KONECRANES

ENVIRONMENTAL PRODUCT DECLARATION

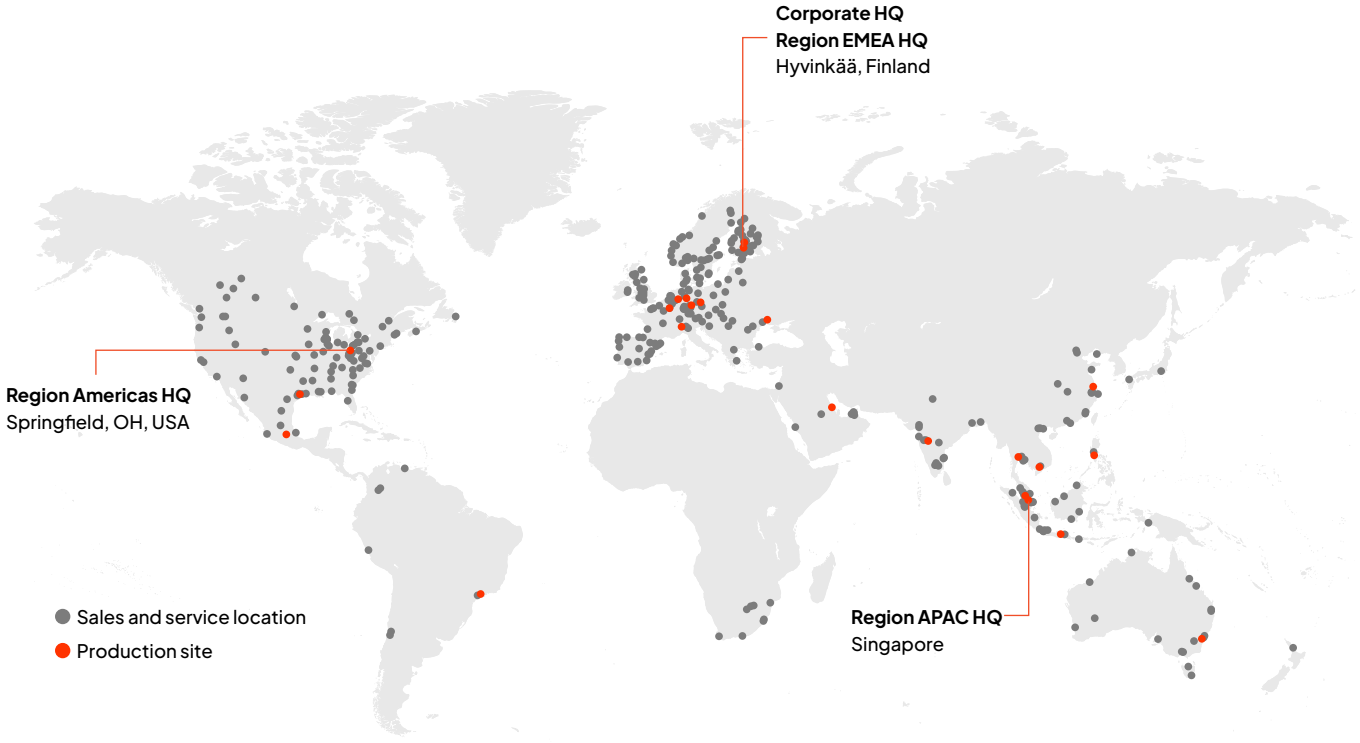
Konecranes S-series low headroom rope hoist

General company information

Konecranes is a global leader in material handling solutions, serving a broad range of customers across multiple industries. Our knowledge and technologies, solutions and services constitute a key link in enabling the flow of essential material and goods. We support our customers' operations with innovative solutions that enhance their productivity, lower their emissions and drive their business forward.

Together with customers and business partners, our resourceful people make material handling more productive and sustainable. We maximize lifecycle value and eliminate waste of resources, energy and time throughout the whole value chain. Our culture is rooted on uncompromised safety, high ethics and diversity and inclusion. We work for a decarbonized and circular world for customers and society.

Our ambition is to provide our customers with sustainable solutions and services while preventing and minimizing emissions and waste. We design our products with their complete lifecycle in mind. Usability, eco-efficiency, and safety are our guiding principles in product design, along with lifecycle thinking. Our aim is to maximize the lifecycle value of our products. We do this through innovative product design and by offering preventive maintenance as part of our Lifecycle Services concept, supported by TRUCONNECT Remote Service.



This EPD is based on ISO 14021: Self-declared environmental claims, type II. Life Cycle Assessment (LCA) calculations are carried out following the ISO standards 14040–44. Internal expert review has been carried out for EPD and LCA.

Product description and application

Konecranes offers a wide range of industrial hoists for different applications. The Konecranes S-series low headroom hoist is meant for light to medium duty industrial use. The equipment is designed to perform lifting, lowering and traveling operations, within the limits specified by its duty class. Due to the range of available frame sizes, possible configurations, manufacturing locations and variations in usage specifics, environmental impact may vary.

The compact Konecranes S-series low headroom hoist offers excellent approach dimensions and smooth stepless lifting with a purpose-designed load dependent hoisting motor for the ultimate user experience and shorter cycle times. With long-lasting, durable components, carefully selected raw materials and innovative design, the S-series low headroom is a new generation hoist with a lifetime that can be extended for decades.

Strong, lightweight, durable and clean synthetic rope is one example of innovative material selections, improving the lifting experience by offering safer and easier handling, without producing sharp barbs like traditional steel wire rope. Another specialty of the S-series low headroom hoist is the thrust rocker solution that enables a reduced need of raw material compared to counterweights and a lower climate impact for hoist balancing.

Integrated Smart Features like Hook Centering and Snag Prevention enhance safety and help increase productivity with shorter load cycle times. Safe operation can also be boosted with an optional safety light on the trolley that provides a visual signal of crane movement to nearby personnel in the workspace.

The S-series low headroom hoist is designed to maximize performance and increase lifetime, lowering lifecycle costs. This Environmental Product Declaration (EPD) applies to the Konecranes S-series 5–ton hoist (S05–L) with low-headroom trolley, utilizing a variable speed hoisting motor.

Product description of the Konecranes S-series low headroom hoist used in this EPD

Load	5000 kg
Reeving	4 falls
HOL (height of Lift)	6.5 m
Duty class	M5
Hoisting speed with stepless B3 motor (min/nominal/max) 50Hz network	0.4/2.5/7.5 m/min
Hoisting speed with stepless B3 motor (min/nominal/max) 60Hz network	0.4/3/7.5 m/min
Hoist traversing speed 50 Hz network (max)	32 m/min
Hoist traversing speed 60 Hz network (max)	40 m/min
Hoist weight	260 kg

Environmental impact of the Konecranes S-series low headroom hoist

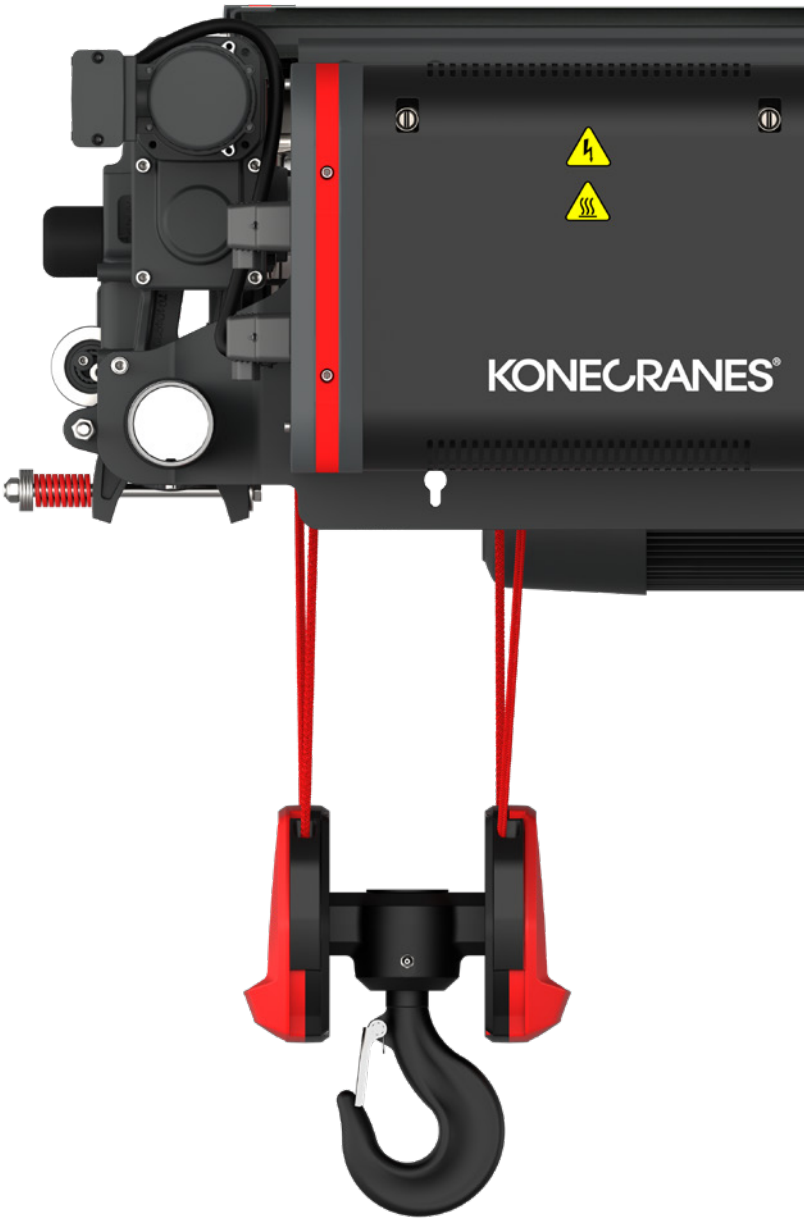
At Konecranes, we are committed to supporting our customers in reaching their low-carbon targets with our offering. Decisions made at the design phase critically determine a product's overall environmental impact. Therefore, we can significantly improve the environmental performance by taking the environmental impacts into consideration early in the product development process.

Konecranes' Design for Environment (DfE) concept aims to reduce the environmental impact of the product's lifecycle. The concept focuses on repairability, durability, material selection and energy efficiency.

Environmental considerations are realized in our Konecranes S-series hoists in the following ways:

- Our own Design for Environment concept and tools were applied to the product design process to optimize the use of raw materials, while also considering reusability and repairability aspects to secure maximum lifetime.
- Energy consumption is optimized with our purpose-designed Core of Lifting components—gears, motors and controls—specifically intended for crane use and lifting motions.
- Substances of very high concern (SVHCs) in product design are minimized.
- PVC- and halogen-free variants are offered to customers.
- The hoist packaging design optimizes material usage and the package delivered from our component factories is reusable.

We also assessed the environmental impact of the product throughout its entire lifecycle with a Life Cycle Assessment (LCA).



Material breakdown

The material breakdown relates to the total weight of the 5–ton rated capacity Konecranes S-series low headroom hoist with a maximum lifting height of 6.5 meters and frequency-controlled hoisting. The weight can vary, depending on which S-series features are selected for the hoist. The total weight of the hoist is 260 kg.

In this particular S-series hoist, about 90% of the hoist materials are metals—including steel and steel alloys, cast iron, aluminum alloys and copper—which are fully recyclable at the end of the hoist's lifespan.

The Konecranes S-series low headroom hoist does not contain any chemical substances that do not conform with our Restricted Substances List, based on legal requirements in the EU and in other selected countries. Any factory-installed lubricants in the product are industrial hydrocarbons. Coatings are applied on-site, or the work is outsourced to a subcontractor.* Solvent-born epoxy binder paints and zinc-nickel electroplating are the main coating types used in the S-series products. The electroplating process uses trivalent chromium and the paints are pigmented with iron oxides.

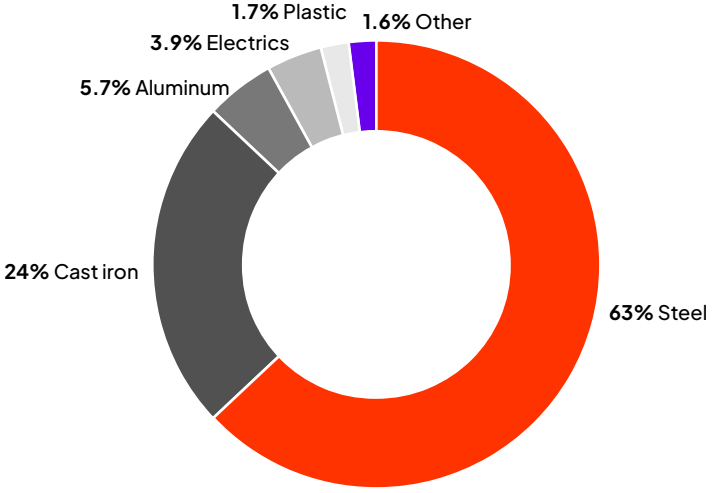


Figure 1. Materials breakdown of selected S05–L hoist without optional parts

The specialty of the Konecranes S-series is the use of synthetic rope. With a 6.5–meter lifting height and 4–rope reeving system, the weight of the rope is 1.3 kg, which is 80% less than traditional wire rope. In addition, the S-series low headroom hoist features a thrust rocker, replacing counterweights for hoist balancing. The thrust rocker solution is lighter in weight compared to counterweights, reducing the amount of steel used and therefore resulting in a lower climate impact on a component level.

*Konecranes has clear processes in place to mitigate sustainability-related risks both in the supplier selection phase and during the business relationship. The Konecranes Supplier Code of Conduct includes the minimum requirements for suppliers on topics such as human rights, health and safety, environmental management, anti-corruption and compliance with laws and regulations. Konecranes Restricted Substances List describes our key requirements for the use of harmful substances.

S05 low headroom lifecycle assessment

We analyzed the environmental impact of the S05 low headroom hoist with the Life Cycle Assessment (LCA) method and standards ISO 14040 – ISO 14044. The lifecycle of an S05 hoist was divided into the following stages: raw materials, component production, supply transportation and assembly, packaging, delivery to customer, usage at customer site, maintenance at customer site and dismantling and preparation for waste treatment. The logistics required during or between each stage to move the hoist components from one place to another were included. Only the components specifically relevant to the S05–L hoist were under examination, excluding all the other parts of the crane.

The functional unit for the LCA study was the entire lifecycle of a hoist across 20 years (approximately 70,000 duty cycles). The S05 low headroom hoist under examination has a maximum lifting height of 6.5 meters and a B3 model hoisting motor using a frequency converter. The use profile was based on median usage data representing an average customer in the European Union area (EU28).

The impact focus was set on climate impact (global warming potential) and the calculations based on emission factors from The Intergovernmental Panel on Climate Change (IPCC) dating back to 2013 using a 100–year time horizon and excluding biogenic carbon. At the time of the study, there was no product-specific LCA guideline (product category rules) available for rope hoists.

We used both average and specific data for the LCA. Specific data was collected on the product structure and materials of the S05 low headroom hoist and its use phase. In-house production process and selected first-tier supplier (i.e., suppliers with which we have a direct business relationship) data was also used. This data was especially crucial for the use phase because usage levels can vary significantly between individual hoists depending on customer needs.

We analyzed data such as the number of lifting cycles, loading levels, power-on time and hoisting times from 1,300 individual wire rope hoists from 2011–2019 collected with TRUCONNECT Remote Monitoring. This data helped define load spectrum, hoisting cycle length and the number of hoisting cycles for each loading level. These, together with expert calculations, gave a representative figure for median operating cycles and median electricity consumption.

We used a professional LCA software tool (Sulca LCA software with Ecoinvent 3.9.1 database) for our LCA modelling and calculations. Additional emission coefficients related to steel materials and commercial componentry were collected from Worldsteel LCI data and specific component EPDs.

S05 low headroom climate impact results

The S05 low headroom hoist total climate impact result was up to 1,951 CO_2 eq. kg considering all the lifecycle phases and median (typical) use for 20 years.

The most significant part of the climate impact in the lifecycle of an S05 low headroom hoist comes from the processing of raw materials which is done for the manufacturing of the hoist components. Steel production in particular causes a high amount of value chain emissions.

The second largest amount of climate impact of the hoist lifecycle is created when the hoist is in actual operation (median use), mostly due to the greenhouse gas (GHG) emissions related to the electricity production used for powering the hoist.

Maintenance, including service technicians' visits to customers and spare parts production, is the third most significant source of emissions.

The climate impact of dismantling and preparing for waste treatment includes the transportation of the discarded product to a waste facility and its processing, but excludes material recycling credits.

Konecranes offers general overhaul, retrofitting and modernization services that can extend the life of the hoist and thus reduce its environmental impact. These, however, were excluded from the LCA analysis, as we focused on the basic product configuration. Customers can also further lower their operational climate impact by using electricity from renewable sources at their site.

S5 low headroom lifecycle climate impact

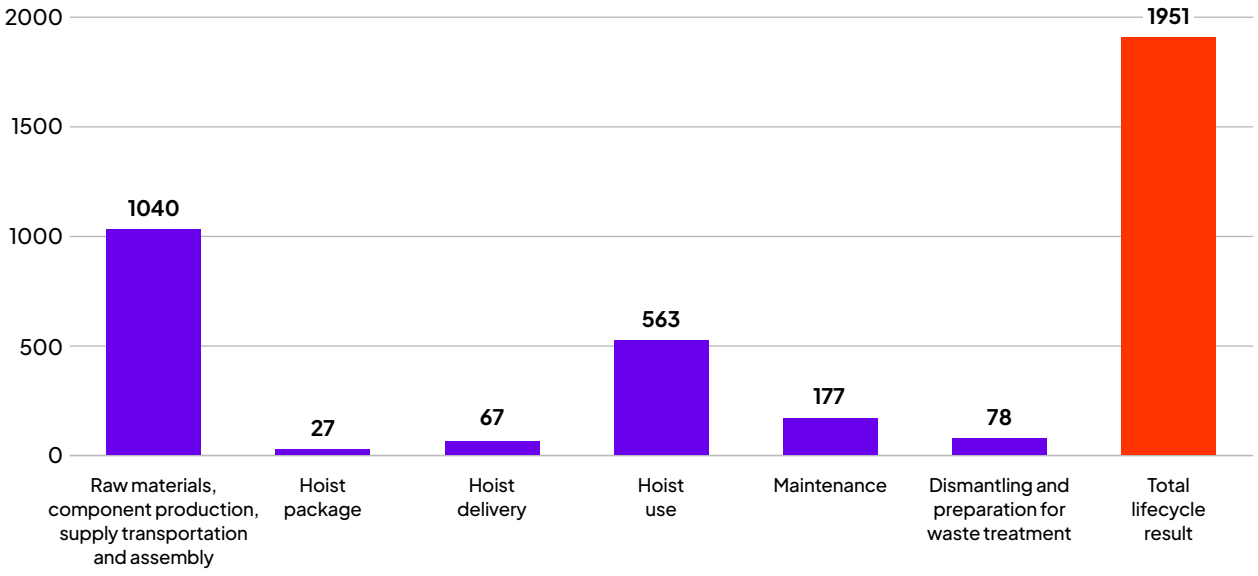


Figure 2. S05 low headroom hoist lifecycle climate impact results in kg CO_2 eq.* representing 20 years of use in a workshop application, with average European electricity.

* Impact assessment methods: CMLv4.8 2016. The term "Global Warming Potential (GWP 100)" is used instead of climate impact in CML methodology.

Use phase energy consumption and climate impact

Hoists are electrically powered, mostly by supply from a main outlet. We analyzed the power consumption and climate impact on a 5 ton Konecranes S-series low headroom hoist in median usage, using a default cycle as the basis of the calculations.

The default cycle in typical use utilized in the LCA consists of:

1. 0.85 m of load lifting (from usage data)
2. 2 m of traversing movement (estimated)
3. 0.85 m of load lowering

The number of yearly cycles in median (typical use) is approximately 3,500.

A median use S05 low headroom hoist running a B3 hoisting motor with frequency-controlled hoisting and traveling movements uses about 1,590 kWh of electricity in 20 years. All hoist usage states have been considered in the calculations, including hoisting with a load as well as an empty hook, and trolley traversing consumption, together with the standby and idle power consumed by the trolley and hoist electrics when not actively hoisting or traversing.

The way customers use the hoist can change the energy usage and climate impact results significantly. When we only look at the hoist's use phase, hard usage of the S05 low headroom hoist consumes more energy and the corresponding climate impact is estimated to be around five times higher compared to median usage.

Figure 3 shows how the climate impact of the use phase changes by using different ways to produce energy. The demand for electricity stays the same in every case.

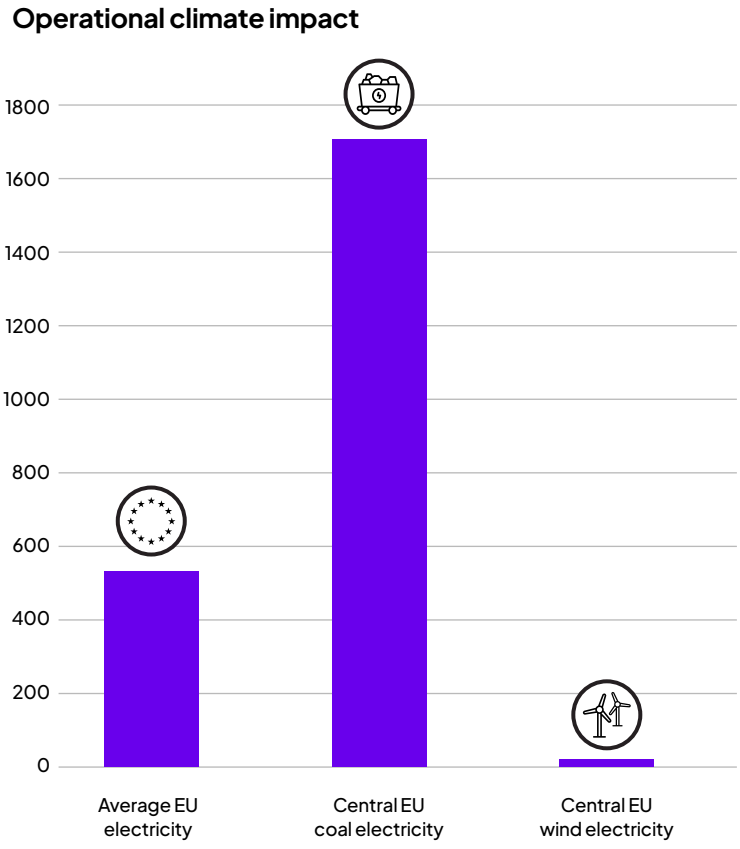


Figure 3. The operational climate impact of the S05 hoist with different electricity sources over 20 years of median use. Operational electricity demand is the same.

Manufacturing and logistics

Konecranes is committed to science-based targets (validated by the Science Based Targets initiative) for reducing scope 1, 2 and 3 emissions 50% by 2030. These targets are aligned with the ambition of the Paris Climate Agreement to limit global warming to 1.5°C. We work to decarbonize our own operations by continuously improving the energy efficiency of our manufacturing operations while maximizing the share of renewable energy sources, and—for example—we already use renewable electricity in all our factories.

We're also improving the fuel efficiency of our service vehicle fleet. In 2022, we managed to reach the science-based target of halving the scope 1 and 2 emissions from our own operations, and now we have set a new, more ambitious target of reaching carbon neutral own operations by 2030.

Our Hämeenlinna factory in Southern Finland, one of the factories manufacturing the S05 low headroom hoist among others, has received the CarbonNeutral® building certification, in accordance with The CarbonNeutral Protocol, the leading global framework for carbon neutrality. The certification is the result of the factory's actions in reducing its greenhouse gas emissions by using renewable energy and improving energy efficiency, as well as purchasing carbon credits to compensate for the emissions that cannot be eliminated yet. Work continues to further reduce the remaining emissions, for example through electrifying the majority of the diesel lift trucks operating in the factory yard.

We follow our internal guiding principles for chemical handling, energy and emission management, and waste and resource management globally—setting the company standard for environmental management. The majority of our factories have an ISO 14001:2015 Environmental Management System in place, requiring continuous development, solid risk management and annual targets.

We expect high ethical standards from ourselves and our business partners. And as we work with companies around the world who provide us with materials and components we expect all of our suppliers and subcontractors to commit to the same ethical, environmental and labor-related principles that we ourselves apply. To help mitigate risk in our supply chains, we ask our suppliers to follow our Supplier Code of Conduct which describes the standards we expect from our business partners.

In addition, we pay attention to efficiency in logistics and packaging. With our global factory network, we are able to optimize the delivery chain for the Konecranes S-series and other products. The S-series hoist is packed on a wooden pallet, surrounded with corrosion inhibitor packaging film and placed in a foldable wooden container. The packaging is reusable, allowing it to be returned to the component factories for reutilization. The hoist package was designed to be resource efficient and optimized for purpose, providing the best possible protection to the product with minimized use of packaging materials.

We reduce the GHG emissions across the lifecycle of the hoist by choosing fewer and lighter materials and components. These emission reductions multiply during delivery as there is less physical mass to transport.

Maintenance

Well planned and executed maintenance not only helps increase safety and reduce downtime, but it can also extend equipment life, optimize energy use and reduce environmental impact.

Material handling equipment that is not properly inspected and maintained can experience premature wear on components resulting in breakdowns. More service calls and downtime mean more time on the road for technicians, more parts consumed, and more product wasted.

When carefully maintained, a crane can last for decades. With Lifecycle Services, smart technology, and our digital ecosystem Konecranes can provide services to maintain equipment reliability and efficiency and optimize maintenance planning.

Inspections and preventive maintenance are key to keeping equipment and components in use. Inspections identify risks and improvement opportunities and preventive maintenance tasks such as adjusting and lubricating help keep equipment productive and minimize downtime. Frequently needed parts can be kept on site with a parts package reducing the need for transport. Parts can also be refurbished or rebuilt helping reduce waste.

Predictive maintenance utilizes condition monitoring, advanced inspections and data analytics to help us make informed component-specific predictions and prioritize recommendations and actions. This means maintenance can be carried out based on actual condition and planned around production schedules, making repairs more targeted and resource efficient. Predictive maintenance also supports the planning of retrofits, overhauls, modernizations or outright replacements when needed.

When equipment begins to age instead of replacing the entire hoist or crane, retrofits and modernizations can bring the benefits of more efficient and updated technology and improve equipment performance. A general overhaul can also extend the useful life of your crane when the remaining hoist service life falls under 10% by replacing parts before they wear out and thereby contribute to equipment failures.

These services can not only improve energy efficiency and performance, but save a great deal of raw materials, reduce emissions from the transportation of new equipment, and decrease the energy used in manufacturing. The Konecranes S-series hoist can be retrofitted, remanufactured and modernized to extend its lifespan and recycled when it can no longer be used, greatly reducing its environmental impact. Reduced need for unscheduled maintenance and repairs improves reliability and decreases the environmental impact associated with unexpected downtime.

Dismantling and end of life

The Konecranes S-series hoist can be recycled to a high extent as almost 90% of the hoist materials are recyclable metals. Most hoist parts can be refurbished, and the hoist modernized to lengthen its lifespan. The customer is responsible for taking care of the equipment when it reaches the end of its lifespan. When that happens, the hoist materials can be utilized for a new purpose, or they can be recycled based on available infrastructure. Waste material from installation, maintenance or dismantling should be taken care of by the customer according to local regulations.

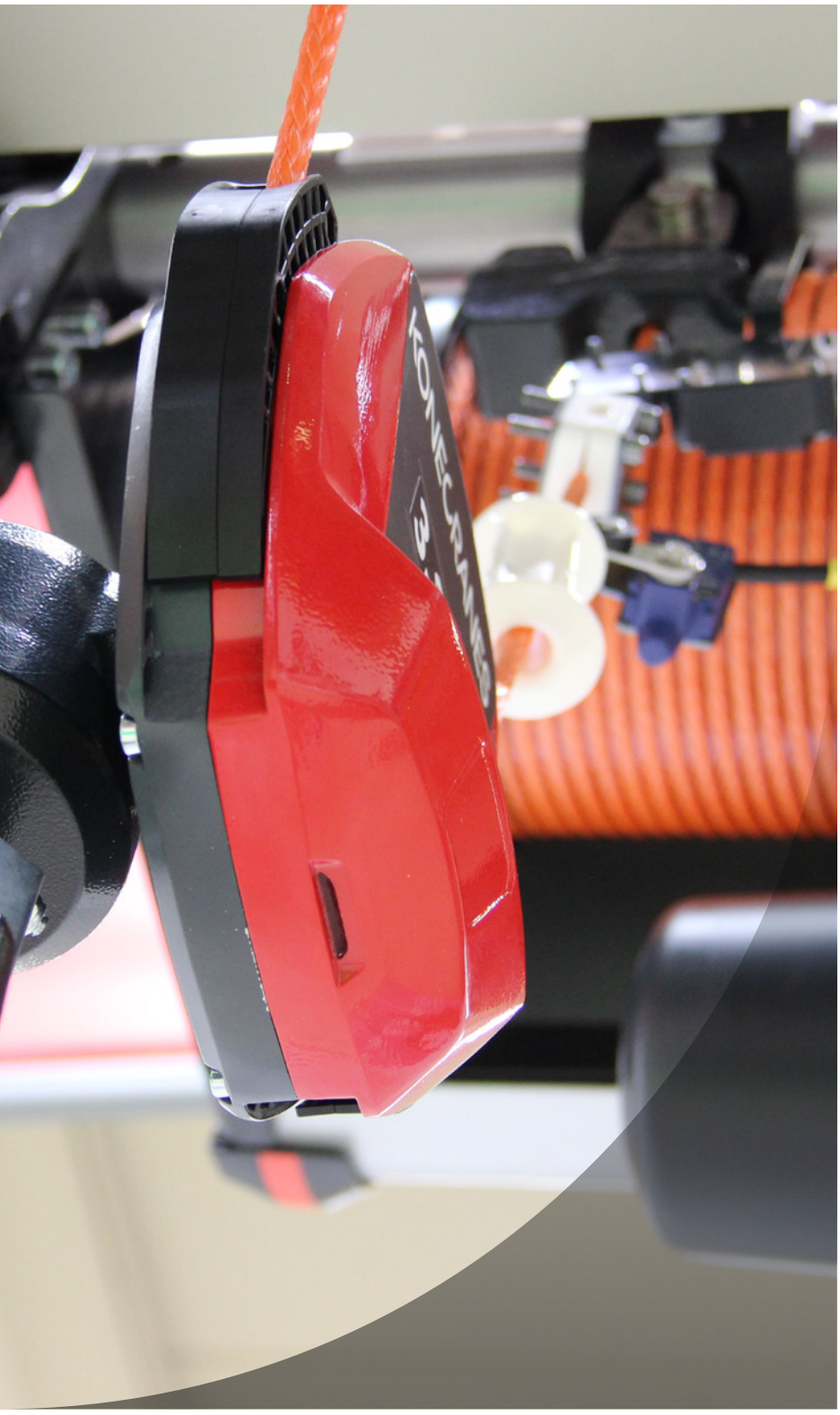
Dismantling should always be planned and executed by licensed professionals. Regulations and methods vary regionally, but we expect that our customers always use licensed waste-handling companies for industrial waste disposal and/or recycling of recyclable materials.

We use marked fumigated wood for packaging and special anticorrosive packaging film to prevent rust during transport. The wood package and the packaging film can be reused or recycled. All our packaging materials comply with the EU packaging material directive ((EU) 2018/852). The wood material used in packaging is delivered according to ISPM 15 of the International Plant Protection Convention, to prevent the spread of disease and insects that could adversely affect plants or ecosystems.

Proposed waste handling methods*

MATERIAL	HANDLING METHOD
Metals	Materials recycling, multi-metal scrap recycling
Plastics	Recycling, if applicable or incineration as energy
Elastomer parts	Recycling
Electrical and electromechanical components	Recycling, e-waste management
Lubricants (gear oil, bearing grease)	Oils should be removed from the hoist before end-of-life recycling, oil can be regenerated or treated as hazardous waste

* We encourage waste handling to be based on the EU Waste Framework Directive (EU) 2018/851.



Konecranes is a global leader in material handling solutions, serving a broad range of customers across multiple industries. We consistently set the industry benchmark, from everyday improvements to the breakthroughs at moments that matter most, because we know we can always find a safer, more productive and sustainable way. That's why, with around 16,600 professionals in over 50 countries, Konecranes is trusted every day to lift, handle and move what the world needs. In 2023, Group sales totaled EUR 4.0 billion. Konecranes shares are listed on Nasdaq Helsinki (symbol: KCR).

KONECRANES Moves what matters.