

Three (Overlooked) Things You Need to Know for Successful RFID Smart Label Printing

The RFID smart label printer/encoder is a critical component of a successful smart labeling program, but it is only one of several essential elements, many of which can be overlooked. The foundations of successful smart label printing/encoding are the printer/encoder, the smart media, and the environment in which they're used. Like a three-legged stool, a system won't stand up to user requirements if any of these elements aren't solid.

Understanding each of these elements and how they affect the others is essential for producing reliable, readable RFID smart labels. There are three things RFID integrators and users need to understand before developing a smart labeling program:

1. Printer/encoders are not equal, even if they're standard;
2. Smart labels are not a commodity;
3. Labeling specialists are not necessarily RFID specialists.

Smart Labeling Basics

A smart label contains an RFID inlay or tag—an RF chip attached to an antenna—that is embedded within label material. An RFID encoder inside the printer writes data to the tag by radio frequency transmission. The transmission is narrowly focused for the specific location of the inlay within the label. Printer/encoders are available for ultrahigh-frequency (UHF 860-960 MHz, including EPC Gen 2) and high-frequency (HF, 13.56 MHz) RFID technology, but not both. Weber's Zebra-brand multi-protocol printer/encoders simultaneously support several UHF technologies including Gen 2, previous EPC generations, and ISO-standard protocols, so customers can use one device to meet multiple labeling needs.

Encoding can be done with both direct thermal and thermal transfer printer/encoders. Bar codes, text, and graphics are printed as usual. Weber's Zebra-based printers print and encode media in a single pass, which improves reliability and preserves the integrity of the inlay by minimizing the chance of damaging it during the printing/encoding operation.

There are three basic types of RFID printer/encoders: stationary (both tabletop and desktop); cart-mounted; and print engines, which are integrated with automated print-and-apply systems. Printer/encoders can be included on 802.11-standard wireless networks and offer several cabled connectivity options.

Not All Printer/Encoders Are Created Equal

There are many feature differentiators among products in these broad categories. Too often, professionals who specify printer/encoders look little beyond whether the desired RFID standard or protocol is supported. Features for printer management, quality control, and programmability greatly differentiate printer/encoders and the long-term reliability and value they provide.

Standards and technical developments brought considerable improvements to smart label reliability. However, some inlays in a media roll will still fail to encode, and therefore the printer/encoder must prevent duds from being included in finished labels. Ideally the printer/encoder will perform two inlay quality checks, first to ensure the inlay is undamaged and can be encoded, and second to verify that information was encoded correctly and is readable on the printed label. Zebra printer/encoders automatically perform both checks and print "VOID" on unusable labels to prevent them from being applied.

Smart Labels Are Not a Commodity

Users often focus on paying the best price for smart label media, when they should really focus on getting the best quality and the best match for their printer/encoder. Printer/encoders that support the same RFID standards and protocols are not necessarily compatible with the same media because inlay positions vary by media product and by printer/encoder. Printer/encoders focus RF energy on a very small area to encode and verify inlays one at a time. In contrast, most RFID readers are configured to broadcast—cover a large area to identify as many tags as possible. Users must therefore ensure the smart label media they use is designed to be compatible with their specific brand and model of printer/encoder.

The best way to ensure smart label/printer compatibility is to order smart labels converted for the inlay placement specification of the printer/encoder being used.

Specialists Needed

Media substrates, adhesives, and coating also affect RF performance. Solution providers like Weber go beyond simple awareness of these factors: Our RFID specialists demonstrate true understanding and are better equipped to recommend systems that will provide reliable performance with minimal waste and maintenance.

Specialists can also help separate hype and headlines from real user needs. For example, the EPC Gen 2 standard has attracted a lot of attention and supporters, but applications require a range of RFID technologies, and smart label printer/encoders support them. High-frequency (13.56 MHz) technology is also standardized and is popular for many short- and intermediate-range applications, such as file tracking, and automated checkout/check in at libraries and video rental stores. There is extensive research and debate within the pharmaceutical industry as to whether 13.56 MHz or a UHF technology such as Gen 2 should be used for item-level identification. Resolution of this question will go long way to facilitating use of RFID for efficiently meeting track-and-trace requirements.

Conclusion

RFID and smart labeling technology are maturing and improving just as predicted. Users now often report better than 99 percent quality inlays in their rolls of smart label media. Even as quality has dramatically improved, prices have dropped.

These trends will continue, but smart labels will probably never be a true commodity, plug-and-play technology. There are simply too many complex variables that impact performance. Understanding these variables, especially the lesser-known product features and media considerations, is essential for smart labeling success.