Can RFID Tags Work Inside Metal?

“If you build it, they will come”

Inventory management takes time. This costs companies money, both directly in labor costs and indirectly by interrupting normal operations. RFID can significantly reduce the time it takes a company to complete their inventory, improving their bottom line.

The benefits of RFID-based inventory management have been available only to companies with inventory that was “RFID friendly”, excluding those whose inventory consists of metallic items. Companies with high value metallic inventory could justify the use of expensive active or battery-assisted RFID systems, but these were not economically justifiable for mainstream operations. Recently, however, passive RFID technology has improved significantly. RFID tags have become available that work well near, or even directly attached to, metal. This has made the benefits of RFID-based inventory management affordable for a much wider range of companies.

There is still a step, however, in between the point of manufacture and the end customer when an RFID tag is applied to an asset. This added step adds cost. In addition, the applied RFID tags are exposed externally making them susceptible to damage from normal “wear and tear” and to deliberate tampering. Many companies have been asking for an RFID solution that can be seamlessly and invisibly integrated into their products at the time of manufacture.

In addition to inventory management, embedded RFID can be valuable for authentication. Financial institutions such as Visa, American Express and Discover have implemented RFID in credit cards for use as instant payment mechanisms at retail and food establishments as well as serving as an additional form of verification of the card holder's identity. Automobile manufacturers have embedded RFID tags containing the information required to unlock and start an automobile directly into plastic key fobs, making it much more difficult to duplicate the owner's key and steal an automobile. Building this level of authentication and security into other products would bring similar benefits.

Traditionally, metallic material has been troublesome for RFID. The challenge of designing a RFID tag to perform *on* a metallic surface has largely been solved. *Embedding* the tag into a metallic surface, however, has continued to render the tag unreadable, or readable from only a very limited range. The good news is...the technology to do this exists today, and is available from XERAFY.

Metal-Embedded RFID

Embedding RFID tags at the point of manufacture enables the manufacturer to differentiate their product line from their competition by offering product that is either "RFID ready" or fully "RFID enabled". With volume production, the cost of adding an embedded RFID tag is more than offset by the return on investment from customers who prefer to purchase the product with the ability to readily have real-time inventory visibility.

For a server manufacturer who sells thousands of blades to financial institutions and large corporations, their customers are going to not only appreciate the fact that their datacenters are already RFID enabled, but also that the tags are not only appreciate the fact that their datacenters are already RFID enabled, but also that the tags are not vulnerable to being damaged or knocked off during routine movement of servers from rack to rack. In addition, when servers return for warranty repair or other reasons, the built in RFID may be utilized by the manufacturer for real-time management of returned/repaired units.

Large corporations who lease or purchase capital equipment such as laptop computers, wireless routers and other IT related items that need to be accounted for each business quarter for accounting purposes will see instant ROI from real-time visibility of asset movement with doorway portals and mobile RFID enabled carts that are able to account for a company's complete inventory in a matter of hours versus days.

Military and law enforcement agencies need to keep accurate inventory of their firearm inventory. Accountability of an agency's firearm inventory serves several purposes. One purpose is to

ensure that all personnel are properly equipped with equipment. Another is visibility to missing inventory (either misplaced or possibly stolen). Finally, when equipment requires periodic maintenance, a record needs to be maintained of all equipment requiring service, what service needs to be performed and all equipment which has gone through a proper and complete cleaning cycle.

Embedded RFID enabled firearms provide instant and discrete tracking to each agency. Not only will the agency's equipment inventory manager be able to know real-time how many firearms are checked out for service, but also how many remain in inventory ready to use, amount in need

of service and reconcile total number of assets registered with actual amount in inventory (i.e. if any are missing). This prevents unnecessary ordering of additional firearms. More importantly, this allows the agency to immediately initiate a search for missing equipment.

Commercial tools, ranging from hammers, screwdrivers and tape measures to large scale generators, jack hammers and cranes, are often purchased by firms that then lease those tools to construction companies on a project to project basis. The leasing company's inventory is highly valuable, mobile and broadly dispersed, making inventory of assets a significant challenge. The loss of a large item has an immediate business impact. Even smaller items, while not individually expensive, quickly become a liability when

significant quantities are either misplaced or stolen.

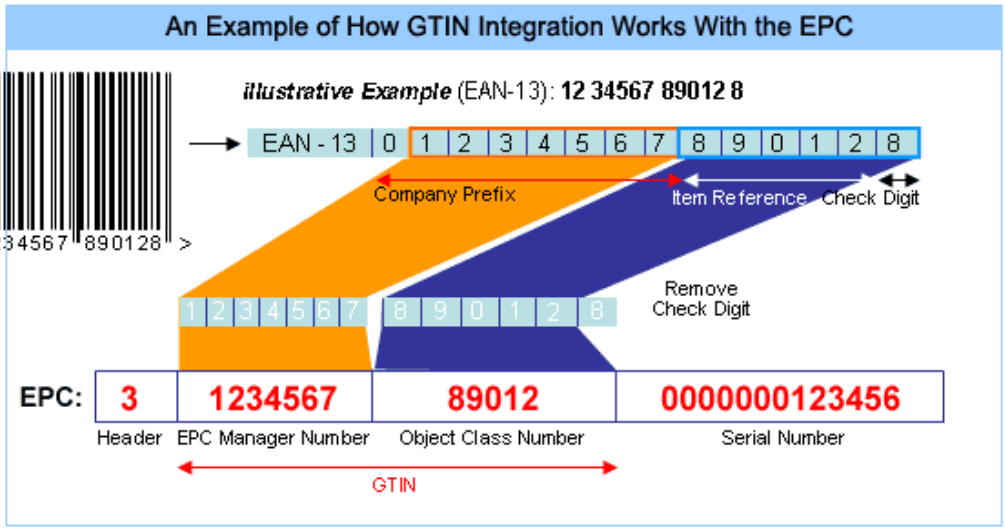
RFID-based tool tracking solutions have been deployed to customers for several years, including RFID enabled tool boxes and truck bed reader systems. It is relatively straight forward to add an external mount-on-metal RFID tag to a tool; however these tags are vulnerable to damage or loss during normal use and their obvious appearance may lead to intentional tampering. Tools that contain an embedded RFID tag eliminate these concerns, as the tag is now a part of the tool itself.

Privacy and the Cost of Manufacture

Like many product lines, particular features of a part may be optional, but physically designed into all variants. Embedding of RFID is no exception. In volume production, the cost to manufacture an asset will remain the same. Likewise, the cost of enabling a particular feature set for a specific customer base is negligible compared to the cost of inclusion. In the case of RFID, if a customer requires RFID enabled product, the RFID tag may be programmed per the customer's requirements and ship directly out the door ready to work upon receipt. If a customer does not require RFID, the same product is likewise ready to ship and work upon receipt, with the inactive embedded RFID tag being completely invisible to the customer.

Information on a RFID tag may vary depending upon what is contained. Many systems use a standard Electronic Product Code (EPC) as the principle method of identifying a RFID tag and corresponding asset. Additional product information, such as product type, product stock number, serial number or any other information pertaining to product and manufacturer, can be encoded into the user memory of the tag.

Several methods may be employed to prevent unauthorized personnel from reading and/or modifying the information contained within a RFID tag. Tag memory may be locked using several layers of password protection for both read and write capability. In addition, information within tag user memory may be encrypted, making the information meaningless to a would-be thief interrogating the tag.



XERAFY Embedded Solution

Until now, mount-on-metal RFID technology has been strictly about surface mounting. The ability to not only embed an RFID tag that will fully perform, but also integrate it into an asset at the point of manufacture was only a dream. XERAFY has pioneered RFID that not only offers full performance on and near metal, but also embedded within metal.

"Managing and recording assets for industrial manufacturers requires an embed in metal solution with long read range and XERAFY provides the only embed-in-metal tags that meet the performance requirements." Said Jim Stradinger, Managing Partner, Holland 1916 Inc.

XERAFY uniquely provides:

- A revolutionary antenna design, enabling XERAFY embedded RFID tags to deliver peak performance when embedded in metal
- A small footprint, for limited space assets such as bolts, IT equipment, metal faceplates
- Full performance without additional product modifications such as spacing and additional case material
- Durability, backed by an industry leading warranty, for guaranteed tag longevity

Conclusion

Embedding RFID into products has substantial benefits in both cost and product value. Those benefits, however, have only been available to manufacturers whose products are made of “RFID friendly” materials such as plastics. XERAFY’s unique technology enables embedded RFID in metal products, bringing the benefits of RFID to those products manufacturers and their customers.

Contact Us

For more information on this application, product overview or any other questions, please contact XERAFY.