

Trends in marine terminal automation

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An unpredictable economy and fluctuating container volumes are two key challenges marine terminal operators continue to navigate, creating new demands for efficiencies. These uncertainties have caused a renewed interest in process and equipment automation technologies as a path to increased efficiency. When deployed and integrated with the terminal operating system, these automation technologies can support and increase terminal capacity, optimize equipment utilization, and improve overall container handling performance in the terminal.

Process automation involves the integration of the TOS with third party hardware solutions that are utilized at the gate, in the yard and at the quay. Various forms of hardware including real time locating systems (RTLS), radio frequency identification (RFID), global positioning satellite (GPS), and ocular character recognition (OCR) can automate the tracking of vehicles and the movement of containers to and from the ships, within the yard, and in and out of the gate, providing real time data streams on asset identity, location and performance. When integrated with the terminal operating system, process automation technologies can improve the visibility of container and truck movements, to optimize asset allocation, automate the delivery of 'next move' information to the equipment driver, and ultimately increase the productivity of the terminal.

The evolution of automation

Since the late 1980s, the marine terminal industry has been supported by a growing range of expert information systems to coordinate and more recently automate the planning and management of container and equipment moves in a complex and demanding business environment.

TOS was originally used for ship and yard planning, but as container throughput, yard and vessel sizes and the number of shipping routes served increased, systems were expected to also optimize gate planning, equipment control, ground stowage strategies and human resource management.

Prior to the launch of the world's first terminal operating systems, many operators used paper and wall charts to manage container movements. The skyrocketing increase in global container throughput – nearly 700 percent from the end of the 1980s to 2008 – has led to the development of programs, systems, equipment and devices to enhance operating efficiencies, improve management controls and business intelligence and connect marine terminals with the wider supply chain. Terminals and systems once expected to cope with just 50 moves an hour now have to manage 100 or more moves in larger container yards with exponentially higher container stacking positions.



The control room at Transnet NCT.



APL Gate Test.

Current trends in automation

In this equipment intensive business, the ability to make terminal fleets more productive will be a major differentiator. Looking forward, process automation technologies will help extract better utilization and extend the lifespan of these expensive assets. The ability to maintain real time asset visibility gives the industry a key to handling more business with existing assets. Remote monitoring technologies will also support the industry by improving the environmental and energy performance of its equipment, with real time tracking of operational parameters, such as fuel consumption, oil usage and running temperature.

The terminals that are doing it right leverage both process automation and equipment automation to address the optimization of business intelligence. Having visibility into the data, created from process and equipment automation, provides marine terminals with real time operations and business intelligence. The results are real, in some cases delivering 10 to 20 percent or more in productivity improvements. Terminal operators can use the data from process and equipment automation, optimization tools and real time location to ultimately make better business decisions.

Looking for ROI

This year, Sociedad Portuaria de Cartagena (SPRC) in Cartagena, Columbia will implement a terminal process automation solution

that integrates Navis Marine Telematics Software (MTS) with RTLS technology provided by Zebra Technologies, to track the location of street trucks, utility tractor rigs (UTR) and general assets in real time. The tracking system will provide location information to the Navis SPARCS TOS, offering real time asset visibility, increased domain awareness and improved operational efficiency for SPRC.

As the first terminal in South America to deploy RTLS technology to track truck movements, SPRC will be able to identify queue order in the rubber tire gantry (RTG) stack. The increased visibility into street truck location allows SPRC to optimize RTG job assignments and correctly prioritize competing gate and vessel jobs for peak efficiency and cost savings.

SPRC utilizes Navis PrimeRoute to automatically dispatch tractors to the optimal point of work in the yard, increasing utilization and lowering the number of vehicles required to move cargo. To increase efficiency, the RTLS Technology will provide real time location information to PrimeRoute to automate the manual data entry that equipment operators are required to key in, removing the dependency on manual data entry and allowing the equipment operators to focus on their primary objective – moving containers. This greatly improves the effectiveness and accuracy of Navis PrimeRoute, as well as the overall safety of the operation. Once the RTLS infrastructure is in place, SPRC also plans to track additional assets, such as people, personal vehicles and baggage carts.

The future of automation

“As we look to double our container traffic in the next five years, it is imperative for us to increase operational efficiency and productivity to manage that anticipated growth.”

Eduardo Bustamante, IT director at SPRC

Since 1993, when ECT launched the world’s first automated terminal, the industry has been both fascinated and skeptical about the prospects for robotized container handling. Until recently, automated container handling was the province of the pioneering few with deep pockets to fund big in-house development and implementation teams. But, like IT before it, the robotics industry



is maturing. Growing experience and competition within the commercial sector is driving down costs and the terminal industry is now able to draw a growing skills base within its third party suppliers, driving the trend toward automated equipment.

In a marine terminal, the advent of equipment automation is focused on the shift to unmanned vehicles. Equipment such as automated stacking cranes (ASC), horizontal transport vehicles (HTV) and automated guided vehicles (AGV) are in development and once deployed will eliminate the need for manual operations, thus reducing operating costs, increasing equipment utilization and allowing workers to be redirected to other tasks.

As terminal operators continue to navigate an uncertain economy and import and export volumes fluctuate, the future of automation will focus on optimizing the entire terminal rather than just specific parts, such as the yard or gate. Automation will need to go beyond the TOS and container operations to include the total set of needs at the terminal, from equipment

maintenance to labor rostering as well as other critical terminal functions. Operators will take advantage of the greater visibility and integration provided by new technologies to define and implement best practices for the business as a whole.

Further, a single, open, standardized platform that runs across terminals will allow terminal customers and shipping lines unprecedented visibility into their operations across multiple sites. Automation solutions of the future will provide terminal operators the ability to interact in real time to optimize operations across an entire network, with the potential to be intuitive enough to slow down certain operations while accelerating others. There will be a greater shift in focus on technological solutions that provide greater quality, reliability and scalability. From gate to yard to vessel, terminal operators who invest in systems that govern the movement of all container logistics and operations will ultimately differentiate themselves from competitors now and in the future.

ABOUT THE AUTHOR AND THE COMPANY

John Scott joined WhereNet, now Navis, in April, 2000. Navis acquired WhereNet's Marine Telematics Software (MTS) in March of 2011. As vice president of Container Terminal Solutions, John is responsible for Navis' existing MTS customers and sales of new container tracking solutions. Multi-site MTS customers include SSA Marine, Ports America, APL, APM Terminals, Yusen Terminals, and K-Line.

Navis, a part of Cargotec Corporation, is the global technology standard for managing the movement of

cargo through terminals, standing the test of time. Navis combines industry best practices with innovative technology and world class services to enable customers to maximize performance and reduce risk. Whether tracking cargo through a port, automating equipment operations, or managing multiple terminals through an integrated, centralized solution, Navis provides a holistic approach to operational optimization, providing customers with improved visibility, velocity and measurable business results.

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