

HUTCHISON PORTS SOHAR

INTERVIEW

OCR PORTALS

3RD GENERATION PORTALS

WAREHOUSE & WORKSHOP OPTIMIZATION

INDUSTRY 4.0

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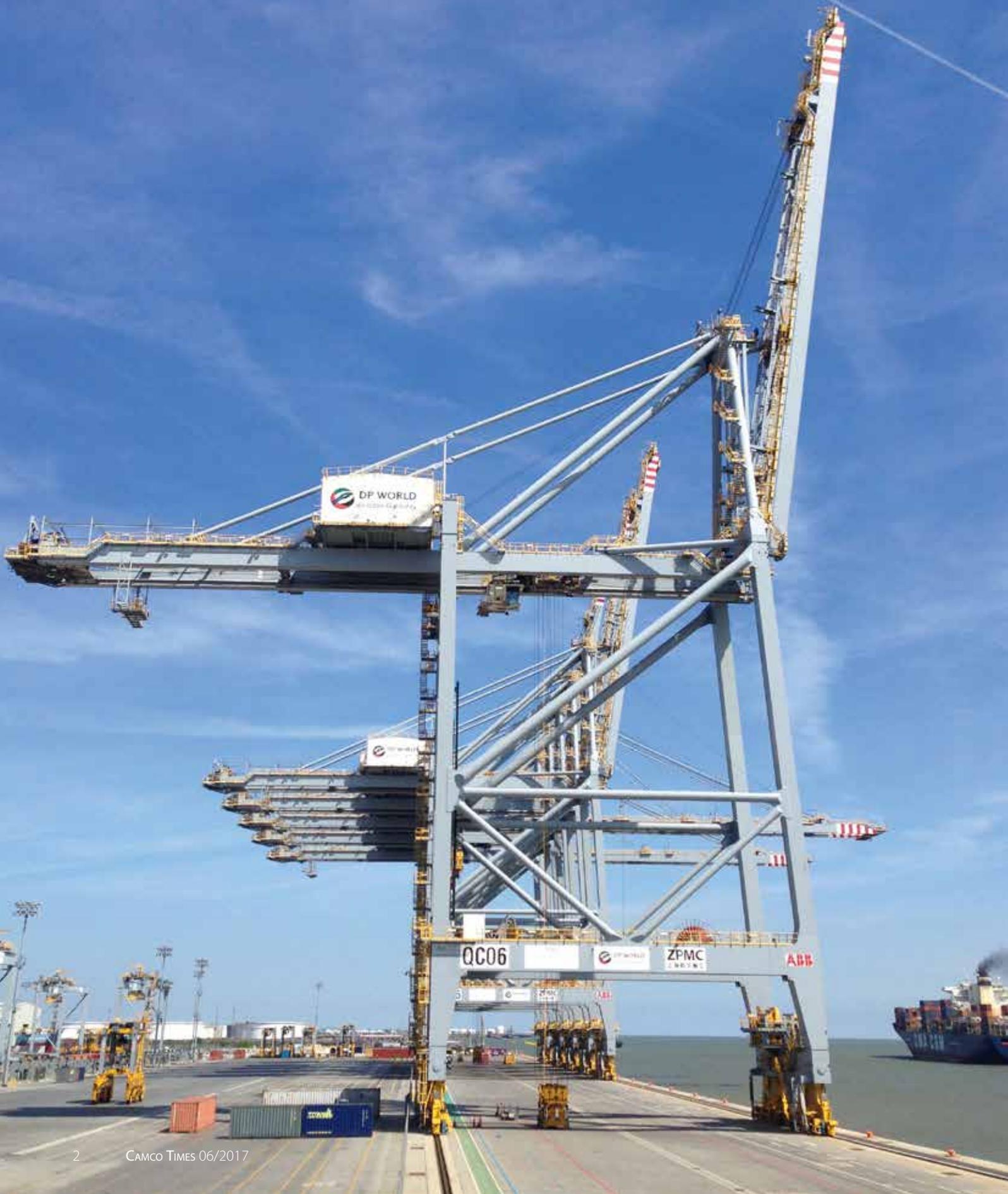
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COLOPHON

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Special thanks to

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About Camco Technologies

Camco Technologies is the leading technology company in innovative terminal automation solutions and services. Since 1999, our systems empower marine and railway terminal operators to increase their performance and safety while reducing operating costs.

Already 150+ terminal operators worldwide successfully optimized their gate, crane, rail and yard processes using our highly accurate OCR technology, robust kiosk systems and advanced Gate Operating System.

Camco's core business exists of products that automate the handover process of containers by using visual-assisted and micro location technologies. In-house developed OCR-based systems accurately register containers entering or leaving the terminal by any means of transport, enabling the TOS to make the right decisions. The powerful combination of OCR technology with micro location technology provides accurate information on where a specific container was lifted or dropped.

Camco's hardware and software systems can be customized and are designed for seamless integration with other systems, such as the TOS, vehicle booking and planning systems.

Read more at: www.camco.be

Camco offers locally based services to Middle East customers from Dubai office

DEDICATED PRESENCE IN MIDDLE EAST WILL ENHANCE CAMCO'S SUPPORT AND MAINTENANCE SERVICES AND CREATE NEW BUSINESS OPPORTUNITIES.

As Camco's customer base in the Middle East region has grown significantly over the past few years, the decision was made to set up an office in Dubai's Jebel Ali Free Zone. From this office, Camco technicians and engineers will be able to effectively plan and perform technical interventions at customer site.

"We currently have customer installations in major Middle East ports located in Dubai, Saudi Arabia, Egypt and Oman, while others will soon follow," says Camco CEO Jan Bossens. "To increase our response time for service interventions and technical support, we've opened an office in Dubai. In addition, our long-standing partnership with World Security and WCS Dubai for warehousing services enables us to maintain a full-size stock of spare parts close to our Middle East customers."

Camco's terminal automation systems are designed for the highest reliability and availability. In case of a system failure, Camco's remote support team will try to resolve the problem. If on-site intervention is required, the intervention will be scheduled according to the service level agreement and carried out by a Camco certified technician.

Having both technical support staff and spare parts closer to the customers will improve problem resolution time and customer satisfaction.

Establishing a presence in Dubai is a logical result of the growing interest in Camco's terminal automation solutions and micro location technology in the Middle East region. It will be advantageous to both customers and Camco for technical and business reasons.

"With our dedicated presence in the region, we will be able to get much closer to our customers and to bring our expertise locally to support customer needs," concludes Jan Bossens.



Technical support staff, project engineers and business developers use the Dubai office to get closer to the customers.

Successful Gate Automation at Hutchison Ports Sohar, Oman

INTERVIEW WITH HEAD OF IT AT HUTCHISON PORTS SOHAR: "INNOVATION IS KEY FOR FURTHER OPTIMIZING THE TERMINAL INDUSTRY."

Situated within Sohar Port – close to the booming economies of the Gulf states, Iran, Pakistan and India – Hutchison Ports Sohar enjoys a prime strategic location in the Gulf region. It lies at the heart of the Arabian Triangle of rapid economic growth – an area encompassing the regional powerhouses of Abu Dhabi, Dubai and Sohar. Equally important is its proximity to the hinterland of this Arabian Triangle, as well as the Batinah region of northern Oman where industrial and economic investment is currently at record highs. A network of modern highways ensures seamless connectivity with Muscat (200 kilometres), Dubai (160 kilometres) and Abu Dhabi (180 kilometres).

Hutchison Ports Sohar's Head of IT is proud to say that it is his responsibility to enable and facilitate the business of Hutchison Ports Sohar to reach its strategy and objectives by providing them with the right IT and technology solutions to better serve their customers.

As head of IT he recommends solutions, systems and changes. This goes beyond the traditional terminal IT and includes added technology, adding value to the business. For 4 years he has been working with Hutchison Ports Sohar, after gaining experience and expertise on other terminals during the last 10 years.

Procurement process

After a detailed internal feasibility study, Hutchison Ports Sohar made the decision in principle to procure and install gate systems. Earlier, Hutchison Ports Sohar implemented a truck appointment system. The gate systems are planned to further optimize the truck processing at the terminal.

Before floating the tender to select the best fit vendor, the assessment criteria were specified and agreed upon at Hutchison Ports Sohar. Amongst the evaluation criteria, the most relevant were: technical quality, proven track record, technical and proven fit for the local climate and environment – in Oman, the climate is extremely hot and dusty –, technology used, accuracy, proven implementation methodology, value for money.

Hutchison Ports Sohar made a very detailed market study and evaluation, taking about 9 months. During this evaluation process systems and suppliers were assessed. Camco was selected as the best provider, capable of delivering the solution Hutchison Ports Sohar needed, and an agreement was reached. The final system objectives and expectations in terms of system performance were integrated in the agreement.

FACT SHEET TERMINAL C

Handling capacity:	1 mio TEU/yr
Surface:	68ha
Quay length:	970m
Quay berths:	3
Max depth:	18m
Auto Gates:	1 main gate, 2 side gates
Quay cranes:	11
RTG cranes:	32
TOS:	nGen
Truck Appointment System	

Camco Systems

• Truck OCR portals:	6
• Truck pedestals:	14
• Gate Operating System	



Truck gates at Hutchison Ports Sohar



System implementation

During the implementation of the systems, there were a few challenges, as with any encompassing project. Over the last years, Camco has grown very fast. As a result, the company was short staffed from time to time.

When Hutchison Ports Sohar escalated these issues to Camco, Mr Jan Bossens, Camco’s Managing Director, and Mr. Anton Bernaerd, Camco’s Business Development Director, personally came to the terminal to listen to the project management team and coordinated the efforts for solving and remediating the issues.

Hutchison Ports Sohar management and project team, together with the Camco management, greatly appreciated the mutual personal involvement and commitment.

After all, implementing complex technology solutions is a challenging process requiring precise planning, excellent communication, and depends on strong personal commitment and motivation of all team members.

Expert advice

When asked for personal advice targeted to terminals wanting to implement gate systems or technology in general, Head of IT of Hutchison Ports Sohar points out that there are very distinct key success factors to be observed:

1. Every terminal is specific.
2. Integration between systems is crucial.
3. Be as specific as possible about needs and requirements.
4. Project implementation is teamwork.
5. Get “buy-in” from the community.

Every terminal is specific

The operational processes, the layout and the configuration of each terminal is different. This is especially important for projects requiring infrastructure works, civil engineering and civil works. The climate on each terminal is different: temperatures and humidity may vary from extremely high values to extremely low values. Hardware needs to be withstanding adverse conditions without system performance decaying. The best guarantee for a client is to learn from customers working in similar climatological circumstances.

Integration between systems is crucial

Systems are no longer working as islands. Systems need to share information and therefore need to integrate and interface seamlessly with each other, share data and enable terminals to meet customer requirements.

Be as specific as possible about needs and requirements

State clearly what you expect, what you need and what criteria the technology or system needs to comply with. This includes the criteria for the successful commissioning of systems and technology.

Project implementation is teamwork

The responsibility for a successful implementation is a shared responsibility. Provider and client teams need to work as one, share information and work towards a common goal. Procuring a system does not mean automatically shifting all responsibility to the provider. Cooperation is needed during all phases of the project.

Truck gates at Hutchison Ports Sohar



Get buy-in from the community

The users need to be involved and educated to work with the systems provided by the terminal. In this case, users are the truck drivers and their employers.

The Head of IT elaborates on a splendid example. When implementing the truck appointment system at Hutchison Ports Sohar, the terminal spent the same effort and investment on road shows and seminars to ensure that the trucking community clearly understood what was going to change when they plan to visit the terminal.

Intensive training sessions were conducted and information brochures provided in the languages used by the drivers: Arabic, English, Urdu and Hindi. The user interfaces displayed on the user's mobile phones and on websites were developed in the same languages.

For organizing these seminars, a professional PR company was hired. The investment in this education and promotion was almost as important as the investment in the truck appointment system itself, but it was crucial in overcoming the learning curve and achieving results.

This was especially valuable in Oman, where most truck drivers are either self-employed or work for small sized trucking companies.

Getting the community to use the system greatly contributes to the outcome and the return on investment. The target of investing in technology is the better utilization of terminal resources to maintain and improve profitability.

Results

After going live with the Camco systems, the same success was observed. Truck queues almost immediately disappeared: trucking companies and the port authority were happy with the results.

Some tweaking and tuning was necessary during the first days of operation. After these initial adjustments, the system is running in a reliable way, delivering the results targeted and expected.

On the terminal itself, staff previously involved in manual checking processes was deployed to other departments in need of experience and qualified staff. In their new job, they now contribute to the increased customer service.

Innovation is key to further optimize the terminal industry

Hutchison Ports Sohar's Head of IT concludes his valuable contribution by stating that terminals can go further, optimizing performance, effectiveness, efficiency and customer service by attaching more importance to innovation.

Compared to other industries, the drive to innovate lags and there remains a long road ahead.

For both terminal operators and suppliers there remains a huge opportunity to go the extra mile. The key success factor is integration.

Pedestal at OOG lane



Mobile app speeds up container registration at MCT

TERMINALS CAN USE MOBILE TECHNOLOGY TO DELIVER BETTER SERVICES TO THEIR CUSTOMERS AND TO MODERNIZE THEIR OWN PROCESSES

Together with Moerdijk Container Terminals (MCT), Camco has developed a mobile app that allows truck drivers to pre-register their container drop-offs and pick-ups at the terminal. This on-the-go solution speeds up the container registration process at the terminal, allowing drivers to proceed directly to the in-gates, without the need to park and register through MCT's Service Desk.

Peter Van Veelen, General Manager at Combined Cargo Terminals (Moerdijk, The Netherlands) explains: "Today, trucks entering the terminal must perform their registration process inside the Service Desk building, either through the self-service kiosks or the SD assistants. During peak hours, the parking area fills up and becomes the bottleneck."

As the container registration process is quite simple and the data known beforehand, the idea was launched to have the drivers enter the information via a mobile app before arriving at the terminal.

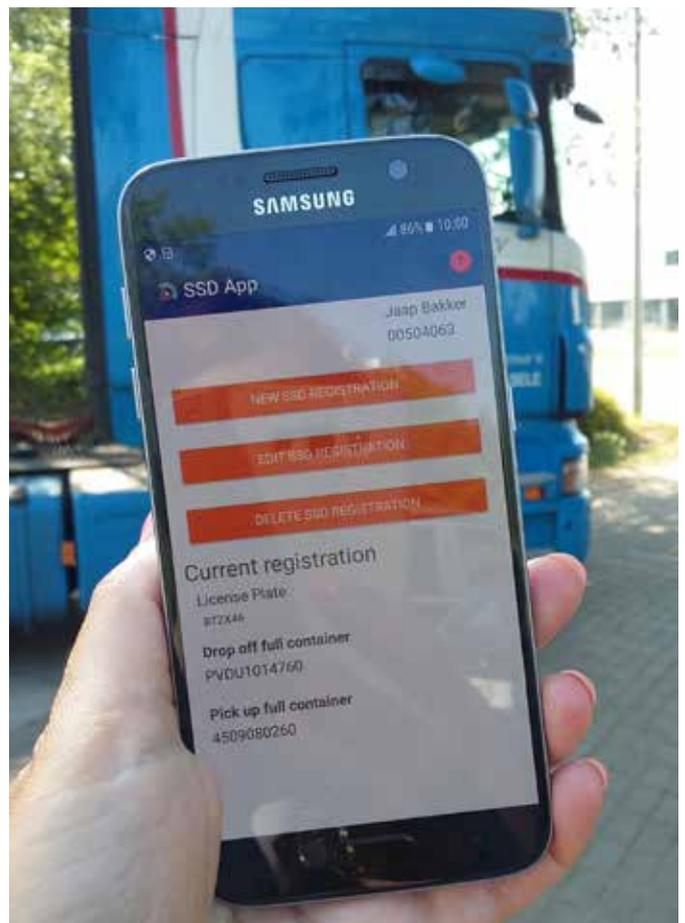
"In the app, drivers will get immediate feedback on any inconsistencies in the registration data, such as a mismatch between the container reference number known to the driver and the one known in our TOS," continues Peter. "The driver can thus contact the transportation company to get the data straight before heading to the terminal and losing precious time."

With the app, MCT primarily targets their regular customers and expects to have 40 to 50% fewer visits to the Service Desk. In a later phase, MCT will open a secondary in-gate for preregistered container traffic, which will further improve overall throughput at the in-gates. MCT will launch the SSD App in July, together with a campaign to inform their customers.

Easy on-boarding, simple app, no training required

The **SSD App** (Self-Service Desk) must be used in combination with the Cargo Card or Alfapass in use on Dutch terminals, which serves as a personal ID card for truck drivers, holding identification and biometrics data. Truck drivers can install the app from the app store on their Android phone or iPhone.

First-time users must stop at MCT's Service Desk to complete the on-boarding process – bringing their phone and Cargo Card / Alfapass. During on-boarding, the Service Desk will generate a barcode token that is linked to specific driver data



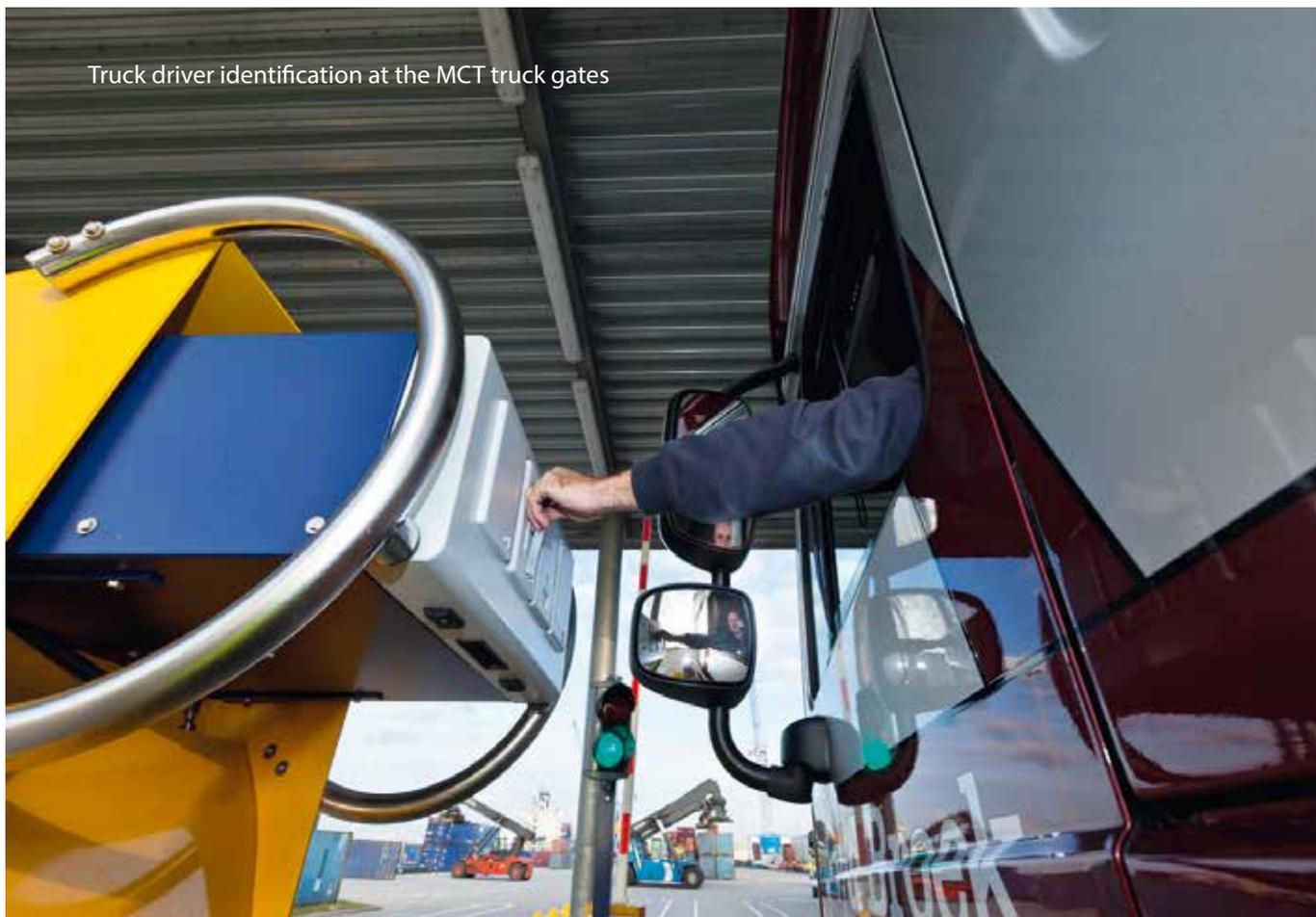
BENEFITS FOR TERMINALS

- Freed up parking space
- 40-50% fewer visits to Service Desk
- More efficient Service Desk
- Shorter truck turnaround time
- Better control on truck flows

BENEFITS FOR TRUCKING COMPANIES

- Immediate feedback on container registration info: errors can be set straight before arrival at terminal
- Immediate access to in-gates
- Shorter truck turnaround times
- Better time-management for truck driver

Truck driver identification at the MCT truck gates



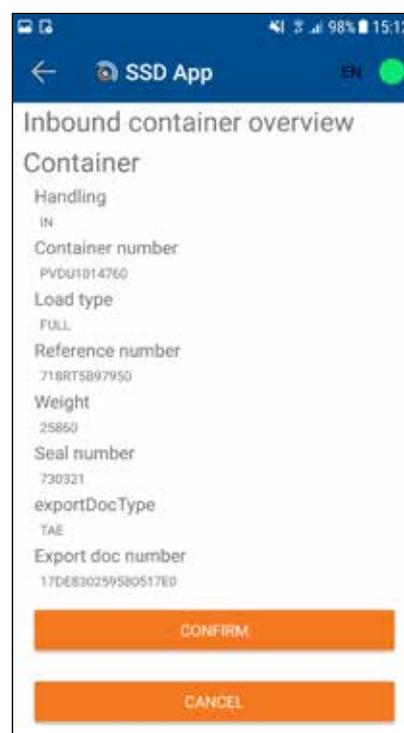
and the corresponding Cargo Card or Alfapass. After installing the app, the driver scans the barcode token with his phone and thus installs it on his smartphone. Once registration is complete, drivers can start using the app and no longer need to visit the Service Desk.

Camco as app developer partner

Transportation companies and terminals can greatly benefit from mobile apps to increase productivity and efficiency of daily processes. Many terminals are already considering interesting applications, for example: A **Truck Driver Appointment** app where drivers receive a QR code holding their appointment data. The driver scans this QR code at arrival at the terminal and receives relevant driving instructions. A **Cargo Inspection** app for gate clerks or cargo checkers, replacing the current RDT handhelds.

"With the Camco Gate Operating System (GOS) already at the crossroads of different port applications and databases, these kinds of mobile applications are the natural extension of our portfolio," says Bart Grauwels, Camco Software Team Leader. "We are ideally placed to combine information from the TOS, VBS, ACS and many other terminal and gate related systems into user-friendly apps."

Camco's extensive experience with gate processes and driver and operator workflow optimization can now be applied in these new and exciting applications. If you see any opportunities for mobile apps on your terminal, please contact Camco to see how we can help.



The truck visit registration consists of a simple wizard, asking for container info. Each registration must be confirmed.

Introducing a new market standard: Camco's third generation OCR Portal

CAMCO'S INTELLIGENT AND ROBUST OCR PORTAL WITH INTEGRATED CONTROLLER, CABLING AND CAMERA SUPPORTS CAN BE INSTALLED IN 1 DAY ONLY.

Camco's OCR Portal success story is entering a new chapter with the launch of a 3rd generation OCR portal at the end of Q4.

With its durable and well-thought-out design, terminal operators will gain in installation plus maintenance time and system longevity. Improved technology will result in higher read rates and throughput at the truck gates.

The new portal uses the concept of proven spotlight triggering and allows dynamic drive-through from 0 to 60km per hour.

"In the portal frame design, integration is key," says CTO Jef De Geeter. "Portal controllers are built into the portal legs, while power and data cabling is integrated into the frame. A snap-on system is used to fix electrical equipment, while portal supports carry the side cameras. This allows for quick equipment installation at reduced costs and lead time."

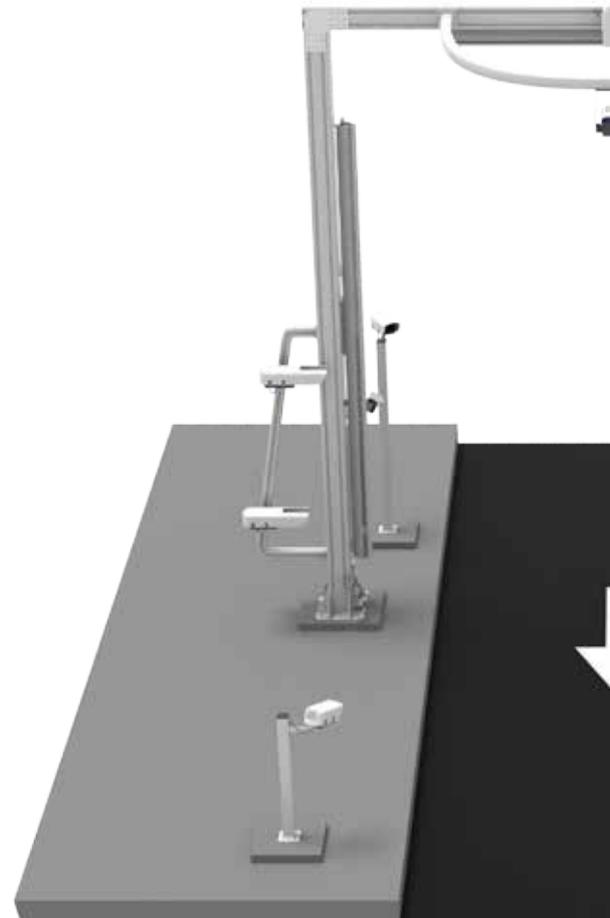
A decade ago, Camco set the standard for highly reliable and durable portals: more than 400 portals are daily used in over 120 terminals worldwide. The GEN3 portal is precisely designed to even surpass this success.

PORTAL FRAME

- Camco-owned design: durable anodized aluminum portal frame.
- Small footprint - limited dimensions.
- Enhanced equipment integration: side cameras (1D) fixed on portal supports, easy snap-on system for electrical equipment, integrated cable trays for data and power.
- Fully installed in 1 day.

INTEGRATED PORTAL CONTROLLER

- Integrated Portal Controller replaces Field Equipment Cabinet.
- Built into the portal legs and accessible via panel.
- Redundancy setup for high availability.
- Intelligent controller to steer all electronic devices such as PoE cameras, LED lights, sensors and laser scanners.



CAMERAS

- PoE cameras, simplifying cabling.
- Integrated CPU and dedicated image processor.
- Compact housing.
- 2D camera: 4/12/25MP global shutter image sensors up to 200fps.
- 1D camera: new hybrid line scan sensor, allowing vehicle speed up to 60km/hr (37mi/hr).
- Guaranteed 10+ years availability.



SECURITY

- Portal controller has integrated PoE switch with proxy server.
- Communication with central server using a single IP address.
- Communication is encrypted with AES.
- Tamper-proof devices.

LED LIGHTS

- Gen4 LED light fixture: 1 unit of 4.5m (14.7ft) with easy snap-on system.
- Independent and easy accessible LED controller.
- Ethernet enabled with web interface for remote diagnostics.
- Super high-bright LEDs for scanning up to 60km/hr (37mi/hr).



SOFTWARE

- Next generation in-house developed image analysis software.
- Based on deep learning using neural network hardware processor.
- Guaranteed the highest OCR read rates.
- Continuous learning based on worldwide data in order to maximize OCR read rates.

INTERNET OF THINGS ENABLED

- PoE enabled cameras.
- Ethernet enabled LED lights, sensors, laser scanners, barriers.
- Web app for controlling all portal devices.



Warehouse and workshops fully operational

TO HANDLE INCREASING VOLUMES, CAMCO HAS OPENED A NEW WAREHOUSE FACILITY IN BELGIUM. THE FACILITY ALSO HOSTS WORKSHOPS FOR MILLING, PAINTING, 3D-PRINTING, SANDBLASTING AND WELDING ACTIVITIES.

1250 square meters facility

In 2016, Camco opened an additional 1250m² warehouse facility next to its headquarters in Leuven, Belgium. The decision to build this warehouse was driven by the need to handle increasing volumes and accommodate the rapid growth.

The new warehouse is, among others, used for outbound shipments and is equipped with a loading dock to facilitate transport handling. A team of 6 logistics people is responsible for running both warehouses as efficiently as possible, including inbound logistics, production picking and outbound shipments.

Milling, 3D-printing, painting, welding and sandblasting shops

Part of the new facility is reserved as workshop area. It hosts two 5-axis machining centers, used for multi-surfacing milling purposes. The largest milling machine is mainly used to finish aluminum extrusion profiles, such as the aluminum tubes of Camco's newest OCR Portal structure.

Several 3D-printers are used for prototyping and producing serial components and spare parts. In addition, Camco has set up dedicated painting, sandblasting and welding shops.

Prefabrication of kiosks and BoxCatcher rails

The facility furthermore allows the prefabrication of Camco's Gate Kiosks, LSTPs and BoxCatcher rails (up to 36 meter), a key driver in realizing faster delivery times and higher volumes.

By preassembling these products on Camco's premises prior to delivery and installation at customer site, installation time is significantly reduced and product quality is further improved.

By continuously improving its warehouse processes and infrastructure, Camco enhances its stock accuracy, production process and order to shipment time.



CAMCO headquarters with adjacent warehouse

Camco is moving towards industry 4.0

FURTHER AUTOMATION OF CAMCO'S MANUFACTURING PROCESS RESULTS IN SHORTER DELIVERY TIMES, STANDARDIZED PRODUCTS AND BETTER CUSTOMER SERVICE.

To provide a better customer service, higher product quality and shorter delivery times, Camco has decided to take control of the manufacturing process of aluminum tubes used for the OCR Portal structure, BoxCatcher rails and LED light profiles. Two 5-axis machining centers are operational in Camco's workshops. The Profile-Flex 5-axis machining center is mainly used to finish large aluminum extrusion profiles up to a length of 12.25m - it can mill, drill, tap and saw tubes, profiles and extrusions in aluminium.

"With these milling machines we are expanding our shop capacity and reducing production time," explains Thomas Pattyn, Product Engineer at Camco. "We are no longer depending on external parties to timely finish our milling work. At the same time, it allows us to swiftly implement improvements to our CAD designs, without the need to run this through our supplier."

Another advantage of insourcing milling work is flexibility. "When finishing large profiles, we integrate the profile measurements into the milling program, and thus ensure accuracy on each single part," continues Thomas. Previously, precious time was lost doing quality and measurement checks at the supplier.

The milling workshop employs only one operator. All design and programming is done by the product engineer and made available to the shop. The engineer uses CAD/CAM applications (computer-aided design and computer-aided manufacturing) to design the products and program the machining centers. CAM software uses the models and assemblies created in CAD software to generate tool paths that drive the machines that turn the designs into physical parts.



Milling center operator and engineer



5-axis milling center



BoxCatcher rails in CAMCO warehouse



Milling center

New Projects

SITRANS, SANTIAGO, VALPARAISO, SAN ANTONIO, CHILI

Construction of an Automated Gate System at different terminals operated by Sitrans: Santiago, Valparaiso, San Antonio. Purpose is to optimize gate processes and yard planning, as well as to provide condition recording for reefer containers. The project combines OCR portals, kiosk gate lanes, Gate Operating System and software.

Sitran, present in at least 12 locations around Chile, offers domestic logistics distribution and container storage services.

FACT SHEET



Design

- Handling 140,000 containers per year
- Santiago:
 - Surface: 20 hectares
- Valparaiso:
 - Surface: 30 hectares
 - Container storage capacity: 18,000 TEU
- San Antonio:
 - Bajo terminal: Surface: 5 hectares
 - Alto terminal: 19 hectares

Camco Systems

- Truck OCR portals: 7
- LPR camera systems: 7
- Truck pedestals: 25
- Matching LPR cameras: 25



© Sitrans

PACIFIC NATIONAL, AUSTRALIA

Pacific National is one of Australia's largest rail freight businesses. Camco was awarded the design, installation and commissioning of a comprehensive Gate Automation System in the Pacific National intermodal terminals of Townsville, Perth, Sydney, Brisbane, Melbourne and Adelaide.

To automate Pacific National's validation and registration processes, Camco is implementing a combination of truck driver pedestals, Gate Operating System (GOS), including interfacing with the existing terminal weighbridges.

FACT SHEET



Design

- A network of intermodal freight terminals
- 180 weekly services across mainland Australia
- Moving and handling over 674,000 TEU per year

Equipment

- Rail gantry cranes
- Reach stackers
- 350 locomotives
- 7000 wagons

Camco Systems

Automated gate lanes with pedestals, traffic barriers, traffic signs:

- Townsville: 2
- Perth: 7
- Sydney: 3
- Brisbane (Tennyson): 3
- Melbourne: 6
- Adelaide: 5



Pacific National Perth

SOCIEDAD PUERTO INDUSTRIAL DEL AGUADULCE, COLOMBIA (SPIA)

SPIA - a joint-venture of ICTSI and PSA - is developing a multi-user container terminal at the port of Buenaventura in Colombia.

Introduction of a comprehensive Automated Gate solution, including OCR portals and gate lanes with driver pedestals.

FACT SHEET



Design

Phase 1:

- Surface: 128 hectares of terminal area
- Surface: 140 hectares for further logistics development
- Design capacity: 550,000 TEU
- Berths: 2

Equipment

- Super Post Panamax quay cranes: 4
- Rubber Tired Gantry cranes: 10
- Terminal tractors: 32

Camco Systems

- Truck OCR portals: 2
- Truck pedestals: 8



© SPIA

NOATUM CONTAINER TERMINAL BILBAO, SPAIN

Noatum CT Bilbao is one of the leading ports for the Atlantic region of Southern Europe.

For the automation of truck traffic flows, Camco will implement multiple OCR portals with LPR technology at the in and out gates, gate kiosks at the inbound gates to control access to the yard, and gate kiosks at the outbound gates.

FACT SHEET



Design

- Surface: 43.8 hectares
- Quay length: 1.155 m
- Depth: 21 m
- Gates: 9 entry/exit gates + 1 OOG
- Dedicated rail terminal

Equipment

- STS cranes: 7
- RTG / RMG cranes: 16 / 2
- Reach stackers: 6

Camco Systems

- Truck OCR portals: 4
- Truck pedestals: 7 + 4



© Noatum

New Projects

CONTARGO TERMINAL



NEUSS GERMANY

Comprehensive automation project at Contargo Neuss Terminal, including multiple OCR portals, kiosk gate lanes, self-service kiosks, and a TrainGate system (Rail OCR).

Contargo Neuss Terminal is centrally positioned in Europe, near the Rhine and Western seaports, offering trimodal logistics services.

KATOEN NATIE GULF COAST



HOUSTON, USA

To optimize traffic flows at Katoen Natie's new logistics facility in Houston, Camco has implemented a gate access system.

The project combines truck pedestals for identification and registration processes, Gate Operating System (GOS) and interfacing with the Warehouse Management System.

PSA ANTWERP



EUROPA & NOORDZEE TERMINAL

Terminal automation project at PSA Antwerp's Europa Terminal and Noordzee Terminal. The project combines indoor self-service kiosks for driver registration with truck pedestals and OCR portals at the terminal out gates.

HHLA CONTAINER TERMINAL



BURCHARDKAI, GERMANY

Further automation at HHLA CTB terminal with a 3rd OCR camera portal and corresponding kiosk at the inbound truck gates.

HHLA Container Terminal Burchardkai is the largest facility for container handling in the port of Hamburg.

THESSALONIKI PORT AUTHORITY



GREECE

Implementation of a gate automation project at the Port of Thessaloniki: installation of 3 truck OCR portals with LPR technology.

THPA is responsible for the construction and maintenance of new and existing infrastructure and structures in the port of Thessaloniki.

ABIDJAN TERMINAL



CÔTE D'IVOIRE

Automation of the Abidjan Terminal with the installation of two OCR portals including stop-and-go kiosks and LPR technology. In addition, 3 gate kiosks will be used for identification and registration purposes at the export gate lanes.

At the rejection lane and X-ray lane, stop-and-go kiosks will be installed for identification purposes. Similar kiosks are used for identification at the yard entry gate lanes.

QQCTN QINGDAO



CHINA

Additional order of two OCR camera portals at Qingdao Qianwan Intelligent Container Terminal. The portals will be positioned in-between the two container terminals in order to control the traffic.

HPH HARWICH



UNITED KINGDOM

Further automation of the HPH Harwich International Port by implementing two OCR camera portals, positioned at the inbound and outbound truck gates.

Position guidance system for SC & TT alignment under STS crane

Constantly striving to optimize terminal operations, Camco has developed a position guidance system to help straddle carrier (SC) and terminal truck (TT) drivers to drop containers at the optimal target position under the STS crane. Micro Location Technology (MLT) is used to measure distances between vehicles and STS portal beams and to ensure perfect alignment under the crane.

To accelerate the container ship loading process, SCs must drop container boxes along a specific line perpendicular to the dock beneath the ship. Optimal alignment eliminates the need for re-adjustment of the STS crane position in the longitudinal plane parallel to the dock.

Common solutions

Several solutions are used at terminals, each having drawbacks. One is to draw temporary chalk lines on the yard, and to drop containers along those lines. Unfortunately, new lines have to be drawn for every STS move, and chalk lines will fade in bad weather. Another solution is based on laser light and uses 2D laser scanners mounted on the water and landside gantry. SCs need extra markers to enable the lasers to identify them. This system is quite expensive and subject to fog as distance can be up to 30 meter. It's neither fit for simultaneous multi-lane operations as one SC can hide another.

Camco's solution for SC and TT alignment under cranes

Camco developed a system based on Radio Frequency - it is part of Camco's Micro Location Technology (MLT) solutions. MLT uses Ultra Wide Band distance ranging, a technology sending wide pulses in the 2.4/5.2 GHz range between tag and antenna to measure the distance.

Usually two-way-ranging is used: a pulse is sent to the antenna and bounced back to the roof-mounted tag. The measured time of flight is in function of the distance. On the STS portal beams, 6 UWB active antennas are installed, while on the SC, intelligent UWB tags are mounted.

The moment the SC drives under the crane to drop a container in a specific lane, the roof-mounted UWB tag continuously measures the distance to the 6 antennas. The tag returns the SC position with a minimal accuracy of 5 cm. The driver receives visual or audio feedback and guidance when dropping the container in one of following ways: screen (Vehicle Mounted Terminal), audio signal or red and green LEDs.

The picture shows the accuracy of the MLT system, with the old chalk line as reference.

- Very accurate and economical
- Robust, not subject to sun, rain, fog
- Multi and simultaneous lane support
- Identification/lane matching
- Targeted to straddle carriers and terminal trucks
- Several feedback solutions: screen, LED light, audio



Automating container hand-over under STS crane

CAMCO'S CRANE OCR SOLUTIONS ARE HIGHLY ACCURATE AND ENGINEERED FOR RELIABILITY, HIGH AVAILABILITY AND EASY MAINTENANCE. THE SYSTEM'S GUARANTEED LONGEVITY RESULTS IN GREAT ROI.

Already in 2012, Camco started investigating technologies to support further automation of crane operations. Soon, the **BoxCatcher** was added to Camco's terminal automation portfolio.

This patented dynamic Crane OCR solution – installed on a rail mounted on the crane – accurately identifies containers during STS crane handling, without hindering crane operations. It provides 360° coverage and full crane OCR, supporting container ID, ISO code, seal presence, IMDG presence and classification number and door direction. Its proven interface with the TOS ensures optimal TOS planning, ultimately improving vessel turnaround time. OCR read rates are high, keeping operator exception jobs to a bare minimum.

Operational on 46 cranes

"At present, our Crane OCR solution is operational on 46 cranes already, while orders were placed for an additional 35 cranes. Installations cover multiple regions, such as Europe, USA, South America, Africa and Asia," elaborates Anton Bernaerd, Business Development Director at Camco. "What distinguishes Camco's solution from that of other vendors are the various OCR attributes that can be read and the short processing time." When a container is picked up by a spreader, it takes only 3 seconds to process the OCR data and make it available to the TOS."

Support for full crane OCR and 360° coverage

The BoxCatcher supports full crane OCR for day and night crane operations. This moving camera unit provides 360° container images during container loading and discharge, without interrupting or slowing down normal crane operations. It's installed on a rail and automatically follows the container's flight path in realtime, the path being determined by the crane driver or crane automation. The position of the rail depends on the terminal's specific needs, the crane design and type of operations. Rails can be mounted vertically to the legs, or horizontally to the portal beams. Both setups provide full crane OCR and seamless TOS integration.

This one-fit-all solution supports all possible container configurations: single, twin, tandem, quad, 20/40/45ft. The BoxCatcher's 12MP global shutter cameras are designed to capture fast moving objects, traveling at 4,5 m/s over a distance of up to 36 meter. Adequate lighting conditions are

provided by built-in LED light projectors. The BoxCatcher will autonomously compensate for the container swing during operations.

The BoxCatcher is complemented with a set of SideViewers to capture the container's long sides. These 4MP cameras are oriented in two directions: container moving towards and away from the BoxCatcher. Similar LED light projectors are aimed at the long side of the container.



BoxCatcher installed on vertical rail

One Operator handles 4 to 6 cranes

The BoxCatcher comes with a powerful Crane Operator Application. It allows operators to perform further exception handling and validate data based on detailed container images.

As the number of exceptions is limited, a single operator can be assigned for handling 4 to 6 cranes, depending on the complexity of the crane operations.

Vessel Statistics: Focus on exceptions instead of naked OCR read rates

Operators and terminal managers can consult the Vessel Statistics of the ImageSearch application to view charts based on the number of exception jobs, OCR job causes, etc.

Anton Bernaerd: "Terminal operators are rightly interested in statistics of complete moves, not in the reading of a single container number. It's all about fully automated processing of complex container moves. The combined reading of the container number, ISO code, door direction, seal presence ... is what matters. But when you calculate the success rates of the combined read result, you get disappointing numbers."

To better manage expectations, Camco focuses on exceptions instead of naked OCR read rates when communicating OCR results. A shift towards KPIs expressed in the number of exceptions is a more practical approach and gives customers a more realistic idea of the success of their crane solution. It also allows better resource planning with respect to the number of operators needed for handling vessels.

Swift installation, easy maintenance

A complete crane OCR system, including rails, can be installed by Camco in only one week. Both the rails and camera system are manufactured and stored at Camco, in the recently built workshops and warehouse. Maintenance is safe and easy, as the BoxCatcher can be moved to its camera home base position where it is easily accessible.

- Easily accessible maintenance position: camera home base
- Minimal equipment: two BoxCatchers per crane
- No moving cables inside the rails: Inductive Power Transfer (IPT) and leaky coax
- Lifetime warranty on mechanical components
- Remote monitoring and software updates

Powerful combination of OCR and Micro Location Technologies

At present, proofs of concepts are ongoing where Micro Location Technology (MLT) is applied to optimize terminal truck and straddle carrier alignment under STS/RTG cranes. A perfect alignment of the prime movers under the crane would result in shorter drop and pick times, as the number of crane moves will go down. Read our article on page 17.

In addition, Micro Location Technology can be applied to verify container pick & drop locations, as the TOS will know exactly where a container has been dropped.

Example of Vessel Statistics



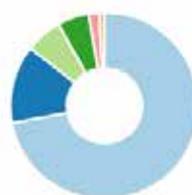
Containers ⓘ
Total : 3466

- Without Jobs - 3343 (96.5%)
- With Jobs - 123 (3.5%)



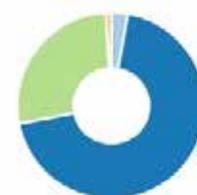
Job Category ⓘ
Total : 132

- Verified OCR Jobs - 9 (0.3%)
- Corrected OCR Jobs - 102 (2.9%)
- Unprocessed OCR Jobs - 0 (0.0%)
- Motion Jobs - 0 (0.0%)
- SideView Motion Jobs - 0 (0.0%)
- Motion Sync. Jobs - 0 (0.0%)
- N4 Jobs - 17 (0.5%)
- Not in Worklist - 4 (0.1%)
- Other Worklist - 0 (0.0%)
- Tank Jobs - 0 (0.0%)



OCR Category ⓘ
Total : 111

- UNIT - 80 (2.3%)
- ISO - 15 (0.4%)
- DOOR - 7 (0.2%)
- UNIT/ISO - 6 (0.2%)
- UNIT/DOOR - 2 (0.1%)
- ISO/DOOR - 0 (0.0%)
- UNIT/ISO/DOOR - 1 (0.0%)



Move Category ⓘ
Total : 2727

- Single20 - 77 (2.2%)
- Single40 - 1885 (54.4%)
- Twin20 - 740 (21.4%)
- Tandem20 - 0 (0.0%)
- Tandem40 - 0 (0.0%)
- Quad - 0 (0.0%)
- Single30 - 25 (0.7%)

THANK YOU FOR VISITING CAMCO AT TOC EUROPE 2017



Newest OCR portals at Thessaloniki

Camco Technologies is the leading technology company in innovative terminal automation solutions and services. Since 1999, our systems empower marine and railway terminal operators to increase their performance and safety while reducing operating costs.

Camco's core business exists of products that automate the handover process of containers by using visual-assisted and micro location technologies. In-house developed OCR-based systems accurately register containers entering or leaving the terminal by any means of transport, enabling the TOS to make the right decisions. The powerful combination of OCR Technology with Micro Location Technology provides accurate information on where a specific container was lifted or dropped.

Interested? Contact us! Our team will assist you in designing, implementing and integrating the solution that best meets your specific needs.



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CAMCO TECHNOLOGIES