

Eight key attributes
of an effective
crane preventive
maintenance program



Don't let your cranes become the center of attention

Minimize unplanned downtime with a preventive maintenance program

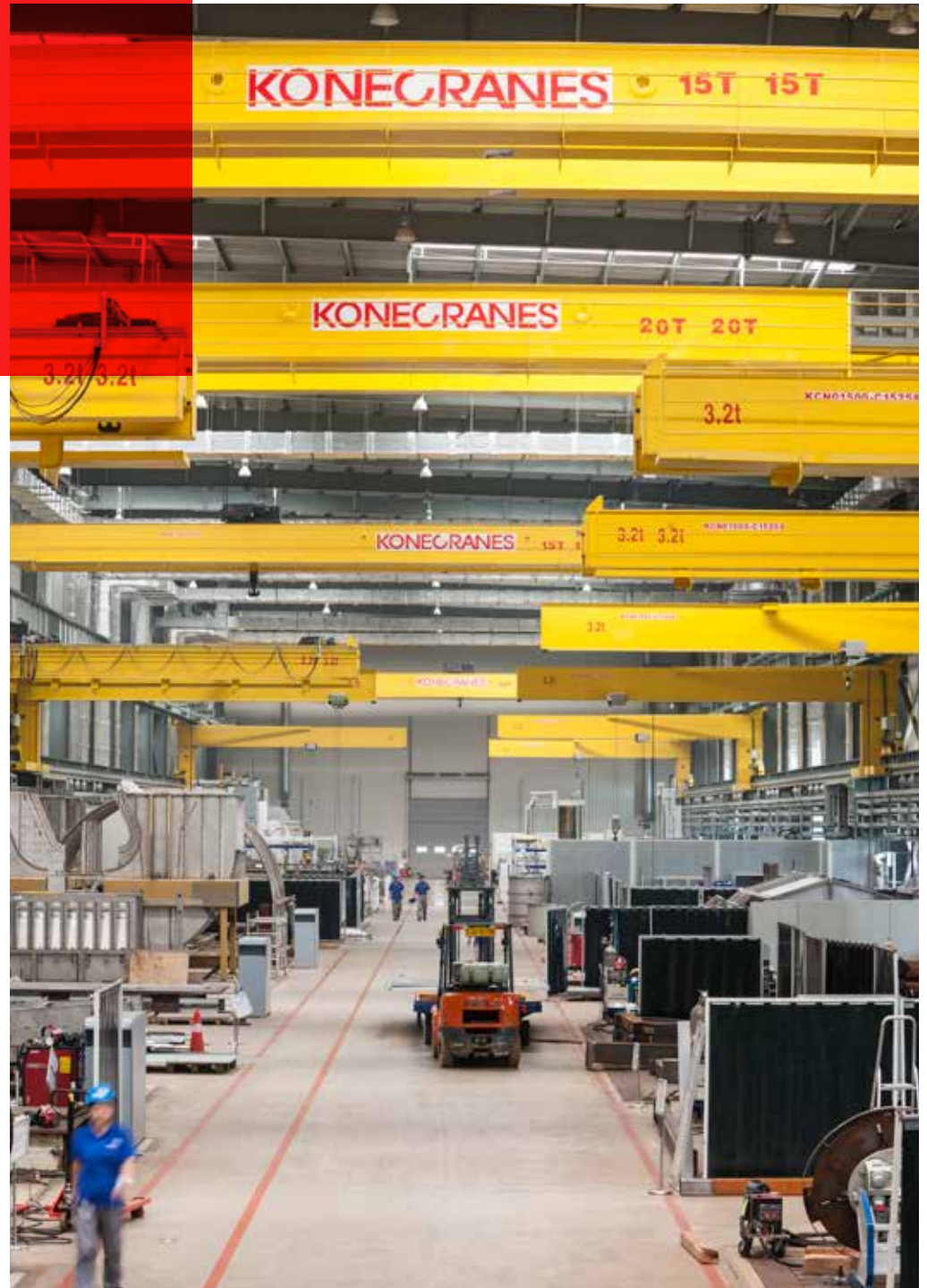
Cranes and hoists are often critical components of industrial manufacturing facilities; but generally, they are not always foremost in mind. When your cranes perform at their best, doing their jobs as designed, no one complains. Few people would have reason to look up and notice them. When performing reliably, your cranes are somewhat invisible. They simply wait off stage, playing out their roles when called up and then returning to the wings until their next cue. They are supporting players, making production the star of the show.

However, the show doesn't always play out as rehearsed. If you are a maintenance manager, it is a problem when your show goes off script, when your cranes steal the spotlight and upstage production.

Therein lies a challenge for many industrial manufacturing facilities: what is the right amount of attention at the right time so that your cranes and hoists support production by performing when called upon without fuss?

An effective preventive maintenance program can help address potential maintenance issues before they spoil production, compromise employee safety and negatively impact revenue. While most companies do have some sort of preventive maintenance program, many of these programs are not as robust as they could be. Even with good maintenance programs, there is always room for improvement.

This white paper takes a look at the key components of an effective preventive maintenance program that can help improve the safety, productivity and reliability levels of overhead cranes and hoists in a typical industrial manufacturing environment.





Benefits of an effective preventive maintenance program

At a most basic level, an effective preventive maintenance program consists of periodic inspections, routine maintenance and repairs. The objective is three-fold: to help comply with regulations, to follow manufacturer's recommendations for maintenance and to reduce the likelihood of failures that result in unplanned downtime. Preventive maintenance, when done properly, is an investment, not an expense.

When it comes to cranes, there are a number of benefits to having an effective preventive maintenance program:

- The right preventive maintenance program can have a significant impact on the performance and reliability levels of your cranes.
- Regularly scheduled inspections help identify and address safety issues before they threaten employee safety and affect company revenue.
- A good preventive maintenance program can help minimize the frequency and cost of unplanned downtime.
- Planned and scheduled maintenance work can help minimize excessive labor and parts replacement.
- A maintenance program can help assess whether your cranes are being used properly or as intended, and identify opportunities for user/operator training.
- Preventive maintenance conducted at regularly scheduled intervals can often be the most effective way to maintain and potentially extend the lifespan of certain cranes.
- Preventive maintenance supports compliance with applicable laws and regulations.



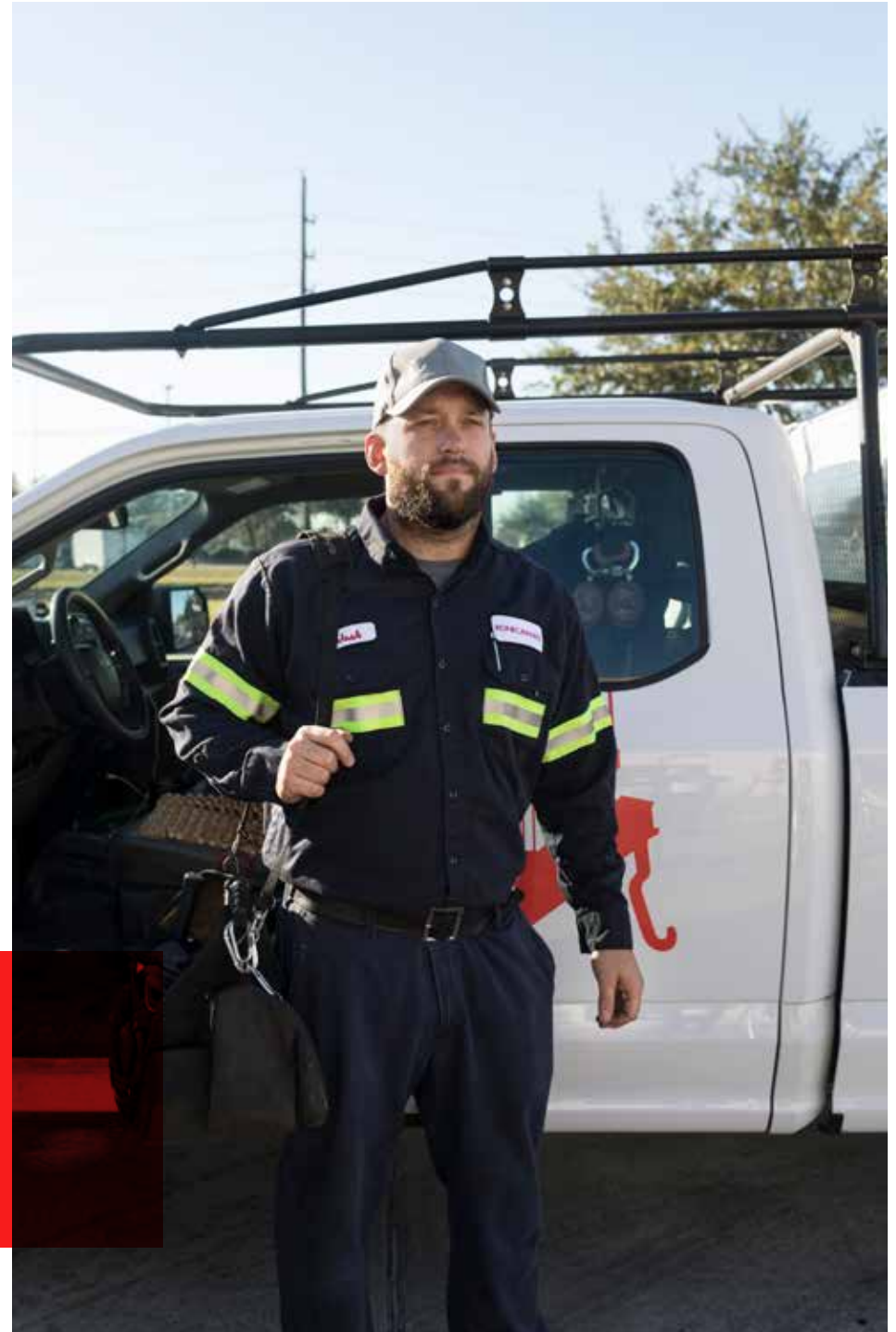
One size does not fit all

It is important to avoid a one-size-fits-all approach to maintenance. While most crane manufacturers provide scheduled maintenance guidelines or recommendations to help equipment perform as expected during normal operation, the most effective preventive maintenance programs are those that are customized or tailored to the environment in which the cranes operate. At a minimum, crane usage, the environment, duty classification, and local regulations and compliance should be taken into account along with manufacturer recommendations.

Below are attributes of an effective crane preventive maintenance program that will help you take full advantage of a properly designed program.

- Trained and, where applicable, certified inspectors and technicians
- Preventive maintenance inspections
- Routine maintenance
- Risk assessment
- Remote monitoring
- Review and consultation processes
- Maintenance management software
- Advanced services and deeper competencies

The most effective preventive maintenance programs are those that are customized or tailored to the environment in which the cranes operate.





Trained and certified inspectors and technicians

Good companies attract and retain good people. They have high standards and provide ongoing training for the development of their employees and the enrichment of customer experience. Maintenance providers can be assessed on this most basic criteria.

Additionally, service personnel's levels of knowledge, experience and in-field capability must suit the job at hand. The benefit of

having bench strength, in sheer numbers of technicians, as well as diverse in-house experience with industrial processes may not be a differentiator on a typical day. But what is a typical day? It's the atypical day and challenging circumstances that require attention and expertise. Without properly trained and certified inspectors and technicians, even the best-designed preventive maintenance program will fall short of expectations.

Preventive maintenance inspections

At the very least, preventive maintenance inspections should follow manufacturer recommendations in order to reduce the likelihood of failures before they occur or develop into major defects. Preventive maintenance should also be structured to satisfy and address any local laws and regulatory compliance requirements, such as a requirement for periodic inspections.

For those who want something more than a standard preventive maintenance inspection program, there are opportunities to expand the scope of the inspections. Some maintenance providers and manufacturers

offer consultation services that supplement standard inspection programs and target the components that require more in-depth examination than can be provided within the scope of a standard preventive maintenance inspection.

These supplemental services are often, but not always, supported by advanced technologies and can include inspections on gear cases, couplings, hooks and shanks, wire ropes, crane geometry, runway and overall crane reliability. In some cases, these inspections may require disassembly and pre-arranged downtime.



In the field

During a standard preventive maintenance inspection conducted on a crane being used in a facility manufacturing automobile interior mechanisms, a Konecranes technician learned that the previous company that serviced the crane had not inspected the gear case for a number of years. The technician recommended a gear case inspection.

Upon opening the gear case, the technician found a thick sludge of oil and glittering specks of metal, which indicated that pieces of the gear teeth were disintegrating into the oil.

With this level of damage and neglect, the crane could have been moments away from catastrophic failure. If the gears had meshed improperly, the crane could have dropped a steel die. The appropriate repairs were made. Most importantly, the company now replaces the oil and performs open gear case inspections regularly.

In the field

Norfolk Southern Corporation is one of the United States' premier transportation companies. Its Norfolk Southern Railway subsidiary operates approximately 20,000 route miles in 22 states throughout the U.S., serves every major container port in the eastern U.S. and provides efficient connections to other rail carriers.

Over a three-year period, the company worked with Konecranes to increase safety and reduce maintenance costs at one of its major railroad yards. During that time, the company was able to reduce equipment deficiencies by 62 percent. Total maintenance costs of the equipment were reduced by 50 percent.

A key part of this effort was a routine maintenance program designed to identify and replace components with a pattern of wear on a regularly scheduled basis long before they become a safety hazard. These repairs can be scheduled around production, increasing the efficiency of the facility.



Routine maintenance

Routine maintenance for overhead cranes and hoists should include simple, small-scale maintenance tasks, such as adjusting and lubricating, with the intent of satisfying the manufacturer's maintenance instructions.

This type of regularly scheduled maintenance is often less expensive than the large-scale repairs that would be needed if an existing issue went unchecked. Routine maintenance helps reduce component wear and unplanned stoppages, maintains equipment performance and availability, and provides visibility of equipment condition.

One of the most important factors of routine maintenance is its schedule or interval. In addition to manufacturer guidelines, any schedule should be based on a time or usage trigger. For instance, servicing an air conditioner every year before summer is an example of a time-based schedule. Having a car serviced every 10,000 miles is a good example of a usage-based schedule. Similarly, a hoist or crane should be serviced after a certain number of cycles.

Risk assessment

Risk assessment is a systematic approach to documenting component conditions, assessing and prioritizing risks, and providing recommended actions to address exceptions and to improve safety and productivity. During an assessment, each component should be inspected to determine its condition. Detected failures, deficiencies and violations should be documented and assigned a risk type: safety, production or undetermined.

Once completed, all detected exceptions, related risks and recommended actions should be accurately stated, prioritized and reviewed on a regular basis to assist with fast and reliable decisions regarding the maintenance of equipment. When combined with properly timed corrective maintenance, consultation and modernization services, risk assessment contributes to the maintaining of equipment safety, performance and reliability.



In the field

A North American chemical manufacturer had four identical cell room cranes in its Texas facility that required significant maintenance due to constant exposure to chemicals and extreme heat.

The company needed to find a way to make the cranes last longer in adverse conditions – especially since the amount of time personnel can spend working on the cranes is limited.

Konecranes technicians conducted a risk assessment to identify the necessary adjustments that were needed. As a result, a number of improvements were made to enhance the performance of the cranes and make them less prone to corrosion, including sealing the cranes with fiberglass, enclosing the hoists, trolleys, bridges and mainline controls, installing high-heat and chemical-resistant cables, and adding soft starts in the panels, which reduces impact by starting each lift at a lower torque.



Remote monitoring

A remote monitoring service is one that gathers and delivers condition, usage and operating data from lifting equipment.

The data typically covers condition and expected service life of critical components, running time, lifted loads, motor starts, work cycles and emergency stops.

Alerts for brake service life, hoist overloads, emergency stops and over-temperature occurrences can be quickly transmitted by email or text message allowing for prompt response.

Remote monitoring provides asset usage and operating information that is used to assess crane condition and safety. Maintenance actions can be planned based on estimated component condition such as estimated remaining life.

Monitored equipment data should be visible through an easily accessible online portal that provides companies with operating information in just a few keystrokes or clicks of a mouse.



In the field

A U.S. automotive parts manufacturer located in the eastern part of the country tasked Konecranes with putting together a business review for overall crane performance at its facility.

The review found that some of the facility's older hoists were in unsafe or non-productive operating condition. These 30-year old cranes were experiencing frequent major breakdowns and deterioration because of age. The review showed that repairs and emergency service for the two cranes in question were siphoning up to 75 percent of the company's overall crane budget.

As part of the review process, Konecranes recommended replacing both old-style hoists with modern ones and upgrading contactor controls to variable frequency drives. The customer agreed, and since the two new hoists were installed, crane downtime at this facility has plummeted by 85 percent.



Review and consultation process

Another key attribute of an effective preventive maintenance program is a thorough review and consultation process. The service inspector or technician, or a sales professional will share findings and provide recommendations through a systematic process to achieve high quality and consistency.

There are four types of customer consultations that will be delivered throughout the service process:

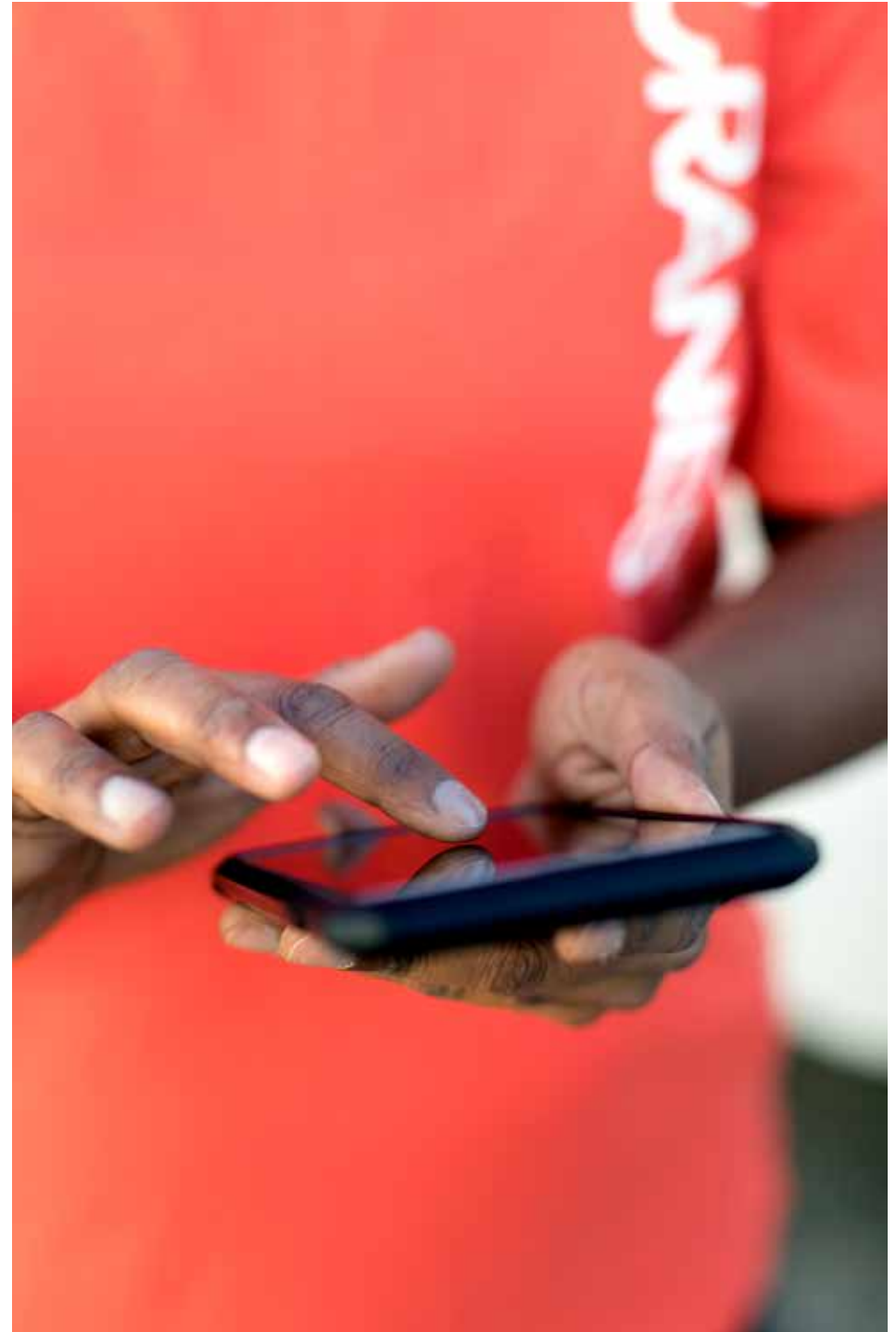
- A safety review is carried out whenever a safety-related risk is detected. It is performed before the inspector or technician leaves the site or returns the equipment to operation.
- During a visit review the inspector or technician will share insights of their findings, review identified risks and improvement opportunities and obtain decisions on recommended actions.
- After a service request is complete, the branch will follow up with a service review to go through open risks/recommendations and quotations and to answer any questions or concerns and document next steps.
- Once a year or as needed, a business review is performed at management level. This is an in-depth review of the service relationship and looks at progress, feedback and documented value.

Maintenance management software

A good quality maintenance management software supported by technology-equipped technicians is an important part of an effective preventive maintenance program. When properly installed and maintained, a good systems software package can enable dynamic sharing of service information, including equipment and parts details, reports, service history and inspection results.

An effective maintenance and service software package can help a provider plan for consultations and service calls in advance, helping to minimize—and sometimes eliminate—crane downtime. Using these integrated systems, a technician can typically review maintenance history and inspection reports, manuals and crane usage history, as well as input inspection data, submit quotes, order parts and schedule service calls remotely. This capability can increase efficiency in the field and can help expedite the quoting, scheduling and parts ordering processes.

The right software system can help maintenance managers gather and parse important service data, even with numerous clients in hard-to-access locations. Managers can easily access these reports, along with maintenance equipment information, via a web portal often equipped with multimedia capabilities, such as image galleries and video playback, useful in service documentation. After planned maintenance or an inspection has been completed, reports can be viewed online and downloaded on demand.





Advanced services and deeper competencies

The final attribute of an effective crane preventive maintenance program is advanced services paired with deeper competencies. In some ways, these two components are the most critical pieces of a program designed to improve the safety and productivity of operations.

A quick industry search will produce a long list of companies that provide crane preventive maintenance packages and programs. Most of these are the standard packages, containing the standard services. Sometimes this package may be all that's needed; however, it is important to avoid a one-size-fits-all approach to maintenance. One vital way to ensure you have a program that is customized or tailored to your specific needs and the environment in which the crane operates is to have service options that extend beyond the standard offering, such as outage support or runway or crane geometric surveys.

When you encounter an unexpected maintenance issue, it pays to have a technician who can think on their feet and is confident enough to troubleshoot and identify issues that don't necessarily follow the maintenance script. These are the technicians who have a deeper competency within their field. They are graduates of proven, competency-based training programs where progression is dependent on content mastery, so you know they are experts.

When you encounter an unexpected maintenance issue, it pays to have a technician who can think on their feet.

Keep production at center stage

All cranes and hoists have a finite service life. To help get the most out of the equipment, it is important to take care of the little things before they become big problems and focus attention away from the rest of the operations.

An effective preventive maintenance program is designed to improve equipment safety and productivity through the systematic application of inspections, routine maintenance, risk assessments and recommendations, remote monitoring capabilities and a good maintenance management software.

A cared-for crane is more likely to perform as required and live a long, happy life as a supporting actor without stealing the spotlight from production, the star of your show.



Konecranes is a world-leading group of Lifting Businesses™, serving a broad range of customers, including manufacturing and process industries, shipyards, ports and terminals. Konecranes provides productivity enhancing lifting solutions as well as services for lifting equipment of all makes. In 2017, Group sales totalled EUR 3,136 million. The Group has over 16,000 employees at 600 locations in 50 countries. Konecranes shares are listed on the Nasdaq Helsinki (symbol: KCR).



© 2019 Konecranes. All rights reserved. 'Konecranes', 'Lifting Businesses' and  are either registered trademarks or trademarks of Konecranes.

This publication is for general informational purposes only. Konecranes reserves the right at any time, without notice, to alter or discontinue the products and/or specifications referenced herein. This publication creates no warranty on the part of Konecranes, express or implied, including but not limited to any implied warranty or merchantability or fitness for a particular purpose.



Learn more

Contact Konecranes Service to plan
your preventive maintenance program.
[konecranes.com](https://www.konecranes.com)