**The Independent Fact Group**

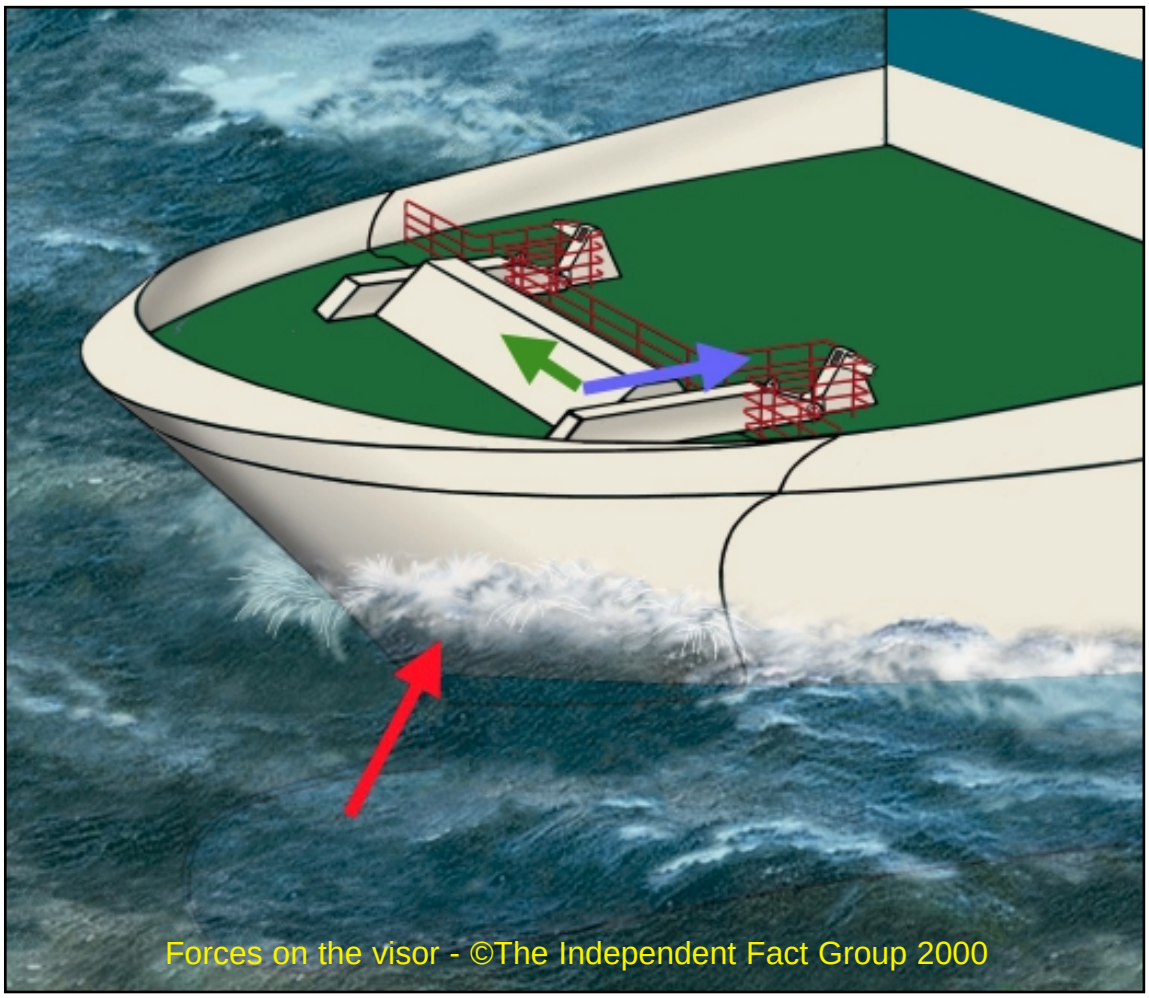
# Impossible Visor Scenario

(An excerpt from the full report)

**The Commission:**

**“The load needed to overcome the strengths of the bow visor attachments is thus sensitive to the shape of the visor, which has not been investigated”**

**”The many uncertainties involved make detailed calculations of this development meaningless”**



Forces on the visor - ©The Independent Fact Group 2000

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# STATEMENT REPORT

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## The Fact Group's aims and objectives:

The Independent Fact Group was formed in early 1999 to clear up the many question marks about the MV Estonia disaster, in a structured and methodical manner. There has been considerable speculation concerning the efforts of the Joint Accident Investigation Commission (JAIC) and the political, legal and media treatment of the accident and its tragic consequences.

The aim is to give those in authority an opportunity, based on the facts of the case, to decide to review this matter, with a view to further action. Our efforts also enable the media and the general public to decide on the basis of the objective information which is available concerning the accident, and the conclusions to be drawn from a technical and civic perspective.

The overall objective is the setting up of a new investigation of the accident which can describe the course of the accident in detail, and its causes, with subsequent assessment of the moral and legal responsibilities, where this is feasible.

We are motivated by the belief that a properly conducted investigation will contribute to maritime safety and by our concern for Sweden's reputation as a nation which upholds safety at sea and the rule of law.

**Methodology:**

In the course of this task, we have assumed that the solution of a problem is never better than the validity of the basic assumptions. As a result, we have stipulated some methodological principles, of which the following are the most fundamental:

1. All scenarios must be considered to be true until the contrary is proved.
2. All observations, assumptions or statements on which a scenario is based must be considered false until the contrary is proved.

We have defined a number of criteria for concluding that an observation, assumption or statement may be considered to be true or false, and processes and routines for the route to be taken in clarifying an observation, assumption or statement. These criteria involve technical, empirical, statistical and/or semantic requirements which, if they are relevant must all be met if the observation, assumption or statement is to be classified as an objective fact.

The materials we have worked with are primarily the documents, audio recordings and films in the Swedish Accident Investigation Commission's Estonia archive, together with supplementary information from other public sources and, in addition documentation from the Meyer shipyard and its independent commission.

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## Summary

In this report, the Independent Fact Group shows that JAIC's scenario regarding the loss of the visor, described in the final report was impossible.

As a direct result of a faulty conclusion when the Commission stated that "The many uncertainties involved make detailed calculations of this development meaningless", the Commission came to a wrong and impossible conclusion regarding the loss of the visor. The Commission did not take into consideration or study the preventive effect that a massive transverse deck beam would have if the visor broke loose. Ironically the Commission did, however, correctly assume that the transverse deck beam in fact was "the heaviest structural element preventing the visor from moving forward".

This report shows that, by a few "detailed calculations", it is proved that it was technically impossible for the visor to move forward as concluded by the Commission. First and foremost, the forces in a forward direction presented by the Commission are a confusion of reaction forces and resultants from the wave impacts. The Commission used the reaction forces in order to obtain forces strong enough to break the visor loose. Secondly, the forces to cut through the transverse deck beam could never have been achieved even if the lowest and most favourable theoretical values for the strength of the beam were used.

The Independent Fact Group shows both that it was impossible that the visor was lost in the way the Commission concluded, and as a result of this, that the ramp could never have been forced open by the visor.

The Independent Fact Group does not, however, draw any conclusions in this report as to how the visor was lost or what created the forces involved in such a scenario. We prove only that the Commission, by sloppy work and contradictory conclusions, has described a technically impossible scenario as their most central and important evidence regarding the MV Estonia disaster.

We leave it to a coming new independent investigation group to draw the correct conclusion as to how the visor was lost, and maybe most important, when it was lost and what consequences it led to.

To summarise this report in a few sentences: The JAIC final report's most important evidence was based on the assumption that the visor cut its way through a massive deck beam on two sides in four cuts. This conclusion has been presented in spite of the fact that the necessary forward forces did not exist. Whether this scenario was possible or not, has not been checked by any technical calculations whatsoever by the Commission. The scenario has now been proved wrong and therefore the complete final report musto be disqualified by this new evidence.

**Definitions of certain language marks used in this report:**

Text presented from the JAIC final report and its supplements is quoted as printed.

Our comments, explanations or clarifications, within quotes, are presented within square brackets [ ].

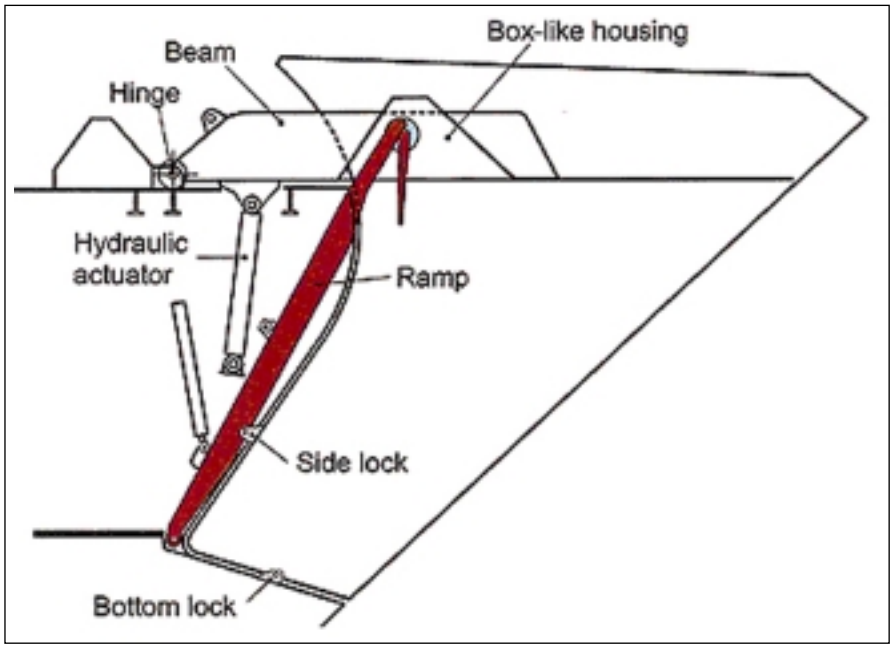
Text in quotes that has no relevance for the issue at hand has been left out and is indicated by a number of dots ".....".

We have underlined certain sentences and words, to mark their importance.

## General visor description and arrangements

The visor was attached to the ship by hinges and hydraulic actuators situated close to each other in the aft part of the two ”visor arms” (shown as ”Beam” in JAIC figure 3.5 below). It was possible to lock the visor to the ship after closing by five devices. When closing the visor it was guided to the right position by three locating horns. The horns were also constructed to absorb any side loads from the waves. The locks were two hydraulic side locks and one hydraulic bottom lock (also called Atlantic lock). There were also two manual side locks.

In the picture below (JAIC Figure 3.5), the general arrangement of the bow with the visor, the hinges for the visor and the hydraulic actuators for lifting / opening the visor are shown. The visor was constructed with a ”box-like housing” for the top part of the ramp.




When the ramp was closed, the visor enclosed the top part of the ramp.

The ramp was locked with six locking devices. On each side there were two hydraulic locking devices (pins) and one hydraulic locking hook, the latter also for pulling the ramp tight back when locking it.

However these locks are not shown in the JAIC figure 3.5.

JAIC figure 3.5

**JAIC Final report, 3.3.2:**

”....Three locating horns, one on the forepeak deck and two on the front bulkhead, engaged recesses in the visor in order to guide the visor to its proper position when being closed and to absorb lateral loads.

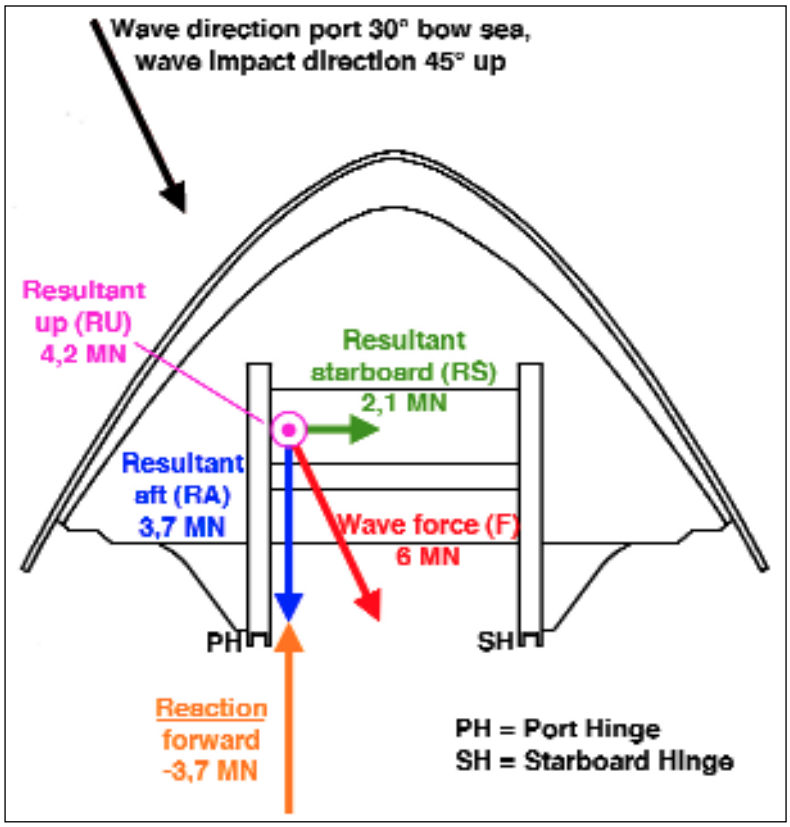
....The three locking devices kept the visor down in its closed position and the locating horns absorbed any side loads that might develop.”

**The Fact Group commentary:**

The Commission here stated that ”any side loads that might develop” are absorbed by the locating horns. After this correct statement they totally forgot all about the locating horns. They did not take in to consideration the load capacity of the horns and most important, the discharging effect of the wave impact loads on the visor locking devices.

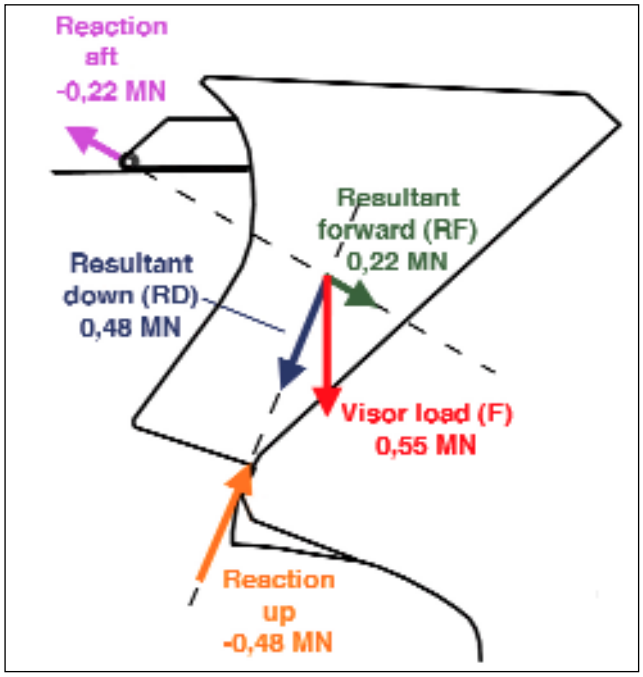
## The Fact Group graphic analysis of forces on the visor

The visor is shown from above, with a wave induced force of 6 MN in bow sea 30 degrees on the port side. The centre of the wave induced force was hitting the visor 4,5 metres over the normal water line in calm water, with an upward impact direction of 45 degrees. The resultants aft, starboard and up are shown in FG 2 below. The reaction force (forward) on the resultant RA 3,7 MN is shown.




FG 2. Forces induced from bow sea.

No forward force was created from waves (unless the visor bounced back from the bulkhead). The rubber seal between the visor and the bulkhead had a total length of approximately 12 metres that could be compressed and could generate a bouncing effect. The stiffness of the seal was progressive. To compress the seal 10 mm would require a force of 10 000 N/m. To compress the seal 15 mm would call for 25 000 N/m (JAIC supplement 511). However the bouncing would only generate forces equivalent to a fraction of the visor weight as the "free motion margin" was only at maximum about 10 to 20 millimetres.

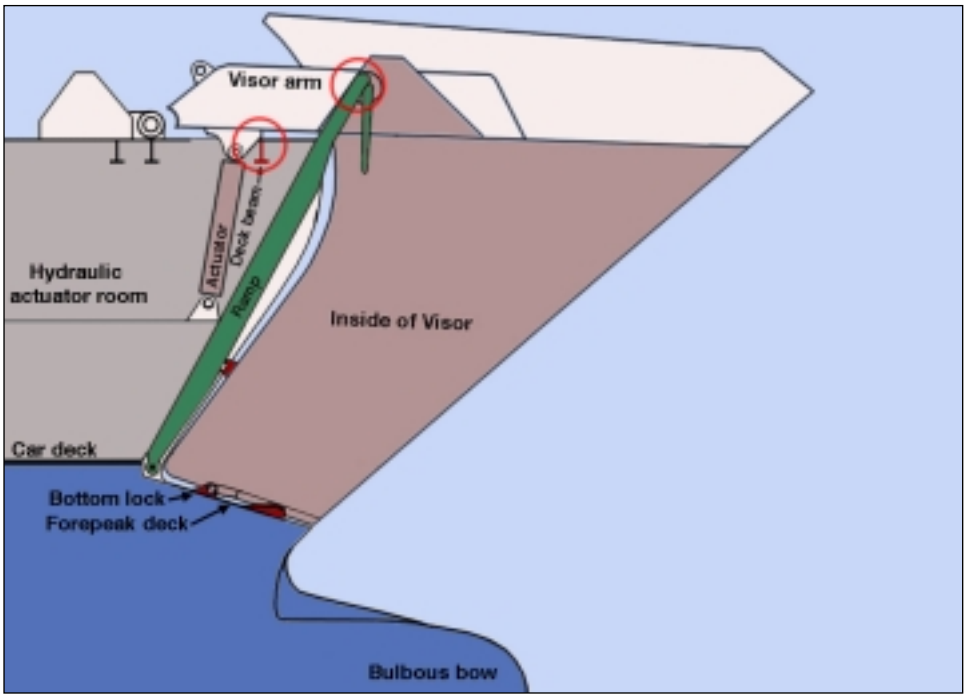



FG 3. Visor load force.

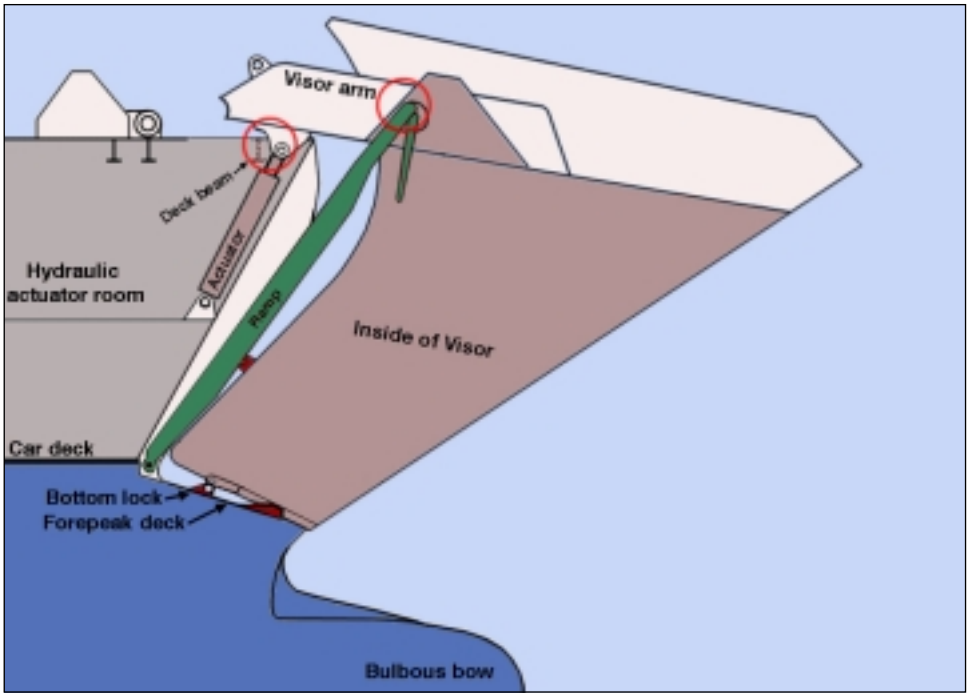
The visor seen from the starboard side. Theoretical force distribution between forward and down resultants. The visor was mainly resting on the forepeak deck. After the visor broke loose the forward resultant from the visor load was around 20 tons, but decreased to much less due to the hydraulic actuators holding the visor back.

## Investigated cutting scenario

The scenario we are checking is limited to the short time when the hydraulic lugs are said to have cut their way through the deck beam. If cutting through the deck beam is proven impossible by the forces involved, the entire JAIC scenario is wrong. Moreover, in that case it also prove that the ramp could not have been ripped open by the visor. The scenario is described in the following figures:



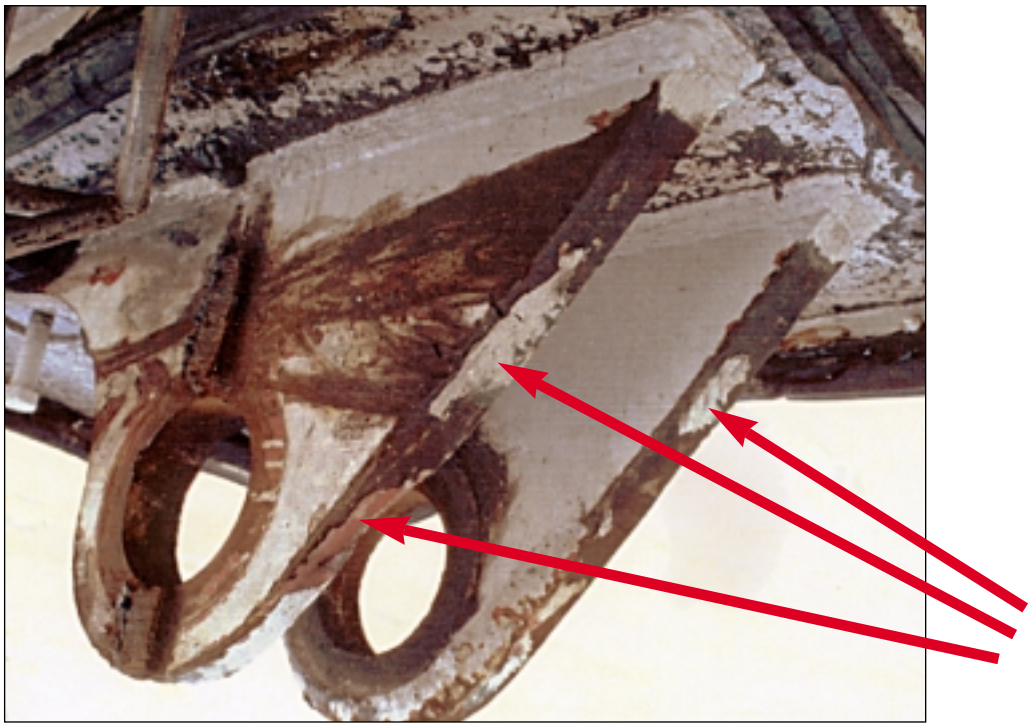

FG 4. The hinges on the visor arms broke and also the side lockings of the visor. The visor fell forward and the hydraulic lugs under the visor arms hit the deck beam (see also FG picture 6, A hitting B).



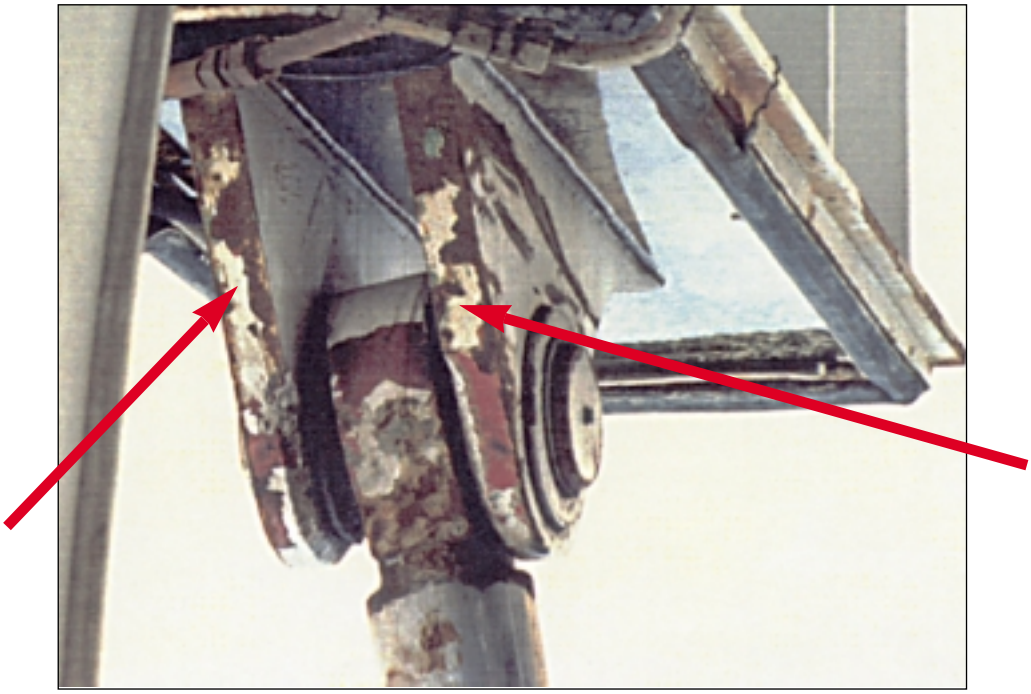

FG 5. The hydraulic lugs cut through the deck beam, and at the same time the visor housing hit the ramp and ripped it open (see also FG picture 6, C hitting D).

## Pictures of the hydraulic actuator lugs

The following two pictures are from the German Expert Group. The pictures have been edited to show the lugs in detail.



German Expert Group picture E9, No. 17 A. Lugs for dismounted port hydraulic actuator. On the lug to the left in the picture, the Commission adapted a vertical plate by welding and later cut this plate away. Note all the paint left on the surface that should have been in contact with the deck beam while cutting (arrows).



German Expert Group picture D8, No. 15 A. Lugs for starboard actuator.