White paper

How Mobile RFID Systems Improve Operations and ROI

Intermec®

Inherent Scalability Removes Incremental Cost

Introduction
Most current supply chain RFID operations involve tracking pallets, containers and cases. Much of this activity is driven by compliance with customer initiatives (e.g. retailer, DoD, aerospace), which has made it difficult for manufacturers and their distribution wings to get a positive financial return on their RFID investments. RFID has been proven time and again to provide strong ROI when it is combined with improved business processes that reduce labor and prevent errors. A combination of mobile and fixed-position RFID readers supports these operations and helps deliver these benefits.

Adding mobility to RFID systems with forklift-mounted readers adds value to compliance, shipping, receiving and other RFID implementations. They are an emerging resource for improving supply chain visibility and reducing capital expenditure and labor costs. Mobile systems can be implemented for a fraction of the cost of many traditional RFID infrastructure configurations, while supporting more uses. Forklifts can be much more than vehicles for moving goods. When integrated with RFID and vehicle-mounted computers, forklifts become mobile data hubs that deliver strong return-on-investment from lower implementation costs, more operations flexibility, and a more complete, real-time view of inventory.

This white paper presents the specific benefits and uses for mobile RFID systems. For more general information about RFID applications and technology, see additional white papers and case studies available on www.intermec.com.

Four Ways Forklift RFID Helps ROI
Integrating RFID and forklift operations improves ROI in four primary ways:
1) Reducing the capital expenditure required for a RFID deployment;
2) Increasing asset utilization;
3) Providing scalability; and
4) Supporting labor-saving processes.

Reduced Capital Expenditures
Whether used for basic "slap-and-ship" compliance or more extensive applications, forklift and other mobile RFID systems can save significant implementation costs compared to traditional configurations. Organizations that need to ship or receive RFID-tagged cases and pallets have typically installed fixed-position RFID readers at dock doors to record tagged shipments. The alternative is to install readers at a portion of dock doors and have a manager spend a significant amount of time scheduling and coordinating pickups and deliveries so tagged shipments are processed at RFID-enabled locations. The second option greatly complicates yard management and transportation planning and requires managerial time, while the first option requires RFID hardware and networking at each dock door, even if only a fraction of shipments need RFID processing.

Compare this to how forklifts are allocated in factories, warehouses and distribution centers, where it is common to have a ratio of approximately one forklift for every four dock doors. By integrating RFID read/write capability with the forklift, not the dock door, businesses can efficiently handle their dock-door RFID operations with the same 1:4 equipment ratio. Forklift configurations make it is possible to reduce RFID hardware costs by 75 percent. Asset utilization for the RFID equipment improves because forklift readers will sit idle far less than dock door portals.

Increased Asset Utilization
Asset utilization and return on investment improve even more when RFID applications move from the dock. RFID-enabled forklifts can process tagged cartons and pallets wherever goods are handled, such as at picking and putaway locations, staging areas, packaging lines, and even within trailers or in the yard. Mobile readers can be used multiple ways throughout a facility, which provides superior asset utilization to application- or location-specific readers.

Intermec RFID forklift systems have optional real time location service (RTLS) features to further enhance asset utilization. A module on the forklift works with the wireless LAN in the facility to provide real-time location data. Software applications can use the data to provide real-time feedback and recommendations or for longer-term asset utilization, productivity and trend reporting. Forklift RTLS applications include:

- asset locating and management;
- dynamic routing;
- maintenance management;
- security;
- dwell time monitoring;
- productivity reporting;
- route/layout analysis.

RTLS can also enhance picking and putaway operations and help reduce losses by automatically recording items in unmarked locations.

Scalability
Because mobile RFID systems for dock door applications can also be used throughout the facility, new RFID readers may not have to be purchased every time new applications are added or operations are expanded. RFID processes for picking, replenishment, shipment verification, inventory transfers can be completed with the same mobile equipment used at the dock door. The inherent scalability of mobile systems takes much of the incremental cost out of expanded RFID operations, making it practical to introduce additional labor-saving applications that leverage the initial investment and improve overall ROI.

Labor Savings and Process Improvement
The scalability, asset utilization and capital expenditure benefits of forklift RFID systems all help keep costs down. The process improvements that mobile RFID equipment creates bring productivity up. RFID makes it possible and practical to track goods in locations and environments where bar code scanning or manual data entry is too labor intensive or physically impossible. Increased tracking improves visibility, which can help prevent shortages, over stocking, shipping errors, reduce shrink and provide numerous other benefits. RFID-supported distribution center processes are proven to reduce costly inventory handling and shipping errors and reduce associated costs. METRO Group, for example, reported its RFID distribution center applications produced a 14 percent labor reduction, 11 percent improvement in stock availability and an 18 percent reduction in lost goods.

Intermec's case study on METRO (available free at www.intermec.com) describes some of these applications and their benefits. The following sections explain how forklift RFID systems can improve specific warehouse and distribution operations.

Applications
When a reader is integrated with the forklift, every movement of RFID-tagged cases and pallets can create data that can be used to enhance existing business process applications. Combining read data with location information provided by the wireless LAN and/or a forklift location tracking application provides total, real-time visibility, creates accurate putaway location records, and builds an audit trail. Here's how RFID-enabled forklifts can improve three common operations: receiving, picking and shipping.

Receiving
Receiving errors were responsible for 58 percent of all shipment shortages and overages in a seven-month analysis of receiving operations and the potential impact of RFID processes conducted by EPCglobal, an RFID standards organization. A typical receiving error is miscounting or failing to identify materials received, which leads to inaccurate inventory records. More than half the discrepancies could be prevented by automated receiving with more accurate RFID identification. The resulting improvement in inventory accuracy would reduce out-of-stocks and thus potentially increase sales. The value of RFID receiving processes was measured at between $0.01 and $0.03 per case.

Identifying goods received with RFID-enabled forklifts instead of dock door readers requires less RFID hardware and improves utilization. Other benefits include operational flexibility – with mobile systems, RFID shipments can be cross docked or even processed in the yard if all dock doors are unavailable or if goods will be stored outside. RFID-enabled forklifts with wireless access to host applications can also quickly verify incoming shipment contents against purchase orders, which can catch shortages and overages before they create inventory accuracy problems. As with fixed-position readers, mobile RFID processes also save receiving and putaway time compared to manual recording and bar code scanning practices.

Picking and Shipping
Verifying orders prior to shipping eliminates shortages and overages that lead to costly adjustments and inventory inaccuracies. Case picking is where most errors occur (typically between two and four percent of total case shipment volume), resulting in undocumented overshipments (shrink), mispicks (which are typically left at the retailer for their disposition rather than returned), or picking incorrect quantities (resulting in out-of-stocks). RFID can improve picking accuracy and automate the labor-intensive shipment verification process with minimal disruption to legacy processes, resulting in savings of up to 30 cents per case.

Mobile RFID operations can prevent picking errors by automatically reading items picked and recording the unique case identification. Using a wireless LAN connection between the forklift-mounted computer and host system, the tag data is used to confirm the picked item belongs with the order. This enables problems to be identified and prevented as they occur, rather than corrected later at an inspection station, or worse yet, at the dock door. Utilizing Serialized Shipping Container Code (SSCC) labeling and tags, shipping units can be uniquely identified and associated for a specific customer and truck. Staging areas can also be tagged for proper pallet/container placement verification. Finally, both the dock door and trailer can be tagged to verify that the load is going on the proper vehicle. These applications not only reduce write-offs for inventory shrink, but also increase "perfect orders" and reduce costs associated with penalties, invoice/shipment dispute investigation and invoice adjustments, which cost hundreds of dollars per occurrence.

Topping it off with EDI, using Advance Shipment Notices, ensures that the receiving party is informed and prepared for a fast, limited audit receiving goods, while keeping your delivery personnel on-time for their next stop.

Mobilizing vs. Optimizing
The RFID system should be designed specifically for forklift operator needs and usage environments to ensure safety, convenience and reliable operation. Each component must be rugged enough to withstand the shock, vibration, bumps and cleaning that go with forklifts, without impairing the operator's vision or access to controls. Besides providing reliable, RFID read/write capabilities, forklift-mounted systems should integrate tightly with the mobile computer used on the vehicle and the load backrest, along with the enterprise wireless network and security protocols. The following considerations are specific for each component to provide safe, reliable performance in forklift-mounted RFID operations.

Antenna – RFID antennae are typically mounted on the forklift load backrest so they will be very close to tags on pallets, cases or rack locations. Ideally, the antenna will fit within the profile of the backrest so it doesn't obstruct the operator's view or protrude outside the protective housing, where it is more susceptible to damage. Antenna should offer flexible

placement options so read/write operations can be optimized for the specific usage environment. Antenna cables should be secured to prevent tangling and potential damage.

Controls – The forklift operator should be able to easily reach and use RFID controls without having to leave the seat or take his or her eyes off the task at hand. If gloves are commonly worn, consider whether controls can be worked easily by gloved operators. LED indicators and audible tones for alerts and confirmations should be clear and suitable for noisy forklift environments.

Mobile computers – The mobile computer used with the RFID system has all the same requirements as traditional forklift computers: vibration, shock and dirt resistance; an easy-to-read screen that can be mounted conveniently; resistance to temperature changes and condensation if used for cold storage or highly hot, humid operations; support for enterprise wireless LAN and security protocols; interface ports, including Bluetooth if desired (Bluetooth and RFID wireless communication can be used concurrently); ruggedness and reliability; etc. The computer should also minimize obstruction of the user's view and should support advanced capabilities like speech recognition to give real-time feedback, even while the user is off the forklift picking cases.

Intermec Forklift RFID Systems

Intermec has extended its RFID leadership to create a forklift system with best-of-breed components for safe, reliable and powerful performance. It includes RFID antenna modules and mounts specifically created for forklift use, color computers specifically for forklift mounting and industrial use, wireless 802.11b/g network connectivity and security certified by Cisco Systems, plus exclusive wireless forklift location tracking capabilities to improve asset utilization.

Today, almost all RFID forklift installations are retrofit exercises costing thousands of dollars and requiring up to a day's worth of field engineering time to cut, weld and drill. To drastically reduce the time and cost of RFID forklift deployments, Intermec has partnered with Cascade Corporation to co-develop a Forklift Install System. Scheduled to be available in late 2006, the Forklift Install System will consist of an adaptable load backrest and accompanying antenna cells to enable rapid, professional mounting of RFID equipment onto forklifts. It will compress today's daylong retrofit exercise to a 20-minute process requiring nothing more than a wrench. Large fleet deployments will become organized and cost effective.

Mobile computer options include the Intermec CV60 and CV30, which were each specifically developed for use on forklifts. The compact CV30 conveniently mounts anywhere, including the vehicle steering column, while the CV60 provides a larger screen. Both offer rugged housings, bright color displays, a choice of operating systems (Microsoft® Windows CE, .NET or XP) and other features. The computers can be powered by the forklift instead of batteries and retain RFID reads and other data if the vehicle loses power. The CV30 and CV60 offer 802.11b/g wireless network connectivity with Cisco Compatible Extensions (CCX).

Conclusion

Forklift RFID systems are a flexible and cost-effective way to support RFID operations. Provided the RFID equipment is purpose-built for forklift operations, it will provide long-term reliable performance and scalability to support increased volume and new applications. A forklift-based RFID infrastructure helps return on investment by holding down implementation expenses and provides a scalable, cost-effective migration path to meet expanded needs. Best of all, it will improve productivity and accuracy while reducing labor costs.

Intermec Inc. (NYSE:IN) develops, manufactures and integrates technologies that identify, track and manage supply chain assets. Core technologies include RFID, mobile computing and data collection systems, bar code printers and label media. As an RFID pioneer and a leading manufacturer of rugged mobile computers, Intermec is ideally positioned to help its customers effectively integrate forklift-based and other RFID systems into industrial environments.

Contact Intermec to learn more about how to take advantage of innovative RFID forklift systems or visit www.intermec.com to see more white papers, case studies and other resources about RFID, mobile and wireless computing, data capture systems for industrial environments.

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