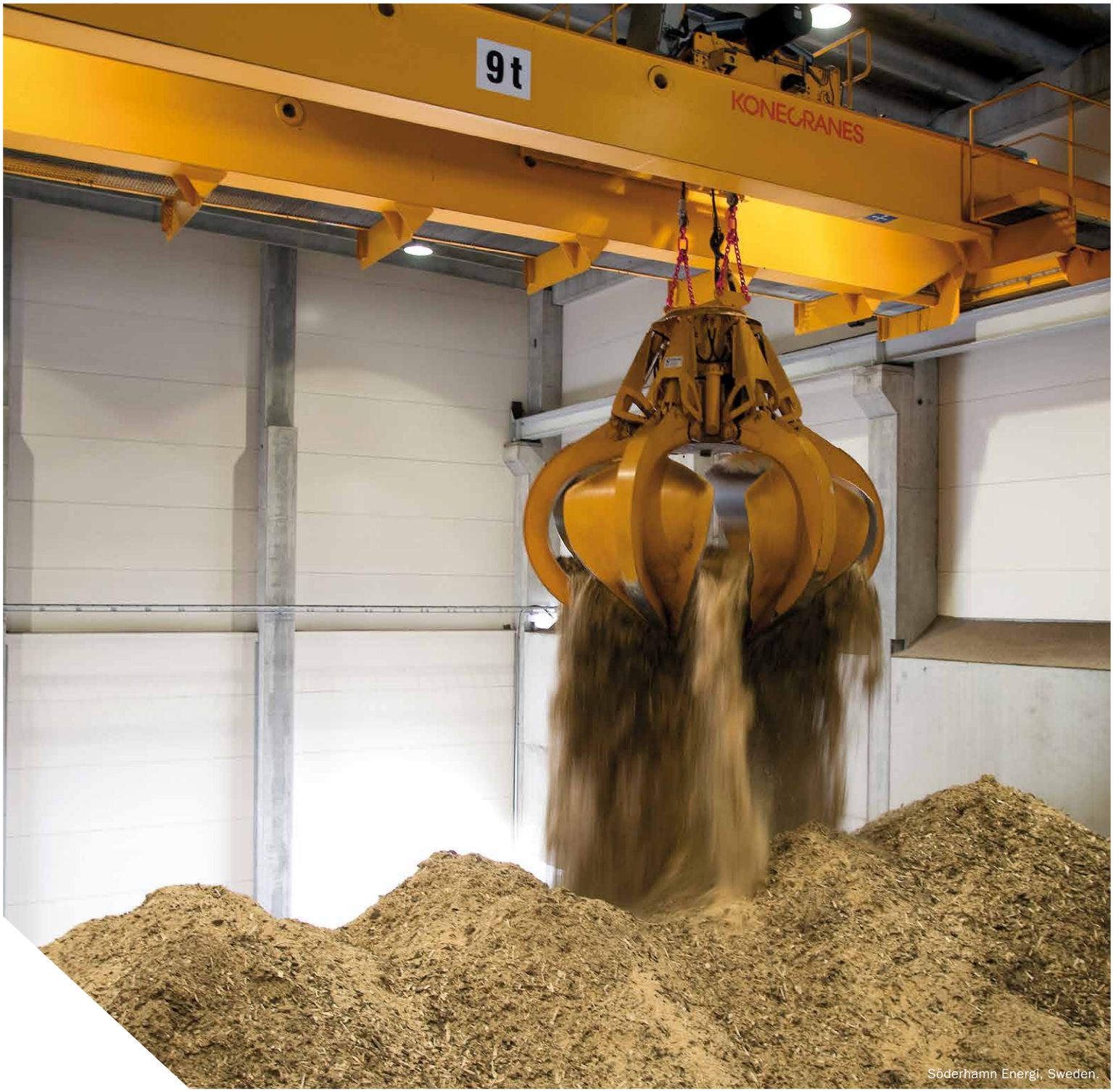
KONECRANES®
Lifting Businesses™

Renewable Energy Plant Solutions

SUSTAINABLE ENERGY PRODUCTION



Söderhamn Energi, Sweden.

Konecranes Waste to Energy solutions

THE RIGHT SOLUTION IN THE RIGHT PLACE

Unique experience to meet the demands of your plant
Konecranes provides specialist skills and brings together a unique worldwide experience to meet the demands of all incineration plants irrespective of throughput and size. Important components like hoisting trolleys, drives and buckets are engineered to reduce maintenance requirements.

Secured materials handling process
Cranes play a crucial role in modern incineration plants, where tight environmental management guidelines are applied. It is important that the continuous materials handling system has maximum efficiency and uptime from the arrival of the waste, to separation, and to incineration. If the cranes stop, the whole process is in danger. The key factors, when specifying waste-to energy cranes, are the total burning capacity of the incinerators, the layout of the handling area, type of waste, and the time it takes to receive and process the waste.

Typically, there are two waste handling cranes above the waste-pit, one of which is a backup. The primary crane undertakes the main operating functions whilst the other is being serviced.

Fully automated cranes demand high availability
The biomass fuel plants produce both steam for the central heating and electricity. The most typical fuel types are shredded wood-based materials and peat.

Normally only one unmanned fully automated crane without an operator's pulpit is running above the biomass storage, moving the fuel from the reception area to the storage and continuously feeding the combustion line. When there is only one crane feeding the process, the high availability is crucial.

CRANES ON DUTY

Waste incineration plants
- Waste handling cranes
- Slag (ash) handling cranes
- Maintenance cranes
- Turbine room cranes
- Container cranes
- Service hoists

Biomass plants
- Biomass handling cranes
- Maintenance cranes
- Service hoists

Compost plants
- Waste handling cranes
- Service hoists

Special plants
- Straw bale handling
- Livestock litter burning

WASTE HANDLING CRANES, TWO UNITS

with hydraulic orange peel type buckets for stacking, mixing and feeding of waste in the waste bunker.

SHREDDER

NOT JUST LIFTING THINGS, BUT ENTIRE BUSINESSES

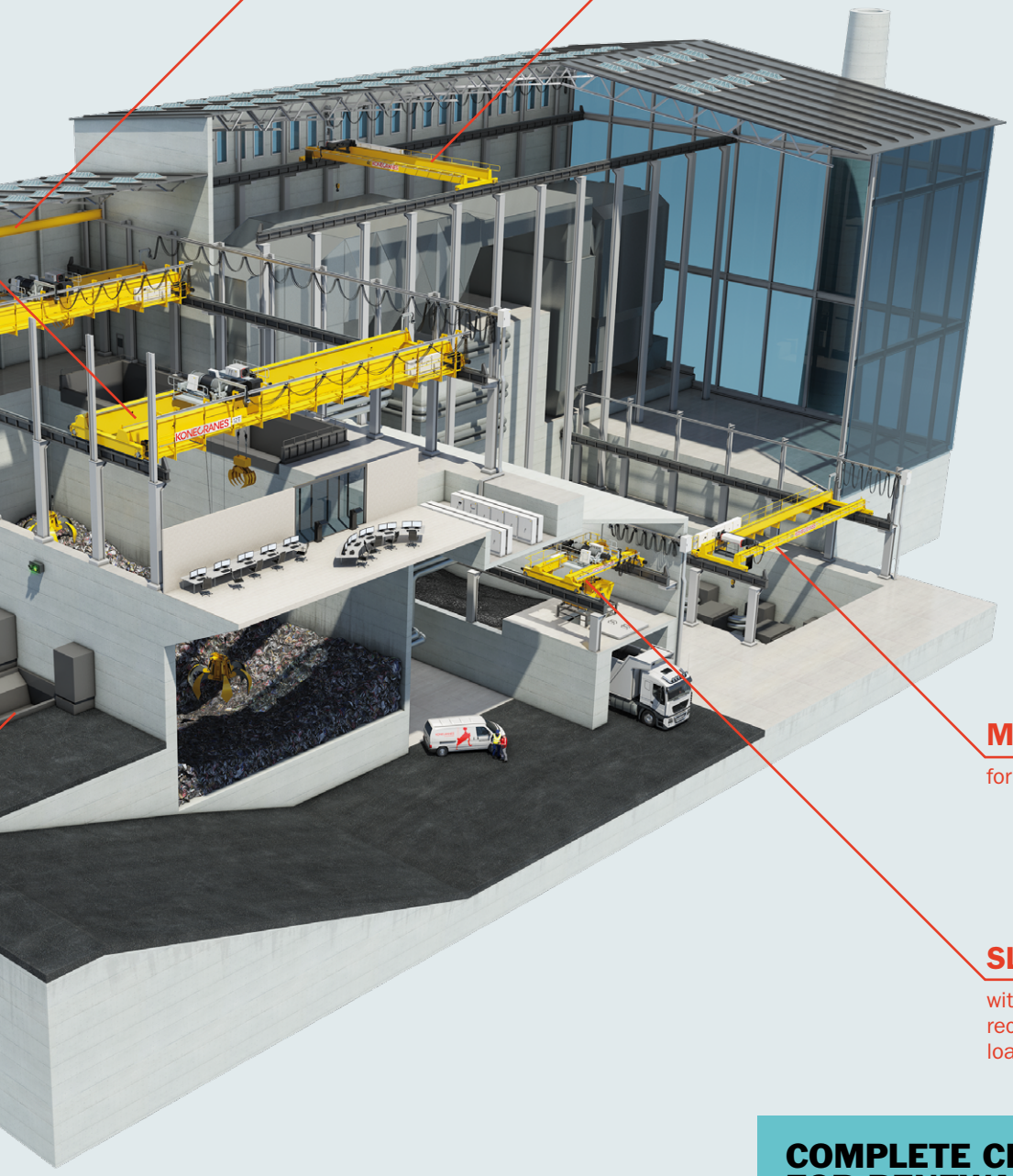
Konecranes is an industry-leading group of lifting businesses that offers a complete range of advanced lifting solutions to many different industries worldwide. We are committed to providing you with specialized lifting equipment and services that increase the value and effectiveness of your business.

When you choose Konecranes, you acquire a unique source of global experience and knowledge combined with local know-how to empower your lifting solution.

MONORAIL MAINTENANCE HOIST

MAINTENANCE CRANE

for boiler and flue gas treament area.



MAINTENANCE CRANE

for turbine area.

SLAG HANDLING CRANE

with hydraulic clamshell type bucket for recasting of slag in the slag bunker and loading of slag on the trucks.

COMPLETE CRANE SYSTEMS FOR RENEWABLE ENERGY INDUSTRY

Some of the most challenging locations across the world for heavy duty crane applications exist in the renewable energy industry. Konecranes provides a commercial advantage no other manufacturer can offer. That is the capacity to research, design and manufacture complete crane systems with all the relevant equipment including electrification, control systems, and automation.

ENGINEERED FOR THE BOTTOM LINE

Konecranes realizes that the most expensive crane is the crane that does not work. Ideally, equipment should be checked and repaired before a problem arises, not just because of costly downtime, but also because maintenance costs have a substantial effect on operating profits.

Our approach to maximizing uptime is to include features that reduce the need for maintenance, and to engineer cranes to be easier and faster to maintain during planned outages. Konecranes' services cover the whole lifetime of the crane by offering a comprehensive service contract to ensure crane reliability with preventative maintenance programs.

Schedule downtime for maintenance

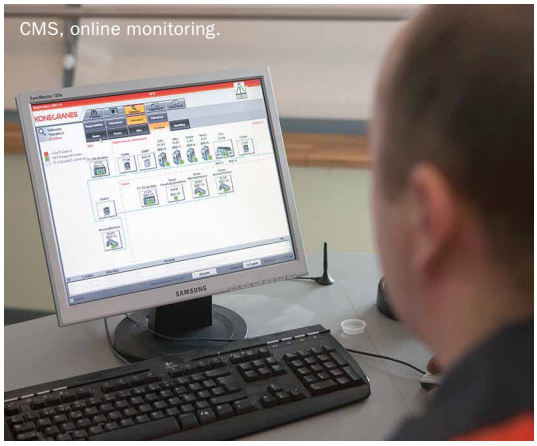
Konecranes' condition and maintenance monitoring system anticipates crane component failure, preventing unexpected shutdowns. This system, carried out under a controlled discipline, can monitor approximately thirty different functions, for example, temperature and bearing conditions, speed controls, and overload indications. By processing this information, the system can draw conclusions about the expected life and future performance of the equipment, allowing for the scheduling of shutdowns.

Vertical power supply of bucket

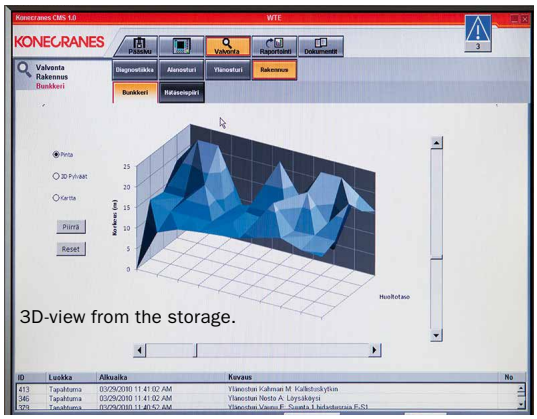
Konecranes has introduced an integrated rope/cable drum. The electrical cable is wound in the middle of the rope drum and is driven by the same hoisting machinery which lifts the bucket. With this unique Konecranes solution, the maintenance costs and used time are considerably reduced.

Hydraulic buckets

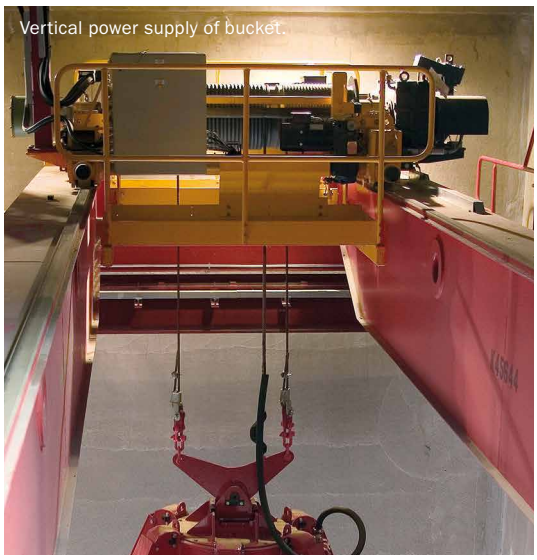
The hydraulic bucket can handle the same amount of waste in comparison to a much larger mechanical bucket. Wear-resistant special steel is used in constructions, which are subject to the abrasion. Tailored design of hydraulics using variable displacement pump offers a versatile operation without the overheating of the system. Many onboard mounted sensors enable the comprehensive operation in unmanned full automation.



CMS, online monitoring.



3D-view from the storage.


Vertical power supply of bucket.


Lakeside, UK. 10 ton capacity slag handling crane.

A PARTNER YOU CAN TRUST

Konecranes has been delivering cranes since 1930. Konecranes' R&D has developed reliable crane components including control system and application software.

RELIABILITY CONSISTS OF:

Construction
- Solutions designed for customer process

Maintainability
- Partner throughout the equipment life cycle – a partner that takes responsibility and follows through

Installation, crane delivery
- Commitment to turnkey deliveries and solutions

Service
- Highest life cycle value means commitment to a long-term partnership

Operation
- Process knowledge – servicing of both Konecranes' and other makes of equipment

Redundancy
- Redundant machineries and components according to analysis of the process needs

Ekokem Finland, 2 units 9,5 ton capacity WTE-cranes, inspection and service of hoisting machinery.

A CLEANER AND MORE EFFECTIVE PROCESS

CASE: KONECRANES BIOMASS CRANE HELPS WHISTLER RESORT MANAGE WASTE AND REDUCE CARBON FOOTPRINT

The Opportunity

Konecranes Biomass Crane,
Resort Municipality of Whistler (CAN)

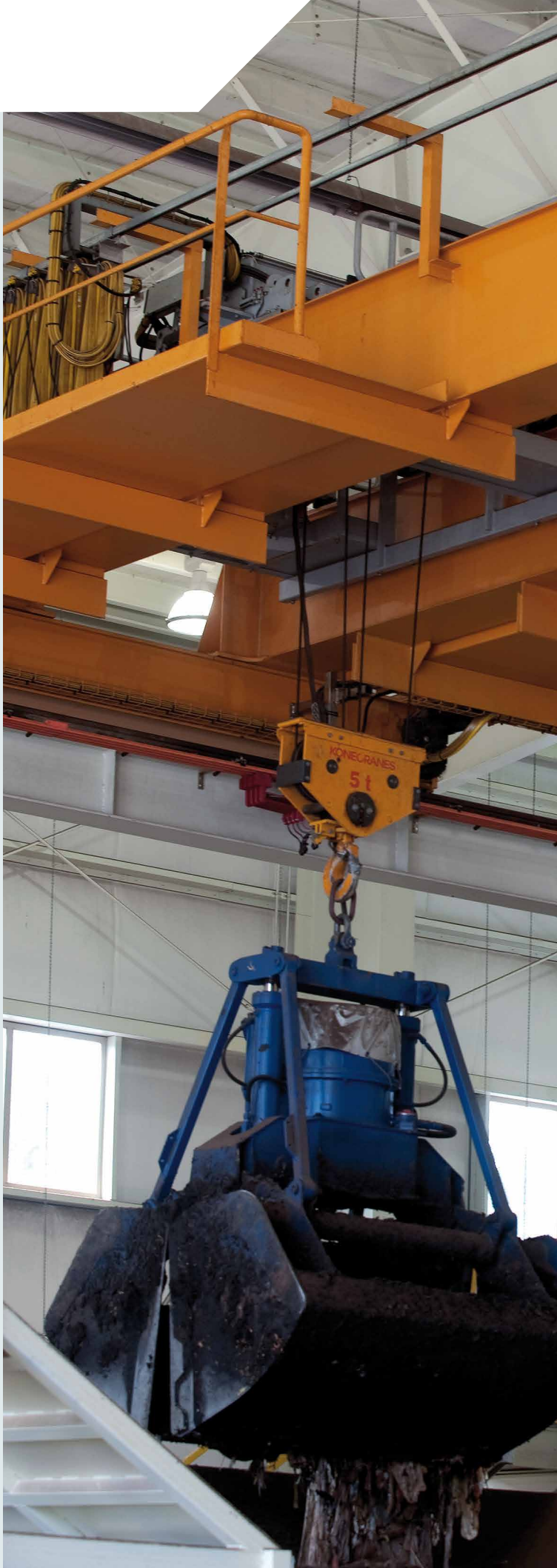
When a municipal waste composting facility outside Vancouver shut down because of odor problems, a new facility was sited in the Resort Municipality of Whistler. The process transforms a mixture of sewage solids, food waste and waste wood into high-quality compost, and replaces trucking garbage to Washington State at a significant cost.

The original facility used front–end loaders to transport the raw materials to a mixer as the first stage in the process. But the new facility, designed to process between 16 and 20 tons of biosolids per day and located in a city known for its high environmental standards, wanted to operate more cleanly than had been possible using front-end loaders. The engineers designing the new facility decided to specify an electric rather than diesel wood chipper, and a crane to handle the raw materials.

The Solution

Konecranes supplied a 5-ton radio-controlled bucket crane, CMAA class “E”, operating on a 60’ span. The bucket holds 2.5 cubic meters, and the crane is equipped with DynAPilot antisway technology and the ability to weigh each load. Working from bins, the crane picks up a full bucket of wood chips and deposits it into a mixer hopper, followed by half a bucket each of food waste and sewage solids, and another full bucket of wood chips. This material is then mixed and transported by conveyor into one of two parallel production tunnels, where it is heatprocessed for about 14 days, emerging at the other end as odorless compost.

Using a crane to mix waste minimizes site contamination, as any spillage falls into the bins or the mixer itself. The facility is enclosed to reduce odor, so eliminating diesel fumes from front loaders inside the building improves conditions for the operator as well as reducing the carbon footprint. Also, fewer workers are required to man the operation.



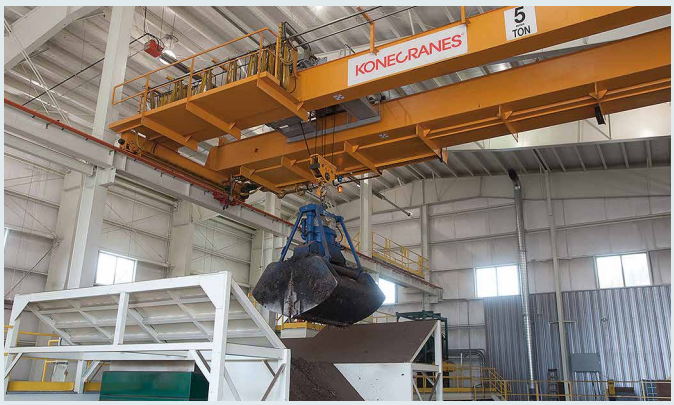
RETURN ON INVESTMENT

The ability to compost its waste rather than ship it to a landfill now saves the community a minimum of $1,200 per day on 10 tons of waste, or at least $37,000 per month. Additionally, two blends of compost aged for six months can be sold by the city for $35 per ton.

Benefits of using a crane instead of a front-end loader:

- **Burns less fossil fuel**
- **Reduces site pollution from biosolids**
- **Eliminates diesel fumes inside the facility**
- **Maximizes floor space**
- **Helps control operating / disposal costs**

> **“There were some significant reservations from experienced operators of plants on our proposed design solution of using a crane rather than a loader.**
>
> **Now, we all are in agreement that probably the most pleasant surprise of the entire project is how well that crane has worked.”**
>
> Whistler Environmental Operations Manager
> Ron Sander



Whistler, Canada,
5 ton capacity biomass handling crane.

ANSWERS FOR PROTECTING YOUR PEOPLE AND EQUIPMENT

Konecranes places great emphasis on the use of safety equipment due to the increased speed of automated cranes. We set requirements for the design and selection of components for cranes with the objective of protecting personnel from hazards affecting their lives and health, and of ensuring reliable crane operation.

Dependable safety designs

When the cranes are operating under full automation the access to the working area of cranes is prevented through a fail-safe safety device. The anti-collision system of cranes is redundant. The basic system is built into the crane automation software and a separate radar system.

Avoid equipment damages with sway control

An integrated sway control system is included in the crane controls to prevent the bucket to hit against the front glass of the pulpit and pit walls. In addition, the pulpit is protected with hardwired limit switches. Sway control increases operator confidence, reduces training time and allows operation of the crane to its full potential.

Fortum Värme, Sweden,
2 units 13 ton capacity WTE-cranes.

AN AUTOMATED CRANE IS TRULY USER-FRIENDLY

Depending on the size and type of incineration plant, Konecranes can provide semi-, or full automation for waste, biomass and slag handling cranes. Manual crane controls are available with Konecranes' remote radio system, which is not lacking in functionality.

Prevent operator fatigue and crane failures

Semi-automation in materials handling cranes reduces operator fatigue and decreases the risk of crane failure. There are occasions when fully automated cranes can reduce direct operational costs. The most demanding is unmanned full automation where the cranes participate into the process without any operators according to the commands directly from the process. The high availability of the system is achieved through the extensive know-how and detailed analysis of the process.

The main benefits of automation are:

- **Increased safety**
- **Reduced downtime**
- **Savings on operation costs**
- **Less operator fatigue**
- **Increased positioning accuracy**
- **Obstacle avoidance in pit area**

Accuracy to the burning process

In order to minimize air contamination and maximize the efficiency of the burning process, the manned or fully automated crane is equipped with a reliable and accurate weighing system. The weighing results are collected mainly for two reasons: first to measure the loading condition of the cranes, and second to record the amount of waste being fed through the system.

Better working environment

Designed with operator comfort in mind, the remote pulpit provides a clean, air-conditioned working environment. Konecranes equips the pulpit with a comfortable swiveling console chair, which is ergonomically designed for complete accessibility to all controls while allowing an unobstructed view of the waste pit area. The most operator-friendly solution is reached with the optimized location of the pulpit. Konecranes' experience in the layouts guarantees the high availability of the cranes.

Monitoring system makes positioning easy

Konecranes' position monitoring system allows the operator to accurately target and position the crane. The location of the crane bridge, hoisting trolley, and bucket can be shown by indication lights and numerical digital displays on the monitor screen.

The Interface of the crane and the process

The main communication links between the crane systems and the plant are the remote control panels, operators' pulpit and the power supplies. In the signal transfer Profibus DP-/DP-coupler is used. The installation and start-up time at site can be shortened to the minimum by using plug-in type cable connections and built-in type control panels. The crane management can happen also remotely from the process control room.

THE COST-EFFECTIVE AND ENVIRONMENTALLY FRIENDLY CHOICE

Modular solutions enable customizing a crane to your needs

Supported by a continuous program of research and development, our highly flexible modular production facilities, and the application of advanced computer design techniques make it possible to produce a range of integrated crane solutions. Our modular solutions are designed to utilize standard components.

Standardized cranes make cost-effective investments

As the world market leader, Konecranes complies with all relevant standardization, quality and safety regulations. The cranes are designed according to worldwide industry norms. The standardization of cranes is based upon the burning capacity of the plants, which range from 50 to over 3000 tons of waste per day. In addition to waste handling cranes, Konecranes also produces standardized biomass and slag handling cranes.

The key benefits of these Konecranes standard cranes are shorter and more accurate delivery times, availability of spare parts and economy of the investment.

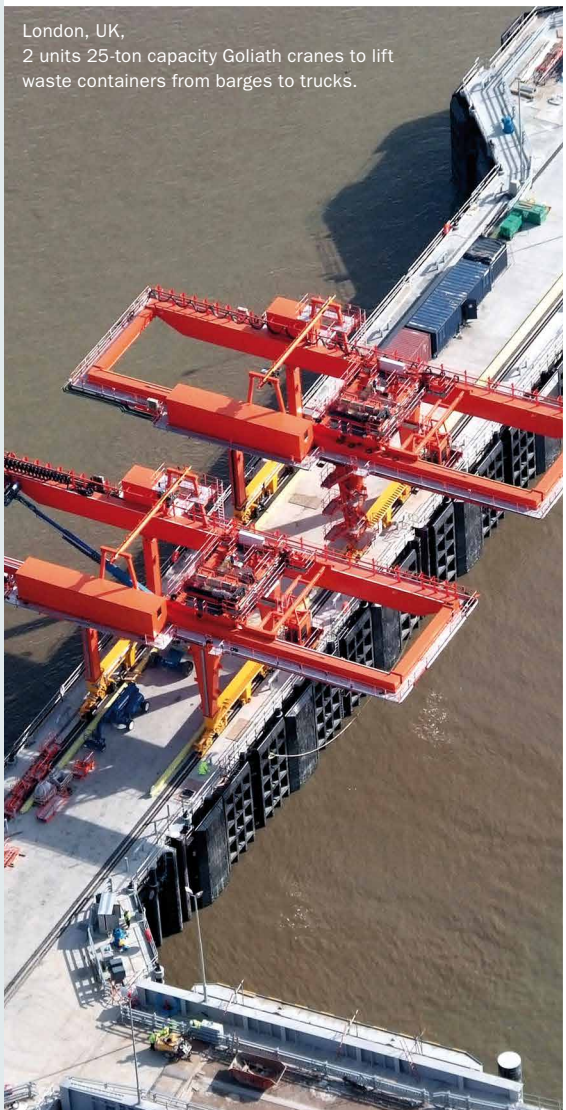
Comprehensive solutions – worldwide coverage

Konecranes' components are designed to produce a specialized crane, which will meet the demands of chosen industry applications. Our extensive range of lifting equipment comprises of a technologically advanced series of electric hoists and crane components.

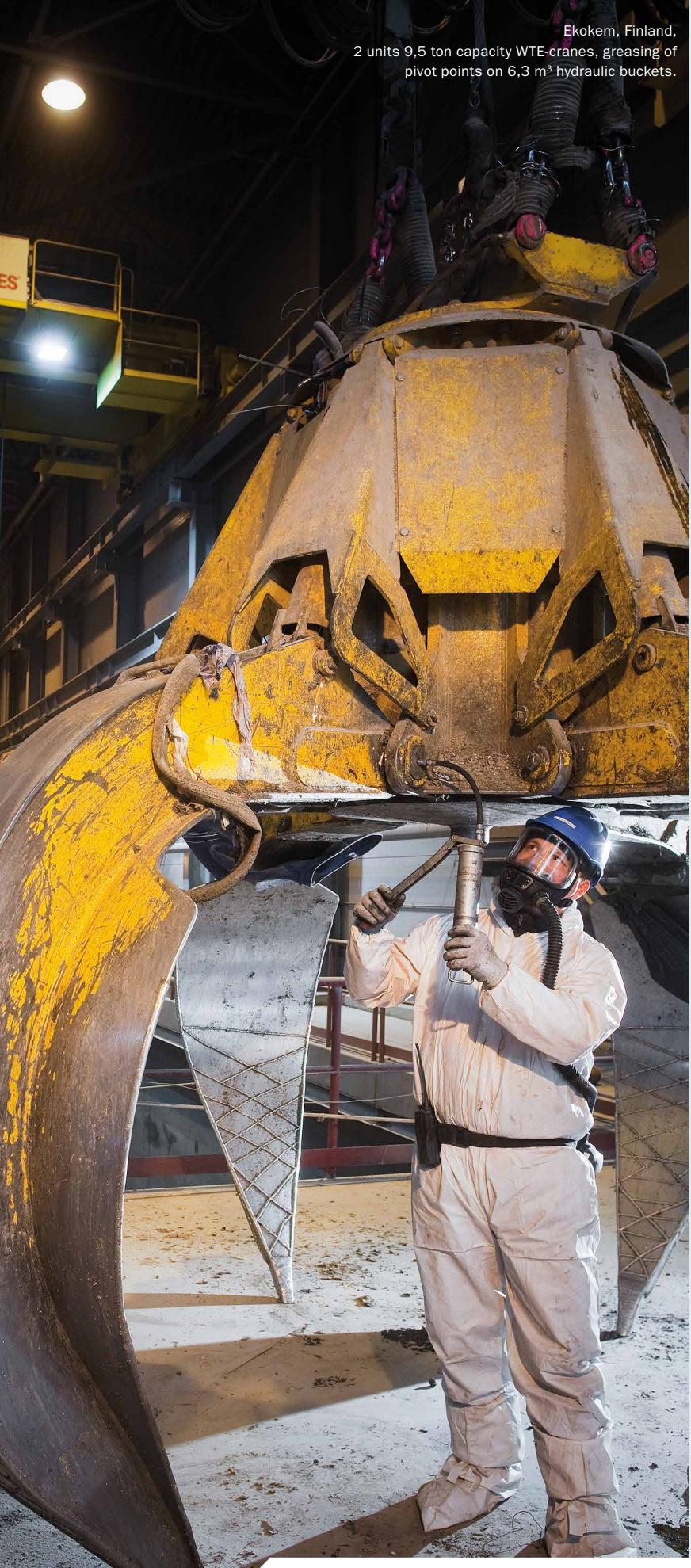
We focus on top-quality components with the most competitive prices anywhere in the world. All our component production is supported by Konecranes' fully integrated and networked logistics, processes, information and communication systems.

SAVE UP TO 30 % OF THE CRANE'S ELECTRICITY CONSUMPTION

Konecranes' network braking removes the need for external braking resistors. This system decreases the crane downtime, and it is more applicable for several supply voltages. Best of all, it saves energy and returns clean, low harmonic power to the network.



London, UK,
2 units 25-ton capacity Goliath cranes to lift waste containers from barges to trucks.



Ekokem, Finland,
2 units 9,5 ton capacity WTE-cranes, greasing of pivot points on 6,3 m³ hydraulic buckets.

KONECRANES SERVICE – ON A LEVEL SUITED TO YOU

Our five service levels define the relationship and cooperation with you and they all aim at raising total life cycle value. From first CONTACT, to our professional evaluation of the CONDITION of your equipment, to preventive maintenance and consultation services for optimal CARE, Konecranes will tailor a program to lift your business.

When a mutual COMMITMENT to performance-based maintenance or COMPLETE material handling outsourcing is required, Konecranes has the experience and resources to help you meet your business objectives.

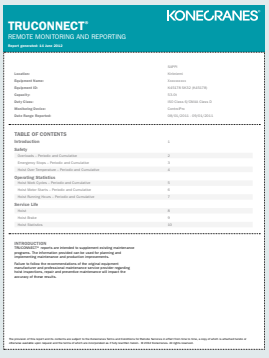
Care
A selection of inspection and preventive maintenance services.

Commitment
Full-scale maintenance operations with set common targets.

Complete
Full responsibility of crane operations, with equipment, maintenance and personnel.

THE FUTURE OF MAINTENANCE IS HERE TODAY WITH TRUCONNECT® REMOTE SERVICES

Konecranes energy from waste cranes can be equipped with **TRUCONNECT**® Remote Monitoring and Reporting service. It monitors the real usage of your equipment through a remote connection. Using the available usage data we provide you with information that can help you increase the safety of your crane usage, optimize your maintenance spending, and plan and budget your crane fleet's modernization needs in advance.


KONECRANES
TRUCONNECT®
REMOTE MONITORING AND REPORTING
Report generated 4.6 June 2012
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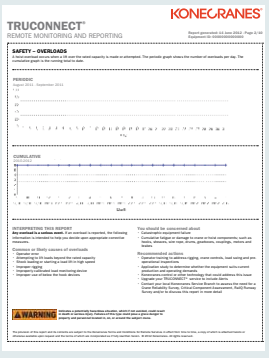
KONECRANES
TRUCONNECT®
REMOTE MONITORING AND REPORTING
SAFETY – OVERLOADS
CUMULATIVE

INDUSTRIAL CRANES

NUCLEAR CRANES

PORT CRANES

HEAVY-DUTY LIFT TRUCKS

SERVICE

MACHINE TOOL SERVICE

Konecranes is a world-leading group of Lifting Businesses™ offering lifting equipment and services that improve productivity in a wide variety of industries. The company is listed on NASDAQ OMX Helsinki Ltd (symbol: KCR1V). With over 12,000 employees at more than 600 locations in almost 50 countries we have the resources, technology and determination to deliver on the promise of Lifting Businesses™.

Ekokem, Finland

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www.konecranes.com