

White paper

Error Proofing with RFID

Introduction

Manufacturers know that costly production and sequencing errors can be prevented by carefully tracking components, parts and assemblies throughout the manufacturing process. The difficulty lies in execution. Bar codes provide accurate, efficient identification and can assist with product genealogy data, but bar code symbols are not viable in many common industrial processes. Wireless radio frequency identification (RFID) is an excellent alternative to bar codes, but this technology has traditionally had its own environmental challenges. Most RFID systems are highly sensitive to interference from metal, which has limited RFID use for manufacturing tracking applications.

As manufacturers and technology developers work to solve these challenges, errors continue to mount – costing automotive manufacturers and suppliers \$1 million per day to fix, according to research by the Automotive Industry Action Group (AIAG) and AMR Research.

Specialized RFID tags that are optimized for use on or around metal are an effective and viable alternative to bar codes for error proofing applications in manufacturing. This white paper details the financial impact of errors and recalls, explains how RFID can be used for error proofing and other manufacturing processes, presents the benefits of RFID-based processes, and describes developments in tag technology that make RFID a reliable resource for automotive process tracking and error proofing.

Benefits to Error Proofing

The earlier in the production process that assembly and sequencing errors are detected, the less they cost to correct. The difference in cost-containment for correcting quality issues in the plant compared to in the field is approximately three to one, according to consulting firm BearingPoint. It costs about nine times more to correct a problem via recall than it does to correct it in the plant. Manufacturers and suppliers thus have a clear and strong incentive to create error proofing systems that ensure products and components have been assembled and tested correctly before leaving the plant.

Today automotive manufacturers take up to 120 days to detect and correct most problems, according to AMR, at an average cost of \$1 million per day for labor, parts and brand impact. After 120 days, most vehicles are long gone from the factory, necessitating a costly recall, which on average takes 250 days to complete, according to AIAG.

To prevent delays in error detection, manufacturers need to comprehensively identify assemblies and components and verify activity throughout production and material handling processes. Real-time identification systems can prevent many errors altogether, resulting in significant cost avoidance. Manufacturers can leverage their ERP, quality control and manufacturing execution systems with real-time bar code and RFID input to close the loopholes in work-in-process tracking that cause production and sequencing errors.

The following sections show how RFID can improve shipping, receiving and material handling operations between suppliers and manufacturers to improve visibility and prevent errors that commonly occur.

Outbound Logistics

By collaborating, manufacturers and their suppliers can both improve operations and error-proof processes with RFID. Consider engines that are assembled at a supplier facility and shipped to the automotive OEM. The supplier can automate and error proof the outbound logistics as engines move from production to the trains or trucks for shipment. Each engine must be uniquely identified, plus loaded in the proper sequence to support just-in-time production. The serial number and model is typically on the engine's bar code label, but these symbols are not always convenient to read, especially in unattended material handling operations.

To facilitate efficient, automatic handling, engine serial numbers can be recorded on reusable RFID tags that are permanently applied to the racks used to carry engines through logistics and material handling operations. Standardized tags for open supply chain applications can provide license plate-type identifiers for use by a database application, or they have plenty of memory to encode the individual serial numbers of multiple engines carried on the rack. Durable RFID tags will perform reliably on racks stored outdoors even when exposed to extreme heat, cold, ice and snow. Permanent tags can be rewritten thousands of times as the rack is reused. Tagging the rack makes it easy to record all material movements and putaway locations accurately and automatically, without bar code scanning or any manual intervention. Racks can be identified with RFID portals or other fixed-position readers, or with forklift-mounted or other mobile readers. Having accurate location information recorded by RFID and conveyed by wireless LANs also takes much of the time and labor out of locating specific engines for campaigns. Prior to shipping, racks can be automatically read to verify that the specific engines belong with the order and are being loaded in the correct sequence. The data can then be shared with the manufacturer through an EDI message or other communication to support receiving and production planning operations at the manufacturing facility.

Inbound Logistics

The manufacturer also needs to track incoming shipments in the correct sequence order. Tagged racks can be read with forklift-mounted or dock-door readers as soon as they arrive at the facility and matched to an order or shipment notification in a database via a wireless LAN connection. Once identified, items are immediately available for delivery to an assembly station for JIT production or for placement into storage. Again, RFID data collection and wireless LAN connectivity can accurately record all movements and putaway locations. Real-time RFID tracking also improves visibility into inventory, materials and work-in-process.

In-plant Logistics

Racks that are conveyed with material handling systems can be identified with fixed-position RFID readers installed at strategic points throughout the facility. By integrating the RFID readers, material handling system, controllers and software systems, components can be automatically routed to the proper production stations and verified before they are installed, preventing assembly and configuration errors. Error-proofing applications can prevent improper installations by automatically issuing alerts if products are out of sequence.

Database applications can take advantage of RFID read data to build complete product genealogies that store the unique ID and production data for components and assemblies. By accurately and automatically recording the unique serial number of each part and component used in an assembly, manufacturers can quickly identify and find products that need to be reworked or recalled because of component problems. With recalls costing an average of \$1 million per day, the ability to quickly pinpoint affected products is extremely valuable and can provide full ROI for the entire RFID system in just one campaign.

Additional Applications

An RFID infrastructure created for error proofing can support many additional beneficial operations. These include automated replenishment and kanban signaling, TREAD Act compliance, yard management, cross docking, picking and putaway, inventory management, asset tracking, automatic vehicle locating (AVL), returnable container identification and more.. Other resources from Intermec describe many of these applications and their benefits are described in detail. Visit the White Papers and Case Studies sections of www.intermec.com to learn more.

Intermec RFID Solutions for Error Proofing

Intermec has proven products and partners for implementing successful, accurate error-proofing applications. Intermec's complete line of industrial RFID equipment and mobile computers include the Large Rigid (LR) Tag and Small Rigid (SR) Tag, which can satisfy production and supply chain tracking requirements and comply with worldwide standards for RFID use.

The tags are made in different sizes to satisfy various identification requirements, but share several characteristics that make them excellent options for use in automotive manufacturing and logistics processes. The tags are made with plastic that shields the RFID inlay from interference while providing protection

from impact, chemicals and temperature exposure. They can be used in temperatures ranging from -40°F to 250°F (-40°C to 121°C). The tags perform equally well whether attached to metal, wood or plastic objects and have a variety of mounting options.

Both the LR and SR tags are available in ISO 18000-6B and EPCglobal Gen 2 standard versions, which are recognized around the world. Global standards compatibility means components, finished assemblies and logistics containers can be tracked throughout production and supply chain processes with a single tag that doesn't have to be removed or supplemented to comply with various RF emissions regulations. The tags are also reprogrammable and reusable, and become very cost effective the more they are used. A reusable, global tag reduces RFID implementation costs and makes it more practical for companies to develop error proofing applications.

Intermec supports its complete tag family with a full range of handheld, vehicle-mounted and fixed-position RFID readers, industrial mobile computers, bar code data collection systems and rugged wireless networking products. Intermec is a leader in RFID technology and standards development, with extensive experience helping organizations implement complete RFID data collection systems. Visit our Web site to see complete case studies on RFID users in multiple industries, and additional white papers on RFID technology and other data collection topics. You can also try our RFID Online Assessment Tool (www.intermec.com/rfidassessment/), 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.

Conclusion

Technology advances have made RFID a viable tool for detecting and preventing errors in manufacturing, sequencing and logistics processes. Intermec's Large and Small Rigid tags allow users to overcome the performance and cost barriers to highly accurate, automated and real-time error-proofing applications. RFID is proving itself every day in a variety of challenging industrial environments. For manufacturers who risk millions of dollars in losses due to human errors, the issue is not whether they can afford an RFID-driven error proofing system, it is how long they can afford to be without one.

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