

	Construction Plant-hire Association Tower Crane Interest Group							
	<i>Tower Crane Technical Information Note</i>							
TIN 021	Maintenance Principles for Tower Cranes							
Introduction The consequences of any failure of a tower crane are likely to be extremely serious, with the potential for multiple fatalities. Tower cranes are also often the primary means of material handling on a construction site and any breakdown will have a serious effect on the construction programme. It is therefore extremely important that tower cranes are effectively maintained to ensure continued safe and efficient operation over time. The Health and Safety at Work etc. Act 1974 sets out a general duty requiring that work equipment is maintained so that it is safe. This requirement is reinforced by Regulation 5 of the Provision and Use of Work Equipment Regulations (PUWER) 1998 which requires that “<i>Every employer shall ensure that work equipment is maintained in an efficient state, in efficient working order and in good repair.</i>” In the case of a hired-in tower crane the actual undertaking of the maintenance is often delegated to the crane owner by the user. The user however, retains the legal responsibility for ensuring that the maintenance is carried out. The Guidance to PUWER, contained in HSE publication L22, provides advice on the maintenance process for various types of work equipment. The following outlines the maintenance techniques that are appropriate for tower cranes, given the potential consequences of any failure of the crane or its components.								
Frequency of Maintenance Tower crane maintenance activities should be carried out, as a minimum, at the intervals specified in the tower crane manufacture’s maintenance manual. Varying circumstances on site may however require the frequency to be increased. Such factors are: • intensity of use - frequency and maximum working limits; • operating environment, for example working in or near marine environments, or corrosive atmospheres; • variety of operations - is the equipment performing the same task all the time or does this change? • risk to health and safety from malfunction or failure where use in certain locations may require more frequent maintenance.								
Maintenance Management There are a number of maintenance management techniques that can be employed, including “Breakdown Maintenance” where maintenance is only carried out after faults or failures have occurred, and “Planned Preventive Maintenance” which involves replacing parts and consumables or making necessary adjustments at preset intervals, so that risks do not occur as a result of the deterioration or failure of the equipment. In the case of tower cranes the “Breakdown” approach is obviously totally inadequate, as any failure presents an immediate risk. The most appropriate technique is therefore the “Planned Preventive Maintenance” management technique.								
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Responsibility For Maintenance

Once a tower crane has been erected on a site, the user of the crane has a duty to ensure that it is adequately maintained. The actual undertaking of the maintenance is often delegated to the crane owner by the user; the user however, retains the responsibility for ensuring that the maintenance is carried out.

Clear lines of responsibility for maintenance operations should be established from Board level downwards, ensuring that those appointed and responsible have sufficient knowledge and experience to carry out their duties in a way which will ensure that risks are properly controlled.

Preventive Maintenance Schedules

Each tower crane should have a documented preventive maintenance schedule which is targeted at the parts of the equipment where failure or deterioration could lead to health and safety risks and which specifies the frequency of inspection and test of relevant parts, taking account of the manufacturer's instructions, the age of the crane and its in-use history.

Expert Engineering Advice

Tower crane owners may not have access to expert professional engineering advice in-house. If this is the case arrangements should be made for securing such advice externally where this is necessary for the purposes of health and safety and clear guidelines should be established for when this advice should be sought.

Maintenance Records

For a preventive maintenance system to be fully effective it is essential that comprehensive records of daily checks, intermediate inspections, maintenance work sheets (including details of parts replacement) and reports of thorough examination are kept. These should be filed in an individual machine history file which should be kept for the life of the crane.

Review of Records

An extremely important aspect of a planned preventive maintenance system is the continuous and systematic review of all maintenance records, inspection reports and reports of thorough examination to ensure that the maintenance is effective, defects are found and worn components are replaced well in advance of any possible failure. Should this review indicate that maintenance is not fully effective, the frequency may have to be increased and maintenance practices amended.

Maintenance Personnel

Maintenance should only be carried out by those who are competent and have adequate training and information to carry out the work required. A number of general maintenance training courses and qualifications are available for personnel carrying out and supervising maintenance operations. Training is offered by a number of training providers including the National Construction College, whilst qualifications are available through the NVQ/SVQ scheme.

All maintenance personnel should have received machine specific training, traceable to the tower crane manufacturer, before carrying out maintenance tasks on any tower crane.

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Availability of Tower Cranes For Maintenance

Tower cranes, when erected on a construction site, are often pivotal to the construction process and Site Managers may be reluctant to release a tower crane to the owner to allow maintenance to take place. It is essential that adequate downtime is built into the construction programme to allow effective maintenance to be carried out and to ensure that maintenance personnel do not feel under pressure to skimp the work. Maintenance should always be carried out during the hours of daylight and the crane operator should be in attendance to operate the tower crane for functional testing and adjustment.

Further Guidance

Further guidance on the maintenance, inspection and thorough examination of tower cranes is given in:-

- *CPA Good Practice Guide on the Maintenance, Inspection and Thorough Examination of Tower Cranes* (free download from cpa.uk.net)
- *BS 7121-2-1:2012, Code of practice for the safe use of cranes. Part 2-1: Inspection, maintenance and thorough examination – General* (available to purchase from bsigroup.com)
- *BS 7121-2-5:2012, Code of practice for the safe use of cranes. Part 2-3: Inspection, maintenance and thorough examination – Tower cranes* (available to purchase from bsigroup.com)