Do we see RFID helping ports improve their efficiency?

Introduction

Around 90% of the global trade is carried out by maritime transportation. Thus, improving operational efficiency remains a key focus for the ports. With globalization kicking in, there is an upsurge in cargo volumes. In order to scale up and meet the demand, ports need to transform an to be built efficiently, to manage large volumes of cargo.

Radio Frequency Identification (RFID) is one of the Internet of Things (IoT) technology that would help ports and terminals to improve efficiency, safety, security and improved asset utilization in ports. The overall RFID market in ports is nearly $100m with wide usage in port gate automation and yard processes like track container location, Asset Track & trace, Monitoring Reefer container, Fuel consumption and personal tracking to name a few
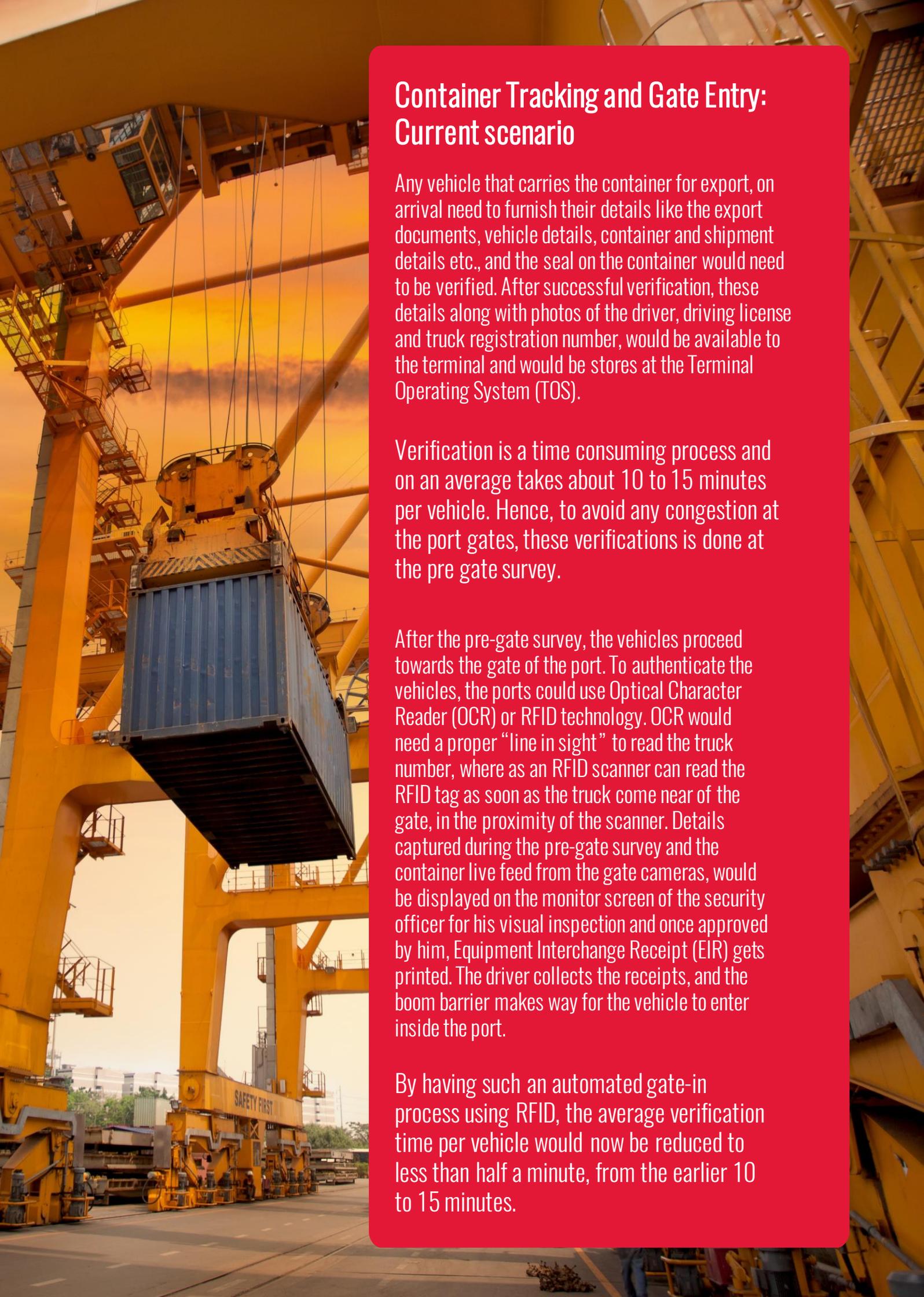
Container Tracking and Gate Entry: Current scenario

Any vehicle that carries the container for export, on arrival need to furnish their details like the export documents, vehicle details, container and shipment details etc., and the seal on the container would need to be verified. After successful verification, these details along with photos of the driver, driving license and truck registration number, would be available to the terminal and would be stores at the Terminal Operating System (TOS).

Verification is a time consuming process and on an average takes about 10 to 15 minutes per vehicle. Hence, to avoid any congestion at the port gates, these verifications is done at the pre gate survey.

After the pre-gate survey, the vehicles proceed towards the gate of the port. To authenticate the vehicles, the ports could use Optical Character Reader (OCR) or RFID technology. OCR would need a proper "line in sight" to read the truck number, where as an RFID scanner can read the RFID tag as soon as the truck come near of the gate, in the proximity of the scanner. Details captured during the pre-gate survey and the container live feed from the gate cameras, would be displayed on the monitor screen of the security officer for his visual inspection and once approved by him, Equipment Interchange Receipt (EIR) gets printed. The driver collects the receipts, and the boom barrier makes way for the vehicle to enter inside the port.

By having such an automated gate-in process using RFID, the average verification time per vehicle would now be reduced to less than half a minute, from the earlier 10 to 15 minutes.

Container Location Tracking

Currently, the location details of the container, where it is stacked in the yard, is manually fed on the hand held device by the individual working on the container handling equipment's like QC / RTG / RMG / Reach Stackers etc. These location details are stored in the TOS / the Freight Station system. Since the location is manually entered, there are chances of error which would cause delay in locating the container later.

RFID is used by container terminal or a container freight station, to track the exact container location. Whenever a container comes in, the below steps are followed in order.

8. Container movement tracked real-time

1. Create RFID tag for the Container

2. Attach RFID tag

7. RFID tag details with location co-ordinates, are uploaded over GPRS interface with the time-stamp

3. Allow Container to Enter

6. Antenna on spreader arm, starts reading the container RFID tag

4. Upload transaction with a time-stamp`

5. Unload container from trailer using container handling equipment

When container leaves the terminal/yard,

- Remove container RFID tag
- Disassociate container RFID tag
- Allow container to Exit
- Upload transaction with the time-stamp

Using RFID and GRPS interface, the exact location gets auto-recorded in the TOS / Container Freight station application without any manual intervention, for it to be located easily thereafter.

RFID Reader Mounted on Boom

Visual- acoustic
Indicators in
driver cabin

RFID Antenna to read
Container tag while handling

RFID Tag placed on
Container using magnet

- Weather proof industrial cabinet
- RFID Reader
- GPS Device & Controller

Source I-TEK Partner Solution

Asset Track and Trace

Port is usually a very large area and getting real time visibility of various assets is a challenge.

Using RFID and GRPS interface the exact Geo location of cargo handling equipment, vehicles, cranes and other tools/devices would be available to ports operations and maintenance team.
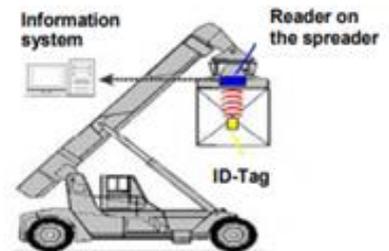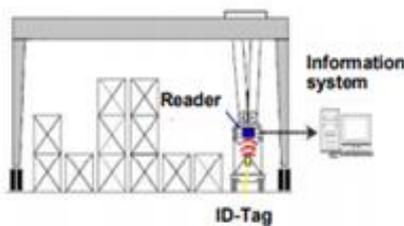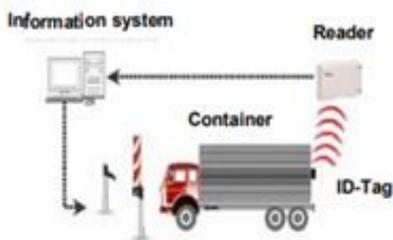

RFID TECHNOLOGY IN A CONTAINER PORT: AN ACTIVITY-BASED
MODEL TO ASSESS COSTS AND BENEFITS
Source: https://pdfs.semanticscholar.org/775c/6e74e03d9b99702d6153b0e24e84fdc34.pdf

Wireless Reefer Monitoring

RFID application is also seen in the areas of reefer condition monitoring, and involves wireless temperature sensors to control and monitor the temperature inside the container. This helps in collecting critical real-time information, in terms of the condition, the location by enabling GPS, and also used to send engine diagnostics.

Source: https://wlius.com/blog/active-rfid-temperature-sensor
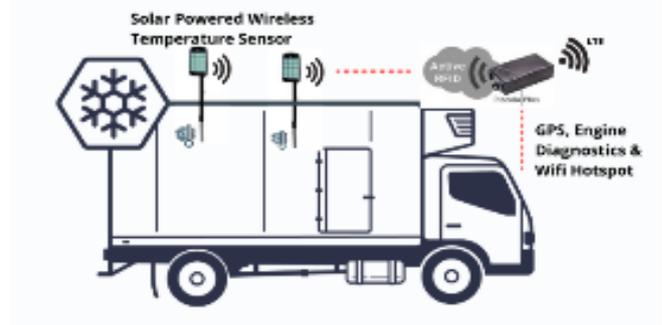
The main advantage is that this helps reduce the spoilage due to faulty temperature.

Vehicle Emission Control

RFID has great potential to monitor and track the number of vehicles in the port premises and based on that data in hand

Apply standard emissions, and later assess the total emission levels inside the port premises.

RFID for Fuel Consumption

The fuel tanker that goes for the movers and equipment like crane / RTG / RMG / Tugs / pilot etc., launches to dispense the fuel. Flow meter on the hose indicates quantity of fuel being dispensed by each equipment. Accurate disbursement of fuel is essential to prevent loss and theft.

RFID is used to identify authorized equipment before fueling starts. Fuel filling is controlled and one can issue quantity of fuel that can be pre-fixed as per allocated quota; and/or automatically stop when tank is full. Using RFID, fuel would be dispensed only to authorized equipment's and have the complete data in record in terms of the fuel consumption

Hence help in preventing theft/loss of fuel, which ultimately results in the reduction in fuel expenses for the port.

Personnel Tracking

RFID access cards which are issued at the ports by their staff, can be used to track personnel across a terminal, or anywhere across the yard. This information would also be useful in case of any incident or emergency, and help in better evacuation.

RFID Container E-Seal

The E-Seal is an ISO 17712:2013(E) compliant high security bolt seal, designed for ISO container cargo shipments. The E-Seal is a radio frequency enabled device that transmits container information as it passes a RFID reader and stops working if the E-Seal has been tampered or damaged The E-Seal combines physical as well as RFID security that analyses and reports any seal tampering to ensure the integrity of container shipped across the globe.

RFID Use Cases in the Industry

Port of Singapore, has installed RFID transponders into its container yard to create a multi-dimensional tracking grid. All of this helps them to track, manage the placement and location of their containers.

The Port of Rotterdam, is one of the largest operators of container handling systems in Holland. Buried RFID transponders guide automated guided vehicles (AGVs). All container transfers are controlled by automated guided vehicles, and unmanned bridge cranes carry out stacking operations.

Most of the Ports have implemented RFID based gate automation solution. Every export container in India is fitted with RFID e-Seal at the factory premises at the time of stuffing. This mandate is from central board of indirect tax and customs, government of India.

Benefits of using RFID

Reduce cost

Process Automation

Improved container identification efficiency, tracking and storage management through real time updates

Reduced manual inspection

Ensures safety and security

Improves supply chain management

Reduces chances of error

Speeds up the shipping process

BENEFITS OF USING RFID

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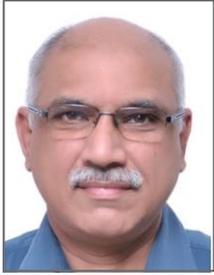
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Having experience in project delivery in conceptualization, visualization, development & deployment of comprehensive ICT solutions for Maritime industries. Created unique solution offering for Smart Ports / Shipping using connected technologies like RFID, IOT, RPA, Blockchain, Drones and 5G. Ability to visualize end to end solution, thorough understanding of the Ports business processes & IT systems

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PGDM from IMT, Hyderabad. She's been working with the maritime practice. She was involved with an As-Is study at the Port. She has been working on doing a research on various technologies used by various Ports.

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