

Crane modernization with optimized grab control

A case study from Emotron





The modernization of the dockside crane was concluded in only 14 days. The customer now benefits from optimized grab control and reduced maintenance costs.

When modernizing this dockside crane in Hildesheim, Germany, Emotron concluded the project in only 14 days. The customer now disposes of an up-to-date crane with optimized grab control, and will benefit from reduced costs thanks to minimized maintenance.

Port crane modernized after 18 years

The grab slewing crane in Hildesheim port, manufactured in 1988, is primarily used for the loading of scrap metal. In the autumn of 2006 it was taken out of operation due to technical defects. Emotron, with close to 20 years of experience in the field of crane modernization, was contracted to develop and realize a completely new drive concept. The solution was based on Emotron VFX variable speed drives and a unique grab control system. The results are optimized cycle times and minimized mechanical stress.

From concept to commissioning

As the general contractor, Emotron was responsible for engineering, delivery of the motors, construction of

the cabinet equipment and commissioning. Ralf Teichmann GmbH, a long-time partner of Emotron, was the subcontractor for the assembly. The employees of the port company lent a helping hand during the disassembly of the old motors and the cabinets as well as during the installation of the new equipment cabinets.

“This saved both time and money,” says Lothar Sendzik, crane application expert at Emotron. “The crane operators also participated during commissioning, an ideal opportunity to introduce them to the new technology under realistic conditions. They can now solve minor malfunctions themselves.”

Quick installation with standard system

Since Emotron had tested the cabinet equipment before delivery, only a week was required for installation and verification of all signals. The commissioning of all drives, including a load test and the acceptance performed by an authorized inspector, took three days. This was possible due to the fact that the Emotron grab control is a standard system, which can be utilized for all four-rope grab cranes. This is also an important prerequisite for reliable solutions and easy servicing.

New system with existing components

Included in the delivery was the complete cabinet equipment for the engine room, Emotron VFX variable speed drives and grab control system, brake resistors, standard asynchronous motors as a replacement for the old slip-ring motors, disassembly respectively assembly, wiring of the new motors, commissioning and finally acceptance by an authorized inspector.

Existing components incorporated in the new concept were crane disconnection switches, long travel motors, slip-ring system, illumination and climate-control in the engine room, the cabin and the complete mechanical system including the brakes, the magnet system and the wiring.

Optimized four-rope grab control

The four-rope grab is controlled by the Emotron electronic grab control. It coordinates the two drives controlling the hold and close motors. For the crane operator, the crane works as if there were only a single hoisting device with the additional functions of “open” and “close”. Setting the nominal grab positions only has to be performed once after a change of a rope or grab unit.

Only four signals are required for the grab operation: hoist, lower, open and close. A joystick with the corresponding contacts delivers the signals. The individual functions can be combined in any order. An integrated position control ensures that the two hoisting devices move correctly towards each other at the correct rate at all times.

Cover photo: The Emotron four-rope grab control minimizes cycle times and reduces stress on ropes. For example, the grab can be closed or opened while being hoisted and lowered.

Minimized cycle times

To minimize cycle times and reduce stress on ropes, the grab can be closed or opened while being hoisted and lowered. Furthermore, a slightly opened grab can be hoisted and lowered.

"If the order for hoisting is given during closing, the grab is first closed and is then immediately hoisted," says Lothar Sendzik. "The hoisting process can also be started at a predetermined angle before the grab has been fully closed. Our system minimizes the jerking motion that occurs during tightening, thereby removing the strain from the mechanical parts."

Synchronized grab motions

In order to keep the grab securely closed, the torque of the close motor must always be slightly higher than the torque of the hold motor. The Emotron synchronization ensures the correct division of the load torque when the grab is hoisted or lowered in its closed condition. This makes it possible to select smaller motors and variable speed drives.

When picking up material, the grab digs itself in utilizing its own weight. The hold ropes should not raise it while doing this, however should at the same time be sufficiently taut to avoid any slack rope on the drum. The Emotron grab control puts the hold motion into a state of suspension during closing. The ropes are held with a defined torque and are slowly rolled up.

Control system and operator panel

The application was configured using Emotron's combined crane control system and operator panel PP41 that is built into the crane cabinet. The operator

can adjust the grab settings as well as monitor control signals and current values. Parameters are set during commissioning of the system and a password is required to prevent accidental or unauthorized modification. An auto tune function senses the system and automatically sets the required values. A PC is not required and the system is easy to install and use.

Long-time benefit from reduced costs

The project was concluded in a very short time against a reasonable cost, and the modernization will be cost-efficient in the long run. The customer now benefits from an up-to-date crane, which will be serviceable for another 15-20 years. Maintenance will be reduced considerably thanks to the Emotron solution minimizing mechanical stress on components. Above all, the replacement of brake pads is a thing of the past as the old operating brakes are now only used as holding brakes and when conducting emergency stop tests.

Technical specifications

Loading capacity	6.3 t, radius 9.5-25 m 12.5 t, radius 9.5-13 m
Working speed, grab	63 m/min
Luffing time	approx. 50 s
Turning speed	1.6 rpm
Travel speed	40 m/min
Motor power hoist drive	2 x 67 kW, 4-pole, 500 V, with encoder



Emotron was responsible for engineering, delivery of the motors, construction of the cabinet equipment and commissioning.

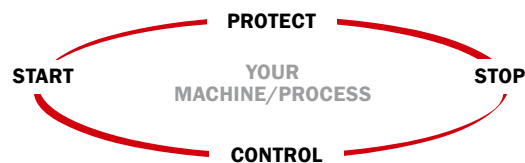
Dedicated drive

Emotron develops products for starting, protecting, controlling and stopping machines and processes driven by electric motors. Our drive is to create measurable benefits for our customers through reliable, cost-efficient and user-friendly solutions. By focusing on selected applications, such as pumps, cranes and lifts, we can offer functionality optimized for specific needs.

Since 1975 we have established a solid position as an innovative and pioneering company. Research and development takes place at our head office in Sweden and at our subsidiaries in Germany and the Netherlands. Germany is also the location for the Emotron technical centres for lift and crane solutions. We have sales offices in Sweden, Germany, the Netherlands, China and Latin America, as well as a worldwide network of authorized service partners.



Products for your specific needs



Our complete product portfolio offers optimum solutions for your specific needs. The products are all based on the same technology platform and can easily be integrated in complete solutions. Wide power range, high protection class and compliance with global standards mean they fulfil the highest demands.

- *Shaft power monitors* – protect your process from damage and unplanned downtime.
- *Softstarters* – ensure smooth starts and safe stops.
- *Variable speed drives* – minimize energy consumption and wear.



Emotron AB, PO Box 222 25 , SE-250 24 Helsingborg, Sweden
Phone: +46 42 16 99 00, Fax: +46 42 16 99 49
www.emotron.com

Emotron partners worldwide – please see our website