



DUTCH
SAFETY BOARD

Hatch cover crane entrapment



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The Hague, April 2016

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Dutch Safety Board

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NB: This report is published in the Dutch and English languages. If there is a difference in interpretation between the Dutch and English versions, the Dutch text will prevail.

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1 INTRODUCTION

On Tuesday 9 June 2015 a crewmember of Dutch cargo ship Beauforce was trapped under the hatch crane. The hatch crane was in use at the time moving pontoons¹ to make the hold ready for a new cargo. The ship lay at anchor awaiting passage through the Panama Canal. The accident resulted in the death of the crew member.

The accident is a very serious marine casualty under the terms of the Casualty Investigation Code of the International Maritime Organisation (IMO) and under EU Directive 2009/18/EC. As a consequence of this, the Netherlands has a duty as the flag state to investigate the accident. This duty to investigate is also enshrined in the Dutch Safety Board Decree.

This report describes the circumstances of the incident and its direct and underlying causes. The timeline method and the MAIF/IMO analysis method were used to investigate this incident, whereby failure mechanisms and operational and organisational factors are identified in order to pinpoint any safety problems.

¹ The pontoons were being used as a tweendeck and bulkheads to separate and safely stow the cargo.

2 CIRCUMSTANCES AND BACKGROUND INFORMATION

Background information

Weather conditions

It was dry and sunny at the time of the accident with a variable wind of 1 on the Beaufort scale. There was a low north westerly swell and air temperature of 27 degrees Celsius.

Ship and crew

The Beauforce is a ship owned by Vertom Shipping & Trading BV and managed by Focus Shipmanagement BV. Focus Shipmanagement manages a total of seventeen ships. The Beauforce was built in 2010 by Damen Shipyards Bergum and is one of the first series of ships of the type 'Damen Combi freighter 8200'. The ship is chartered for use throughout the world. The Beauforce can transport different types of cargo and to facilitate this the hold can be configured in different ways. The crew can position the pontoon hatch covers to configure the hold as required, for instance as a tweendeck or bulkhead.²

The crew of the Beauforce was made up of eleven persons at the time of the accident. The first mate and six seamen have Philippine nationality, the captain has Ukrainian nationality and the first and second engineer and second mate have Russian nationality. The minimum safe manning is eight persons. All crew members have the correct seafaring qualifications. The victim was an ordinary seaman in the second year of his training. It was his first contract on board the Beauforce, for which he signed up on 26 November 2014.

The safety management system (SMS) employed by Focus Shipmanagement and the Beauforce has been 'International Safety Management' (ISM) certified by classification society Bureau Veritas.

The Beauforce has two cargo holds separated from one another by a partition. The rear cargo hold (hold 2 in figure 1) can be entered via an access at the rear from the ship's accommodation and via an access starboard amidships. The front cargo hold (hold 1 in figure 1) can be entered via an access at the front from the forecastle and via an access port amidships (marked in green in figure 1).

The accesses amidships on both the port and starboard sides have 8-metre high vertical ladders. There is a narrow landing above the ladder in a covered portal that gives access to the outer deck through a door. A single-level floor measuring roughly one metre must then be crossed to get to a set of steps that give access to a gangway one metre lower down.

2 See Appendix A for the ship's specifications.

The access to the portal has a 60 cm high sill. This height accords with the International Convention on Load Lines³ and is intended to give the ship a safe freeboard.



Figure 1: Below: ship's configuration. Top left: access to hold amidships via portal. Top middle and right: View looking down ladders from portal and platform above ladders. (Photo: Dutch Safety Board)

Hatch crane

A hatch crane is a mobile crane used to move pontoon covers longitudinally to the ship. The hatch cover crane runs on rails located on the hatch coaming on both sides of the ship. The crane consists of two vertical uprights and a yoke, placed athwartships. The crane operator stands on the hatch crane and rides along with the hatch crane while the hatch is moved (see figure 2).

The hatch crane on board the Beauforce is of the 'Gantry crane 2x15kW DB Bnr.: 9412' type supplied by Coops & Nieborg BV and forms part of the standard equipment of the 'Damen Combi freighter 8200'.

³ Load Lines, 1966/1988 - International Convention on Load Lines, 1966, as Amended by the Protocol of 1988, regulation 18.

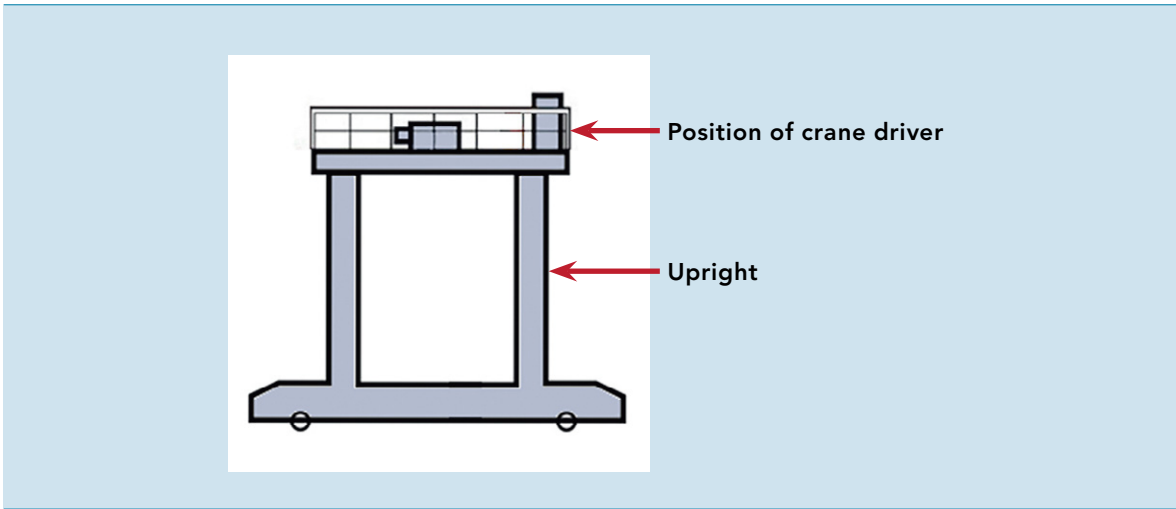


Figure 2: Drawing of hatch crane.

Circumstances

Work had been completed on board the Beauforce at 20.30 on 8 June⁴ to unload a cargo of paper rolls, and the ship departed from the port of Colón (Panama). The ship then set course for the anchorage outside the harbour where the Beauforce dropped anchor at 23.00 hours. In anticipation of the Panama Canal passage (from the Caribbean Sea to the Pacific Ocean), the daily duties were conducted such as maintenance and cleaning of the holds.

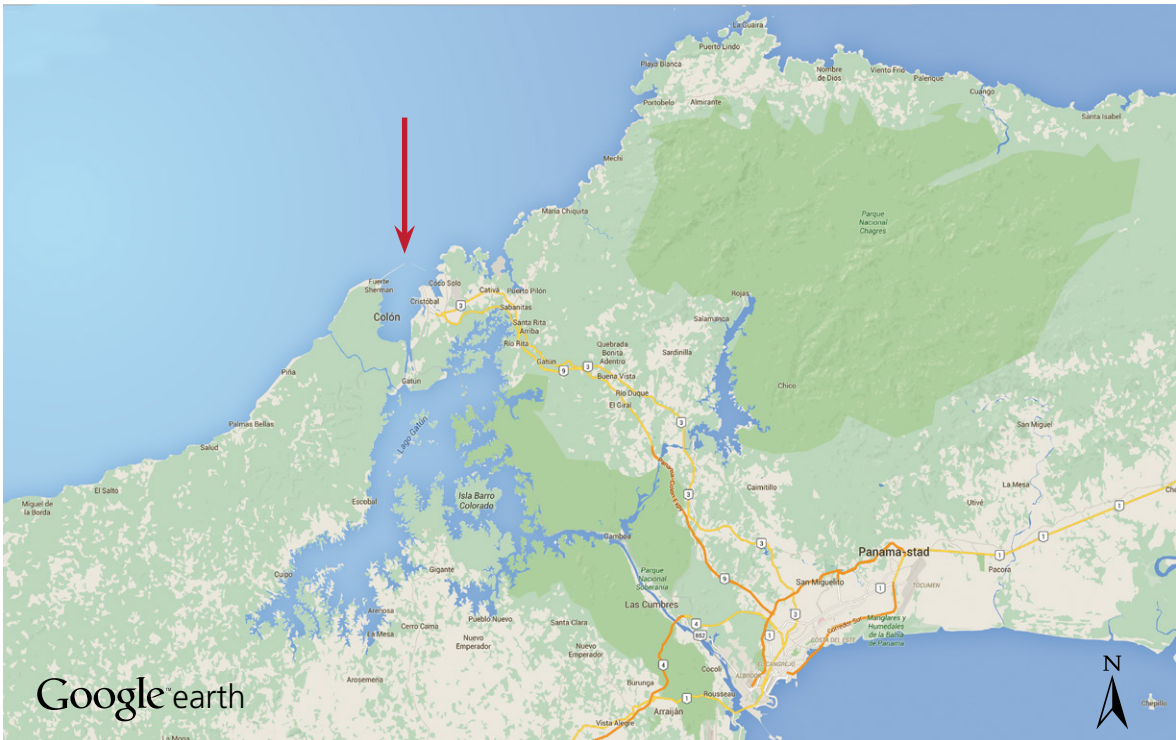


Figure 3: Map position of the Beauforce at the time of the accident. (Source: Google earth)

4 Local time is used throughout this report.

The following morning the captain received new loading instructions from the shipping company at 09:00 hours, on the basis of which he drew up a stowage plan⁵ for the loading of the cargo of lead concentrate. The stowage plan showed the configuration to be implemented on the ship so that the new cargo could be taken on board.

At 10.00 the crew members concerned were given the task of making the holds ready for the next load. The captain explained the plan to the crew member in charge and gave him a checklist and the work permit. Cleaning of the holds had to be completed, the tweendecks, in the form of pontoons, had to be removed and a number of them set up as a bulkhead. One crew member stood in hold 1 to attach the pontoons to the crane and two crew members stood in hold 2 to position the pontoons and release the crane. One crew member operated the hatch crane to lift and move the pontoons and one crew member stood on the port gangway to ensure that the rails (on which the hatch crane runs) on that side of the ship were free of materials and personnel to ensure the crane could run safely and freely. Communication took place using portable radio's carried by each crew member.

At 16.20 the hatch crane, with the second pontoon hitched to it, travelled from hold 1 to hold 2. At that moment one of the crew members in hold 2 decided to leave his workplace. He informed the colleague with whom he was working in hold 2 of this. He then climbed up the ladder from the midships hold exit on the starboard side to the deck portal (see figure 4). On arriving there he left the portal and stepped over the sill of the open watertight door, with the intention of stepping over the hatch crane rails to get to the starboard gangway.

His colleague stood at the bottom of the ladder throughout this time, until he had climbed to the top. Instead of getting the usual signal from his colleague that the ladder was free, he heard the alarm bells and the hatch crane stopping. Because he had not had the signal he then climbed the ladder. When he stepped out of the portal he found his colleague badly trapped between the hatch crane and the stack of hatch covers. He alerted the rest of the crew on his portable radio. The other crew members came quickly with a stretcher. However, it was clear almost immediately that no more could be done to help the victim.

⁵ Stowage plan: plan detailing the sequence of placing and positioning the load and goods in the hold or holds of a ship. Also referred to as the cargo plan.

Stern

BOW

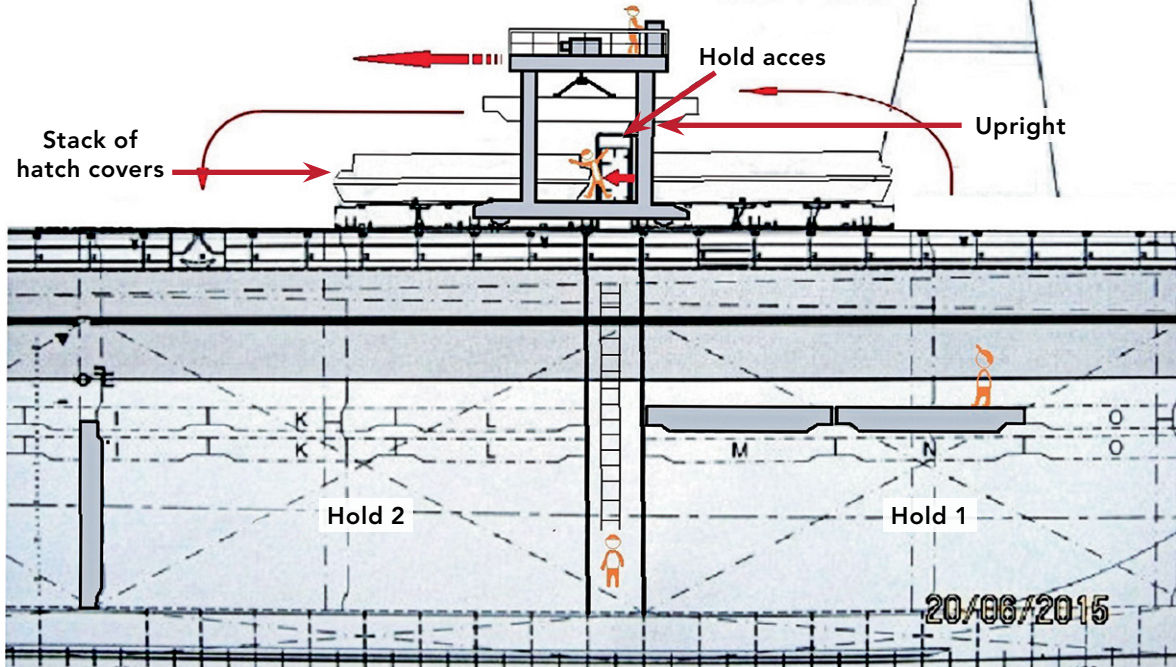


Figure 4: Illustration of the accident and the hatch crane. (Source: Focus Shipmanagement)

Accident

No one on board the ship actually saw the accident take place. Even the crew members who were standing closest to the victim at the time of the accident did not see it take place. The crew member who was working with the victim in the hold was standing in the hold under the ladder. The crane driver did not have a view directly below him, and the victim stepped on deck at precisely the moment the hatch crane was passing.

The deck was not slippery. There was no residue from the cargo on the deck and it was not wet, so it is unlikely the victim lost his footing.

The fact that the hatch crane was in motion could be clearly distinguished. This could be noticed from the two holds below and was apparent from the alarm bells that were ringing loudly. In addition, the movement of the crane on the rails makes an unmistakable sound and causes vibrations throughout the ship that were clearly perceptible. The victim was not wearing ear protection as part of his work clothing.⁶ The other crew members who were working in the hold could clearly hear the crane moving, in the same way they heard the crane stop immediately after the accident.

The precise reason the victim left the hold has not become clear. The victim left the hold during the operations without saying why or what he was going to do. The victim told to the seaman he was working with in the hold that they had finished with the cleaning and he was going up on deck and he asked if the seaman was coming with him. He did not give any further reasons as to why. At that time a pontoon was being moved to the two crew members for them to put in position. None of the two crew members communicated their intention to leave the hold over the portable radio.

The position the victim was found in suggests that the most likely scenario is that he tripped over the sill when stepping out of the portal onto the deck. The victim was found on his side with his arms next to his head, trapped between the rear upright of the crane and the stack of hatch covers (stacked next to the portal, see figure 5). He lay with his head towards the starboard gangway.

⁶ The victim was wearing an overall with a harness on top of this. He was also wearing gloves, a hard hat and safety boots. When working on the ship all crew members carried a portable radio for communication.



Figure 5: Site of the accident, hold access starboard portal amidships. (Photo: Dutch Safety Board)

Ship's design at the site of the accident

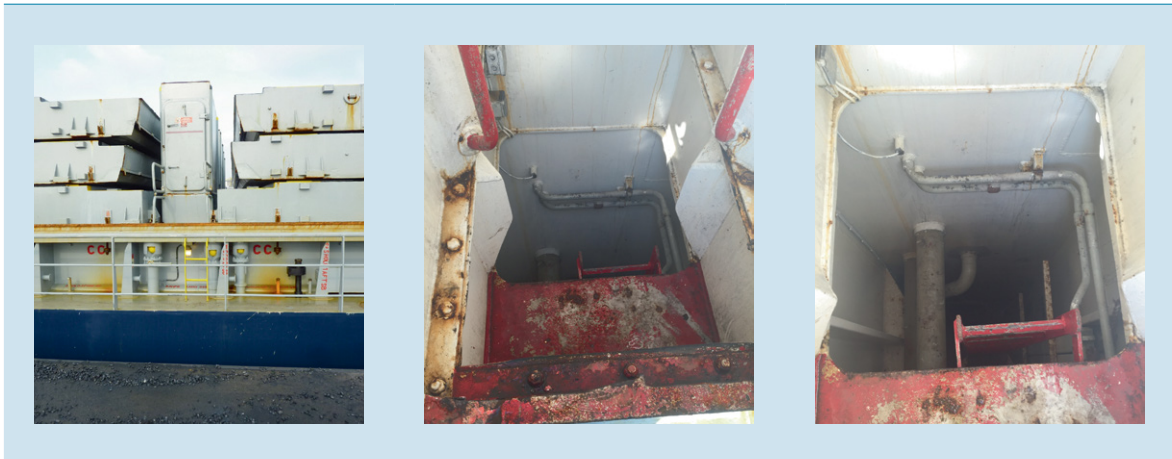


Figure 6: Photo left: access to holds amidships via portal. Photos centre and right: View looking down ladders from portal and platform above ladders. (Photo: Dutch Safety Board)

The hold access amidships would give no reason for the person to stay inside, rather all the cues are to step outside onto the deck in front of the portal. The platform above the ladder is of limited dimensions with a shaft below it approximately 8 metres deep (see photograph on right in figure 6). When stepping outside there are two grab rails to hold onto mounted one on either side as the person steps over the 60 cm high sill. This would involve leaning forwards. It is likely that the victim tripped when stepping out of the door resulting in him becoming trapped between the rear upright of the moving hatch crane and the stack of hatch covers to the side of the midships hold access.

The design of the 'Damen Combi Freighter 8200' type included a midships hold access since there was some space left over when designing the partition. Ventilation was provided amidships, between the two holds on the 8200 series, and that is why the shaft is there. There was space left over in the shaft to create an extra hold access. No rules exist about the number of hatch accesses for this ship as the hold was not designed as a place to stay in. The only way to exit hold 2 if the bulkhead is in place is via the hatch access in the middle of the ship on the starboard side.

When designing the ship the designer looked at the ship drawings from a safety point of view (user safety). In doing so, he was guided by the rules drawn up by the appropriate classification society as well as national and international regulations. Nowadays, 3D drawings assist designers to check whether a design is safe, for example whether a particular access is easy to use or whether someone could easily bump their head, etc. There was no option to use 3D drawings when designing this type of ship. Once the ship is built inspectors from a certificating classification society, Bureau Veritas in the case of Beauforce, walk over the ship and check that it is sufficiently safe. Any points brought up during this process are then addressed before the certificate is issued. Neither at the design stage or during the inspection tour by the inspectors was the structure of the hatch access amidships found to be potentially unsafe.

Procedures

Risk assessment and SMS

In compliance with Article 5 of the *Arbeidsomstandighedenwet* [Dutch working conditions act] and the ISM code the Beauforce had a risk assessment on board. With respect to control measures for the risk of colliding with/running over a person, the risk assessment refers to the report on the hatch crane themed action (see below) and the associated ARBO [health & safety] sheet (D-201).⁷ This ARBO sheet specifies all (precautionary) measures to be taken and checklists for employees and employers to ensure safe working with hatch cranes.

Furthermore, the Beauforce's SMS includes a section that describes cargo handling. One element in cargo handling is use of the hatch crane, including to move pontoons (to act as bulkheads or tweendecks). A work permit signed by the officer in charge is required to move the pontoons. This work permit has a checklist that includes all safety measures to be taken. The manual for the hatch crane is available on board as background information that, in addition to the technical data, describes the safety measures to be implemented.

Compliance with procedures

The crew carried out the work to prepare the holds and used the hatch crane in accordance with the procedures. Those doing this job knew what they had to do and had performed these tasks before. They were aware of the risks. The checklists had been completed, the work permit had been issued and the crew members had been informed (during an informal work meeting) of the tasks to be performed. A crew member was following the crane on the gangway on the port side, this person did not have a view of the starboard side. On the starboard side, the crane driver could see the gangway and the rail of the hatch crane up to around 5 metres in front of the crane and, for this reason, there was no duty and it was not considered necessary to deploy another crew member to walk next to the crane on this side.

The operator of the hatch crane (crane driver) was standing on the hatch crane. From this position he had a view of the rail in front of the hatch crane and the gangway on the starboard side. The crane driver did not have a clear view directly below the crane and certainly not when pontoons were being moved (see figure 7).

The crane driver was not able to see the victim in order to be able to stop the hatch crane in time. The crane driver was looking ahead to the rail and below him in order to be able to see the suspended hatch cover. At the moment the victim stepped out of the portal, the hatch crane was above the portal. The hatch cover obstructed the crane driver's view (see figure 7).

⁷ ARBO sheet D201 hatch cranes/carriages, issued by the Royal Dutch Shipowners Association (KVNOR) and Nautilus International (trade union for seafarers).



Figure 7: View from the hatch crane. Photo left: view below the hatch crane, right: view in front of the hatch crane. (Photo: Dutch Safety Board)

It was not forbidden to use the access to the hold amidships while the hatch crane was in operation. The common practice was for crew members leaving the hold via the midships portal to wait in front of the portal if the hatch crane needed to pass. This is in principle a safe position to stand without any risks if the person stays there. The hatch crane then passes in front and the attached hatch cover/pontoon passes above the portal.

Hatch crane recommendations

In 2010 the Netherlands shipping inspectorate (*Inspectie Leefomgeving en Transport (ILT)*) instigated a 'Hatch cranes' themed action because accidents with hatch cranes were occurring on a regular basis. In support of this themed action the legal requirements and recommendations emerging from research into accidents with hatch cranes were set out. The solutions that emerge from the recommendations are detailed in an interim report on the hatch cranes themed action, no final report on this themed action is available.

Summary of interim report on hatch crane themed action by ILT:⁸

- **Procedural measures arising from the recommendations**

- Procedure for using hatch cranes⁹

There must be a procedure on board for using hatch cranes safely. The procedure must cover the following three points as a minimum:

1. the correct way of attaching (hooking on) the hatch covers;
2. how running over/colliding with objects/people can be prevented;
3. that work may only be carried out using the hatch crane under the supervision of at least one extra person and, on certain ships where there is no view of the gangway from the hatch crane control panel, two persons. These persons must

⁸ The interim report can be found on the website of the Netherlands shipping inspectorate: https://www.ilent.nl/Images/Tussenrapportage%20Thema-actie%20luikenwagens_tcm334-330784.pdf

⁹ This requirement also arises from the Netherlands' Labour Conditions Decree (*Arbeidsomstandighedenwet*) (Article 5) and the ISM (International Safety Management) code.

check that the rails are free of objects and people and that the hatch cover is properly attached to the hooks.

- **Technical solutions arising from the recommendations**

- Audio-visual warning signals, two-fold
- Track sweepers in front of the wheels to protect the hands/fingers
- Sharp ended hooks, pockets and lock plate, in order to make sure the hatch cover stays in position
- Apply markings to the hatch crane/hatch covers so that it is clear whether the hooks are correctly positioned in the pockets.
- Use claws that grip the rails so that the crane cannot become derailed
- Automatic stop mechanism to prevent accidents involving running over/colliding with objects/people.

The hatch crane on the Beauforce did not have an automatic stop mechanism. The ILT recommended that automatic stop mechanisms be fitted after an accident on board the Frisian Summer on 30 September 2010 where a crew member became trapped under the hatch crane. This recommendation was also made in the interim report on the hatch crane themed action, with an aside that the inspectorate is not (yet) seeking the universal installation of automatic stop mechanisms, but that it reserves the right to make this recommendation as understanding develops in this area.

An automatic stop mechanism would probably not have stopped the accident from happening, since the victim on the Beauforce was trapped between the uprights. Such a stop mechanism would be mounted on the front and rear of the crane next to the track sweepers (in accordance with the recommendation from ILT). None of the hatch cranes made by Coops & Nieborg BV have been fitted with an automatic stop mechanism to date.

Otherwise, the hatch crane fulfilled the technical and procedural recommendations discussed in the context of the ILT themed action. The hatch crane was technically in good condition and was regularly maintained.

Since the time the hatch cranes themed action was instigated by ILT in 2010, seven accidents with hatch cranes have occurred on board Dutch ships, including the accident on board the Beauforce. The seven accidents resulted in one death and five injuries. Notwithstanding the fact that not all the recommendations referred to have a direct bearing on the accident on board the Beauforce, the Dutch Safety Board therefore considers it important to highlight once again the risks of working with hatch cranes and suitable measures.

4 CONCLUSIONS

The factors that made it possible for the accident on board the Beauforce to happen were the following:

- The use of the midships access while the hatch crane was in operation was not forbidden in the procedures but, combined with the high sill, meant there was a risk of stumbling and falling awkwardly at the wrong moment.
- Apart from the colleague who was working with the victim in the hold, no one else knew that the crew member would be coming on deck out of the hold access. No communication about this took place by portable radio.
- The design of the hold access amidships may have contributed to the victim stumbling.

This accident is an example of an unfortunate combination of circumstances, however the statistics show that accidents with hatch cranes, even after introduction of the themed action by ILT, are still happening. For this reason, the Dutch Safety Board is highlighting once again the lessons to be learned from previous accidents with hatch cranes. These lessons have been documented in the ILT recommendations on hatch cranes (see page 15 and 16 of this report). The risks of working with hatch cranes can also be managed by implementing the procedural and technical recommendations referred to.

SHIP'S SPECIFICATIONS BEAUFORCE



Figure 8: Beauforce. (Photo: Focus Shipmanagement BV)

Call sign:	PCHK
IMO number:	9526095
Flag state:	The Netherlands
Home port:	Sneek
Type of ship:	Fully cellular container ship
ISM administrator:	Focus Shipmanagement BV
Classification society:	Bureau Veritas
Year of construction:	2010
Shipyard:	Damen Shipyards Bergum
Length overall (LOA):	118.14 m
Length between perpendiculars (LPP):	112.29 m
Width:	15.9 m
Draught:	7.2 m
Gross tonnage:	5425
Engines:	MAK 9M25
Propulsion:	1 screw propeller – variable speed, 1 bow thruster
Maximum propulsion power:	2970 kW
Maximum speed:	12.9 knots
Ship's certificates:	All valid

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