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Lack of safety culture leading to fatalities in enclosed spaces is cause for concern

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Introduction

There continues to be fatalities within enclosed spaces onboard ships. Mariners go to work at sea, undertake jobs onboard their ships, enter enclosed spaces, and some die during this activity. This is despite many years of guidance, legislation, and industry campaigns.

Over many years it has become clear that the fundamental root cause of the deaths occurring in marine enclosed spaces is the failure to establish a truly global marine industry safety culture, without which there remains an inability to learn and therefore improve.

A consequence of the lack of safety culture is the lack of effective education and training for the marine industry, both shore-based managers and seagoing mariners; on the complexities of identifying, managing, and controlling enclosed space hazards and risks. These problems all continue today, because there is a demonstrable failure to learn from enclosed space incidents and any other incident in the past, combined with a lack of effective legislation designed to deal with this apparently intractable problem.

The number of casualties relating to enclosed spaces in the international maritime industry should be recorded within the International Maritime Organisation's database system GISIS. However, it is felt that not all enclosed space casualties are recorded, and the analysis of this data is not robustly undertaken.

The following are the main points that should be addressed:

1. While recognising the self-evident wisdom of the current advice to not enter enclosed spaces unless essential, entry will, on occasion, still be required. It would appear that a substantial number of ships and their managers still have not followed the IMO guidelines in respect of auditing and recording their enclosed spaces. Consequently, those ordering crewmembers to enter a space and those entering such spaces, can have little knowledge of the problems they may encounter, nor of the difficulties of rescue if required. It is now essential that this auditing becomes mandatory rather than only providing guidance.

2. Access and egress methods to enclosed spaces on ships are still not designed to facilitate safe entry to carry out emergent inspection or work within the space. We are still commissioning ships with manholes of the same size as one hundred years ago. All manholes must be of such a size that entry can be affected by those wearing a BA set and enable a stretcher to pass through. It should be noted that if manholes are enlarged, it does not conflict with any structural class regulations.

3. As a ship is constructed with many individual spaces, many of which are enclosed spaces, caution is always required, especially when carrying cargoes that have hazardous emissions. The use of individual oxygen or multi gas meters would provide essential warning of any danger in a space.

4. Brain damage begins to occur after four minutes of oxygen deprivation. For any rescue attempt to succeed, it is essential that oxygen is provided to the casualty as soon as possible to limit this damage. It is difficult even for a well-trained rescue party to reach a casualty in four minutes and the retrieval of the casualty from any difficult space can be expected to be prolonged well beyond this time. Unless a space is immediately readily accessible, only the provision of a resuscitator (not just an emergency escape device) can provide the oxygen essential to give life support to the casualty.

5. Most flag states have established their own criteria governing the settings for oxygen measuring instruments and gases: However, these only apply nationally. Consequently, the safety settings for oxygen content in the air depends on the country of manufacture and this ranges from a minimum of 18% to a maximum of 21%. It is important that consideration be given to establishing just one international standard for required oxygen settings in the marine industry and that they are easily understood by mariners using the equipment. The following messages must be clear:

    a. The space has sufficient oxygen to support me.
    b. There are no dangerous gasses [vapours] present which will harm me.
    c. I am sure that my gas measuring equipment is working correctly.
    d. I have my own personal gas monitor to alert me quickly to leave the space.

6. The IMO has promulgated a requirement for a minimum alarm setting of 21%. This is incorrect. However, because this is the official IMO figure, some manufacturers may be setting their alarms accordingly. The general accepted measurement of oxygen content of normal air is 20.8%. If a setting of 21% is used, the alarms will continually sound on the instrument in use. If this happens, the reaction of those on board could be to switch the alarms off, thus defeating the object.

7. The use of natural ventilation, rather than mechanical ventilation, for enclosed spaces is also a subject for concern due to the complex nature of the construction of some enclosed spaces, such as double bottoms and inter barrier spaces. Vapours in an enclosed space, which are heavier than air, will remain in that space even when emptied of any liquids. Likewise, when solid residue, such as mud, rust deposits, shale and cargo residue is present, then vapour release from these substances can take place, particularly with changes in temperature during the day.

8. Ventilation is a design, construction, and regulation problem, with few tanks and cofferdams being fitted with mechanical ventilation. Regrettably it is wrongly assumed that natural ventilation can clear such spaces of any dangerous vapours. While this can deal with surface spaces and the surface of tanks, it does not deal with gases heavier than air deeper down in the space. It is essential that fit for purpose fans and sufficient ventilation tubing, that can reach the deepest spaces on a ship, are provided to supply

forced ventilation where required. This equipment must then be used in sufficient time for spaces to be cleared and this then brings about the obvious requirement to conduct thorough, extensive, and comprehensive testing prior to tank entry being considered.

9. We should be clear about the Master's responsibility onboard their vessel. The Master is responsible for the safety of all on board the vessel, regardless of their status. This especially applies in drydock. There is a false premise held by both drydock management teams and the ships that the drydock can abrogate the master's responsibility by issuing a document stating the drydock company assumes responsibility for their own employees on board, or for safety in general, during the vessel's stay. This is incorrect and illegal. Regarding enclosed spaces in drydock, since many of these can be open at the same time, and the ship's staff can be overwhelmed by the work, the Master can employ a specialist enclosed space company to take charge of these spaces under his authority. The alternative is for the Master and crew to sign off the vessel and hand over the ship to the drydock as a 'dead' ship.

10. The UK risk-based regulations, starting with the Health & Safety at Work Act 1974 (HASAWA) and augmented by the subsequently introduced Management of Health and Safety at Work Regulations 1999, have been largely adopted by the MCA and written into UK maritime legislation. However, and self-evidently, these regulations do not apply to the rest of the world's ships, which of course form the vast majority. Notwithstanding the above, in the UK there is still a disparity between regulations as applicable to seafarers on board a UK registered ship and those applying to dock and shipyard workers. The Health & Safety Executive (HSE) are responsible for the safety of the latter and HSE regulations still tend to be stricter and better policed, while carrying substantial penalties for convicted transgressors. The differences between IMO standards, as applied to all ships, and those of the HSE are even more marked. If there was an attempt by IMO to follow some of the hard-earned lessons of the UK HSE in respect of managing the risks associated with enclosed spaces, real progress might finally be achieved.

11. Despite the progress made in recent years to make entry into enclosed spaces less of a risk, the industry still kills mariners in enclosed spaces. This is unacceptable. Effective well delivered and managed training; identifying enclosed spaces upon each ship; having an easy to follow and use SMS and permit to work system that the crew understand and can easily use; undertaking drills planning for enclosed space entry and rescue, are all essential. In addition, when things do not go as planned, it is equally essential to have an open and transparent means of investigation, recording and trending of these and other types of incidents available, to enable all to truly learn all available lessons. In this global industry, all of the above is essential if the industry is to ever make progress in this vital area.

Conclusion

This article has attempted to set out the many moral, legal and financial reasons for more effectively managing the risks associated with the hazard of enclosed spaces on ships. As

was explained in the introduction, meaningful changes in people's behaviour will never be achieved in the maritime industry without pursuing and achieving a world-class safety culture. There is now considerable evidence demonstrating that a world-class safety culture is the most **productive** thing both a company and an entire industry can do to improve **all** aspects of its business. The step by step 'how to' part of changing an industry culture exists but needs to be the subject of a further article.

The author acknowledges the fact that this subject and its solutions are being examined extensively and thoroughly by both InterManager, where they have widely consulted with seafarers over several years to get to the bottom of this problem, and the Human Element Industry Group (HEIG). So, apart from pointing to the imperative of creating a world-class industry safety culture, the article does not attempt to offer all the individual solutions to this long-standing industry problem.

Some suggested topics for future consideration may be:

- How to establish and grow a safety culture
- The importance of actions that address a global audience of mariners and reflect the true global nature of the industry and workforce and the migratory nature of today's mariner
- How to set up and establish a simple, affective and easy to operate safe system of work [SMS], which includes enclosed space risk assessment, permits to work and testing procedures for enclosed spaces
- How to operate a safe system of work that is 'mariner centric' so it is seen by all as a benefit rather than an administrative burden. If it's not and if it's not workforce owned, then there is a risk the work becomes detached from the paperwork. The primary purpose of the paperwork side is the last 'pause and check' before undertaking any task

About the author:

The author has written about safety at sea for over forty years and recently carried out a considerable amount of work to tackle the marine enclosed space problem. On retiring from the sea, and still seeing the number of deaths occurring in enclosed spaces, the Mines Rescue Service (MRS) was approached. This organisation boasts the premier National Enclosed Space Rescue Force. The then Chairman of MRS, Dr Barry Jones, CBE, invited the author to give a presentation on the marine situation in respect of enclosed spaces. They were so disturbed by the state of affairs outlined that he was invited to form a new division of the service, Mines Rescue Marine, to provide enclosed space services and advice to the marine industry, which was carried out for several years until the author's retirement in 2017.

During the author's time with the MRS, numerous seminars were organised, and a countless number of presentations given. Many ships and production platforms were visited and a series of DVDs on enclosed spaces were produced in partnership with Videotel. The author produced a book and over twenty articles on the subject and MRS also hosted several

management residential training weekends. However, it was noticeable that very few board level directors attended any of these presentations and seminars.