

Kalmar automated terminals



Drivers of automation, Kalmar

Get automated

More container traffic, larger vessels and shorter turnaround times drive the need to process more containers in less time and in less space. Combine this with the absolute requirement for safety, the need to reduce costs as well as ever stricter environmental regulations, and automation is the natural solution.

Automation ensures consistent, predictable and reliable performance. This makes your planning and ship handling dependable – giving your terminal a competitive advantage and boosting your business. The increase in productivity reduces operational costs and builds a solid foundation for future growth. With automation, you're ready for tomorrow, today.

Putting innovation in automation

In 1990 we were the first to introduce automatic stacking cranes, and we launched the first automated straddle carriers in 1993. We continue to lead the industry in equipment automation solutions, having delivered the first automated straddle carrier terminal in 2005 and the first three-crane automatic stacking crane system in 2009. We also realised a terminal featuring multiple automatic stacking solutions in 2014, and introduced the most advanced rubber tyred gantry crane, RTG, terminal to date, due to open in Oslo, Norway in 2015.



Fit for purpose

The automation of the brownfield TraPac terminal in Los Angeles, USA, is built around a fully decoupled process. The terminal combines three automation concepts: perpendicular and parallel ASC stacks and a diagonally placed AutoStrad stack. TraPac remains fully functional during the upgrade process.

The latest terminal designs combine a range of the leading container handling technologies. As a result, the benefits of automation are accessible for both greenfield terminals and existing brownfield terminals. The transition from a manual to partial or full automation terminal can be done step by step to avoid a loss of capacity, or by expanding into an unused area.

With automation proven for ship-to-shore handling rates of 25 to 30 containers per hour, decoupling of vessel and yard operations is key to reach the projected performance of around 40 to 45 moves per hour. Decoupling enables you to maintain a smaller fleet while reducing congestion and equipment idle time.

Whatever automation technology, the solution should be fit for purpose. Kalmar's portfolio includes technologies allowing the realization of an AutoStrad terminal, Automatic Stacking Crane terminal and AutoRTG terminal – or a combination of those.



Automatic Stacking Crane

AutoStrad

AutoShuttle

AutoRTG

**Kalmar
automated
terminals**

Process
automation

Automated
straddle
carrier
terminal

Automated
RTG terminal

Automatic
stacking
crane
terminal

Hybrid
terminal

The ease of automation

Realising an AutoStrad terminal can be simple, low-risk and achieved within a relatively short time frame. Only a single piece of equipment is required for the automation of your quay, stack and landside operations. Automation has a positive impact on your terminal operations overall: automation means longer servicing intervals and fewer lost-time injuries, while avoiding the need for line markings and night-time lighting.

Added value

Straddle carrier operations are typically suited for midsize terminals. When increased volumes require a higher stacking density, the AutoStrad can still provide transportation to an ASC.

You can convert from a manual to an automated straddle carrier terminal without any temporary drop in capacity and throughput. We can future-proof straddle carriers during manufacture by configuring them for both manual and fully automated operation. This means that you can move towards automation at your own pace.

Technology

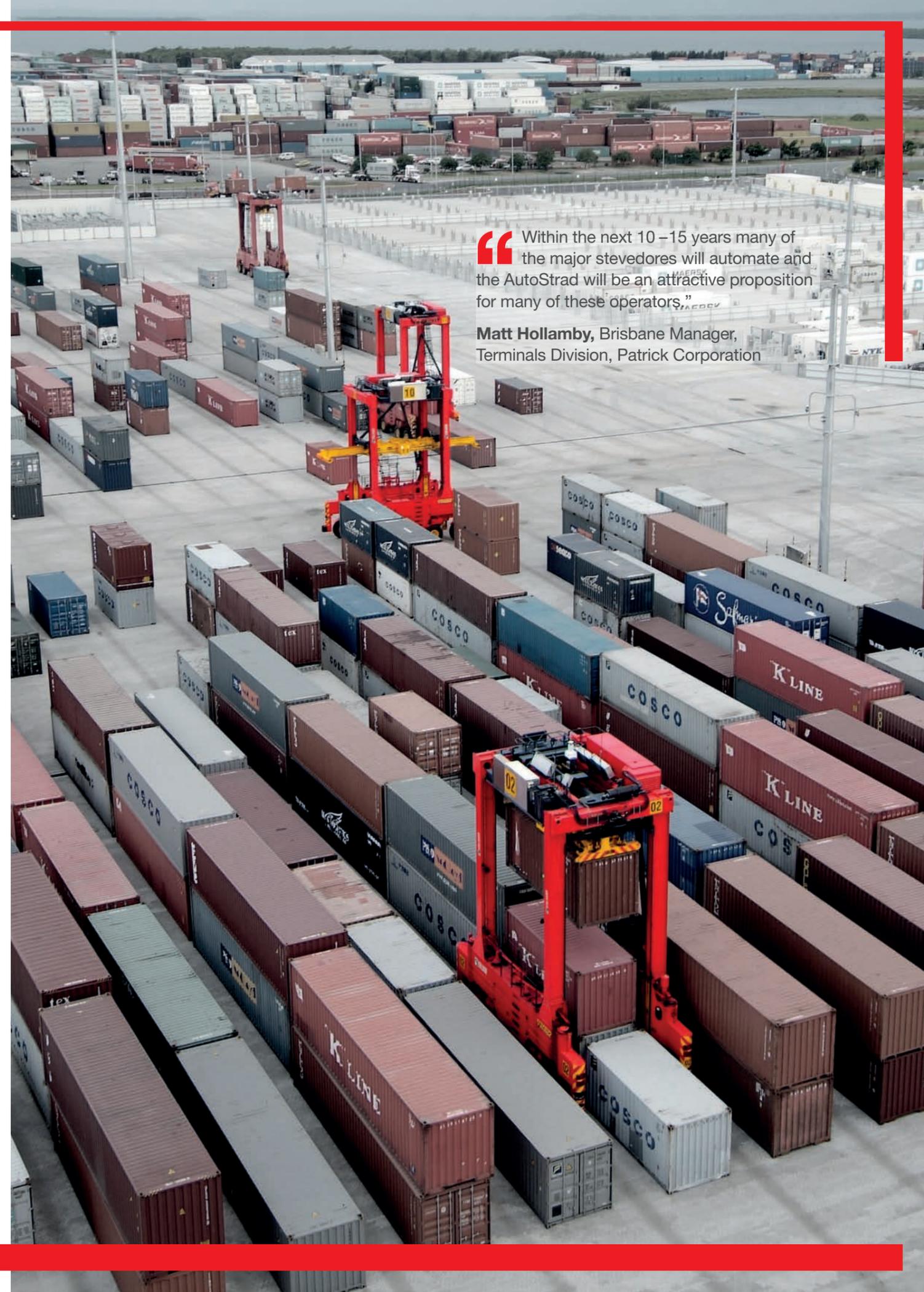
The AutoStrad vehicles are self-contained and autonomous in terms of navigational integrity. The vehicles navigate based on virtual routes within 2cms accuracy, providing unmatched reliability and flexibility. In combination with the ability to simply deposit the box on the pavement, decoupling the duty cycles of quay and yard cranes, and allowing building of buffer stacks behind the crane, the flexibility of the technology moves you ahead.

With its proven design, supreme reliability and easy maintenance, Kalmar's straddle carriers are the industry workhorses. An AutoStrad based on the hybrid version consumes up to 40% less fuel, saving even more operational costs and making your operations more sustainable.

This intelligent technology makes the AutoStrad the most flexible way to realise your automated terminal.

“ Within the next 10 –15 years many of the major stevedores will automate and the AutoStrad will be an attractive proposition for many of these operators.”

Matt Hollamby, Brisbane Manager, Terminals Division, Patrick Corporation





Automatic stacking crane terminal

End-to-end efficiency

“ Ultimately, we felt that a combination of ASCs and shuttle carriers would not only provide the best financial return on investment, but also the highest level of waterside productivity.”

Mark Hulme, Director & General Manager, DP World Brisbane

End-to-end automation from water- to landside is possible through the combination of Kalmar AutoShuttles, automatic stacking cranes and Kalmar automated truck handling. The solutions improve the efficiency of operations, space and energy consumption in each process.

Added Value

Automatic stacking cranes enable the highest possible capacity and stacking density. Automatic stacking cranes optimise throughput and stack footprint, ensuring a predictable and sustainable performance landside, waterside and in the stack itself. When using Kalmar AutoShuttle™ as a feeder, apron size can be minimised, making your terminal as space-efficient as possible.

For greenfield terminals, the reduction in footprint size can result in significant cost savings, in terms of both land acquisition and terminal realisation.

The combination of ASCs and AutoShuttles is easily scalable, ensuring the capacity can be increased in phases.

For brownfield terminals, the space freed up could be used for an expansion of the stacking area that enables you to increase operational income.

Technology

A combination of automatic stacking cranes, and automated shuttle carriers helps you maintain high waterside productivity. It also ensures the highest standards of safety and compliance with maritime transport regulations. Automation minimises the potential for human error and improves safety. It also helps you avoid unexpected interruptions that impact productivity and profitability.

ASCs are often used in larger terminals, where throughput and stacking density are important key performance indicators. They have also proven to be a cost-effective solution in the long term for medium-sized terminals.

Our ASCs can be fitted with automated truck handling, which enables handling of street trucks directly at the ASC stack's interchange area. This improves safety and efficiency while reducing costs.

Unleash the potential of your RTGs



“ It offers us greater flexibility for the future, allowing us to take automation to the next level. Efficiency is everything in a country like Norway, where labour costs are high.”

Svein Olav Lunde, Director of Technical Operation & Maintenance at the Port of Oslo.

Rubber-tyred gantry cranes, RTGs, are the most popular equipment choice for container stacking at terminals around the world, especially where high-capacity stacking and good manoeuvrability are key requirements. Now you can release the potential of your existing RTGs by breathing new life into them, by upgrading. To drive greater operator safety and efficiency your existing RTGs can now be automated: allowing them to be managed remotely in safety and at an operator ratio of 1:3 for exception handling.

Added Value

Upgrading your current RTGs may be the start of a seamless journey that in the future results in your entire fleet of RTGs fully automated.

RTGs combine high stacking density with excellent manoeuvrability. This makes them a great fit for both medium-sized and larger terminals. By automating horizontal transportation by means of automated shuttle carriers, you make operations safer by removing the need for people to be in the handling lane under the crane.

Technology

Kalmar's TLS brings automation technology proven in ASC operation to the RTG environment. Various levels of automation, ranging from remote control to full automation, are available and can be introduced incrementally. Automation can be taken one step further by introduction of other Kalmar automation products such as the AutoShuttle and SmartPort process automation, as part of the integrated automation system.



Conducting automated operations

TLS is the key to realizing the full potential of your automated terminal: it ensures your automated equipment and terminal operating system, TOS, work in harmony and in the right sequence while accommodating for the exceptions typical in your operations. As a centralized system, Kalmar TLS ensures easier implementation and reduced complexity, while ensuring productivity and performance from day one.

Added Value

As the most flexible and widely adopted equipment control system, TLS is able to interface to any type of system – thus ensuring your operations are captured in a single platform. The common automation platform integrates your automated equipment, process automation solutions and access control, safety and fault monitoring systems. While TLS is the only equipment control system pre-integrated with Navis N4 and Kalmar equipment, it supports any brand TOS and any brand equipment.

The container flow from ship to yard requires seamless and safe operation of ship-to-shore cranes, the horizontal transport system and automatic stacking cranes. With all automation integrated in Kalmar TLS, it allows to focus on integration testing and securing safe interactions between equipment. This ensures both a smooth start to operations and a high productivity level at go live.

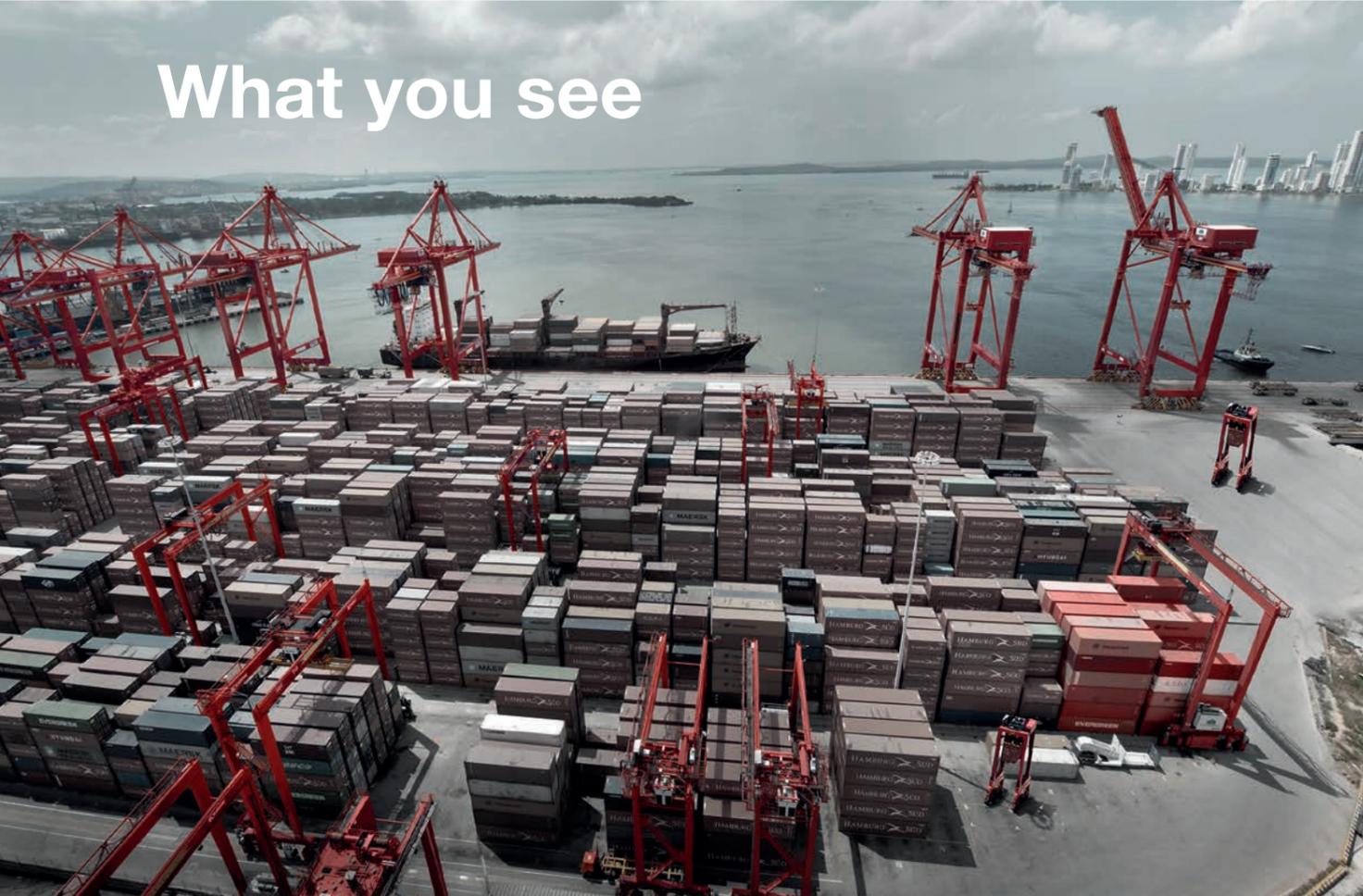
Technology

Kalmar's equipment control system TLS conducts planning, routing and execution for automated operations based on the orders from the TOS. TLS controls and monitors both your equipment fleet as a whole and individual machines 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.

TLS combines the advanced technologies of Kalmar and Asciano terminal logistic systems. It has been proven at different terminals worldwide since 2000, interfacing with all types of equipment, including automated stacking cranes, AutoShuttles, AutoStrads, automated guided vehicles, and ship-to-shore and rubber-tyred gantry cranes. TLS common look and feel, the first to feature a 3D interface, provides operators with better insight into the operations while also reducing the required training time.

Complementing your automation

What you see



What you get



For automated terminals there are several solutions that allow you to expand automation to more areas of the terminal.

Added value

Kalmar SmartPort process automation solutions optimise information flows within your terminal's business processes. This maximizes the efficiency and results in lower overall operational costs and improved safety. They are a quick and accessible way to get immediate productivity improvements for a relatively small initial investment. Our process automation solutions are suitable for any size of terminal, any brand of equipment and any Terminal Operating System (TOS).

SmartPort solutions capture information automatically. By making the information available in the right place at the right time, saving a few seconds per move 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.

Technology

Whatever equipment you use, SmartFleet enables remote monitoring and reporting of the equipment status. SmartQuay and SmartTracks ensure automatic identification of containers arriving or leaving the terminal per vessel or train respectively. Containers arriving or leaving the terminal by street truck can be processed and identified using SmartLane, while SmartTrucks allows for monitoring of those trucks while they are on the terminal.

In addition to the efficiency, process automation solution improve the safety of operations as well by removing people from harms way.

We offer process automation solutions for all terminal areas, and all brands and types of equipment.

Kalmar Care for automation

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 organisation 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.

Making sure your business never stops

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 Care offers

- maintenance for complete system
- structured maintenance management approach
- competent and skilled personnel
- optimised material management

Kalmar Care contract types

Support Care We support your maintenance process on demand.	Essential Care We perform agreed maintenance tasks proactively.
Complete Care We meet your complete maintenance requirements.	Optimal Care We optimise your business performance.



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

Kalmar
Porkkalankatu 5
FI-00180 Helsinki, Finland
tel. +358 20 777 4000

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