Automotive Aftermarket RFID

MEMA Information Services Council **White Paper**
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Introduction

Radio Frequency Identification (RFID) technology uses small tags to track the location and history of items that carry small tags. It is not new, having been invented in 1948 as a result of radar technology used in World War II. It was used in electronic article surveillance (EAS) equipment to counter theft in the 1960s. The 1970s saw the development of tags for animal tracking and electronic toll collection for highways. Personnel access applications surfaced in the 1980s along with a number of commercial companies hoping to capitalize on the growing list of uses. There was a focus on inventory tracking, asset management and condition monitoring applications in the 1990s.

RFID is now being looked at by the automotive aftermarket in hopes that it will help the industry with issues like excess inventory, shrinkage and counterfeiting.

RFID is different than bar codes in that “line-of-sight” is not required for readers to detect the information contained on small tags. RFID also offers the potential for greater amounts of information and allows for better tracking of products throughout a facility and a supply chain.

This paper defines RFID, its benefits and challenges, and the current and potential future use of the technology in the aftermarket.

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RFID Defined

Radio Frequency Identification, or RFID, is a general term for technologies that involve the use of radio waves to transmit information from small tags, or chips, to a receiver. The tags can be located on tires, parts of engines, tools, pallets of shipped goods, individual cases or individual parts, and they carry a basic series of numbers that comprise an item's Electronic Product Code™ (EPC).

RFID does not require a direct line of sight like bar code scanning and can transmit through many types of materials.

Applications can include tracking of items throughout a process or location, i.e. monitoring luggage throughout an airport and directing the luggage to specific conveyors, carts and planes automatically; tracking goods throughout a manufacturing facility; sensing changes to the ambient conditions around the tag, such as tire pressure; checking incoming shipments of pallets to ensure products were shipped correctly; tracking of pharmaceuticals to prevent counterfeiting; tracking animals; security access and egress; and many more.

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How It Works

RFID utilizes small tags, which contain small microchips and an antenna, and low-frequency radio wave signals that travel between the tags and interrogators (readers). Readers convert the signals to digital information and move the data to a network.

Data delivered from RFID tags to readers can include part/container/pallet identification information, location, recently completed actions and a complete history of where items have been. Readers are responsible for delivering the data to an intelligence device, such as a host computer or network. Eventually, the data is sent to a database on a server within a company. The EPCglobal Network™ is a series of servers that coordinates the flow of data among warehouses, operations, manufacturing facilities and retail locations. (EPCglobal Inc.™ is a joint venture between the Uniform Code Council® and EAN International and is charged with creating and maintaining standards and commercializing RFID technology.) Each time a tag is scanned and the information on the location of the item is captured, the item's history and life cycle expand and are accessible by others allowed to view it.

Electronic Product Code™ (EPC)
The EPC is actually a simple set of numbers that identifies a product or item. It is associated with details on the item, which are stored in databases on the EPCglobal Network (see below). Membership in EPCglobal is required to have EPC numbers issued for a company.

Passive Tags
Passive RFID tags receive power, transmitted in the form of radio electromagnetic waves, from a nearby reader. The chip contains the tagged item's EPC and controls the delivery of the data in the form of energy back to the reader, which converts the data into digital form. Passive tags are less expensive, smaller, require less power, last longer and do not require an internal battery. Data can be delivered over distances of up to several meters.

Active Tags
Active RFID tags have internal batteries and generate their own energy to deliver data to readers. These tags have read/write capabilities, can store up to 128 KB of data or more and have a much longer communication range relative to the reader. Recently developed chips allow the storage of up to 4 MB of data, and data can be delivered over distances of up to a mile or longer.

Reader
An antenna connected to a reader is located in proximity to the tagged items. The antenna receives the signal emanating from a tag and moves the signal to the reader, which converts the signal to digital form. The reader then directs the data to the nearest computer, which may be part of an internal network.

One or multiple antennae may be attached to a single reader. Placement of antennae and readers is critical to optimal signal transmission and should be determined through testing.

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How It Works (continued)

EPC Middleware
A computer, typically on a network, receives the EPC information from one or more readers. The computer utilizes software based on EPCglobal standards that monitors and manages EPC data received from the interrogators. These computer/sofware applications, or middleware, are the central nervous system of the network and work to distribute information to the appropriate locations. They also correct data point anomalies, delete duplicate readings of the same tag and manage the flow of data to prevent data overload at varying databases.

Object Naming Service (ONS)
The Object Naming Service provides a "yellow pages" service for the EPCglobal Network, so participants can quickly discover the computer server in the EPCglobal Network that contains the information associated with a particular EPC on an RFID tagged item. ONS works much like the Domain Name Service (DNS) works for the public Internet.

EPC Information Services (EPCIS)
Middleware delivers EPCs and EPC-related information to databases and information systems local to the company or division that just read that EPC. EPC Information Services are a set of standardized data elements and communication techniques for trading partners in the EPCglobal Network to share that EPC-related information. Using a federated data storage model, each participant in the EPCglobal Network can retain its own sensitive business-related information yet still make key EPC-related data available to others in the supply chain.

EPCglobal Network™
The EPCglobal Network includes several components required for supply chain RFID to work. In addition to EPC tags and readers, EPC middleware, the ONS and the EPC itself, it includes services enabled by EPCglobal standards that allow the exchange of data among trading partners that are EPCglobal members.

The EPCglobal Network is limited in the information it captures and retains, which contrasts much of the prevailing perceptions regarding RFID. The network stores company header information and the associated GLN (Global Locator Number) only and directs individual requests for additional informaton to other sources. Essentially, beyond the basic company information hosted by EPCglobal, the system becomes a "peer-to-peer" network.

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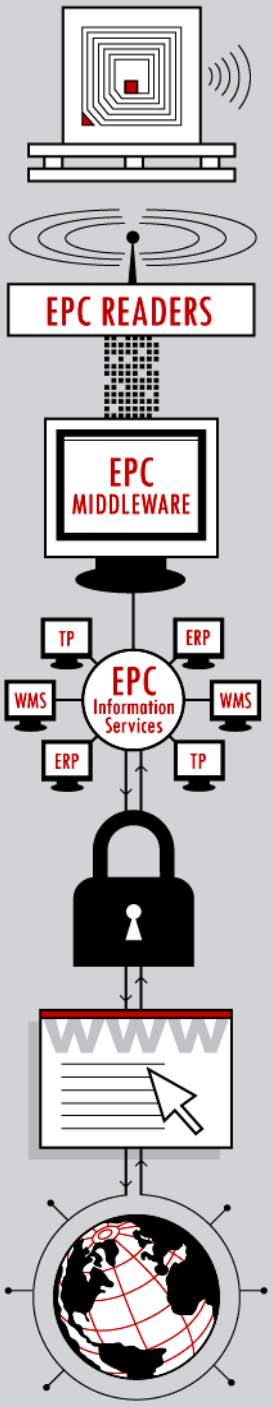
THE RFID PROCESS



STEP 1: RFID tags are attached to units moving through the supply chain.

STEP 2: Readers capture the EPC number from the tagged units.

STEP 3: Middleware processes streams of tag data from multiple readers. They also filter and aggregate data.

STEP 4: EPCIS makes tag data available to trading partners and internal systems (ERP, WMS, etc.), enabling track and trace and other higher order functions.

STEP 5: Security and Access Services (identification, authentication, profile, access control) support business processes.

STEP 6: EPC Information Services linking to multiple EPC Information Services throughout the world.

STEP 7: Directory Services and ONS are global services that enable value-added business processes.

Benefits

Benefits of RFID implementation depend on the type of application, such as internally or externally focused, but some of the highly touted benefits of the technology include:

- improved data linking / info exchange between ERP and MRP systems,
- ability to better manage parts proliferation,
- recall management,
- tracking reusable assets,
- tracking MRO assets,
- tracking history of goods throughout a supply chain,
- tracking history of items along a production process,
- reduced shrinkage due to theft,
- reduced threat of counterfeiting,
- greater data visibility throughout an operation or supply chain,
- ability to scan multiple items in a small time span, and
- reduced labor costs.

Applications

Inventory Visibility

Wide-spread implementation of RFID throughout a supply chain will provide substantial opportunity to identify where parts are located. This would result in greater opportunity for collaborative forecasting, planning and replenishment (CPFR) between suppliers and customers. Improved visibility enables manufacturers to more accurately produce parts that the demand chain will need to meet retailer and consumer needs. Specific areas that could be improved include:

- shrinkage reduction,
- visibility of incoming raw materials,
- excess inventory reduction,
- control of work in progress, and
- sequencing of raw materials/subcomponents.

Also, traditional methods of cycle counts and periodic operation-wide inventory would become obsolete in a perfect RFID world.

Recall Management

Recalls can create havoc throughout a supply chain because of the difficulties associated with identifying where all parts produced with faulty materials or components are located. RFID potentially will be able to identify where parts are located and more specifically parts that were made with the recalled materials or components. A selective recall would dramatically reduce unnecessary shipping and handling costs related to returning good parts.

According to EPCglobal Inc, tracking of tires in the event of a recall may be one of the first wide-spread uses of RFID for part life cycle tracking. The National Highway Traffic Safety Administration's (NHTSA) TREAD (Transportation, Recall Enhancement, Accountability and Documentation) Act mandates that the automotive industry develop a way to track tire recalls.

Labor Savings

Strategic placement of RFID readers can detect the flow of items in and out of an area. This enables the system to understand where products are located and can provide data on how many products are in a certain area. The higher level of use of RFID in a facility, the less labor is required to manually count, bar code-scan or locate individual items and containers. This will result in bottom-line cost savings.

Tracking Reusable Assets

Containers, racks and other items used in the production and movement of products are assets carried on balance sheets and require management and tracking. These assets represent costs due to shrinkage, wear, damage and inability to locate them. RFID technology can enable manufacturers and their trading partner to track container location, contents and condition, resulting in improved management of the asset's costs. This also represents an area to which RFID can be applied in a controlled system, helping a company with the inevitable learning curve.

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Applications (continued)

Tracking MRO Assets

Typical manufacturers have sizeable investments in replacement parts and tools for equipment. Managing optimal levels of these items is essential to minimizing costs and ensuring manufacturing processes experience as little downtime as possible. RFID tags placed on tools, parts or parts containers, and even equipment can provide data to help eliminate loss due to theft, misplaced items and poor visibility of items. Several automobile manufacturers have implemented programs to internally track containers, engine racks and recycle bins.

Product Location

Real Time Locating Systems (RTLS) utilize RFID tags, software and a triangulation to locate parts, containers and pallets. Essentially, it is RFID on steroids. RFID is limited to the knowledge of the location of the last set of readers that tags passed. RTLS tags transmit information, such as part identification and location, at varying intervals with a low-power radio signal. A central processor receives the signals from thousands of different tagged items and continuously provides information on the locations.

Product Authentication

The magnitude of counterfeit parts in the aftermarket and other automotive market segments continues to grow. It has been estimated that counterfeiting costs the automotive industry $12 billion annually. This correlates to a loss of 200,000 jobs. Recent activities by the Motor & Equipment Manufacturers Association (MEMA) to address this issue include:

- holding conferences and other forums to help the industry identify the core issues, challenges and potential solutions,
- establishing a Brand Protection Council,
- working with U.S. Immigration and Customs Enforcement, a division of the Department of Homeland Security to reinforce the emphasis on curtailing imported counterfeit goods, and
- working with Congress to develop and introduce a bill that strengthens current counterfeiting laws.

RFID has been touted as a partial solution to the huge counterfeiting problem in the pharmaceutical industry. It has been suggested at automotive industry events on counterfeiting that RFID, applied properly to imported aftermarket parts, has the potential to significantly curtail the problem.

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Applications (continued)

Ongoing Vehicle Maintenance
Although reading tags through dense metal remains a formidable challenge, technology improvements may one day allow installers to detect whether vehicle parts are OE or aftermarket and how long they've been in use. This would help improve and speed the repair/maintenance process. Information from the tags also could help mechanics anticipate problems due to aging parts and schedule needed repairs.

Tags for monitoring the air pressure in tires are already in use in limited situations (see Performance Tracking below).

Manufacturing Processes
Active RFID tags can record information from a manufacturing process to:

- track smaller components being added,
- identify location of the assembly,
- indicate which tests or inspections have been performed,
- provide an overall status, and
- provide information for a shipping list.

This would eliminate extra paperwork for tracking the flow of goods through an assembly process, which eliminates errors associated with manual data entry. Product databases can be updated when each process is completed, and quality and recall issues can be more quickly resolved with the data collected throughout the manufacturing process.

Future RFID applications may enable customers or even end consumers to track the status of their ordered goods along the manufacturing process or supply chain.

Performance Tracking
Tire manufacturers have been working for some time on the use of RFID to track conditions, the environment and tire performance while in use. The Automotive Industry Action Group (AIAG) has developed a standard for item-level tracking of wheels and tires. The AIAG B11 standard combines data from the tire with the vehicle identification number, which enables the tracking of tire performance. Improper tire pressure can be detected and drivers alerted through RFID. Much of the development in this area is in response to the TREAD Act.

Advance Shipping Notices
RFID-tagged pallets and containers can automatically be read as they leave the dock of a distribution center or a warehouse. The information generated can be used to automatically create an electronic Advance Shipping Notice (ASN), which would be sent via EDI to the customer, and can be used to create EDI invoices that would be sent at the same time.

Getting Started

Almost every company in the aftermarket probably has people reading articles on the promises of RFID, the Wal-Mart and Department of Defense initiatives, and the future environment of auto-id. 'Wait and see' is the flavor of the day. Estimates on wide-spread RFID implementation throughout the aftermarket vary from two years to five years or more.

At some point companies will be forced to comply with a customer-mandated method or will complete an internal ROI analysis to move forward with an RFID program. Initiating an RFID program now will facilitate the process of meeting future mandates when they are issued. There are different approaches, but most companies will, based on today's technology and available expertise, use some or all of the elements listed below:

- Clean your data – The aftermarket is "all over the place" regarding product identification, and with efforts to standardize this through aftermarket association activities, there really is no excuse to ignore this critical area. Product identification should not be based on varying customer and internal needs, but on a standard. Efforts to clean and certify product data will make the supply chain RFID implementation process much easier.
- Map internal, demand chain and supply chain processes – Almost everyone agrees that RFID, like most information technologies, should be implemented only when supporting or enhancing business goals and processes. Benchmarking existing infrastructures and total cost of ownership forms the basis of all ROI analyses. It is essential to consider existing infrastructure and process investments, such as bar coding and internal networks, and how they will be utilized or integrated with RFID programs.
- Develop a plan – create an RFID Policy stating the program's purpose, management approval and support, project owner(s), specific goals, implementation plan, areas that will be affected or touched, training implications, etc.
- Identify potential applications – Internal inventory or asset tracking, customer requirements for part identification or demand chain through suppliers are obvious areas, but as this paper depicts, there are many opportunities to realize benefits from RFID.
- Purchase a starter kit – Companies can "get their feet wet" by learning RFID technology through inexpensive kits. Costing $2,000 to $15,000, information technology (IT) staff can apply tags, scan them, collect data and practice part tracking on a limited bases. This is an excellent way to expedite the learning curve prior to making substantial investments in an unfamiliar technology.
- Test – The most strategic approaches to launching an RFID initiative include a prototype or testing program. This enables a company to identify problem areas before significant investments are made in a wide-scale program. This goes a step further than a starter kit. Companies can manage this in-house or utilize the outsourcing services of companies that have warehouses with RFID equipment in place for "rent."

Getting Started (continued)

- Contact a consultant – Inevitably, companies face the in-house versus outsourcing decision with new technologies. The number of companies offering RFID evaluation and implementation services is growing quickly. The atmosphere surrounding this technology is similar to the Y2K frenzy of the late 1990s. Consultants can help with ROI analysis, internal process and infrastructure reviews, implementation plan development, actual implementation and periodic program evaluations.
- Identify potential sources of interference – i.e. transmissions from other wireless sources, vibrations from conveyor belts or floors, inconsistent radio frequencies used by trading partners or throughout an operation, non-synchronized readers in close proximity to each other, etc.
- Standards – Internal implementation may not require industry standards, but receiving and shipping parts or containers with RFID tags almost certainly mandates the use of some form of standards. Companies should allocate resources to cooperative industry efforts to develop RFID standards that are specific to their respective industries. MEMA has established a working relationship with EPCglobal to support standards development activities.
- Early efforts – While it is impossible to predict when wide-spread usage will occur or when customers will launch mandates, aftermarket manufacturers should begin to do more than simply read articles (as stated above). With low-cost starter kits, the learning curve should begin soon and not be delayed until mandates are issued.
- Identify collaborative partners – Select one or two customers and suppliers that have demonstrated a willingness to introduce new technologies and launch a trial program. Much can be learned by a limited RFID launch with a limited investment and fewer challenges.

Standards

Process and Equipment
EPCglobal Inc has completed an enormous amount of standards-development activities to establish a base line for RFID implementation and usage. It has established working parameters for reader/tag communications; middleware; the EPC numbering system; the Object Naming Service (ONS) and EPC Information Services.

However, each supply chain has inherent nuances that create unique needs of a technology like RFID. An industry that moves huge plastic containers of liquids through the supply chain may need a different radio frequency than one that ships cardboard containers of millions of microscopic electronic components. Readers for tracking moving livestock may require a different setup than that used on readers that scan individual gas turbines.

EPCglobal continuously updates and maintains global standards on the equipment and process, but it works with individual supply chains to develop industry-specific standards.

Product Identification
EPCglobal Inc's parent organizations, the Uniform Code Council, Inc. and EAN International, have well-established standards for identification. The EAN.UCC System for bar code standards and the newer GTIN (Global Trade Identification Number) will work in concert with the new Electronic Product Code (EPC) to enable standardization in a global sense. Each supply chain, however, is responsible for identifying how its unique product identification scheme integrates with the EPC system. EPCglobal allocates resources to each industry to help with the integration process and, as stated above, has committed to working with MEMA and the aftermarket with this process.

Challenges

Industry standards for product identification

Product identification technology and processes continuously improve and represent tremendous potential for supply chains to streamline, reduce excess inventory levels and reduce costs. However, inaccurate data is a significant problem in the aftermarket and prevents RFID from reaching its full potential. Efforts by association and industry organizations to standardize the way products are identified are paying dividends, but so far only a few leading major companies are participating in these initiatives. The industry does not yet have wide-spread use of a common methodology for product identification.

While the aftermarket has progressed over the last three years with efforts to establish a process to certify that a company's data complies industry standards, there are few companies that utilize and send product data that is accurate and agrees with systems used by multiple trading partners. (This industry continues to struggle with a proliferation of bar code systems.) The EPCglobal Network is flexible enough to work with the standards from different industries, but RFID benefits will not be fully realized if the aftermarket has a myriad of identification methods populating the system and if data is not clean/accurate.

Part Composition

Compositions of aftermarket parts and materials range quite a bit. Small, thin plastic or metal electrical components have significantly different densities than heavy calipers and brake drums. Five-gallon containers of chemicals and oils differ greatly than boxes of plug wires. These variances create complexities in passing pallets of items by readers to achieve an accurate read of each tagged item on the pallet.

Interference

Because RFID is not a line-of-sight technology like bar coding, automating the process of moving pallets or large containers by readers will be a goal of most operations. When perfected this will speed shipping, receiving and inventory management activities. However, there are devices, environments and elements that can create signal interferences.

Conveyor belts, industrial equipment, phones, wireless devices, chemicals, HVAC equipment, etc. have been demonstrated at some level to create an interference with RFID signals, depending on the power and frequencies generated by the equipment. Magnets affect transmission by bending the radio waves. Liquids, such as cleaning solutions and oil, absorb energy from the waves. Metal can reflect the radio waves.

Another challenge is current RFID technology's inability to distinguish between individual parts when they are contained in a small area.

Data Management

A typical RFID program will generate substantial amounts of data. Although EPC Middleware helps manage the flow of data, users will be forced to implement or expand systems to manage the increasing demand on storage.

Challenges (continued)

Privacy
Public concern over corporate America's penetration into homes via RFID has been raised for some time now. The potential dangers associated with supply chain RFID largely are perceived ones. As the public is educated and RFID use in industrial supply chains increases, the privacy issue should subside.

EPCglobal Inc has developed a Public Policy Steering Committee to provide education and outreach to key stakeholders in the public and private sector. Under a full-time executive director, this multi-industry, global committee comprises representatives from major retailers, manufacturers and trade associations. To inform and guide its strategy, the committee reviewed all related and recent studies on public policy issues and commissioned a new comprehensive study of consumer perceptions and opinions regarding privacy and EPC. Members of the Committee have appeared before various state and federal bodies providing factual, relevant information on the technology and its benefits to consumers and business. The Committee evaluates and updates the EPCglobal guidelines on public policy on an ongoing basis and monitors legislative and regulatory initiatives to ensure a balanced and informed approach to deploying EPC technology worldwide.

Tag Life
Initial RFID programs are focused on pallet and case tagging, which will result in the placement of tags on the outside of boxes, pallets and possibly shrink wrap. Inevitably, pallets and cases are exposed to forklifts and other elements that cause damage. Handling shipments or containers with damaged tags may be part of each operation's RFID program.

Software Integration
Suppliers (ERP) and WDs (WMS) depend on software to manage inventories, generate production runs, create critical business documents for trading partners and calculate performance levels. Providers of software packages need to work closely with aftermarket companies, aftermarket standards groups and RFID consultants to ensure data from RFID tags is integrated with software and useful in further operations and processes. There has been limited activity in this area.

Legacy Bar Codes
Bar coding has been used in the aftermarket for 10 to 20 years, and its use has resulted in improved inventory management, reduced errors and costs, and more efficient data collection. While the industry continues to struggle with using common bar code methods/systems, infrastructure for the technology is in place at many manufacturers, distributors, jobbers and retailers. Migrating to a new product identification system, such as RFID, probably will require significant infrastructure upgrades, which could create resistance to the change. Dual-scanning systems and companies that leapfrog further bar code implementation initiatives (to move to an RFID solution) would overcome some of the hesitancy to migrating.

Challenges (continued)

Costs

Beginning almost any new information technology requires an ROI analysis, which means direct and indirect costs must be carefully identified. Even casual observers of the RFID technology trend understand that tag costs remain an issue. While passive tags have dropped in price in recent years, they are still far from the $.05 per tag level that experts agree is required for typical companies to justify implementation. Prices currently range from $.30 to $.80.

Area	Internal	External
Tags	✔	
Infrastructure audit	✔	✔
Prototype	✔	
Software		✔
Standards adoption	✔	
Implementation		✔
Testing	✔	✔
Equipment purchase	✔	
Staffing	✔	

The table to the left indicates where the responsibility lies in managing the respective cost areas. Companies have options in many cases of outsourcing or hiring/training employees, depending on the company's level of in-house expertise and outsourcing philosophies.

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Activity in the Aftermarket

There is very little commercial activity in the traditional automotive aftermarket regarding RFID. A few suppliers are working hard to meet Wal-Mart's pallet-based tagging mandates and the equipment and part-tracking system being rolled out by the Department of Defense. Most aftermarket manufacturers are increasing efforts to learn about RFID's challenges, benefits, required infrastructure changes and overall direction of similar supply chains. The general tendency is to learn all that is possible, monitor other industries and begin implementation after large retailer customers begin mandating its use.

There are a few exceptions, however. Following are examples of RFID initiatives among aftermarket companies:

Example 1 – Top 10 Manufacturer
A leading aftermarket and OE parts manufacturer has launched a pilot study to evaluate the internal benefits of using RFID tags to track inventories of parts moving from its largest manufacturing facility to its largest distribution center (DC). It is tagging individual heavy-metal parts that are stacked on pallets, scanning them and shipping the pallets to its DC. The company is identifying areas for real benefits, such as better visibility of parts as they flow through the system and tighter inventory control; however, challenges have appeared. The metal parts are dense, which limits the ability of the radio frequency waves to penetrate a stack of parts and read tags on parts at the bottom. Evaluation of potential solutions to the transmission problem is ongoing.

Example 2 – Goodyear Tire & Rubber
Suppliers to Wal-Mart are slowly ramping to meet the retailer's January 2005 RFID mandate, which requires the retailer's top 100 vendors to use RFID tags on every pallet of product shipped to select locations. Goodyear Tire & Rubber and a few other suppliers volunteered to participate in this initiative. The supplier's goal is to increase tire sales and reduce supply chain costs over the long term.

While the previous effort focuses on tracking products between supplier and retailer, Goodyear has been working on RFID implementation since 2001 to identify when tire conditions and properties change to eventually warn drivers of improper inflation.

Example 3 - Leading Rubber Products Manufacturers
Another leading rubber products manufacturer also has announced a new technology that will result in RFID tags being used to monitor tire conditions during operation.

Different approaches are planned by Goodyear and other tire suppliers, such as whether to place tags within the rubber or mount them on wheels. Estimates for roll outs of the new applications range from 2005 to 2006 model years.

Activity in the Aftermarket (continued)

Example 4 – Parker Hannifin
A diversified, leading aftermarket manufacturer, Parker Hannifin plans to launch a pilot program in September of 2004 to evaluate the benefits of RFID. The company will use Real Time Locating System (RTLS), which is active RFID (as described in the Applications/Benefits – Product Location section above). The company plans to take advantage of the technology's ability to track and locate products throughout a facility's inventory or shipping/receiving areas. While RTLS is a more expensive application than basic RFID, Parker has determined that if successful, it will enable greater levels of item awareness and will easily justify the costs.

Initially, the supplier will establish a test facility and use RTLS to supplement its Kanban triggers associated with lean manufacturing. Plans are to track components and parts from receipt throughout the entire production facility and through shipping. Human intervention will be minimized or eliminated. Parker will be able to know at any time where parts are, how many parts are in house, the number of Kanban cards needed on the production line and how many Kanban cards are missing.

The program will be implemented at the receiving dock of the manufacturer's Modesto, Calif., facility by mid-year 2005. Two other manufacturing facilities will be targeted for implementation by mid-year 2006.

Parker expects benefits in managing physical inventories, locating parts in process and locating parts in inventory. Although this is an internal implementation, results should translate into improved customer service, thereby providing benefits to the supply chain.

Activity in the Aftermarket (continued)

What will retard the growth of RFID use in the aftermarket?
The cost of testing, infrastructure changes, training, new equipment and new software; recurring costs of tags (until costs come down significantly); limitations of radio waves to accurately penetrate heavy metal and containers of fluid; investments in bar code technology and infrastructure; slow-to-market efforts by Warehouse Management System (WMS) providers to integrate RFID capabilities with their systems; ongoing bar code initiatives; and the lack of collaborative industry effort to develop standards could contribute to slow growth of RFID use in the aftermarket.

What will spur the use of RFID in the aftermarket?
"Open-loop" scenarios (as coined by the Auto-ID Center) require companies to evaluate RFID benefits based on tracking of parts, cartons or pallets between their facilities and those of their customers. Benefits from inventory management, shrinkage/theft control and counterfeiting control must outweigh the direct and indirect costs of launching a full-scale RFID program. A standardized infrastructure for RFID tags specific to the aftermarket will be required to ensure efficient use of the technology. In addition, creative cost-sharing initiatives in the industry may be required to prevent the supplying side of trading partner relationships from bearing the entire burden of the costs. This assumes that customers – distributors, jobbers and/or retailers – will realize benefits from this technology.

EPCglobal Inc also recommends evaluating "closed-loop" scenarios that focus on benefits generated from internal RFID applications. Standards are not required for these scenarios, but a careful evaluation of the cost/benefit derived from applications such as inventory management, container tracking, equipment maintenance and tool tracking is required.

More concerted and collaborative efforts by the aftermarket to reduce inventory levels will bolster support for RFID development and implementation. Identifying where "returns" are located and where specific part inventories at various WD locations will help manufacturers schedule the production of parts the aftermarket needs. Today's disconnected supply chain results in a lack of data visibility, which automatically generates production runs that create excess inventory. RFID technology will help resolve this issue, but its use will only grow, in this case, as fast as data visibility and industry collaboration will allow. Benefits generated from improved forecasting by the supply chain should provide enough "carrotts" to motivate aftermarket companies to launch pilot RFID programs.

Customer mandates may be the central force that drives RFID use in the aftermarket. The Department of Defense and Wal-Mart have launched well-publicized efforts to require suppliers to use RFID at some level. Recently, Target announced a program to have all suppliers using RFID tags with the large retailer by spring of 2007. NATO (North Atlantic Treaty Organisation) and several large retail chains have similar programs in the works. Aftermarket retailers are evaluating RFID's value proposition and probably will begin active programs within two years. Aftermarket parts manufacturers and distributors should begin active programs to research and evaluate RFID's impact on their businesses in preparation of mandates by retailers.

RFID and Bar Codes

The fear of many IT managers is that a recent bar code implementation project may become a complete waste of resources due to the perception that RFID will immediately obsolete bar codes. Most experts predict a peaceful coexistence of the two technologies for several years. Reality might be somewhere in between the two.

Scanning bar code labels is not 100 percent accurate, and close proximity to the label is required. Radio frequency technology promises flexibility and efficiencies to warehouse operations by expanding the distance of tag reading and increasing accuracy. Bar codes should continue to provide benefits to operations that are not prepared to alter existing infrastructures and will continue to provide limited information on parts.

Bar codes are limited in automation (typically, hand-held devices are used) and in future technology developments. RFID lends itself to automation (pallets of items can pass by stationary readers), and since it is based on computer technology, there should be significant opportunities for expanded memory, reduced sizes, reduced costs and increased reading distances. Bar codes also are more subject than RFID tags to damage that hinders readability.

There are minimal ongoing costs to printing bar code information onto labels. RFID technology is projected to always cost more, regardless of how low the price tags become. Therefore, the total cost of ownership (TCO) or overall value of an RFID program must be considered when direct comparisons between the two are made.

RFID technology and the virtual database of tag information ultimately will supersede bar codes because it is based on advanced technology and because part history and many other types of information will be available by connecting to the EPCglobal Network.

New devices have been developed that will read bar code labels and RFID tags. These hybrid scanners can transmit data from either or both to an in-house network. This arrangement would allow a company to evaluate RFID without disrupting normal business processes and while easing the transition from one system to the other.

Bibliography/Resources

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