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FOREWORD

Margherita Bruno,
Editor

Welcome to PTI's inaugural journal of 2024, dedicated to the realm of port development and investment. We are thrilled to go back to our tradition of delivering one journal per month, promising a year filled with insightful content and special editions to commemorate our events in 2024.

After a bustling 2023, the onset of this year brings formidable challenges as geopolitical shifts disrupt global supply chains. This compilation of articles captures the dynamic landscape of port development, providing a thorough exploration of topics pivotal to the industry's evolution. As the maritime sector grapples with environmental imperatives, geopolitical changes, and technological advancements, this journal serves as a guiding light for informed discourse.

Highlighted in our first journal of the year is the critical importance of investment in transitioning to greenfield environments in ports and terminals, along with investments in smart technology and automation solutions driving the industry's evolution. Yvo Saanen, Managing Director at Portwise, invites you on the next page to uncover groundbreaking developments from the past year, which not only showcase the investment trajectory in the industry, but also guide stakeholders in making informed and careful decisions.

We hope you find this journal insightful and look forward to engaging with you in the next issue!

FOREWORD

Yvo Saanen,
Managing Director,
Portwise

ZEPA - COP28

The United Nations Climate Change Conference, COP28, has concluded with a historic agreement to transition away from fossil fuels, triple renewable energy and increase climate finance for the most vulnerable. It aims to keep alive the goal of the Paris Agreement to try to limit long-term global average near-surface temperature to 1.5°C above the pre-industrial era.

During COP28, APM Terminals and DP World launched a joint initiative – Zero Emission Port Alliance (ZEPA) - a sector-wide coalition open to all industry participants, intending to accelerate the adoption of zero-emission container handling equipment in ports.

This initiative follows the white paper published by the two GTO's in October, where they sketch a path towards zero-emission terminals, whilst listing the hurdles towards increased sustainability. The objectives of ZEPA are as follows:

- Encourage scaled-up production capacity of battery-electric container handling equipment by manufacturers and reduce product costs
- Bring down the cost of batteries and charging systems, simplify implementation and increase equipment interoperability
- Ensure terminal operators and the grid infrastructure are ready for the new equipment and shore power roll-out
- Create better implementation conditions for zero-emission fleets and help accelerate the adoption of zero-emission container handling equipment

In the current jungle of battery types, charging technologies, and equipment types, the aim to streamline and foremost standardise is key. However, standardisation takes time and typically delays progress. It takes bold approaches like Tesla did with rolling out their charging infrastructure and making other manufacturers adopt their de-facto standards along the way.

Moving towards prudent investments into zero-emission fleets requires careful analysis to align the demands of dynamic terminal operations and the characteristics of battery-electric fleets of equipment. Given the limitations of feed from the grid, simplistic approaches (e.g. charging all vehicles at the same time – during the break) will lead to unfulfillable demands on the grid.

IMPACT ON GLOBAL SUPPLY CHAINS FROM THE RED SEA DISRUPTIONS

Not too far away from the COP28 (geographically), the global supply chain is once more confronted with its vulnerability to disturbances, now caused by Houthi rebels making the entrance to the Red Sea too dangerous to pass. Consequently European factories are experiencing some hurdles resulting in closure due to a lack of supplies. At the same time, freight rates are going through the roof, as the demand for ships – to compensate for the longer journey times – spikes. It's almost like post-Covid times are returning. The earnings made by the shipping lines in the two years after COVID-19 have led to major investments into different assets across the supply chain, whether its terminals (for instance MSC acquiring a stake in HHLA, or CMA CGM purchasing GCT North America), intermodal facilities or other players (3PL's, warehouses, distribution centres, trucking companies or rail operators). Of course, with the rates coming back to 'normal', this enormous influx of capital has stopped.

LESSONS LEARNED FROM AUTOMATION; HANDS-ON EXPERIENCE

Finally, it becomes evident worldwide that terminal automation is here to stay. The societal wish for increased safety and better working conditions, fostered by the increasing availability and maturity of technology, makes automation (almost) mainstream for the terminal sector. However, the road to a successful implementation is paved with hurdles, which require clever circumventing. Learning from past experiences and avoiding mistakes is essential to ensure a smooth ramp-up of a new automated facility. In an in-depth paper, Kaj de Groot, Director of Automation Projects at Portwise, and Pim van Leeuwen, Simulation Consultant at Portwise, discuss several typical pitfalls they have come across in their daily work while assisting terminals in their automation journey. Again, standardisation and integration are hot topics, which are not easily achieved in a competitive industry where technology is rapidly advancing. Keeping it simple remains a basic rule, which should be applied wherever possible.

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BROWNFIELD TERMINAL AUTOMATION
FIVE MAJOR PITFALLS

"LABOUR SHORTAGES AND ENVIRONMENTAL CONSIDERATIONS HAVE MADE AUTOMATION INCREASINGLY ATTRACTIVE."

Kaj de Groot, Director of Automation Projects, Portwise, and **Pim van Leeuwen**, Simulation Consultant, Portwise

MORE TYPES OF AUTOMATED EQUIPMENT ARE AVAILABLE ON THE MARKET

Today, most container terminals worldwide still have a fully manual operation for the yard, quay and transport. However, labour shortages and environmental considerations have made automation increasingly attractive. Container terminals would also like to increase their capacity and efficiency on the existing footprint. This means operators are looking into automation to increase their throughput capacity and to be less affected by labour shortages.

The industry is aware of the move towards automation, with more companies looking into ways to automate existing terminal concepts. Automated Rubber-Tyred Gantry Cranes (A-RTGs) are an example of such equipment, as shown in Figure 1. With these new types of automated equipment, the road towards automation becomes more straightforward, with less infrastructural impact on the operation.

Yet, the road to automation is full of risks and challenges. If such challenges are not tackled adequately, the objectives may not be achieved. In this paper, we will discuss some pitfalls to be avoided during the implementation of (automation) technology:

1. Overestimating automation potential
2. Underestimating the changes required for automation
3. Misjudging integration timelines
4. No thorough automation roll-out strategy
5. Trouble operating a hybrid terminal with two different modes

FIGURE 1.
3D image of an Automated Rubber Tyre Gantry crane, interchanging with a terminal truck.

When these pitfalls are not remediated, the chance of additional costs, project delays and unsatisfactory automation implementation will increase.

1. OVERESTIMATING AUTOMATION POTENTIAL

Container terminal automation offers increased safety, higher storage density and the possibility to work 24 hours, 7 days per week, without much loss due to shift changes and meal breaks. However, at Portwise, we have seen terminals that overestimate the benefits of these points for their future automated operation. Consequently, business cases may be too optimistic, causing distress when the target productivity cannot be reached.

Consider a remotely operated quay crane, involving a handover between automated and manual control. This handover is not always seamless, causing longer crane cycles, due to additional braking of the hoist or trolley and could therefore result in lower productivity. Similarly, automated interchange is typically slower than manual interchange, due to positioning times of automated equipment. This must be taken into account when aiming to set realistic automation targets.

Careful estimations and assumptions are essential to setting realistic targets and creating accurate business cases. Equipment specifications and productivities should be discussed in detail with suppliers. Furthermore, by properly assessing the impact of a system change towards an automated terminal concept, for example using

“THE IMPACT OF REQUIRED CHANGES FOR AUTOMATION IS OFTEN OVERLOOKED OR UNDERESTIMATED. WORKING WITH AUTOMATED EQUIPMENT HAS A HUGE IMPACT ON THE WAY OF WORKING.”

detailed simulation models, realistic expectations of the operational gains or losses can be quantified. This helps in managing expectations for the project team and overall terminal organisation.

2. UNDERESTIMATING THE CHANGE REQUIRED FOR AUTOMATION

The impact of required changes for automation is often overlooked or underestimated. Working with automated equipment has a huge impact on the way of working. If the complete terminal, including hardware, software and staff, is not fully prepared and on board with the transition, there will be costly interruptions and delays and less efficiency.

At Portwise, we have seen numerous requests for proposals with detailed equipment specifications, and little to no specifications of how the automation should interact with the operation, including workflows, but also the interaction between man and machine. Workflows and processes are often assumed to be similar between a manual and automated terminal, but more often than not, automation is different, and cannot work the same as a manual operation. Moreover, results from virtual testing are often assumed to be easily replicated after the go-live. This way, the go-live could result in disappointment due to the set expectations.

Existing operational procedures should be mapped and reevaluated against the situation with the new automated system. Automation systems can only perform up to their potential if the operational processes can be adequately adjusted to the provided automated solution. Next, personnel must be fully on board and trained to work in a new environment. Also, to manage an automated system, the (IT-)organisation needs to be prepared, trained and likely expanded. They should be familiar with the new technology, the ways to maintain it, install upgrades, but also firefight exception cases.

3. MISJUDGING INTEGRATION TIMELINES

With the change towards automation, integration of software systems of different suppliers is key to success. These systems need to work together seamlessly; equipment, control software, scheduling, TOS, etc. The time and effort needed to complete this component is often underestimated because it does not only depend on the supplier delivering automation, but also on the other systems that need to interact with an automated system.

When a container is discharged from a vessel in an automated container terminal, it often involves OCR cameras on the quay crane to validate and confirm container information. The OCR might detect a different container than expected by the automated system. When the new container information is not fully updated in all systems (e.g., equipment control system, terminal operating system), it could lead to a mismatch in validation between the different systems, resulting in delays and manual intervention. This is one of the many integration items that could be encountered the during go-live of an automated system.

Project planning is key to the success of any project. Projects should start with a proper and realistic schedule of the key deliverables. Civil project timelines and equipment delivery times are often predictable and well known in the industry. Integration of software comes with much more uncertainty, but by predefining integration needs and constructively planning with suppliers, delays can be minimised. Planning sufficient time for testing, and solving integration issues is key to success. Proven and existing solutions often help here, since general issues have already been tackled, resulting in an easier implementation.

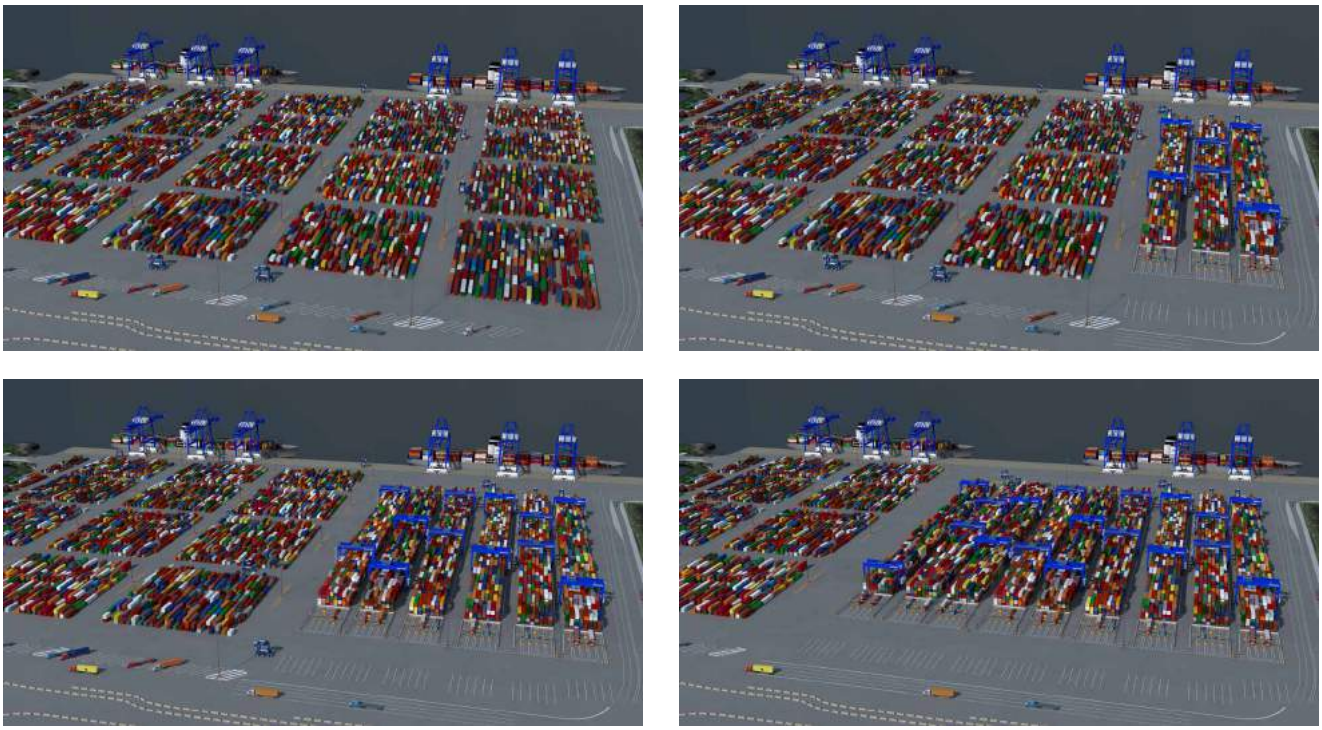
4. NO THOROUGH AUTOMATION ROLLOUT STRATEGY

When civil works are completed, the equipment has been facilitated, planning control software is installed and the terminal can start transitioning operations from manual to automated. This rollout requires a clearly defined strategy, which could be a gradual transition or a so-called big bang. Every strategy has advantages and disadvantages, but not having one in place will inevitably lead to problems when going live.

There are three different ways of implementing a new automated container terminal concept;

1. Big-bang transition; switching from the old mode of operation to the new mode of operation in a couple of days.
2. Greenfield expansion, with the new mode of operation.
3. Gradual transition to the new mode of operation.

Planning a big bang could be a way to mitigate the impact of transitioning, but it includes many risks such as:



- Edge cases (non-happy flow) not properly defined and tested
- Integration between different system components is not adequately tested.
- Personnel has not been given enough time and training to work in the newly automated system

A greenfield expansion, where an additional piece of land is used for testing and commissioning an automated operation, has a lower risk, but cannot be performed everywhere due to lack of space. It ensures that sufficient testing and familiarising with the system can take place, before further roll-out to the brownfield piece of the terminal.

Gradual transition is a way to provide sufficient time for testing and commissioning, but results in a reduction in capacity, or a change of operation throughout the testing period. A phased transition is shown in Figure 2.

Having a well-defined rollout strategy that is clear to every member of staff involved in the step towards automation is essential for a successful go-live. When going through an extensive go-live with an existing running operation, always ensure that a fallback strategy is defined. This way, the automated system can be bypassed to continue operation in case of failures.

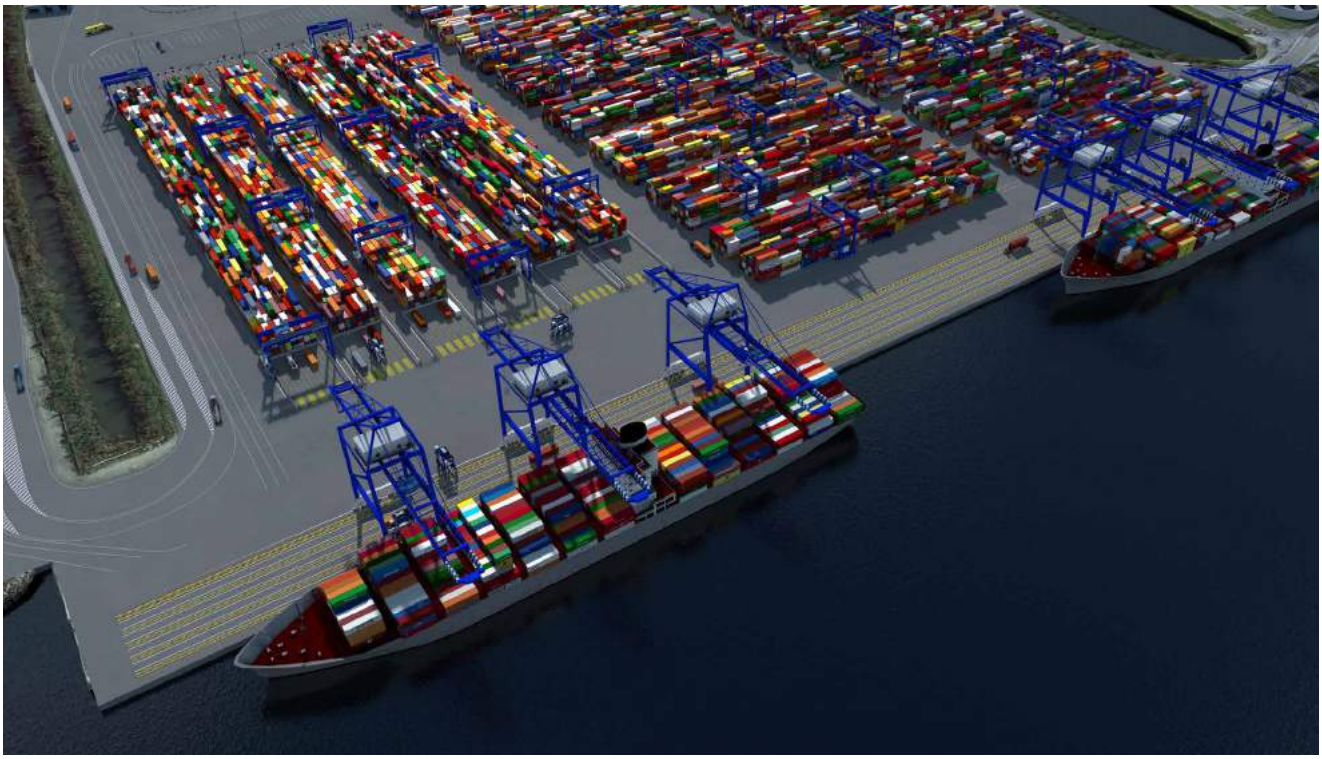
5. TROUBLE OPERATING A HYBRID TERMINAL WITH 2 DIFFERENT MODES

Automating the terminal is not done within a day. Instead, there typically is a phasing period during which an increasing share of the terminal becomes automated. During this period, a hybrid operation could exist, utilising both manned and automated equipment. This is difficult to manage from both a planning and operating perspective. However, shutting down a large part of the terminal is very costly and interruptions must be avoided.

When operating with multiple modes of horizontal transport or stacking concepts, one should consider that there are two separate terminals. For example, consider the terminal shown in Figure 3. This terminal has two different types of stacking concepts, Automated Stacking Cranes (ASC) and Rubber Tired Gantry Cranes (RTGs). Also, two types of horizontal transport are used by this terminal: Shuttle carriers and Terminal trucks. When loading from the ASC modules,

FIGURE 2. A phased transition path from straddle carriers to automated stacking cranes

"PROJECT PLANNING IS KEY TO THE SUCCESS OF ANY PROJECT. INTEGRATION OF SOFTWARE COMES WITH MUCH MORE UNCERTAINTY, BUT BY PREDEFINING INTEGRATION NEEDS AND CONSTRUCTIVELY PLANNING WITH SUPPLIERS, DELAYS CAN BE MINIMISED."



the terminal uses Shuttle carriers, which place containers underneath the quay crane. This is a different type of operation and does not mix. Hence, when containers are placed in the RTG stacks, but must be loaded to the quay cranes served by ASCs / Shuttle carriers, a handover must take place.

Using detailed operational planning and analysing the impact on all systems that are influenced by such a hybrid operation, the risk of overspending can be reduced or avoided.

FIGURE 3.
Visualisation of a container terminal converting van RTG + TT to ASC + ShC in a hybrid operation

CONCLUSION

Manually operated container terminals are currently researching how to either partly or fully automate their operation. Automated existing equipment, such as Automated Rubber-Tyred Gantry cranes or Straddle carriers, could make the automation process more straightforward and less risky. However, at Portwise, we have seen that the discussed points in this paper are often not considered in a sufficient level of detail, resulting in severe project delays and additional costs.

Before starting your automation project, or even signing with suppliers, these 5 major pitfalls should be extensively noticed, discussed and evaluated. By taking the aforementioned points into account in the planning phase of automation projects, a stronger start to the process can be guaranteed. In addition, expectations within the organisation of what automation may bring can be managed well, which is key to the success of an automation project.

Portwise has years of experience with automation projects, both in the preplanning phase, project initiation phase and the implementation and go-live phase. We provide valuable automation consulting to mitigate risks and delays and to ensure project success. In this way, we guide terminal operators along the journey towards automation.

ABOUT THE AUTHORS:
Kaj de Groot works as Director of Automation Projects at Portwise. He has worked in the ports and terminals field for about 9 years and has been involved in many different brownfield terminal design and automation transition projects.

Pim van Leeuwen works as a Simulation Consultant at Portwise and has extensive experience with capacity analyses in ports and other logistics facilities. Next to this, he is a PhD candidate at Erasmus University Rotterdam, studying the in effects of communication between terminals and shipping lines.

ABOUT THE COMPANY:
Portwise, formerly part of TBA Group, is a world-leading consultancy and simulation firm that combines extensive automation and operational knowledge with proven simulation tools to create a future-proof plan for your port, terminal or warehouse operation.

HUMAN-ASSISTED AUTONOMY: PIONEERING THE FUTURE OF PORT AUTOMATION TODAY

"IN FERNRIDE'S GLOBAL SURVEY OF CONTAINER TERMINAL PROFESSIONALS, 95 PER CENT OF RESPONDENTS HAD ALREADY SEEN THE BENEFITS OF AUTOMATION."


Martin Isik, CCO, FERNRIDE, and
Peter Szelei, Director Business Development, FERNRIDE

As the maritime industry adapts to the era of automation, the horizontal transport component of port operations becomes a focal point. Efficient container handling is crucial for port operations and development, yet the complexity of both quayside and landside operations presents unique challenges for automation. The article sheds light on the stagnation in the automation of horizontal transport, emphasizing the need for innovative solutions to address the intricate tasks and external factors influencing port environments. Against this backdrop, human-assisted autonomy emerges as a pivotal approach that balances economic viability, safety, scalability, and reliability in terminal operations.

While key global industries benefit from widespread digital transformation, the comparative stagnation in maritime transportation has exposed the fragility in our global supply chain. Container terminal operators face increasing consumer demand, rising costs, skilled labour shortages and slim profit margins, exacerbated by geopolitical tensions and global issues such as the pandemic. This is driving them to embrace new, digital solutions to increase productivity, improve worker safety, enhance sustainability and achieve the operational resilience required to meet contemporary challenges.

In FERNRIDE's global survey of container terminal professionals, 95 per cent of respondents had already seen the benefits of automation. A 60 per cent majority had installed or planned to install optical character recognition (OCR) technology for gate automation, reporting faster truck turnaround times and reduced congestion as a result. Now that industry players like Hamburger Hafen und Logistik AG (HHLA) and Volkswagen are pioneering the use of autonomous yard trucks, the race to leverage this technology is gathering speed.

Despite its rate of development, machine intelligence is yet to parallel the adaptability and problem-solving capabilities of a human being. Furthermore, supply chain players require solutions that can be implemented without negatively impacting efficiency and deliver near-term ROI. This is where the human-assisted approach to autonomy offers a unique solution that can help terminal operators benefit from autonomous vehicles (AVs) today.

CHALLENGES IN AUTOMATING HORIZONTAL TRANSPORT

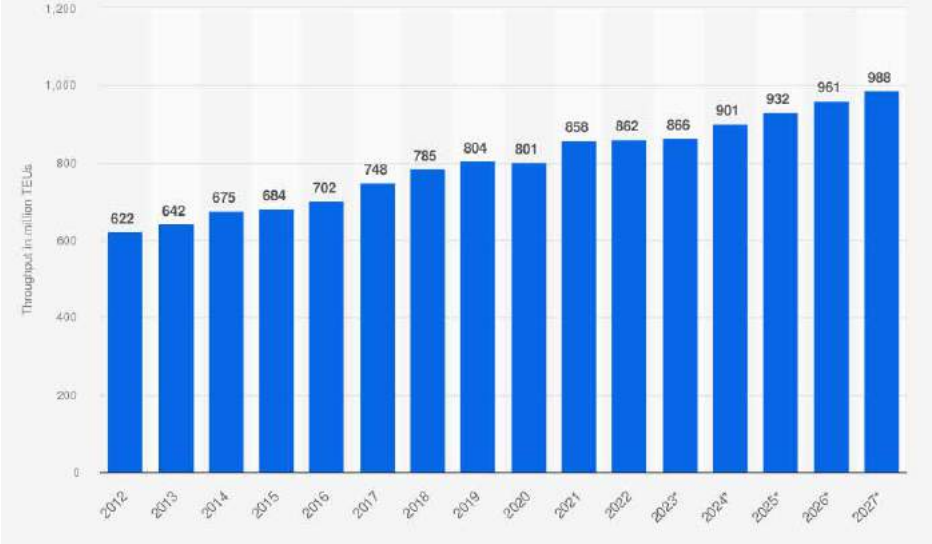
Given the complexity of both quayside and landside operations, the level of automation in horizontal transportation has stagnated when compared to other industries. With increases in container throughput expected to continue, success rests on a port's ability to continually optimise efficiency in container handling. A critical but labour-intensive component of port operations, horizontal transportation also poses some of the highest safety risks.

The sheer variety of tasks and external factors that influence the dynamic port environment present a challenge for automation because existing solutions struggle to cope with the unexpected. Ships can run behind schedule, equipment failures cause delays, and mixed traffic behaves unpredictably, e.g., external drivers not adhering to lane markings or speed limits. As a result, the kind of predictable, easy-to-replicate scenarios that are traditionally ripe for automation are few and far between.

Automation in fenced areas or on rails, such as with automated guided vehicles (AGVs) and automated Ship-to-Shore (STS) or Rubber-

"GIVEN THE COMPLEXITY OF BOTH QUAYSIDE AND LANDSIDE OPERATIONS, THE LEVEL OF AUTOMATION IN HORIZONTAL TRANSPORTATION HAS STAGNATED WHEN COMPARED TO OTHER INDUSTRIES."

CONTAINER THROUGHPUT AT PORTS WORLDWIDE



ABOVE
Container throughput at ports worldwide from 2012 to 2021, with a forecast through 2027 in million TEUs
Statista

tyred gantry (RTG) cranes, can be programmed to deliver consistent results under the same set conditions – algorithms are deterministic. In mixed traffic scenarios, however, unexpected situations do occur. The aim is for autonomy to be able to navigate these just like a human driver would. Simply teaching the algorithm an infinite number of scenarios would bring us no closer to autonomy, only to deeper learning.

Producing autonomous vehicles that can handle the mixed traffic in ports requires a different approach: a cloud-based 'brain' that is constantly evolving and being updated. The solution must be able to handle a variety of scenarios, from navigating unexpected obstacles to prioritising tasks in real time. While technology development in this area has progressed, autonomy is not yet able to handle such complexity with reliable efficiency without human oversight.

STRIKING A PROFITABLE BALANCE: HUMAN-ASSISTED AUTONOMY

It's not just the complexity of port operations that poses a challenge for fully autonomous vehicles but the economic urgency of the issues they face. Operators need viable solutions that make financial sense today.

In the human-assisted autonomy approach, autonomy handles a significant portion of operations, but human oversight remains crucial: machines handle routine tasks while humans oversee and only support exceptions or complex decision-making. In real terms, this means that if an autonomous terminal tractor is cut off by a human driver, meets a fallen container in its path or encounters a twist lock that's out of place, your investment won't grind to a halt. Instead, a human operator supports the autonomy remotely to navigate the situation safely before passing the baton back to autonomy. This approach not only ensures operational efficiency but also builds an additional safety net around automation.

BUILDING SAFETY, SCALABILITY AND RELIABILITY INTO TERMINAL OPERATIONS

Container terminals are already combining automation and teleoperation technologies to improve safety, working conditions and productivity. Examples include automated and teleoperated cranes, where automation handles most of the action and human operators can oversee safely from a control room.

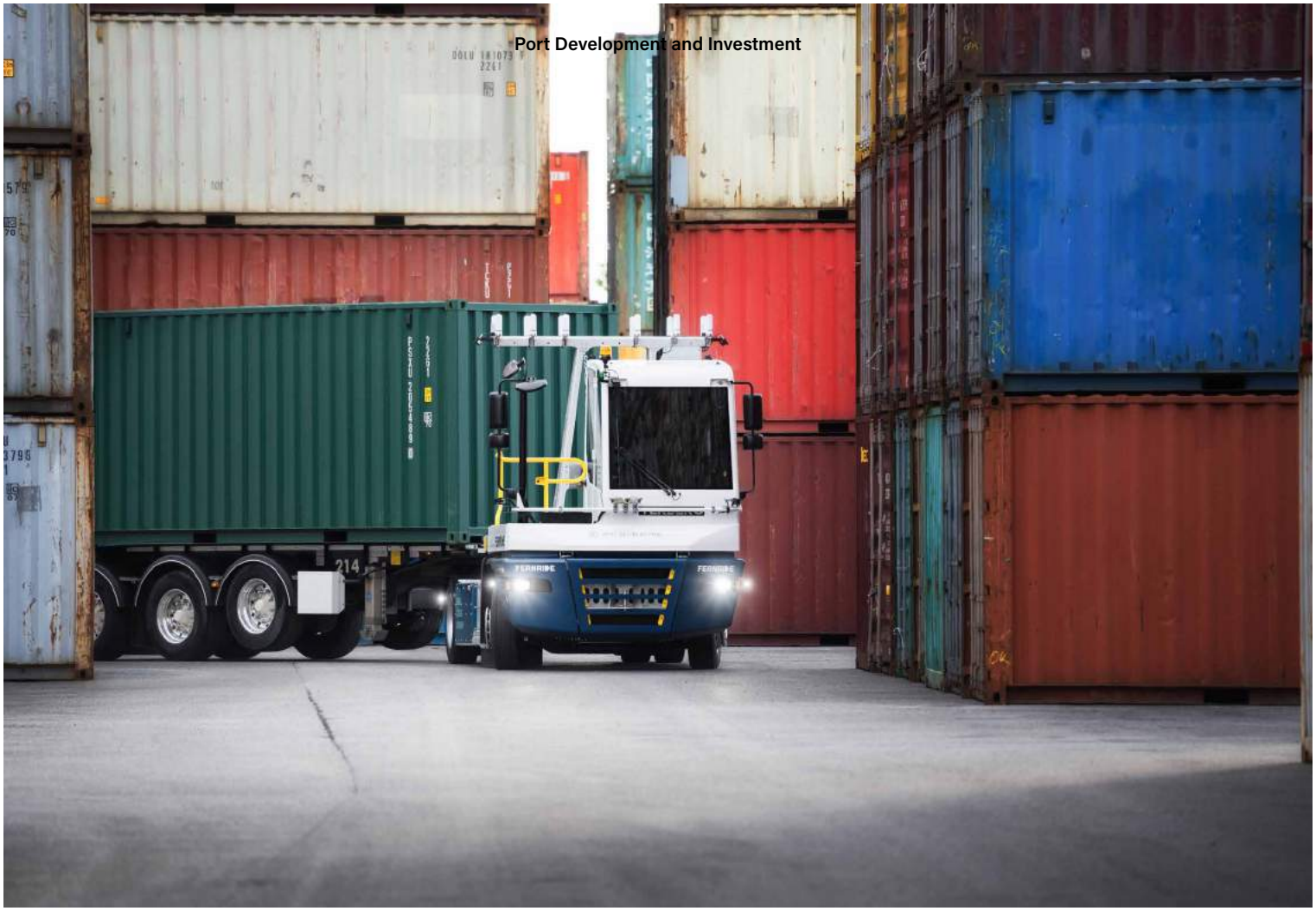
This approach has been particularly effective in the case of STS container cranes where autonomy can gather visual information using cameras and sensors over long distances, much more accurately than the naked eye, and without risk to the human operator. We have also seen ports successfully introduce teleoperation RTG cranes, before making the gradual progression to full automation.

Based on these proven principles, a terminal tractor equipped with human-assisted autonomy can enable container terminals to:

- **Optimise operations by allowing a single operator to manage multiple vehicles**. Human-assisted autonomy retains human insight while broadening each operator's reach, allowing fewer personnel to do more and contributing to the reduction in OPEX.
- **Transform a risky job into a safer, office-based position**. Shifting the human driver to a remote location not only improves safety, but also makes the industry accessible to a wider demographic of talent, including those previously excluded from traditional driving roles.
- **Ensure a reliable fallback mechanism by incorporating human oversight in the automation loop**. While machines handle routine tasks, human judgement is available to tackle unforeseen challenges, ensuring continuous and dependable operations.

DISTINCT FROM FULLY AUTONOMOUS SOLUTIONS THAT EXIST TODAY

FERNRIDE found that 43 per cent of container terminal professionals surveyed already benefit from full automation in various forms,



e.g. automated stacking cranes and RTG cranes, and a quarter use AGVs. Existing AGVs and AUVs can operate without human intervention, by operating on pre-defined routes where mixed traffic isn't an issue. However, with 62 per cent of respondents citing the high initial investment required as their main barrier to automation, the infrastructure required to deploy AGVs along with the rigidity of set routes means that these solutions are becoming less practical in today's supply chain.

In comparison, vehicles equipped with human-assisted autonomy by FERNRIDE can work across existing networks within a port and negotiate obstacles and external traffic, with an average initial capex of around 75 per cent less than an AGV.

THE ECONOMIC AND ENVIRONMENTAL IMPERATIVE

Like any forward-looking investment, autonomous vehicles must make economic sense and be environmentally responsible too.

Economic Viability

When asked about the main challenges around implementing AVs in their ports, 62 per cent of survey respondents cited high initial investment, followed by resistance from workforce (56 per cent).

When correctly managed from a technical, operational, and commercial perspective, the human-assisted autonomy approach can alleviate these blockers by 1) enabling a higher operator-to-truck ratio to simultaneously reduce pressure on and increase the productivity of the existing workforce, 2) making the industry more accessible to new talent, and 3) leveraging machine-learning that enables trucks to drive more smoothly and efficiently than a manually driven vehicle to increase operational

"FERNRIDE FOUND THAT 43 PER CENT OF CONTAINER TERMINAL PROFESSIONALS SURVEYED ALREADY BENEFIT FROM FULL AUTOMATION IN VARIOUS FORMS, E.G. AUTOMATED STACKING CRANES AND RTG CRANES, AND A QUARTER USE AGVS."

“BY ADOPTING A HUMAN-ASSISTED AUTONOMY APPROACH AND EMPHASIZING ELECTRIC TRUCKING, THE FOCUS ISN'T SOLELY ON ECONOMIC GAIN BUT ALSO ON ENVIRONMENTAL IMPACT.”

efficiency and maximise fuel economy.

The result is cost savings across several KPIs, in addition to the absence of costly infrastructure changes. This ensures a lower barrier to entry and a faster ROI for terminal operators when compared to indirect competitors such as AGVs, which have a significantly higher (c. +75 per cent) acquisition cost per vehicle.

Sustainability at the Forefront

By adopting a human-assisted autonomy approach and emphasizing electric trucking, the focus isn't solely on economic gain but also on environmental impact. As global challenges related to climate change intensify and leading corporations pledge to reduce the Scope 3 emissions incurred in the transport and distribution of their goods, pressure on container terminals to adopt more sustainable transportation methods is ever-present and growing.

In a recent paper from the Massachusetts Institute of Technology, Hickert et al. (2023) examined the potential for AVs to reduce fuel consumption by using a control algorithm that received information from traffic signals and told autonomous vehicles when to accelerate and decelerate. The test scenario, which involved passenger cars approaching an intersection, resulted in no stop-and-go traffic (when vehicles are forced to come to a complete stop) and demonstrated the potential to reduce fuel consumption by 18 per cent and CO2 emissions by 25 per cent while boosting travel speeds by 20 per cent if every vehicle in the situation was autonomous. If applied to mixed-traffic container terminal use cases, even a small percentage of AVs could deliver significant efficiency gains as ports push towards sustainability targets.

TACKLING TECHNOLOGY, OPERATIONS AND COMMERCIAL CHALLENGES WITH HUMAN-ASSISTED AUTONOMY

In the past, conversations around electric, automated trucking have been centred largely around the technology itself. Companies

thought less about proving the commercial viability of the technology or solving operational problems, e.g. where trucks are charged or what happens in an outage. FERNRIDE's solution takes a three-pronged approach to deliver a safe and operationally reliable solution that delivers the business benefits of automated trucking technology today.

OUTLOOK FOR 2024

With ongoing challenges intensifying and sustainability pressures looming, the race is on for container terminal operators to fortify their operations for the future. Forward-thinking operators have already seen a return on investments in automation and teleoperation, such as the efficiency of gate automation and the transformative impact of safer STS crane operation.

Thanks to breakthroughs in technology development, autonomous terminal tractors are now capable of fulfilling the requirements of the modern port environment and its ever-growing global shipping volumes. While these innovations promise to help operators increase efficiency, lower operating costs, and enhance safety, how quickly these make an impact will depend on the sector's (traditionally slow) pace of adoption. With access to this technology still limited, operators who move quickly to secure supply before others will hold the improved competitive edge.

"COMPARED TO THE OTHER OPTIONS FOR EXPANDING CAPACITY AND IMPROVING OPERATIONAL EFFICIENCY, RETROFITTING PROVIDES THE STRONGEST ROI."

ABOUT THE AUTHORS :

After almost 10 years at BMW and a strong focus on the autonomous driving space as the VP of Digital Product Strategy, Martin Isik decided to embark on a more entrepreneurial journey. As the CCO at FERNRIDE he is responsible for corporate development and defining FERNRIDE's business model, build global strategic partnerships and a customer-centric product development.

Peter Szelei is a seasoned business development leader with over 12 years of experience in autonomous driving technology and the automotive industry. At FERNRIDE, as Senior Director of Business Development, Peter is responsible for driving the commercial growth by forging strategic partnerships and onboarding key customers.

ABOUT THE COMPANY:

FERNRIDE offers scalable automation solutions for yard trucking that increase productivity, promote sustainability, and improve worker safety. The company employs a human-assisted autonomy approach, that ensures seamless integration and reliable operations for logistics operators. FERNRIDE uses cutting-edge technology to address major industry challenges, such as driver shortages and the negative environmental impact of logistics operations.

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