

# 10 Steps to Safer Crane Operation

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As children, many of us played with toy cranes. Fascinated with using them to lift and move objects, we never gave a second thought to load limits or safety issues. If a toy crane fell over, we put it back up. If the string that functioned as a cable snapped, we asked Dad to tie another one in place. And the worst injury we'd receive from a crane accident might be a minor scratch or bruise.

Cranes continue to be a fascinating part of jobsites, but the real ones are far more complex – and usually far more delicate – pieces of equipment than the miniature versions we used as kids. Accidents involving cranes are typically the result of not fully understanding how they work, ignoring the physics involved with their operation, or simply failing to follow basic steps to safeguard workers.

Crane accidents tend to be very costly in equipment losses, damage to property, and injuries to workers. What's more, when a crane topples, collapses, or otherwise fails, it usually does so in a spectacular way that's a magnet for TV coverage. Consider the extensive national coverage of recent tower crane collapses in New York City.

While a crane may appear to be a simple device, its operation involves complex physics. You don't need to be an engineer to operate cranes safely, but everyone involved with their operation should be aware of some of the basic aspects, and follow some basic steps for safe operation.

**1. Have a certified operator.** On some sites, supervisors and workers may consider one piece of equipment to be like another. An equipment engineer accustomed to running an

excavator or a dozer may be asked if he can handle a crane. But the physics of how a crane is designed and how it operates are more complex than those associated with other types of jobsite equipment. When something goes wrong, the potential for significant damage and fatalities is very high. That's why OSHA has been developing tougher standards for crane operation. An operator who has been properly trained and certified, and who is familiar with the type of crane, is the first step for safety. Riggers should also be properly trained on setting the crane up for the specific load and circumstances.

**2. Inspect, inspect and inspect.** Verifying that the crane has received its annual inspection is only the beginning. It's important to check the operating functions daily to ensure that everything is working properly and that there are no defects or cracks in the support members. The cranes of a generation ago were made with alloys that could handle overloading and other abuse. Today's cranes use materials that are less tolerant of mishandling. Longtime operators are often surprised to discover that the tricks they used to push cranes beyond the limits in the past can easily create very dangerous situations with newer cranes.

Overhead cranes are frequently used in heavy industrial applications such as steelmaking, and need to be inspected just as carefully. Many of these cranes spend decades working in extreme environments such as melt shops. That constant exposure to intense heat and temperature swings can cause the beam and other structural members to become brittle and lose strength or even fail.

**3. Know what's below.** The most powerful, carefully rigged crane is only as strong and stable as the surface upon which it stands. You need to know the classification for the soil or other material under the crane, and adjust your setup and load limits accordingly. While many cranes are equipped with outriggers, extending them doesn't necessarily mean that you've provided a stable surface. Outriggers displace the weight on the lift much the way that snowshoes spread your weight out so you don't sink into the snow. The pad and float at the end of the outrigger carry a great deal of compression force when the crane is under load. Too much force can cause them to punch through the ground, causing the entire crane to tip.

It's important to know the load weight and how that is affected by the conditions of your jobsite. The crane's load chart can help you determine whether your lift will be safe. The allowable load will depend on whether the tires or outriggers are being used, along with other factors. For example, asphalt may seem to be a stable surface, but on a warm day, it may become very flexible. Even concrete may not provide enough strength if there is a

void beneath it.

We can remember a situation when a mobile crane was placed on the top floor of a parking garage to handle some lifts. The floor was strong enough to handle the crane's weight when it sat on its tires, but once the outriggers were deployed and the lift began, the compression force flowing through one outrigger caused it to break through the floor. The crane tilted, and as the floor weakened under the additional compression, it fell through to the next floor, causing extensive (and expensive) damage.

One way to increase the safety of a crane is to place cribbing under the outriggers. However, you have to ensure that the cribbing is capable of handling the load given the materials and conditions underneath it without failing or cracking. Simply placing a sheet or two of plywood under each outrigger usually won't be enough.

**4. Plan for swing.** The counterweight and boom travel within a specific arc that's called the swing radius. It's important to ensure that the area within that radius is barricaded off, and to establish a control zone for those authorized to work in the immediate area. Also check the area every day to ensure that there are no objects the boom might strike, such as power lines. If such obstacles exist, be sure that the operator and other workers are aware of the obstacle and the plan for avoiding it.

**5. Use cranes properly.** Cranes are engineered for vertical lifting. That doesn't stop some crews from trying to use them for side loading or other improper activities. Using a crane to drag something across the ground or from under an obstacle puts extreme stress on the boom, the turntable, and all the structural members. It could potentially weaken key components and lead to their failure. If someone on the site has used a crane improperly, be sure to inspect it thoroughly to ensure that its integrity has not been impaired.

**6. Stay in touch.** Whether you use radios, air horns, hand signals, or some other method, there needs to be clear communication between the operator and the other workers. That's especially critical when a crane is making a lift in which the operator cannot see the load, such as when air handling equipment is being delivered through an opening on another side of a structure. Don't assume that everyone knows how instructions will be communicated. Make sure everyone understands the system and follows it.

**7. Pay attention.** It may seem ridiculous to present this as a tip, but we've seen plenty of sites on which operators are talking on cell phones while moving the crane, napping between lifts, or distracted in other ways that have the potential to create dangers for their fellow workers. Everyone associated with a crane needs to stay alert and focused on the

job at hand – especially on critical or difficult lifts.

**8. Think twice about manbaskets.** Sometimes it looks like the easiest way to put employees where they're needed is to lift a manbasket to the work area. However, that approach creates hazards that must be tested and addressed before work begins, such as providing proper fall protection, verifying basket capacity, and checking that the basket is properly attached. In addition, the safety of the employees in the basket is entirely dependent on the skill of the operator, and a simple mistake could have tragic consequences. Before using a manbasket, consider whether an articulating boom lift or a scissor lift might provide a safer alternative.

**9. Don't use cranes for storage.** In areas where site security is a concern, it's not unusual to see laborers end the workday by attaching a compressor or similar piece of equipment to the crane and suspending it for safekeeping. It's a common practice, but one that's very risky. In addition to the danger that someone could walk beneath it, a strong wind could cause the load to sway – perhaps to the point of toppling the crane. But an even better reason not to do this is that most of today's newer cranes are hydraulically-operated. A small leak anywhere in the system will eventually reduce the hydraulic pressure to the point where the boom will drop, and the suspended load will fall on whatever is below it – maybe a more expensive piece of equipment.

**10. Start with a plan.** Each lift is different from another, and it's important to review load weight capacities, the integrity of the equipment, the possible effect of wind, and other factors. The operator, riggers, and other workers involved with the lift should be part of that planning process.

After all, the standards requiring tag lines on loads, capacity limits, ground stability, and similar factors have all been adopted because incidents, injuries and fatalities demonstrated a need for them. Following those rules and ensuring that your operators and other workers have the right education, training, and experience will protect everyone involved.