

Workplace Health and Safety Queensland

Technical guidance note

Safe Operation of Mobile Cranes

Purpose

The purpose of this safety alert is to remind crane operators, and other persons involved in crane operation, of their safety obligations when operating mobile cranes.

The safety alert identifies some of the most common issues that must be addressed when carrying out a lifting operation.

Background

In Queensland, there are a continuing number of mobile crane incidents involving crane rollovers, structural failures and loads falling.

Many of these incidents have occurred due to poor planning of the lifting operation – often because basic factors have been overlooked.



Photo 1: Mobile crane overload

Key causes of mobile crane incidents include:

- when the crane has been set up on soft or sloping ground
- when the crane has been overloaded, making it unstable (See Photo 1)
- when safety-systems have been ignored or over-ridden

- when the crane makes contact with power lines or other mobile plant.

Work method statements

The use of a mobile crane can be hazardous particularly as the complexity of the lift increases.

Work method statements need to be prepared for mobile crane lifting operations and are important for pre-planning to help reduce the risk of an incident.

Where the type of lift is straightforward and has been undertaken in the past, the work method statement can be a general statement that applies to more than one lifting operation.

Where the type of lift is more complex and unique, the work method statement needs to be site specific and comprehensive.

Examples of such higher risk lifts include:

- tilt-up and pre-cast concrete panel jobs
- multiple crane lifts
- lifting of workboxes with personnel
- installation of bridge beams
- working near power lines
- lifting large pressure vessels or tanks
- cranes used on barges
- mobile plant retrieval following an incident
- erection of tower cranes
- heavy lifts (as defined in the *Mobile Crane Code of Practice 2006*).

What should the work method statement contain?

When preparing any work method statement for a lifting operation, it is important that the statement:

- can be easily understood by persons involved in the lift
- only include information that is directly related to the lift
- is flexible enough to allow for changes to the lifting procedure if on site issues require a change.

Where the work method statement is for a higher risk lift, the statement should also include:

- diagrams of the crane position and the load position both at the start and end of the lift(s)
- mass of load(s) to be lifted
- a description of the lift sequence (generally in a step-by-step process)
- names, qualifications and responsibilities of persons involved in the lift.

Issues to consider when planning and undertaking mobile crane operations

A number of questions are provided in this alert as prompts or reminders on some key issues. The questions are not intended to replace procedures that mobile crane companies already implement, nor are they intended to take the place of information included in the relevant Codes of Practice, such as the following:

- [Mobile Crane Code of Practice 2006](#)
- [Tilt-up and Pre-cast Construction Code of Practice 2003](#)
- [Steel Construction Code of Practice 2004](#)

The questions have been broken up into nine basic categories and are listed below.

Crane selection

- Does the crane have adequate lifting capacity to safely perform the lift?
- Is the crane type suitable for the lift (i.e. adequate space, ground conditions, accessibility, visibility, etc)?
- Does the actual site layout agree with the information provided when the crane was ordered?
- Does the crane have the correct number of counterweights fitted?

- Is the crane rigged with the correct number of rope falls?
- Is there a diagram that shows the position of the crane and load to be lifted?
Note: this is particularly important with heavy and complex lifts including tilt-up, dual lifts, etc.
- If tilt-up panels are to be lifted, has allowance in the crane's capacity been made for the panel tilt?
- Have clearances for the crane's counterweight been considered when operating around tilt-up panel braces?

Crane condition

- Is the crane in good condition?
- Has a pre start safety check been performed? (particularly important in day/night shift operations)
- Are all features on the crane operating correctly?
- Has the crane received an annual safety inspection?
- If more than 10 years old, has the crane received its 10 year major inspection?

Load chart issues

- Is the correct load chart provided in the crane operator's cabin?
Note: The computer read out is not enough on its own.
- Does the load chart verify the crane has adequate capacity?
- Is the load chart written in English?
- Is the load chart and rated capacity limiter based on 75 per cent of tipping on outriggers and 66.6 per cent of tipping for pick-and-carry mode in accordance with the Australian Standard (AS 1418.5 Mobile cranes)?
- Does the crane have the same load rating for the full 360 degrees of slew?
- Have the correct deductions been made to the rated capacity of the crane based on the load chart notes (i.e. hook block mass, fly jib deduction, etc)?

Crane safety features

- Are the load, radius, boom angle and boom extension indicators operating and are they correctly calibrated?
- Has the operator been adequately trained to operate the safety system on the crane?

- Has the rated capacity limiter (computer) been set correctly for the crane rigging configuration?
- Is the anti-two block and luff limit (where fitted by the manufacturer) operating? (See Photo 2)
- Are there systems to prevent the rated capacity limiter and safety system being easily over-ridden?



Photo 2: Anti-two block

Ground conditions

- Have enough timbers been placed under the outrigger feet? (See Photo 3 and 4)
- If the crane is being used in pick-and-carry mode, is the ground hard enough or is the ground slope less than that allowed by the crane manufacturer?
- If the ground has been recently excavated or if there is a likelihood of underground services, have precautions been taken?
- Is the ground dry enough to prevent slipping of pick and carry cranes or to prevent outriggers slipping?
- If it has rained since the last lift, is the ground still firm enough?
- Are the ground conditions being monitored as lifting continues to ensure that outrigger feet are not sinking?
- Has the ground bearing capacity been calculated for heavy lifts?
- Has the pressure applied by the crane to the ground been calculated for heavy lifts?



Photo 3: Example of good outrigger support



Photo 4: Example of poor ground & inadequate support

Other environment issues

- Is the wind speed less than that specified by the crane manufacturer or an engineer?
Note: An engineer may be required in circumstances where the load has a large surface area and the wind is likely to make the lift hazardous.
- In the event of strong winds, can it be assured that it is still safe to carry out the lift? If so, have the correct precautions been taken?
- If there are live power lines within the operating radius of the crane, have the correct precautions been taken to prevent contact?
- If it is claimed that the power lines are de-energised, is there signed and dated documentation on site verifying this is the case?
- If there is other mobile plant within the operating radius of the crane, have correct precautions been taken to prevent collision?

- Have precautions been taken to minimise suction forces as the load is lifted (i.e. muddy conditions, tilt-up panel work)?
- If there are additional factors making the load heavier, does the crane still have adequate capacity in accordance with the load chart to safely lift the load?

Load type issues

- Has the load mass been clearly marked on the load or noted on the work method statement?
- Does the marked load seem reasonable based on the material type?
If the mass of the load is unknown, has its mass been estimated by calculation?
- If the exact mass of the load is unknown, does the crane have more than adequate capacity for the lift?
- If the load is of a large surface area that will easily be affected by the wind, have precautions been taken?
- If the lift is with more than one crane, have appropriate deductions been made to the rated capacity of each crane?
- If more than one crane is lifting the load, is an Intermediate rigger supervising the lift?
- If a workbox is to be lifted are the crane and workbox suitable for this type of lift?

Load securing

- Is the sling type and configuration suitable for the load?
- Are the slings in good condition and marked with their working load limit in different configurations?
- Have slings been periodically inspected and marked with the inspection date?
- Has the load been firmly secured so that it cannot move once it is lifted?
- Will the slinging technique effectively secure the load?
- Note:** Basket hitch should not be used anywhere near persons.
- Have synthetic slings been protected around corners of hard materials (including steel and concrete edges)?



Photo 5: Synthetic slings without protection around beam – this is unacceptable

Personnel issues

- Does each person involved in the lift understand his or her responsibilities?
Note: This is very important where there are multiple doggers or riggers or where it is a multiple crane lift.
- Do all persons involved in the lift hold the appropriate high risk work licence?
- Has the crane operator received documented familiarisation training for the crane?
- Is there effective communication between persons involved in the lift?

High risk work licenses

Persons operating mobile cranes are required to hold a high risk work licence or to be a *trainee*, as defined in the Workplace Health and Safety Regulation 2008.

The categories of licence for mobile cranes are as follows:

- C N – Non-slewing mobile crane (greater than 3 tonne capacity)
- C 2 – Slewing mobile crane (up to 20 tonnes)
- C 6 – Slewing mobile crane (up to 60 tonnes)
- C 1 – Slewing mobile crane (up to 100 tonnes)
- C 0 – Slewing mobile crane (open/over 100 tonnes)

In addition to the high risk work licence, all mobile crane operators should receive the relevant training (documented) for the particular type and model of mobile crane they operate. A high risk licence alone does not demonstrate competence to operate a particular mobile crane.

For more information

For more information visit the Workplace Health and Safety Queensland website at: www.worksafe.qld.gov.au or call the WHS Infoline on 1300 369 915.

Further information relating to the safe operation of mobile cranes is also provided in the [*Mobile Crane Code of Practice 2006*](#), the [*Tilt-up and Pre-cast Construction Code of Practice 2003*](#) and the [*Steel Construction Code of Practice 2004*](#).

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