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RFID & RFID Applications

What is RFID?

Radio frequency identification, or RFID, is a generic term for technologies that use radio waves to automatically identify individual items. RFID does not require line-of-sight. Radio frequencies are used to communicate between the tag and reader. This means that an item can contain its label on the inside. There are several methods of identifying objects using RFID, but the most common is to store a serial number that identifies a product and perhaps other information, on a microchip that is attached to an antenna (the chip and the antenna together are called an RFID transponder or an RFID tag). The antenna enables the chip to transmit the identification information to a reader. The reader converts the radio waves returned from the RFID tag into a form that can then be passed on to computers that can make use of it.

How does RFID technology work?

Radio frequency identification technology is an automatic way to collect product, place, and time or transaction data quickly and easily without human intervention or error.

An RFID system comprises a reader (or interrogator), its associated antenna and the transponders (Tags/ RFID Cards) that carry the data.

The reader transmits a low-power radio signal, through its antenna, that the tag receives via its own antenna to power an integrated circuit (chip). Using the energy it gets from the signal when it enters the radio field, the tag will briefly converse with the reader for verification and the exchange of data. Once that data is received by the reader it can be sent to a controlling computer for processing and management.

Is RFID better than using bar codes?

Yes. RFID is "better" than bar codes. The big difference between the two is bar codes are line-of-sight technology. That is, a scanner has to "see" the bar code to read it. Radio frequency identification, by contrast, doesn't require line of sight. RFID tags can be read as long as they are within range of a reader. Bar codes have other shortcomings as well. If a label gets damaged during shipping and handling then there is no way to scan the item. And standard bar codes identify only the manufacturer and product, not the unique item. The bar code on the bread is the same as every other, making it impossible to identify which one might pass its expiration date first.

Is RFID new?

The technology itself has been around for decades, but only recently has it attracted a great deal of attention till now, it's been too expensive and too limited to be practical for many commercial applications. But if tags can be made cheaply enough, they can solve many of the



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problems associated with bar codes. Radio waves travel through most non-metallic materials, so they can be embedded in packaging or encased in protective plastic for weather-proofing and greater durability. And tags have microchips that can store a unique serial number for every product manufactured around the world.

What is a Tag?

A wireless data collection technology that uses electronic tags for storing data. Like bar codes, they are used to identify items. Unlike bar codes, which must be brought close to the scanner for reading, RFID tags are read when they are within the proximity of a transmitted radio signal.

RFID tags hold more data than bar codes, which generally contain only a product ID, the RFID tag can be used for tracking individual items. For example, one of its first uses was to track livestock and other animals. Taking that a step further, in 2004, an amusement park in Denmark launched a child tracking system that uses RFID wrist bands. If children are lost, they can be found by the numerous readers around the park. Tags are also attached to retail products for security purposes, and libraries use them to track books and videos.

The tag, also known as an "electronic label," "transponder" or "code plate," comes in two forms. "**Passive**" tags have no power source but use the electromagnetic waves from the reader up to approximately 15 feet away to transmit back their contents. Such systems are used for ID badges because employees need only pass by the reader rather than have to stop and insert a smart card. For high security, such systems can instantly display pictures of the people as they approach manned entrance and exit ways.

"**Active**" tags use a battery to transmit up to 1,500 feet. These are used for tracking trailers in yards and containers on the loading dock. RFID systems use frequencies in the kilohertz, megahertz and gigahertz ranges.

Applications of Radio Frequency Identification (RFID)

Currently found in applications from work tracking and waste management, to vehicle security and highway toll systems, radio frequency identification (RFID) technology is increasingly becoming a familiar part of our lives, both at work and at home. RFID, which creates a dynamic link between people, objects and processes, has established itself as a primary player in the future of data collection, identification and analysis systems.

The uses for RFID technology are limitless. More flexible and easier to use than bar coding or other forms of data collection, RFID is a multi-purpose technology. While this presentation will discuss the capabilities of RFID and site some specific examples, keep in mind that the full potential of RFID technology has only just



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started to be realized -- perhaps some of the greatest applications and unique solutions based on RFID have yet to come to market.

Evaluating the benefits of RFID begins not only with a full understanding of how the technology works, but also an appreciation of how the implementation of the technology saves time, reduces handling and labor costs, cuts cycle times, eliminates errors and waste, and improves overall quality.

The following list represents applications where passive tagging has been implemented over the last 2 to 3 years

1. Person Identification
2. Food Production Control
3. Blood Analysis Identification
4. Time & Attendance Management
5. Toxic Waste Monitoring, Vehicle Parking Monitoring
6. Flight Monitoring
7. Valuable Objects Insurance Identification
8. Car Body Production
9. Parts Identification
10. Access Control
11. Machine Tool Management
12. Asset Management
13. Production Monitoring.
14. CAR Security Systems
15. Inventory management
16. Equipment tracking
17. Access control
18. Attendance System
19. Library books management