

University of Kansas Lab Develops Foam-Attached Tag

The school's Information & Telecommunication Technology Center says its new passive UHF Agility technology enables the creation of low-cost inlays that provide a long read range and work well near metals and liquids.

By Beth Bacheldor

June 24, 2008—The [Information & Telecommunication Technology Center \(ITTC\)](#) at the [University of Kansas \(KU\)](#) has developed a new passive ultrahigh-frequency (UHF) tag technology known as Agility, designed to perform well when placed near metal or conductive liquids, which can often interfere with RF waves.

The technology follows ITTC's KU-Tag technology, announced in 2006 and also designed to work with metals and liquids (see [University of Kansas' Tag for Metal, Liquids](#)). Both the KU-Tag and Agility were developed by Dan Deavours, an ITTC research assistant professor and principal inventor. A KU-Tag inlay has a rigid solid core containing a rectangular microstrip (patch) antenna and a foil ground plate, with a plastic substrate separating the foil from the antenna in the middle.

The foil ground plate is a thin metal sheet that serves to isolate the antenna from any other metal or fluid that can lower a tag's read range. Because the antenna cannot make contact with the foil ground plate, the substrate must be thick enough to fully separate the two. A KU-Tag inlay's thin design differentiates it from other comparable tags on the market. On average, an RFID tag with a metal ground plate for isolating the antenna is approximately 5 millimeters (0.20 inch) thick—nearly four times thicker than a KU-Tag inlay, which measures about 1.5 millimeters (0.059 inch).

An Agility inlay, on the other hand, is a foam-attached tag (FAT), which Deavours describes as "simply an inlay, possibly converted to a label, with foam that has adhesive and a release liner on the back. That's it—no ground plane." The inlay has a 2/16-inch-thick foam layer, thinner than that of other FAT tags on the market, such as [MetalCraft's](#), which measures 3/16 inch in thickness. (According to Deavours, ITTC is considering developing a FAT tag as thin as 1/16 inch.) The Agility inlay's antenna is designed so that when the tag is placed on metal, the antenna offers approximately the same read distance as it does in free space—typically, 15 to 20 feet.

"Unlike all other known FAT tags, our antenna design allows the antenna to work perfectly in free space and work extremely well when placed on metal," Deavours says. "There is conventional wisdom in the industry that tag performance degrades when the tag is near metal, and that's just the way it is—the laws of physics dictate it to be so. The big deal is that we demonstrate that conventional wisdom is wrong. We don't change the laws of physics; we're just clever in how we apply the laws of physics. This tag can be used like any other tag. It also happens to be a very good general-purpose tag, and it's a very good metal tag."

The Agility technology might make more sense for companies that don't require the ruggedness of tags

manufactured using KU-Tag technology, Deavours says. "If the requirements called for a tag that could take a beating and needed to be put on metal, then that asset tag is probably the best choice," he states. "But there are a lot of scenarios where the tag doesn't require the same robustness and ruggedness. Foam is cheap as a material, and [tags based on the Agility technology] are cheaper to manufacture because they can be made in a roll-to-roll process," allowing for volume production.

Adasa, a technology company specializing in advanced mobile RFID systems and RFID tag encoding, tested Agility at its headquarters in Eugene, Ore. According to Clarke McAllister, Adasa's chief technology officer, the test focused on the firm's PAD3500, a mobile tag interrogator, and its ability to encode an Agility tag and apply it efficiently to metal objects. "We would welcome the commercialization of the Agility technology," McAllister says. "The ITTC Agility tag works great."

Kansas City, Mo., RFID solutions provider Starport Technologies has licensed the rights to Agility and has already begun developing a tag based on the technology. Last summer, the company began developing its first two products—the rigid solid-core Adamas and Portunus tags, both based on KU-Tag technology (see Starport Licensing KU-Tag Technology for Challenging Asset-Tracking Apps). Jeff Nedblake, managing partner of Starport Technologies, says the firm opted to license the Agility technology for its longer read distance, and because its thinner form offers greater flexibility and a lower price point than either the Adamas or Portunus.

RELATED_ARTICLES "The Agility tag or FAT tag offers read ranges up to 25 feet with a base material of 1/8-inch foam," Nedblake says. "Starport's main focus is to manufacture specialty RFID tags that are best in class. Therefore, we chose to license this technology to add this unique tag for customers interested in tags that work on metal and other hard-to-read surfaces."

The Orion, Starport's Agility-based inlay, is a standard EPC Gen 2 tag that contains Alien Technology's Higgs 2 integrated circuit (IC). Samples are expected to be available in the next two weeks. In addition, Starport Technologies also plans to offer custom-design tags using Agility. "We will develop these new tag designs based on market need, or a specific customer requirement," Nedblake says.

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