

Rebuilding a container crane for Madagascar Port

Refurbishment is an attractive and less costly alternative for replacing port equipment

Ralf Teichmann GmbH, Essen, Germany

A typical 'like-new' solution

In 2009, Ralf Teichmann GmbH from Essen, in close coordination with the Distripool Schiphol Holding BV, a consortium of Dutch forwarding agents, completely redesigned, rebuilt and supplied a used container gantry crane to the Madagascar Port in Amsterdam.

In this project, Ralf Teichmann GmbH could again successfully put into practice their corporate philosophy as a full range supplier of cranes in mint condition. The crane had originally been used by Deutsche Bahn AG (German Rail) and was dismantled by their staff, reconstructed in Essen, and finally erected at its new location at the Madagascar Port in Amsterdam. All logistical services, including the simultaneous deployment of six large truck-mounted cranes, were likewise coordinated from Essen.

Redesign of the steel construction

Since the crane had formerly been used at an inland terminal with no water connection, extensive work had to be done to adapt it to the new location. After intensive discussions with the customer on site and in Essen, the crane was completely reconstructed. The span was reduced from 25 meters to 22.5 meters. To enable the efficient unloading of container ships, the cantilevers had to be extended on the water side to a length of 18 meters, and on the

land side to 12.5 meters. Since the cantilevers facing the water side are exposed to harsher conditions, the decision was made to not only reinforce the support columns, but also to provide for anchoring of the pylons to increase stiffness. After completing the necessary calculation and design work, Ralf Teichmann GmbH implemented the project at their own production facilities.

By optimizing the hoisting gear and installing a new rope drum, the crane was adapted to the required lifting height to be able to lift one container over four, and was likewise prepared for the lowering depth underground below the rail surface.

The Distripool Schiphol Holding BV was interested in enabling efficient container handling without any time delays. Consequently, the distance between the columns was extended to allow containers of up to 40 feet to be transported without the time consuming overhead of turning them around between the columns. This dramatically increased the handling capacity which, in turn, can mean a significant competitive advantage for a tri-modal terminal with storage as well as direct ship truck transhipment between vessels.

The technical specifications of the crane remained largely unchanged. This applies to both the lifting capacity of 42 metric tons at the ropes and the operating speeds (hoisting full load/partial load: 10m/min and 18m/min; trolley travelling 45m/min; crane travelling 75m/min).



Capacity: 42 metric tons
Span: 25m
Cantilever fixed leg: 5m
Cantilever pendulum leg: 10m

Original container crane.

Capacity: 42 metric tons
Span: 22.5m
Cantilever land side: 12.5m
Cantilever water side: 18m



Container crane after reconstruction.

Reconstruction of the electrical system

Besides the steel construction, the complete electrical equipment of the crane was also renewed – starting with the main power supply, which was converted from 400 V to 10kV, down to the high voltage cable drum and the high voltage transformer.

In order to be prepared for future expansions of the terminal, the cable drum was designed so that a crane runway of about 300 meters (its current length is 200 meters) can also be used later without any issues. After completely gutting the existing electrical switching cabinet, the electrical installation was reassembled on mounting panels.

The crane was equipped with a new controller based on frequency converters, including SPS S7 and Profi bus. To secure emergency operations, the control system was designed to be fully redundant. Even in terms of hardware and software, the crane is now equipped with state-of-the-art technology. A powerful computer was installed for the warehouse management system. In addition, the crane includes a crane management system to identify all crane coordinates such as the hoisting gear, trolley, crane bridge, and so on. The current position of every single container can thus be localized in real time.

In order to meet the rigorous safety requirements in modern container terminals, Ralf Teichmann GmbH installed a system for personal safety and obstacle monitoring, which stops the crane as soon as any obstructing individuals or objects are detected on the crane runway.

To calculate the cargo-handling operations as quickly as possible, the weighing technology for the containers was optimized so that the measurement takes place during the lifting procedure, with wireless transmission of data. Consequently, no separate weighing is needed, which again optimizes the handling capacity. A further feature of the new crane installation is the integrated power measurement system, which allows the operator

to measure, track and account for the energy consumption of the crane on a per container basis.

“A special challenge in this crane construction was the so called ‘cocoa containers’,” explains Urban Lehmkuhler, Technical Manager of Ralf Teichmann GmbH. “These types of containers have an electrical hydraulics system to open the bottom of the container and allow the dust free loading of dry bulk materials like cocoa. We therefore had to develop a system that could supply power to the containers.”

An appropriate prototype was developed: When connecting the containers with the twist locks of the spreader, the crane operator has the option of connecting the power supply at the same time by simply pushing a button. The containers are then opened by the operator on the ship by radio control and subsequently closed. After having returned the container to the storage area, the crane operator disconnects the power supply.

Conclusion

“With this successful project, we have once again impressively demonstrated our capabilities as a full service provider of ‘like-new’ cranes from a single source,” states Ralf Teichmann, Managing Director of Ralf Teichmann GmbH. “Our customer received a state-of-the-art crane within a very short time frame, and at only 60% of the costs they would have incurred for a new steel construction. This results in decisive competitive advantages.”

Besides the crane itself, the scope of delivery for the group of Dutch forwarding agents also included the rails for the crane runway with special track supports and end stops, as well as a telescopic spreader for 20–40 foot containers in the form of a rotary spreader with gravity point adjustment. Furthermore, the crane was fully repainted in the color desired by the customer, while taking the specific climatic requirements of a seaport terminal into account.

ABOUT THE COMPANY

TEICHMANN Cranes was founded in 1988 by Mr. Ralf Teichmann and is today, with about 200 employees, Europe’s leading supplier of used, overhauled or rebuilt cranes. After having taken over BRUNNHUBER in 2009 both new and used cranes are offered to customers from all over the world.

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