Crane Association of New Zealand (Inc)

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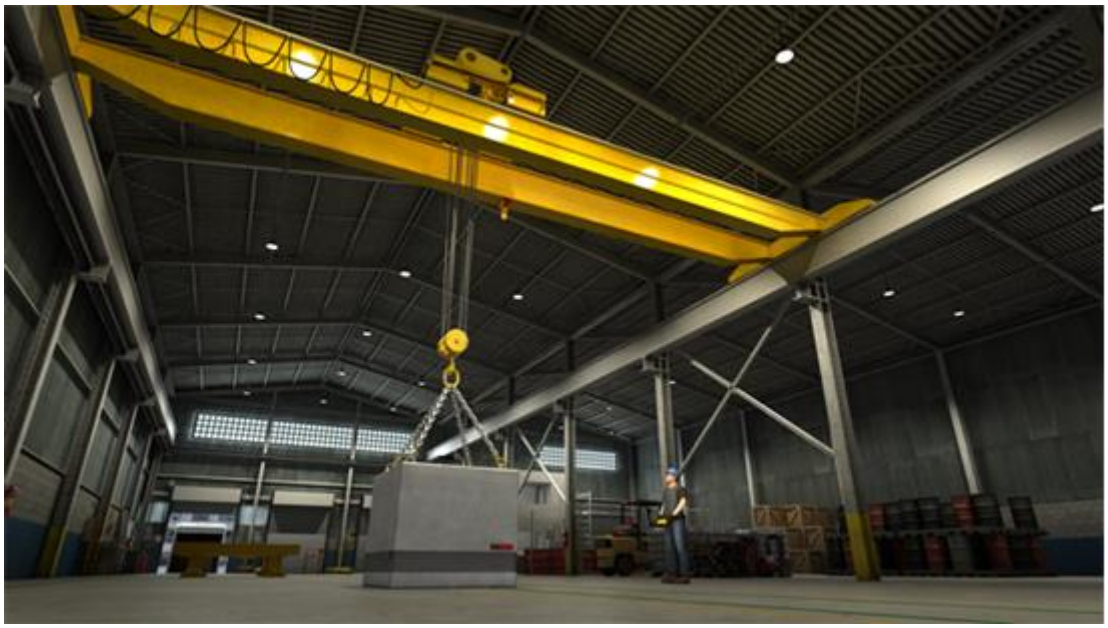
higher standards - safety first



Crane Association of New Zealand Position Paper

Safe Use of Gantry Cranes

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Date: 23 October 2019

CANZ PP-005

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1. Crane Association Position

It is the position of the Crane Association of New Zealand (Inc.) that:

Overhead Gantry crane design, manufacturing, and testing are regulated by standards, safety regulations and industrial codes of practice. Numerous modern technology and materials are applied and used on the Overhead Gantry cranes by crane manufacturers to make sure these sophisticated, state of the art machines are safe to operate under different conditions.
Overhead Gantry crane operators need to be familiar with the behaviour of the crane and follow manufacturer's instructions to perform safe lifting operations with them.
CANZ recommends that all operators of Overhead Gantry cranes undertake New Zealand Certificate qualifications training which includes technical and theoretical information competency assessment and familiarization training including practical demonstrations that should be conducted under supervision. However, the Approved Code of Practice (ACOP) for Cranes states " all persons operating or working with a crane must hold the applicable unit Standard as a minimum". Since this was written in 2009 there have been upgrades to Unit Standard training and it is a pre-requisite of NZQA Unit Standard 3800 V6 that NZQA Unit standard 30072 is now achieved. With these 2 Unit standards an operator should be competent to operate an Overhead Gantry crane in the workplace including lifting and securing loads without the need for a full New Zealand Certificate. If an operator can attest that he has relevant experience for slinging and rigging loads then achieving NZQA unit standard 3800 is sufficient to operate an overhead gantry crane to lift and place regular loads.

2. Background

"Gantry Cranes" is a collective name given to cranes that generally have an overhead beam as the main part of their structure. The two main types of gantry crane are portal and overhead. (Crane Association of New Zealand Inc, 2015) Gantry and portal cranes are used widely for material handling, particularly in the engineering, manufacturing and port industries. Safe operation of such cranes requires operators to have the knowledge and competence to avoid accidents.

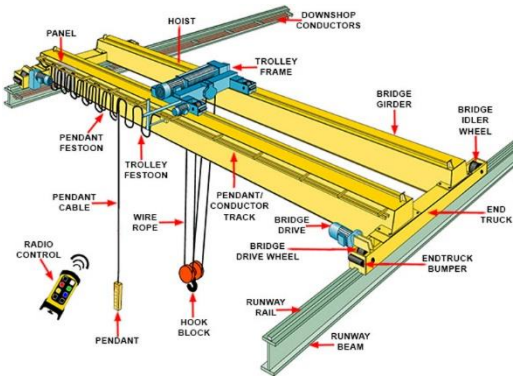


Figure 1 Overhead Crane

Figure 2: Portal Crane

1.1. Purpose

The purpose of this position paper is to advise on what the crane industry expects of a gantry operator to safely operate gantry cranes on a worksite.

1.2. Application

This position paper is intended to be used by crane operators and supervisors to promote safe lifting operations in the handling of gantry cranes.

2. Training and Assessment

The Approved Code of Practice for Cranes (2009) Part 4 states that Unit Standard 3800 is the minimum requirement to operate a gantry crane. However, since this document was written the qualifications have undergone significant review.

Level 3 qualifications which include Unit Standard 3800 have been adjusted to setup a pathway for new entrants into the industry without excluding those persons already in the industry that have yet to undertake a qualification to validate their experience. It also took out the requirement to complete Unit Standard 3789 (Sling varied regular loads and safely direct a crane during crane operations.) which cannot be assessed on a gantry crane (cannot be slewed).

Unit Standard 30072 has been designed to provide a person with theoretical knowledge that can be applied to a practical assessment in a classroom environment. This is a level 3 14 credit course.
The Level 3 pathway is as follows:

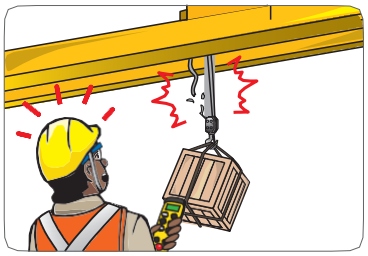
Unit Standard 30072 (Demonstrate and apply knowledge of slinging regular loads safely) or demonstrate equivalent knowledge and skills.

Unit Standard 3800 (Use a radio remote or pendant controlled gantry crane to lift and place regular loads)

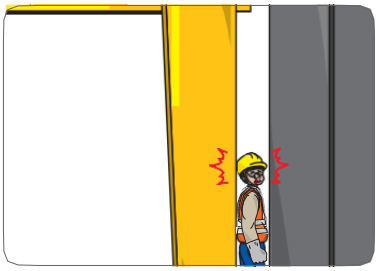
To demonstrate equvalent knowledge and skills to achieve Unit Standard 30072, the employee must demonstrate that they have prior knowledge and experience slinging and rigging loads either with an attestation from their employer or by recorded experience in the form of a logbook or similar.

3. Common Accidents

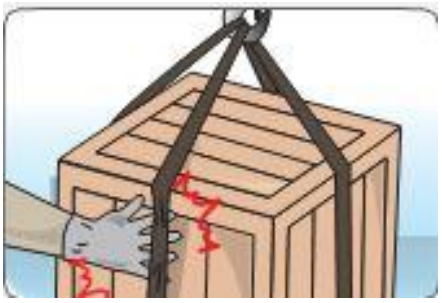
Most accidents related to gantry cranes occur during the lifting activity. The consequences of an accident can be serious, and fatal at times. Adopting the right method and using the right equipment will greatly minimise potential accidents during lifting operations.



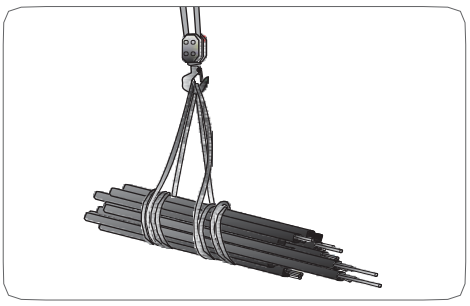
Overloading



Caught in between a moving gantry crane
And structure/ objects/ fixed obstruction



Caught in between load and lifting gear



Falling load to duse to insecure rigging

Hit by moving or swinging loads

Figure 3: Common Accidents

4. Key Personnel Involved in Lifting Operations

The key personnel in lifting operations includes the following duty holders:

4.1. Management

Crane owners and managers of gantry cranes must be fully aware of their responsibilities under the Health and Safety at Work Act 2015 and also should also be aware of their requirements to:

- Ensure operators hold the appropriate qualifications and deemed competent for the crane in use, (Crane Association of New Zealand Inc, 2015); and
- Maintain the crane properly and retain appropriate maintenance records (Ministry of Business, Innovation and Employment, 1999)

3.2. Crane Operator

Crane operators must be fully aware of their responsibilities under the Health and Safety at Work Act 2015, (Ministry of Business, Innovation and Employment, 2015)
and it is the crane operators responsibility to:

- Appropriately plan lifts
- Operate the crane safely
- Carry out regular checks of the crane to ensure that it is kept in a safe operating condition; and
- Record and report all defects/faults as per company procedures.

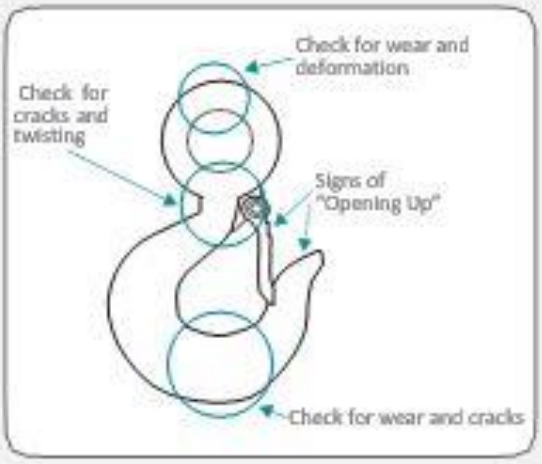
4. Visual Checks

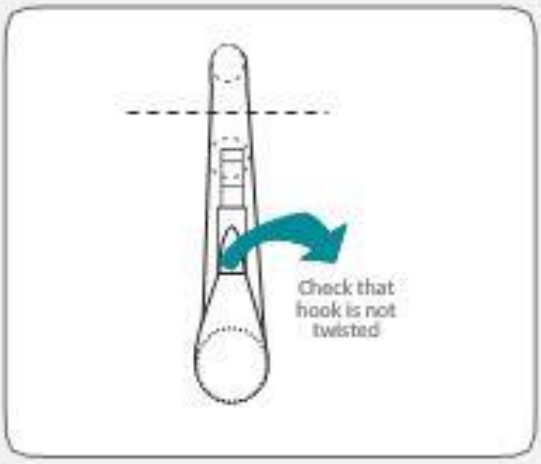
The following required checks are non-exhaustive. Crane operators must conduct visual checks to ensure the crane is in working condition, and test all limiting and indicating devices under no load condition before the start of every shift. All observations must be recorded in a log book or organisation's checklist(s) according to work processes at the workplace. Report any defects found to your supervisor immediately. See Figure 4 for types of visual checks.

Types of visual checks

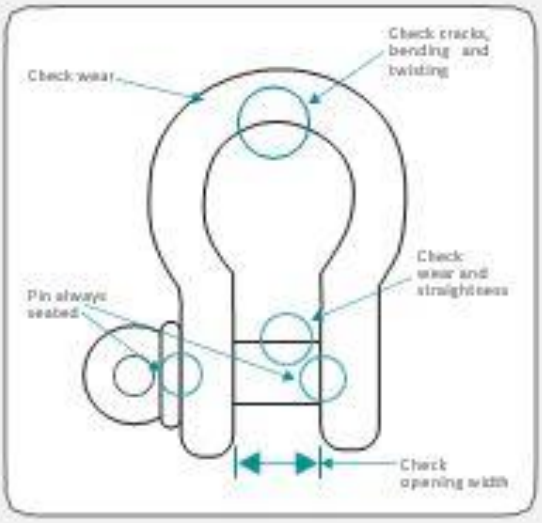
Check the crane for: • Oil leakage; and • Any unusual vibration or sound.	
Check that hoist is in proper working condition, and all motion indicators on the pendant control correspond with control device marking. Always familiarise yourself with the controls as pendant controls can differ from one another.	
Ensure all hoist limit switches, travel limit switches and indicating devices are in good working condition. A Crane may also be provided with any or a combination of the following types of indicators: • Load indicator; • Working space limiter; • Anti-collision device; and • Crane Motion indicator (Audible and visual).	
Check hook block to make sure it is in good working condition. Check that the safety latch is able to spring back. There should be no illegal modification to the hook.	

Inspect the hook for nicks, gouges, deformation of the throat opening, wear on saddle or load bearing point, and twisting.





Check shackles for any defects and make sure they are in good working condition.



Check wire ropes for any deformation or damages such as:

- Broken wires;
- Strand distortion;
- Kinks;
- Excessive wear;
- Bird caging;
- Crushing;
- Rusty; and
- Stretching.

Wire rope kinks

Strand protrusion or distortion

Rope bulging

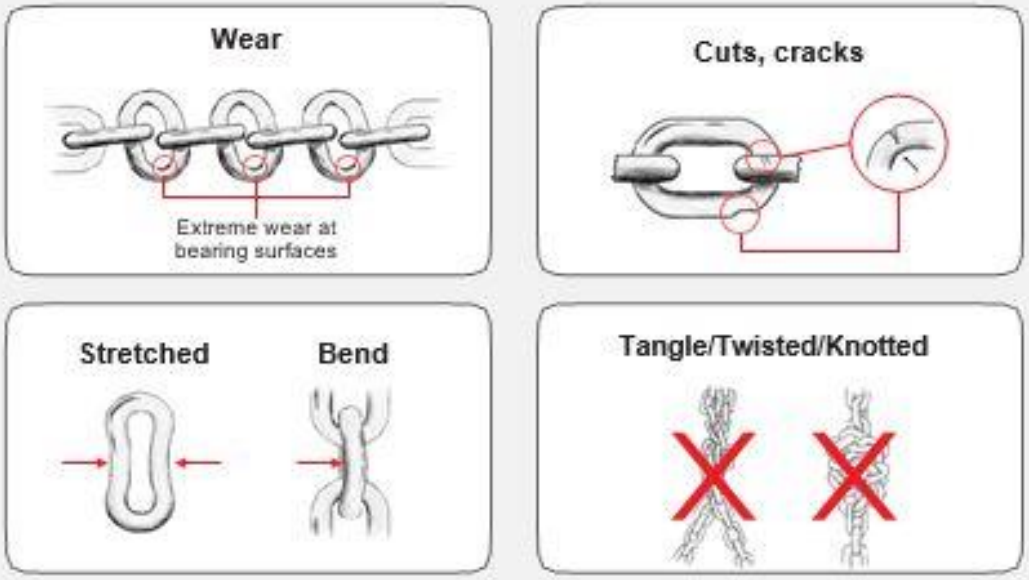
Broken wire

Bird cage

Rusty

Check chains and chain slings for any defect. Make a link-by-link inspection and report the defect if the following conditions are:

- Cut, nicked, cracked, gouged, burned, or corrosion pitted;
- Twisted or bent; and
- Stretched (Links tend to close up and get longer).



Check web slings for any defect. Damage is usually easy to detect. Report to the Supervisor if there are:

- Cuts, holes, tear;
- Frays, broken stitching, worn eyes and worn or distorted fittings ; and
- Burns from acid, caustics or heat.

These are for immediate replacement.

Figure 4: Rigging Checks

5. Rigging Methods

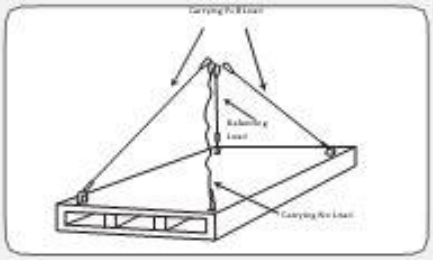
Accidents due to rigging can often be traced back to a lack of rigging knowledge by the dogman or operator.
The operator must know the following:

- the crane Safe Working load (SWL) must be clearly displayed in a location that is legible to the crane operator when working the crane,
- the safe working load limit of the lifting gear; and
- that the the laod to be lifted is less than the SWL.

When the weight and capacities are established, the dogman or operator must then use the proper methods to rig the load so that it is stable.

Multi-leg slings

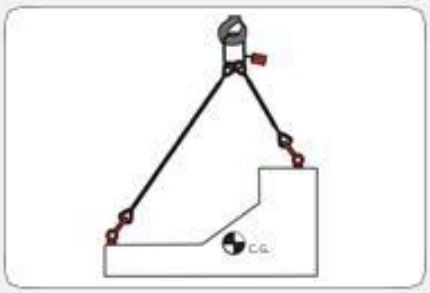
- For slings with more than two legs and a rigid load, it is possible for some of the legs to take the full load while the others merely balance it.
- As a result, when lifting rigid objects with three- or four-leg bridle slings, make sure that at least two of the legs alone can support the total load. In other words, consider multi-leg slings used on a rigid load as having only two legs.



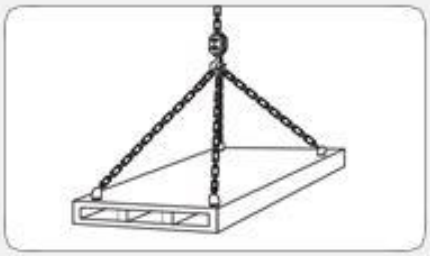
Centre of Gravity (CG)

It is always important to rig the load so that it is stable. The load's centre of gravity must be directly under the main hook and below the lowest sling attachment point before the load is lifted

- Ensure (CG) is directly under the hook for stability of load



Rig with correct lifting gears



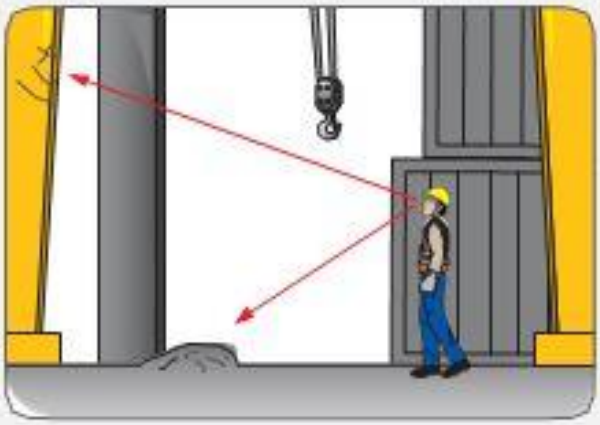
More information can be found in the Code of Practice for the Safe Use of Lifting Equipment.

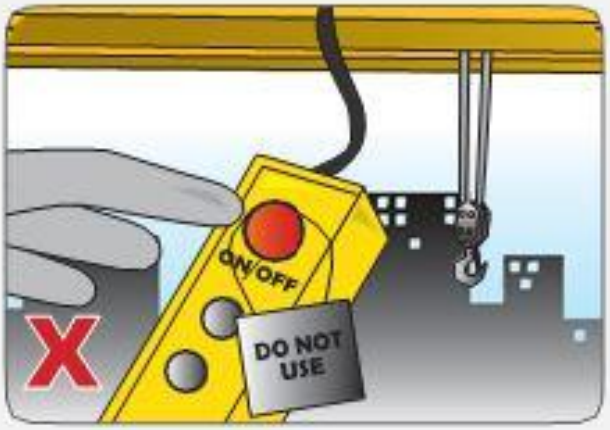
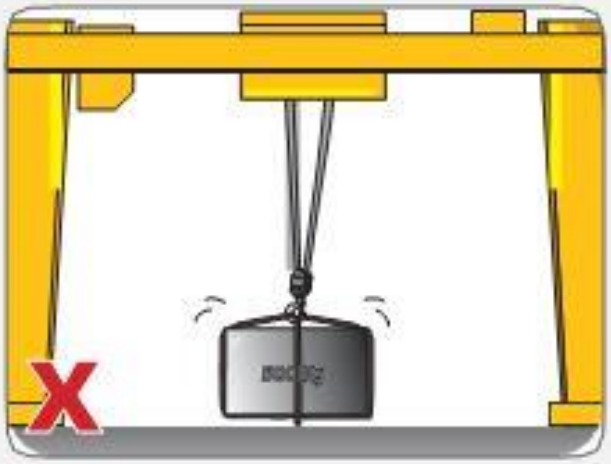
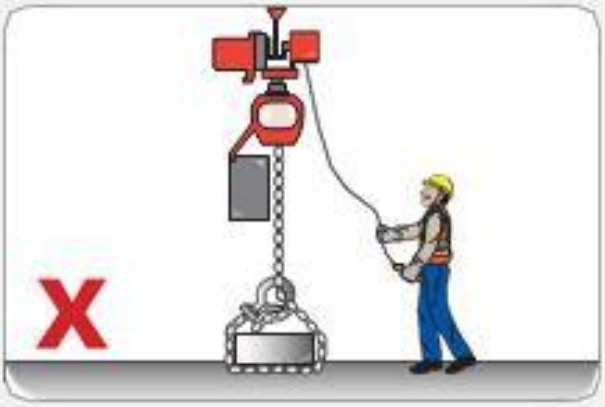
Figure 5: Rigging Methods

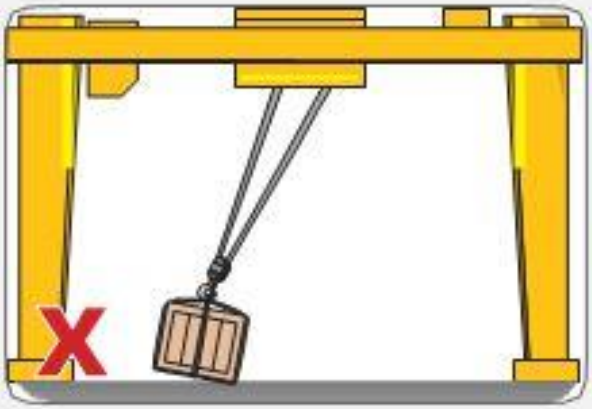
6. Operational Safety

6.1. Safety Considerations

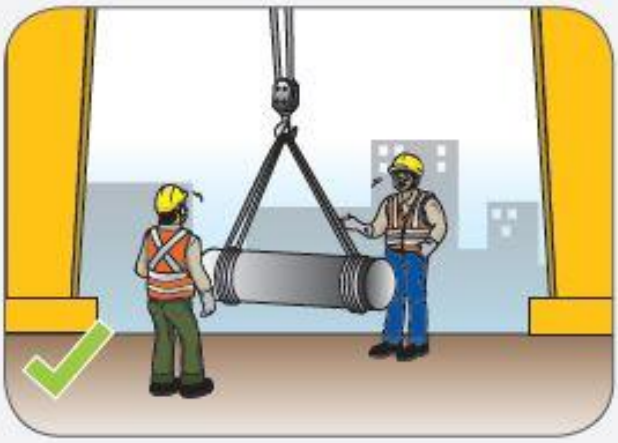
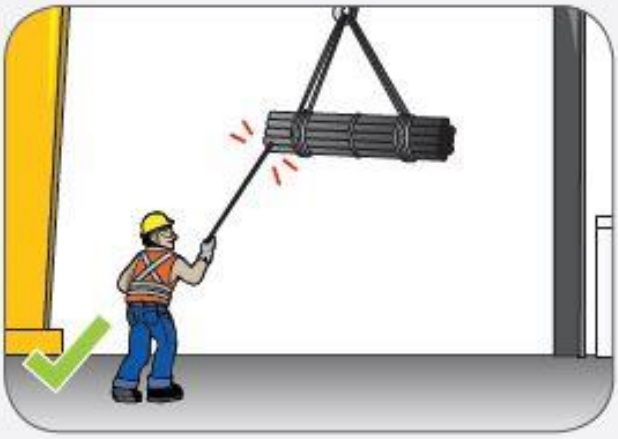
This section highlights several safety considerations when operating gantry cranes.

Visually check the operating environment to make sure that there are no new hazards which might affect the safe use of the crane.	
Do not make assumption. Ask if in doubt.	
Do not operate the crane if not feeling well.	

Do not operate the crane if it is locked out or tagged out (LOTO).	
Do not overload crane or hoist.	
Do not use the hoist rope/chain as a sling.	

Do not lift a load from the side. Centre the crane directly over the load before hoisting to avoid swinging the load.	
Do not ride on the load or allow others to do so.	
Do not lift loads over people.	

Make sure the load is properly secured before lifting.	
Do not multi-task when operating the crane.	
Do not operate the crane in a rushed manner.	

Communicate clearly between lifting team before and during lift.	
Use Tag Lines or Push/Pull Sticks to help control the load.	
Do not use crane to pull out a jammed or stuck object.	

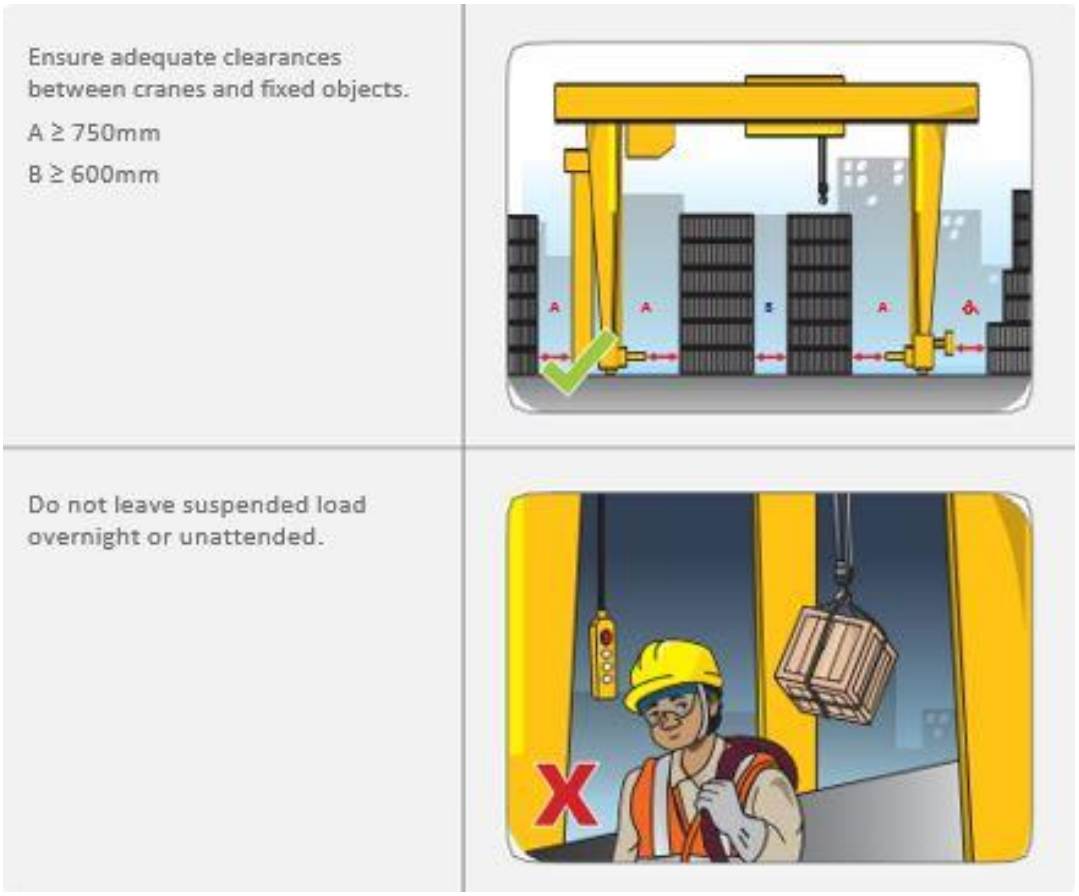


Figure 6: Safety Considerations

6.2. Tandem Lifting

When using more than one crane or with two hoists for tandem lifting operations, a competent person shall carefully plan out the operation in detail with a thorough lifting plan and emergency plans. The operation shall be carried out under proper supervision. The person supervising the operation shall fully understand the details of the operation and shall ensure that the operators understand the sequence and the hazards of the operation.

6.3. Maintenance

The employer must maintain a crane and its accessories in a condition that will not endanger an operator or another employee.

A preventive maintenance programme should be established and the programme must be based on the manufacturer's recommendations and, for the application as reviewed by a qualified person.

7. Use of Special Lifting Attachments

The use of clamp, grabmagnet, and vacuum as attachments are mainly used in heavy industry for mass production and in incinerator plant for waste management. The use of such attachments is complex. Should these attachments be used, users must refer to the manufacturers'operational and safety manual.
The following are examples of lifting clamps to lift steel plate;

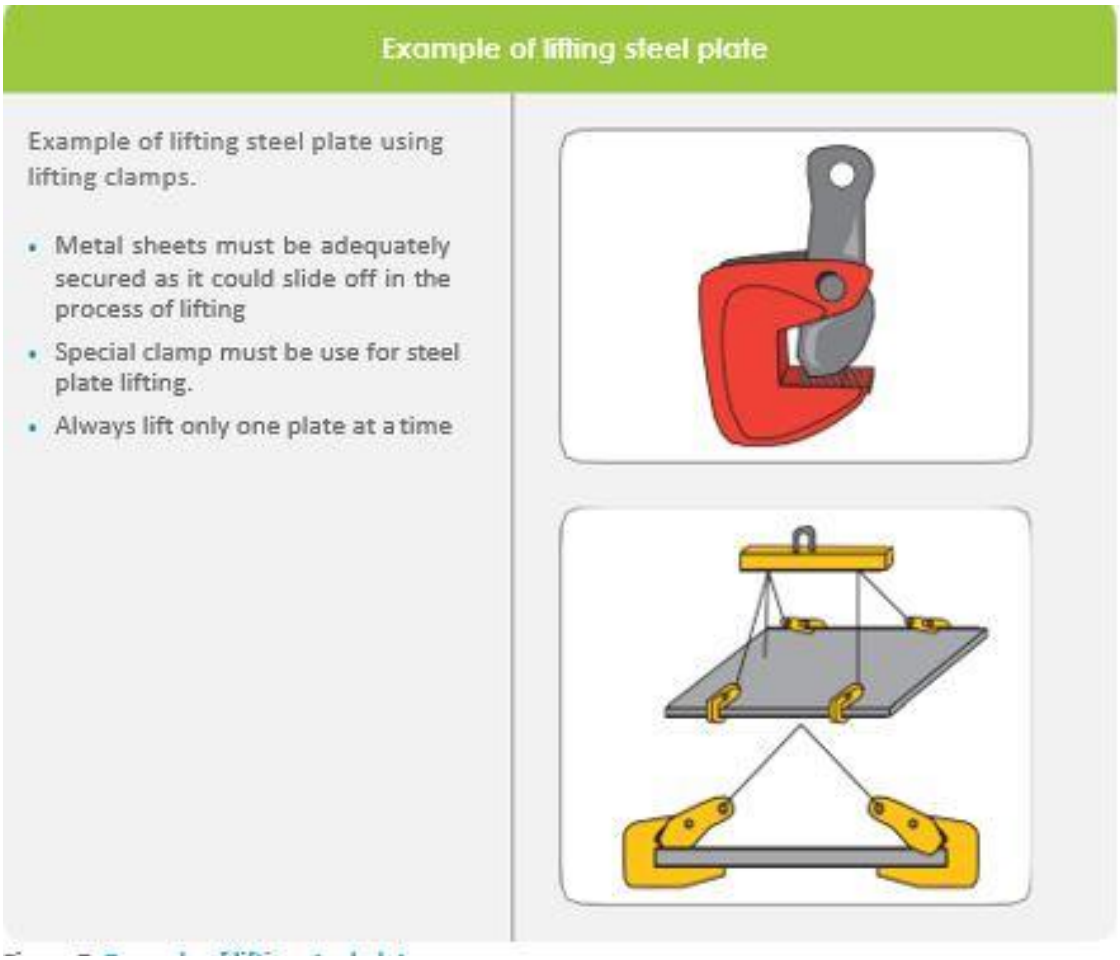


Figure 7: Special Lifting Attachments

8. Environmental Conditions

During outdoor operations, lifting operations can be affected by rain, thunderstorms and strong winds.

8.1. Rain

For all outdoor cranes, the equipment and all sensitive components should have been designed with the correct Ingress Protection (IP) enclosure and proper shelters.

8.2. Thunderstorms

During thunderstorms, stop lifting operations immediately.

8.3. Strong Winds

Cranes must never be used when wind speeds are beyond those recommended in the crane manufacturer's instructions.

In the event of strong winds, stop all lifting operation and secure the gantry crane with a wind restraint device.

9. Documentation

The following three documents must be prepared and signed off by the supervisor before the commencement of all lifting:

- Gantry Daily Prestart Check
- Rigging Plan
- Lift Plan

The crane operator must fully understand the above documents and follow them closely. If in doubt he/she must seek help from the supervisor.

These documents are available from the Crane Association (Crane Training New Zealand Shop, 2019)

Further Information

This Position Paper contains summary information only and further information is available by contacting the Crane Association of New Zealand (Inc.)

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