

AS PART OF THE CASE STUDY MATERIAL, THE FOLLOWING COMMENTARY PROVIDES FURTHER ANALYSIS OF SOME OF THE KEY ISSUES TO SUPPORT REFLECTIVE LEARNING.

The first four pages of this commentary discuss some of the contributory factors and lessons learned in more detail with particular reference to best practices. The final page illustrates graphically some of the barrier control measures that could have potentially mitigated against the risks associated with the hazards using Britannia's interpretation of the Hierarchy of Barrier Controls triangle as a framework.

FATAL CRUSH INCIDENT

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. FURTHERMORE, THIS INCIDENT PROVIDES 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.

The case study identified a number of contributing factors and lessons learned, as discussed below.

SAFE WORK PRACTICES

The second officer (2/O) was an experienced seafarer and had completed ten contracts on the same class of ship. Therefore he should have been well aware of the hazards and established safe practices while working on deck in way of the gantry crane. As he walked forward along the starboard walkway before the incident, he would have been aware that crane was being operated by the chief officer (C/O). However, when the 2/O and the crane arrived at the hatch cover stack at the same time, this would have coincided with the warning bell and flashing light stopping as the crane became stationary. This presumably led the 2/O to believe that he had time to pass between the gantry crane and stack of hatch covers. However, he was unaware that the C/O was about to move the crane. The C/O was also unaware that the 2/O was under the crane, as once the 2/O was within two metres of the crane on the walkway, he would not have been visible to the C/O from the gantry control position.

When the C/O started to move the gantry crane aft this reduced the gap between the crane's ladder platform and hatch covers to around 130mm, trapping and crushing the 2/O. This could have been avoided if the C/O had moved from the crane's control position to check the walkways and ensure that the area directly below was clear before starting to move the crane.

The C/O immediately stopped and then reversed the gantry crane, moving it forward as soon as he became aware that the 2/O was trapped. The 2/O was rolled between the crane's ladder platform and the hatch covers and then fell off the coaming onto the walkway below. Although this would have inflicted further injuries on the 2/O, the C/O's action was instinctive and the investigation concluded that no other options were probably available.

CLEAR COMMUNICATION

The investigation identified a lack of communication between the C/O and the crew working on deck, including the 2/O. 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. This could have included voice and/or radio communications supported by line of sight between the involved crew. The need for this was highlighted in the onboard manual for the safe operation of the hatches, but not followed.

FATAL CRUSH INCIDENT

RISK ASSESSMENT AND PROCEDURES

The company had a comprehensive safety management system (SMS) covering all aspects of the ship's operations, including ship-specific risk assessments and procedures. This included a manual and risk assessment for opening and closing the cargo hold pontoon-type hatch covers, and guidance and instructions for operating the gantry crane. The safety precautions listed in the risk assessment and procedures included: keeping personnel who were not directly involved in hatch cover operations clear of the area; positioning crew members on both sides of the hatch to monitor walkways and operate the crane's emergency stops; and ensuring good communications between those involved.

The risk assessment for opening and closing the hatch covers using the gantry crane did not specifically identify the risk of crushing, and the procedure for the safe operation of the hatches and bulkheads could have been more prescriptive about the monitoring of the starboard walkway. Nevertheless, the incident should have been avoided if the included safety critical control measures had been implemented.

GANTRY CRANE SAFETY DEVICES

Although the gantry crane was fitted with a loud warning bell and flashing amber light, these only operated while the gantry was moving along its rail tracks. The 2/O would have been alerted to the crane's imminent movement if it had been fitted with a warning device indicating that the stationary crane was about to move, and which could have afforded him time to get clear. Although there was no requirement for the crane to be equipped with a pre-movement warning device, such devices can provide another safety barrier to alert anyone who has intentionally or unwittingly strayed into a danger zone, giving them time to raise the alarm or operate an emergency stop.

The 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. Furthermore, the area where the buttons were positioned was dangerous when the crane was moving. Following the incident, additional emergency stop buttons were provided on the outer face of the crane legs, increasing the chance of someone being able to stop the crane in an emergency. The position of emergency stop buttons should always be considered as part of a thorough risk assessment of the hazards associated with the machinery.

DRUGS AND ALCOHOL POLICY

Given the 2/O's high blood alcohol content (BAC) which was more than twice the legal limit for seafarers, it was likely that his judgment and perception of risk would probably have been adversely affected. The investigation was not able to establish how much alcohol the 2/O had consumed and when. However, there was some evidence to suggest he drank with other crew members the evening before and/or during his midnight to 0600 watch, noting that the day of the incident was the 2/O's birthday.

Although the company's drug and alcohol policy allowed the crew to drink in moderation provided they were always under the legal limit, it was evident that this policy was not followed or being effectively enforced. The policy also dictated that all involved crew members should be tested immediately after an accident, but the investigation cast some doubt over whether this took place in this instance.

Alcohol and hazardous working environments are not compatible and, as this incident demonstrates, can lead to tragic consequences. To be effective, drugs and alcohol policies need to be strictly enforced by onboard senior management. This includes implementing robust testing protocols following an incident or whenever there is any reason to believe the policy has been breached. This must then be followed up with appropriate action to prevent offenders from putting themselves or others at risk.

FATIGUE

The 2/O was woken 3 hours into a rest period before the incident, which combined with the effect of alcohol in his bloodstream, increased the likelihood that he was tired, if not fatigued, when he arrived on deck. The C/O had also only had 4.5 hours rest in the 16 hours before the incident and it is possible that his judgment and failure to apply the correct safety procedures were also affected by tiredness. Both the 2/O's and C/O's overall hours of rest records did comply with the mandated minimum standards. The working pattern on the day of the incident was affected by the time pressures introduced when the vessel's departure was brought forward at short notice. Nonetheless, safety is tantamount and it is essential that crew members are fit for duty when conducting hazardous or safety critical tasks.

FATAL CRUSH INCIDENT

GENERAL SAFETY ON DECK DURING CARGO OPERATIONS

As part of the investigation it was noted that the crew were not following the company's safe systems of work, while the tasks being undertaken were not being closely monitored or controlled. One AB was observed walking along and leaning over the unprotected edge of a hatch cover while clearing the hatch covers despite the obvious hazard. Although the company's SMS required portable guardrails to be rigged and safety harnesses and fall prevention lanyards to be used, these were not evident on the day of the incident. Furthermore, the crew members on deck were being exposed to large amounts of cement dust. Although the risk assessment required the use of face masks and goggles, these were only being worn by the ABs and deck cadet and not the C/O or 2/O. It is likely that these types of deviation from the safe systems of work had become common practice and normalised.

SAFETY CULTURE

The investigation concluded that the onboard safety culture was weak given that established safe systems of work were not being followed, personnel were working close to moving equipment and unprotected edges, and were not wearing adequate levels of PPE for the tasks. It was apparent that priority was given to getting the job done, rather than implementing the vessel's documented safe working practices. This was probably influenced by time pressure and possibly by alcohol consumption.

Safety culture defines the ways in which safety is managed on board a vessel and is reflected in the shared attitudes, beliefs, perceptions and values of the crew in relation to safety. An effective safety culture leads to an organisation where the shared beliefs and behaviours from the top to the bottom result in all employees feeling responsible for their actions to improve safety and performance. Owners, managers and masters fulfil a key role in embedding and driving a strong onboard safety culture. In this instance, this should have led to the onboard unsafe practices being identified and eliminated.

JUST CULTURE

The investigation established that despite there being additional evidence that the 2/O had been crushed, this was not reported to the company by the crew, which resulted in a significant delay in the incident being effectively investigated. Although the company had a confidential near miss reporting procedure, including a confidential complaints procedure and telephone line, none of the crew formally raised the possibility of the 2/O's death being accidental rather than a medical event with the company.

As indicated in an article on the Britannia website (<https://britanniapandi.com/2019/01/just-culture/>) the successful integration of an open and just culture of reporting accidents and incidents is an essential element of an effective, high performance safety critical organisation and should be supported and encouraged in order to learn lessons and improve safety standards.

INITIAL INCIDENT COMMUNICATION

The crew's first-aid response was immediate and external assistance was quickly called. However, the external medical teams were not made aware of the crushing incident and the full details of the injuries. It is unlikely that this affected the 2/O's survival chances, given the severity of his injuries. Nevertheless, it is critical that medical responders are always given as much information as possible about the circumstances of an incident in order to ensure the most appropriate medical treatment can be provided.

SEE NEXT PAGE FOR HIERARCHY OF BARRIER CONTROLS DIAGRAM

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THE PURPOSE OF THIS CASE STUDY IS TO SUPPORT AND ENCOURAGE REFLECTIVE LEARNING. THE DETAILS OF THE CASE STUDY MAY BE BASED ON, BUT NOT NECESSARILY IDENTICAL TO, FACTS RELATING TO AN ACTUAL INCIDENT. ANY LESSONS LEARNED OR COMMENTS ARE NOT INTENDED TO APPORTION BLAME ON THE INDIVIDUALS OR COMPANY INVOLVED. ANY SUGGESTED PRACTICES MAY NOT NECESSARILY BE THE ONLY WAY OF ADDRESSING THE LESSONS LEARNED, AND SHOULD ALWAYS BE SUBJECT TO THE REQUIREMENTS OF ANY APPLICABLE INTERNATIONAL OR NATIONAL REGULATIONS, AS WELL AS A COMPANY'S OWN PROCEDURES AND POLICIES.

HIERARCHY OF BARRIER CONTROLS

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

<p>ELIMINATE THE HAZARD</p>	<p>ENSURE no personnel are in vicinity of the moving gantry crane. ELIMINATE entrapment area, as far as function and design permit.</p>
<p>SUBSTITUTE THE HAZARD</p>	<p>CONSIDER alternative means of moving hatch covers, as far as function and design permit.</p>
<p>ISOLATE THE HAZARD</p>	<p>MOVEMENT and PRE-MOVEMENT WARNING devices. AUTOMATIC STOP SYSTEM to detect/avoid obstructions. ACCESSIBLE EMERGENCY STOPS based on identified risks.</p>
<p>INFLUENCE BEHAVIOURS</p>	<p>RISK ASSESSMENT/PROCEDURES to mitigate the risks. EFFECTIVE COMMUNICATION system established. LOOKOUTS to advise gantry crane operator of hazards.</p>
<p>PROTECT</p>	<p>TRAINING in working with/near gantry cranes. SAFETY CULTURE campaign to embed safe behaviours/reporting. DRUGS AND ALCOHOL policy enforced.</p>
<p>PHYSICAL CONTROLS/BARRIERS</p> <p>ADMINISTRATIVE CONTROLS/BARRIERS</p> <p>BEHAVIOURAL/SKILL CONTROLS/BARRIERS</p> <p>PPE CONTROLS</p>	<p>CORRECT use of safety helmet with chin strap, safety shoes. Also safety harness, safety line, fall arrest when working aloft.</p>

MOST EFFECTIVE

LEAST EFFECTIVE

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.