

Interim Factual Report 11-201: Passenger vessel Volendam, lifeboat fatality,
port of Lyttelton, New Zealand, 8 January 2011

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Interim Factual Report

Marine Inquiry 11-201

Passenger vessel Volendam, lifeboat fatality,
port of Lyttelton, New Zealand, 8 January 2011

Approved for publication: February 2011

Transport Accident Investigation Commission

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The Transport Accident Investigation Commission (Commission) is an independent Crown entity responsible for inquiring into maritime, aviation and rail accidents and incidents for New Zealand, and co-ordinating and co-operating with other accident investigation organisations overseas. The principal purpose of its inquiries is to determine the circumstances and causes of the occurrence with a view to avoiding similar occurrences in the future. Its purpose is not to ascribe blame to any person or agency or to pursue (or to assist an agency to pursue) criminal, civil or regulatory action against a person or agency. The Commission carries out its purpose by informing members of the transport sector, both domestically and internationally, of the lessons that can be learnt from transport accidents and incidents.

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Important notes

Nature of this report

This interim factual report is an example of a preliminary report referred to in section 9 of the Transport Accident Investigation Commission Act 1990. It is not a draft report prepared for comment but a completed report, which the Commission believes is necessary or appropriate in the interests of transport safety.

This interim factual report presents the facts and circumstances established up to this point in the Commission's inquiry, and contains no analysis or findings. However, it does refer to an urgent recommendation to address safety issues identified early in the investigation. Any extrapolation of the information given in this report would be speculation.

Final report may include different information

The Commission intends completing a final report on the occurrence after it completes its inquiry. That report will contain an analysis of the facts of the accident, findings and any recommendations. The information contained in the Commission's final report may differ from the information contained in this interim factual report.

Citations and referencing

Information derived from interviews during the Commission's inquiry into the occurrence is not cited in this interim factual report. Documents that would normally be accessible to industry participants only and not discoverable under the Official Information Act 1980 have been referenced as footnotes only. Other documents referred to during the Commission's inquiry that are publicly available are cited.

Photographs, diagrams, pictures

Unless otherwise specified, photographs, diagrams and pictures included in this interim factual report are provided by, and owned by, the Commission.



M.V. Volendam



Location of accident

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Abbreviations

kW	kilo Watt(s)
LMC	Lloyds machinery certificate
m	metre(s)
mm	millimetre(s)
SOLAS	International Convention for the Safety of Life at Sea 1974
t	tonne(s)
UMS	unmanned machinery space certification
UTC	co-ordinated universal time

Glossary

✘	new vessels constructed under the classifications society's special survey
100A1	ship considered to be suitable for sea-going service, accepted into class as complying with the society's rules and regulations and carrying on board an anchor or mooring equipment complying with the society's rules.
davit	a fitting that can project over the vessel's side for attaching tackle for hoisting or lowering a boat
elastic deformation	deformation to an object that is reversible. Once the forces are no longer applied, the object returns to its original shape
fall wires	wire rope by which a lifeboat is hoisted or lowered.
plastic deformation	deformation to an object that is irreversible. However, an object in the plastic deformation range will first have undergone elastic deformation, which is reversible, so the object will return part way to its original shape
traveller wires	wires attached to the telescopic davit arm enabling a section of the arm to extend further out than the end of the moveable trolley

Data summary

Vessel particulars

Name:	<i>Volendam</i>
Type:	Passenger vessel
Class:	SOLAS
Limits:	Unlimited
Classification:	Lloyds Register LR ✕ 100 A1, Passenger Ship, Ice Class 1D ✕ LMC, UMS
Length:	237.90 metres (m)
Breadth:	32.25 m
Gross tonnage:	61 214
Built:	Fincantieri Shipyard, Maghera, Italy
Propulsion:	Five 8640 kilowatt (kW) diesel generators providing electrical power for two 13 000 kW electric motors driving two, 4-bladed variable-pitch propellers
Service speed:	22.50 knots (kts)
Owner:	HAL Antillen N.V.
Operator:	HAL Westours Inc.
Port of registry:	Rotterdam
Minimum crew:	57
Minimum working crew	620

Date and time Saturday 8 January 2011, at about 1357¹

Location Lyttelton, South Island, New Zealand

Injuries one fatality

one minor

Damage one lifeboat constructively lost,
one tender/lifeboat repairable damage to hull

¹ Times in this report are in New Zealand Daylight Time (UTC + 13 hours) and are expressed in the 24-hour mode.

1. Conduct of the inquiry

- 1.1. On 8 January 2011 at about 1524 the Transport Accident Investigation Commission (Commission) learnt from Maritime New Zealand that an accident had occurred earlier that afternoon on board the passenger ship *Volendam* while berthed at Lyttelton.
- 1.2. The circumstances as reported at the time were that the *Volendam* had been carrying out lifeboat maintenance when the forward fall broke on one of the starboard lifeboats and 2 crew fell into the water. One crew had been rescued; the second was still missing.
- 1.3. The accident fell into the category of a “very serious accident” as defined in the International Maritime Organization’s casualty investigation code, which requires states to conduct investigations under the code. The Commission opened an inquiry into the occurrence.
- 1.4. During the night of 8 January 2011 the Commission was contacted by the Dutch Safety Board and an agreement was reached that the Commission would investigate the accident in its own right and also on behalf of the Dutch Safety Board. An agreement was made that the Commission would also be the reporting authority for the accident to the International Maritime Organization.
- 1.5. On 9 January 2011, two investigators from the Commission boarded the vessel when it arrived in Wellington and met with the senior officers on board. After a debriefing with the master and senior officers the scene of the accident was inspected and members of the crew involved in the accident and subsequent search and rescue were interviewed. Access to the failed wire was limited as the vessel was berthed port side to the quay.
- 1.6. The *Volendam* sailed from Wellington the same evening and during its subsequent port stays in Napier, Tauranga and Auckland the failed wire fall was removed and retained by the Commission. All the remaining wire falls, their attachment arrangements and the davit heads were inspected by a Lloyds Register Asia surveyor.
- 1.7. Two lengths of wire on either side of the failure point were examined by the New Zealand Defence Technology Agency, on behalf of the Commission to establish the nature of the wire failure
- 1.8. On 23 February 2011, the Commission approved an interim factual report for circulation to interested persons and urgent safety recommendations to be issued to the manufacturer of the davit system to address safety issues identified.

2. Factual information

2.1. Narrative

- 2.1.1. On Saturday 8 January 2011, the Dutch-registered passenger vessel *Volendam* berthed in the port of Lyttelton.
- 2.1.2. At about 0800, four crew members were tasked with the routine maintenance job of greasing the lifeboat fall and traveller wires on number 7 lifeboat on the starboard side. The crew members started this job at about 0830.
- 2.1.3. Two of the crew members were standing on the access platform, one greasing the wire falls on the winch drum and one operating the controls to boom the telescopic davit in and out and lower and raise the lifeboat as required to facilitate the greasing of the wires.
- 2.1.4. Two crew members were standing on the top of the lifeboat greasing the wire falls and davit traveller wires. They were attached, by safety harnesses, clipped to a safety line that had been strung tight between the forward and aft lifeboat lifting hook arrangements.
- 2.1.5. At about 1355, the job was nearing completion. The 2 crew members in the lifeboat requested the crew member at the controls to lower the lifeboat, from the lifeboat's extreme height against the davit trolley arms, a small amount to allow them to finish the greasing of the davit traveller wires.
- 2.1.6. As the winch operator was lowering the lifeboat the forward lifeboat wire fall parted and the lifeboat fell bow down, suspended by the aft lifeboat fall (see Figure 1).



Figure 1
Number.7 lifeboat in vertical position after failure of wire fall

- 2.1.7. The safety line rigged between the forward and aft lifting arrangements parted, and as it was this line to which the crew's safety harnesses were clipped, the 2 crew members on the lifeboat fell about 16 m into the water. The crew on board the *Volendam* raised the alarm and one of the vessel's rescue boats was launched shortly afterwards. One crew member was rescued but the crew member who had been at the front of the lifeboat could not be found, despite searches by the ship's crew and emergency services. Later that evening divers recovered his body from the seabed near where he had fallen into the sea.

2.2. Vessel information

- 2.2.1. The *Volendam* was built by Fincantieri Shipyard in Maghera, Italy in 1998. The vessel was owned by HAL Antillen N.V. of Curacao Dutch Antillies, and operated by HAL Westours Incorporated of Seattle, Washington, United States of America. The vessel was registered in Rotterdam, Netherlands and had valid certificates issued by the Dutch Government and by the Lloyds Register classification society.
- 2.2.2. The *Volendam* was a steel hulled passenger vessel with an overall length of 237.90 m and a breadth of 34.45 m. The vessel had an international gross tonnage 61 214. It was powered by five 8640 kW diesel electric generators powering two 13 000 kW electric motors driving two 4-bladed variable-pitch propellers giving a service speed of up to 22.5 knots.
- 2.2.3. The *Volendam* was certified to carry 620 crew and 1805 passengers. The vessel was fitted with 14 motor lifeboats accommodating 1920 persons, 16 davit launched life rafts accommodating 560 persons and 18 life rafts not required to be launched by davits accommodating 630 persons.

2.3. Lifeboat and its launching arrangement

Davits

- 2.3.1. The davits on board the *Volendam* were designed, manufactured and supplied by Navalimpianti Tecimpianti Group to the Fincantieri Shipyard. The davits for the lifeboats were of SPTDL-150P design and differed from the davits for the cruise tenders and the rescue boats.
- 2.3.2. The SPTDL-150P davits were hydraulic telescopic davits that used hydraulic rams to move the telescopic trolley arms outboard from the stowed position and recover them when necessary. The system was designed to ensure that both davit trolley arms always moved together.² Power was provided by 2 centralised hydraulic power packs on the port and starboard sides of the vessel. The winches were designed to recover a lifeboat with a maximum of 6 persons on board, not a fully loaded lifeboat.
- 2.3.3. The telescopic trolley arms of the davits were designed to support a safe working load of 86 kilonewtons. The telescopic trolley arms were located on guides on the inner faces of the fixed arms (see Figure 2). To operate the davits and lower the lifeboats the lifeboat lashings were released and the telescopic trolley arm of the davit was hydraulically pushed out to the fully extended position. The lifeboat was then lowered to the embarkation deck and the davit arm brought back in to bring the lifeboat against the ship's side.

Lifeboats

- 2.3.4. The lifeboats supplied to the *Volendam* were designed and manufactured by Schat Harding and were of the MPC 36 SV partially enclosed lifeboat design; The lifeboats were constructed from marine quality laminated glass fibre reinforced plastic; they had an overall length of 10.8 m and a beam of 4.45 m. The lifeboats weighed 5.45 tonnes (t) including loose gear and had a capacity of 150 persons. The lifeboat release hooks were of the Tor T12 design and were 9.40 m apart in the stowed position.

² Holland America Line, M.V. *Volendam*, Lifeboat maintenance manual, provided by Fincantieri

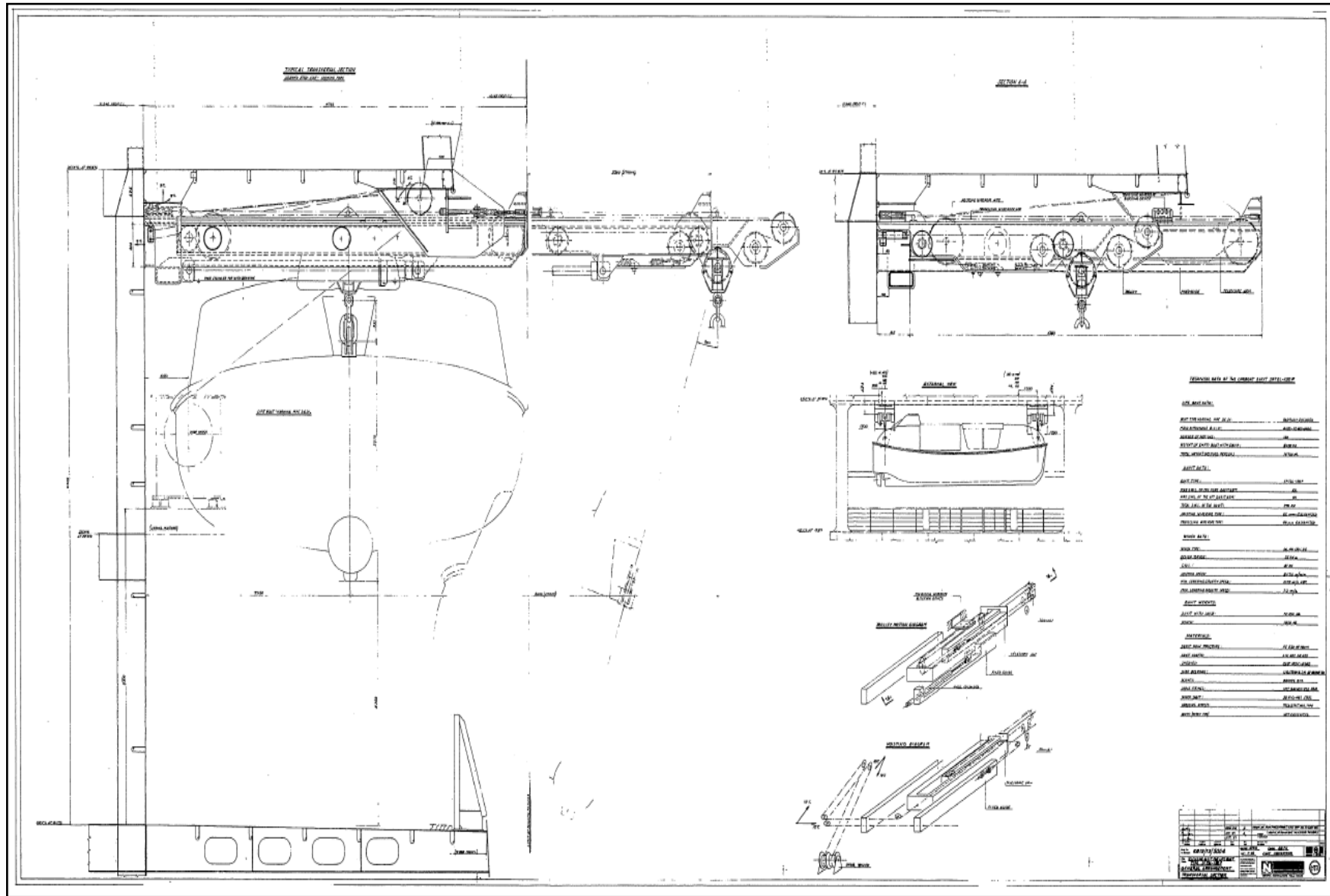


Figure 2
Diagram of the telescopic davit system as fitted to the Volendam

Wire falls

- 2.3.5. The lifeboat wire falls were of 22 millimetre (mm) 6x36 wire strand construction with an internal wire rope core. The wire falls had a minimum certified breaking strain of 390 kilonewtons. The forward fall was 90 m in length and the after fall was 81 m in length; they were manufactured by Vornbäumen Stahlseile of Bad Iburg, Germany. They were supplied to the *Volendam* in late 2005 early 2006 and fitted to number 7 davits on the 28 November 2006.
- 2.3.6. The requirement under the International Convention for the Safety of Life at Sea 1974 (SOLAS) chapter III regulation 20 – operational readiness, maintenance and inspections paragraph 4 stated that:

Falls used in launching shall be inspected periodically with special regard for areas passing through sheaves, and renewed when necessary due to deterioration of the falls or at intervals of not more than 5 years, whichever is the earlier

Holland America Line had designated a renewal period for lifeboat falls of 4 years with routine inspections at regular intervals. The number 7 forward lifeboat forward fall had been fitted to the davit for more than 4 years. The vessel's management had noted that the wire fall was due for replacement, and on 24 November 2010, asked the vessel's fleet manager whether to proceed or defer until the vessel dry docked in March/April 2011 when other work was to be carried out on the davits. Fleet management agreed to defer the changing of the fall provided that "a visual inspection of the wires was done and if the wires appeared to be in good shape the replacement could be deferred until dry dock". On 29 November a visual inspection of the wires was undertaken.

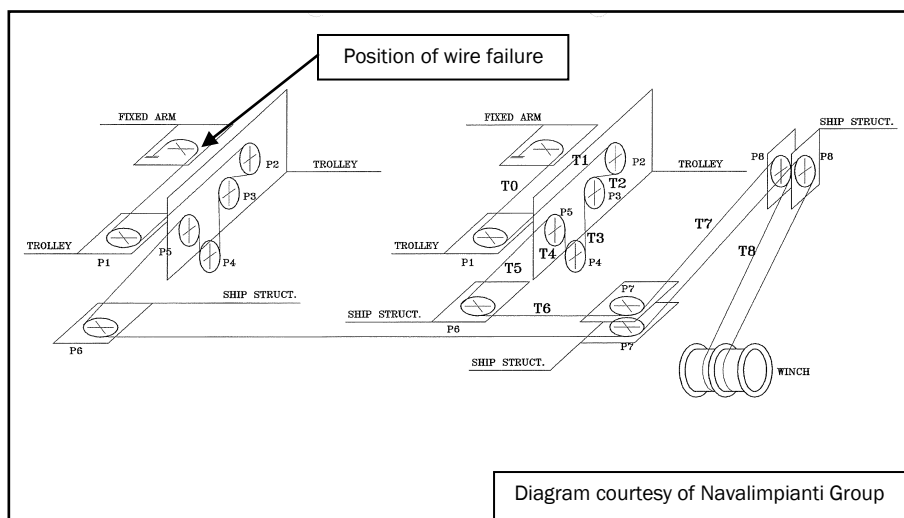


Figure 3
Wire fall reeving diagram

Since being fitted to number 7 davit, the fall had been greased on average every six weeks by ship's staff using the recommended grease.

- 2.3.7. The wire falls were wound onto 2 hydraulically driven winch drums and reeved through a series of sheaves located on the ship, on the telescopic trolley arms and on the fixed arms. Both wire falls terminated after passing around fixed guides located on the outboard end of the fixed arm of the davit (see Figure 3).

2.4. Inspection and testing

Davit

- 2.4.1. After the accident, number 7 telescopic davit was re-housed in its stowed position with the fixed end of the forward wire fall still in place. This allowed the investigators to view the wire fall in place before it was removed.
- 2.4.2. The wire failed at a point just inboard of the fixed guide on the inside of the forward davit arm (see Figures 4 and 5). When being extended and rehoused the moving trolley arm moved horizontally past this fixed guide. The groove on the fixed guide was of sufficient size to accommodate a 22 mm wire under tension. A vertical bracket on the moveable trolley beam lay adjacent to the fixed guide when the davit was in its stowed position.

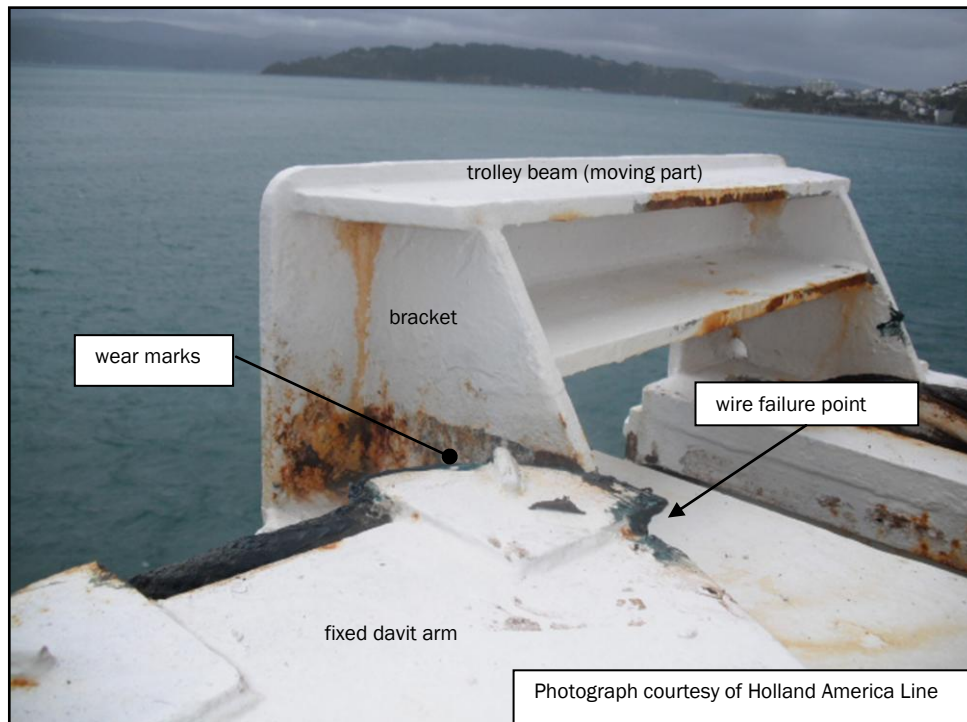


Figure 4
Number 7 forward davit showing moveable trolley beam and wire break point

- 2.4.3. Figures 4 and 5 show where the bracket had been rubbing against the fixed guide, causing wear marks on the bracket. When number 5 davit was inspected, there was evidence of wire score marks on the bracket (see Figure 6).
- 2.4.4. When number 5 davit was tested during the inspection, the surveyor noted that when the weight of the lifeboat was taken on the falls there was an elastic deformation of the fixed davit arm of up to 15 mm inwards towards the moving trolley beam. On further inspection and measurement the surveyor noted that the fixed davit beam had an inward plastic deformation of about 10 mm (see Figure 7).

Wire fall

- 2.4.5. Both parts of the broken wire were sent to the Defence Technology Agency for independent examination and testing.

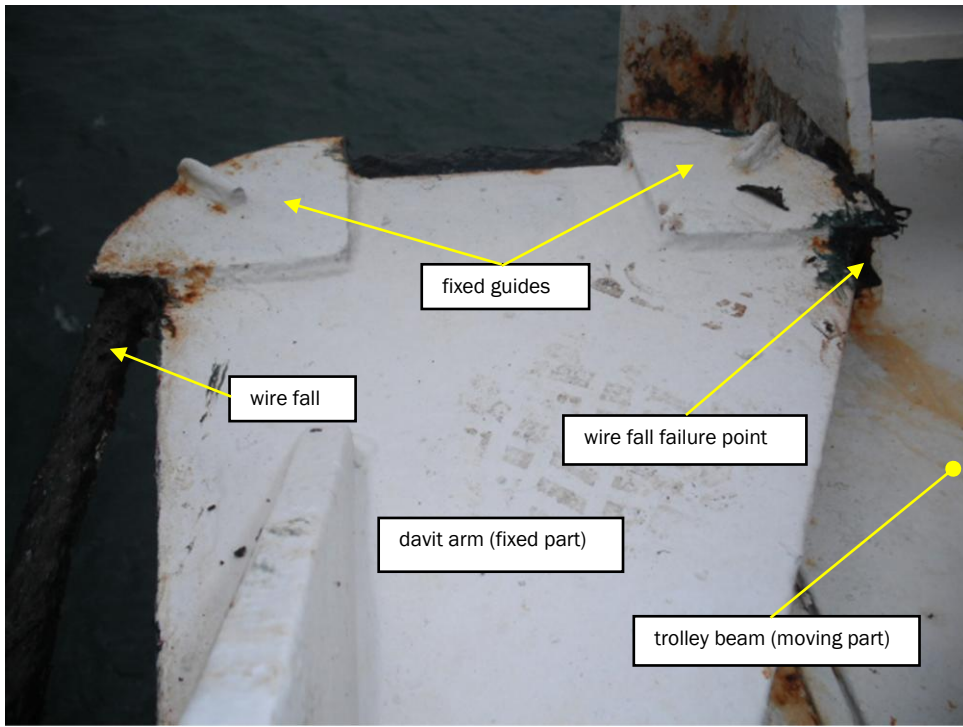


Figure 5
Head of number 7 forward fixed davit arm

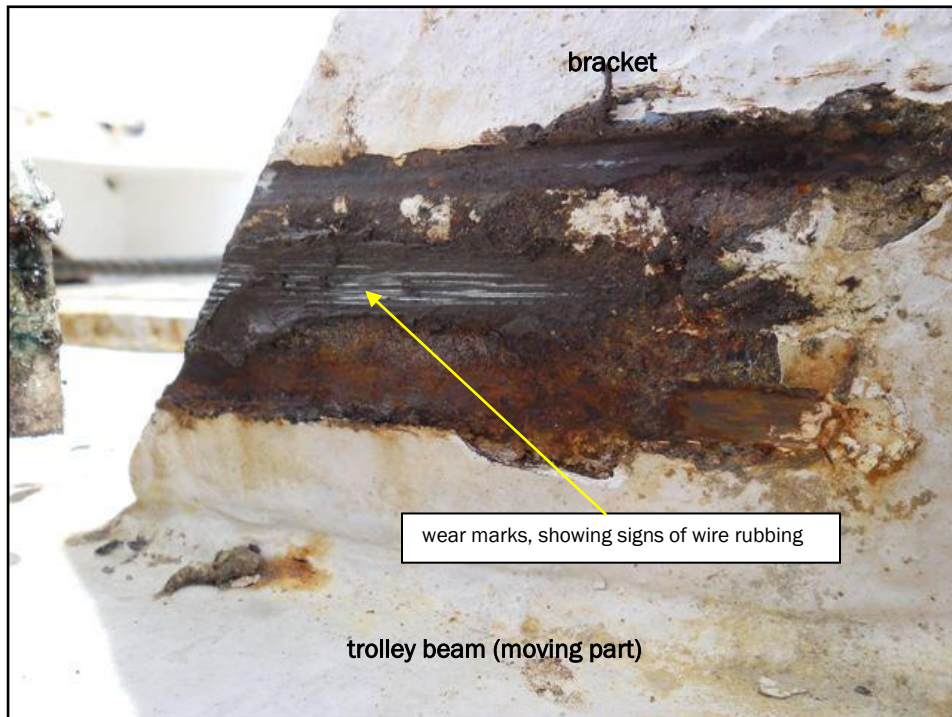


Figure 6
Vertical bracket from number 5 trolley beam

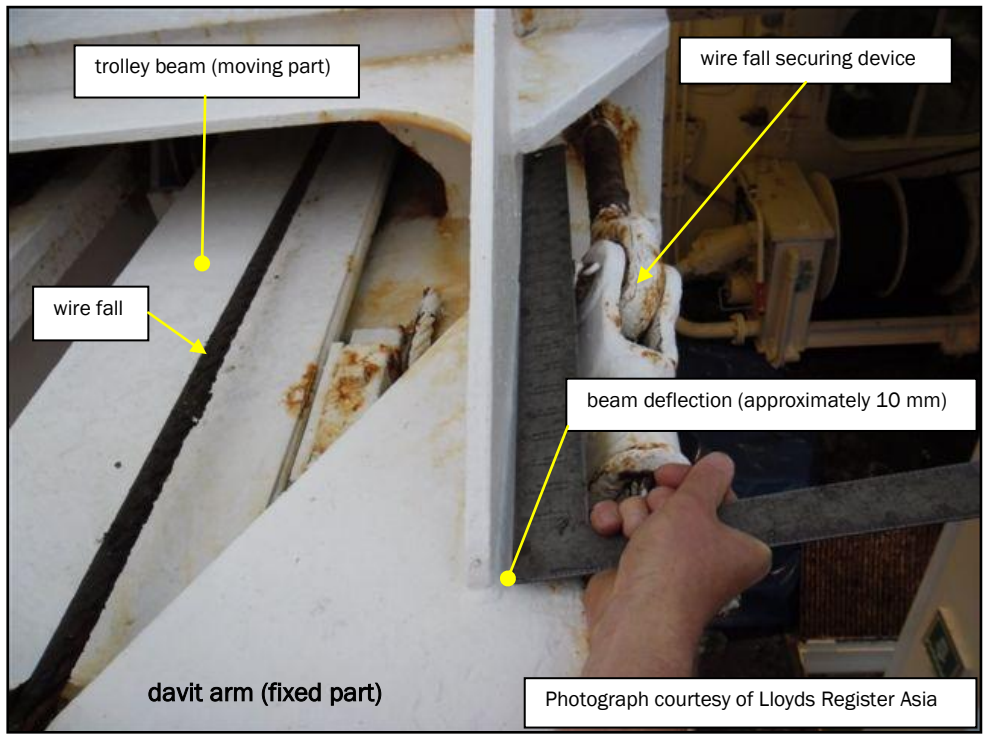


Figure 7
Number 5 davit beam (fixed part) showing deflection



Figure 8
Photograph of the failure point of number 7 lifeboat forward wire fall

2.4.6. In the Technical Memorandum C1191 provided to the Commission by the Defence Technology Agency about the failure of the number 7 davit forward fall, the Defence Technology Agency summarised as follows:

30. The wire rope was formed from galvanised steel wires. Its construction conformed to the documents sighted.
31. Surface wear was observed at several positions along the wire rope. Where present the wear did not significantly reduce the cross sectional area of the strands in question. No abrasive wear was observed within the lay or strands of the wire rope.
32. The failure had occurred in a severely corroded section of the hoist wire. A high proportion of the wires had corroded through and the corrosion had caused a significant reduction in the cross sectional area of other wires which finally failed by tensile fracture. This corrosion was associated with a relative absence of grease in the immediate area of the failure compared to that observed elsewhere.
33. Remote from the failure zone in the hoist section of the wire rope, general corrosion was seen on the surface of the visible wires. Sectioning and inspection of one discrete point on this part of the wire rope showed that only the outermost layers had been affected by corrosion which had not significantly reduced the cross sectional area of the wires or strand.

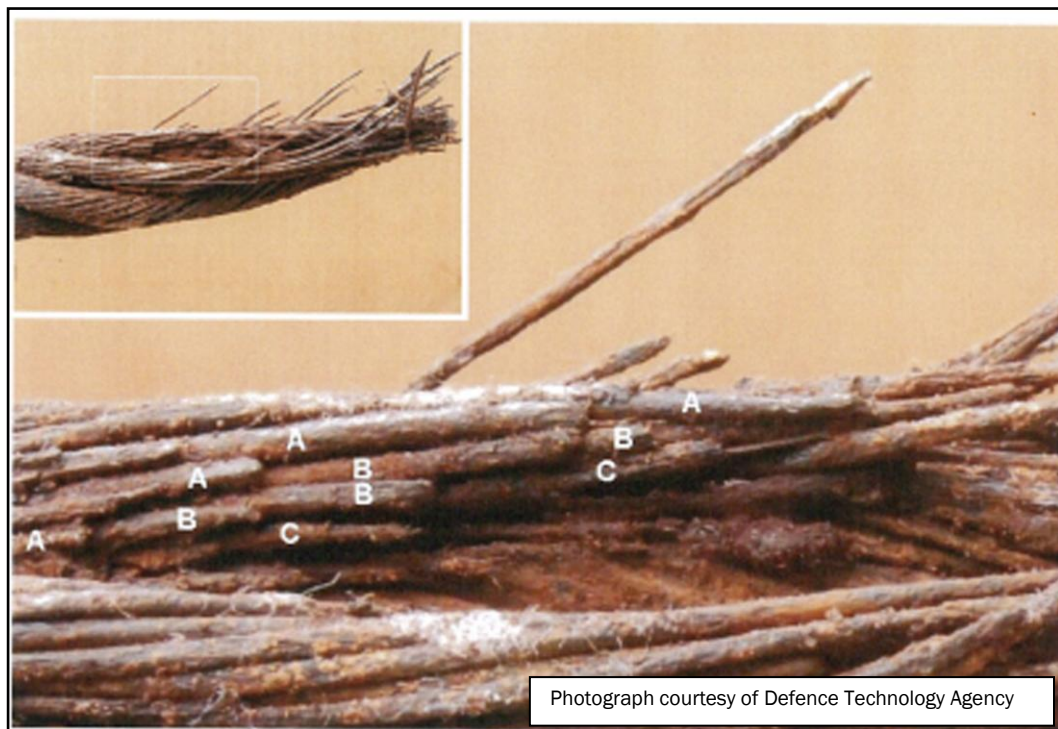


Figure 9
Enlarged photograph of failure point of number 7 lifeboat wire fall

3. Safety actions

General

3.1.1. The Commission classifies safety actions by two types:

- (a) safety actions taken to address safety issues identified by the Commission that would otherwise have resulted in the Commission issuing a recommendation; and
- (b) safety actions taken to address other safety issues that would not normally have resulted in the Commission issuing a safety recommendation.

3.1.2. The following safety actions are not listed in any order of priority.

Safety actions addressing proposed recommendations

- (a) On 11 January 2011, Holland America Line's Fleet Operations issued a Fleet Alert: FA 002-11 on the subject of lifeboat davit systems – one time inspection, the purpose of which was to:

conduct a one-time inspection of all lifeboat davit systems, verify that hoisting wire falls are in proper condition, reiterate fall protection procedures and the use of personal protective equipment

- (b) On 18 January 2011, Carnival Corporation & PLC (the parent company of Holland America Line) issued an advisory notice No. 02/2011 which recommended:

that each operating line:

1. Inspects all lifeboat, tender and rescue boat wire falls for any abnormalities (fish hooks, corrosion, cuts, abrasion etc) with particular attention to areas where the wires may be subject to friction against fixed or moving structural components of the hoisting systems.
2. Examines all sheaves, guides, links, hooks, thimbles and wire securing points of the hoisting system for any abnormalities such as corrosion and excessive wear and to ensure proper functionality. During such inspections the hoisting system should be moved in various positions as designed.
3. Reviews its policies and procedures covering working aloft to assess their adequacy, with particular emphasis to the use and maintenance of fall prevention devices and the related training provided to shipboard personnel.
4. Assesses the adequacy of its requirements for the use of personal flotation devices applicable to personnel working over the ship side and reiterate the importance of using such devices to line workers and their supervisors.

4. Recommendations

General

- 4.1.1. The Commission may issue, or give notice of recommendations to any person or organisation that it considers the most appropriate to address the identified safety issues, depending on whether these safety issues are applicable to a single operator only or to the wider transport sector. In this case, recommendations have been issued to the Navalimpianti Tecnimpianti Group, with notice of these recommendations given to the Dutch Safety Board, International Association of Classification Societies, Cruise Lines International Association, and Maritime New Zealand.
- 4.1.2. In the interests of transport safety it is important that these recommendations are implemented without delay to help prevent similar accidents or incidents occurring in the future.

Recommendations

The following recommendations are not listed in any order of priority:

- 4.1.3. The Commission believes it is a safety issue that the design of the SPTDL-150P lifeboat davit does not facilitate a thorough examination or effective lubrication of the standing part of the wire falls where they pass around the fixed guides before terminating. Lack of effective lubrication in this area will promote rapid corrosion and possible premature failure of the wire rope fall. Difficulty in conducting a thorough examination of the wire rope in this area could result in the risk of possible premature failure of the wire rope going undetected.
- 4.1.4. The Commission believes it is a further safety issue that the design of the SPTDL-150P davit allows the outer ends of the fixed arm to flex towards the adjacent moving trolley beam when the load is taken by the wire falls. There is evidence that this flexing can cause the trolley beam structure to contact the wire guides, and possibly the wire falls, which could lead to excessive wear and premature failure of the wire rope.

Recommendation 1

It is recommended that as a matter of urgency, the Navalimpianti Tecnimpianti Group alert all owners of vessels fitted with the SPTDL-150P stored-power telescopic lifeboat davits of the circumstances of this accident and issue instructions on what immediate inspections and maintenance should be carried out to prevent a failure of wire rope falls for the same or similar reasons. (009/11)

Recommendation 2

It is recommended that as a matter of urgency, the Navalimpianti Tecnimpianti Group make a technical assessment of other lifeboat davit models it has produced to identify if similar safety issues exist with those models, and if so, alert owners of those davits and issue them with instructions on what immediate inspections and maintenance should be carried out to prevent a failure of wire rope falls for the same or similar reasons. (010/11)

Recommendation 3

It is recommended that as a matter of urgency, the Navalimpianti Tecnimpianti Group review the design of the SPTDL-150P lifeboat davit system with a view to remedying the tendency in this case for the fixed davit arm to flex inwards under load and contact moving parts of the structure, which could lead to premature failure of components within the system. (011/11)

A reply to the recommendations was not available at the time of printing.

5. Further lines of inquiry

- 5.1. Further lines of inquiry, that the Commission intends pursuing include (without limitation) examining:
- (a) failure mechanism of wire fall;
 - (b) on board working practices;
 - (c) maintenance regime; and
 - (d) survival aspects



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