

RFID Benefits and Challenges for Industrial Tool Tracking

Tools are vital to industrial operations. Standard tools, such as socket wrenches and hammers, are used in nearly every industry. Many industrial activities also require specialized tools, including tools custom-made for a specific operation. These tools are expensive, yet absolutely necessary.

Securing tools from theft and being able to quickly locate them when they are needed is, therefore, critically important. Industrial operations have long used tool cribs and sign-out/sign-in procedures for tools; however both the efficacy and the accuracy have been less than desired.

The results using the manual methods have been:

- Loss of tools, due to misplacement or outright theft, and therefore the direct cost of replacement
- Lost productivity due to personnel check-out/check-in of tools, searching for lost tools or waiting for replacements to arrive.
- Poor customer satisfaction from missed commitments, maintenance, and added cost.



RFID can substantially improve both the accuracy and the effectiveness of tool tracking, reducing the substantial costs of tool replacement, lost productivity and customer disappointment. The RFID technology has evolved to overcome the challenges of metal interference, harsh environments, and long range read distance requirements.

Real World Examples of Real-time Tool Tracking, Inventory and the Cost of Replacement

Construction projects depend upon heavy excavation and utility vehicles, making fast and efficient maintenance turnaround key for vehicle dealers. In addition, rapid reconditioning of used vehicles allows them to be quickly positioned for sale, helping the dealer's bottom line. A wide variety of maintenance tools, ranging from \$10 sockets to \$20K fluid purity detectors, need to be on hand for immediate use.

Barcodes have significantly improved the tracking of these tools, but requirement for manual scanning reduced accuracy and per dealership in employee man-hours was spent searching for missing tools. Projects and scheduled equipment maintenance would suffer due to inability to locate the tool consumed staff time. In addition, grease, oil and other contaminants eventually made the barcodes



unreadable. Up to \$10K per month, proper tools for the job. A solution that made the tools traceable and "hands-free" was needed. The ideal solution would allow instant tracking of tools, last the lifetime of the tool and be nearly invisible to the tool handlers.

Conoco-Philips

Conoco-Philips has many off-shore oil platforms, and each must be stocked with the tools required to keep it running. With high metallic content, on-site temperatures ranging from -50C to +250C, and sea salt covering all assets, anything used for the automation of inventory management needs to withstand many harsh conditions. Tracking tool inventory with barcodes, as well as with pen and paper, has been the norm.

Ensuring that needed tools are on the platform and being able to locate them when needed is crucial. When a tool goes missing, the current job at hand must stop and a replacement tool must be ordered and delivered. There is significant financial loss for downtime, ranging from \$50K per day for on-shore delays up to \$500K per day for off-shore delays, plus lost productive time. Even if the tool is later found, the expenditure



was made to procure a replacement. The oil and gas operators wanted to find a way to make sure that all tools and assembly hardware could be tracked at any given moment. The automated tool tracking would eliminate expensive, unscheduled downtime, and unnecessary tool replacement costs.

Smart RFID Tools

The construction equipment maintenance and sales facility deployed an RFID-based tool-tracking system. Tools were fitted with industrial-grade, read-on-metal RFID tags, which were able to withstand most of the rough handling experienced by industrial tools. An investment of approximately \$100K in equipment (including tags) was recuperated within a mere 8 months. An overall reduction of lost and stolen tools and an increase of tool traceability and accountability were also realized. Another value-add was the ability to share tools between different maintenance centers owned by the same company with complete visibility to tool location and eliminating the need for duplicate tool purchase.

Conoco-Philips had already deployed an active RFID solution for personnel tracking. For tools, however, Active tags to be too large, too expensive and to have short life-spans (batteries typically deplete within 1-2 years). A rugged read-on-metal passive RFID tag with a range of up to 20 feet is an ideal solution for all assets



that move in and out of a storage room with a fixed point reader. Inventory is updated instantly with the central asset database. For assets located outdoors, a handheld RFID scanner is able to scan and account for everything. Eliminated is the need for scanning barcodes that have most likely been obscured by sea-salt, oil, dirt or have fallen off completely after sitting in the sun. Also eliminated is having to manually enter asset IDs into a computer spreadsheet and having to reconcile asset manifests by hand when lists do not match.

RFID for Tool Tracking in the Aircraft Industry

The aircraft industry is also seeing value in RFID. Boeing and Airbus have been exploring the use of RFID from a component maintenance/logistics and work-in-progress standpoint for the past five years.

Airbus has implemented RFID for work-in-productivity efficiency. Production tooling, shipping containers, shipping work orders and labels each contain a RFID that is instantly scanned and noted in real-time, recording the time and physical location where each process step occurs. Rugged read-on-metal RFID tags provide consistent performance in a metallic and contaminant rich environment. Airbus's work-in-



progress implementation will save “millions of Euros each year” by avoiding disruptions in production due to not having the proper parts on hand when they are needed.

Further benefits are available to this industry. According to Carlo K. Nizam, head of value chain visibility and RFID with Airbus, “We’re looking to optimize our processes, in terms of how much

inventory we hold. Sometimes we might need to increase inventory and sometimes we’ll need to decrease it. But to do either, you need to know what you require”¹.

Embed-in-Metal RFID Technology

In any of these applications, the less “visible” the RFID is when applied to a tool or asset, the better chance of the tag not sustaining damage or even getting knocked off. If the tag can be embedded flush within a metallic structure (such as a wrench handle and air tool receptacle) then it will not be knocked off during use or further damaged by normal “wear and tear”.

Metallic environments can improve the performance of RFID, or seriously reduce it. Nearby metal can act as a reflector, effectively amplifying RFID signals, or set up destructive interference that destroys RFID performance, depending upon how the RFID tag antenna is tuned. Maintaining performance when tags are



embedding in metal (i.e. mounted “flush” with a metallic surface) is a difficult challenge in RF physics.

XERAFY Embedded Solution

Until now, read-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 tools for industrial tools requires an embed-in-metal solution with long read range, XERAFY provides the only embed-in-metal tags that meet the performance



requirements.” Said Jim Stradinger, EVP Sales & Marketing, Holland 1916 Inc. “By incorporating the XERAFY Pico^X technology into a bolt, we have the ability to RFID-enable any tool, equipment, and process.”

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, tools, 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

RFID has provided the foundation to many businesses seeking to reduce the cost of managing current inventory, avoiding lost inventory and optimizing replenishment. The XERAFY embed-in-metal RFID solution is designed for tool tracking and provides the benefits for tool audit tracking, authentication, loss prevention, and quality certifications. Evolving from mere supply chain management, XERAFY has brought RFID technology for metal asset tracking to the real-world applications.

Contact Us

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

¹ Computerworld, “Airbus gets off the ground with RFID technology”, April 10,2008