VISY

Customer Case Study

Wharf Optimization Project

Baltic Hub

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Baltic Hub

Contents

Executive Summary

Baltic Hub

Key Facts:

- A member of the PSA Group
- 2.24 million TEUs in 2024
- Located in Gdańsk, Poland, connecting Asia, European Union and the emerging market of Central Eastern Europe
- Currently operates two deep-water berths: T1 (625m) and T2 (570m)
- A third berth, T3, is under construction and expected to be fully operational by the end of 2025, increasing annual capacity to 4.5 million TEUs
- 24/7 operations, ensuring seamless integration with road, sea and rail networks for uninterrupted supply chain activities

Challenge: Manually managing complex cargo handling operations at the quay

Solution: Visy's Wharf Optimization System including Crane & Spreader OCR technology and user applications

Result: Significant improvement in operational transparency and employee safety, reduction in false lifts, and enhanced job handling accuracy and speed

Safety at Stake: The Reality of Manual Container Handling

Baltic Hub faced growing operational and safety challenges due to a fully manual container registration process at the quay. Key terminal staff – including Wharf Checkers and Lashers – worked in hazardous environments directly beneath ship-to-shore (STS) cranes and around moving terminal trucks. Their tasks relied on visual inspections, radio communications, and manual data entry to coordinate container movements and confirm tasks within the Terminal Operating System (TOS).

A Strategic Shift Toward a Safer, Smarter Terminal

Recognizing these limitations, Baltic Hub initiated a strategic move toward automation. The goal was to improve worker safety, eliminate inefficiencies, and lay the groundwork for a scalable, data-driven terminal operation. Investing in automation was not only a response to immediate operational pain points, but also a forward-looking decision to enhance productivity, accuracy, and control in a highly complex container terminal environment.

Project Background

Long-Term Partnership

Visy's collaboration with Baltic Hub began in 2018, marking the start of a long-term partnership focused on automating and optimizing port operations. The initial phase of the project involved deployment of gate automation with OCR, aimed at improving the efficiency of transactions and safety of cargo handling at the gate.

Visy's Contribution to Baltic Hub's Automation Journey

The collaboration has led to the successful implementation of OCR-based automation. Following the initial deployment of Visy technology at the gates, Baltic Hub expanded the project to enhance its rail operations with Rail OCR portals and OCR cameras on RMG cranes, automating the capture of train and container data on every move. This significantly improved the speed and accuracy of rail cargo handling, reducing manual inspections. The integration of the technologies not only streamlined gate and rail processes but also contributed to Baltic Hub's broader goals of optimizing its terminal operations, improving safety, and reducing environmental impact.

Wharf Optimization Project

The Wharf Optimization Project built on earlier successes by introducing updated solutions that support Baltic Hub's quayside operations. The Wharf Optimization and new process was defined by Baltic Hub's operations and project teams in close collaboration with general contractor Autepra, technology supplier Visy, crane manufacturers Liebherr and ZPMC, Bromma spreaders, and TOS provider Navis.

The Challenge

Critical Pain Points

Baltic Hub's previous container registration process at the quay was fully manual. Employees, including wharf checkers and lashers, operated in a challenging and high-risk environment, often working directly beneath active cranes and alongside moving terminal trucks. Wharf checkers would visually inspect containers and manually input the necessary data into handheld devices to confirm the completion of container moves within the TOS, whether those moves involved a vessel or a terminal truck.

Additionally, based on a printed crane work list and bay plan, wharf checkers provided radio instructions to STS crane operators regarding container placement, and guided lashers to use appropriate lashing equipment such as twistlocks. This manual process not only introduced significant safety hazards but also hindered operational efficiency. As a result, Baltic Hub sought to explore automation as a safer and more productive approach to execute their quayside operations.

The Case for Automation Investment

- Fully manual container registration process.
- Wharf checkers and lashers working in high-risk environments, directly under cranes and near moving terminal trucks.
- Wharf checkers visually inspected containers and manually entered data into handheld devices.
- Container moves confirmed manually in the Terminal Operating System (TOS), either to vessels or terminal trucks.
- Radio instructions provided to STS crane operators based on a printed crane work list and bay plan for container placement.
- Lashers received instructions from wharf checkers based on printed bay views and their experience.

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Before the Wharf Optimization project and the implementation of Visy’s Crane OCR and Spreader OCR systems, along with user applications, we faced significant challenges in coordinating the complex movement of containers between the wharf and vessels, and vice versa. Manual processes posed significant safety risks and created bottlenecks.

– Automation Team, Baltic Hub

Baltic Hub

The Solution

Digitizing Operations with Automation

Visy delivered a Wharf Optimization solution to Baltic Hub, including crane and spreader OCR systems. Along with user applications for managing and digitizing handling events, the system covers the entire container journey between the wharf and vessels, and vice versa. The configuration and delivery of the project involved tailored customizations to create a solution that supports the desired operations and routines across all aspects of quayside processes. From optimizing OCR hit rates to developing user application software, Visy delivered a system that has fundamentally transformed vessel servicing with a more optimized, efficient, and safe approach.

VISY STS CRANE OCR	
Container OCR	• Recognizing container IDs, ISO codes, IMO labels
Seal presence verification	• Recognition of seals
Terminal tractor recognition	• Recognition of terminal tractor ID numbers
High-quality event images	• Further processing, e.g. damage claims
Orientation	• Door direction
Traffic lights	• Synchronizing the system with crane traffic lights to optimize flow and enhance safety.

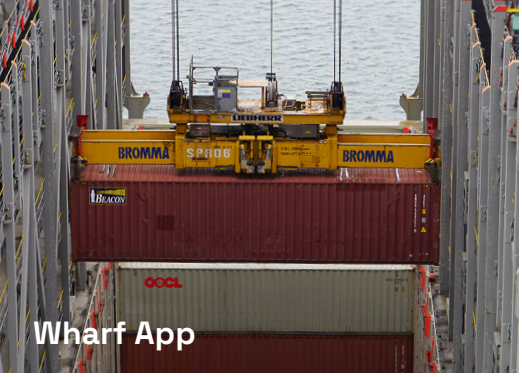
Visy technologies have fully digitized the container handling journey from ship to yard.

VISY TOPVIEW – SPREADER OCR	
Container OCR	· Early container OCR immediately when twistlocks are locked on the container
High-quality roof imaging	· Further processing, e.g. damage claims
Lift type recognition	· OOG, hatch covers, twin lift

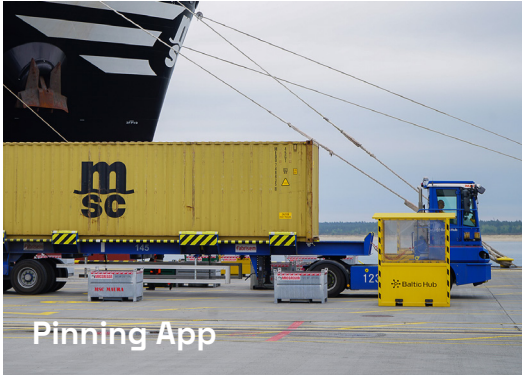
Following the Wharf Optimization, operations under the cranes are now fully unmanned.

OCR is the Ultimate Enabler for Integrating Automation into Operations

- In discharge operations, automatic verification ensures the container is planned for discharge, eliminating false lifts.
- Terminal tractor numbers are matched with the container IDs for seamless tracking.
- All handling events are digitized and recorded for accurate, real-time data.
- Integrated user applications and processes directly support operations and facilitate automation.



Wharf App



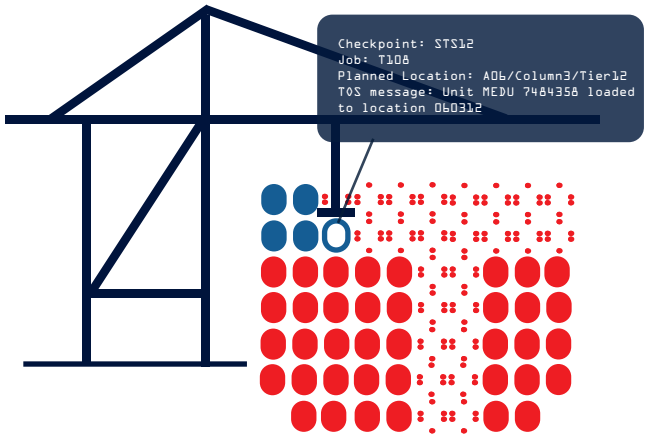
Pinning App

Wharf Dispatcher View

Visy Wharf App

Features:

- Communication tool for crane operators and office coordinators
- Graphical representation of the bay plan
- Loading instructions in audio and visually
- Notifies crane operators of arrived terminal tractors
- During discharge operations, the App informs the operator whether the container is planned for discharge or not (no more false lifts)
- Early container ID verification (information from Visy TopView)
- Integration with the N4 TOS to automatically confirm container move completion



Bay Plan: Visy Wharf App gives loading instructions and automatically updates the TOS after the task has been completed.

#1

Wharf App: Signing in and starting the loading operations.

#2

Wharf App: Checking the terminal tractors in sequence and initiating the loading of a container to its designated position.

#3

Crane Operations: The Wharf App helps crane operators with real-time instructions via loudspeakers.

Visy Pinning App

Features:

- Tool for lashers to proceed with appropriate twistlock operations
- The App is integrated with the N4 TOS to get the information of containers, required locks, and destination
- The logic is tied to the terminal tractor's task and the containers loaded onto it

#1

Pinning App: Typing in the terminal tractor ID number.

#2

Pinning App: Checking twistlock instructions and submitting the task as completed.

#3

Pinning Operations: Selecting the instructed twistlocks.

#4

Pinning Operations: Attaching the locks to the designated positions.

Visy Crane Gate – Wharf Dispatcher View

Features:

- Management of loading sequences
- View on all terminal tractors
- Communication with the Wharf App
- Checking event pictures
- Exception handling
- Monitoring overall loading operations in real time

The Container Journey with the Help of Wharf Optimization

Step-by-Step Automation

Ship Arrival and Discharge Process

1. Vessel is secured at berth
2. Spreader approaches container on the vessel
3. Visy TopView – Spreader OCR system recognizes container ID
4. Wharf App verifies container is planned for discharge
5. System confirms authorization to proceed

Container Transfer to Yard

1. Visy Crane OCR captures images between crane legs
2. System automatically identifies:
    - Container ID
    - ISO code
    - IMO labels
    - Seal presence
    - Door direction
3. Simultaneous recognition of terminal tractor ID number
4. System verifies correct tractor-container pairing and updates TOS

Twistlock Operations at Pinning Station

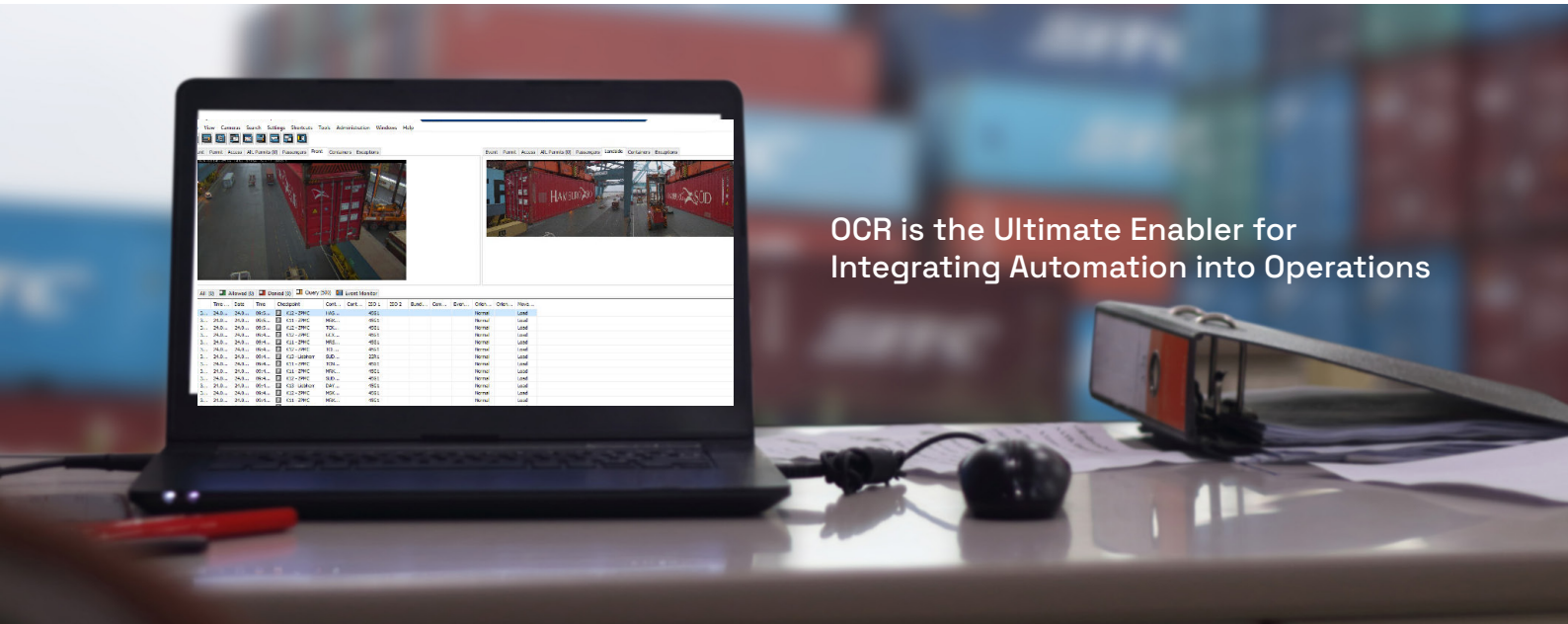
1. Terminal tractor receives instructions to either visit the pinning station or to proceed directly to the yard

Loading Operations

1. Terminal tractor receives instructions to either visit the pinning station or to proceed directly under the crane
2. Lasher uses handheld device with Pinning App:
   - Enters the tractor number
   - Container details and instructions for required twistlock operations are shown
   - The tractor is cleared to proceed
3. Traffic light system directs the tractor under the crane when the lane is available
4. Wharf App notifies crane operator of arrived terminal tractors
5. Wharf App verifies sequence status:
   - TT In-sequence: Proceeds normally (green)
   - TT Out-of-sequence: Requires intervention (red)
6. Wharf App receives container information from TopView
7. System shows intended bay plan
8. Container is loaded and the placement is confirmed
9. TOS is updated with successful completion

Control Room Coordination

1. Wharf Dispatcher view on Visy Crane Gate provides comprehensive overview on vessel operations
2. Control room coordinator monitors:
   - All tractor movements
   - Out-of-sequence status containers
   - Planned vessel positions
   - Potential bottlenecks
3. System allows sequence adjustments when needed
4. Crane operators receive updated loading permissions on their Wharf App
5. All operations are synchronized in real time



OCR Accuracy & System Performance

A hit rate of almost 99% across the entire system

Visy OCR achieves best-in-class accuracy – at the gate, in the yard, and on the quay. This performance is the result of decades of R&D in computer vision, backed by a highly skilled team of engineers across software, hardware, and installation.

Quayside imaging is particularly demanding. The hardware and image acquisition systems must adapt to varying container flight paths, capturing reliable images from all angles – without causing delays in loading or discharge operations. On top of that, the recognition algorithms must deliver consistently high performance, even under difficult angles and poor lighting conditions.

To remain at the forefront of this rapidly evolving field, the Visy OCR team actively follows advancements in AI research and academic developments.

Visy OCR Systems Deliver Unmatched Accuracy

Area	No. of QCs	Live from	Moves	Container ID	ISO	TT ID	Seal	Door	IMO
Terminal 1	6	August 2024	**300k**	99,5%	99,4%	98%	96,8%	99,9%	99,7%
Terminal 2	8	June 2024	**900k**	99,8%	99,8%	99,3%	96%	100%	99,5%
Terminal 3	7	March 2025	**60k**	99,8%	99,7%	98,3%	97,4%	99,9%	99,8%

Hit rate calculations are supplied by Baltic Hub's Automation team.

> **Performance is the result of decades of R&D in computer vision, backed by a highly skilled team of engineers across software, hardware, and installation.**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50t UNDER
75t UND
(TWIN)
SINGLE)
BROMMA
TUG
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Results and Benefits

Significant Improvements Across Multiple Operational Metrics

System Capabilities	Impact on Operations
Improved Data Accuracy	• Consistently high OCR hit rates.
Crane & Spreader OCR System	• Minimizes false lifts → safer operations and fewer handling mistakes.
Digital Documentation Automation	• The system removes the need for manual input and supports smoother coordination.
Integrated Dispatcher Tools	• Enables controlled flows → reduces risk of miscommunication and unsafe movements.

Key Business Benefits

Enhanced Safety: Reduction in manual interventions in high-risk areas – Keeping people away from crane activities

Enhanced Operational Efficiency: Streamlined container handling process between the wharf and vessels, and vice versa

Improved Decision Making: Real-time data availability for operational teams

Reduced Human Error: Automated verification at critical checkpoints

Optimized Resource Utilization: Better allocation of equipment and personnel

Increased Terminal Throughput: Higher container volumes handled with existing infrastructure

Improved Data Accuracy: Consistent information across all terminal systems

Client Testimonial

Automation Team, Baltic Hub

> The new automated and digitally assisted process has significantly enhanced safety by minimizing human presence in high-risk areas, while also improving transparency, efficiency, and overall operational reliability.

Karol Moszyk

Automation Program Manager, Baltic Hub

> The wharf optimization project successfully modernized our key operations and introduced a higher level of automation and control.

Łukasz Raszka

Project Manager, Baltic Hub


ZPMC
上海振华重工
36
ZPMC
上海振华重工


S.W.L
65t UNDER SPREADER (TWIN)
50t UNDER SPREADER (SINGLE)
75t UNDER CARGO BEAM
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ABB
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Visy Oy
sales@visy.fi | www.visy.fi