Crane Safety – Stats and Facts

DID YOU KNOW?

From 2011 to 2017, the Census of Fatal Occupational Injuries (CFOI) reported 297 total crane-related deaths, an average of 42 per year over this 7-year period. Men accounted for 293 of the 297 fatal injuries involving cranes. White, non-Hispanic workers accounted for 72 percent of fatal injuries involving cranes, while 15 percent involved Hispanic and Latino workers.

Event or Exposure

Just over half of all fatal crane injuries involved the worker being struck by an object or equipment. About three-fifths of these cases (91 of 154) involved the worker being struck by a *falling* object or equipment; in 79 of these cases, the worker was struck by an object falling from or put in motion by a crane. Transportation incidents and falls to a lower level each made up about 13 and 14 percent of the remaining fatal injuries involving cranes, respectively.

Industry and Occupation

From 2011 to 2017, 43 percent of fatal work injuries involving cranes took place in the private construction industry. Specialty trade contractors and heavy and civil engineering construction had the most fatal injuries involving cranes in private construction. The manufacturing industry accounted for another 24 percent of crane deaths.

One-third of all worker deaths involving cranes in 2011–17 were to workers in transportation and material moving occupations. Over half of these workers were crane operators. Another 31 percent of worker deaths involving cranes occurred to workers in construction and extraction occupations.

Worker Activity and Location

The worker was operating a crane at the time of the fatal injury in 22 percent of cases. The worker was engaged in construction, assembling, and dismantling activities in another 23 percent of cases. Just over one-quarter of all fatal crane injuries (27%) occurred at a construction site (except road construction). Twenty-four percent occurred at a factory or plant, another 8 percent occurred at a road construction site, and 6 percent occurred at a dockyard.

Cranes are commonly used on construction and industrial sites to lift and move heavy objects. While cranes are an invaluable tool, they are also extremely dangerous if not operated safely. Because of their size and purpose, cranes present a clear danger to the crane operator and other workers and visitors to the site.

CRANE ACCIDENT STATISTICS

The most recent data on crane accidents from the Bureau of Labor Statistics dates back to 2006. In that year, there were 72 fatalities caused by crane accidents. Over the 10 year period from 1997-2006, crane accidents were responsible for 818 workplace fatalities. From 2003-2006, Texas led the nation in the number of fatal crane accidents.

Below are the top four states in terms of fatal crane accidents over that four year period.

- Texas – 42 fatalities
- Florida – 27 fatalities
- California – 25 fatalities
- Louisiana – 17 fatalities

Crane accident fatalities occur from a variety of causes. The most common cause of fatalities is workers or bystanders who are struck by an object that falls from the cranes. Other causes include being run over by a crane, falling from a crane, and electrocution.

Below is a breakdown of crane accident fatalities by cause of death.

- Contact with object or equipment – 62%
- Falls – 20%
- Transportation incidents – 10%
- Contact with electrical current – 8%

WHAT CAUSES MOST CRANE ACCIDENTS?

Cranes are usually the largest piece of equipment on any industrial site. As a result, more accidents are caused by cranes than any other piece of equipment. But what causes such heavy equipment to malfunction catastrophically? In many accidents, cranes buckle or collapse from excess weight. Each crane comes with strict weight limits, but construction supervisors can either ignore these limits or remain ignorant of them, which leads to a crane accident. That's why many crane accidents are tied to poor training or rushed construction jobs.

Major causes of crane accidents are:

- Use of crane for purposes outside of the manufacturer's specifications
- Improper crane selection
- Poor weather
- Improper crane set up
- Falling debris or other hazardous conditions surrounding the crane

Another well-known cause of crane accidents is contact with power lines. OSHA found that 45% of crane accidents are caused by the boom or crane making contact with energized power lines. Regardless of cause, most crane accidents can be prevented by following proper safety protocol and adequately training workers on how to operate the crane safely. In fact, 90% of crane accidents are caused by human error and 80% can be attributed to crane operators exceeding operational capacity.

As cranes are work-related machines, publicly-funded

investigations of crane accidents are carried out by OSHA. In the private sector, there are numerous investigators and rigging experts who specialize in crane accident investigation. These investigators will often work for defense or plaintiff law firms working on crane accident cases. Here at Arnold & Itkin, we use OSHA investigations as well as our own in-house funded investigations to determine the cause of crane accidents.

Most crane accidents result in serious injury or death. If you or a loved one was injured or killed in a crane accident, it is important that you understand your legal rights. Crane accidents can be complex, as there are often numerous parties who may be liable. In order to protect your legal rights, it is advisable to contact an experienced crane accident attorney as soon as possible.

Accidents can be prevented:

Crane accidents are often the direct result of negligence of the crane-related professional or the lack of adequate operator training or experience.

- 90% of crane accidents occur due to human error
- 80% of all crane upsets are attributed to operators exceeding the crane’s operational capacity
- 54% of these incidents are the result of swinging the boom or making a lift without the outriggers full extended
- 45% of all mobile crane accidents involve electrocution that results from the crane contacting a power source during operation
- 40% the victims were struck by an object (such as an uncontrolled hoisted load or crane part)
- 50% of U.S. crane accidents that had injuries in 2009 resulted in fatalities
- 80 lift and material handling equipment workers are killed each year, on average

Not only are workers seriously injured or killed, but bystanders and passersby are also being injured and killed at an alarming rate by crane accidents. Incident and fatalities happen with all

types of cranes, including mobile and overhead cranes.

Did you know that when an accident happens, everyone can be held liable, including, but not limited to, the operator/rigger, the company, and the property owners?

The lack of training costs more than tuition. With looming dangers and inevitable fines from lack of well-trained operators, riggers and signal persons, it makes sense for businesses to invest in education.

The hidden costs of lack of training:

- Missed Work Days
- Increased Insurance Rates
- OSHA Fines
- Litigation
- Lost Business Opportunities

The Board of Labor reports that crane accidents have been responsible for 818 workplace deaths since 1997. That number averages out to about 42 deaths-per-year. Texas is the leading state in all crane-related deaths in the United States. Another startling number that came from the report is that 90 percent of all crane accidents are a direct result of human error. Nearly 80 percent of these accidents can be attributed to mechanical malfunctions, which are mostly caused by human error. These two percentages fall under the category of negligence. Part of the responsibility falls upon the construction company or by unforeseen actions from an operator.

Due to these high statistics, the Occupational Safety and Health Administration (OSHA) has implemented a series of strict regulations to curtail the number of crane accidents. OSHA regulations require better training on how to properly operate a crane at the workplace. These regulations will force all involved to comply within the rules provided before a construction project can even begin.

Determining the cause of crane accidents

Finding what caused a crane accident to occur can be a complex, lengthy process. Most clues are very difficult to find without a thorough examination of the accident site and the machine itself. The most common causes of crane accidents include improper operation, poor communication between workers, and the equipment's beam inadvertently coming into contact with a power line. Each situation requires construction workers to develop into a cohesive unit, because failure to do so could lead to a devastating accident.

Construction companies must create better safety protocols in the workplace, like regular inspections, and train employees on how to properly operate worksite equipment. The goal should be to develop a better course of action that lowers the amount of crane accidents that take place each year.

KEEP IN MIND

Cranes are a marvel of engineering, and an essential component of many industries including construction, manufacturing, warehousing, and more. Operating a crane takes extensive training, and following set standards to ensure both the crane operator, and those in the surrounding area, are safe. Crane safety is an important component of overall workplace safety, and doing it right can mean the difference between life and death in many cases.

There's no argument that preventive maintenance—conducted in accordance with the manufacturer's recommendations—is essential to promoting overhead crane safety. This section of the standard furthers the case for preventive maintenance by outlining safe, proper preventive maintenance procedures that minimize interference with operation of cranes that are still in use.

This section also defines what must be done before equipment is returned to service, following inspections and maintenance. The

service technicians of Konecranes, the world’s leading crane service provider, are well-versed and experienced in these procedures for all makes of overhead cranes.

Preventive maintenance. A preventive maintenance program based on the crane manufacturer’s recommendations shall be established.

Maintenance procedure.

1. Before adjustments and repairs are started on a crane the following precautions shall be taken:
2. The crane to be repaired shall be run to a location where it will cause the least interference with other cranes and operations in the area.
3. All controllers shall be at the off position.
4. The main or emergency switch shall be open and locked in the open position.
5. Warning or “out of order” signs shall be placed on the crane, also on the floor beneath or on the hook where visible from the floor.
6. Where other cranes are in operation on the same runway, rail stops or other suitable means shall be provided to prevent interference with the idle crane.
7. After adjustments and repairs have been made the crane shall not be operated until all guards have been reinstalled, safety devices reactivated and maintenance equipment removed.

Adjustments and repairs.

1. Any unsafe conditions disclosed by the inspection requirements of paragraph (j) of this section shall be corrected before operation of the crane is resumed. Adjustments and repairs shall be done only by designated personnel.
2. Adjustments shall be maintained to assure correct functioning of components. The following are examples:

   - All functional operating mechanisms.
   - Limit switches.
   - Control systems.

- Brakes.
- Power plants.

Repairs or replacements shall be provided promptly as needed for safe operation. The following are examples:

1. Crane hooks showing defects described in paragraph (j)(2)(iii) of this section shall be discarded. Repairs by welding or reshaping are not generally recommended. If such repairs are attempted, they shall only be done under competent supervision and the hook shall be tested to the load requirements of paragraph (k)(2) of this section before further use.
2. Load attachment chains and rope slings showing defects described in paragraph (j)(2)(iv) and (v) of this section respectively.
3. All critical parts which are cracked, broken, bent, or excessively worn.
4. Pendant control stations shall be kept clean and function labels kept legible.

9 Facts About Cranes

1. The first human-made crane was built by the Ancient Greeks in 500 BC. This primitive, wooden form has since been improved hundreds of times, but it was a modern wonder in the Greek’s world. The machine was powered by humans and animals to pull heavy objects up and construct some of the most beautiful structures of the Ancient World. One of the Greeks most famous building, the Parthenon, shows evidence of cranes used in its construction.
2. In the Middle Ages, a new addition was added to the Greek’s crane. This addition, called a “jib,” allowed the crane’s arm to move horizontally, not just vertically. During this time, the crane was first used in harbors to unload cargo from ships.
3. When the steam engine was invented in the 19th century, this technology was added to power cranes, eliminating the need for animals and humans to power cranes.

4. In the 1950s, stronger steel was being manufactured and cranes were put on the back of trucks, introducing the first mobile crane.
5. Today, there are over 200,000 cranes used around the world. It is estimated that 125,000 cranes are used in the construction industry, and 80,000-100,000 cranes are used in general and maritime industries.
6. The tallest crane in the world is a Liebherr type 357 HC-L. It can lift up to 18 tons at 44 meters/minute. It was used in the construction of the Kingdom Tower in Saudi Arabia, the world's tallest building.
7. Although cranes are helpful, they can be dangerous. In the US, there are about 90 crane-related deaths each year.
8. Out of all crane accidents, 11% are caused by some kind of mechanical failure. If caught beforehand, a lot of these failures can easily be prevented, which is why WMs Cranes are inspected daily by operators and yearly by Inspectors.
9. Cranes have many different purposes and are used for many specific projects. Across all industries, there are over 20+ specialized types of cranes, all used for various purposes. Some of these crane types include: mobile cranes, tower cranes, rough terrain crane, truck mounted crane.

Types of crane accident injuries

The injuries sustained from a crane accident can be catastrophic and even lead to death. The types of injuries that occur include being hit by fallen debris, crushed by a toppled crane, and electrocution.

If you have been injured in a crane accident, then it is in your best interest to speak with an experienced personal injury attorney. Receiving compensation from a crane accident caused by human error can be a difficult process. A personal injury attorney has resources to help with determining which party is responsible for the crane accident.

Developing Crane Safety Procedures in the Workplace

Having a detailed crane safety program in the workplace is an important step for all employers where cranes are used. This can start by identifying potential crane related hazards, and continues with finding ways to eliminate the hazards, or compensate for them in some way.

All workplace safety is important, but crane safety in particular is critical because of how devastating accidents related to cranes can be. The following are some key areas that should be included with any good crane safety plan.

Common Crane Hazards

Crane operators, and those working around them, should be taught what the most common crane hazards are. Being aware of these risks will help ensure that everyone is watching out for them, and taking steps to avoid them whenever possible. The following are some of the hazards that all crane safety plans should take into account because of how frequently they can occur, and how serious they can be:

- Electrical Hazards – Cranes operate at great heights, which puts them in a terrible position for accidentally hitting electrical lines. The metal in the crane is an excellent conductor, and can cause fatal electrocution. Crane operators must be aware of where every electrical line is at all times.
- Materials Falling – Every load that a crane lifts needs to be properly secured. But even when the loads are secured, there is always a risk of something falling off. Those below the crane should avoid working in the area, and wear hard hats and other appropriate PPE when it is unavoidable.
- Overloading a Crane – Cranes can lift an astounding amount of weight, but there are limits. Crane operators, and those that load cranes, need to know precisely how much weight it

can handle, and exactly how much weight they have added at any given time. Overloading a crane can cause it to tip over, or to drop the load, which can have devastating consequences.

- Crane Movement (pinch points) – Cranes often need to twist or move to get the load where it needs to go. This can create pinch or crush points where someone could be seriously injured.
- Dropped Loads – If a crane drops its load, whatever is under it will be crushed. Even vehicles or structures can be crushed from the impact of a heavy load dropped from a significant height. Nobody should work directly under a crane load for any reason, even with PPE.

Following are some hazards all employees involved in lifting operations should take into account, because of how frequently they can occur and how serious accidents can be:

- **Pre-Use Operational Inspection –** Making sure that the crane, rigging, rigging hardware and attachment points are in proper working order before lifting is essential. If anything is not working correctly, it can cause serious accidents and injuries to those in the area. Please refer to the Crane Daily Pre-Use Inspection Checklist for a list of items which must be inspected and be in a satisfactory condition prior to operating any crane or hoist.
- **Crane/Rigging Movement (pinch points)**– Cranes often need to twist, adjust and move to get the load and rigging where it needs to go. This can create pinch or crush points where someone could be seriously injured. Know where your feet and hands are at all times. Operators must communicate with the signal person to ensure all personnel are clear of pinch points.
- **Improper Lifting Techniques/Damaged Rigging –** Choosing the proper size of rigging, the proper hitch and working within the proper load angle factors will reduce the chance of overloading or causing damage to the rigging. Do not use damaged or out-of-service rigging.
- **Dropped Loads**– If a crane drops its load, whatever is under

it will be crushed and the object dropped could be damaged, putting a delay in the production process. No one should work directly under a crane load for any reason, even with PPE. Keeping non-essential personnel clear of the suspended load at all times will reduce the chance of injury if the load shifts, swings or drops unintentionally.

- **Materials Falling**– Every load a crane lifts needs to be properly secured and free of loose parts and tools. Even when a load is secure, there is always a risk of something falling off. Employees below the crane should avoid working in the area and be aware of the suspended load while it is moving.
- **Crane Overloading**– Cranes can lift an astounding amount of weight, but there are limits. Crane operators and those who load the crane need to know precisely how much weight it can handle and exactly how much weight they have added or are lifting at any given time. Overloading a crane can cause it to tip over, cause structural damage or cause a loss of load, which all can have devastating consequences.
- **Side Pull** – This is one of the most common mistakes made with overhead cranes. Hoists and cranes are designed to lift straight up and lower straight down only. Side pulls cause a number of dangerous conditions.

First, the wire rope often comes out of its grooves and “scrubs” against the remaining rope or drum, resulting in damaged rope. Sometimes the rope actually jumps the drum and tangles itself around the shaft, resulting in stress to the rope.

In addition, side pulls cause stress in unintended ways even worse than rope problems. In a somewhat oversimplified example, a bridge beam, taller than it is wide, is lifted with a side pull. Pulling at a 45-degree angle would put equal lateral and vertical stresses on the crane, potentially causing bridge beam failure, even with weight only half of the rated capacity.

Supervisors, leads, safety monitors and all lifting personnel should be aware of, and take into account, the above information to prevent misuse, mishandling, and unsafe lifting practices.

All personnel onsite have the right to give a “Stop” signal to the operator if they see something unsafe or dangerous.

These hazards are not all-inclusive of the hazards associated with cranes.

It is the responsibility of supervisors to ensure crane operators retain certification, follow all safe work practices and correct unsafe lifting habits.

Look at it this way: certification is like having a driver’s license for a car. Just because you have a driver’s license, doesn’t mean you are a good driver.

It all comes down to having a culture and mindset of safety. The most important reason for any crane safety program is saving lives and ensuring that every lift is successful.

When operators take time to ensure every lift is made without error, the efficiency of your lift team becomes the greatest component of your productivity.