Fatal crush incident

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BACKGROUND

- **A general cargo ship was berthed alongside and loading a cargo of cement.**
- **The 2/O came on watch shortly before midnight and at 0115 the cargo loading was competed.**
- **The 2/O remained on duty until 0540, when the C/O took over the watch again.**
- **After 0830, the C/O started to close the pontoon-type hatch covers using the ship's gantry crane and instructed the deck crew to commence cleaning cement dust from the coamings.**
- **These tasks had to be completed before departure.**
- **At about 0900, the agents informed the master that the sailing time had been brought forward.**
- **The C/O advised the master that all available hands would be needed to complete the cleaning including the 2/O.**

Starboard walkway looking forward showing stack of hatch covers and gantry crane

Source: Marine Accident Investigation Branch (MAIB), © Crown copyright, 2020

THE INCIDENT

- **The 2/O arrived on deck at about 0930 and began sweeping dust from the aft cargo hold hatch cover landing surface on the stbd side.**
- **The two ABs and deck cadet were on deck sweeping dust from the hatch covers and coaming. They were wearing face masks and eye protection, but the 2/O and C/O were not.**
- **The C/O remained on the gantry crane, moving hatch covers.**
- **At 0942, the C/O moved a cover to the forward end of the forward hold. At 0943, he drove the gantry crane aft.**
- **At the same time, the 2/O finished sweeping and started to walk forward along the walkway.**
- **At 0944, the C/O stopped the crane just short of a stack of hatch covers at the forward end of the aft hold and started raising the lifting bar. The 2/O arrived at the forward end of the hatch cover stack and climbed onto the hatch coaming.**

Zoomed closed-circuit television (CCTV) screenshot looking forward showing the 2/O climbing onto the cargo hold hatch coaming

Source: Marine Accident Investigation Branch (MAIB),

THE INCIDENT (continued)

- **As the 2/O stepped towards the gap between the crane and the stacked hatch covers, the lifting bar cleared the hatch cover stack and the C/O drove the crane aft.**
- **The 2/O screamed as he was trapped and crushed between the hatch covers and the crane's ladder access platform.**
- **The crane stopped abruptly and the C/O immediately reversed the crane. As the crane moved forward, the 2/O was rolled between the crane's ladder platform and the hatch covers and he then fell off the coaming onto the walkway below.**
- **As he fell, he struck his head on the guardrails on the side of the walkway. Reacting to the 2/O's screams, the ABs and the deck cadet rushed to the scene.**
- **The 2/O soon lost consciousness and stopped breathing and the deck crew immediately commenced cardio-pulmonary resuscitation (CPR).**

Reconstruction showing a crew member in the gap between the ladder platform and stacked hatch covers

Source: Marine Accident Investigation Branch (MAIB),

THE INCIDENT (continued)

- **The C/O called the master on his radio and informed him that the 2/O had fallen.**
- **The master made his way to the scene within a minute, then called the ship's agent, who alerted the emergency services.**
- **The master also called the Designated Person Ashore (DPA) and told him that the 2/O had fallen on deck.**
- **At about 1005, two emergency medical teams arrived and the C/O told them that the 2/O had fallen from the coaming.**
- **Despite the efforts of the medical teams, the 2/O was declared deceased at 1100.**
- **The attending doctor told the master and C/O that the 2/O had possibly died as a result of a heart attack.**

THE INCIDENT (continued)

- **The post mortem report concluded that the 2/O had experienced a violent accidental death, resulting from internal bleeding due to organ rupture. He had also suffered multiple fractures.**
- **The 2/O's toxicology report stated that his blood alcohol content (BAC) was 117mg per 100ml.**
- **The incident occurred on the 2/O's birthday.**
- **The investigation noted that an emergency stop button was fitted to the crane platform, but the 2/O would have been unable to reach this while in the gap between the platform and covers.**

Access to starboard emergency stop button

Source: Marine Accident Investigation Branch (MAIB),

REFLECTIVE LEARNING

The questions below are intended to be used to help review the incident case study either individually or in small groups:

- **What do you think was the immediate cause of the incident?**
- **What other factors do you think contributed to the incident?**
- **What do you think were the barriers that should have prevented this incident from occurring?**
- **Why do you think these barriers might not have been effective on this occasion?**
- **What risk assessments and procedures are available for the use of moving machinery, such as gantry cranes, on your ship? Do these identify the risk of entrapment and / or crushing of personnel?**
- **What warning devices are fitted to the moving machinery, such as gantry cranes, on your ship? Do you believe these are effective and adequate to mitigate the identified risks?**
- **Who are the authorised operators of any lifting equipment on your ship? What training have they been provided with? What training have other crew members been provided with in the risks associated with the use of the lifting equipment?**
- **What is your company's Drugs and Alcohol policy? In light of this incident, what are your views on the policy?**

LESSONS LEARNED

The following lessons learned have been identified based on the available information in the investigation report and are not intended to apportion blame on the individuals or company involved:

- **Incident cause –** The 2/O was crushed while he was trying to walk between the gantry crane and a stack of hold hatch covers when the C/O began to move the gantry crane aft at the same time. This reduced the gap between the crane's ladder platform and covers to around 130mm, trapping the 2/O.

- **Communication –** The 2/O was unaware that the C/O was about to move the crane, while the C/O was unaware that the 2/O was under the crane and about to climb through the gap. The 2/O's and C/O's situational awareness would have been enhanced if effective communications had been established and the deck operations had been properly controlled.

- **Situational awareness –** Once the 2/O was within a couple of metres of the crane, he would not have been visible to the C/O at the gantry control position. Before moving the crane, the C/O should have moved from the crane's control position to check the walkways and ensure the area directly below was clear.

- **Crane warning devices –** The gantry crane was fitted with a loud warning bell and flashing amber light, but these only operated while it was moving. The 2/O would have been alerted to the crane's imminent movement if it had been fitted with a pre-movement warning device.

LESSONS LEARNED

The following lessons learned have been identified based on the available information in the investigation report and are not intended to apportion blame on the individuals or company involved:

- **Emergency stops –** The crane's deck level emergency stop buttons could only be operated from the walkways and could not be reached by the 2/O before and after he became trapped.
- **Risk Assessment/Procedures –** The risk assessment and procedure for operating the gantry crane could have been clearer. However, the incident would have been avoided if the stated safety controls had been implemented.
- **Safety Culture –** The onboard safety culture was weak, as established safe systems of work were not being followed, personnel were working close to moving equipment and unprotected edges, and were not wearing adequate PPE.
- **Alcohol use –** The 2/O's judgment and perception of risk were probably adversely affected by alcohol. The company's drug and alcohol policy allowed the crew to drink in moderation provided they were always under the legal limit. However, this policy was not being effectively enforced.
- **Initial incident communication –** The medical personnel were not informed of the full circumstances of the 2/O's injuries, but it is unlikely that this affected his survival chances. All known details of an incident should always be communicated to ensure the most appropriate medical treatment can be provided.

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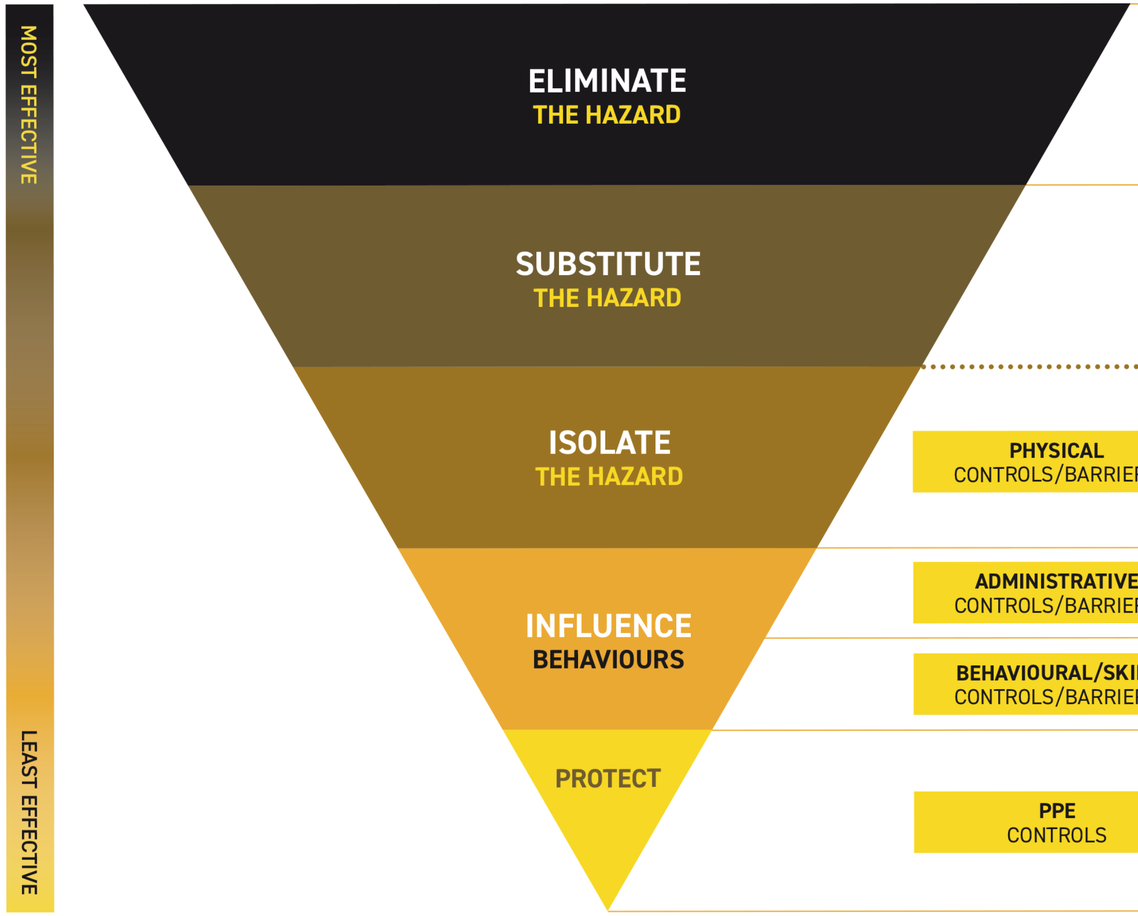
HIERARCHY OF BARRIER CONTROLS



EXAMPLES OF POSSIBLE RISK MITIGATION CONTROL MEASURES RELATED TO THE CASE STUDY

ENSURE no personnel are in vicinity of the moving gantry crane.
ELIMINATE entrapment area, as far as function and design permit.

CONSIDER alternative means of moving hatch covers, as far as function and design permit.

MOVEMENT and PRE-MOVEMENT WARNING devices.
AUTOMATIC STOP SYSTEM to detect/avoid obstructions.
ACCESSIBLE EMERGENCY STOPS based on identified risks.

RISK ASSESSMENT/PROCEDURES to mitigate the risks.
EFFECTIVE COMMUNICATION system established.
LOOKOUTS to advise gantry crane operator of hazards.

TRAINING in working with/near gantry cranes.
SAFETY CULTURE campaign to embed safe behaviours/reporting.
DRUGS AND ALCOHOL policy enforced.

CORRECT use of safety helmet with chin strap, safety shoes.
Also safety harness, safety line, fall arrest when working aloft.

The suggested barriers/controls above are provided to help generate reflective discussions, and should not be considered as conclusive/definitive or comprehensive for the provided case study.
The risk and control measures relating to any similar scenario or activity must always be appropriately assessed based on the specific onboard arrangement and circumstances.

CONCLUSIONS

The circumstances of this incident highlight the significant dangers associated with moving machinery on ship's decks. Travelling gantry cranes tend to be particularly hazardous, due to factors such as the limited space available, restricted visibility and the noisy environment.

The 2/O was an experienced seafarer and should have been well aware of the hazards and established safe practices while working on deck in way of the gantry crane. It is possible that a combination of tiredness, the alcohol in his bloodstream and the complacency associated with the familiarity of working on deck in the vicinity of the gantry crane affected his judgment in deciding to climb through the gap between the crane and the covers.

Both the 2/O's and C/O's situational awareness would have been enhanced if the deck operations had properly been controlled, and effective communications had been established and maintained at all times.

Although the risk assessment for opening and closing the hatch covers using the gantry crane did not specifically identify the risk of crushing, the incident should nevertheless have been avoided if the included safety critical control measures had been implemented.

This incident serves as a stark reminder that excessive alcohol consumption and working on deck do not mix, and significantly compromises the safety of the affected individuals as well as their fellow crew members.

QUESTIONS