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WHITEPAPER

DRIVING TRANSFORMATIVE CHANGE WITH NAVIS RTG OPTIMIZATION

In the rapidly evolving landscape of global logistics, container terminals face unprecedented challenges. As cargo volumes surge and vessel sizes increase, traditional methods of managing Rubber Tyred Gantry (RTG) cranes are proving inadequate. This whitepaper introduces RTG Optimization, a suite of advanced applications designed to transform RTG management and boost terminal efficiency. Developed in collaboration with leading global terminals, RTG Optimization offers a comprehensive solution to enhance productivity, reduce congestion, and optimize resource utilization. Through a case study of Port of Tanjung Pelapas (PTP), we demonstrate the transformative impact of this suite on terminal operations and its role in preparing for future automation.

By Johannes Leholm and Kathy Xie

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Introduction: The Changing Face of Container Terminal Operations

The logistics industry is undergoing a significant transformation, driven by increasing cargo volumes and evolving operational demands. As container vessels grow larger and terminal operations become more complex, the need for efficient, data-driven solutions has never been greater.

To meet these evolving needs, RTG Optimization has been developed in close collaboration with some of the world's largest and fastest-growing RTG terminals. This cutting-edge suite of applications is tailored to enhance RTG management and boost overall terminal efficiency. RTG Optimization seamlessly integrates advanced scheduling, workload balancing, real-time visualization, and predictive analytics. By optimizing every aspect of RTG operations, from crane movements to container stacking, it empowers terminals to handle increased cargo volumes with greater agility and precision. This comprehensive solution not only streamlines current operations but also lays the groundwork for future advancements in terminal automation.

This whitepaper explores the challenges faced by container terminals, how RTG Optimization addresses these challenges, and the substantial improvements it can deliver. Through a case study of Port of Tanjung Pelapas (PTP), we demonstrate the transformative impact of this suite on terminal operations.

Current Challenges in Container Terminals

Container terminals today face a variety of complex challenges that require advanced solutions. The steady rise in global cargo volumes demands that terminals handle more containers within the same space and time constraints, requiring more efficient handling processes to maintain operational efficiency.

The increasing size of vessels adds to the complexity, impacting everything from berth allocation to yard management and necessitating advanced techniques for smooth operations. Terminal congestion is another significant issue. High traffic levels can disrupt operational flow and decrease overall efficiency, making effective congestion management crucial for optimizing throughput.

Rising labor costs further strain operations, as terminals must balance improving efficiency with managing higher expenses. Additionally, while the availability of more advanced automated equipment offers opportunities, it requires substantial investment and integration. The growing trend towards automation presents both potential benefits and challenges. Although automation can improve efficiency and reduce labor costs, it also involves complexities related to implementation and integration with existing systems.

Traditional approaches to terminal management are increasingly insufficient for addressing these modern challenges. Inefficiencies, delays, and higher costs highlight the need for advanced, technology-driven solutions to meet today's operational demands.

The Need for Advance Solutions

As container terminals face increasingly complex challenges, more sophisticated solutions are essential. Navis, with its extensive experience and history in developing optimization tools, remains at the forefront of enhancing terminal operations. Our comprehensive optimization suite has proven effective in improving terminal efficiency and seamlessly integrating with existing systems.

RTG Optimization builds on this foundation of expertise and innovation. It represents a significant advancement in our suite of products, integrating seamlessly with existing tools while offering enhanced capabilities. This improvement is driven by our ongoing investment in research and development, ensuring that RTG Optimization meets the evolving needs of modern terminals.

The solution features a modern and intuitive user interface, providing updated monitoring and control capabilities that streamline operations. Advanced algorithms and configurable options allow for tailored solutions, addressing specific terminal requirements with precision. The integrated dashboard monitoring delivers real-time insights, supporting proactive decision-making and operational efficiency.

RTG Optimization includes valuable features such as Predictive Housekeeping. This functionality leverages predictive algorithms to optimize container stacking by analyzing idle time between moves, improving immediate yard management, and preparing for future vessel loads and gate deliveries.

Fig 1: Predictive Housekeeping

By continuing to innovate and enhance our solutions, the Navis N4 TOS ensures that RTG Optimization offers both significant improvements and seamless integration with our existing optimization products, providing a comprehensive and forward-looking approach to terminal management.

RTG Optimization Suite: A Comprehensive Overview

RTG Optimization is designed to transform RTG management through a suite of integrated components:

RTG Sequencer: The RTG Sequencer analyzes and sequences RTG operations to optimize scheduling. By processing real-time data, it reduces idle time and improves operational efficiency, making it crucial for high-volume terminals with complex scheduling needs. For operators, this means fewer unproductive moves and a more streamlined workflow.

Yard Crane Balancer: The Yard Crane Balancer provides recommendations for RTG lane changes based on workload data. This helps to balance tasks across different lanes, enhancing yard utilization and reducing congestion. It is essential for terminals with variable traffic patterns, allowing operators to respond dynamically to changing yard conditions.
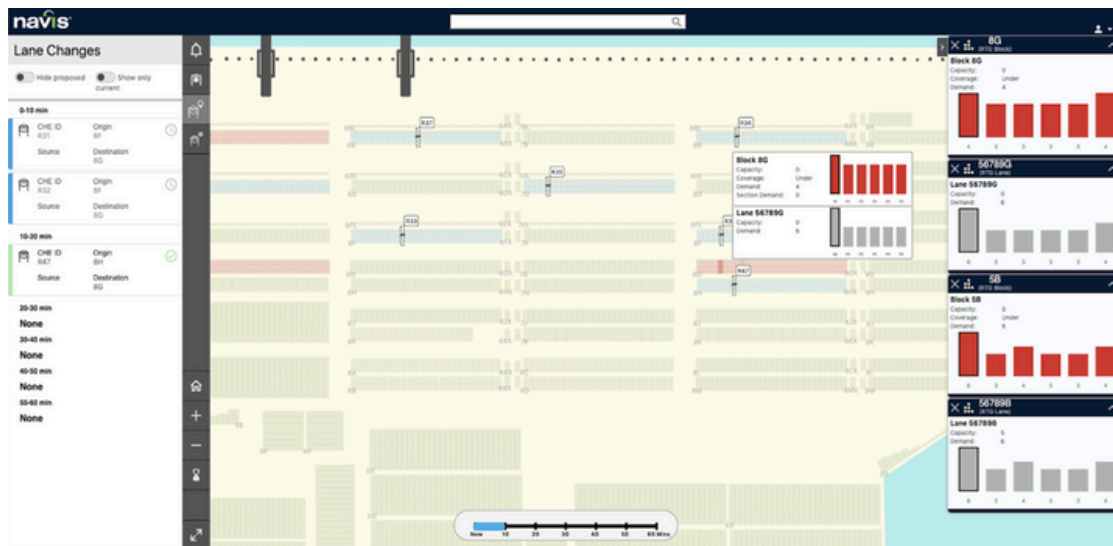
Fig 2: The Yard Crane Balancer recommends proactive RTG lane changes.

Control Room: The Control Room offers real-time visualization of terminal operations. It provides insights into Container Handling Equipment (CHE) activity, yard occupancy, and exception handling with features like priority-based alarms and configurable filters. This comprehensive view allows supervisors to make informed decisions quickly, streamlining operations and enhancing overall terminal performance.

Vehicle Mounted Terminal (VMT): VMT is a mobile application that RTG operators use within the crane cabin to view jobs and inventory in real-time. This tool enhances situational awareness and performance, supporting more efficient crane operations and overall terminal productivity. Operators benefit from immediate access to crucial information, reducing the need for radio communications and minimizing errors. Reducing radio traffic with real time user interfaces for equipment drivers can increase yard operations productivity by up to 50%.

Predictive Housekeeping: Predictive Housekeeping utilizes idle-time data to make recommendations for optimal container stacking, including predictive rehandles for future vessel loads and gate deliveries. This improves yard storage management and operational efficiency, ensuring that the yard is effectively prepared for upcoming tasks. For operators, this means less time spent on reshuffling containers and more efficient use of yard space.

Integration and Implementation: A Seamless Transition

Implementing RTG Optimization involves several key steps to ensure successful integration with existing terminal systems:

Assessment: The implementation begins with a comprehensive assessment of current workflows and systems. This phase identifies integration points and tailors RTG Optimization to meet specific operational needs, ensuring that the solution addresses the unique challenges of each terminal.

Configuration and Deployment: Following the assessment, the suite is meticulously configured and deployed to align with the terminal's unique requirements. This involves integrating the components into existing systems and ensuring seamless operation, minimizing disruption to ongoing terminal activities.

Fig 3: RTG Optimization Configuration

Training and Integration: Comprehensive training is provided to ensure that terminal staff, from operators to supervisors, are fully equipped to use the new tools effectively. The training program is designed to be hands-on and practical, focusing on real-world scenarios that operators encounter daily. Integration is carried out methodically to ensure that RTG Optimization enhances current processes without disrupting ongoing operations.

Case Study: Port of Tanjung Pelepas (PTP)

Port of Tanjung Pelepas (PTP), one of the largest and busiest container terminals globally, handles an annual throughput of 12.5 million TEUs. With 14 berths, 66 Ship-to-Shore (STS) cranes, and 172 RTGs, PTP faces significant operational challenges. To enhance productivity and manage its extensive fleet effectively, PTP deployed the RTG Optimization suite.

Deployment and Results: Improved scheduling efficiency by 6%, resulting in a significant reduction in idle time and increased productivity, over a controlled measure period, demonstrating the suite's effectiveness in a high-demand environment during the early adoption phase.

Setting the Stage for Future Automation

RTG Optimization addresses current operational challenges and lays the groundwork for future terminal operations advancements. By enhancing manual operations, RTG Optimization positions terminals to smoothly transition towards greater automation, including the integration of automated RTGs and remote-control operations.

The suite's advanced analytics and real-time data capabilities have already facilitated significant developments. Recent enhancements include integration with Automated Guided Vehicles (AGVs) and automated horizontal transport systems, which streamline yard operations and improve overall efficiency. These developments represent a critical step in preparing terminals for more advanced automation technologies.

As terminal operations continue to evolve, RTG Optimization provides a robust foundation for adopting new advancements. Ongoing enhancements in areas such as AI-driven predictive analytics and advanced remote-control capabilities are expected to further refine and improve terminal efficiency.

By integrating these current innovations and preparing for future technologies, RTG Optimization ensures that terminals are well-equipped to embrace the next generation of automation and operational excellence. These advancements are expected to set new standards for terminal efficiency, paving the way for the future of remote control and automated RTGs.

Conclusion: Transforming Terminals for Future Success

RTG Optimization addresses critical challenges in RTG management, offering substantial improvements in efficiency and productivity. The successful implementation of these solutions at Port of Tanjung Pelepas highlights their effectiveness in managing high-volume terminal operations.

By adopting these advanced tools, terminals can:
- Meet the demands of modern logistics with increased agility and efficiency
- Drive operational success through data-driven decision making
- Lay the groundwork for future automation and technological advancements
- Maintain a competitive edge in an increasingly demanding global market

As the logistics industry continues to evolve, solutions like RTG Optimization will play a crucial role in shaping the future of container terminal operations. Terminals that embrace these innovative technologies will be well-positioned to thrive in an increasingly competitive and demanding global market.

Take the Next Step: Ready to transform your terminal operations with RTG Optimization? Contact our team of experts today to learn how this advanced suite can drive significant improvements in your RTG management and prepare your terminal for the future of container handling.

About the Authors

Johannes Leholm is a Senior Solution Architect at Navis with two decades of experience with ports and terminals. Previously, Johannes worked as an automation architect where he worked with logistics providers to identify the most effective strategies to deploy robotic handling equipment at marine terminals. He has also held roles as a product manager and sales engineer where he was responsible for implementing and designing automated solutions that accelerate productivity at some of the largest and most advanced ports in the world. Johannes holds a degree in Industrial Engineering and Operations Research at UC Berkeley.

Kathy Xie is a Solutions Architect with two decades of expertise in Technology, Innovation, Implementation, and Solutions Design within the Maritime Industry. She brings deep technical expertise to design innovative solutions that solve complex business challenges for Navis' worldwide clientele, with a particular emphasis on automated and semi-automated terminals. Collaborating closely with Navis' product teams and client stakeholders, she adeptly transforms requirements into scalable, high-performing software solutions. She holds a BSc in IBA and an MSc in Finance & Investment from Erasmus University Rotterdam.
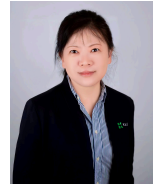
About Kaleris

Kaleris is a global logistics software company. We solve some of the most complex supply chain execution challenges. Our technology drives mission-critical supply chain operations around the world. Our execution software turns time-consuming manual processes into automated, efficient workflows. We layer visibility over the top for a complete view of all activities, assets, and their status. We specialize in technology for ports and terminals, truck and trailer yards, industrial rail shipping, ocean carriers and ship owners, repair shops for railcars and chassis, and railcar owners.

Because we work across the supply chain, we know how fragmented it is. This understanding drives our mission to make it more connected, visible, and sustainable. We're working on a data-as-a-service platform that connects trading partners across nodes and modes. It provides visibility into the execution workflows at each node so partners can plan more effectively and accelerate throughput.

Our portfolio of Navis terminal operations systems offers specialized solutions for every type of operation. We serve general cargo terminals that handle break bulk, bulk, and RoRo, terminals desiring a lean IT footprint, terminals with inland depots, and container terminals with or without automation. For over 30 years, Navis experts have partnered with customers to accelerate their goals. Today, more than 500 ports and terminals around the world trust Navis solutions to optimize their operations and ensure the smooth, efficient, and sustainable movement of cargo.

Kaleris Carrier & Vessel Solutions benchmarks safe, efficient, and environmentally friendly ocean transportation. They enable safer vessel operations, stowage operations that maximize cargo intake, incident prevention in heavy weather, and more sustainable fleet performance along with emission compliance.

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