

Error Chain Case Study : The Herald of Free Enterprise Car Ferry Disaster - 1987

The car ferry *Herald of Free Enterprise* capsized outside the Belgian port of Zeebrugge en route to Dover at 19:05 local time on 6th March 1987. There was a light easterly breeze and the sea was calm. The ship had a crew of 80 and carried 459 passengers, 81 cars, 3 buses, and 47 trucks. She capsized about 90 seconds after leaving the harbour. The loss of life would have been greater had she not settled onto a shallow sandbank.

Following the capsizing a heroic search and rescue operation was mounted. At least 188 people died, 150 passengers and 38 members of the crew, from hypothermia in the ice-cold water. Many others were severely injured physically and mentally. It soon became apparent to the rescuers that the *Herald of Free Enterprise* had left the port of Zeebrugge with her bow doors open. The death toll was the worst for a British vessel in peacetime since the sinking of the Titanic in 1912.

The *Herald of Free Enterprise* was a modern passenger/vehicle ferry designed for use on the high-volume short Dover-Calais ferry route. She could accelerate rapidly to her service speed of 22 knots. She was certificated to carry a maximum of 1,400 persons. At 433 feet long and 7,950 gross tons, the *Herald* was of record size at her launching in 1980 and was the pride of the 22-ship Townsend Thoresen fleet. She had two main vehicle decks and at Dover and Calais double-deck ramps could be connected to the ferry, allowing simultaneous vehicle access to both decks. At Zeebrugge, however, there was only a single-level access ramp which did not allow simultaneous deck loading. Ferry turnaround time was always much longer at this port although the company's timetable did not fully allow for the extra time. The Company wrote a letter to Captains urging them to "put pressure" [on the ship's officers] "if they are not moving fast enough" during turn-arounds at Zeebrugge.

Due to the exceptionally high spring tide that night the ship was floating much higher in relation to the dockside. Because of this the single ramp at Zeebrugge could not quite reach the upper vehicle deck. To allow loading of vehicles onto the upper deck 100 tonnes of seawater ballast was pumped into a trim tank in the bow of the *Herald* to force her to dip her bow some 3 feet deeper into the water than normal. This allowed the ramp to reach the upper deck.

Mr Mark Stanley, the Assistant Bosun, was responsible for closing the bow doors. He had opened the doors on arrival at Zeebrugge and then supervised some maintenance and cleaning activities. He was released from this work by Mr Terry Ayling, the Bosun, and went to his cabin. The company rostered him for long working hours and he soon fell asleep and was not awakened by the "harbour stations" public address call alerting crew to take their assigned positions for departure from the dock.

The Bosun left the car deck at the "harbour stations" call to go to his assigned station. He did not see the Assistant Bosun and he noticed that the bow doors had been left open. He later said, "It has never been part of my duties to close the doors or make sure that anyone is there to close the doors."

The Chief Officer, Mr Leslie Sabel, was in charge of loading vehicles. He stated that he remained on the car deck until he saw – or thought he saw – Mr Stanley threading his way through the parked cars and approaching the door closing control panel. The

closing of the doors took some three minutes and the time pressures prevented the Chief Officer from waiting to observe the completion of the closure. It is believed that he must have seen a passenger of similar appearance to Mr Stanley. It is possible that this passenger may have been returning to collect an item which was needed during the crossing from his car which was parked near the door closing control panel.

The Chief Officer could not wait to observe the complete closing of the door because he had to make his way quickly to the bridge, his assigned position for departure from dock, to carry out essential duties. Some of these duties had been reallocated to him when the post of Third Officer had been made redundant as a cost-cutting measure. Effectively the Chief Officer was required to be in two places at once: on the car deck checking the closure of the bow doors and on the bridge assisting the captain with the final departure procedures. It had become accepted that if the Chief Officer saw the Assistant bosun physically standing at the controls this would be an acceptable check.

The *Herald* had a new design of clamshell doors which opened and closed horizontally. This design made it impossible for the ship's master, Captain David Lewry, to see from the bridge if the doors were opened or closed. Several ship's Captains had written to the company pointing out the need for a 'bow-door-position' indicator light on the bridge which would confirm that the bow door was closed. An electrical engineer, a friend of one of the Captains, had carried out a survey and submitted a quote to install such an indicator system at a total cost of £400. The work could have been carried out without interrupting the ship's schedule.

The company pointed out that no other ships in the fleet had this feature and could not see any justification for this expenditure. They wrote facetiously to one of the captains: "Would you also like us to install a light to tell you if the Assistant Bosun is awake and sober?" At this time there was considerable expenditure on the refurbishing of the ship's Duty Free Shops which were the main source of revenue during the winter months when fares were heavily discounted.

Changes in the Townsend Thoresen operating procedures had had the effect of creating a negative reporting system with respect to the bow-doors. Effectively the Captain was allowed to assume that the bow doors were closed unless someone informed him that they were not. Such a procedure is an example of 'an accident waiting to happen'.

As the ship increased speed, a bow wave began to build up under her prow. At 17.5 knots, with the bow down 3 feet lower than normal, water began to break over the main car deck through the open doors at the rate of 200 tons per minute.

In common with other car ferries vessels, the *Herald's* main vehicle deck lacked subdividing bulkheads. If water entered the deck, it could flow from end to end or from side to side with ease.

The company had calculated that installing bulkheads would have taken up revenue generating space on the car decks. The process of moving and repositioning them on each turn-around would have considerably slowed loading and unloading operations. Over the course of a day these delays would have resulted in the loss of one complete Channel crossing from the schedule.

The flood of water through the bow doors quickly caused the vessel to become unstable. A fire detector bell rang on the bridge as water rushed past a sensor on a lower deck.

The *Herald* listed 30 degrees to port almost instantaneously. Large quantities of water continued to pour in and fill the port wing of the vehicle deck, causing an increasing list to port. More water rushed to the port side increasing the list further. 40 seconds later the *Herald* settled on the seabed at slightly more than ninety degrees with the starboard half of her hull above water. There had been no chance to launch any of the ship's lifeboats.

The interior of the ship had become a nightmare of smashing glass, falling furniture and tumbling bodies. Horizontal corridors had become 'mineshifts' offering no chance of escape.

Studies of a model of the *Herald of Free Enterprise* in a test tank revealed that even relatively small quantities of water (less than one-inch depth of water) on the car deck would render the ship '**dynamically unstable**'. This means that any force causing the ship to roll over in either direction would not be opposed and would, in fact, continue to exacerbate the roll exponentially. The ship would only achieve **dynamic stability** again when it was fully capsized or upside down!

The following are extracts from the report of the court of formal investigation –
The Management of Townsend Thoresen

"...a full investigation into the circumstances of the disaster leads inexorably to the conclusion that the underlying or cardinal faults lay higher up in the Company. The Board of Directors did not appreciate their responsibility for the safe management of their ships. They did not apply their minds to the question: What orders should be given for the safety of our ships?

"The directors did not have any proper comprehension of what their duties were. There appears to have been a lack of thought about the way in which the *Herald* ought to have been operated. All concerned in management were guilty of fault in that all must be regarded as sharing responsibility for the failure of management. From top to bottom the body corporate was infected with the disease of sloppiness.

"It was the failure to give clear instructions about the duties of the Officers which contributed so greatly to the cause of this disaster. Mr Clarke, [counsel] on behalf of the Company, said it was not the responsibility of Mr Develin to see that Company orders were properly drafted. In answer to the question, 'Who was responsible?' Mr Clarke said, 'Well in truth, nobody, though there ought to have been.' The Board of Directors must accept a heavy responsibility for their lamentable lack of directions.