

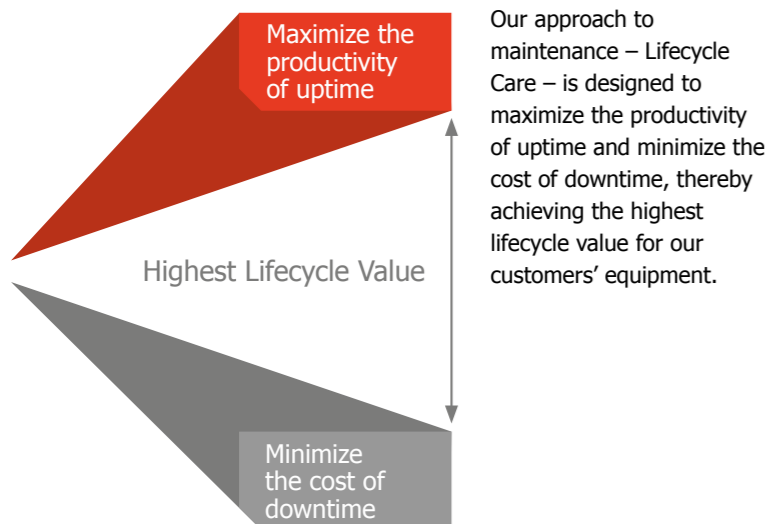
# CARE Preventive/ Predictive Maintenance Program





## Konecranes Service

We provide specialized maintenance services and spare parts for all types and makes of overhead industrial cranes and hoists. Our objective is to improve the safety and productivity of our customers' operations.



**600 000**  
Assets under service agreement

**7 500**  
Service employees

**4 200**  
Service technicians

**20 000**  
Remote connections

## Lifecycle Care

Lifecycle Care is our comprehensive and systematic approach to managing customer assets; connecting data, machines and people to deliver a digitally-enabled customer experience in real time.

Our crane experts apply a systematic Risk and Recommendation Method and a consultative, planning and review process to drive continuous improvement in safety and productivity.

### CONNECT

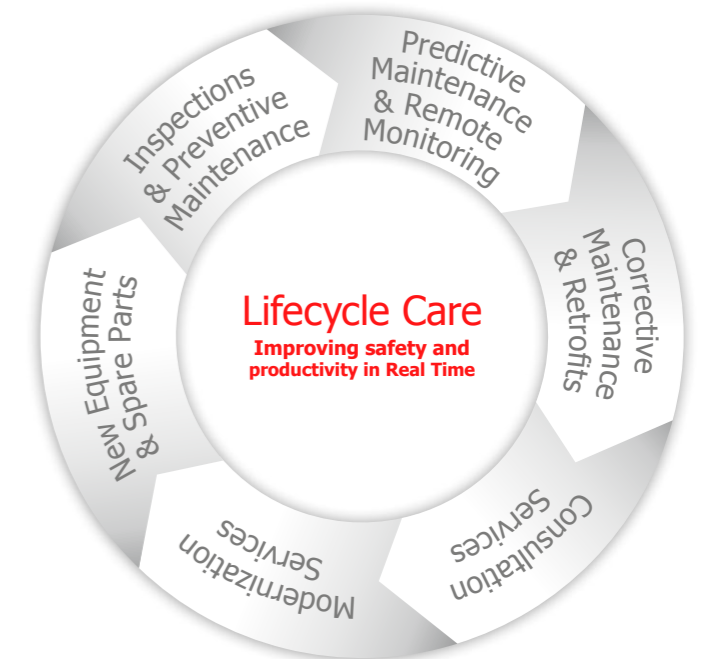
Inspectors and technicians input inspection and maintenance findings when on site. TRUCONNECT remote monitoring continuously gathers condition, usage and operating data and issues safety alerts.

### GET INSIGHTS

Comprehensive usage data, maintenance information, asset details and service history are available in near real time on our customer portal, yourKONECRANES.com. Actionable insights can be drawn by observing anomalies, patterns and trends for a single asset or entire fleet.

### OPTIMIZE

Sharing our broad knowledge and experience, we provide recommendations, and discuss how each action can optimize operations and maintenance.



# CARE Preventive/Predictive Maintenance Program

The foundation of Lifecycle Care is our CARE Preventive/Predictive Maintenance Program. This program has been designed to improve equipment safety and productivity through the systematic application of preventive maintenance inspections, compliance inspections where applicable, routine maintenance, and TRUCONNECT® Remote Monitoring.

## Service agreement tailored to your equipment and how you use it

We tailor the service agreement to your operations taking into account the equipment, its usage, operating environment, duty class, service history, manufacturer's recommendations and statutory requirements.

Inspections and preventive maintenance make up the core of the CARE program, providing a baseline for maintenance planning, tracking, reporting and consultation.

Incorporating predictive maintenance elements as part of a CARE Preventive Maintenance program can further optimize maintenance activities, reduce unplanned downtime and improve equipment safety, productivity and lifecycle value.

## Risk and Recommendation Method

Using this method, we assess and prioritize safety risks, production risks and identify undetermined conditions. We also look for improvement opportunities that are not associated with a particular fault. Recommendations are then provided to improve your safety and productivity via our consultative reviews.



Risks and recommendations for completed service activities can be viewed at any time on our customer portal yourKONECRANES.com

## Consultative approach

### ON-SITE

#### SAFETY REVIEW

Whenever a safety-related risk is detected, the inspector or technician will carry out this review with you before leaving the site or returning the equipment to operation.

#### VISIT REVIEW

At the completion of each service request, the inspector or technician will perform this review on site to share the insights of their inspection or maintenance findings, review the identified risks and improvement opportunities, and obtain decisions on recommended actions.

### WITHIN 2 BUSINESS DAYS

#### SERVICE REVIEW

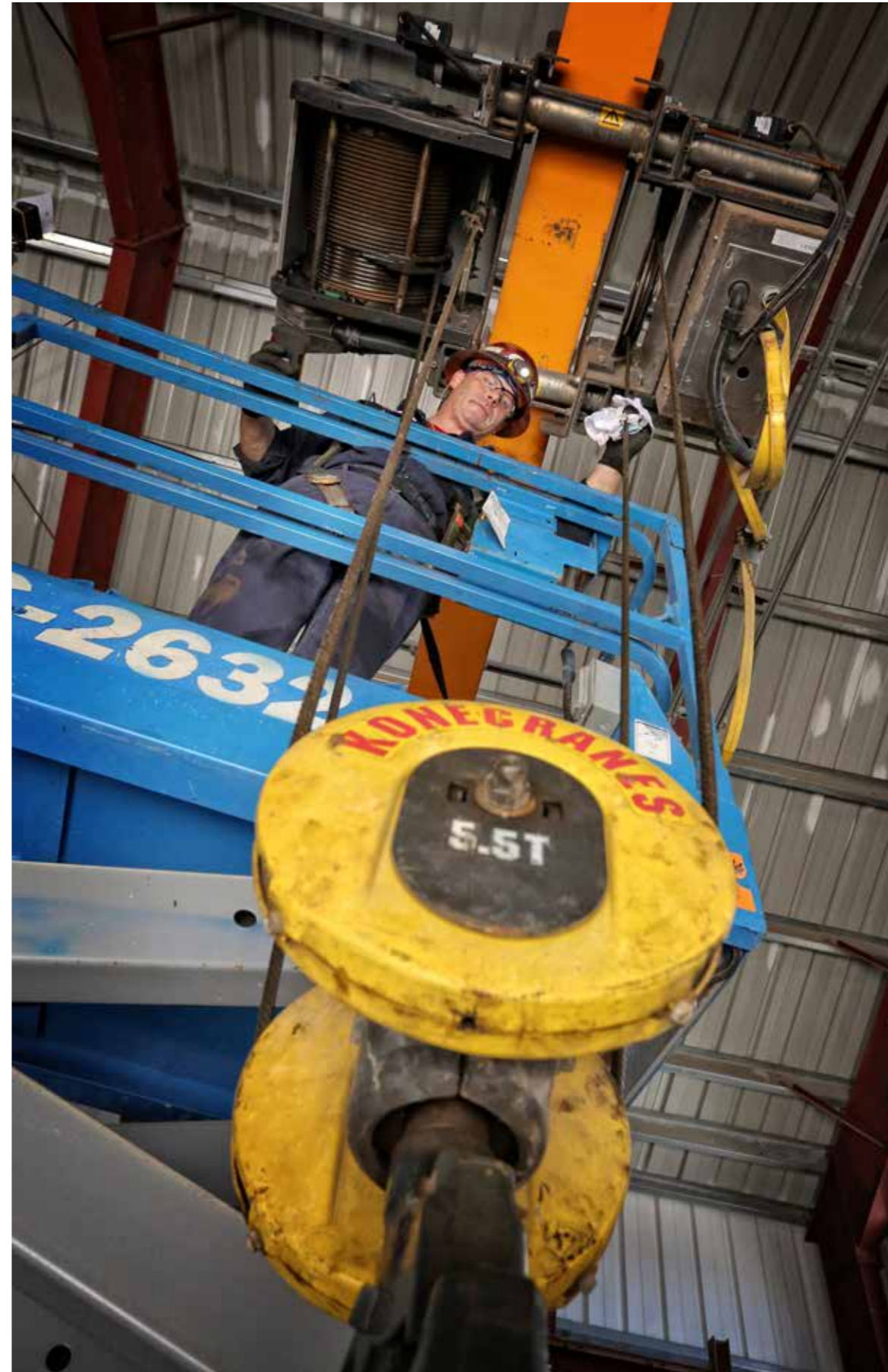
We will follow up with you online or by phone to go through open risk / recommendations and quotations, answer your questions or concerns, and document next steps.



### ONCE A YEAR OR AS NEEDED

#### BUSINESS REVIEW

This review is conducted at your management level and is an in-depth review of our service relationship – looking at progress, feedback and documented value. We'll discuss recommendations and plan jointly.



## Other programs in addition to CARE

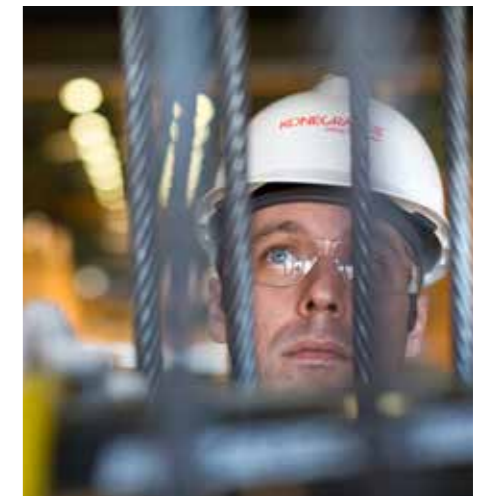
### JUST THE BASICS

#### CONTACT ON-DEMAND SERVICE

We can respond quickly when you CONTACT us for parts, breakdowns and other short-term needs.

#### CONDITION INSPECTION PROGRAM

If you are not ready to outsource your preventive maintenance, our CONDITION inspection program can help you comply with your local statutory inspection requirements and/or support your own in-house maintenance actions.



### BEYOND PREVENTIVE MAINTENANCE

#### COMMITMENT COMPREHENSIVE MAINTENANCE PROGRAM

For customers that recognize the benefits of broad-scope maintenance outsourcing, our COMMITMENT maintenance program can be tailored to your requirements.

#### COMPLETE COMPREHENSIVE MAINTENANCE & OPERATIONS PROGRAM

For customers that are looking to outsource their entire material handling process, including operations and maintenance, our COMPLETE maintenance & operations program may be the answer.



## yourKONECRANES customer portal

Our customer portal, yourKONECRANES.com, gives you quick and easy access to your crane maintenance information. Usage and operating data, maintenance information and asset details are linked, giving a transparent view of events and activities over any

selected time interval. Aggregated data can be viewed, analyzed and shared quickly, for a single asset or an entire fleet. Insights can be drawn by observing anomalies, patterns and trends, helping users make informed maintenance decisions.



**Anomalies** are abnormal events that can show up as faults and should be addressed promptly as they occur. A good example is an overload. Knowing precisely when an overload has occurred is the first step in identifying its cause and taking steps to prevent it from happening again.



**Patterns** are recurring events that might show up on a daily, weekly or monthly basis, or follow some other correlation. Excessive starts during certain work shifts may indicate the need for operator training.



The study of **trends** can help uncover targets for safety and productivity improvement. Data charts and graphs provide visual cues of things that are increasing or decreasing. Analyzing data behavior over time supports investment decisions and the development of predictive maintenance.

## Your crane data in one easy-to-use site



### Maintenance information

- Inspection and maintenance findings
- Overview of open safety and production risks, plus TRUCONNECT safety, production and condition alerts
- Asset lists that can be filtered with a variety of criteria
- Electronic reports suitable for sharing or printing
- Calendar of completed and upcoming service activities



### Service Agreement

- List of assets in your agreement
- Total number of assets serviced - including those not under agreement
- Intervals and frequency of service
- Service products included in your agreement
- Timing of service products for each asset in a monthly calendar view



### TRUCONNECT data

#### REMOTE MONITORING

- Safety-related occurrences, such as brake service life, over-temperatures, attempted overloads and emergency stops
- Pareto analysis of critical alerts and faults
- Operating statistics, such as load spectrum, monitoring of hoist jogging, overloads, emergency stops, work cycles and running hours
- Estimates of remaining Design Working Period (DWP) of selected components, such as the hoist, hoist brake, contactors and trolley

#### BRAKE MONITORING

- Brake air gap measurement, which is an indirect measurement of friction material wear
- Alerts of electrical faults and mechanical faults



### Service Review

- Summary of findings and actions for the completed service request
- List of undetermined conditions - items that we are unable to inspect
- Each of the findings and actions can be drilled into for more detail including comments and photos
- Service report can be downloaded or easily shared by email



### Business Review

- Service KPIs showing trends in work packages and assets serviced
- Number of findings and actions over the selected time period
- Trends in TRUCONNECT safety and production alerts
- Total spend, spend by asset and spend for individual service products



# Adding predictive maintenance elements

Predictive maintenance utilizes condition monitoring, advanced inspections, and data analytics to predict component or equipment failure. Predictive maintenance elements can be added to your CARE Program to help further improve safety and compliance, maximize productivity and achieve highest lifecycle value.

## Optimize your service program

Recommendations to repair or replace components are driven by a combination of preventive and predictive maintenance activities. Pre-authorized repairs may be agreed in advance, allowing Konecranes to proactively perform work, saving both time and money. These recommendations are shared throughout our customer consultation process and all this information is available in near real-time in our customer portal, yourKONECRANES.com.

## Addressing the critical components of each piece of lifting equipment

The critical components of each piece of equipment are individually addressed and specific recommendations are provided throughout our customer consultation process. Equipment and component-level remaining-life dashboards and graphs are displayed in yourKONECRANES.com; available data, remaining theoretical life estimates and methodology may vary by equipment make and model.

With the combined data from all the equipment Konecranes services around the globe, we steadily improve our understanding of equipment and component behavior and further develop our data analytics algorithms. Maintenance and usage data is continuously collected and analyzed on hundreds of thousands of pieces of lifting equipment of all types, makes and brands.

## REMOTE MONITORING AND PREDICTIVE MAINTENANCE

Remote monitoring is used to collect equipment condition and usage data which can be aggregated with your inspection and maintenance data enabling a comprehensive view and analysis of equipment condition, maintenance and operation. Analyzing and identifying anomalies, patterns and trends helps us make informed, component-specific predictions, and prioritize recommendations and actions.

## Services required to implement Predictive Maintenance

To incorporate predictive maintenance elements into your CARE program certain services, when applicable, must be added. It is the combination of these products, the use of analytics and our consultation process that makes predictive maintenance possible.

SERVICE PRODUCTS	DESCRIPTION
<b>TRUCONNECT Remote Monitoring</b>	Collects condition, usage and operating data from control systems and sensors on an asset and provides alerts of certain anomalies. The data is used in maintenance planning and in predicting possible component or equipment failure.
<b>TRUCONNECT Brake Monitoring</b>	Uses a condition monitoring device to collect the status of brake air gap, mechanical and electrical faults from the electromagnetic disc brakes. The service provides visibility into current brake condition, estimates remaining service life and indicates brake faults.
<b>Oil Analysis</b>	Assists in deciding the optimal oil change timing for hoisting, traveling and traversing gears. Can also provide useful information regarding the condition of internal gear components and trends in oil condition may reveal defects such as slowly accumulated fatigue on gear teeth.
<b>Gear Case Inspection and/or Advanced Gear Case Inspection</b>	A Gear Case Inspection is a visual inspection to assess the internal gear case components. In an Advanced Gear Case Inspection, the gear case is disassembled and the internal components are tested using non-destructive testing (NDT) techniques. This inspection can reveal faint or small deficiencies that cannot be seen with the unassisted eye.
<b>Coupling Inspection</b>	Designed to uncover issues that may lead to coupling failure.
<b>RopeQ Magnetic Rope Inspection</b>	Designed to assess the condition of a wire rope including internal wires, strands and core that are not readily visible.
<b>Hook / Hook Shank Inspection</b>	Designed to look for wear and cracks that could lead to failure in any of the internal components of the bottom block.
<b>Design Life Analysis</b>	Designed to calculate the remaining design life of crane structures and machineries based on usage history and the standards used in their design.



## Spare parts for all makes

When it comes to parts and service, it doesn't matter who made your crane. We offer genuine Konecranes spare parts as well as replacement parts for all other makes and models.

### GENUINE KONECRANES PARTS

Contact us for genuine Konecranes spare parts. We are also the OEM for replacement parts and service for dozens of brands that have come into the Konecranes family through strategic acquisition.

### PARTS FOR ANY BRAND

We are fluent in all brands, not just our own. Konecranes can usually source original equipment manufacturer parts.

### EQUIVALENT PARTS

As an alternative to OEM parts, Equivalent Parts are functionally similar replacements manufactured by Konecranes or sourced from suppliers other than the original manufacturer. They are competitively priced and backed by a Konecranes warranty.

### PERFORMANCE PARTS

Performance Parts are engineered for a more demanding environment than was intended for the original part. They offer improved durability on cranes in critical process applications.



## TRAIN YOUR PEOPLE FOR SAFETY AND COMPLIANCE

Crane operator training provides participants the working knowledge to assist in reducing operator errors which may lead to unnecessary downtime. Operator training can also provide additional knowledge to help avoid possible serious injury to personnel caused by improper crane operation.

## Supplement your maintenance program

We can help you enhance the safety and productivity of your operations with a variety of innovative technologies, consultation services and spare parts.

Konecranes uses leading technology and trained specialists to offer a variety of consultation services that take a deeper look at your crane and its components to help uncover critical issues and guide decision making.

### Keep your crane running smooth and straight

Cranes that are straight, square and aligned experience less repair costs and are more reliable. CraneQ and RailQ work together for a total look at crane and runway geometry.

A **RailQ™ Runway Survey** typically utilizes a remote-controlled robot trolley which runs along the rail collecting information. The data is presented in reports that help visualize problem areas.

A **CraneQ™ Crane Geometric Survey** provides accurate information detailing the alignment of wheels and the square of your crane.

### How much life is left in your crane?

The **Crane Reliability Study** looks at the current condition and remaining life of your crane. A team of trained and experienced Konecranes specialists gather detailed information about your crane, perform an inspection using specialized tools and methods and conduct an engineering analysis.

### Spare parts - online any time

Find spare parts and accessories online at [store.konecranes.com](https://store.konecranes.com)



**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. The Group has over 16,000 employees at 600 locations in 50 countries. Konecranes shares are listed on the Nasdaq Helsinki (symbol: KCR).**

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### **Learn more**

Learn more about how Konecranes Service can help you improve the safety and productivity of your operations.