There is little doubt that the RFID initiative started by Wal-Mart several years ago has given this technology a level of visibility it did not previously possess. While much is written about RFID and how it will change the face of distribution, it is time to address several misconceptions about the technology and discuss the effects that recent developments have had on the discrete manufacturing sector.

The visibility that RFID enjoys today is not without problems, as it has created significant hype and unreasonable expectations. Possibly even more problematic is the fact that many potential users actively avoid taking advantage of RFID today, hoping that the Wal-Mart initiative will result in some obscure, super-solution at an ultra low cost. This type of wait-and-see attitude deprives the US manufacturing base of a powerful method to compete in the global market; only better products at competitive prices will guarantee survival in the marketplace, and automation is an important factor in this fight. The following article hopes to paint a clearer picture of the true state of RFID while providing information to better understand what the different RFID technologies can deliver, and where their specific limitations lie.

**RFID tags now cost less than 25 cents and soon will be even cheaper. Why should I pay several dollars for a tag?**

Tags are available today for well under one dollar - but users must realize what they can expect from a tag at that price. They also have to understand all the small print before they can get to this price.

The tags used by Wal-Mart are operating in the UHF band and offer very little memory: 12 bytes, to be exact. These tags are designed for open systems associated with logistics tracking. This means that they have to offer a reasonable level of readability and reliability - 99% is considered very good, at as low a price as possible.

For a tag to be useful in the manufacturing environment it must be housed in such a way to withstand particular environments. In automation environments RFID tags must withstand aggressive fluids, shock and vibration, dirt and grime, and possibly elevated temperatures. These tags are also expected to operate for many years in these abusive applications. And is 99% read reliability really enough for the manufacturing environment?
With this in mind, it is highly doubtful that an industrial tag satisfying the needs of the industrial sector will ever be available for 25 cents. While the cost of the chips used in those tags will continue to come down, most of the cost is tied to the construction and housing material, and it is unlikely that those prices will experience significant reductions.

**EPC is the only technology needed**
We need to differentiate between EPC and RFID. EPC is a code—a number that will uniquely identify a product and/or group of products—that the manufacturer of consumer items must purchase from EPCglobal. EPCglobal did an excellent job pushing for a standardized data format and RFID solutions. As of today, EPC is virtually synonymous with RFID tags operating in the UHF band. UHF was selected because it allows tags (or rather, tag inlays) to be produced very cheaply. UHF technology also tends to allow tags to be read while they are relatively far away from an antenna. This is an advantage when pallets need to be tracked as they are moved through a doorway, but can be a big problem in automation where pallets or items located very close to each other must be read individually.

EPCglobal has recently identified this inherent limitation and HF systems are now evaluated as a suitable alternative for EPC. As far as automation is concerned, a long read/write range has never been a big issue. On most conveyor-based production lines, tagged items that range from engine blocks to tooling carriers are moved with precise accuracy. A read/write range between 1 inch and 8 inches is suitable for most applications. This allows two items to be placed very close to each other without having to worry about them being read simultaneously.

**Based on cost, other tagging technologies cannot compete with UHF**
The basic cost of growing a UHF chip is no different than growing a chip for any other RFID technology. The cost of the chip is first and foremost a function of size; and size is driven significantly by memory. UHF tags for EPC can be made cheaply simply because they have only 12 bytes of memory. On the other hand, tags typically used in manufacturing require upwards of ten times that memory.

The second factor driving the cost of the tag inlay is the antenna. UHF tags, by virtue of their operating frequency, do not use coil antennas, but rather they use printed structures. The same is true for HF tags. Consequently, UHF and HF tagging technologies can offer similarly priced tags.
Read/Write electronics – the forgotten factor in RFID

While the cost of the tags appears to be the primary issue discussed in the literature, the cost of the read/write electronics is often forgotten. UHF readers are still expensive. It is expected that these readers will eventually drop below the $1,000 mark, but exactly when this will happen is unclear. It needs to be contrasted with the cost of read/write electronics for other technologies. This $1,000 price threshold is not even a challenge for devices designed to operate in the HF and 125 kHz band where complete solutions, including communication interfaces, are well below $1,000 and dropping. Consequently, operators of closed-loop systems where tags remain attached to carriers and thus never leave the plant, should be less concerned with using an extremely cheap tag and more concerned with the total cost of ownership (cost of all hardware items, longevity and reliability of all selected items.)

Network connections to PLC still rule the industry

PLCs continue to dominate automation control in plants and manufacturing systems. Any suitable RFID solution for the plant floor must, therefore, offer a reliable and easy way to connect to the dominant networks supported by those PLCs. DeviceNet, PROFIBUS and EtherNet are the most important industrial networks used with RFID technology today. Even though there is no direct connection between the tag technologies and the available networking solutions, there is a direct connection between applications for which UHF tags are suitable and the fact that they are NOT driven by PLCs. As things stand today, typical UHF tags are not suitable for tough automation applications. Consequently, reader connections to PLCs are not required. Exchanging data with an ERP system is more important, and the providers of these solutions have realized and addressed this need.

Among the network solutions used for factory automation RFID, EtherNet is clearly the hottest issue. Pepperl+Fuchs, for instance, has recently designed an RFID controller that simultaneously supports the various EtherNet flavors introduced by Schneider Automation, Siemens and Allen-Bradley. With Modbus/TCP, PROFINET I/O and EtherNet/IP implemented on the same hardware, users, machine builders and integrators can finally take the “learn it once” approach to effectively address their RFID needs and requirements.
Why the wait?
RFID is a mature technology that has been around for several decades. Many fields of automation absolutely require this technology for the purpose of error tracking and prevention. For users who toyed with the idea of using RFID a few years ago, but decided against it for one reason or another, it’s time to take another serious look. The technology has further matured, prices have come down and connections to PLCs have gotten better and simpler.

IDENT Control
The IDENT Control, RFID product family from Pepperl+Fuchs offers a level of simplicity and commonality unparalleled in the industry. At the center of the solution is the IDENT Control interface. The interface supports the dominant networking solutions and offers a user interface that is virtually identical from network to network. The EtherNet based interface takes this philosophy to the extreme by simultaneously supporting Modbus/TCP, Profinet I/O and EtherNet/IP.

Communication with various tagging technologies is possible by selecting the appropriate R/W head. Open technologies such as 125 kHz and HF, in addition to certain proprietary technologies are supported; again using the same IDENT Control interface.

In most cases the R/W heads share common housings. These housings have not only proven themselves in the field, but also allow users to select a tagging technology without having to worry about housing dimensions. This is particularly important when using an HF and/or 125 kHz solution as each one is suitable for general automation.

This level of commonality allows Pepperl+Fuchs to offer high quality, easy-to-use RFID systems at a price point that is still considered wishful thinking in the UHF world.

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