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The advice provided in this pamphlet is basic safety and health information. Ensure you are familiar with your site procedures and, if uncertain, discuss this information with your supervisor and safety and health representative.

Large working structures



COMMON TYPES OF FAILURES

Serious and fatal injuries can result when parts of a shiploader, reclaimers, stacker or other large structure collapse suddenly due to the structural failure of a section of the steel supporting framework or some other critical structural component, such as a guy rope, hoisting equipment, drive couplings or hydraulic systems.

The most common types of structural failure include:

- breaking, bending and collapse of moving components due to overloading, shock loading, poor maintenance or fatigue

- bending or cracking of a beam, column, brace or connection of a load-bearing structure through operational overloading or unforeseen shock loading, leading to the collapse of the boom, mast or counterweight
- a safety device failing, allowing the machine to collide with other objects or overload a component
- a cyclone or strong winds creating excessive loading on the plant or equipment, causing component damage and hazardous uncontrolled movement
- failure or loss of one or more components causing damage by uncontrolled movement of sections of the machine.

COMMON CAUSES OF FAILURES

The structural failure of a machine can be initiated when:

- a safety device has failed due to modification of the device, poor maintenance and testing procedures, or overriding the device to suit maintenance or operational requirements
- unauthorised structural or mechanical modifications have been carried out
- structural components can suddenly fail through fatigue where steel strength has deteriorated under the action of cyclic loads, and the machine has exceeded its design life and loadings
- the steel structure has been bent or distorted by impacts from mobile machinery or other causes, and has not been repaired, causing a reduction in the machine's structural strength
- structural components fail due to neglected corrosion or wear
- inadequate cyclone tie-downs.

SAFE WORK PRACTICES

- Undertake a formal safety assessment of the structure, including hazard identification (HAZID), a quantified risk assessment (QRA) and a critical equipment analysis (CR)
 - Use the results to produce a facility risk profile
 - Establish a safety management system (SMS)
 - Carry out annual structural inspections to produce detailed reports of any repairs required
 - For older plant, carry out a structural design audit to ensure structural steel components are not overstressed, and the supporting structure complies with the relevant Australian Standards
 - Only use the structure for the purpose for which it was designed unless modifications have been design checked, tested and approved by qualified professionals
- Establish a machine modification register to ensure modifications are recorded and are carried out with an audit of the supporting structure, particularly where there are heavier operational needs
 - Automate equipment and remove personnel from danger zones
 - Perform annual non-destructive test (NDT) inspections of critical components identified in the structural design audit, and report any repairs required
 - Document all safety devices, listing the purpose, type, details of operation, and maintenance and testing requirements
 - Carry out regular testing of protection and safety devices and tag out machinery until satisfactorily repaired
 - Provide a documented training program for all operators

- Perform routine mechanical and electrical inspections
- Regularly inspect and lubricate all wire ropes, block assemblies and fittings and ensure all wire rope certificates are current
- Report all incidents and faults, particularly corrosion, wear and damage.

SAFETY MANAGEMENT SYSTEM

A safety management system (SMS) provides quality assurance based on periodic internal audits and clear individual accountability for safety outcomes. It documents all standards, practices and procedures to promote and maintain safety, and the responsibilities of staff for implementing these standards, practices and procedures. An SMS can be used to cover the planning, design and construction of new works, and the operation and maintenance of the existing structures.

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