoeuvring station.

Following completion of the mooring activities, the boatswain, accompanied by a deckhand, had gone directly to the starboard gangway to deploy it. After unfolding the gangway, the boatswain had lowered it down to quay level by means of the winching gear. Then the deckhand and the boatswain had stepped down to erect the railing. They had begun with the inboard part of the handrail. During this operation the deckhand had taken up his position on the lower third of the gangway. The boatswain had worked on the upper third. Hearing a cry from the boatswain, the deckhand had turned towards him but had only seen him falling. The boatswain had fallen onto the quay with the head first and then rolled into the water. He had sunk almost immediately thereafter. The deckhand had jumped onto the quay but was unable to reach the boatswain. The deckhand had then informed the ship's command via his VHF-radio.

Two witnesses who were not part of the ship's crew made similar statements.

The ship's command ordered a diving company to search for the casualty. Yet during the preparation for the dive the casualty was sighted on the water's surface between the quay and the port facilities and recovered dead at approximately 08:30.

5 Investigation

5.1 HEINRICH S

HEINRICH S is a full container ship of typical layout, i.e. the superstructure is located aft. Five hatches and a stowage space forward of the superstructure above the engine room are used to transport the cargo. The vessel is equipped with three loading cranes.

The gangway is stowed in the area of the transition between hatches 4 and 5. This is where the ship has its maximum beam at waterline.

5.2 Gangway

The gangway is a type of diagonally inclined set of steps. When in use its lower end rests on the quay. The ship's movements are evened out by rollers at the point of contact. The upper end is secured onto a swivel platform. This makes it possible to deploy the gangway at different angles depending on the ship's load and the conditions on shore. The steps are large and wide. Each step is rounded, so as to provide a tread at all different gangway setting angles. At the lower end there is a platform to facilitate climbing when the gangway does not rest on the quay.

Folding handrails installed on either side enable safe use of the gangway. These handrails consist of fixed grabs and movable pivot-mounted stanchions. For operation, the handrails must be erected from their horizontal storage position in the direction of the upper platform. This is done manually. Following erection of the handrail, a line is drawn through eyes in the stanchions located halfway between the gangway and the handrail on each side for additional safety.

When the gangway is not in use, it is stored horizontally and tipped by 90° in a kind of gangway pocket in a recess of the ship's railing. Once the gangway is folded outboard, a winch is used for raising and lowering. For this purpose, two wires running over a folding boom or davit are attached to the centre of the gangway.

The gangway of the HEINRICH S is made of galvanised steel.

The gangway manufacturer was BEMEG-Industrieplanung GmbH, no longer in existence today. Nowadays, similar equipment is manufactured by BAUWESTA Metallbau GmbH. Technical documentation for both companies was available from the shipyard.

Safety devices for people on the gangway are not part of the gangway itself. Such safety devices are discussed between the shipyard and the client and are part of the ship's design. The design of the HEINRICH S, which had not been prepared by the Volkswerft Stralsund did not include safety devices. However, other clients consider them to be standard.

5.3 Manual

In the operating instructions available to the Federal Bureau of Maritime Casualty Investigation (BSU) the gangway is described as a "accommodation ladder" [*Fallreepsanlage*]. Both sets of instructions differ only in the sections concerning the winch drive.

Operation is described below using the instructions provided for the BEMEG equipment:

“BEMEG –accommodation ladder system consisting of:

- 1 Swivel platform
- 1 Accommodation ladder with lower platform
- 1 Hoisting arrangement with davit and electric winch
Operating by push button

M O V E M E N T S :

A. Setting ladder into operation

Loose lashings.

Push button “**LOWERING**”. The spring which is fixed between bulwark and davit, swing out davit and accommodation ladder.

Further movements will continue by davit’s and ladder’s own weight.

B. Installation of handrail

Before the accommodation ladder set down on quay wall, handrail must be installed. Swing up handrails and stanchions of ladder in the direction of swivel platform. Screw up to stanchion of platform.

Ropes must be fastened at the lower end to the bolt eyes and pulled through the eyes of stanchions in direction to upper swivel platform. Fasten the ropes at the bulwark.

Ladder’s lower podest has to be put into the right angle of inclination.

Set down the accommodation ladder on quay wall.

C. Removing ladder into bulwark’s recess

Part B to be handled in reversed operation. Push button switch “**HOISTING**”. The accommodation ladder which stops working by limit switch automatically.

Equipment to be fasten.”²

² Breakdown and emphasis as in the original, German version differs from the English translation.

An employee of BAUWESTA Metallbau GmbH stated to the investigators of the Federal Bureau of Maritime Casualty Investigation that the handrail is supposed to be rigged while the gangway is still in horizontal position, i.e. immediately after tilting it out of its storage position.

5.4 Circumstances of the casualty

The handrail was erected by the boatswain together with another crew member. At the time of the accident, both wore the prescribed personal safety work clothing including hard hats. Life vests were not worn. There were apparently no other crew members in the proximity of the scene of the accident. Neither the boatswain nor the deckhand used fall prevention gear.

There was no special manual on board concerning the operation of the gangway, i.e. there was neither a handbook in the form mentioned under item 5.3 nor a set of instructions made up by the shipping company or the ship's command. However, the functioning of gangway systems is relatively standard and thus part of the basic knowledge required of every trained seaman.

The external witnesses both observed most of the boatswain's fall. According to these witnesses, the boatswain fell backwards onto the quay from a height of approximately 5 m after losing his balance. From the quay he rolled into the water.

The scene of the accident was examined by the Koper Maritime Police and the Maritime Inspectorate of the Shipping Administration of the Republic of Slovenia. Excerpts from these reports were made available to the Federal Bureau of Maritime Casualty Investigation.

5.5 Working hours

The boatswain had been on board since 3 December 2005. This was his third contract on that ship. He was therefore experienced and familiar with conditions on board.

At the beginning of his contract he had participated in the mandatory safety familiarisation on board.

On that day the boatswain had started work at 05:30. By the time the accident occurred he had worked for two hours. Exact working and rest hours are set out in Figure 3. The following can be ascertained on the basis of the abovementioned records:

- There were 81 working hours in the seven-day period preceding the accident.
- The rest-time available was 87 hours in the same period.
- In the period between 20 January 2006 01:00 and 21 January 2006 01:00, rest-times had been broken down into three periods of 4 + 1 + 4 hours.
- In the period between 22 January 2006 08:00 and 23 January 2006 08:00, rest-times had been broken down into the following periods: 1 – 3 – 4 – 2
- The last 24 hours before the accident comprised 15 working hours and 9 hours of rest.
- Before starting work on the day of the accident, the casualty had enjoyed an uninterrupted rest period of 6.5 hours.

Date	Weekday	Sea = S Harbour = H	Harbour	Working time																								Total daily working time	Off-times within 7 days before the accident
				0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23		
18.	We	S																										8	16
19.	Th	S																										11	13
20.	Fr	SHS	Taranto																									12	12
21.	Sa	S																										11	13
22.	So	SHS	Rijeka																									14	10
23.	Mo	SH	Trieste																									10	14
24.	Tu	HS	Trieste																									15	9
25.	We	SH	Koper																									81	87

Figure 3: Overview of the casualty's hours of work and rest

6 Analysis

6.1 Course of the accident

Environmental conditions were not unusual at the time of the accident. The Slovenian police ascertained that there was no ice on the gangway. No special constraints due to constructional particularities of the quay or external influences that might have acted on the casualty were observed.

The BSU's investigation was unable to determine an unequivocal cause for the boatswain's fall.

6.2 Occupational health and safety measures

Deployment of the gangway was a standard activity within the scope of general ship operations. The necessary related safety measures are given in § 9 UVV See³:

- (1) *The employer shall ensure that dangerous work is performed only under the supervision and direction of a operational supervisor, and that such work is not started before such safety precautions as are necessary in the specific circumstances have been taken.*
- (2) *Precautions shall be taken to prevent falls occurring during the course of any work that involves more than single manipulations outside the hull, on deck but outside the deck railings, on the mast, in the bosun's chair, on stages, or at other dangerous locations.*

The work on the gangway was not superintended by a supervisor. Supervision could potentially have been part of the emphasised function of the boatswain, thus of the casualty himself.

The requirement of paragraph 2 was not met. Neither of the persons working on the gangway used any fall prevention gear.

To this extent the ship's operator and/or the master as the operator's representative appear to have made only inadequate efforts to ensure compliance with the stipulations of the Accident Prevention Regulations.

To this extent, the ship's command also did not meet the requirements set out in the document published by the shipping company as Master's Circular No. 16 dated 31 March 2004. This circular, which was part of the ISM Manual, includes the following text:

... Personnel working outboard should wear a safety harness/belt with lifeline separately connected to the vessel at all times. Additionally, where work is done overside, buoyancy garments should be worn and a lifebuoy with sufficient line attached should be kept ready for immediate use. ...

The requirements for crew working on the gangway result from § 19 UVV See:

- (1) *Insured persons shall wear the personal protective equipment that has been placed at their disposal. ...*

Both crew members should have worn fall prevention gear. Because of the varying height of the gangway, with the procedure used to deploy the gangway on the day of

³ UVV See – Unfallverhütungsvorschriften für Unternehmen in der Seefahrt [= Accident Prevention Regulations for Shipping Enterprises]

the accident such safety gear would have had to allow for adjustment to different heights. In addition, either two safety backups or structural measures enabling clipping on of the fall prevention gear would have been required. Furthermore, the procedure involving erection of the handrail only once the gangway had already been lowered precluded use of a simple safety system. To this extent the procedure was less suitable.

While it was being lowered and until the moment of setting down on the quay the gangway practically lay against shell plating skin of the ship. Thus the hull provided a natural safety barrier. Why nonetheless this side was chosen to start erecting the handrail could not be determined by the BSU.

6.3 Manual

There were no manuals from the gangway manufacturer on board the HEINRICH S. As the operating instructions in the possession of the BSU did not literally correspond to the information provided verbally by the manufacturer in regard to the deployment procedure, it would have been of little use for the crew. In fact the erection of the handrail immediately after the gangway was tilted out of its storage pocket, i.e. while it was still horizontal, was not described in here.

6.4 Working hours

The casualty's working hours and rest-times were reviewed based on § 84a of the Seamen's Act [*Seemannsgesetz* (SeemG)]. In doing so, the following points were established:

- The maximum working time of 14 hours within every 24 hour period was not complied with in the 24 hours immediately preceding the accident, but was otherwise regularly respected,
- With 81 hours worked, the maximum working time of 72 hours within every 7 day period was not complied with,
- The minimum rest-time of 10 hours within every 24 hour period was not complied with in the 24 hours immediately preceding the accident, but was otherwise regularly respected,
- With 87 hours available for rest, the minimum rest-time of 77 hours within every 7 day period was complied with,
- The requirement that the daily rest-times be subdivided into at most two periods, of which one must have a minimum duration of six hours, was not met in the period between 22 January 2006 08:00 and 23 January 2006 08:00 with a rest-time sequence of 1– 3 – 4 – 2 hours.

To this extent, compliance with the working and rest period requirements was not ensured on board.

The rest-time available to the casualty before the accident was 6.5 hours. The BSU's investigation revealed no indications of fatigue or other influences of the boatswain's ability to perform, although the allowable maximum working time had been exceeded by one hour in the 24 hours preceding the accident.

6.5 Actions taken

As a reaction to the casualty, the ship's operators had a safety wire installed in the gangway pocket area on all the shipping company's vessels. This wire rope stretched over the length of the gangway pocket at main deck level now enables use of safety harnesses with attached safety lanyards.



Figure 4: Unfolded gangway with safety wire ⁴

⁴ The safety belt used in Figure 4 does not meet the standards for safety harnesses set in § 5 UVV See and in Circular B 1 of the Marine Insurance and Safety Association.

6.6 Outlook

In the context of the new regime of bodies responsible for the control of occupational health and safety on board ships, the Accident Prevention Regulations for Shipping Enterprises will also be amended. The responsibility and liability of vessel operators will be assigned significantly higher importance. Operators must carry out risk analyses to identify potential hazards on their ships and then take measures to eliminate or minimise them. This risk analysis procedure is intended to start at the shipbuilding stage. Close collaboration between the client and the shipyard in this respect at this early stage can, through potentially simple constructional measures, increase safety on board ships. Within the scope of this new regime the current Accident Prevention Regulations for Shipping Enterprises will be abridged to the extent that in future only the goals to be attained will be codified. The way to attain these goals will in future be the exclusive responsibility of the owner/operator of a seagoing vessel.

In this sense, safety recommendations generated out of the present investigation are addressed only at the ship's operators and the ship's command.

7 Safety Recommendations

The following safety recommendations shall not create a presumption of blame or liability, neither by form, number nor order.

1. The Federal Bureau of Maritime Casualty Investigation recommends to operators of seagoing vessels to:
 - describe clearly the procedures for operating the gangway and to include the safety requirements to be met in doing so;
 - design their vessels in the gangway area in a manner such as to enable easy implementation of fall prevention measures;
 - guarantee the implementation of the requirements set out in § 9 of the Regulations for the Prevention of Accidents at Sea and § 84a of the Seamen's Act.
2. The Federal Bureau of Maritime Casualty Investigation recommends that vessel command pay increased attention to compliance with the stipulations concerning work outboard and aloft, in particular – as in this case – also the use of personal safety gear pursuant to § 19 of the Accident Prevention Regulations for Shipping Enterprises.
3. The Federal Bureau of Maritime Casualty Investigation points out to vessel command that the working hours and rest periods on board must be organised in a manner such that the maximum working hours and minimum rest-times pursuant to § 84a Seamen's Act are complied with.
4. The Federal Bureau of Maritime Casualty Investigation recommends that gangway manufacturers formulate their operating instructions in a manner such that the procedure is described unequivocally.

8 Sources

- Investigation conducted by the Maritime Police of Koper/Slovenia
- Investigation conducted by the Slovenian Maritime Inspection Division
- Written statements/opinions
 - Vessel management
 - Shipping company
 - Classification society - Germanischer Lloyd
- Ship's files
- Witness statements
- Chart of the Federal Maritime and Hydrographic Agency [*Bundesamt für Seeschifffahrt und Hydrographie* (BSH)]
- Marine Insurance and Safety Association documentation
 - Accident Prevention Regulations for Shipping Enterprises (UVV See)
 - Guidelines, Directives and Circulars
- Operating instructions for gangways published by BEMEG-Industrieplanung GmbH and BAUWESTA Metallbau GmbH
- Photographs: Figures 2 and 4 - H. Schepers Bereederungs GmbH & Co. KG