

33 ERGONOMICS

33.1 General

33.1.1 Ergonomics deals with the interaction between humans and work, and covers three principal areas of work: design and environment, work processes and organisation.

Design and environment:

- Workplace design, layout, controls, displays, temperature, light, noise, smell, vibration.
- Workload and fatigue.

- Safe working posture.

Work processes:

- Mental workload, fatigue and work-related stress.
- Human reliability, errors and violations.
- Competence, capability and training.

Organisation:

- Communication and teamwork.
- Policies, procedures and work instructions.
- Quality management and assurance.

33.1.2 The quality of shipboard ergonomics can have a significant role to play in safety as well as efficient operational performance. Ships designed and built around sound ergonomic principles are generally easier to operate, more efficient, less stressful, safer and more resilient.

33.1.3 Similarly, the quality of procedures, operating instructions, work instructions and maintenance instructions can play a significant role in operational performance and safety. Procedures and instructions that are clear, logical, consistent, easily understood by all users and fit for purpose will reduce violations and lead to safer operations.

33.1.4 However, often seafarers will need to work in less than ideal circumstances. The following advice is offered to help meet the challenge of working safely and efficiently in such circumstances.

Guidance for seafarers

- Familiarise yourself with the layout of your working areas.
- Assess how the layout could affect your situational awareness and working practices during routine and emergency operations.
- Be aware that risk factors do not operate in isolation – they combine and multiply.
- Remain vigilant and take extra care to maintain situational awareness at all times.

- Effective teamwork and communication will be even more important – help each other.
- Do not allow yourself, or others, to be drawn into taking shortcuts or violating procedures.
- Raise concerns about poor ergonomics or procedures at every opportunity.
- Routinely consider ergonomics as part of safety meetings.
- Propose effective solutions, modifications, changes to procedures, etc.
- Be aware of the effect of frustration, fatigue and stress on behaviour and performance.
- Ensure that everyone is completely familiar with the on-board equipment and fully competent in its use.
- Be active in procedural or work instruction review.
- Be assertive in advising the shore-side organisation of the need for any changes.

33.1.5 More information about applying ergonomic principles can be found in Annex 33.1.

33.2 Work with display screen equipment

33.2.1 In this chapter, display screen equipment (DSE) includes devices or equipment that have an alphanumeric or graphic display, such as display screens, laptops, touch screens and other similar devices. There are no specific regulations governing health and safety in the use of DSE that apply to UK ships. This section therefore gives guidance only, reflecting best practice ashore.

33.2.2 Seafarers should be given adequate individual training in the use and capabilities of DSE. This training should include any risks from DSE work and the controls in place; and where possible:

- how to adjust equipment settings;
- how to adjust furniture;
- how to organise the workplace to avoid awkward or frequently repeated stretching movements; and
- whom to contact for help and to report problems or symptoms.

33.2.3 Although the relevant regulations do not apply on ships, it is recommended that any seafarer using DSE as part of their work for continuous periods of an hour or more on a daily

basis be provided with an eye test by a qualified person on request and at no cost to the seafarer.

33.2.4 Lighting should be adequate for the task, with glare and reflection cut to a minimum, and the display on screen should be clear and easy to read. The operator should adjust the brightness and contrast to suit the lighting. When appropriate, the operator should be given short rest periods away from the equipment.

33.2.5 Certain forms of medication may impair working efficiency on DSE. Personnel should be aware of this possibility and seek medical advice if necessary.

33.2.6 Further guidance on the safe use of DSE in an office environment can be obtained from the Health and Safety Executive (HSE) that produces various leaflets including 'Working with display screen equipment (DSE)'. Leaflets can be obtained from the HSE website.

ANNEX 33.1 ERGONOMICS

The underpinning principle of effective ergonomics is to make machines, equipment, processes and organisational policies that fit the actual needs of people who use them. This is known as user-centred design.

In an ideal world, effective user-centred design would be the norm. In reality, it is often the case that people have to adjust as best they can to fit the working environment they are given. This presents a number of challenges for working safely and efficiently, and seafarers need to be extra vigilant and mindful of their tasks.

Challenges of poor ergonomics

Design and construction

- The design of ships, layout of workspaces and arrangement of controls and displays is not always ideal. Important or frequently used controls are not readily at hand, and controls and displays are not arranged in a logical sequence that supports work tasks, or are difficult to see, identify, distinguish and read.
- Working and living environments may be uncomfortable due to heat or cold, noise, vibration, smell or poor lighting. Communication may be difficult, escalating any existing language difficulties. Access may be inadequate; spaces may be cramped, making it difficult to operate tools and equipment.
- A seafarer can encounter physical hazards as part of the ship's design – slips, trips and falls are an everyday hazard.

Work processes

- Manual work (e.g. cargo handling, maintenance and repair work) can be physically demanding and place considerable strain on the mind and body. The most suitable tools and equipment may not be available and the working space may not be adequate to allow a seafarer to carry out a job safely using correct tools or safe ergonomic body posture, which can encourage shortcuts and procedural violations.
- Working at a poorly adjusted workstation for long periods can have an adverse effect on body posture and long-term health and musculoskeletal injuries, as well as induce fatigue.
- Long hours and demanding work cause fatigue and can lead to stress. Poor ergonomically designed ships, equipment, tools and work processes that do not support seafarers effectively and where they continually have to adjust to their environment and

find workarounds will require a significant increase in physical and mental workload, which will greatly increase the likelihood of fatigue and stress, errors and accidents.

- Poorly written procedures and instructions that are difficult to understand may have a direct bearing on the safe and successful operation of ships and ships' equipment. Crews may interpret the instructions in different ways, leading to inconsistencies and errors. Instructions that are difficult to follow may lead to procedural violations as crews struggle to find a workaround. This in turn may lead to increased stress and fatigue, both significant contributors to accidents. Procedures and instructions must make life easier for crews.

Risks

- Ergonomic deficiencies can increase stress and fatigue and encourage shortcuts or procedural violations. They can cause operational distractions that will adversely affect situational awareness and operational efficiency and increase the likelihood of errors, not only in stressful or emergency situations but also during routine operations unless extra vigilance is taken.
- Safe operations depend upon well-trained seafarers who are familiar with their ship and fully competent with the precise equipment and procedures used on it. Degraded levels of competence can lead to increased workload, increased fatigue and stress and an increased error rate. Poor ergonomic design of ships, equipment and procedures will increase any effect of degraded competence.
- Organisational failures, including those that affect design and procedural ergonomics, can easily lead to failures at the operational level through equipment failure, unavailability of tools and equipment, additional stress on personnel, poor resourcing, etc.
- Environmental issues beyond anyone's control can add to any risk, e.g. weather, sea state. Poor ergonomics will become even more difficult to manage.

Mitigation of poor ergonomics

Ship owners and operators should:

- proactively consider effective ergonomic principles when commissioning ships, equipment or designing work procedures – user-centred design principles;
- proactively consider modifying ships, equipment and work processes to become more user centred;
- actively encourage ships and their crews to report ergonomic issues on board;

- ensure that procedures and work instructions are presented in a consistent format, easily understood by everyone who uses them; and
- ensure that those making use of procedures and work instructions are actively involved in their development and review.

Design and construction

Well-designed, user-centred equipment and work processes will support seafarers in their work and have a positive effect, reducing fatigue and stress and making work more satisfying, efficient and safe.

Procedural/work instruction ergonomics

Procedures need to be technically accurate and, equally important, well written, usable and up to date. Procedures need to:

- reflect how tasks are actually carried out;
- be accurate and complete;
- be clear and concise with an appropriate level of detail;
- be current and up to date;
- be supported by training (where appropriate);
- identify hazards;
- state necessary precautions for hazards;
- promote ownership by seafarers;
- use familiar language and be easily understood by everyone on board;
- take into account potential differences in language ability;
- use consistent terminology;
- be in a suitable format; and
- be accessible by all on board.

Organisation

- Organisational policies and practices should ideally support the front line in all its needs, i.e. set people up to succeed.
- Recruitment and selection practices should ensure that all personnel serving on board are fully competent for the duties they are to perform, including operating all equipment found on board. On-board familiarisation training should be immediate and effective.
- Practices for care, maintenance, supplies, etc. should ensure that vessels are always fully and correctly maintained and have ready access to all the stores, tools and supplies needed wherever they are in the world.