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Hot Work: A Concerning Matters For Cadets (An Overview On Cadets As An Apprentice On Board Of A Ship)

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Abstract: *This study aims to examine why seafarers engage in simultaneous tasks, which may lead to accidents. In an exploratory qualitative study, face-to-face interviews were conducted with selective and targeted seafarers previously involved in maritime accidents. The collected data were analysed using interpretive and descriptive qualitative methods with a socio-cultural approach. The findings of this study show that the substantial regulatory changes over the years in the maritime industry have resulted in increased occupational workload for seafarers. Some of these regulatory barriers designed to improve safety at sea prompted seafarers to engage in simultaneous tasks to perform excessive paperwork and compensate for insufficient crewing. The research also revealed how a poor speak-up culture onboard might encourage simultaneous tasks leading to accidents at sea. The analysis shows that reasons for engaging in simultaneous tasks at sea are varied and complex. Therefore, complex intervention efforts to discourage seafarers from engaging in simultaneous tasks is needed to mitigate accidents at sea.*

Keywords: *seafarer, accident at sea, culture onboard*

INTRODUCTION

Merchant shipping is known as an occupation with a high rate of fatal accidents. It is caused by maritime disasters and occupational accidents. The terms “marine accident and incident” and “marine casualty” denote undesirable events in connection with ship operations (IMO, 1996).

Marine accidents are unexpected events. The result could be in financial, properties, damages and either loss of people. Unfortunately, marine accidents are inevitable, even in today’s creative and innovative technologies in shipping sector and precautionary safety rules and regulations.

International Maritime Organization (IMO) is the international regulatory body that attempts to regulate and resolve complex maritime issues. IMO (2019a), (2019b)) continuously introduces and amends regulations such as the International Safety Management Code (ISM) and Standards of Training, Certification, and Watchkeeping for Seafarers Convention (STCW) to curb accidents and improve safety at sea.

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Hot work means any work requiring the use of electric arc or gas welding equipment, cutting burner equipment or other forms of naked flame, as well as heating or spark generating tools, regardless of where it is carried out on board a ship (IMO MSC/Circ. 1084).

Any work where temperature is high enough to cause burning is hot work, typically: welding, cutting, burning, heating, use of some power tools generating heat, open flame, electric arc or continuous sparks (www.knowledgeofsea.com). Hot work must be carried out with hot work permit. This permit must be issued by responsible Officer. Hot work is considered to be dangerous work so, carelessness can result in fire, explosion, heat injuries, strong light injuries (eyes effected) and shock injury to personnel.

LITERATURE REVIEW

Previous studies show that US fire departments responded to an average of 4,580 structure fires involving hot work per year in 2014–2018. These fires caused an average of 22 civilian deaths, 171 civilian injuries, and $484 million in direct property damage per year (NPFA, 2018). Apart from the fire, hot work operations produce toxic gases, fumes, vapours, noise, molten metal in a working environment which make it risky and hazardous job (Osha, 2021). A study also addressed that at least 16% of machinery space fire events have been caused by hot-work operations (Ikeagwuani & John, 2013). Yilmaz (2021) carried out research for shipboard fires and explosions and put emphasis on hot surface and hot-work actions in order to increase fire safety in the engine room. Furthermore, Marek and McGowan (2021) developed a governance model and safety management system for fire events on naval ship maintenance activities. According to their study, the most important factor which leads fire accident by hot work action is carrying the operation in improperly prepared areas.

A cadet is an apprentice on board of a ship. It is an on-board training for Deck or Engine Department student. It usually took 12 months. In this research, the researchers is breaking down on hot work regulation, safety procedure, guidelines and the process of hot work itself. Tukur and Zhoude (2013) reviewed the safety procedures and guidelines for hot work and welding operations. Saputra et al. (2015) also analyzed accidents to reveal safety issues on hot-work operations executed in conveyor belt area of a self-unloading bulk carrier vessel. So, this research is aimed for cadets to know and understand hot work, the regulation, safety procedure and guidelines.

METHOD

This research is using a qualitative approach. A qualitative approach facilitates rich and in-depth accounts of human behavior in various circumstances at sea (Yin, 2011). The researcher collected data from IMO Regulations, books and journals reviewing on hot work on board of a ship. Qualitative data analysis is carried out if the empirical data obtained is qualitative data in the form of a collection of words and not a series of numbers and cannot be arranged into categories/classification structures. data analysis activities consist of three streams of activities that occur simultaneously, namely data reduction, data presentation, and drawing conclusions/verification

RESULT AND DISCUSION

Nowadays, safety is considered as a part of a company's culture. The Safety Management System (SMS) on board should include adequate guidance on control of hot work and should be robust enough to ensure compliance. Absence of guidance should be regarded as prohibition, rather than approval (IMO MSC/Circ. 1084). Adopting standard operating procedures or safe working practices, permit to work, isolation as well as ensuring adequate training, instructions, or information to limit the risk of injury and/or ill health impacts to workers, are examples of administrative controls (HSA, 2021). It means accidents may happen but most times it can be avoided with precautionary measures, the right training and equipment.

Based on the Regulation above a hot work permit should be issued. A responsible officer, should be designated to ensure that the plan is followed.

Hot Work Permit is a document issued by a Responsible Person permitting specific Hot Work to be done during a particular time interval in a defined area. The SMS should include adequate guidance on the control of Hot Work and should be robust for compliance to deliver the expectations of ISM code and confirm that it is effective and that stated procedures are being followed (Andersen).

A Hot Work Permit is used to ensure the safety hazards are identified and that all measures have been taken to eliminate them. The permit identifies possible hazards and eventual precautions to be taken and lists the sequence of operations and precautions. It does not make the job safe by itself, but its strict observance minimizes the possibility of an accident happening.

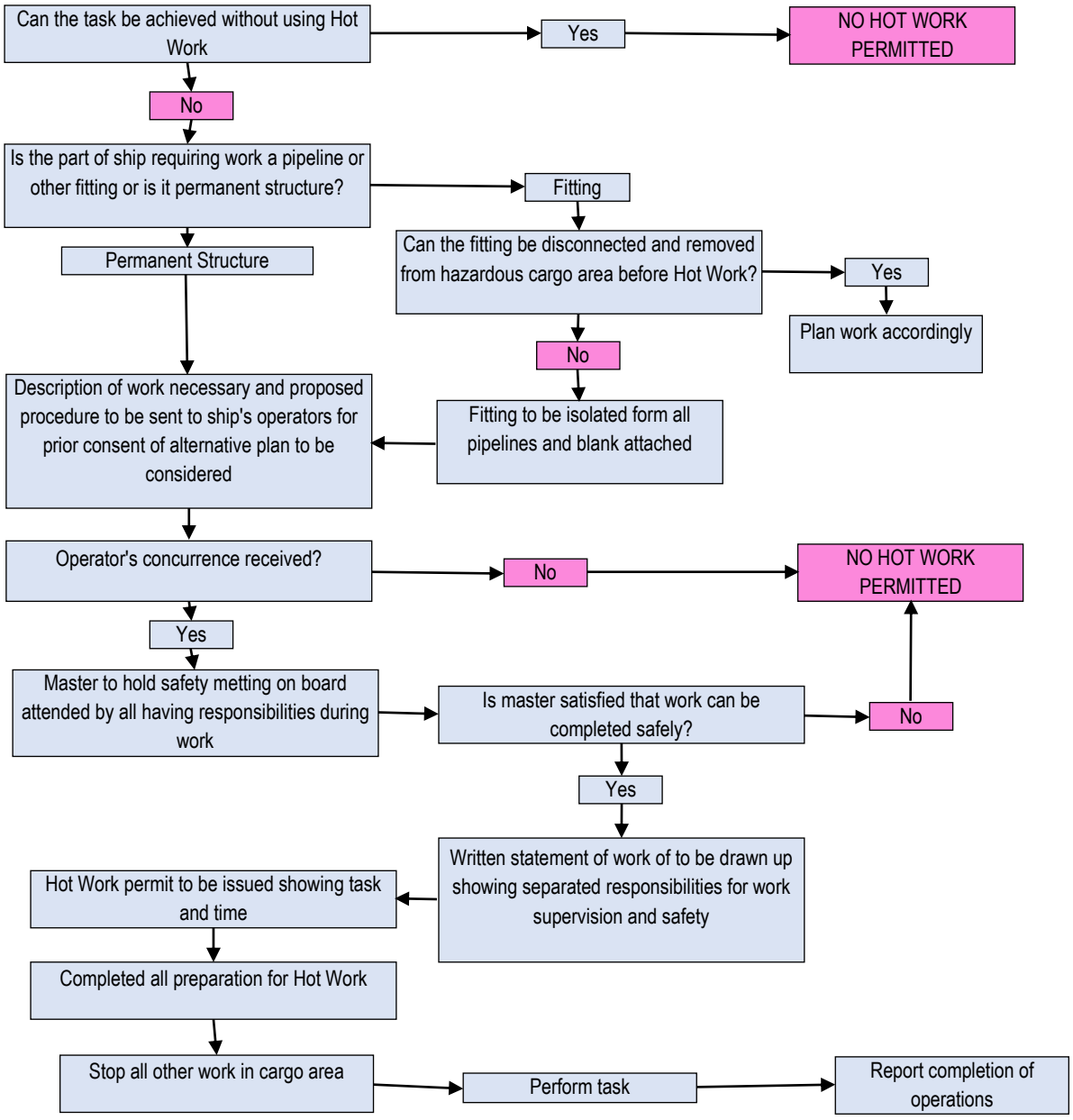

Figure1. Hot Work Flow Chart

Application to all hazardous work not involving naked flame or continuous spark production, and would include use of electrical equipment, use of air driven rotary equipment, sand or grit blasting, hammering and mechanical chipping and movement of equipment or materials over or near to machinery that is operating. Applies to all hot work involving high temperatures, open flames, electric arc or continuous source of sparks etc. This type of work includes but is not limited to welding, burning and grinding. Tests for combustible gas should be carried out immediately before commencement of hot work and at frequent intervals as long as the work is in progress.

As Hot Work is considered as dangerous work. It is careful consideration for safe planning and execution. Below is an example of Risks Involved in Carrying out Hot Work and Control Measures to be taken.

Table 1. Control measurement hot work

Hazard involved	Control Measures to be made
Inhalation hazard due to smoke generation.	1. Proper PPE shall be donned at all times. 2. Ventilation running throughout operation (if applicable). Source for driving the ventilation fan(s) must be kept on (air compressor/fire pump) throughout the hot work operation. 3. Follow safe practices as per Code of Safe Working Practices for Merchant Seamen (COSWP).
Electric Shock.	1. Approved and good condition of electric welding equipment i.e. cables, electric holder shall be used. 2. All electric welding equipment to be checked for insulation-Min 1 Mega ohm. 3. Earthing cable to be connected.
Eye injury	1. Welding mask and safety goggles to be used. 2. All personnel involved in the operation shall wear safety glasses.
Falling from a height. Slipping/tripping depending on the location of hot work.	1. Proper PPE shall be donned at all times. 2. Adequate non-skid shoes to be worn. 3. Ensure area is clear of any slipping hazard. 4. Safety harness shall be used where applicable. 5. Working aloft checklist to be completed so as to avoid any crucial points.
Personnel injury by falling objects.	1. Whilst lowering any objects, safety lines/ buckets to be used. 2. All equipment and ropes to be used for the job shall be thoroughly inspected. 3. Prior lowering any objects, ensure that all personnel in the space are clear underneath.
Burns, Scalds due to contact with Hot Surfaces.	1. Proper PPE shall be donned at all times. 2. Personnel involved in the hot work to exercise utmost care to ensure no contact is made with hot surfaces.
Fire/ explosion hazard.	1. A fire watch shall be posted. 2. Fire Fighting Equipment to be ready for immediate use in the vicinity. 3. All elements of the hot work permit shall be followed prior commencement of hot work. 4. Gas checks to be carried out to ensure space is free of any combustible material.

In a maritime workplace, applying for a hot work permit has a large managerial impact. Following are a few managerial effects of applying for hot work permits: By requesting a hotwork permit, managers may make sure that only safe, regulated processes are followed when doing hot work or welding. This can lessen the possibility of fire or explosion, which could endanger the safety of passengers and the ship's property. Increasing output: By requesting a hotwork permit, managers can schedule and keep an eye on any hotwork or welding work being done on board. Managers can ensure that work is completed swiftly and effectively without interfering with ordinary operations at work by optimizing work schedules. Increasing coordination: Several ship departments and sections, including safety, production management, and the fire fighting team, are involved in the application for a hotwork permit. This enables managers to enhance cooperation between various departments and sectors, boosting the effectiveness of their job.

The practice application of a hot work permit helps ship management to create a safe, efficient and productive work environment for the ship's crew and property on board. Following are a few tangible effects of obtaining a hotwork permit: Obtaining a hotwork permit can assist protect crew safety by ensuring that welding and hot work are only performed in a safe and prescribed manner. This can limit harm or loss and lower the likelihood of accidents. lowering the danger of fire: Ship management can lower the risk of fire on board by adhering to the hotwork permit process. This can prevent large losses and safeguard the crew and ship's belongings. Enhance productivity applying for a hotwork permit can enhance productivity by allowing ship management to organize hot work and welding schedules more effectively. This can reduce downtime for the ship and prevent disruption of its regular operations.

Work quality improvement the crew of the ship must follow prescribed safety protocols in order for a hot work permit to be issued. By making sure that all work is done in accordance with strict safety regulations, this can aid in improving the quality of hot and welding work. Increasing coordination Several ship departments and sections, including safety, production management, and the fire fighting team, are involved in the application for a hotwork permit. This enables ship management to enhance communication across various divisions and sections, enhancing the effectiveness of their work. Increasing crew members' understanding of safety can be accomplished by applying for a hotwork permit. This can

reduce the likelihood of an accident or loss and help foster a strong safety culture inside the organization.

CONCLUSION

Based on the discussion regarding the hot work permit on board, it can be concluded that the application of a hot work permit is very important to ensure the safety of the ship's crew and property on board when carrying out hot work or welding. The application of a hot work permit can also help reduce fire risk, increase work efficiency, improve work quality, improve coordination, and increase safety awareness on ships.

In applying for a hot work permit, it is necessary to carry out strict and well-coordinated procedures between various departments on board, such as the safety department, production management, and the fire fighting team. This ensures that hot and welding work is performed to high safety standards and minimizes the risk of injury or loss.

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