

KUENZ FREERIDER

THE NEXT LEVEL OF RTG

Decades of experience and continuous product improvement has led Kuenz to become an innovation leader in the container handling industry. Our crane components are designed and selected with a focus on safety, availability, reliability and efficiency. Because of these strengths, we've elevated the common RTG design into the 21st century with its latest product innovation – the Kuenz FREERIDER – unveiled in 2018.

MORE EFFICIENT, FASTER AND FLEXIBLE

We didn't want to copy and paste or simply update the common RTG designs "For Kuenz it was clear that we cannot succeed when we don't go new ways" says Walter Schoenecker, Product Manager Kuenz Freerider. The primary objective was to meet the requirements of the future container handling business for greater efficiency and faster and more comfortable container handling.

WHY AN RTG FROM KUENZ?

The industry knows that we have the expertise in building rail mounted container cranes and we want to fulfill the customers demand for a wider product range. This demand has resulted in the Kuenz Information System (KIS) and new solutions in automation, as well as the development of the FREERIDER.

WHY FREERIDER?

It is the missing link between the existing RTG and common ASCs. Converting RTG brown field terminals to automated operation is a new milestone for the industry and the FREERIDER gives it several options, including:

- Operate the RTG on common operation mode as today
- Operate the existing RTG terminal with the Freerider and use all the benefits
- Change the existing operation models to future needs

Existing RTG operations were originally used for the side loading and unloading of containers for horizontal transport, usually in a trolley movement. In this instance the conventional RTG was used in trolley movement.

Furthermore, characteristics of RTGs include low operating speed, weak gantry structure and operational instability. Finding solutions based on automation, therefore, was a challenge. The future of container handling is automation. We know that the basis for a well working automated crane is a proper mechanical concept and key performance indicators. We measure these on the mechanical side (stiffness of the crane and rope tower), via intelligent travelling drive units, accurate manufacturing of all components and self-adjusting systems (such as rope adjusting during lifting).

Maintenance costs and time pressures are great challenges in automated terminals. Therefore, beside the cost, there is a risk when people need to enter an automated terminal to tend to cranes. To fulfill all these future requirements, the FREERIDER redesign results in three important innovations:

- Kuenz FREERIDER - improved gantry structure design.
- Kuenz SPIDER – a patented new hoist system
- Kuenz ONE HAND – an easy and intuitive new operating system

IMPROVED GANTRY STRUCTURE FREERIDER

The mechanical concept has been optimized to an ideal cost-performance ratio. The new design reduces gantry weight and pressure. Following years of work on automated equipment, we are focused on the next step. In fact our customers have already increased terminal operational productivity and operational safety, reached lower overall yard operational costs with greater efficiency of operational control and, last but not least, improved ROI. We meet these needs with high quality FREERIDER, RMG and ASC crane technology - optimizing energy and minimizing breakdowns, as well as offering the best class services by monitoring cranes that are being used at a port container terminal or intermodal center.

The new crane gantry structure is stronger and lighter, due to an innovative aerodynamic design. It is manufactured as a stiff and robust single girder with-

an aerodynamically shaped main girder and A-shaped posts. Four traveling gears, each consisting of four rubber tires, are equipped with- a steering gear, which allows for different travel directions. The stiff aerodynamic gantry structure, together with the robust rope tower of the new hoist system SPIDER allow for significantly higher travel speed, even with a fully loaded container up to 130 m/min.

SPIDER HOIST SYSTEM

The new, patented SPIDER hoist system is currently the most innovative and advanced hoisting gear concept on the market. The rope tower consists of eight rope drums and is a key function of- the Kuenz FREERIDER. A special 8x2 rope reeving system creates a rigid rope tower with a mechanical anti-sway in all directions. Additionally, the hoist system is able to perform micro-motion movements, as well, trim and list functions. All combined in a single system – it is independent from the gantry and trolley drives.

It ensures optimum, precise, and safe container handling. Auxiliary ropes are not required for -the fine positioning. Furthermore, no additional anti-sway or micro motion is necessary for a smooth-operation. The integrated Micro-Motion allows +/- 5° of all movements and a horizontal shift of 300 mm in all directions.

With the new system, the rope's lifetime can stretch to more than 400,000 moves, a great deal longer than conventional





RTG hoists. With the self-calibrating hoist system, a rope can be changed in less than two hours. The combination of a stiff gantry structure, stiff gantry travel units and the high stiffness of the SPIDER hoist system means the FREERIDER is an upgrade on conventional RTGs. The key features are its ability to operate quickly when carrying a loaded container and that its system is ready for full automation. Of course, it is possible to automate every piece of equipment. It just depends on how many sensors and other equipment you put on the crane. However, just a stiff structure allows you to keep the automation system simple and reliable.

OPERATING SYSTEM ONE HAND

The new Kienz Operating System ONE HAND is a ground-breaking method of crane control. The control desk allows for an easy, comfortable and intuitive one-handed operation. The ergonomic control unit offers accurate and smooth crane movements in all directions, as well as all six degrees of freedom.

The remote station in the cabin has two One Hand Controllers, one for the left and the right. In the future, we want the operator key to tell the system, if the operator is left or right handed, which will improve health and safety standards during operations.

Furthermore, this system can be integrated on all Kienz cranes and remote stations.

BENEFITS

The main benefits for terminal operators are numerous and include:

- Higher productivity – fewer RTGs needed: The stiff aerodynamic gantry structure and the robust rope tower of the Kienz SPIDER hoist system allows a significantly higher travel speed, even with a fully loaded container. Its maximum speed is 160 m/min when empty and 130 m/min when fully loaded. Because of the higher speed, it is 20% more productive than common RTGs. In addition, the Kienz SPIDER and Kienz ONE HAND systems guarantee faster positioning. Consequently, when compared to traditional RTGs, fewer FREERIDERS are needed to handle the same amount of containers in a terminal.
- Total Cost of Ownership: Fewer cranes means fewer operators and lower costs. In addition, the aerodynamic gantry structure of the FREERIDER significantly reduces power consumption. We estimate operational costs to be 20-30% lower over a crane's lifetime.
- Intuitive control of cranes – Skills of operators: Because the Kienz ONE HAND system is so intuitive, it does not require the same intensive training as traditional control systems. This will make operations safer, while saving money.
- Ready for automation: As well as the above-mentioned benefits, the Kienz FREERIDER is also opening up completely

new possibilities for automation. This makes the Kienz FREERIDER a future-proof investment, even if you will still work with operators on the RTGs.

CONVENTIONAL RTG OPERATION

How can the FREERIDER change today's RTG operation? Simulations have shown that the new design can increase productivity of an RTG by as much as 20%. This allows you to save on equipment, maintenance and labor costs. Currently, it is common to wait a long time for horizontal transport, which makes the whole system slow and unproductive. The FREERIDER, however, lets you make better use of your time by allowing you to do the necessary housekeeping between moves and/or transport breaks.

Therefore, it is more flexible than other RTGs currently on the market and can help you save money by cutting the amount of additional equipment you use, such as straddle carriers, reach stackers and tractors. Additionally, you will cut labor costs because the FREERIDER combines two jobs – the horizontal loading and the necessary housekeeping.

FREERIDER- The wheeled Automation

In recent years, the major challenges facing stacking crane operations in ports has been positioning accuracy, interfaces to neighboring machines, speed and overall performance. The stacking area has been fully automated and the exchange area on the water and land side mostly semi-automated- depending on the layout of the



terminal. When the industry asked us for RTGs it was always in response to the same problems. Common RTGs bring big safety problems, such as, high operational costs and high maintenance costs.

The industry is currently faced with the problem that they have to invest a lot of money in equipment to solve the problems that come from the weak gantry structure of RTGs and semi-automated cranes with the same old safety problems. Because of the high degree of automation equipment, they will be less reliable and be expensive to maintain.

At Kuenz, we're known as an innovative industry leader that offers the most advanced and capable automated crane systems on the market. The Kuenz FREERIDER was specifically designed to meet high-level automation requirements. Because of the high gantry speeds, it is possible to operate the Kuenz FREERIDER like an Automated Stacking Crane. This is what we refer to as 'Wheeled Automation'.

The concept of 'Wheeled Automation' consists of:

- Transfer zones at each end of the block
- 1 or 2 RTGs per block which are powered by a mono spiral cable drum or bus bar system
- RTGs equipped with a small generator set to switch blocks.
- Standard laser and camera systems combined with remote operating stations known from typical ASC terminals.
- Standard infrastructure as used for manual RTG's.

'Wheeled Automation' can be implemented step-by-step in a terminal operation. The following modes are available:

- Crane operation by using a remote operating station
- Semi-automated operation – loading / unloading of trucks still done by a remote operator, stack operation fully automated
- Fully automated operation – loading / unloading of trucks as well stack operation fully automated
- Because of end-loaded design, it is even possible to load / unload outside trucks fully automatic

The concept of 'Wheeled Automation' is the most modern RTG automation concept available in the market providing for lowest operating costs combined with maximum safety for people inside the terminal. Compared to a sophisticated modification to an automated ASC terminal, the automated FREERIDER concept improves your operation by converting your RTG Brownfield to an end loaded block. Modification works occur systematically without effecting your daily terminal operation.

Existing RTG tracks can be reused - furthermore, no significant civil works are required, except electrification, enclosure and building of the transfer zone. Systematic moves to remote and automation using the existing TOS interface. Stacking capacity will stay the same as ever. We are sure that the FREERIDER is ready for the future tasks and will help the industry on the way to safer, costless and automated operation in the future.

ABOUT THE AUTHOR

Walter Schoenecker is the Head of the product development FREERIDER at Kuenz. He is in charge of the FREERIDER development. Before he was responsible for sales and project management of hydro mechanical equipment for power plants at Kuenz. He studied Civil Engineering and Economics at the Graz University of Technology, Austria and employed at Kuenz for more than 10 years.

ABOUT THE ORGANIZATION

Kuenz was founded in 1932 by Hans Kuenz who succeeded in creating a significant and successful mechanical engineering company in a very short period of time. The company started out manufacturing tower construction cranes. The focus later shifted towards manufacturing container cranes, followed by hydro power equipment. Kuenz is one of the oldest and most prestigious mechanical engineering companies in Austria.

ENQUIRIES

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