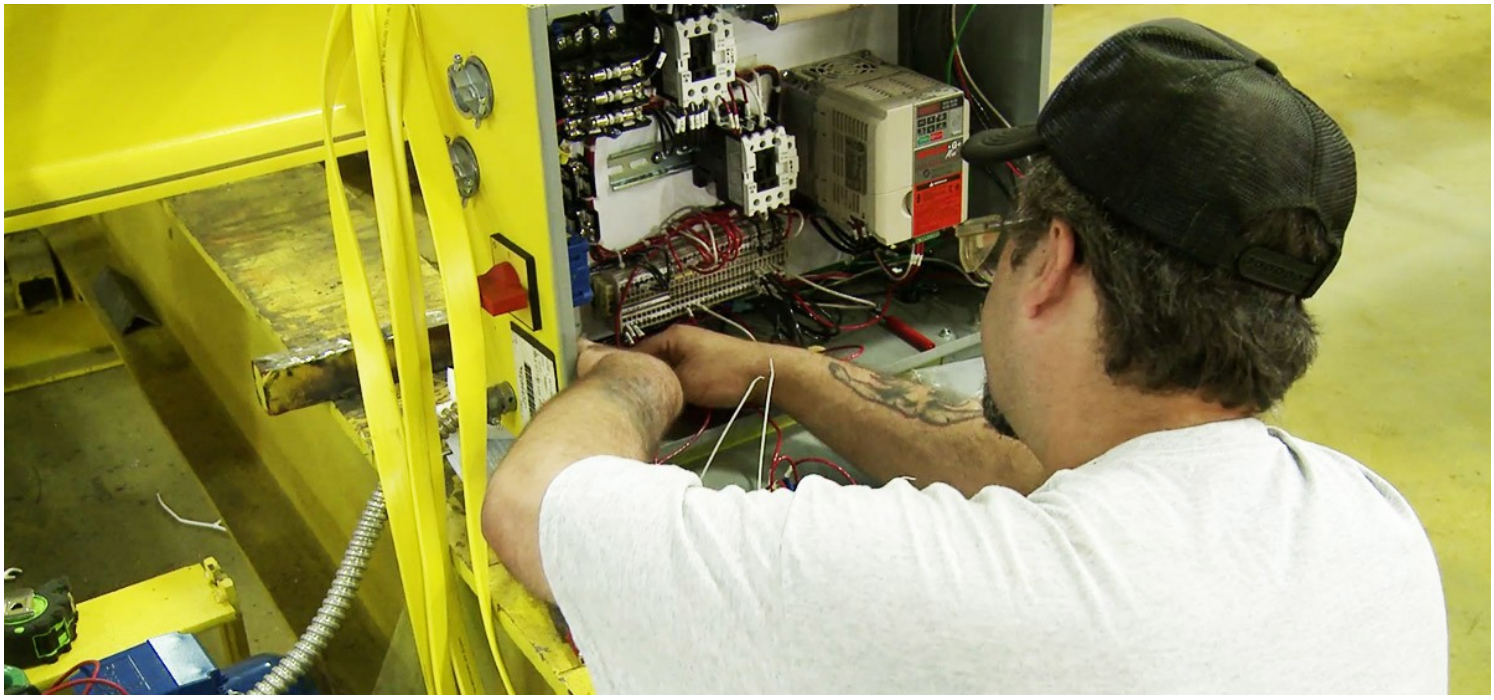
Five Common Problems with Overhead Cranes and How to Avoid Them

Just like with an automobile or any other piece of equipment or machinery, your overhead crane will need regular maintenance to prolong its life and keep it operating efficiently. We understand that purchasing an overhead crane can be a big investment, and an investment that you'll want to protect.



This section outlines the five most common problems with overhead cranes so that you have a better understanding of what issues or problems you might encounter during the life of your overhead crane. And most importantly, what you can do to help prevent or mitigate them.

We recommend that you establish a regular inspection schedule for your overhead crane. You should also follow the manufacturer's recommendations for service and maintenance intervals, and consider duty cycle and environmental factors when designing your crane to help extend the life of your crane and the crane components.

1. Damage or Degradation to the Wire Rope

Damage or degradation to wire rope is one of the most common issues that you may experience with an overhead crane system.

There are a number of common wire rope problems, including any of the following:

- The wire rope has jumped out of the reeving system
- Reduction of rope diameter below nominal – loss of core support, internal or external corrosion, wear of outside wires

- Broken or worn outside wires
- Corroded or broken wires at end connections
- Severe kinking, crushing, cutting, or unstranding

Many operating conditions can affect the life of wire rope. Bending, stresses, loading conditions, speed of load application (shock load), abrasion, corrosion, sling design, materials handled, environmental conditions (heat or chemical exposure), lubrication, and history of usage will all factor into how long wire rope can stay in service.

The best way to prevent damage to, or failure of, a wire rope is to inspect it prior to each shift. If any evidence of damage is observed, the wire rope should be properly disposed of to prevent further usage.

Also, make sure that the wire rope is properly lubricated. Proper lubrication of the wire rope has two primary benefits:

- Reduces friction as the individual wires move over each other
- Provides corrosion protection and lubrication in the core, inside wires, and outside surface

2. Crane Skew and Alignment Issues

An overhead crane that is out of alignment and skewing as it travels down the runway can cause significant stresses and damages to the entire crane system. The problem with a crane that isn't tracking properly is that over time, forces that weren't accounted for in the design and installation of the overhead crane cause stresses to the runway beams themselves and also to the tie-backs or building support structures.

These types of stresses can result in:

- Accidents
- Crane failure or derailment
- Equipment downtime and productivity loss
- Costly repairs and replacement of parts

A crane that isn't tracking properly also causes extensive wear to the wheels, wheel bearings, and wheel flanges—as well as premature wear to the motor drives and other equipment.

There are certain signs that your crane may not be aligned properly and is skewing as it moves down the runway.

When your crane is in operation, be aware of the following:

- Loud scraping sounds
- Broken or cracked wheel flanges
- Abnormal wear on the wheels, wheel bearings, and rails
- Extra power required to move the crane through certain areas of the runway
- Wheels that float or climb over the rail and then crash down

The best way to prevent overhead crane skew and alignment issues is to have your crane regularly inspected by a reputable third-party service provider. A crane service provider can survey your crane rails and runway systems to identify and correct any issues before they become bigger problems.

A crane service provider can make sure that your overhead crane system is in compliance with the allowable tolerances specified by the Crane Manufacturers Association of America (CMAA) for the design of the runway system.

CMAA Specification #70 – 1.4.2: "Rails shall be straight, parallel, level, at the same elevation and at the specified

center to center distance, within the tolerances given…”

- **Crane Span Tolerance:**
  - Less than 50 feet: ± 3/16”
  - 51-100 feet: ± 1/4"
  - Greater than 100 feet: ± 3/8”
- **Straightness Tolerance:** ± 3/8”
- **Elevation Tolerance:** ± 3/8”
- **Rail-to-Rail Elevation Tolerance:**
  - Less than 50 feet: ± 3/16”
  - 50-100 feet: ± 1/4"
  - Greater than 100 feet: ± 3/8”

CMAA Specification #70 – 1.4.5: “Rail joint misalignment can be a significant factor in wheel, axle, and bearing failures. It is recommended that horizontal rail separation at joints not exceed 1/16”. Vertical and horizontal alignment at joints should be maintained as closely as possible. Rail joints should be ground flush as necessary to provide a smooth transition from each rail segment to the next.”

3. Excessive Wear to End Truck Wheels

End truck wheels are components of overhead cranes that can require frequent maintenance, replacement, or adjustment. Throughout the course of a crane’s life, the wheels will naturally wear down due to normal use of the crane and will need to be replaced.

Wheels can be made of a variety of materials, including polyurethane for gantry cranes, alloys, low-carbon steel, or medium-carbon steel. The more carbon in the steel, the harder the wheel will be. There are also methods of heat-treating that can be used to increase the hardness of a wheel—increasing the service life and load capacity of the wheels.

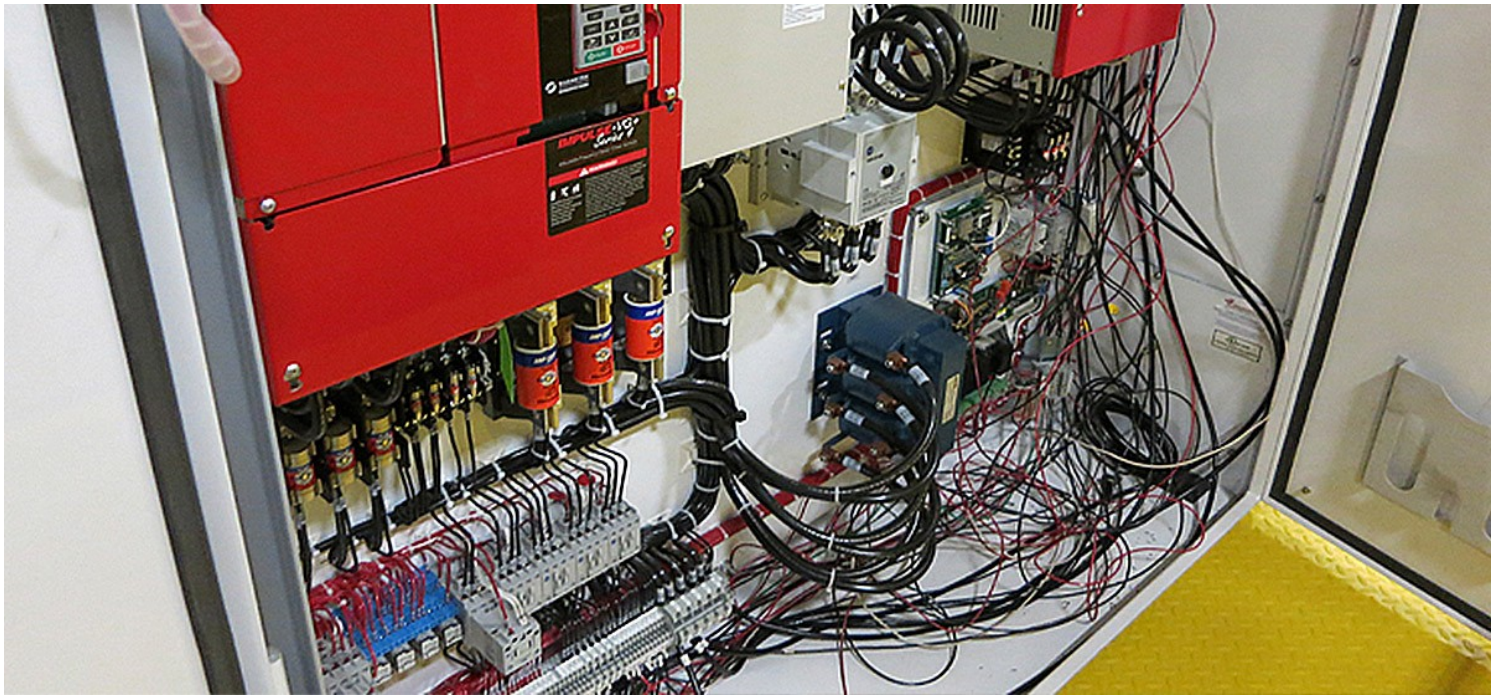
If the wheels, wheel bearings, or wheel flanges begin to wear or break down prematurely, it can be an indication that the crane is skewing and not properly tracking down the runway system. Skewing of the crane can cause excessive wear and stress on the wheels, but also on the runway beams and support structures as well.

Wheels tend to wear out faster on a crane that was installed using an existing rail system as opposed to a new installation. Unless the runway has been properly surveyed prior to installation, the runways may be misaligned or the rails may be out of tolerance.

To avoid premature wear on the wheels and end trucks, your overhead crane runway system should be designed, tested, and regularly inspected by a reputable overhead crane manufacturer. Any signs of premature wear will indicate the possibility of a larger problem that should be addressed and corrected before the problem compounds itself. Make sure wheels were made specifically for the rail they're running on. Hardness must match hardness of rail.

4. Issues with the Electrification System

There are a number of different issues related to an overhead crane's electrification system that may require service or future maintenance.



Problems with Contact Interruptions

One of the most frustrating problems that a crane operator can experience is when there are contact interruptions between the conductor bars and the collector. These contact interruptions can cause intermittent control problems with the overhead crane system.

On the collector, a brush made from carbon graphite can wear down, which can cause carbon graphite to build up. Because carbon graphite dust is a conductive material, this build up can cause shorts in the electrical connection.

On older crane systems, the copper rails on the conductor bars can also become corroded or oxidized due to the operating environment or due to long periods where the crane is not being used. To prevent this from happening, the conductor bars and collectors should be inspected and cleaned regularly to make sure that the contact between the collector and conductor bar is uninterrupted.

Another problem that can cause contact interruptions is if there are alignment issues with the conductor bars themselves, causing the collector shoes to jump out of the track and lose contact.

Problems with Push Button Pendants or Radio Controls

Although not very common, there are environments that create their own radio waves that may interfere with the operation of an overhead crane. An example might be a facility that performs induction heating or induction welding procedures. Radio waves created during these processes may disrupt the communication between the radio's transmitter and receiver.

On pendant controls and radio controls, the push buttons or levers may stick or become unresponsive over time. The control may need to be replaced or repaired to correct any issues with the operation of the buttons.

You may also find that pendant controls can become disconnected or pulled out of the hoist. The reason that this can occur is because the operator pulls on the pendant to maneuver or position the crane—especially on jib cranes or workstation cranes. If your controls become unresponsive, you may need to check to see if the pendant became disconnected from the hoist, or have the system serviced and re-wired if any wires become loose.

Blown Fuses

If you find that your overhead crane is blowing fuses, then it's an indication that you have a faulty circuit in the crane's electrification system. Contact a crane service provider immediately to come out and inspect the crane's electrification system and identify the fault.

5. Bent or Damaged Hooks

A hook is designed to hold a load in a particular and precise direction. When the weight isn't supported as intended by the hook, it compromises the internal integrity of the hook and can increase the chance of it bending, stretching, or cracking. The load can also slip off of the hook if it stretches out the throat opening.

Regular inspection of hooks and other pieces of rigging hardware should be performed at the beginning of each shift to check for deformities or damage.

While there are no clear-cut guidelines on the use of hook latches, we train our employees and inspectors that if a hook is designed to have a latch, it should have the latch installed to help move a load safely and securely. We advise that the end user must evaluate the work activity with regards to the safety of their employees. If the activity makes the use of the latch impractical, unnecessary, or more dangerous, then the end user may choose to eliminate the latch. It is also recommended that each lifting activity is considered independently as far as the use of a hook latch is concerned.

Help Protect Against Excessive Wear and Costly Downtime

To help prolong the life of an overhead crane system, there are a number of things that should be taken into consideration before you even buy an overhead crane:

Make Sure Your Crane is Rated for the Actual Duty Cycle and Usage Required

Be honest with yourself and the manufacturer who is designing and building your overhead crane. Don't try to design or build a crane that won't meet the actual usage and duty cycle requirements of your business.

Every component on the crane is rated for a specific load capacity—if your crane isn't built to handle your actual lifting needs, it can lead to premature wear or failure. If you're straining the crane by lifting loads or using it in matters that it wasn't designed or rated for—just because you wanted to save a few bucks—you'll ultimately end up spending more in the long-run in repairs and costs associated with upgrading and modernizing crane components.

Consider Your Operating Environment When Designing and Building Your Crane

The environment where the crane is used can play a major role in the life of your overhead crane and the crane's components. Environmental factors such as high heat, the presence of chemicals or fumes, steam, dust, or excess moisture can require special metal coatings to protect and enhance the operating life of the crane.

If these factors aren't accounted for during the design and quotation process, then the components of the overhead crane can be affected by corrosion, oxidization, and parts can get gummed up with dirt and grime.

Have Your Crane Inspected Regularly

Regular inspection is one of the best forms of preventative maintenance. Staying on top of regular maintenance identifies problems earlier and allows you to replace or repair worn-out parts before they cause a major disruption to production or an equipment failure.

Not only will regular crane inspections keep you in compliance with sanctioning bodies like OSHA, ASME, and CMAA but it will help keep the crane and hoist equipment operating at top efficiency, help to keep your employees safe, help reduce costly down time, and extend the life of the equipment.

Follow the Manufacturer's Recommendations for Regular Service and Maintenance

You should receive some type of owner's manual or maintenance interval book from your crane manufacturer. The manufacturer's service recommendations are provided based on the duty cycle and capacity of your specific crane, so follow the manufacturer's recommendations for crane and hoist maintenance, as well as lubrication and inspection intervals.

Installing an overhead crane in your facility is a big monetary investment. However, it's also an investment in your employees' safety, as well as an investment in improving the efficiency of your production and workflow processes.

Hopefully, you have a better understanding of what types of issues or problems you might encounter with an overhead crane system and what you can do to mitigate them.

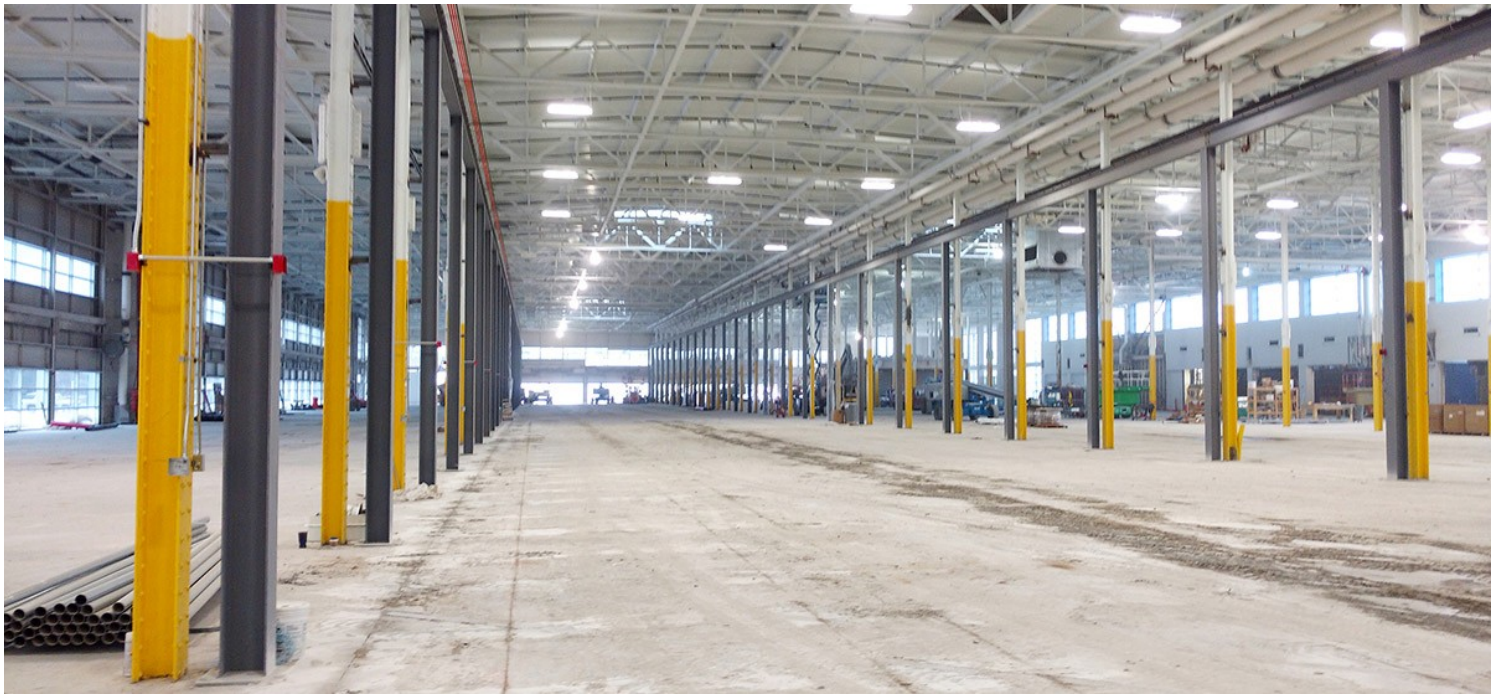
The Hidden Costs of Overhead Crane Ownership

It’s easy to overlook some of the hidden costs of buying an overhead crane and maintaining an overhead crane over the course of its service life.

In this section, we’ll help you identify some of the pitfalls and hidden costs associated with overhead crane ownership. Our goal is to help you better understand how to properly budget for and design an overhead crane so the installation and future maintenance is as painless as possible.

The Overhead Crane Design and Quotation Process

The most important thing you can do when purchasing an overhead crane is to partner with a reliable overhead crane manufacturer. You want a partner who understands your unique lifting and material handling challenges and will help design and build a crane system specific for your application.



By having multiple manufacturers bid on your project, you'll get a better sense of the true cost of buying an overhead crane. Also, if a company knows that they aren't the only ones bidding on the project, they will tend to provide a more comprehensive and competitive estimate and may be more willing to negotiate on the final purchase price to get your business.

Duty Cycle and Design

Duty cycle and CMAA crane service classifications allow you to select and build an overhead crane that is the most economical and safest design for your lifting application. Selecting the right duty cycle or service classification of an overhead crane helps ensure that the components of the overhead crane are durable enough to withstand the load and usage requirements.

When partnering with a manufacturer, be open and honest with them about the following:

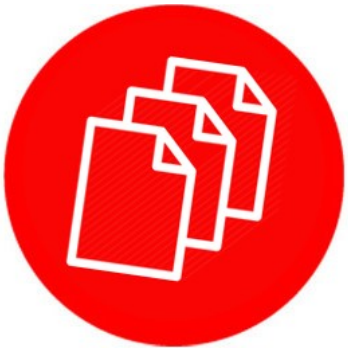
- How often you will be using an overhead crane
- How hard your overhead crane will have to work
- The type of environment that your crane will be operating in

This information will give the manufacturer a good sense of what type of crane class will be best for your business or facility and what type of crane will be the most economical design for your application.

When designing an overhead crane, you'll also want to give special consideration to any future usage requirements. If you think that your production may expand down the road (which may result in higher capacity lifts or an increase in the number of lifts per day) then you may want to spec out the crane and components so it can accommodate future growth.

If you over-specify a crane, it will result in a higher initial cost for the crane and runway system, but will have less maintenance and down time in the long run.

However, if you under-specify an overhead crane system, it will result in a lower initial investment, but will cost you more in maintenance and downtime in the long run.



Comparing Quotes

When reviewing and comparing overhead crane quotes, it’s essential to make sure you fully understand the specifications and full details of the quote. Every project is different and not all cranes of equal capacity are the same. Sit down with each manufacturer and review the specifications of the crane system that they’re proposing. This gives each manufacturer a chance to explain their design, why they chose the materials they did, and why they’re specifying the individual components. This will give you a more comprehensive understanding of the cost and capabilities of the crane system, as a whole.

Also, understand that you should never select a manufacturer based solely on price. An overhead crane is a complicated piece of equipment and no two cranes are built exactly alike. Unfortunately, some in the industry view a crane system as nothing more than a commodity and will base their purchase on the lowest-priced option. This mindset can lead to a crane that isn’t properly specified for the application and may be comprised of low quality components that will break down frequently and not hold up to the rigors of the lifts being performed.

Remember, if you purchase solely on the lowest cost option, it’s likely going to cost you more in maintenance and downtime in the long run.

Material Costs

Right now, the U.S. steel market is volatile and unstable. Steel prices have been rising steadily due to the recently announced tariffs on imported steel. Be aware, there may be a disclaimer in your quote stating that the estimated material costs are only valid for a certain time frame or can change at any time.

From initial consultation to installation, the process of buying an overhead crane can take a long time. By the time you're ready to purchase, it's possible that the original estimated cost of the steel may have gone up 3-5% or even more! Fortunately, the price of steel is published and publicly available, so you can check to make sure what you're being quoted is accurate and up-to-date.

Freight Costs, Permits, and Inspections

When you look at your quotes, are the manufacturers providing you with one single price for a turnkey project—including equipment, freight, and installation? Or, are they providing itemized prices for each of those services? You'll want to make sure you're clear on the total costs for the project—including FOB shipping, and at what point you, as the buyer, are responsible for freight and additional installation expenses.

Do you know who is responsible for obtaining and paying for permits? You'll need to know whether the manufacturer or installer will handle the paperwork to obtain permits, and who is responsible for paying any associated fees and arranging for surveys prior to the work, and inspections once the work is complete.

Other Common Misunderstandings

Other common misunderstandings between a customer and an overhead crane installer may include in-house electrical work prior to the installation and load testing of the overhead crane equipment once it's been installed.

In regards to electrical work, make sure that you and the installers are clear on who will run the electrification from the disconnect to the runway to tie into the crane's electrification. Often times, this is done by a third-party or by an in-house electrification. As long as everyone is clear on who will be doing it, it shouldn't be an issue.

Per OSHA 1910.179 Overhead & Gantry Cranes Regulations, your new crane system will need to have two operational tests, plus a rated load test performed prior to initial use:

- Testing of the hoist operation up and down; trolley travel; bridge travel; limit switches and locking and safety devices
- Testing of the trip setting of the hoist limit switches to make sure the actuating mechanism of the limit switch is functioning properly
- Load test the crane at no more than 125% of the rated load and keep test reports on file where readily accessible

The load testing of the crane can be performed with a variety of materials including concrete, steel, or water weight bags. Again, make sure that the installers have a clear understanding of who is responsible for providing the testing materials so that they can have material on-hand and begin load testing the crane as soon as installation is complete.

The Overhead Crane Installation Process

Any special considerations for an overhead crane installation actually begin during the quotation process. During that process, the overhead crane installer will review generic drawings of the crane equipment and review blueprints or building floor plans to give their best estimate of what it will take to install an overhead crane in the customer's facility.

In the quote, the crane installer will provide a window or time frame that they think they'll need to complete the crane installation. This can range anywhere from 2-10 business days, to a longer time period for more extensive or complex crane installations.

This estimated installation window will be consecutive working days—once they've brought the cranes, trucks, materials, and all installation equipment on-site, they can't break up their time, or stop and re-start the installation, without significant increases to cost of the crane installation.

Installing a Crane in a New Construction Facility

Ideally, you're installing an overhead crane into a new construction facility and the Engineers and Project Managers can work with your building construction contractors right from the start. This gives them more freedom and flexibility to design the building to accommodate an overhead crane system.

The manufacturer can provide a construction contractor with crane loads and also help calculate building support requirements for the crane system. The contractor can provide the crane manufacturer with drawings that allow the manufacturer to incorporate the crane design right into the building design and prints.

In rare cases, you may be able to design and build the facility around the application of the crane. This truly allows you to accommodate all design requirements including hook height, lift, span, and any foundation or structural requirements. This type of upfront planning is the most cost-effective way to help you accommodate the space required to operate an overhead crane, as well as lay out your production areas, design work cells, and maximize storage and floor space.

Heck, if an overhead crane is one of the first items installed in the building, you can even utilize the crane to help with the construction and erection of the building and other equipment in the facility.

Installing a Crane in an Existing Building Structure

Unfortunately, most crane installations don't occur in a brand new facility with a flexible installation time frame and a blank slate to design and build the structure around the crane itself. In most cases, the design and engineering team has to retrofit an overhead crane and its support structure into a space that wasn't originally designed for a crane system.

To further complicate things, production is already up and running with employees moving about and machinery and other equipment in operation—all creating obstacles for getting installation equipment and materials into the building.

Installing an overhead crane in an existing building requires a thorough understanding of the current building's structural supports. You will most likely have to bring in a third-party to perform structural surveys of the following:

- Support beams or columns
- Roofing
- Foundation and flooring (concrete, dirt, gravel, etc.)
- Any existing runway structures

In most cases, these load surveys need to be performed by a third-party civil or structural engineer and are the responsibility of the customer to coordinate and facilitate prior to the installation. A crane installer may be able to help coordinate the effort, but they will not perform the surveys or load ratings themselves. The results of these ratings can determine if the crane is supported from the roof, is a free-standing design, or can be tied back to existing supports.

The deadweight of the crane, or the loads on the structure which remain fixed even when the crane is not performing a lift, need to be considered. Ceiling beams, flooring, and support beams can be reinforced with internal bracing, or can be totally redesigned to spread the load between multiple points versus a single point.

You should have a clear understanding of any additional costs related to reinforcing your foundation, ceiling beams, or building support columns prior to the installation of any overhead crane.

Free and Clear Access to the Facility

The Project Managers and installers should have a clear understanding of how they're going to get the crane equipment and any other equipment required for installation into and out of the building and yard. This equipment can include any of the following:

- Semi-trucks, trailers, and flatbeds
- Mobile installation cranes to lift the bridge and runway beams
- Generators
- Scissor lifts

For a wide span crane system, it's a good idea to have the installers come out and do a dry run prior to the installation date. A tape measure can be used to mock up the length of the beams that need to be maneuvered through the facility and a couple of guys can plan a route to safely and efficiently move material to the installation site.

It also helps them determine if any building panels need to come off, if any fencing needs to be temporarily removed from the yard, and identifies potential obstructions within the facility that may affect installation efficiency.

Headroom

Another often overlooked consideration is headroom within the facility. If you've designed a crane system that just meets OSHA's 3" minimum overhead clearance requirement, how do you plan on erecting the crane itself? You may not have enough headroom to use a mobile crane or man lift to pick the beams up to erect the crane's runway and bridge structures.

You may need to leave off a building panel for a new construction facility, or use a skylight or other means of roof entry on an existing facility. It's better to plan for that ahead of time, than to realize it's an issue on the day of the installation—

potentially racking up additional charges for a longer than expected installation.

Production Costs

If you're installing an overhead crane into an existing building, then you have to consider what type of production may be affected by the crane installation. Are there permanent work cells that need to be maneuvered around? What type of other equipment or machinery may cause obstructions for the installers? Do you plan to have production up and running during the installation? If the installers need to work around production or operating machinery in your facility, they need to know that upfront so they can accurately quote and develop a timeline for your installation.

However, sometimes the cost of shutting down production is just too high. Understanding how production downtime can affect your bottom line will help you determine if it's better to have the installers work while your other equipment is in operation, or if you can schedule an installation to occur during off-hours—including during the evenings, on weekends, or even on holidays.

However, you should know that non-standard installations typically come at a higher rate than the standard hourly rate because the installers are working non-traditional hours and may have to run continual shifts to complete the installation during the desired time frame.

Not Being Ready When the Installers Show Up

Some overhead crane manufacturers require 30 days change notice to the agreed-upon install date, and other manufacturers may only require 7 days prior to make any changes to the scheduled install date. Make sure that you have a clear understanding of the "point of no return" for your overhead crane installation.

Once the process gets rolling, there's really no way to stop it as the crane and installation equipment is probably en route to your facility. Also, consider all of the different people that will be involved in the installation process and all of the

effort involved to coordinate their schedules:

- Truck drivers
- Mechanical installers and mechanical assemblers
- Riggers, who will do the majority of the unloading and setting up of equipment
- Crane operators
- Electrical specialists
- Crane technicians

Your agreement with the installer will specify that if any type of delay occurs within that 7-30 day cancellation window, you will incur significant charges related to paying employee wages, and rental and storage of equipment.

It is so important that you keep in constant communication with the crane installer and notify them immediately of any issues or concerns that could delay their installation time frame.

Overhead Crane Service, Maintenance, and Repairs

Keeping your overhead crane in service and in peak operating condition, should be a top priority for safety, maintenance, or operations personnel at any job site or industrial facility. Frequent and periodic inspections help to keep crane and hoist equipment operating at top efficiency, help keep the user and other personnel safe, help reduce costly down time, and extend the life of the equipment.

Routine Maintenance

Unfortunately, your overhead crane is going to break down at some point. Just like any other appliance, vehicle, or piece of machinery, an overhead crane requires regular service and maintenance to keep it performing to the best of its

abilities. Depending on how often the crane is in use, the operating environment, and how frequently it gets inspected, all contribute to the service life of an overhead crane system.

Just like you need to replace brake pads on your vehicle, or the filters in your furnace, overhead cranes have parts that need to be adjusted, maintained, and replaced at regular intervals. Investing in a reliable overhead crane and hoist service provider, or an in-house maintenance team, can help keep your crane up and running, but you should always budget for unexpected repairs and possible production downtime.

Plant managers and maintenance personnel need to establish a preventative maintenance program for their overhead crane based on the recommendations of the crane manufacturer. Each manufacturer has their own recommended protocol for regular and scheduled maintenance of their equipment, so it's important to consult with them directly regarding crane operation, application, and maintenance protocols.

Replacement Parts and Repairs

Also, keep in mind that the longer you own your crane system, the more difficult it may become to source replacement parts, or find parts without long lead times. If your overhead crane is critical to your facility's production and operations, then you or your crane service provider should have an inventory of critical replacement parts, or a backup plan to move that same material through your facility without the use of a crane.

In some mill applications, a broken-down crane can cost tens of thousands of dollars an hour! Know what the cost of production downtime means to your bottom line and plan accordingly.

Overhead Crane Operator Training and Inspection Protocols

Providing training for your overhead crane operators and riggers should not be considered an expense, but you should look at it as an investment to help keep your workers safe and extend the life of your equipment. The same can be said for developing a frequent inspection program for your crane.

Crane Operator Training

According to ASME B30.2 standards, it is the responsibility of management (owners/users) to provide training to those who will be operating the crane, as well as those who perform maintenance or repairs on a crane.

Operator Training – Crane operator training shall be provided to promote proficient performance of a crane operator in accordance with best practices.

Maintenance Training – Maintenance training shall be provided to promote proficient adjustments, repairs, and replacements to an overhead crane that will allow the crane to perform. Training shall also be provided to persons who maintain the mechanical, structural, and electrical components of an overhead crane system.

They'll review your equipment, review inspection and training records and watch your personnel rig a load and operate the crane to make sure they're using the equipment safely and following best practices laid out by ASME, OSHA, and CMAA standards.

Overhead Crane Inspection

Developing an overhead crane inspection protocol and making sure your operators report anything out of the ordinary, will help to identify and address smaller problems before they become much larger and possibly catastrophic problems. Not only is it best practice to regularly inspect your overhead lifting equipment, but it's also required by OSHA, ASME, and CMAA:

Initial Inspection – Any new, reinstalled, altered, repaired, and modified crane shall be inspected prior to initial use.

- A new crane's initial inspection shall be performed by a qualified OEM representative in accordance with OEM recommendations.
- An altered, repaired, modified or reinstalled crane's initial inspection shall be performed by a qualified person to assure that the modified component(s) have been properly installed and functionally tested.

Frequent Inspection – A frequent inspection is a visual and operational inspection performed monthly or as often as daily. Inspection frequency is based on service, environmental, and application factors, as designated by a qualified person.

Below are guidelines for frequency of inspection based on ASME and CMAA overhead crane service classifications:

Periodic Inspection – A periodic inspection is a detailed visual and operational inspection where individual components are examined to determine their condition. Inspection frequency can be quarterly to annually and is based on service, environmental, and application factors, as designated by a qualified person.

Below are guidelines for frequency of inspection based on ASME and CMAA overhead crane service classifications:

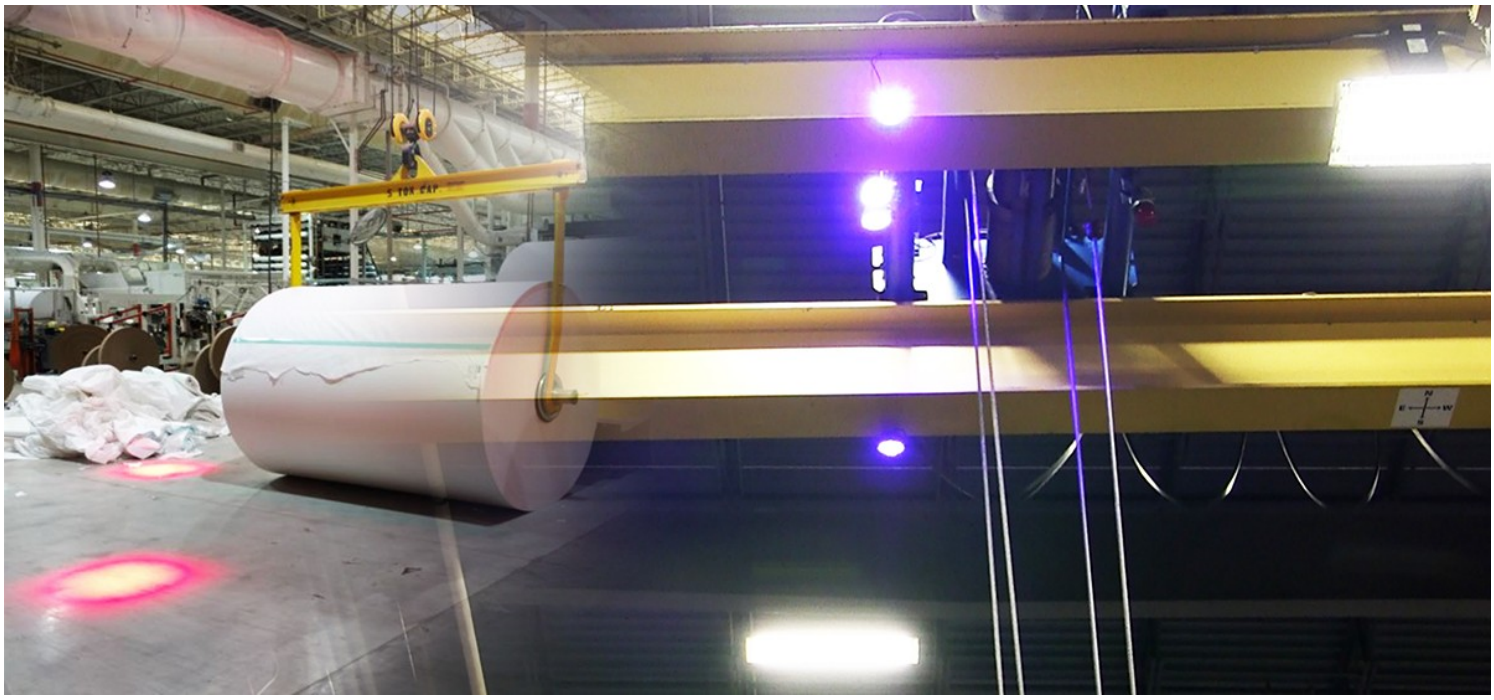
You can also bring a third-party on-site to assess your lifting and rigging practices. Their trained and certified personnel will come on-site and observe your lifting practices, review your documentation and training records, and look at the equipment that you use to make lifts.

From there, the results of this assessment can be used to develop programs that solve safety and compliance issues regarding overhead cranes and rigging equipment.

Improved Safety and Production Efficiencies

So, what is the final hidden cost of owning an overhead crane system?

Once that initial overhead crane is installed and up and running, you may find that your employees want you to buy another one!



Instead of using a tow motor or manual labor, your crane helps simplify the process of moving heavy materials through your facility in an efficient and safer manner. In fact, those are the two biggest advantages of using an overhead crane.

Overhead cranes are more efficient than using a group of workers or tow motors to lift and move material and can work up to 2-3 times faster. Think about how a manufacturer, mill, or warehouse can streamline their processes and procedures by introducing an overhead crane to automate the lifting, maneuvering, and unloading of materials at their facility.

Another advantage of installing an overhead crane is that cranes can be used to lift and move materials in extreme environments and can handle corrosive or dangerous materials like hot metals, chemicals, and heavy loads. A workstation or jib crane can be put in place to help workers move heavy objects in a controlled manner and help cut down on repetitive motion injuries and muscle strains.

In the industry, they often say that the easiest crane to sell is the 2nd one to a business owner who's already bought his first. Once you understand how valuable they can be to your production and operations, it's easy to dream up an endless possibility of future uses for all different types of cranes.

The other major benefits to using an overhead crane system include:

- Reduction in workplace accidents
- Reduction of product or material damage
- Improved workflow
- Lowered operating costs
- Green solution that reduces environmental impact

In order to get the most bang for your buck and understand the future return on your investment, consider the following:

- Understand and discuss with the manufacturer why you're spending the money you're spending on their proposed crane design and what you'll get in return for that investment
- Make sure you fully understand the quote and review it with the manufacturer. Are freight, installation, and miscellaneous fees like permits, surveys, or inspection included?
- Make sure the installers visit the installation site prior to installation to understand your building layout and identify anything that may impact the installation time frame
- Understand how critical this equipment will be to your production process. Is there redundancy built in to move material should the crane go down? How much will production downtime cost you if your crane goes down for service or repair?
- Invest in an in-house training and inspection program. Making sure that your operators know how to use the equipment properly and that the equipment is regularly inspected and serviced will help prolong its service life and reduce future downtime.

Keeping your overhead crane in service and in peak operating condition, should be a top priority for safety, maintenance, or operations personnel at any job site or industrial facility. Frequent and periodic inspections help to keep crane and hoist equipment operating at top efficiency, help keep the user and other personnel safe, help reduce costly down time, and extend the life of the equipment.

OSHA (Occupational Safety and Health Administration), ASME (The American Society of Mechanical Engineers) and CMAA (Crane Manufacturers Association of America) are the three governing bodies that have developed documented standards and best practices for inspection and preventative maintenance of overhead cranes.

If you are a Plant Manager or Operations Manager in charge of inspecting and maintaining your

company's overhead crane equipment, you will want to familiarize yourself with the following standards:

OSHA 1910.179	Overhead and Gantry Cranes
ASME B30.2	Overhead and Gantry Cranes (Top Running Bridge, Single or Multiple Girder, Top Running Trolley Hoist)
ASME B30.10	Hooks
ASME B30.16	Overhead Hoists (Underhung)
ASME B30.17	Cranes and Monorails (With Underhung Trolley or Bridge)
ASME B30.20	Below-the-Hook Lifting Devices
CMAA #70	Specifications for Top Running Bridge & Gantry Type Multiple Girder Electric Overhead Traveling Cranes
CMAA #74	Specifications for Top Running & Under Running Single Girder Electric Traveling Cranes Utilizing Under Running Trolley Hoist
CMAA #78	Standards and Guidelines for Professional Services Performed on Overhead and Traveling Cranes and Associated Hoisting Equipment

Overhead Crane Inspection Frequencies

Many maintenance supervisors and plant managers mistakenly think that they are in compliance with inspection standards if they have their crane equipment inspected once a year. This misconception can be costly and lead to fines and downtime if OSHA were to come on-site and issue citations after performing an audit. OSHA's overhead crane inspection standards, as well as the ASME and CMAA standards, require three different types of inspections throughout the lifetime of the crane equipment:

Initial Inspection

Any new, reinstalled, altered, repaired, and modified crane shall be inspected prior to initial use.

- A new crane's initial inspection shall be performed by a qualified OEM representative in accordance with OEM recommendations
- An altered, repaired, modified or reinstalled crane's initial inspection shall be performed by a qualified person to assure that the modified component(s) have been properly installed and functionally tested

Frequent Inspection

A frequent inspection is a visual and operational inspection performed monthly or as often as daily. Inspection frequency is based on service, environmental, and application factors, as designated by a qualified person.

Below are guidelines for frequency of inspection based on ASME and CMAA overhead crane service classifications:

CMAA Service Class	ASME B30.2 Service Class	Frequency of Inspection
A B C	Normal	Semi-Monthly to Monthly
D	Heavy	Weekly to Monthly
E F	Severe	Daily to Weekly

Periodic Inspection

A periodic inspection is a detailed visual and operational inspection where individual components are examined to determine their condition. Inspection frequency can be quarterly to annually and is based on service, environmental, and application factors, as designated by a qualified person.

Below are guidelines for frequency of inspection based on ASME and CMAA overhead crane service classifications:

CMAA Service Class	ASME B30.2 Service Class	Frequency of Inspection
A B C	Normal	Annually
D	Heavy	Semi-Annually to Annually
E F	Severe	Quarterly

Manufacturers' Recommendations

In addition to the types of inspections listed above, any inspection provisions found in the manuals supplied by the manufacturer(s) of the crane and the crane components shall also be followed.

Inspection Items for Overhead Cranes in Regular Service

The inspection procedure for cranes in regular service (operating at least one time per month) is divided into two general classifications based upon the intervals at which inspection occurs. The intervals are dependent upon the nature of the critical components of the crane and the degree of their exposure to wear, deterioration, or malfunction. The two general classifications we'll be focusing on are the criteria for Frequent and Periodic inspections.

Frequent Inspection Items

Per CMAA Specification #78, when performing a frequent inspection, a qualified person shall include, but not limit themselves to, inspection of the following items:

- Check that the crane or hoist is not tagged with an out-of-service sign
- Check that all motions agree with control device markings
- Check that all braking motions do not have excessive drift and that stopping distance is normal
- *Check hook for damage, cracks, nicks, gouges, deformation of the throat opening, wear on saddle or load bearing point, and twist
- Check that the hook latch, if provided, is not missing and operates properly
- *Check wire rope for broken wires, broken strands, kinks, any deformation or damage to the rope structure, or loss of lubricant
- *Check load chain, including end connections for excessive wear, twist, distorted links or stretch, beyond the manufacturer's recommendations
- Check that the wire rope or load chain is properly reeved and that rope or load chain parts are not twisted. Make sure wire rope is properly seated in drum grooves

- Check that the hoist upper/lower limit devices stop lifting or lowering motion of the hoist load block before striking any part of the hoist, crane, or floor
- Check bridge and trolley travel limits for proper function
- Check for any sign of oil leakage on the crane and on the floor beneath the crane
- Check for any unusual sounds from the crane or hoist mechanism while operating crane and hoist
- Check that warning and other safety labels are present and legible. Check that audible and visual warning devices are operational

Items marked with (*) shall be documented with a certification record which includes the date of inspection, signature of the person who performed the inspection, and the serial number or identifier of the hook, chain, or wire rope that was inspected.

Periodic Inspection Items

Per CMAA Specification #78, if any of the following deficiencies are observed, they shall be carefully examined and determined whether they constitute a safety hazard:

- Check that structural members are not deformed, cracked, or corroded. Foot walks are free from debris, grease, etc.
- Check that the operating cab has the proper fire extinguisher in place.
- Check for proper capacity labels, and that they are legible from the floor. Are warning signs in place and legible?
- Check connection points for loose/broken bolts or rivets.
- Check sheaves and drums for worn, cracked, bent, or broken parts. Check for loose or missing hardware.
- Check brake system parts, linings, pawls, and ratchets for excessive wear and proper adjustment. Check to make sure electric control brake functions properly.
- Check indicators, gauges, or other devices for calibration and load, wind, and other indicators over their range.
- Check self-contained electric, hydraulic, or gasoline powered generating units for improper performance or noncompliance with applicable safety requirements.
- Check transmission for excess wear of chain drive sprockets and excessive chain stretch. Check gearbox for gear teeth wear and proper lubrication.
- Check all electrical apparatus for signs of pitting or any deterioration of controller contactors, limit switches, push button stations, motor slip rings, brushes and resistors. Check for loose or damaged wiring, or evidence of overheating.
- Check all bumpers and end stops for damage. Check for proper restraints and obvious under sizing or improper energy absorption capabilities.
- Check trolley and runway rails and fastening devices for looseness, gaps, misalignment, and wear.
- Check runway structure for proper anchors, loose bolted connections, corrosion, and cracked or deformed members.
- Check the conductor system alignment, fastening, splices, power feeds, and conductor shoes for wear.
- Check below-the-hook devices for cracks or structural damage. Check mechanical components for wear, alignment, and missing or loose hardware. Check all motors, pendant or remote radio controls, and wiring. Check that all guards are in place and secure.

NOTE: A qualified person shall determine whether conditions found during the inspection constitute a hazard and whether a more detailed inspection is required. Any unsafe conditions uncovered during inspection shall be corrected before operation of the crane is resumed. Adjustments and repairs shall be done only by designated personnel.

Inspection Of Cranes Not In Regular Use

If you have an overhead crane that has been idle for a length of time due to shutdown or storage, or you have a standby

crane with infrequent or irregular usage, the crane needs to be inspected before it is put back into service. OSHA has determined that cranes that have sat idle for the following lengths of time shall be inspected prior to use:

- A crane that has been idle for at least 1 month, but less than 6 months, shall be inspected conforming to the **Frequent Inspection** requirements.
- A crane that has been idle for 6 months or more, shall be given a complete inspection conforming to the **Frequent Inspection and Periodic Inspection** requirements.
- A standby crane—meaning a crane which is not in regular service but which is used occasionally or intermittently—shall be inspected at least semi-annually in accordance with the criteria required for **Frequent Inspection**, as well as the criteria for **Idle Wire Rope Inspection** (see below).

Idle Wire Rope Inspection

All wire rope which has been idle for a period of 1 month or more due to shutdown or storage of a crane on which it is installed, shall be given a thorough inspection before it is used. A certification record including the date of the inspection, the signature of the person who performed the inspection, and an identifier for the wire ropes which were inspected, shall be kept on file.

When inspecting wire rope that has sat idle for one month or more, look for the following signs of damage or deterioration:

- Reduction of rope diameter below nominal diameter—this could be a result of loss of core support, internal or external corrosion, or wear of outside wires
- A number of broken outside wires and the degree of distribution or concentration of such broken wires
- Worn outside wires
- Corroded or broken wires at end connections
- Severe kinking, crushing, cutting, or unstranding

After the wire rope has been inspected, you will determine if any observed deterioration, defects, or damages to the wire rope will result in a safety hazard with continued use. If the wire rope is deemed a safety hazard, it needs to be removed from service, quarantined, and be replaced.

NOTE: A qualified person shall determine whether conditions found during the inspection constitute a hazard and whether a more detailed inspection is required. Any unsafe conditions uncovered during inspection shall be corrected before operation of the crane is resumed. Adjustments and repairs shall be done only by designated personnel.

Performing Maintenance on an Overhead Crane

Plant managers and maintenance personnel need to establish a preventative maintenance program for their overhead crane based on the recommendations of the crane manufacturer. Each manufacturer has their own recommended protocol for regular and scheduled maintenance of their equipment, so it is important to consult with them directly regarding any questions or issues regarding crane operation, application, and maintenance protocols.

OSHA 1910.179 states that before adjustments and repairs are started on a crane, the following precautions shall occur:

- The crane that is being repaired shall be run to a location where it will cause the least interference with other cranes and operations in the area
- All controllers shall be at the OFF position
- Warning or “Out of Order” signage shall be placed on the crane, and also on the floor beneath the crane, or on the hook where visible from the floor
- 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
- After adjustments and repairs have been made, the crane shall not be operated until all guards have been reinstalled, safety devices have been reactivated, and maintenance equipment has been removed

Training for Crane Operators and Maintenance Technicians

According to ASME B30.2 standards, it is the responsibility of management (owners/users) to provide training to those who will be operating the crane, as well as those who perform maintenance or repairs on a crane.

Operator Training — Crane operator training shall be provided to promote proficient performance of a crane operator in accordance with best practices.

Maintenance Training — Maintenance training shall be provided to promote proficient adjustments, repairs, and replacements to an overhead crane that will allow the crane to perform. Training shall also be provided to persons who maintain the mechanical, structural, and electrical components of an overhead crane system.

A certificate or formal record of training will be issued to any person who has been trained and passed the examination requirement.

Following the documented OSHA standards and best practices for overhead crane inspection and preventative maintenance will help keep crane and hoist equipment operating at top efficiency, keep your employees safe, reduce costly down time, and extend the life of the equipment.