Crane Safety

Moving large, heavy loads is crucial to today's manufacturing and construction industries. A lot of technology has been developed for these operations, as well as careful training and extensive workplace precautions. There are significant safety issues to be considered, both for the operators of the diverse lifting devices and for workers in proximity to them. For the purpose of this article the types of cranes will be divided into two groups: shop and mobile.

Cranes are the ultimate material-handling devices and, when used correctly, can lift and position large loads that are not able to be lifted without them. All workers must exercise proper precautions in working with this equipment.

MOBILE CRANE SAFETY

Mobile cranes are responsible for the most accidents, injuries, and fatalities of all crane types. Workers need to be aware of the hazards when operating or working around mobile cranes. Mobile crane operation in the workplace is regulated under *29 CFR Part 1926 Subpart CC—Cranes and Derricks in Construction*. These very thorough regulations establish:

Employer Responsibilities – Employers who use cranes and derricks in construction work must comply with the standard. In addition, other employers on construction sites where cranes and derricks are used are responsible for violations that expose their employees to hazards and, therefore, need to know the requirements of the standard that may affect their employees. Crane lessors who provide operators and/or maintenance personnel with the equipment also have duties under the standard.

Ground Condition Requirements – Adequate ground conditions are essential for safe crane operations because the crane's capacity and stability depend on such conditions being present. If, for example, the ground is muddy or otherwise unstable, a crane could overturn even if operated within the load limits specified by the manufacturer.

Assembly/Disassembly Requirements – Accidents during assembly and disassembly of lattice boom and tower cranes are one of the major causes of crane-related fatalities. When assembling or disassembling a crane, you must comply with either:

- Manufacturer procedures
- Your own employer procedures, which must be developed by a qualified person. Such procedures must, at a minimum, (1) prevent unintended dangerous movement or collapse of any part of the equipment; (2) provide adequate support and stability of all parts of the equipment; and (3) position employees involved in the assembly/disassembly operation so that their exposure to unintended movement or collapse of part or all of the equipment is minimized.

Power Line Exposures – Electrocutions caused by a crane, load, or load line contacting a power linehave caused numerous fatalities. To prevent such accidents in the future, the standard contains detailed, systematic procedures that employers must follow when operating cranes near power lines. Keeping a safe distance from power lines is the key to preventing power line accidents. Therefore, the first step you must take when planning to operate a crane on a site where a power line is present is to identify the crane's work zone and use that work zone to determine how close it should come to the power line.

Inspections – The following inspections are required of all mobile crane equipment:

- Shift inspections
- Monthly inspections
- Annual inspections
- Shift, monthly, and annual wire rope inspections (if the equipment uses wire rope)

In addition, the following special inspections are required in particular circumstances:

- Post-assembly inspections
- Pre- and post-erection inspections of tower cranes (section 1435(f))
- Equipment used in severe service
- Equipment not in regular use
- Inspections of certain modified equipment
- Inspections of certain repaired/adjusted equipment

Employers and affected employees must make themselves aware of the specifics required for each of these inspections.

Safety Devices – The following safety devices are required on all crane equipment, unless otherwise specified:

- Crane level indicator (except on portal cranes; derricks; floating cranes/derricks and land cranes/ derricks on barges, pontoons, vessels or other means of flotation)
- Boom stops (except for derricks and hydraulic booms)
- Jib stops (if a jib is attached), except for derricks
- Locks on foot pedal brakes
- Integral holding device/check valve on hydraulic outrigger jacks and hydraulic stabilizer jacks
- Rail clamps and rail stops for equipment on rails (except portal cranes)
- Horn (either built into the equipment or on the equipment and immediately available to the operator)

There are other required "operational aids" for specific types of equipment. The standard should be consulted to determine which of these might apply to a specific operation.

Operations – The standard contains a number of requirements that are designed to prevent dangerous conditions during crane operations. These should be studied for application in your operations.

Signaling and Signal Person Qualifications - A crane operator often needs a second set of eyes, in the form of a signal person, to be able to operate safely. Each signal person must meet the following qualification requirements:

- Know and understand the type of signals used. If hand signals are used, the signal person mustknow and understand the Standard Method for hand signals.
- Have a basic understanding of equipment operation and limitations, including the crane dynamics involved in swinging and stopping loads and boom deflection from hoisting loads.
- Know and understand the relevant requirements of the sections of the standard dealing with signals.
- Demonstrate that he/she meets these requirements through an oral or written test and through a practical test.

Fall Protection Requirements - Falls from dangerous heights can occur when employees work on boom sections during assembly/disassembly, when employees are gaining access to and from their workstations, or at other times when employees are working at elevations, as on tower crane walkways. Exposed employees must receive appropriate fall protection training and understand how to implement fall protection techniques for the various exposures.

Work Area Controls - To prevent employees from entering an area where they could be struck/crushed, employers must:

- Train each employee assigned to work on or near the equipment in how to recognize struck-by and pinch/crush hazard areas posed by the rotating superstructure.
- Erect and maintain control lines, warning lines, railings, or similar barriers to mark the boundaries of the hazard areas.

Operator Qualifications and Certification - Employers must ensure that equipment operators are competent through training and experience to operate the equipment safely. If an employee assigned to operate a crane does not have the required knowledge or ability to operate the equipment safely, the employer must train that employee before allowing him or her to operate the equipment and must evaluate the operator to confirm that he/she understands the information provided in the training. If a state or local jurisdiction has a licensing program that meets the federal minimums, OSHA requires the employer to ensure that all operators working within that jurisdiction are licensed by that state or local jurisdiction, unless they are qualified by the U.S. Military.

Qualifications for Maintenance and Repair Personnel - Improper crane maintenance and repair can lead to dangerous equipment failure. To ensure that maintenance and repair employees are qualified to perform their assigned tasks, the standard requires maintenance and repair personnel to meet the definition of a qualified person with respect to the equipment and maintenance/repair tasks they perform.

Employee Training Requirements – There are specific training requirements for a variety of crane operation exposures and specific employees throughout the standard. Other requirements include:

- *Operators* - equipment operators must be trained in the manufacturer's emergency procedures for halting unintended equipment movement and in the following practice: whenever moving a boom off a support, first raise the boom a short distance (sufficient to take the load of the boom) to determine if the boom hoist brake needs to be adjusted or repaired.
- *Competent persons and qualified persons*- Employers must train each competent person and qualified person in the requirements of this standard that applies to them.
- *Crush/pinch points* - Employees who work with the equipment must be trained to keep clear of holes, crush/pinch points, and hazards.
- *Tag-out* - Employers must train each operator and each additional employee authorized to start/energize equipment or operate equipment controls (such as maintenance and repair employees) in the tag-out and start-up procedures.

Personal Protective Equipment (PPE) - Though not addressed specifically in the crane standard, employees must be trained and equipped to use the appropriate PPE when working around mobile crane equipment and suspended loads.

The crane safety standard is very specific on a number of topics and it is recommended that all employers and employees working around these devices become well versed in the related safety regulations.

For additional information on mobile crane safety and requirements, OSHA has a publication titled: *Small Entity Compliance Guide for the final rule for Cranes and Derricks in Construction OSHA Publication 3433.*