Ergonomic criteria for control room equipment and layout  A checklist

User interaction
- In accordance with ergonomic standards
- Response speed sufficient for interaction without disrupting task
- Comfortable for long watches
- Operator interface permits monitoring, control/supervision of machinery/equipment
- Visual/audible/mechanical feedback acknowledges operator input
- Functions requested by operator confirmed by displays on completion

Visual clarity
- Information clear
- Display formats free from irrelevant information
- Logical grouping & structure of information
- Display formats not densely packed/cluttered
- No distraction from user's primary tasks

Consistency
- Information consistently presented within & between subsystems
- No confusion/errors through inconsistencies
- Graphical symbols and colour coding in accordance with recognised International Standard
- Symbols used in mimic diagrams consistent across all displays
- Screen layout & arrangement of information consistent
- Flashing of information reserved for unacknowledged alerts or transient states

Compatibility with users’ expectations
- Information/labelling in accordance with recognised standards/conventions
- Information in form that users are accustomed to
- Control functions work as users expect
- Equipment mode obvious to user

Alarms
- Provision of alarms consistent with Human Hazard Assessment
- No unnecessary alarms
- Alarm philosophy based on good practice
- Accepting/canceling alarms do not cause distraction/excessive workload
- Alarms prioritised/grouped to reflect urgency
- Captions/alarm list messages easily understood
- Different audibles easy to distinguish
- Sufficient alerting when user busy with other item of equipment

Error prevention and correction
- Failure indications clear & unambiguous
- Sufficient information to identify cause of failure
- Assistance in recovering from user error
- ‘Undo’ function provided
- Single user errors identified and avoidable
- Operator confirmation provided for control action that could affect safety of ship

Flexibility and control
- Equipment meets needs of different users
- User ‘in control’ of sequence of commands/actions
- Able to switch between tasks with some incomplete
- Obvious to team who is in control of particular function(s)
- Transfer of control compatible with good watchkeeping procedures

Situation awareness
- Functional overview display provided
- Equipment & arrangements assist operator in maintaining awareness of overall situation
- Operator not absorbed in what equipment is doing
- ‘Head-down mode’ avoided

Automation and status indication
- Operating mode of machinery & equipment clearly indicated
- Defects/failures & their implications obvious to user
- Able to override automation or intervene part way through process
- No monotonous monitoring tasks
- Procedures & assigned tasks address failure modes

Support for operator tasks
- User interaction in accordance with task requirements
- Needs of all watch conditions & situations considered
- Specific needs of particular users considered
- Workstation design supports teamwork/assignment of tasks
- Operator able to crosscheck control actions

Supporting tasks
- Adequate storage of manuals, log books, work surfaces, etc
- Able to perform background tasks at workstation
- Background or supporting tasks do not cause distraction or additional workload

Panel layout
- Panel layout logical
- Items grouped & sequenced in manner that supports correct use & helps to prevent errors
- Controls & displays positioned according to frequency, urgency and criticality

Controls & displays grouped according to sequence of use
- Keyboards divided logically into functional areas

Controls, displays & labelling
- Controls, displays & labelling clear & easy to access
- Purpose of each control clearly indicated
- Controls and indicators easily distinguishable
- Displays & indicators present operator with clear, timely & relevant information
- Operating mode of machinery & equipment clearly indicated
- Failure indications clear & unambiguous
- Sufficient information to identify cause of failure
- Display visibility satisfactory in conditions of daylight, darkness or no natural light

Documentation design
- Appropriate formats of documentation provided
- Documentation consistent with equipment
- Documentation provided in correct language
- Documentation easy to use
- Documentation does not cause distraction from safe and effective watchkeeping
- Needs of all watch conditions and situations considered
- Specific needs of particular users considered

Environment
- Control room environment meets criteria for heating, ventilation, air conditioning, airflow, humidity, heat sources; noise; vibration; ship movement
- Lighting sufficient to avoid glare/reflections from working & display surfaces, flicker-free
- Non-reflective or matt finish on surfaces
- No confusion/errors through inconsistencies
- Sufficient alerting when user busy with other item of equipment

Room layout
- Layout supports operation in all watch conditions & emergency situations
- Location of equipment appropriate to operator task does not cause distraction to other users
- Sufficient space & access for intended number of operators in expected operating conditions
- Local control stations positioned to minimise risk of harm to operator
- Instruments face operator’s intended working position

Access
- Access to & within control room meet ergonomic criteria
- Controls easily accessible to operator at workstation
- Layout of control room meets ergonomic criteria
- Ease of maintenance addressed
- Ease of cleaning addressed

Occupational safety
- Measures for occupational safety, including grab rails, non-slip surfaces, warning signs, protective clothing, protuberances, safety equipment marking, escape & survivability, security, cleaning

Documentation easy to use
- Documentation consistent with equipment
- Documentation provided in correct language
- Documentation easy to use
- Documentation does not cause distraction from safe and effective watchkeeping
- Needs of all watch conditions and situations considered
- Specific needs of particular users considered

Field of view
- External view meets Regulatory requirements
- Satisfactory horizontal field of view from each workstation
- Satisfactory vertical field of view over bow from conning & manoeuvring positions
- Window inclination, dimensions, framing & heights of upper & lower edges satisfactory
- Satisfactory view between different workstations/operators

Adapted from Lloyd's Register Rules and Regulations for the Classification of Ships, Part 6, Chapter 1 Control Engineering Systems, Section 3 Ergonomics of control stations; and the ATOMOS IV SOLAS Regulation V/15 Template 2013 Retrofit and Newbuild

To access a more comprehensive checklist together with appropriate reference documents, scan the QR Code