

RFID in ports and terminals: moving towards global acceptance

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Radio Frequency Identification – or, as it is more commonly known, RFID – is an automated identification and data collection (AIDC) technology. From access cards to passports to toll tags, RFID has become a ubiquitous, integral part of our daily lives both at work and at home. RFID offers unique benefits for the identification and tracking of people, assets and inventory. It provides automated identification without the line of sight required by bar code and optics (laser, OCR), can be read at short to very long range and can be encoded with significant amounts of data. Few AIDC technologies can match its flexibility and cost/benefit ratio.

The ports and terminals sector represents a proven, growing market for RFID. Historically, the ports market was an early adopter of RFID. However, what started as a market focused on the use of passive RFID for security has evolved to a predominantly active RFID for long-range asset tracking and process automation. Current RFID applications in ports and terminals are grouped in four main areas:

- **Network asset visibility:** These applications support the identification and tracking of assets typically associated with operations within a facility, but to a growing extent also across wider-spread container logistics networks. A derivative of visibility, Real Time Locating Systems (RTLS) provides precise asset tracking inside the terminal.
- **Process automation:** These are applications intended to automate previously manual processes with the goal of improving operational productivity and/or equipment utilization. They are almost exclusively deployed within a facility.
- **Safety:** Safety applications use RFID to ensure the safety of people as well as hard assets. This is fast becoming a hotspot in RFID as terminal worker safety is increasing in importance.
- **Security:** Security applications use RFID to ‘secure’ an asset or uniquely identify an individual, generally in conjunction with other security technologies such as biometrics.

Today, the overall RFID market in ports represents nearly a US\$100 million business per year. The largest segment of this is within port community and marine container terminals for automating gate and yard processes. However, the emergence of new applications using RFID as a ‘wireless sensor’ may change the way the RFID market develops.

Application of RFID is driven by core benefits including labor productivity, safety and increased asset utilization. However, another key element of growth in the port community and terminal market is environmental. Ports and marine terminals are highly visible and tend to reside in large populous areas – think LA/Long Beach. Moreover, ports have been heavy ‘carbon foot-printers’ from both over the road diesel trucks and internal vehicles. RFID is now an integral part of the tracking of vehicles tied to emissions programs, as well as optimized travel of internal vehicles, thereby also reducing emissions.

New directions in RFID application

The current ports market is vibrant and has been steadily growing excluding the recent economic downturn. Most of the large-

scale deployments are concentrated in the marine container terminal and port community areas, focused on applications for gate automation and truck tracking. New opportunities also exist across a broad number of additional submarkets and applications such as bulk handling and RoRo.

So what should we expect to see and what are the hot applications in the next two to three years?

More telemetric sensors: Users should be looking at the continued growth of RFID as a ‘wireless sensor’. In addition to ID and location, RFID transponders can capture data on security tamper signals (e-seals), temperature, motion, speed, light etc. The wireless nature of RFID and the lower cost compared to PC or PLC-based processors to capture this data make it extremely attractive. The most compelling new application in this category is RFID-enabled reefer monitoring. A programmable RFID tag with connector cord is plugged into a reefer serial port and can remotely monitor hundreds of containers in real-time with no power line modems and with minimal reader infrastructure.

Convergence with GPS: The convergence of advanced technologies has led to the emergence of new mixed applications of RFID. As a case in point, GPS chip sets are now mixed with RFID tags to create a hybrid locating technology. The tag locates itself using GPS, but communicates using traditional RFID protocols. This has resulted in low cost, precise locating but with the further advantage of minimal impact on data networks. The



Reefer cargo can be monitored by plugging an RFID tag into a reefer serial port, without power line modems and with minimal reader infrastructure.

data can be wirelessly backhauled through the existing RFID reader network. The big new application here is to use GPS-RFID hybrid tags to track terminal tractors. It is of lower cost than GPS and places no overhead on the existing WiFi or narrow-band data systems.

Multi-use infrastructure: The bulk of RFID systems deployed today are single-purpose, i.e. the RFID system does 'X'. However, once the RFID reader infrastructure is installed, users soon realize that other applications may feed the same reader network, hence reducing the cost of new deployments. A gate system, RTLS system and reefer system can all use the same infrastructure.

More passive/semi-passive: While the market has been dominated by active technology, improvements in passive tag read distances are leading users to re-evaluate passive as a viable alternative. The major advantage is the generally lower cost of passive technology driven by strong standardization.

More standards: The active RFID market in ports can be characterized by a 'winner-take-all' approach. As virtually all technology is proprietary to a vendor, if a vendor wins a port community system, for example, the port is committed to that vendor until the system is removed. However, the market is driving toward more standardization. The new ISO 18000-7 protocol is the first solid attempt at creating a global standard in the active market akin to the now well-established Gen2 standard for ultra high frequency (UHF) passive RFID.

Justifying the technology gets easier

In the early days of RFID, users took a leap of faith that the ROI would be there. Today, with a proven track record of operational systems, the fundamental benefits of the technology are more widely understood and accepted, and the ROI process is getting cleaner and clearer. The discussion now is more focused on which type of RFID to use than whether to use it all. While ROI is highly situational and very much depends on the application-type (asset visibility, operational control etc.), potential buyers should be looking at the following key measures when evaluating an RFID investment:

Increased asset utilization

Across the container supply chain, the management and tracking of marine-related assets such as trucks, chassis, containers and gensets improves their availability while reducing the downtime in the usage life-cycle. Network asset visibility systems can provide the critical core information to execute advanced decision-making on the movement of containers, enabling improved supply chain process management (SCPM), as well as environmental factors. In a narrower context, for terminal operators the ability to track equipment in real-time can significantly improve asset usage. For example, the use of job assignments based on actual, not assumed, position should increase throughput and decrease travel times by as much as 40%. At the same time, excess assets can be deployed elsewhere or eliminated.

Asset loss reduction/prevention

Asset purchase and subsequent depreciation has a significant effect on cash flow, the balance sheet and P&L. Protecting this investment and minimizing on-going investing is a key ROI element of asset management systems. Asset loss reduction has substantial impact on a company's bottom line. For example, asset

based operators like ferry companies may experience 10-40% lost assets. 'Loss' consists of non-locatable assets in the supply chain, i.e. unable to be used, as well as true loss. In either case, new assets must be purchased to refill the available pool.

Content loss reduction

'Track the asset and the contents follow'. A key benefit of RFID systems is the prevention of content loss in addition to the asset loss prevention described above. Content loss through theft, mishandling or expiration can be considerable.

Increased productivity

Most RFID operational systems within the terminal are focused on increased labor productivity. The solutions discussed previously aim to reduce task times or minimize manual data input to improve throughput.

Increased safety

Handling equipment operators often cannot see people on the ground. Using RFID for detection of personnel with corresponding alert mechanisms within the operator cab enables better accident prevention.

Facility security

Since September 11, 2001, there has been significant attention focused on improving the security and safety of public venues and facilities. Consideration has been given to monitoring security personnel so that in case of an event, the security person nearest the event can be contacted to investigate or utilizing technology to provide additional means of identification that can be used to provide or limit access to specific areas of a facility. Both for prevention and in dealing with the aftermath of an event, knowing the location of security personnel and possibly even visitors may become more and more of a necessity. RFID provides low-cost identification of staff for access control, as well as locating them.

Asset security

Equally as challenging is keeping equipment and assets from walking out the front gate. Regardless, the result is that the asset is no longer available and the company will incur additional cost to replace it. There are countless stories of container loss. Being able to detect a potential theft before it happens requires real-time visibility, and information relating to the location and status of the item. Additionally, that information must be integrated into the existing host systems so that decisions and actions can be taken in real-time.

Conclusion

The ports sector has presented a growing number of opportunities for the adoption of RFID technology, and will doubtless present many more as the technology continues to develop. Likewise, RFID is providing significant value to the ports sector, whether as a standalone technology or when integrated with other existing technologies. With a little insight and the right information, ports can go about implementing the technology and secure a good ROI, automate processes for increased security and efficiency, as well as ensure the security of their facility and assets for years to come.

For further information on RFID applications at ports, download the PEMA Information Paper here: <http://bit.ly/pemarfid>

ABOUT THE ORGANISATION

The **Port Equipment Manufacturers Association** (PEMA) provides a forum and public voice for the global port equipment and technology industries, acting as a neutral platform to enhance industry best practice and knowledge, and to raise awareness of how equipment and technology can enhance port efficiency. Founded in 2004, the Association currently has over 50 members and counting.

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