The quay factor

John Lund of Visy argues that 'the key to efficiency is in the quay'

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Visy is a leading access and area control systems provider for port authorities, terminal operators, Customs agencies, and logistics centres. Visy has designed and implemented the largest Customs agency border traffic control system between the European Union and the East and the largest Port Access Control System (PACS) in Northern Europe.

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To efficiently manage port and terminal operations, it is important to account for everything that goes in and out of the site via road, rail or quay.

The system that manages these entrance/exit points is often referred to as the Gate Operating System (GOS) or, in a larger context, the Port Access Control System (PACS). Indeed, multiple GOSs may operate at several terminals within a port and be part of a single PACS.

The application of the GOS or PACS to road and rail operations is well established. There are many technologies – including optical character recognition (OCR), damage inspection imaging, radio frequency identification (RFID), biometrics and driver kiosks – which collect data for software applications that manage complex processes. Such systems are well suited for various businesses, whether at a port of entry or an inland logistics hub. The individual data collection technologies are selected based on the specific needs of the site with respect to the traffic, operational specifications, and goals.

Many ports and terminals have become very efficient at managing data collection and utilising PACS/GOS applications for road and rail operations. However, data collection on the quay or in the yard is often labour intensive and time consuming, with a likelihood of incorrect data input which causes problems in operations and precludes automation (as one of my statistics professors would say: 'Garbage in results in garbage out'). Additionally, there are significant health and safety risks for personnel working on the quay and near the stacks. Therefore, implementing a Quay GOS (Q-GOS) is a practical way to reduce operating expenses, optimise safety and security, and increase throughput capacity in quay and crane operations.

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Q-GOS features and benefits

Much like a road or rail GOS, the Q-GOS can integrate various technologies and features to meet the needs of the operation. OCR and imaging systems for container code ID, licence plate recognition (LPR), and trailer ID can be fixed to cargo handling equipment (CHE) including ship-to-shore (STS) cranes, rubber tyre gantry (RTG) and rail-mounted gantry (RMG) cranes, automatic stacking cranes (ASC), straddle carriers and other equipment. The benefit to operators is clear: ID numbers will be automatically collected by the OCR camera system, thus eliminating the time and expense of manually entering the codes. Ultimately, the Q-GOS supports terminal automation. On the STS cranes, the cameras can produce high-quality images for damage inspection purposes,

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thus giving the operator photographic evidence of the condition of the cargo as it arrives at the terminal. OCR data can update the terminal operating system (TOS) with container IDs and the actual order that the units were off-loaded. The system can also update the TOS with a container's specific location on the terminal and provide updated work order information.

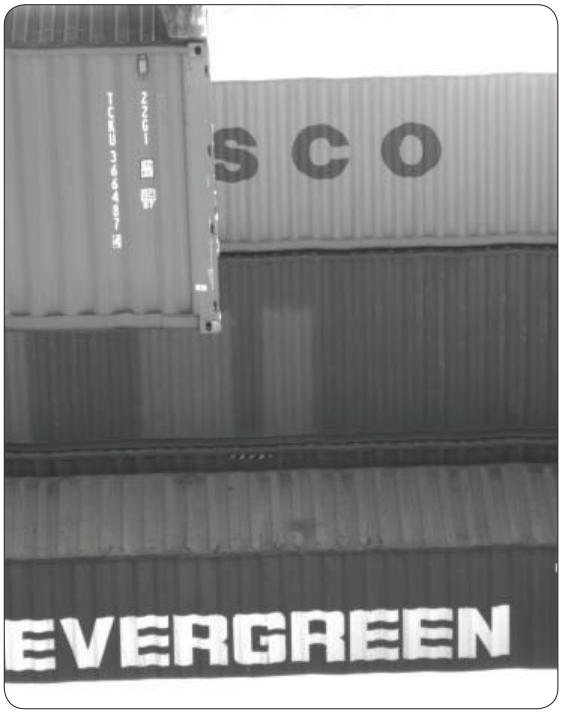
Lost boxes

Lost or misplaced boxes are a common problem for many terminal operators. Dedicated straddle carriers equipped with OCR can regularly roam the stacks and compare the actual yard inventory to the anticipated yard inventory. This automated approach greatly reduces the amount of time and resources required to search for boxes when compared to manual searches. Other straddle carriers equipped with OCR will automatically verify that the container being picked up is the correct container for the specific work order. Biometric devices or ID card readers can be added to CHE to authorise and link a driver and machine to a container movement, thus adding safety and security. The OCR and driver data will be sent to the TOS, PACS or another system in real time to provide tracking and tracing of containers with photographic evidence.

Q-GOS design

The key to good system design is consistency. Applied to a GOS or PACS, this means that the hardware should be commercial-off-the-shelf (COTS) with standard interfaces and software should be commercially available. For example, there are scores of commercial camera manufacturers on the market, offering high-quality equipment. These cameras produce consistent and reliable images for OCR and damage inspection purposes. Using bespoke hardware adds risk and uncertainty to the long-term viability of a project. Bespoke hardware also limits the options that the end user has during periods of service, support, and maintenance.

Commercially available software from a flexible supplier can be easily configured to meet local requirements. While many ports and terminals have similar business processes and operating procedures, very few have identical needs. Inevitably, a newly installed IT system such as the Q-GOS will be modified to meet local requirements. Such requirements may include modifying the OCR algorithms for vehicles or cargoes that are unique to a port operation, or modifying the user software to include specific features. On the quayside, perhaps unique STS cranes or CHE are used, so special IT considerations must be made to properly implement damage inspection imaging.



Preventative measures

A ship's delivery manifest is known to the terminal operator before arrival. As the operator off-loads the

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vessel, the OCR and damage inspection cameras collect real-time data of the actual containers being delivered. If the wrong box is lifted from the ship, the problem can be solved before the unit touches quayside or, even worse, put in the stack.

The images of the boxes are stored for damage inspection purposes so that in the case of an insurance claim, the operator can verify the condition of the container as it arrived at the port.

Depending on the type of operation, OCR and RFID can be used together to verify the container that has been handed to the CHE on the quay.

An RTG/RMG equipped with OCR will verify and move the box and update the TOS of the actual location. In ASC operations, OCR can be used on the waterside, landside, and during the internal stacking operation.

Having OCR at both ends of the stack, and on the cranes in the middle, provides the actual container ID and photographic evidence of every work order, therefore preventing errors that reduce efficiency.

A truck driver may pick up the box from a container exchange area and the GOS will validate the driver's details for the transaction.

If a Customs check is required, the PACS will direct the truck driver to clear the cargo before access permission is granted to exit the port. Immediately before the lorry driver and cargo leave the port, the PACS or GOS will once again verify the driver's ID, registration number, and container ID to ensure that the work order has been properly fulfilled.

Conclusion

While there are many different ways to operate a terminal, the use of advanced operating systems will help reduce operating expenses, optimise safety and security, and increase throughput capacity.

The GOS for road and rail are well established and until recently were well ahead of the Q-GOS in terms of functionality. The Q-GOS is the final link of the security and operational chain that supports an efficient port and terminal automation.

By implementing a Q-GOS, quayside processes can be managed with the same efficiency as road and rail processes and deliver a substantial return on investment.