



Kalmar automatic stacking crane system

End-to-end efficiency

 **KALMAR**



No time to waste, the future is here

Your challenge can be summed up in just a few words: more container traffic, less time, less space. Add to that the need to increase safety, reduce costs and eliminate the risks of mistakes, and you'll find that automation is the answer. Consultation and planning together with us at Kalmar terminal development makes you prepared for the future.

As the shipping lines want faster and more predictable turnover times, the demands on your terminal are ever increasing. So, we know that everything that can save you time and resources is extremely valuable. Just a few seconds saved at every container move means a significant increase in productivity every year.

That's why we've driven the development towards ever more automation, using our advanced and proven technology to answer your demands. Kalmar is the system integrator: crane, electrical system and automation.

Increasing your productivity with the Kalmar automatic stacking crane

Constantly high throughput, predictable and reliable performance 24/7, less need for personnel, no lost containers, higher stacking density, safety – the automatic stacking crane brings lots of advantages to your container terminal.

Already in 1990, we were the first to introduce the automatic stacking crane at ECT Delta Terminal Rotterdam, the Netherlands.

Today, end-to-end efficiency is realised both in waterside and landside operations by Kalmar integrated automation solution. Kalmar features

advanced automation at the quay, in the yard and when handling trucks, ensuring efficiency is optimised in your every move.

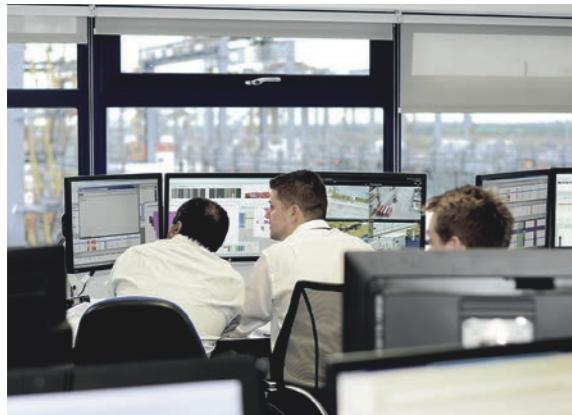
Fit for all horizontal transport systems

To get the optimal solution for your terminal, you can combine the automatic stacking cranes with other equipment types, automated or not. Just turn the page, and you'll see how some of the world's busiest and most advanced terminals have teamed the automatic stacking cranes with other equipment to handle their container flows.

DP World London Gateway

DP World London Gateway is a new mega-terminal with **automated yard operations**. **40 automatic stacking cranes** handles the container flow in an **integrated solution** with **Kalmar shuttle carriers** and **Navis N4 terminal operating system (TOS)**. The performance of the equipment is optimised by **Kalmar TLS**.

Manned shuttles are used for the transport from the ship-to-shore area to the ASCs. On the landside, **Kalmar automated truck handling feeds containers to road trucks** and to cassettes which are operated by terminal tractors.





DP World Brisbane

At DP World Brisbane, the terminal has been converted from reachstackers to **automatic stacking cranes in an integrated solution with Kalmar shuttle carriers and Navis N4 terminal operating system**. The performance of the equipment is **optimised by Kalmar TLS**. In the first phase of the conversion, a total of 14 ASCs are installed.

Manned **shuttles are used for the transports from the ship-to-shore area to the automatic stacking cranes**. On the landside, **Kalmar automated truck handling feeds trailer-trains up to 4 TEU**.



CTB Hamburg

The CTB Hamburg terminal will be gradually converted **from straddle carriers to automatic stacking cranes**. It uses a unique Kalmar ASC System with **three cranes per block**, in total 24 automatic stacking cranes, and the performance of the equipment is **optimised by the Kalmar TLS**.

The terminal uses **manned straddle carriers for ship-to-shore** traffic and yard stacking, for feeding the containers to the ASCs from the waterside, and feeding containers from the ASCs to a rail yard on the landside. **The truck handling is operated by remote control through a Kalmar system.**

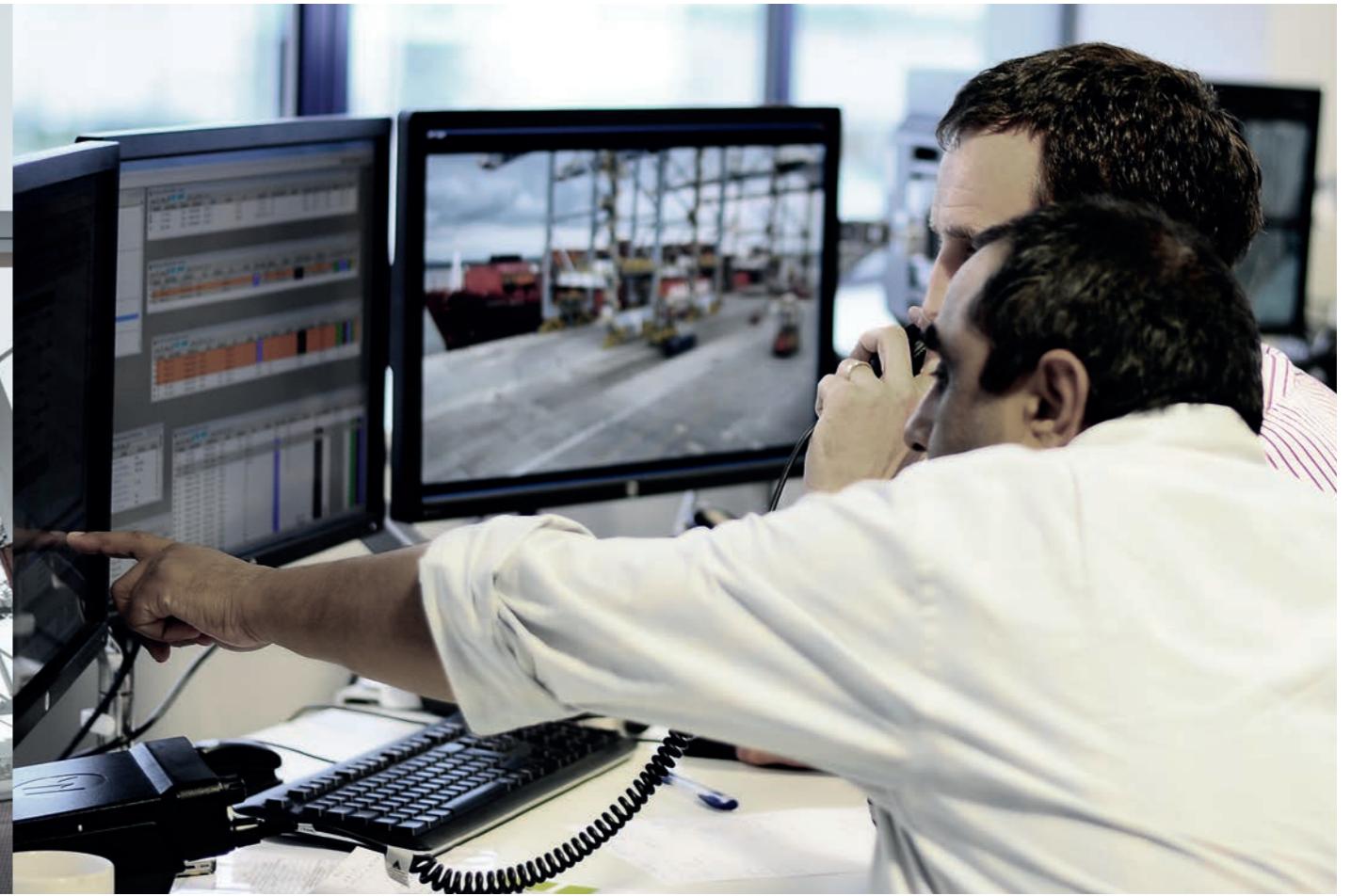


ECT Delta Rotterdam

ECT Delta is **the first fully automated container terminal in the world**. It's a combination of **an automatic stacking crane yard and automated guiding vehicles**, AGVs, on the waterside. On the landside, manned straddle carriers feed containers from the ASC yards to road trucks. The first Kalmar automatic stacking cranes were delivered in 1989, and today there are 105 Kalmar ASCs in operation.

In order to **improve the performance at the ECT Delta Terminal in the short and longer term, a large investment programme is being carried out**.¹¹ Kalmar 1 over 5 high automatic stacking cranes are replacing old 2 high cranes to increase the stacking capacity.

A **one crane per block design aims for simplicity and high reliability**, supported by a **rescue crane concept**.



Minimise your integration risk

Kalmar TLS is an all-in-one package.

Optimised performance

In a container terminal environment it is extremely important to guarantee that things happen in the right sequence and in the expected time frame. Optimising equipment performance by one centralised system, Kalmar TLS, generates additional benefits such as easier implementation, reduced complexity, and improved productivity and performance from day one.

Intelligent logistics

TLS controls and monitors both individual machines and your equipment fleet as a whole to enable optimal efficiency. Based on the container moves received from the TOS, TLS schedules and executes equipment moves based on its knowledge of the position and status of each machine. TLS then assigns the most appropriate machine for each move. The system determines the time and order

of delivery within the constraints of your ship-to-shore workflow.

Integration at all levels

Kalmar TLS integrates all equipment to ensure a smooth start of operations, saving you time in interface testing and providing more time for crucial integration testing. This significantly increases the productivity of the terminal during the "go-live" phase. Having one supplier for all equipment means no duplication or mismatches of the systems and software.

Advanced diagnostics and monitoring tools ease maintenance and coordination of all Kalmar equipment. Since TLS is the only system pre-integrated with Navis N4 (TOS) and Kalmar equipment, it supports any brand TOS and any brand equipment. The ability to interface with any type of system ensures your operations are captured in a single platform.

Integrated safety system

Container flow from ship to yard requires seamless and safe operation of the ship-to-shore crane, horizontal transport system and automatic stacking cranes. Kalmar TLS secures safe interactions on all above equipment interfaces hence fewer containers are lost and fewer goods are damaged.

One look and feel

The common look and feel of all Kalmar automation products and high-usability graphical user interfaces makes operator training easier and faster. This includes integrated fault finding, monitoring and diagnostic system interfaces for the entire fleet.

Extending the automation towards ship and road

The automatic stacking crane works seamlessly with pre-integrated Kalmar

AutoShuttles serving the waterside and automated truck handling on the landside, further increasing the benefits you gain from Kalmar TLS end-to-end automation. Through Kalmar in-house automation the everyday performance of the ASC system is guaranteed.

Lifetime support

Kalmar TLS software maintenance and support ensures future compatibility of the software with the latest operating systems, databases, hardware and so on. Also, compatibility with future releases of Navis products is provided. This protects the long-term investment to the automation system against rapidly changing IT and automation technology, and provides the customer with future enhancements and improvements.



Improve your productivity

Kalmar ASC+ meets your needs.

Fit for automated port

Kalmar ASC+ references cover all the main market areas. The crane fits your highest stacking density requirements and operational needs. Your investment risk will be minimised with Kalmar as the single point of contact – all the way from the automated terminal development phase to delivery and the support of your everyday operations.

Safety and predictable performance

Seamless integration between the crane and block control elements ensures high performance and minimises the risk of accidents and material damage. The collision avoidance system guarantees safety on the ASC block level, thus maximising the productivity of the crane pair operation.

Save energy every day

The low-weight crane design with all-electric Bromma YSX-45E spreader, combined with the electrical supply having full regeneration capability, ensures a high degree of energy efficiency in your daily operations. Energy usage is further reduced by intelligent idle time management and LED light control when no jobs are in operation.

Secured availability of high-speed yard crane

Innovative drive-assisted braking functionality prevents gantry wheel breakage due to slipping and reeling cable slack during an emergency stop. Stand-alone disc brakes enable higher braking capacity and ease of maintenance. Fully automated storm stowing can cope with the highest regional wind requirements, which maximises crane uptime.



Taking automation one step further

Kalmar automated truck handling.

Major operational savings

Kalmar automated truck handling is the first solution in the world that automates your landside operation. The solution that is designed for a high productivity level and a constant success rate. Man-hours are reduced, efficiency increased and the truck turn-around time shortened. All with uncompromised safety. The amount of the remote controlled operation is minimized to exception handling only, significantly cutting labour costs.

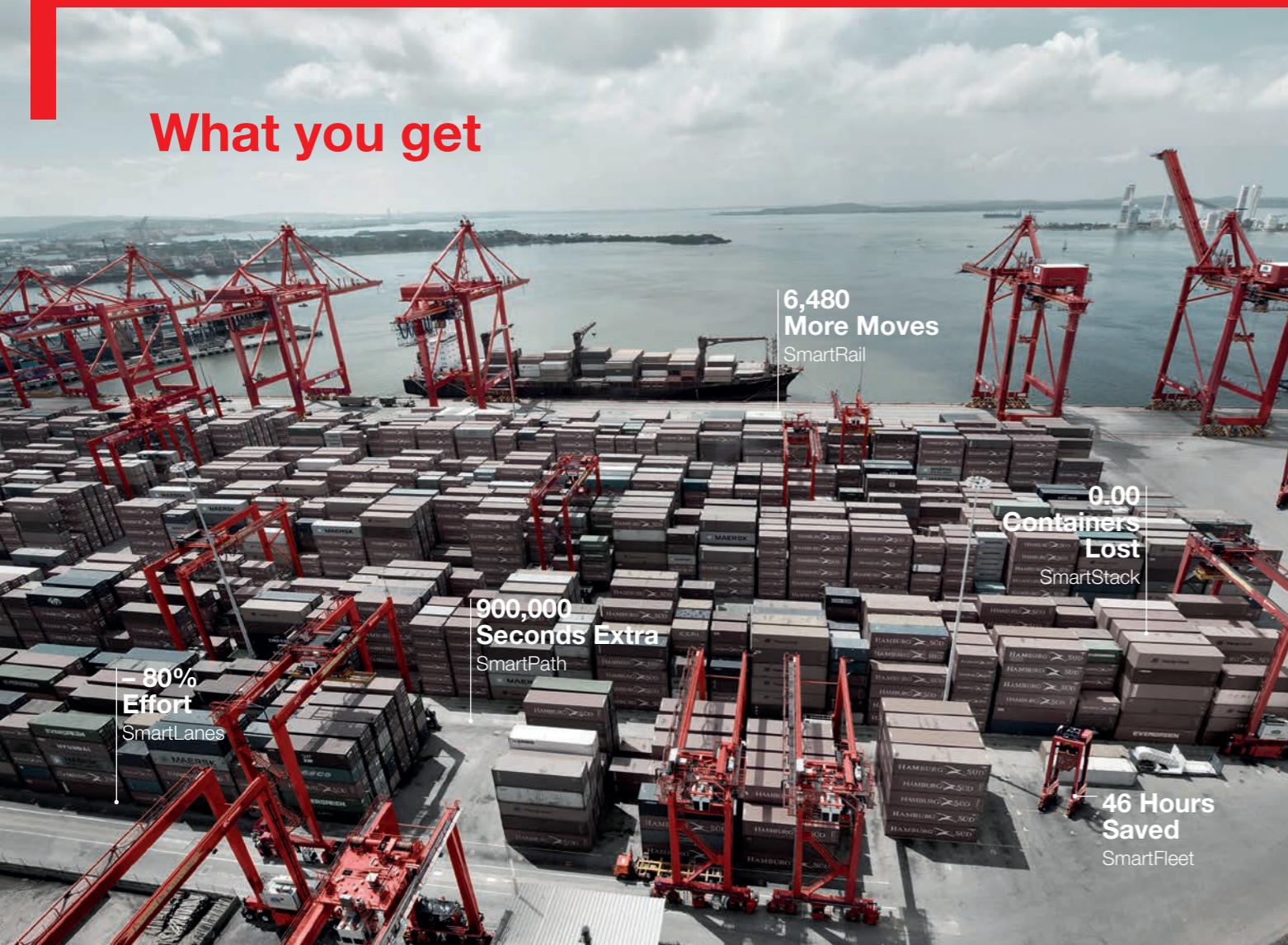
Improved landside safety

Automated truck handling improves the safety of landside operations, which means less

accidents, less damaged goods, and lower insurance and compensation costs. Lifting as well as grounding of the containers is fully automated by laser based truck lane measurement technology. Measurement is done while the crane is approaching, causing no delay in truck handling. This means that truck turnaround time is shorter.

Automated truck handling works with trailers with twistlocks, internal chassis and cassettes up to 4 TEU long. Together with our other automation solutions for your operations it means a fully end-to-end automation including the landside.

What you get



Automation systems that turn seconds into savings

Whatever equipment you use, we offer Kalmar SmartPort process automation solutions for all terminal areas. They are suitable for any size of terminal, any brands of equipment and any terminal operating system, TOS.

Kalmar SmartPort solutions maximise your terminal's productivity by optimising information flows within the terminal. This gives you lower overall operational costs and improved safety. It's a quick way for you to get immediate effects on the productivity.

The SmartPort solutions capture information automatically, eliminating the need for human input and human errors. By making the relevant information available at the right place at the right time, you can save a few seconds per move. It may not sound much, but it leads to significant annual savings. For example, if there are 300,000 moves per year at your terminal, saving just three seconds per move would save you over 10 days per year.

Making sure your business never stops

Kalmar Care covers all the essential services for automated equipment and terminals, providing you with guaranteed equipment availability and improved financial predictability. Whether you require occasional extra hands in the existing organization or an optimal maintenance package with personnel, Kalmar Care caters for your needs.

Automation changes the maintenance focus

Equipment automation not only changes the way how you operate the equipment but also how you handle maintenance. We use intelligent systems to monitor, report and analyse the data generated by the equipment, which provide a wealth of real-time information of their condition and performance. With this information at hand, you can increase the share of preventive maintenance, allowing you to move from reactive mode to more planned operations. As a result you will reduce the total cost of maintenance, cut unexpected downtime and improve equipment availability.

A smooth start with automation

Automated equipment also requires a new set up of maintenance competencies. Developing them can be time consuming, but your business doesn't always have the time to wait. Therefore we offer professional maintenance management as well as skilled maintenance personnel and training, ensuring as smooth start with automation as possible for you.

For different contract types to fit your business needs

Kalmar Care consists of four different tailorable contract types. The range of services include for example inspections, corrective and preventive maintenance, software, automation and infrastructure maintenance, as well as 24/7 support and online troubleshooting. In addition, our extensive spare parts management reduces obsolescence and tied-in capital by optimizing your spare parts inventory.

Kalmar Care supports all cargo handling brands. We are present in over 100 countries, with more than 1,500 service professionals supporting more than 1,000 customers worldwide.





Kalmar offers the widest range of cargo handling solutions and services to ports, terminals, distribution centres and to heavy industry. Kalmar is the industry forerunner in terminal automation and in energy efficient container handling, with one in four container movements around the globe being handled by a Kalmar solution. Through its extensive product portfolio, global service network and ability to enable a seamless integration of different terminal processes, Kalmar improves the efficiency of every move. www.kalmarglobal.com

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