

Pedestrian operated tower crane

Note: It is recommended that you read the Supporting Information page before you read this factsheet.

Preparation and completing work *(Preparation)*

- Pedestrian operated tower cranes (POTC), commonly known as self-erectors, consist of a mast and jib section and are usually mounted on a trailer-type chassis which transports the crane to the place of work. It is then unfolded and erected (usually by an erecting team) without the assistance of another crane, before being handed over to the user, who becomes responsible for safe and correct use of the crane.
- Being pedestrian operated means that the controls are operated from ground level and mainly through a unit worn by the operator with the control signals sent to the crane via an umbilical cord or radio signals.
- Proper pre-use checks are a requirement for the safe operation of any type of plant, including POTCs. The operator must undertake these at the required intervals, although some checks may need to be made by the hirer's maintenance team.
- Failure to properly check all relevant parts and components of the crane, whether undertaken by the operator or maintenance staff, could mean that incident or injuries occur because faults have affected both performance and safety.
- One important check that should be made to POTCs fitted with outrigger legs is to ensure that they have not sunk into the ground, as a crane that is not level can easily go out of radius and become unstable.
- A requirement under legislation is the devising of a lift plan for the particular lifting operations that are to be carried out, constructed by a lift planner/appointed person. Amongst many factors, the lift plan identifies all risks, the mitigating measures to be taken and the weight of any loads that are to be lifted.
- It is also important for all those involved in the lifting operation to be informed of its contents and required actions. All personnel, including the operator, must take note of the lift plan contents and what is required of each individual as they may notice an error or that something is not correct, and in which an incident could occur.
- The operator should immediately relay any concerns about the lift plan to the lift supervisor or appointed person/lift planner. If the lift plan needs to be amended before or during the lifting operation, only the lift planner/appointed person is allowed to alter the lift plan.
- The lift plan should further identify external operations that may affect any lifting work, such as nearby cranes or plant such as MEWPs, with the sequence of operations determined before work begins. If the POTC is working close to other cranes or plant, a sequence of operations should be determined before work starts.
- On larger sites where there may be various crane operations, a crane-co-ordinator may be present who will determine the sequence of operations.
- As POTCs may stay on site throughout the project, the area around the crane can become more restricted or parts of the structure may impede the chassis area. As the crane can rotate through 360 degrees, part of the rotating structure could come close to a structure or object. If the remaining gap is less than 600mm, then it must be fenced off to prevent others from walking through the gap and being crushed.
- On completing the work, the jib may need to be partially folded. This operation should be only be undertaken by someone who has been trained.
- Before the folding sequence begins, wind speeds must be checked first to ensure they are within the limits set by the manufacturer. The whole of the folding sequence should be constantly observed by the operator and others, as incidents have occurred during folding operations.

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- The jib must be placed into free slew which minimises the area presented to the prevailing wind. A check must also be made, when weather vaneing, to see if the jib oversails, or is above, other property for which approval may need to be sought.

Working safely and others *(Working safely)*

- Lifting operations occur in a variety of places within the radius of the crane, including near or next to areas with public access. The area of lift and the area of load placing must be segregated from pedestrians and should be planned before work starts by the appointed person.
- Lifting guidance states that wherever possible, the moving of a suspended load above other workers or pedestrians should firstly be avoided. Only where this is not possible can other measures such as netting around a load or additional securing or protection features then be considered.
- Conditions on site need to be taken into account before, during and after work. The crane's position should be planned so that is kept well clear of any overhead power lines. Guidance issued by the energy networks utilities indicates what minimum distances must be kept from overhead power lines and the higher the voltage in the power line, the greater the distance that must be kept. This is to reduce the danger of arcing if the jib or boom is close to but not actually touching the power line.
- Slewing with a load, especially one that is near to the rated capacity for the configuration, needs to be undertaken with caution as slewing too fast can cause the jib or boom to be subjected to additional side stress could also cause the load to overshoot the landing place and strike a structure or object.
- Wind speeds should be regularly monitored so that the crane only operates when winds are below the maximum authorised speed as stipulated by the crane manufacturer. Operators and users need to note that wind speeds at height can be greater and the direction different to ground level in open areas.
- Gusts of wind may also need to be taken into account, even if overall wind speeds are below the set limit. Wind speeds should be regularly given to the person acting as the crane supervisor (the appointed person may not always be on site) because the work schedules may need to alter if rising wind speeds force a crane to stop work.
- Loads with a large surface area, such as shuttering, can, in high winds, move and/or swing and cause the crane to go out of radius.
- Some types of POTC are operated, as mentioned earlier, using a remote control unit. Although it is possible, it is generally recommended that the operator does not sling the loads as they need to use both hands to operate the controls in order to maintain safety.
- Care must be taken when following the path of a load on foot whilst the crane is slewing or changing radius as trips and injuries have occurred where the operator was concentrating on controlling the load and not looking where they were going.
- Where long periods of heavy rain have occurred, the ground beneath the crane could become soft. Before any work starts, the ground conditions must be checked by a suitable competent person to ensure that ground conditions can still safely support the crane.

Attaching and lifting loads *(Working tasks)*

- All lifts should not only be planned but the POTC must also be kept within the rated lifting capacity for the relevant configuration e.g. radius, number of falls etc. The operator should only lift loads that have been detailed in the lifting plan.
- The crane's rated capacity indicator (RCI) provides warnings to the operator when the crane both approaches and exceeds maximum rated capacity for the configuration. Some RCIs can be overridden but this is purely for diagnostic and testing purposes during the maintenance programme and must never be overridden during lifting operations, otherwise over-lifting could occur with the crane.
- Tower cranes including POTCs are designed to lift a load vertically. This means that the hook of the crane must be placed directly above the centre of gravity for the load, not the centre of the load. Depending on the load, the

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measured centre of the load and the centre of gravity of the load (the point that it is in balance) is not always at the same place.

- The rated capacity of a crane only applies to a freely suspended load, and does not apply at all times or for all situations. For example, if a load is still attached to a structure, vehicle etc. or embedded in the ground, the increased resistance when being lifted can overload the crane.
- The operator should be aware of the constitution of each load (its type or content) and how particular types of load should be slung before they are lifted. The correct lifting accessory (gear) must be used and correctly fitted. For example, where fabric bags (known as FIBCs) are being lifted, the lifting loops should be kept near to vertical by using a four-legged chain sling.
- One factor that operators need to take into account is that, being remotely operated, they do not receive direct feedback of the crane's motions through the controls or by being on the crane. This means that when slewing and working near to full radius, crane movements could be erratic, causing jolting and even overloading.

Stability

- POTCs have become unstable and overturned, with the usual costly consequences. Effective planning must take into account the ground, working area and other environmental factors must be taken into account before setting up begins.
- The weight of a load must be identified or calculated before it is lifted as incorrectly guessing the weight and finding that the load is too heavy for the configuration (radius and height) is likely to result in instability.
- Uncontrolled swinging of a load, particularly heavy loads, can cause the crane to go out of radius and become unstable. This can happen when the operator slews the jib too fast.
- Ground conditions or the support base strength play an important part in stability and these should be checked by a suitable and competent person to ensure the ground or base can support the weight of the crane as well as any bearing pressure applied through an outrigger or stabiliser for all expected loads and configurations.
- The aim is to reduce ground-bearing pressure through each outrigger which can be achieved by using spreader or support mats, such as timber sleepers, to spread the applied pressure. The larger the mat or more sleepers used, then in principle there is a decrease in bearing pressure of the outrigger. The minimum size of any mat should be determined by an appropriate expert.

Sample questions

The following questions are based on the text within this factsheet and indicate how the questions and answers are structured. Based on the factsheet, there is only one correct answer. The correct answer to each question is indicated at the end of this factsheet.

Q1. What information must be in a lift plan for a pedestrian operated tower crane?



The torque setting for the lower slew ring bolts



The weight of all loads to be lifted



A layout plan of the site



The frequency setting of any wireless remote control unit

Q2. Why is it poor practice to use a pedestrian operated tower crane to lift objects, such as pipework, that are embedded in the ground?



The trolley could snag on the jib



The hook cannot be centralised over the load



Motion limiters need to be overridden



An overload situation can easily occur

Study checklist

This checklist aims to act as a study aid to ensure that the reader has identified and understood the relevant parts of this factsheet.

Do you know?

1. Who decides what pre-use checks the operator can undertake.
2. Why regular checks needs to be made on the outriggers.
3. What the purpose of the lift plan is and why it must be followed.
4. What procedures should be put into place when there are a number of cranes working within the same area.
5. What the procedures may be when placing the crane out of service.
6. Why the jib must be placed into free slew when being put out of service.
7. What the conditions are if loads have to be lifted over persons.
8. What the procedure is should pressure be applied to the operator when working with a number of contractors.
9. Why cranes should be kept at a minimum distance from overhead power lines.
10. Why wind speeds must be constantly be monitored.
11. What information does the RCI supply to the operator.
12. When does the rated capacity of the crane apply.
13. What the effects can be of lifting large surface area loads in high winds.
14. About the effects on the crane if the hook block is not positioned correctly above the load.
15. Why the crane operator should not both sling and operate the crane at the same time.
16. What can be the result of slewing too fast with a load.
17. Why care must be taken by the operator when following the path of the load.
18. Why the guessing of the weight of a load can be hazardous.

Answers to sample questions: Q1: B and Q2: D