

## BTG Transponders for Singapore AGVs



After six years of testing, PSA has decided to use transponder technology for AGV navigation at Tuas Mega Port

PSA Corporation Limited (PSA) in Singapore and BTG Special Products (BTG) of the Netherlands have signed a five-year contract for AGV positioning measurement systems. About 400 AGVs will be equipped with BTG sensors when the first phase of the Tuas Mega Port development is completed.

"PSA decided to go with the BTG transponder technology after successfully testing it for six years at the Pasir Panjang Terminal. In addition, BTG is also supplying the STS gantry positioning systems for Tuas Port phase one," the companies said in a statement.

"Despite upcoming new technologies, the BTG absolute transponder measurement system proves to be the only highly accurate, reliable and all-weather system on the market for outdoor applications like container port AGVs," said BGT. "To simplify the transponder installation, BTG has designed its own transponder installation robot."

The order is something of a victory for an established technology. Companies looking to break into the market for AGVs and other automated horizontal transport vehicles are promoting newer sensor technologies and navigation systems that re-

quire no physical infrastructure on the ground, and therefore claim to be cheaper to install and more flexible than transponders. By contrast, the system BTG is supplying for Tuas Mega Port is the sixth generation of a product that was used with the very first AGVs in the port industry, at ECT in Rotterdam.

BTG said more and more automated terminals are willing to accept the higher initial investment in installing transponders because they are proven to be more accurate, reliable and, once installed, the complete system is easier to set up and commission on the crane side. Furthermore, the new installation robot reduces the installation cost significantly.

As well as applications for AGVs and STS cranes, BTG continues to grow its customer base in yard gantry applications, with six leading RTG manufacturers now using its Absolute 2-Dimensional transponder systems for gantry positioning. The system acts as a '2D linear encoder' and gives continuous absolute position information for each crane leg to an accuracy of 10mm. BTG also has a compact and easy to install spreader measurement system available.

## ZPMC in the yard at Charleston terminal

ZPMC has made a breakthrough in the US market with an order for 25 hybrid RTGs for the Port of Charleston's new Hugh K. Leatherman Sr. Terminal.

The Chinese crane maker has supplied several STS cranes to South Carolina Ports Authority (SCPA) over the years, but SCPA has preferred Konecranes for its fleet of RTGs. In May last year, SCPA announced that it was purchasing 26 RTGs from Konecranes for US\$46.4M (US\$1.78M per RTG). Of these, 24 are going to the Wando Welch terminal, while two machines are going inland to SCPA's Inland Port Greer rail facility. The contract was the sixth in a row that SCPA had placed with Konecranes, and will take the total number of Konecranes RTGs at its terminals to 79 units when completed.

The Konecranes RTGs will soon be joined by a fleet of 25 ZPMC machines at Charleston's new terminal. *WorldCargo News* understands that ZPMC put in a lower bid than Konecranes to win SCPA's latest order.

The port authority has not awarded contracts to the lowest price tender in the past, but the dynamics of investment in

Charleston are changing. Bigger vessels have raised the price of entry on the US East Coast terminal market considerably. The new Leatherman terminal will open with just one berth initially, but to be in the market for calls by neo-Panamax vessels, the terminal needs to be equipped with five STS cranes and 25 RTGs.

Speaking at the SCPA's annual 'State of the Ports' address, CEO Jim Newsome said that "capital investment is our biggest challenge" when it comes to Charleston's ambitious infrastructure plans. Prior to 2016, SCPA had never invested more than US\$100M in a single project. In 2020, it will be spending US\$446M on capital investments. Of that number, US\$273M is for the new Leatherman facility, to be followed by another US\$249M.

Altogether, the Leatherman terminal is costing US\$986M for the first 700,000 TEU of capacity. Most of the funds are coming through debt financing. SCPA's long-term debt in 2021 will hit US\$1.3B, whereas 10 years ago, it was just US\$96M.

In other news, the SCPA is planning to launch an inter-terminal barge service (see p11).

## Retrofitting remote control to RTGs

*Pictured are some of the guests at a remote control RTG demonstration that Konecranes hosted at Sociedad Portuaria Region de Cartagena SA's (SPRC) Contecar terminal during the TOC Americas event in Cartagena last month. On display was a Kalmar E-One<sup>2</sup> RTG, retrofitted with Konecranes' automation systems, allowing it to operate with a mix of automated operation over the stacks and remote-controlled operations over trucks. Equipment OEMs have been saying for a while that they can retrofit automation to other brands of yard cranes, and Konecranes demonstrated that this is indeed possible. Konecranes added its own automation layer over the crane control system without making any modifications to the crane or its main mechanical components (see p19 for a full report).*



## Terberg launches new tractor platform



Terberg Benschop has announced a new generation of its YT 4x2 tractors, to replace the current YT182 and YT222 models.

The new YT platform supports a Stage 5 diesel engine, fully electric drive and, in the future, a fuel cell hydrogen driveline. "These innovative yard tractors are even more robust and durable than the YT182/YT222, and even easier to maintain and update. They are compatible with all power options (diesel, electric and hydrogen) and ready for the future," stated Terberg. The new platform can also be used for the Terberg automated AutoTUG.

There is already a wide range of electric machines on the market. Most recently, the engine OEMs Cummins and Volvo each announced that they are launching their own electric driveline options, with Volvo also launching its own autonomous electric tractor, dubbed Vera.

With regard to its new platform, Terberg noted that a motor and battery management system must be developed together, and tested as a package. "It is not easy to swap for another system or batteries," the company explained to *WorldCargo News*. Though it has developed a new YT, Terberg is not changing any of the suppliers for its electric platform.

At this point, the new YT platform is for Terberg's European machines only, and not tractors built in Malaysia under licence by Tractors Malaysia, part of the Sime Darby Group. Terberg said that while lots of items from the new platform will gradually find

their way onto the Malaysian-made product, it has never been an exact copy of the European tractor, and that will continue.

*continued on p3*

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# Crossing the OEM divide

At the TOC Americas event in Cartagena last month, Konecranes unveiled a significant project to retrofit its automation system on two manual Kalmar E-One<sup>2</sup> RTGs for Sociedad Portuaria Region de Cartagena SA (SPRC) at its Contecar terminal.

With Konecranes automation technology, the RTGs can now operate automatically over the stacks and in a 'supervised operation' mode with a remote control operator when loading/unloading trucks. At this stage, the project is a trial for Contecar as it explores how to increase yard productivity by automating RTGs in the terminal.

## Brand-neutral

The demonstration highlights how far automation has come in yard gantry crane applications. There are terminal operators all around the world that are currently considering how to plan for an eventual migration to automation. If that can be achieved without having to replace all the equipment, it makes automation a much more attractive proposition.

At Contecar, Konecranes has automated two relatively new 16-wheel Kalmar E-One<sup>2</sup> RTGs. The cranes are powered off a cable reel, and have a mechanical anti-sway system.

When Kalmar announced an order for 23 of these machines in 2015, *WorldCargo News* reported that the RTGs "will come prepared for future remote control and semi-automation features, which will be added in the near future".

What was demonstrated at TOC Americas, however, was Konecranes' "brand-neutral automation concept that does not require existing RTGs to be pre-configured for remote operation or other automation-related processes", said Alfredo Bouza, sales director, Port Service, Konecranes. The company has essentially added an automation layer on top of the existing crane control system. This eliminates the need for it to perform any major modifications on the cranes.

## Taking control

The RTGs at Contecar were delivered with Kalmar's SmartRail GPS system for container position detection, but Konecranes has opted to use its own DGPS dual antenna autosteering system to guarantee optimal accuracy.

Automation features include Auto-Steering and Auto-Positioning for the gantry and trolley motions, an automated stacking function, as well as an AV system for remote handling operation. Konecranes also provided integration with the TOS (Navis N4) to support Auto-TOS reporting requirements.

Konecranes added hardware

On the side of the spreader, Konecranes installed laser sensors, which are from its NEXTGEN automation system for yard cranes



## Konecranes has retrofitted automation and remote control systems to two Kalmar RTG cranes at SPRC's Contecar terminal in Cartagena, Colombia



The test site for the first two automated RTGs at the Contecar facility

including laser scanners and video cameras, plus its own automation software to interact with the RTG subsystems. As well as controlling and positioning the crane, the new hardware and software also support Smart Features such as Collision Prevention, Truck Lift Prevention and Gantry Collision Prevention.

"Taken as a whole, the package involves the retrofitting of a fairly high degree of automation technology," said Bouza. But very importantly, all the components and systems are from Konecranes' range of modular automation products. This does not mean that the automaton is 'out-of-the-box', but Konecranes is able to apply hardware and systems already developed to retrofit applications.

The laser sensors on the spreader, for example, are from Konecranes NEXTGEN automation system for yard cranes. The system has been developed and proven in several ASC and ARTG terminals over the last five years to produce precise and reliable container stacking in different applications. Locating the laser sensors on the spreader, said Bouza, puts them "as close as you can get to the real container handling action", and he added that it means reliability is less affected by harsh operating conditions such as bad weather.

When it comes to integrating the RTGs into the operation, container handling within the stacks will be fully automated, while long travel, gantry travel and truck handling will require different levels of input from the remote control operator. Gantry travel is performed in 'supervised mode' where a 'hold-to-run' feature makes sure the crane slows down and stops at the correct position for the next container move, under the supervision of the operator. For truck handling in the road lane, the remote operator has full control of the crane.

Having a supervised mode is an important development. Whether a crane is 'supervised' or not affects the number and level of safety systems and fencing required for the operation. Bouza noted that "fencing off the container stacking area is required by safety legislation when there is no direct operator supervision".

## Cycle times

At Contecar, Konecranes has not made any adjustments to the trolley, hoist and long travel speeds of the cranes. It does, however, expect that the crane cycle will be more efficient, by virtue of the automation systems being smoother and faster than a manual RTG operation.

But trying to make the cranes

handle boxes faster is not the point of the automation. "The cycle time has been optimised for continuous operation because this is where automation provides its greatest benefit – increasing the efficiency of an entire fleet," said Bouza. "Automation does not increase or decrease the designed performance of the individual cranes, but it provides a stable and continuous operation, ultimately increasing performance over a longer period of time."

## For the future

The demonstration at Contecar shows that Konecranes' NEXTGEN automation system for yard cranes can be retrofitted to a crane manufactured by another OEM. According to Konecranes, it makes no difference whether the machine was initially designed for automation or not. "Our brand-neutral automation concept incorporates the configuration of the existing machine as it is, and we add the automation layer on top of the existing control system. In this way, we eliminate the need to modify the cranes in order to automate them," said Bouza.

It will not always be the case that this is the best option. In particular, older machines with less accurate drive and control systems could be too challenging to automate, both from a cost perspective and with regard to the difficulty of maintaining the cycle time on cranes that have poor load control characteristics that are compensated for by the skill of the driver.

Bouza said that Konecranes recommends that terminals considering brownfield automation with an equipment retrofit carry out a thorough study, perhaps involving simulation, when making this assessment.

"In some cases, investing in automation retrofits will pay back quickly, but in other cases, due to the age of the equipment and the technology available on the machines, new and larger investments would be necessary and more beneficial," he said. "This is not a one-size-fits-all world. Each case has to be analysed individually with the customer in question. Based on the assessment, we match the specific terminal needs with field-proven modules that we configure for their application."

"We also offer larger scope conversions and turnkey automation systems for those customers who wish to take the bigger step. Case-by-case flexibility is the goal of our brand-neutral approach, and we are seeing great potential for this approach in existing terminals around the world," he concluded. □

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