Beyond the Tag: Finding RFID Value in Manufacturing and Distribution Applications

Intermec
by Honeywell

Introduction

Radio frequency identification (RFID) has always been considered a forward-looking technology. Today, most of the focus is on how emerging Electronic Product Code (EPC) RFID tags can help connect trading partners and align supply chains. However, to see the immediate benefits RFID can provide, manufacturers should look inward at their operation's own business processes, not forward into just supply chain customer's compliance requirements. RFID provides a quick return on investment in many factory and warehousing industrial operations, without as much coordination and complexity as supply chain implementations require. Manufacturers who consistently experience bottlenecks, desire traceability, or who want to reduce the labor required forcosts associated with materials management and replenishment, are excellent candidates to save money with RFID.

A major reason manufacturers can gain a rapid return on RFID investment is because industrial applications use currently available, highly proven technology. Many of the concerns and perceived implementation challenges for supply chain RFID applications center on the uncertainty of tag standards. Numerous industrial applications, including work-in-process tracking, parts identification, replenishment, asset and fleet management, are closed loop and do not require RFID technology to be coordinated with customers, suppliers, logistics providers or other outside organizations. This gives users a much wider range of opportunity for RFID adoption. This also provides users with the choice of many proven products that are backed by mature international standards.

Manufacturers, mechanics and service technicians know that no single tool is right for every job. RFID needs to be viewed in the same way. The RFID tag is only one component of a total system that may combine bar codes, mobile computers, wireless LANs, material handling systems and industrial controls to manage materials and assets more effectively. A "tag first" approach – i.e. looking at tag capabilities and trying to force fit them into operations – is not advisable. Instead, begin an RFID solution design from a business process perspective, identifying points in the process where data is classified, collected, communicated and acted upon. Companies need to look beyond the tag to see the value of RFID. This white paper will describe how companies have used internal RFID systems to reduce costs and improve efficiency, and explain how the lessons learned can be applied to a variety of industrial operations.

Where Is RFID Providing Value Today?

RFID technology was originally developed in the 1940s and has been used commercially for more than 30 years. In industrial environments, RFID is commonly used to automatically route materials, identify containers and track equipment. Generally, RFID provides the highest value in situations when traceability through a process or item life cycle is required, where labor costs or data errors related to identification and handling are high, when there are time or labor constraints related to item identification, handling or replenishment, and any time business processes or software applications need more information about an object than bar codes or other forms of automated data capture technology provide.

Specifically, RFID delivers tremendous value and control for product genealogy and lifetime traceability, material management and replenishment, especially in just-in-time (JIT) and Kanban environments, asset tracking, warehousing and yard management processes. Here are some examples and scenarios that show how RFID brings benefits to common industrial environments.

Yard Management

High-value assets and time-critical operations define the business environment for Old Dominion Freight Lines (ODFL), a trucking and logistics provider whose drivers operate from 117 service centers throughout North America. ODFL relies on RFID to manage its 2,600-truck fleet and to provide the foundation for new business processes that get trucks loaded on unloaded faster, with less labor.

Permanent RFID tags were applied to every truck in the ODFL fleet. When trucks pull in to service centers, an RFID reader at the gate automatically identifies the vehicle and notifies the dispatcher of its arrival by wireless LAN. The dispatcher then assigns a "switcher" driver in a shuttle trailer to meet the vehicle and to take the trailer to storage or a dock door for immediate processing. Switcher drivers receive their instructions by an Intermec in-vehicle computer that receives the information from the dispatcher over a wireless LAN connection. By using real-time systems to identify loads and direct activity, ODFL frees its drivers from having to pull up to the dock or office and wait while their paperwork is looked up and workers are found to process the load. After implementing the system, ODFL significantly improved yard productivity, eliminated some switcher positions, and was able to reassign some shuttle tractors to over-the-road duty. The system streamlines loading and unloading operations, where wasted time is a profit-killer for logistics companies who need to have their assets on the road.

Paramount Farms, a California nut processor that supplies approximately 60 percent of the U.S. pistachio crop, integrated an RFID receiving system with production control operations to increase throughput and accuracy. During the peak processing season, Paramount Farms receives 400 truckloads of pistachios and almonds from growers every day. Each truckload weighs about 50,000 tons, which means Paramount Farms has 20 million pounds of nuts to check in, weigh, sample, grade and record daily.

An RFID reader at the Paramount yard automatically identifies the incoming truck as they are being weighed in. The truck ID and load weight is transmitted over a wireless LAN to a host computer inside the processing center. A database on the host looks up the truck's profile information and returns handling instructions to a worker at the weigh station, who carries an Intermec wireless mobile computer. Paramount must collect detailed information about the load, for example the field on which it was grown on and method of harvest, and include it with the grower's records. Much of the data entry is done by bar code scanning and input into the handheld computer. Once the data is collected and the load has been graded documentation is automatically printed for the grower.

"Crop receipt data accuracy effects our greatest processing expense—raw material costs—and drives our annual production planning process. It's imperative for us to ensure that the volume and quality we pay for is the volume and quality we receive," said Andy Anzaldo, Paramount's director of grower relations. "We are more confident than ever of our data system's integrity and the

accuracy of the information, since more of the data is collected using radio frequency identification tags and bar code scanners."

Asset Management

Paramount Farms and ODFL rely on RFID to manage their most expensive and time-sensitive assets. RFID is so adaptable that many other types of businesses can use it to improve the tracking, availability and utilization of their valuable assets, whether they are tools, equipment, materials or work in process machinery. Asset tracking holds excellent ROI potential that virtually any company can enjoy. Because RFID tags can be read automatically without any worker intervention, RFID systems can be designed to provide unattended, constant tracking. All asset movements are automatically recorded as they pass by RFID readers, and unauthorized movements can trigger an alarm or event notification. RFID systems could help manufacturers reduce inventory theft by up to 10 percent and lower their fixed asset base up to five percent according to a series of studies by Accenture.

The U.S. Social Security Administration (SSA) estimated its RFID pilot program for asset management would produce more than $60,000 in annual savings just by eliminating manual data entry and paperwork processing. The SSA put RFID tags on the key fobs for the 86-vehicle fleet at its headquarters facility. To sign out a vehicle, an RFID reader was used to read the employee's RFID identification badge and the key fob. The RFID readings created a database record of who had what vehicle. RFID readers at the fleet fueling station automatically recorded the vehicle ID, fuel consumption and mileage. The system provided accurate, real-time information about the availability and usage of fleet vehicles, without requiring office personnel to enter and transcribe data or prepare reports.

RFID is more commonly used in industrial environments to track assets like forklifts, returnable containers, equipment and tools. It is easy to imagine how the Social Security Administration's procedures could be modified to provide tool crib management. Permanent tags would be applied to high-value tools and equipment and read when an employee checked the tool out for use. By scanning the employee's bar code ID card at the same time, the enterprise could automatically build custody and usage records. If RFID employee ID cards are used, check in and check out operations could be completely automated by positioning readers to automatically record all item movements and the person associated with them. These applications provide information that prevents time-wasting searches for missing items, deters unauthorized borrowing or theft, and improves asset utilization. Tracking and dispensing systems can also be linked to asset and maintenance management software applications to provide accurate information about how often tools and equipment are used, helping the organization plan purchasing, service and preventive maintenance.

Product Tracking & Genealogy

RFID tracking is also highly valuable to organizations that must trace genealogy of their products or provide lifetime identification. In the aviation industry, for example, if positive identification and lifetime service records aren't available for a part, it can't fly. Misidentification and record-keeping errors could potentially cost airlines millions of dollars in unnecessary replacement costs. That is why the aviation industry is a leader in developing RFID product tracking standards and applications. There are similar initiatives in other industries. The Transportation Recall

Enactment, Accountability and Documentation (TREAD) Act requires manufacturers to include identification and production history information about tires, child restraint systems, drive trains and other parts that can be accessed throughout the entire product life cycle. In response, the industry created an RFID tire tracking standard in recognition of RFID's ability to provide accurate, lifetime identification when exposed to heavy use in a variety of environmental conditions.

Consider how traceability applications could be enhanced with RFID by the ability to update item information through out its life. Read-write RFID tags can permanently and securely store an item ID number and reserve additional memory for data that can be written and updated later. Maintenance, asset management and warranty applications could benefit from this capability if item tags were regularly updated with inspection dates, service codes, or even data from sensor readings. These applications go beyond the basic requirement of providing tracking and identification and can provide true value and cost savings to the enterprise.

Having accurate product genealogy data can provide a big boost to service, returns and recall operations. Companies could detect and prevent ineligible service claims with an RFID system that enables them to uniquely identify otherwise look-alike parts. The ID information could also verify that items being returned for credit rightfully belong to the registered user. Linking individual part numbers with customers also enables companies to conduct narrow, targeted recalls should the need arise. The data can also limit liability exposure and provide valuable service and maintenance evidence if product performance is ever in dispute.

WIP Tracking

The sooner that RF identification is applied to products and components, the more benefits it can provide. Tags for genealogy and lifetime traceability can serve double duty as enablers of efficient production tracking, routing and materials management applications. Manufacturing operations that require sequencing or build-to-order production rely on item-level identification to ensure the right components are added to assemblies. RFID provides a way to quickly verify identities, and can be integrated with material handling and production control systems to route items to the appropriate assembly, testing or packaging locations.

In the automotive industry, where just-in-time, just-in-sequence delivery requirements are common, automakers and their suppliers routinely use RFID to identify sub assemblies to ensure they are installed in the correct chassis. One OEM applies RFID tags to racks that carry engines to their installation location. Each engine has a bar code serial number, which is scanned to associate the specific engine with the rack that is carrying it in a database. The database verifies that all engines on the rack have the same configuration, to prevent the possibility of the wrong type of engine being installed in a chassis. Forklift-mounted RFID readers confirm to operators that they are picking the right rack. The racks are read again prior to the engines being unloaded. All RFID and bar code scan data is communicated to the database application in real time over a wireless LAN that covers the facility. By preventing sequence loading and installation errors, the company avoids the high cost of product rework.

Replenishment

RFID is also used to provide timely replenishment of materials used for production. In the previous example, suppose the

simple act of moving the engine rack from an assembly station triggered a wireless signal to deliver another rack to the station for work. Or suppose that after 10 racks had been moved, the work station was automatically replenished with a new bin of parts for the assembly process. RFID has the potential to bring Kanban and other just-in-time replenishment processes to new levels of responsiveness and efficiency. These performance improvements provide the confidence and control that let companies lower their materials inventory, thereby reducing operating expenses with no adverse effects.

Think about all the capital your organization has tied up in raw materials and finished goods inventory, plus the capital equipment, storage space and labor needed to process it. Seemingly modest incremental improvements to how goods are managed, processed and accounted for can unlock a significant amount of cash for your business. The examples presented here have shown how RFID can facilitate these improvements – by complementing your business processes, not by requiring you to reengineer them. Organizations who are finding value in RFID today are profiting by becoming more efficient in their internal processes, without waiting for supply chain partners to adopt the technology.

The following section provides guidance on how RFID can be integrated to leverage current data collection systems and processes.

Unlocking the Value

In many applications, the RFID tag serves as a key the system uses to unlock item information from a database. Just as you need to look beyond the supply chain to see RFID's benefits, you need to look beyond the tag to understand how RFID will create value and provide a return on investment. Characteristics like frequency, size, standards support and cost provide a good basis to compare tags, but not to evaluate the total value of an RFID system. Value – and more significantly, investment ROI payback – depends on how successfully the entire system works together to provide operational improvements.

One reason Old Dominion Freight Lines' application was so successful is that it fully leveraged the company's existing wireless LAN and mobile computing infrastructure. Application software was modified to accept input from RFID gate readers, and to communicate the information to personnel who could make use of it. The result was an incremental process improvement that did not require replacement of existing technology, which led to a rapid ROI payback period that ranged from eight to 11 months per facility. Paramount Farms benefited by upgrading its gate operations to leverage its processing and production applications.

The Social Security Administration had no data collection infrastructure, but kept its program affordable by selectively using RFID. Tags are not applied to every asset the SSA uses, only to vehicles, which are among the highest-cost assets to purchase and maintain. The system was developed as a standalone application to improve one specific operation, which helped hold down development costs and minimized the need to integrate with other enterprise applications.

In these examples, the greatest benefits came from process changes that the unique properties of RFID made possible. And these process changes did not require business re-engineering by hired consultants. The benefits were not dependent on anyone outside the organization applying tags or reading them. Closed-loop systems like these can be planned and implemented in less time than supply chain applications and allow organizations to choose from a wider range of RFID products to meet their needs.

This flexibility is important, because tags are not the largest part of the total cost of ownership of an RFID system. Readers, software and host-level integration are all required to make an RF system work. The talent and experience of the system provider is an even larger factor, because skillful integration can prevent many unnecessary equipment, software development and future migration costs. For example, an experienced RFID implementation partner might conduct a thorough wireless site survey that provides excellent coverage and read rates without requiring redundant readers or customized tag modifications that an inexperienced integrator might specify.

The design and features of the RFID equipment itself also contribute to total cost of ownership and system value. Agile systems that support multiple frequencies and readers with modular radios provide the flexibility to change the system without having to rip out and replace the hardware. Read-write tags can be erased and reused thousands of times, along with providing the ability to encode additional data on existing tags if operational needs change. Again, application changes won't necessarily require hardware changes. Smart label printers will give users the ability to encode RFID tags on demand, wherever they're needed in the enterprise. Flexible features like these provide a migration path when RFID applications change and help organizations fully leverage their initial investments.

Conclusion

Tags are one component of RFID systems, which are themselves components of the enterprise information system. To evaluate how RFID can provide value to your organization, its impact on legacy hardware, software and processes must be considered. As we have seen, there are numerous opportunities to profit by selectively using RFID in targeted applications that complement and leverage legacy operations. This approach will provide value today while positioning you to gain future benefits from your supply chain or other extended applications.

Intermec Technologies offers a complete range of services and products to help organizations evaluate if they could benefit from RFID and how it could be integrated into business processes. Intermec is a leader in RFID technology and standards development, with extensive experience helping manufacturers, distributors, logistics providers, retailers, service companies and other businesses implement complete RFID data collection systems. Visit our Web site to see complete case studies on Old Dominion Freight Lines, Paramount Farms and the Social Security Administration, and additional white papers on RFID technology, lean and agile manufacturing applications and other data collection topics. You may also try the Intellitag RFID Online Assessment Tool, which leads you through a targeted assessment to determine if RFID-based technology is a good fit for your company. Intermec has been helping companies profit by taking advantage of data collection technologies for more than 35 years. Visit us today at www.intermec.com to learn more about how Intermec can help you prepare for RFID.

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