



Seafarer onboard vessel

Hours of work and rest – impact on fatigue

Fatigue can have serious consequences for the safety and health of seafarers, operational safety and the marine environment. The demanding nature of shipping means that seafarers may be required to work long and irregular hours. They may work and live away from home for weeks or months

at a time, on a vessel subject to unpredictable and changing weather conditions. While on board, the vessel is both a seafarer's workplace and their home, so there may not be a clear separation between work, recreation and rest. This can affect mental and emotional wellbeing.

If companies address fatigue proactively, it will improve personnel safety. Effective management of fatigue also has the potential to cut costs for the company by reducing injury and downtime because of accidents, as well as physical damage to high-value assets and the environment.

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Case study 1

A tanker was attempting to anchor in the Southwest Pass Fairway Anchorage when it struck an oil and gas platform¹. The platform's four crewmembers and one technician evacuated to a nearby platform by helicopter after activating the emergency shutdown device to the platform.

The tanker company's safety management system (SMS) required a minimum one-day turnover between senior personnel aboard a vessel. However, the master took command of the vessel at night, having never served on it before and after travelling for about 54 hours from his home to join the vessel.

An investigation found that the tanker's operating company did not ensure there was sufficient time for the master's turnover, which resulted in the master becoming fatigued contributing to poor situational awareness. The company did not comply with its own SMS, expecting the master to conduct critical vessel manoeuvres, such as navigating downriver and anchoring at night, whilst fatigued and without any overlap with the departing master.



Tanker pictured on the left and platform pictured on the right

Case study 2

An articulated tug-barge composed of a tug and a tank barge ran aground on Edge Reef near Athlone Island, at the entrance to Seaforth Channel, Canada². The tug's hull was eventually breached with approximately 110 000 L of diesel oil released into the marine environment. The tug subsequently sank and separated from the barge.



An investigation found that the second mate who was working alone on a 6-on, 6-off watch schedule on the bridge, became fatigued and fell asleep. The navigational alarms were not used, and a bridge navigational watch alarm system (BNWAS) was not fitted. The other crew member on watch was not stationed on the bridge and did not reach the wheelhouse in time to prevent the grounding.

The report concluded that if a vessel employs a one-person bridge watch or 6-on, 6-off shift schedule without using appropriate fatigue-mitigating measures, particularly during the hours of darkness, there is an increased risk that the crew will be impaired by fatigue while on duty.

Tug involved in the accident

AMSA Inspection Data

PSC deficiencies

AMSA issued 392 deficiencies relating to shipboard working arrangements, records of hours of work and rest, fitness for duty and documentation relating to work and rest hours between 2019-2021 (see Figure 1). This equates to 3% of all PSC deficiencies. During this period 46 International Safety Management (ISM) Code deficiencies were issued relating to failures to ensure adequate rest for seafarers or failures to take appropriate measures when repeated breaches occur.

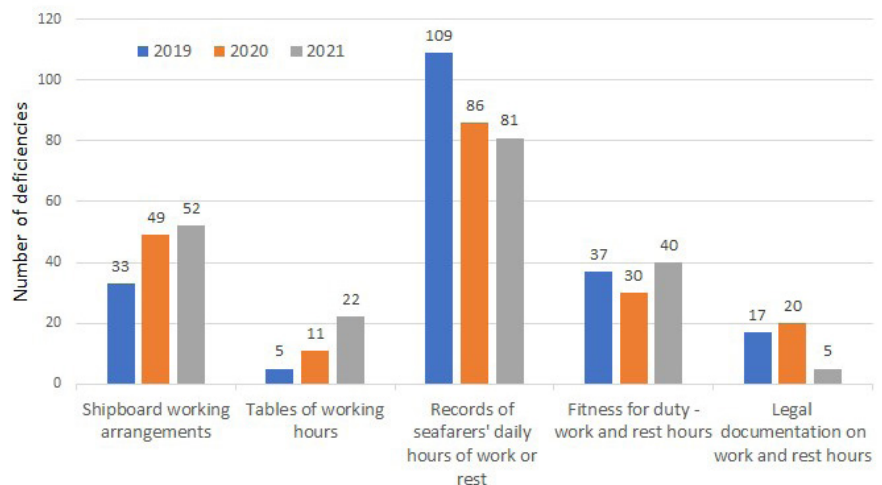


Figure 1 PSC Deficiencies relating to work and rest hours (2019-2021)



Fatigue and the Company



Hours of work and rest

The Principles of minimum safe manning (resolution A.1047) provides for an assessment of the tasks, duties and responsibilities of the vessel's complement to ensure that crewing levels are adequate at all times to meet all conditions and requirements, including peak workload situations and emergency conditions.

Prescriptive formulas for hours of rest are set out in Chapter VIII of the Standards of Training Certification and Watchkeeping (STCW) Convention. However, applying these prescribed hours of rest (those identified in international conventions and national regulations) does not guarantee a seafarer will not become fatigued. The hours of rest requirements are a minimum and the company should also consider key aspects of work

patterns that affect fatigue, including night work and different types of operational schedules.

The Maritime Labour Convention, 2006 (MLC) also sets out requirements for hours of work and rest in Regulation 2.3. The MLC provides goal-based standards (A2.3) to be considered when determining hours of work and rest – in particular taking into account “the danger posed by fatigue on seafarers, especially those whose duties involve navigational safety and the safe and secure operation of the ship.”

Adequate resources

Although the master is responsible for managing the vessel and its crew, the company should provide adequate support and resources to the master

to ensure they can manage shipboard duties and operations safely and effectively.

Effective operational planning is critical to ensuring adequate resources are always available, so that operational and other (or unexpected) demands placed on the vessel and its crew can be managed safely and effectively. Standard A2.3 of the MLC Regulations allows some flexibility with respect to hours of rest in cases of emergency or other overriding operational conditions. However, AMSA does not consider the relaxation provided for in the regulations extends to the normal operations of the vessel or commercially required work such as port arrivals, berthing, unberthing, cargo operations and hold cleaning³ which can be planned so as not to effect rest hours.

Duty scheduling and planning

Duty scheduling and planning is critical in managing fatigue. The company should ensure its duty schedules provide adequate opportunity for sleep

Duty schedule design principles⁴

The following principles should underpin the design of duty schedules:

- Plan duty (work) schedules based on the actual hours worked.
- Develop a working-hours policy on daily duty hours and maximum average weekly hours. If possible, a work week should not exceed 70 hours.
- Minimise occasions in which seafarers work more than 12 hours in a duty period per 24 hours. Limit the use of overtime, especially unscheduled overtime.
- Ensure that any period of extended work hours is compensated with a longer break before resuming the next duty period.
- Account for ‘covering’ contingencies caused by sea sickness or illnesses.
- Use forward rotation such as day-afternoon-night shift changes.



continued from page 3...

- Use fatigue assessment tools and/or fatigue prediction software to verify new duty schedules are within safe limits.
- When possible, schedule complex tasks for daytime (i.e., not between 0200–0600, or to a lesser degree, between 1500–1700).
- Avoid scheduling high-risk tasks on the first night of a night watch duty period. If unavoidable, when planning the task consider additional controls.
- Allow seafarers who work regular nights, periods of normal night's sleep to catch up on their sleep deficit. Factor in sleeping, eating, washing and wind-down time in rest periods.
- Ensure rest periods allow for a minimum of six hours uninterrupted sleep.
- When a minimum of 7–9 hours of sleep is not possible, compensate for any sleep loss with daily naps of up to 90 minutes in length (allowing 30 minutes between a nap and returning on duty for sleep inertia).
- Provide for short breaks during duty periods (coffee, meals etc).

If possible, allow individuals to manage their own short breaks.

- When possible, provide reset breaks of 25 consecutive hours every 7 days in which unrestricted sleep is possible.

Seafarer fatigue is the result of the actual work, not the planned work



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Key messages

- While it is not possible for the company to regulate and oversee the sleeping habits of every seafarer on every vessel, it is within its capability to mitigate the risks of fatigue through vessel design, operational and crewing policies.
- Ensure that crewing levels are adequate to operate a ship 24/7, including during emergencies, not just to meet the minimum crewing.
- Seafarers employed in a 6-on, 6-off shift schedule will rarely, if ever, receive a six-hour period of unbroken rest.
- When seafarers require rest, ensure they are provided opportunities to do so. This may include anchoring after a departure. It cannot be assumed that simply allocating a rest period from duty will provide an adequate level of sleep and recovery.
- While a seafarer may 'finish' their watch at a given time, they cannot switch immediately into "rest". Handovers and paperwork often keep a watchkeeper working beyond the end of their watch.
- Maintain accurate records of work/rest to reflect actual hours worked.

References

- ¹ NTSB (2021) Contact of Tanker Atina with Oil and Gas Production Platform SP-57B. Investigation Report, MAB-21/24.
- ² TSB (2018) Grounding and subsequent sinking of articulated tug-barge. Marine transportation safety investigation report, M16P0378.
- ³ AMSA (2017) Fitness for Duty. Marine Notice 14/2017
- ⁴ AMSA (2020) Duty schedule design principles. Fatigue guidelines – Managing and reducing the risk of fatigue at sea.