RFID Opportunities Grow when Smart Labels get Tough

Radio frequency identification (RFID) technology has revolutionized automated data capture and item and asset tagging applications by providing accurate, real-time information in a host of use cases and environments. There is proven value for using RFID to track, manage and protect assets, and adoption has been expanding significantly as a result, helped greatly by continued innovation that has enabled RFID to be used to identify more types of objects.

The value of RFID programs increases with the volume of items that can be tagged and tracked. Today the number of RFID-suitable items is set to expand exponentially because of continued innovation – specifically because of new read-on-metal smart labels that are flexible enough to be applied to almost any object and provide users the ability to produce RFID asset labels with variable information on demand.

This white paper highlights some of the leading use cases and benefits for read-on-metal smart labels and provides background information about Titanium Metal Skin from Xerafy, which enables entire new categories of products and components to be RFID enabled because it is the smallest and thinnest read-on-metal RFID smart label on the market.

Innovation Redefines What Can Be Tracked with RFID

Despite stops and starts in the supply chain segment, there has been virtually uninterrupted growth in RFID adoption for asset management, process control, product authentication, work-in-process tracking, autoclave and sterilization processes, inspection and maintenance, and other operations. However, there have always been items that were traditionally either difficult, if not impossible, to tag. In particular, the presence of metal often impeded the use of RFID. Depending on the item being tagged, metal can reflect, amplify or otherwise interfere with the RF signal, which greatly reduces the performance of an RFID tag or label.

A variety of tags have been developed to address this issue, and now there are tags available that can not only work on metal, but that can even be embedded inside metal objects. The development of read-on-metal RFID tags solved many interference challenges and led to new levels of RFID adoption in aerospace, healthcare, oil & gas, data center and other operations.

However, some challenges and limitations still remained. Most on-metal tags were designed with a spacer (or air gap) to shield the antenna from the metal, but this design added height and made them incompatible with applications that required a low-profile tag. These on-metal tags were typically rigid and expensive, and unlike flexible smart labels, the tags could not be produced and encoded on-demand.

Recent developments in read-on-metal RFID smart labels have removed many of the remaining barriers to using RFID tags on metal items. Thanks to the introduction of Xerafy's Titanium Metal Skin, there is now a flexible, EPCglobal Gen 2/ISO 18000-6 standard tag option for curved metal surfaces, and for applications requiring a very thin, low profile tag that is still durable enough to operate in harsh environments. More importantly, the inlays can be embedded in traditional smart labels.

Titanium Metal Skin measures 1.77 x 0.22 x 0.03 inches (45 x 5.6 x 0.86 mm), which makes it thin enough to be embedded within a label and used in smart label printers. With the ability to print Metal

Skin labels on demand, users receive the benefits of a specialty, on-metal tag as well as the ease-of-use and tag generation capabilities of traditional, commodity smart labels. On-metal labels for these applications can now be made available from a variety of label converters, systems integrators and value-added resellers, because the tags themselves can be more easily embedded into standard smart labels formats that can be applied to almost any asset. Compatible smart label printers can also generate these new types of labels, offering more control adaptability for end users that want to produce volumes of RFID labels with variable information, or that want the option to continuously add new assets to their existing tracking systems.

The following section highlights how small, thin and flexible read-on-metal smart labels are creating other use cases for RFID tracking.

Use Cases

On-metal RFID tags are already helping companies in a variety of vertical industries expand their real-time asset tracking, work-in-progress, inventory management, product authentication and supply chain management applications in ways that were previously not possible. Making these tags available in a standard, low-profile label format that can be printed on demand and on-site makes it even easier for users to tag new items, while increasing their potential return on investment. Here are some of the current and planned projects that are using Titanium Metal Skin smart labels.

IT Asset Tracking: A flexible on-metal tag can meet both the price and performance requirements of the information technology (IT) industry to track on-premise items (like servers and desktop devices) and mobile assets such iPads, laptops and even smart phones. Thin, flexible labels allow users to track relatively small devices at a reasonable price point. Source tagging servers, laptops, and other equipment can provide end-to-end asset lifecycle tracking that can meet developing industry standards for asset management.

A large school district in Texas is using on-metal RFID labels to track laptops, tablets, smartboards and other classroom assets in a solution that integrates directly with the district's existing asset software. The labels have made it much easier to conduct classroom audits, quickly identify which assets are present or missing for a given room. The system records asset movement, and helps the district save time and money by speeding the auditing process.

Being able to produce asset labels on demand allows enterprises to easily add (and remove) devices in the asset pool. This ability is especially critical for companies that have adopted "bring your own device" policies that allow employees to use a mix of personal and company-owned mobile devices for their work activities.

In another application, an airline successfully completed a proof-of-concept using the Metal Skin labels to identify iPads provided to passengers for in-flight entertainment. Using RFID enabled flight attendees to quickly record assets being returned during the busy time at the end of flights. The process could be completely much more quickly with RFID than with bar code scanning, and the Titanium Metal Skin smart label made it possible by being small enough to fit easily on the iPad without affecting comfort or operation.

Healthcare: Hospitals and other healthcare facilities struggle with a variety of asset tracking and management challenges, from locating wheelchairs and IV pumps, to ensuring the correct surgical kits are present in each operating room, to tracking items through caustic, high-temperature sterilization processes. As such, they have responded by deploying a variety of technologies to help track assets, including bar code labels, direct part marking, RFID and RTLS/Wi-Fi solutions.

A uniform asset tracking approach based on standard RFID tags could greatly simplify these efforts, particularly if standard tags could be found that could be used both on and off metal. A flexible, on-demand label for tracking a variety of objects (including metal items, and those with complex surfaces) can improve asset visibility, while reducing the complexity of attaching the tags to the items being tracked. On-demand smart labeling enables hospitals to encode the date the asset was placed into service, configuration and calibration data, and other variable information.

Gas Cylinder and Drum Tracking: One of the primary advantages of flexible, read-on-metal tags is that they can be used to track items with uneven or curved surfaces. Round or curved containers have always presented a challenge for RFID tracking because of their shape, their metal content, and the fact that they are often used to store RF-unfriendly liquids and other materials.

Durable, on-metal RFID labels that adhere to these difficult surfaces and remain readable can help greatly improve inventory and asset management operations, while eliminating the line-of-sight requirements of traditional labeling solutions. Work-in-process (WIP) operations can also benefit, because bulk materials can be tracked regardless of the type of container they are stored in.

Industrial Product Identification: Manufacturers utilize a variety of machinery, tools, parts and other metal assets that could benefit from real-time asset tracking. However, traditional RFID tags often were too large, too expensive or too susceptible to interference to be used on these items, while bar code labels simply couldn't withstand the harsh operating environment. A rugged, flexible RFID label

that performs on metal would allow these companies to track even relatively small, inexpensive items without adding significant operational costs. With the ability to create these labels on demand, the often dynamically shifting asset bases within these companies could easily be managed without relying on pre-encoded tags.

General Asset Tracking: Because these types of RFID tags can be used to cost-effectively track both metal and non-metallic assets, it is possible for end users to track a wide variety of items using a standard tag, rather than the mix of specialty tags that were sometimes required for these solutions. Items that might previously have been managed using barcode labels can now benefit from real-time RFID tracking.

In one application in South Africa, Mercury Metal Skin tags from Xerafy are be used to track 800 individual pieces of fire safety equipment for inventory management, verification and maintenance purposes. The end user in this case was able to rapidly deploy the tags even on fire extinguishers and other items with curved surfaces, while providing human-readable information and branding data as well. The system was developed by South African solution provider RFIQ, using its RFIQ Maintenance Software application and Alien Technology ALR-9000-EMA handheld readers, to give users the ability to collect data on hand-held devices. Information collected by RFID on the mobile device can also be exported for analysis or integration with an asset management solution.

The RFID tags provide easy identification and proof of ownership of each item. The company also uses the tags to track maintenance activity for each asset, and quickly conduct inventory counts.

Anti-Counterfeiting: Product authentication has become one of the key challenges of the global economy. The global economic and social impact of counterfeiting and piracy adds up to $775 billion each year, and potentially costs 2.5 million jobs annually, according to the International Chamber of Commerce. Improved traceability is needed, and RFID is increasingly being considered for use in product authentication and anti-diversion programs.

Using RFID labels on small, hard-to-track, high-value items like consumer electronics, pharmaceuticals and cosmetics can help verify the authenticity of these products as they travel across the supply chain. The ability to produce large runs of cost-effective smart labels with variable information is key to enabling this type of mass-market application. The relatively low cost of the labels, as well as the benefits achieved by protecting these high-value goods, provides a fast and easily calculated ROI.

Titanium Metal Skin Creates New Possibilities

Xerafy's innovative Titanium Metal Skin makes the use cases described in this paper possible and is helping bring RFID traceability into new environments. Titanium Metal Skin is a patent-pending RFID inlay for smart labeling both metallic and non-metallic assets. Its extremely low profile and flexibility make it suitable for small assets like smart phones and tablets, and for larger objects such as drums and other packaging and shipping containers.

Titanium Metal Skin is the thinnest tag available in the market that can be applied directly onto metal surfaces. It measures 1.77 inches long by 0.22 inch wide by 0.03 inch thick (45 x 5.6 x 0.86 mm). Titanium Metal Skin is made from PET material for thermal-transfer smart label printer/encoders and has an operating temperature range of -40°F to +185°F (-40°C to +85°C). Titanium Metal Skin tags and inlays comply with ISO 18000-6 and GS1 EPCglobal Gen 2 standards and offer 128 bits of EPC memory.

Titanium Metal Skin is the latest addition to Xerafy's Metal Skin product line, which has been a game-changing innovation that transforms RFID for metal tracking, and has opened up new markets for RFID. The Metal Skin RFID inlay family includes Mercury and Titanium Metal Skin products. Globally compliant to EPCglobal UHF Gen2 and ISO 18000-6C standards, the Mercury Metal Skin is cost effective for a wide range of applications from product authentication and IT asset tracking, to global tracking of assets shipped and anti-counterfeiting of high value items and medical supplies. Metal Skin inlays can also be converted into different label sizes through standard label converting equipment and processes; logos and barcode can also be printed using standard RFID printers available in the market.

Conclusion

The availability of a thin, flexible RFID inlay that can be used for tracking both metal and non-metallic items greatly expands the universe of assets that can be managed using RFID, while simultaneously reducing the cost and complexity of tracking metallic assets and items with challenging surfaces. By making the tags available through common label converting services, and ensuring compatibility with smart label printers, end users gain even greater control over where and how items and assets are tagged, while making it possible for them to organically expand the number of assets being tracked in real time. This ultimately helps increase the return on investment in RFID by distributing the solution cost across a wide field of traceable items.

Titanium Metal Skin makes it possible to track new types of assets with RFID. Because of its unparalleled size flexibility for a read-on-metal tag, Titanium Metal Skin enables new RFID use cases for asset tracking in medical, industrial, data center, supply chain and other environments.

About Xerafy

Xerafy's innovations have changed the price-performance ratio for RFID tags and made it possible for customers to track assets in a wide range of harsh environments. Xerafy provides read-on-metal tags that can be embedded directly into assets to meet a full range of needs for RFID asset tracking in the aerospace, industrial, data center, healthcare, energy and other industries. Xerafy is headquartered in Hong Kong and maintains U.S. sales and support offices in Dallas and Minneapolis, and additional offices in the U.K. and China.

Contact Us

For more information on the new Metal Skin and all of Xerafy's products, please visit our website: www.xerafy.com.