

Comparison of RFID tags and Barcode labels in the Cylinder Industry

Physically auditing and creating an accurate asset tracking system is a time consuming, disruptive process that can pull valuable employees from their normal jobs. Implementing an automated solution can dramatically reduce the time and manpower required to both track of assets and provide better visibility. In the cylinder industry, every transaction - receiving, filling, issuing, delivery and pickup - requires tracking. Some companies have implemented an automated solution utilizing barcode scanning. Barcode labels are easy to produce, relatively cheap, and suitable for a variety of environments. Vinyl or polyester labels offer good resistance to heat, cold, moisture and UV light. Metal labels can be developed for more hazardous environments or industrial requirements. Handheld barcode scanners are also simple to use, highly portable and very affordable. But barcodes have shortcomings as well. If a label is ripped or soiled, has fallen off or is mutilated, there is no way to scan the item. Further, standard barcodes identify only the manufacturer and product, not the unique item, and can be easily duplicated.

When leveraged and integrated properly, RFID (radio-frequency identification) and barcodes offer tremendous benefits to almost any business. An experienced RFID consultant can help companies determine what is most appropriate for their particular application and needs.

Many consider RFID to be the future, claiming that traditional barcoding will soon become obsolete. RFID technology has been in existence more than 50 years, but only recently has taken the lead in automated tracking solutions as the cost of scanning devices and tags continues to drop, and due to the adoption of global RFID standards. Both RFID tags and barcodes carry information about products and both work very well, however, the two technologies bring their own advantages, disadvantages and benefits.

COUNTERFEITING

Tags are produced with a unique identity code (UIC) or serial number from the manufacturer. This is embedded digitally on microchips and may not be changed, making them extremely resistant to counterfeiting. Barcodes are simple to duplicate and attach to products, making them easily counterfeited.

COST

High volume UHF RFID tags currently cost US \$2 each, although the cost is expected to go lower as they become even more widely used. By comparison, high volume barcodes are less than a penny. In the cylinder industry environment, costlier metal barcode labels may be needed for hazardous environment or industrial requirements and may cost 30 to 40 cents. The cost differential is reduced when the total cost of attaching the metal label to the cylinder is considered. Additional labor costs may be incurred for frequent replacement of damaged

barcode labels. This cost differential becomes insignificant as the RFID tag cannot be counterfeited. It also eliminates the practice of returning new cylinders with old cylinders after replacing the barcode tag.

PHYSICAL SIZE

RFID tags range in size from a postage stamp to a book. The aspect ratio of a tag's length vs. width is very flexible and not a significant factor for the RFID reader. Barcodes are larger than the smallest RFID tag and very sensitive to the aspect ratio for presentation to a scanner. The ratio of a barcode's length vs. width is critical to its operation. In the cylinder industry environment, a normal UHF RFID tag size is 1" to 2" square or rectangular.

LIFESPAN

RFID tags have no moving parts, are embedded in a protective indestructible case and have a multi-year lifespan. Barcodes have unlimited shelf life but are subject to degradation with handling. In the cylinder industry environment, barcodes may not last more than two to three cylinder rotations.

HARSH ENVIRONMENTS

RFID tags may be placed in extreme environments and still perform to specification. They are very robust to handling. Barcodes are sensitive to environment, and generally degrade once used, stored or handled in a non-office environment.

PRODUCT CODES

Digital data is stored on an RFID tag and provides a significant capability to encode:

- 1) Tag originator
- 2) User data as needed by the segment/application
- 3) Serial number as needed by the segment/application

Major vertical markets such as Retail have created standards which are excellent at coding product type and manufacturer. Including information beyond these basic parameters is not feasible as the size of the barcode becomes too large.

DYNAMIC UPDATES

RFID tags may be written to and offer on-board memory for information retention. This feature may be used to store product calibration history, preventive maintenance and other information. Updates may be made quickly and automatically without human intervention. Once a barcode is printed it remains frozen. The code and the process of attaching the barcode are not supportive of real time updates. It is a labor intensive process to update any information on a barcode once printed.

TRACEABLE

The combination of UIC (unique identification code), user data, serial number and on-board memory contained in an RFID tag makes it possible to track, recall or document the life span of a single item. With cylinders, this means the manufacturer, test date; serial number, rotation number and more may all be tracked. This type of information supports complete information for an item attached to the tag. Barcodes are limited to an entire class of products and cannot drill down to a unique item. It is not feasible to recall, track or document a single item with a barcode.

SECURITY

Extremely high security is possible with RFID tags. Data may be encrypted, password protected or set to include a "kill" feature, removing data permanently, if necessary. Barcodes have much lower levels of security, and can be more easily reproduced or counterfeited.

SIMULTANEOUS SCANNING

RFID - Standards have algorithms to support simultaneous reading of multiple tags at one time.
Barcodes - Limited to one barcode at a time and unable to support simultaneous reads.

SCANNING

RFID - Offers a range from inches to hundreds of feet. Does not require line of sight and can be read through dirt, oil or snow.

Barcodes - Offer a range over inches and require line of sight to read the code. The barcode must be presented to the scanner in a limited orientation and distance.

The big difference between the RFID and barcodes is that barcodes are line-of-sight

technology, meaning a scanner has to "see" the barcode to read it. Often workers must orient a barcode toward a scanner for it to be read. A major advantage of RFID is that the technology doesn't require line of sight, or any human involvement to operate in most cases. RFID tags can be read as long as they are within range of a reader. Additionally, multiple RFID tags can all be read at once, providing exponential gains in output and efficiency, whereas barcodes must be read individually, one at a time. In addition, barcodes must be physically located so they are viewable and easy to read, or workers must physically move cylinders to locate and view the barcode.

While RFID tags are more expensive than barcode labels, they offer superior technology along with durability, time savings, accuracy and convenience, making RFID solutions an excellent Return on Investment (ROI).

