European EPC Competence Center Updates UHF Tag Study

According to the updated study, new tag designs and improved antennas have increased UHF tag performance during the past year.

By Beth Bacheldor

July 1, 2008—The European EPC Competence Center (EECC) has released an update of its UHF Tag Performance Survey (UTPS) study, based on tests it has completed on 20 inlays from six vendors. The tests measured the performance of ultrahigh-frequency (UHF) tags when attached to a range of materials representing various products.

The EECC is a joint venture founded by Metro Group, DHL, and GS1 Germany. The center released its initial study in 2007 (see European EPC Competence Center Releases UHF Tag Study).

The purpose of the study is to help companies determine which UHF tags work best for their particular needs, by testing the performance of several tags once they are attached to products composed of various materials. The performance of UHF RFID tags can be affected by the materials to which the tags are attached, because the materials can absorb or reflect energy from the reader antenna that the tag requires to function, and because metal and other materials can detune the antenna, adversely affecting performance.

"The EECC tries to make the RFID market transparent," says Conrad von Bonin, the center's manager. By making testing results available via the report, he explains, companies can save time and money since they don't need to test each tag themselves. "The EECC has the world-leading measuring technology," he states, "and wants to share this knowledge in order to speed up successful RFID [adoption]."

The EECC tested each tag in free air, representing a tagged item on an apparel hanger; on 2-milimeter-thick Teflon, representing paper or boxes with relatively high air content, such as diapers, disposable paper or large detergent boxes; on 10-milimeter-thick Teflon, representing beverage cases or other plastic cases; on a PET plastic bottle containing distilled water, with a 2-milimeter-thick spacer between the bottle and the tag, representing products containing water, such as ketchup or milk; and on a metal reflector with a 4-milimeter-thick spacer, representing goods containing metal, such as chocolate or coffee.

The tests were performed on tags from Alien Technology, Avery Dennison, KSW Microtec, Omron, RSI ID Technologies and UPM Raflatac. All inlays conformed to the EPC Gen 2 and/or ISO 18000-6C standards, and all were tested separately at the frequencies allowed for use in Asia, Europe and North America (ranging from 800 to 1,000 MHz).

This year, the EECC bolstered the study with new techniques designed to provide more comprehensive tag performance data. After tests were conducted on the free air, Teflon, bottle and metal reflector, researchers measured an additional eight reference materials that characterized the physical (dielectric) parameters of all possible substrates without water and metal. The researchers then employed computer modeling to predict tag

performance on additional materials derived from the tested substrates.

"With all [the EECC] reports before, you did not get an answer on special applications," von Bonin says. "But our goal is to give the user an answer for every application—on all substrates, at all frequencies, from all directions." Although the performance of all tags improved overall, von Bonin says the tests revealed dramatic differences among the various ICs. In fact, he adds, each tag performed differently, depending on the frequency.

RELATED_ARTICLES "That's why a lot of tags are optimized for the U.S. or Europe frequencies, but also are optimized for different subsurfaces," von Bonin says. "But that's not the answer the user needs. He doesn't want to have a different tag for each different application in the same company. And it's much more complicated—if you have one tag on two different materials, with different dielectric parameters, than you [can have] different read ranges at the same frequency because of detuning effects."

That, according to von Bonin, is why studies such as that conducted by the EECC are necessary. "There is no general answer," he states. "[The] read range of one tag is always dependent on frequency and subsurface." The updated report is available from the EECC for €795 ($1,255), or for €395 ($625) as part of a five-year subscription.