White paper

Practical Uses for RFID Technology in Manufacturing and Distribution Applications

Intermec®

Consider the ideal manufacturing and distribution process. Would it eliminate human error, improve speed and efficiency? Increase information availability? Would it offer high security and deliver data without a network connection?

In most manufacturing and distribution environments, the challenge is to produce and move quantities quickly with the least amount of handling and in the most efficient and profitable way possible. One of the latest technologies developed to manage quantity distribution is radio frequency identification (RFID). RFID systems, like Intermec's Intellitag products, can help solve logistical problems that affect manufacturing and distribution.

RFID Simplifies Business Processes
More than a great technology, RFID is an excellent business tool that helps manage supply chains, increase margins and profits, and decrease costs.

In manufacturing and distribution environments, the adoption of RFID technology can deliver:
- Smoother-running business environments–knowing precisely where inventory is
- Increased throughput and productivity
- Reduced costs, leading to more competitive pricing
- Shorter order cycles
- Faster shipping
- Better inventory management
- Reduced labor costs by reducing the workforce needed for tracking and inventory management
- Increased revenues/higher profits
- Better customer service

What is RFID?
An RFID system consists of a radio-enabled device that communicates with, or interrogates a tag or label, which contains an embedded single chip processor and antenna. Just like barcode scanners, the "interrogator" or RFID reader can be fixed or portable. The tag itself is an extension of the bar code labels you see everywhere today, only with more intelligence.

The advantage of these more "intelligent" systems is that, unlike barcode-based data collection, an RFID system can read the information on a tag without requiring line of sight or a particular orientation. This means that RFID systems can be largely automated, reducing the necessity of manual scanning for exceptions management.

Various types of tags and labels are available for use in different environmental conditions. Write Once-Read Many (WORM) or Read-only tags are pre-numbered and require a host database. Once a read-only RFID tag is programmed, the data cannot be altered for the life of the tag.These tags can hold more information than a single bar code label, but because the data is static it can never be changed once it is written.

Read/Write tags can also hold more information and the information can be updatedand changed as often as needed. A read/write tag becomes a portable database that travels with the product and allows companies to modify the data content throughout its journey along the supply chain. If desired, data can be permanently locked on a byte-by-byte basis. Flexibility is the key, especially as business operations, information needs, industry standards, customer requirements, and other variables change over time.

How Does RFID Work
At the manufacturing stage, goods receive an RFID tag that contains a unique electronic code, called a Global Trade Identification Number (GTIN), and a serial number that allows the item to be identified at every point along the supply chain. Items are packaged, either individually or in batches, and then placed on a pallet, which also has an RFID tag. As the goods leave the factory floor and pass through dock doors, the RFID readers read the tags on the pallets and cases, identifying all the products and automatically building the manifest.

The tags are read again at the distribution center or warehouse, where arrival is confirmed, and the information is sent into the inventory system. Each read provides complete and accurate receiving information along with back-of-store and front-of-store inventory levels. This information then is sent to the ERP or WMS system. The RFID readers also provide inventory and expiration date control.

With this level of continuous real-time inventory visibility, companies can spend less time and money on administration and more time providing products to the customer.

Benefits of RFID
RFID is a flexible technology that is convenient, easy to use and well suited for automatic operation. It combines advantages not available with other identification technologies: RFID does not require contact or line-of-sight between the reader and the object to be identified; can function in harsh environments; enables multiple tags to be read simultaneously; and provides a high level of data integrity. RFID can also provide security and product authentication because tags can be applied discreetly and are extremely difficult to counterfeit. RFID technology:

- Carries dramatically more information than bar code labels
- Eliminates human error
- Improves speed and efficiency
- Increases information availability and location
- Allows enhanced security
- Delivers data with or without network connection

Integrating RFID
While many companies know they need to improve processes and efficiencies beyond current levels, most do not understand how RFID technology's capabilities can help. Most assume that RFID is a technology onto itself that is expensive to implement and can lead to long down times.

In reality, RFID is a data collection technology that is relatively simple to deploy, integrates easily into existing data collection systems, requires minimal down time, and offers benefits and returns on investment that are beyond expectations.

If your company already has a data collection system in place that is integrated into a WMS or ERP system, you need to improve efficiencies beyond current levels, bar codes do not contain enough information, or you have compliance labeling mandates to meet, then your enterprise is ready for RFID.

With small and manageable process re-engineering the benefits gained in the manufacturing and distribution environment can be astounding.

RFID Application in Manufacturing and Distribution
RFID is the ideal technology for automating manufacturing and distribution data collection processes. And because it can provide a portable database that lives with the product throughout its entire lifecycle, it can be used to store product genealogy data, including any after market adjustments/up grades. Having the complete history attached to the product could assist in minimizing warranty risk and optimizing the efficiency of a possible recall.

The following are some of the applications where RFID provides the greatest improvements and the benefits manufacturers can realize:

Receiving
As the pallet comes off the truck, a portal interrogator or handheld device reads the pallet tag. RFID allows immediate verification of all the contents of the load and real-time visibility to the WMS or ERP system. Forklift operators can be immediately directed for shipment disposition.

Benefits
- Increases productivity
- Makes routing faster
- Eliminates time-consuming and costly steps
- Enables faster invoice settlement
- Minimizes human error
- Increases inventory accuracy
- Reduces inventory levels

Sortation
The RFID tag carries data about carton contents, origin and destination. The portal is set up at various points along a high-speed conveyor/sortation system where they read the destination. The computer tells the sortation system where to route the carton for staging and delivery. The information can be written to the tag and stored for the receiving customer.

Benefits
- Ensures proper item placement
- Delivers swifter, more accurate staging
- Eliminates incorrect shipping
- Eliminates inaccurate order sequencing
- Decreases shipment delays
- Provides quick validation
- Improves customer satisfaction

Product Genealogy
The RFID tag is affixed to the part assembly or box. The tag contains part number, location produced, production line, worker, dates, and other types of information. Product genealogy can travel with the part through out its useful life or or as required by the business process. Portals, vehicle-mounted units (VMU) or handheld devices can interrogate the RFID tag anywhere, any time to get a complete history of the item.

Benefits
- Eliminates wasted time
- Improves regulatory compliance
- Minimizes warranty risk
- Optimizes efficiency and customer satisfaction
- Increases recall efficiency

Putaway and Picking
The RFID tag is placed at each location for both A and B level items. On each load there is an RFID pallet tag or over-pack label. The VMU interrogator automatically reads and writes the tags; a handheld device can also be used. Any validation required by the WMS is enabled for location and pallet identification.

Benefits
- Provides swifter identification and location
- Alerts incorrect action
- Eliminates wasted time and costs by matching items and location
- Validates without error

Inventory Management
The RFID tag is affixed to a part, assembly, or box and is secured in each location. The location and item conveyance (pallet, tote, container, box, etc.) is matched at putaway. Readers track rack locations, contents, moves, and picks. Portable readers are used for cycle counting.

Benefits
- Delivers swift and accurate cycle counting
- Allows automatic reordering
- Eliminates wasted activity
- Reduces or eliminates inventory
- Optimizes space and cost

Kanban Signaling - Replenishment
The RFID tag can contain exact part number and production line destination. When parts are gone, the container can be placed or pushed into the range of RFID readers. The forklift driver is directed to pick the part and deliver it to the proper work location. The VMU interrogator or handheld device verifies proper match and can read the location tag at the work cell, then update the ERP and WMS.

Benefits
- Ensures accurate replenishment
- Decreases or eliminates down time
- Reduces error correction expenses
- Provides Kanban directly communicated
- Improves work cell efficiency
- Increases on-time delivery

Work-In-Progress (WIP) Tracking
The RFID tag can contain the BOM and router produced by an ERP or MES system. The WIP material can be routed and tracked at every checkpoint along the production process. Throughout production, the part/assembly/product and labor detail can be written to the RFID tag. Exact sequence of parts loading is written to the container RFID tag. Customer shipment information can also be contained on the tag.

Benefits
- Enables swift and accurate production choices
- Improves quick change-over as demand requires
- Reduces mistakes and delays
- Increases flexibility

Just-in-Sequence Tracking
The ERP or MES system produces a listing of what was made and in what order. The listing is matched to ASN or other notification from the customer as to the sequence and production line location. The part/assembly/product detail can be written to the RFID tag. The exact sequence of parts loading is written to container RFID tag. Items are loaded in sequence and the container is shipped to customer.

Benefits
- Enables swift and accurate receiving and line replenishment
- Reduces sequence mistakes and costs
- Increases speed to market and customer satisfaction
- Decreases quick change delays and increases agility
- Optimizes warranty and recall reduction

Shipping
The RFID tag carries data about pallet and package contents, origin, and destination. The customer order number and line items are verified and added to pallet or container tag at the time of pick or order consolidation. The computer tells delivery and inventory systems where and how to route the shipment.

Benefits
- Ensures proper shipment sequence
- Provides swifter and more accurate order staging
- Eliminates shipment placed on the wrong truck
- Validates loading sequence
- Decreases shipment delays
- Improves customer satisfaction

Yard Management
Incoming trucks are logged in. The bill-of-lading or manifest is matched to a purchase order. A temporary RFID tag is attached to the trailer. Scanning the tag is done with a handheld device or a portal as the truck goes through, and writes the manifest number to the RFID tag. If location tags are used, the location is matched when the driver drops the trailer. If a random location is used, the RFID tag allows swift trailer location and content identification.

Benefits
- Reduces lost shipments
- Increases productivity
- Eliminates costs
- Reduces excess inventory
- Increases customer satisfaction

Plant Management and Field Service
Plant or field equipment carries an RFID tag, which can contain information such as the last maintenance date, technician ID, upgraded parts, actions taken, and next maintenance date. The technicians read the tag to verify equipment and location, perform the maintenance or repair required, and then updates the RFID tag with the newest data.

Benefits
- Ensures proper location and equipment
- Allows quick reference
- Provides Immediate updates
- Eliminates wasted time and procedure error

Labor Tracking and Security
Worker badges contain an RFID tag, which contains worker identification and authorizing data.

Security: workers can use their RFID badge to open portals, secure doors, cages, etc.
WIP: labor value added by specific individuals can be captured
Asset Utilization: attempts to utilize assets such as forklifts can be verified against training

Benefits
- Increases facility security
- Decreases risk
- Efficiently captures labor costs
- Optimizes warranty

Real Benefits, Minimal Risk
There is no reason any company should wait to take advantage of RFID technology and its benefits. The technology is mature, highly functional, and supported by current and emerging standards. Manufacturing companies of all sizes have established proven track records in self-implementing RFID technology and are reaping real benefits in increased productivity, process improvements, and reduced costs and errors.

To learn more about RFID technology, visit www.intermec.com.

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