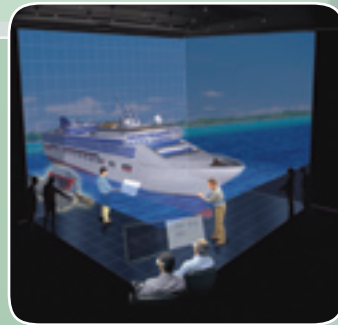


## Design

- Accessible anchorages for scaffolding and fall arrest systems
- Adequate handrails on bulkheads and platforms
- Adequate lighting
- Anti slip deck surfaces
- Arrangements for barriers
- Avoid vertical ladders as primary means of escape
- Climber safety rails
- Collapsible masts for maintenance of equipment
- Control panels and displays at ground level instead of at heights
- Deck and other edge protection
- Design to minimize need to go aloft
- D-hole connectors in tanks
- Employ the operational experience of seafarers
- High coefficient of friction treads for ladders
- Ladders and access points to be away from edges or protected by guard rails
- Ladders and safety rails built into systems
- Long life coatings and extended maintenance periods for confined spaces
- Make stairs uniform throughout the vessel
- Personal fall arrest systems
- Place sensors and controls outside tanks
- Provide bolt down guards for unguarded openings
- Provide for rough weather lifelines on upper decks
- Provide handrail extensions that can be collapsed when hatches are closed
- Provide secure handrails at tops of ladders
- Replacement of scaffolding with mobile lifts where feasible
- Robotic inspection devices for fuel tanks
- Safe means to raise tools and equipment to elevated work platforms
- Seek advice from Human Factors specialist
- Stowage for loose objects
- Walkthrough of traffic and escape routes



Slips, trips and falls account for the majority of occupational accidents aboard ship. This feature lists some of the hazards that can be faced, and offers some ideas as to how to mitigate them. Wherever possible, the aim should be to 'design out' these hazards. Any such design solutions must be kept under review throughout the lifecycle of the ship.

## Falls

- Corroded ladders
- Deck Openings and Edges
- Inadequate anchorages or tie off points for fall arrest gear
- Improperly secured gangways
- Inadequate guardrails in confined spaces, tanks & voids
- Inadequate scaffolding
- Inattention
- Lack of guardrails, chain or man ropes at hatch openings
- Loss of balance
- Poor illumination
- Poor ladder or handrail design
- Poor traction
- Removed engine room plates
- Shaky ladder or a ladder with slippery or broken rungs
- Slippery surfaces
- Striking by moving equipment
- Uneven surfaces
- Unguarded openings
- Unguarded ladders or platforms
- Unstable work surfaces
- Vertical unprotected ladders
- Working over the side or aloft

## Build

- Employ the operational experience of seafarers
- Seek advice from Human Factors specialist
- Ensure unguarded openings are properly guarded
- Ensure gangways are properly secured
- Ensure all handrails are secure
- Ensure ladders (portable or fixed) are properly secured
- Ensure scaffolding is properly secured and guardrails fitted
- Post safety & warning notices
- Mark all tripping hazards
- Conduct regular safety inspections
- Wear correct personal protective equipment (PPE)



## Slips

- Inappropriate footwear
- Inattention
- Loose/unanchored/unattached rugs & mats
- Oil & grease
- Polished deck surfaces
- Wet or slippery decks
- Worn non skid areas

## Hazards

## Trips

- Loose fittings on stairs
- Carrying of stores/equipment obscuring view
- Changes of deck level
- Cleats, bitts, pad eyes and other fittings at deck level
- Door sills
- Frayed rugs/carpets
- Inadequate handholds
- Inadequate slip resistance
- Inappropriate footwear
- Inattention
- Insufficient illumination,
- Loose or no handrails or stair rails
- Miscellaneous rubbish around decks, eg plastic bags
- Sloping decks
- Smoke/steam obscuring view
- Trailing wires and cables and hoses
- Uneven surface or steps
- Unmarked deck fittings

## Maintain

- Retrofit fall arrest systems, climber safety rails etc
- Review adequacy of lighting
- Renew anti slip deck surfaces
- Repair deck and other edge protection
- Renew friction treads for ladders
- Replace corroded/broken ladders & handrails
- Retrofit bolt down guards for unguarded openings
- Ensure unguarded openings are properly guarded
- Ensure gangways are properly secured
- Ensure all handrails are secure
- Ensure ladders (portable or fixed) are properly secured
- Ensure scaffolding is properly secured and guardrails fitted
- Post safety & warning notices
- Mark all tripping hazards
- Conduct regular safety inspections



## In service

- Clean up spills
- Comply with Codes of safe working practices
- Conduct regular safety briefings
- Conduct regular safety inspections
- Conduct regular safety training
- Conduct table top exercises of lessons learned
- Do not leave equipment, stores lying around the decks
- Ensure proper stowage of stores & equipment
- Erect safety rails
- Follow safety procedures
- Follow the principle of 'one hand for the ship and one for yourself'
- Mark unavoidable tripping hazards
- Post safety notices
- Provide extra lighting when needed
- Rig upper deck safety lines in rough weather
- Use personal fall arrest systems
- Wear correct personal protective equipment (PPE)
- Wear lifejackets when working in the vicinity of ship's side
- Wear safety harness when aloft

