

The human element – the effects of fatigue on ship safety

PART 2 – Practical advice to the seafarer

The human element is often cited as a major cause of marine incidents. Fatigue is the main contributory factor in such incidents. 82% of the recorded groundings and collisions occurring between 0000 and 0600 hours are caused by fatigue.¹



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Introduction

Fatigue is not a new issue for seafarers. However, in recent years, it has increased due to:

- greater commercial pressure
- quicker turnarounds
- more efficient port facilities
- reduced manning
- the depressed economic state of the marine industry.

It is paramount for all seafarers to fully understand fatigue, how it is caused and what can be done to prevent or at least minimise its effects.

What is fatigue?

Fatigue is considered as 'A reduction in physical and/or mental capability as the result of physical, mental or emotional exertion which may impair nearly all physical abilities including: strength; speed; reaction time; co-ordination; decision making; or balance'.²

The effect of fatigue on human performance

Medical research has proven how dramatically fatigue can influence an individual's ability to carry out day-to-day duties. Approximately 22 hours of wakefulness is equivalent (in relation to impairment of performance) to having a blood-alcohol concentration of 0.1%.³

This is double the legal driving limit in most EU member states. It can also lead to long-term health conditions such as obesity, cardiovascular disease and diabetes.⁴ It is clear that eliminating fatigue is paramount for both the shipowner and the crewmember.

What action can be taken by the ships' staff to prevent or reduce levels of fatigue?

Outside of efforts undertaken by shipowners and industry bodies, there are measures that can be taken by the seafarers themselves to reduce occurrences of fatigue, which should be encouraged by managers.

Management of work periods

Although responsibility for a ship's compliance to STCW has now been placed on shipowners (to provide the necessary resources and manning levels), final responsibility stills remains with the ship's master.

The use of the '6 on 6 off' watch system has proven to increase fatigue and stress levels.⁵ Forward planning by masters, whenever possible, to minimise periods where this watch system is required is essential.

- 1 UK Marine Accident Investigation Branch (MAIB), *Bridge Watchkeeping Safety Study, 2004*
- 2 International Maritime Organization (IMO), MSC/Circ.813/MEPC/Circ.330, *List of Human Element Common terms, 1997*
- 3 *Comparison of the relative effects on performance of sleep deprivation and alcohol*, by A.M. Williamson & A-M Feyer, 2000
- 4 National Health Service, UK (NHS), *Sleep and tiredness, why lack of sleep is bad for your health, 2018*
- 5 Warsash Maritime Academy, Southampton Solent University and the Stress Research Institute, University of Stockholm, *Investigation of the 8-hours on/8-hours off seafarer watch keeping system, a final report to the UK Maritime and Coastguard Agency, 2016*

Management of rest periods

Modern technology allows seafarers to readily communicate with friends and family ashore, watch movies and play video games in the comfort of their own cabin. Whilst this is an advantage, seafarers should take care to ensure that they don't unduly disrupt their rest hours with such diversions. The ease of communication with home can result in unfiltered news, sometimes bad, being received, leading to increases in stress levels.

Optimum contract lengths

Individual seafarers' contracts vary considerably, despite all being compliant with MLC 2006 limitations.⁶ An optimum contract length would be three to six months, significantly less than the MLC limitation. Contracts of over six months may result in sleeplessness, loss of sleep quality and reduced motivation, leading to fatigue and stress.^{7,8}

Seafarers, not only owners/managers, should be active in determining the length of their contract. The extension of contracts to over 11 months should be discouraged.⁹

Suitable vacation periods between contracts

Seafarers need to take accountability for ensuring suitable leave periods to avoid stress or fatigue-related long-term illnesses. Research indicates that leave periods cannot be calculated from a generic equation, as recovery time between voyages is dependent on many variables such as rank, watchkeeping patterns, ship design,

trading pattern and workloads, and ultimately the well-being of the individual seafarer.^{7,8,9}

Fully embrace and utilise new innovations to help reduce fatigue

These schemes need seafarers' support for shipowners/managers to be able to identify where any significant beneficial changes can be made.

Weather routing

Utilising effective weather routing to avoid adverse weather provides a more comfortable living environment, ensuring that crewmembers get sufficient sleep during rest periods.

Fatigue Risk Management Systems

Fatigue Risk Management Systems (FRMSs) are being introduced into the marine industry, having already had considerable success in other safety-critical industries. FRMSs are designed to assist in identifying shortfalls in existing company procedures as well as international regulations and what amendments should be made to address them.

FRMSs use a comprehensive, systematic approach by reviewing all aspects of the workplace, including operational requirements/restrictions, quality assurance as well as company procedures. The standard core elements being implemented across the industry are:^{7,8}

- fatigue awareness training and cultural change programmes
- a fatigue reporting system within a just culture

- data-driven analysis for operational fatigue risk assessment, workload management and monitoring of adequate sleep for seafarers

For FRMSs to be truly effective, it will require full commitment from shipowners, shoreside personnel as well as seafarers.

Maintaining seafarers' standard of health

Seafarers need to understand the link between fatigue and ill health. Long-term fatigue can lead to reduced work performance, ill health and reduced lifespan. Seafarers can take positive steps to help minimise the effects of fatigue on their health by prioritising rest during off-watch periods over other on-board activities.

Conclusions

A full understanding of fatigue, how it is caused and the ability to recognise the symptoms is of paramount importance for all seafarers and particularly the master. Pre-emptive action should be encouraged:

- maintain a healthy diet and exercise routine
- ensure prejoining medicals are comprehensive and all, if any, medicines being taken are disclosed
- ensure a good understanding of fatigue and know how to identify the symptoms
- ensure that crew feel able to advise senior officers if they believe they are suffering from fatigue
- avoid extensions past 11-month contracts
- ensure adequate leave to allow crew to fully regain normal physical health before returning to sea.



6 MLC 2006

7 Project Horizon, 2012

8 Project Martha, 2013–2016

9 Occupational Safety and Health Research Institute, USA, *Sleep and Fatigue Among Seafarers: The Role of Environmental Stressors, Duration at Sea and Psychological Capital*, 2016