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A Flurry of High-Memory Tags Take Flight

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Marubeni Chemix and Xerafy are the latest companies to announce high-memory UHF passive tags for aircraft components, such as those being made for Airbus' A350 wide-body.

By Claire Swedberg

Mar. 18, 2011—To meet the needs of airplane manufacturers and their parts suppliers, a growing number of RFID vendors are releasing passive EPC Gen 2 RFID tags with 4 or 8 kilobytes of memory, to store historic data regarding parts. Airbus is scheduled to complete its A350 XWB wide-body, for which the company is requiring that most flyable parts be tagged with high-memory EPC Gen 2 RFID tags for maintenance-tracking purposes. Each A350 is expected to have 3,000 tagged parts, 2,000 of which will be fitted with high-memory tags. The planes are expected to be put into service in 2013, so parts suppliers are seeking RFID tags that will help them meet those demands soon.

Chip manufacturer Tego provides the only high-memory ultrahigh-frequency (UHF) chip currently available for this market that has a non-erasable memory with the ability to retain data for many decades, according to the RFID tag makers. All high-memory RFID tags currently available, the companies report, incorporate Tego's TegoChip XL. A portion of the memory can be rewriteable, and the TegoChip XL is also capable of interfacing with sensors, controls and displays, and can provide power to them as well. "The (aerospace) industry has been waiting on high-memory chips, and so a flurry of activity would be expected when chips become available in volume," says David Puleston, Tego's VP of marketing. The high-volume release of Tego high-memory chips began with a 4-kilobyte version in the first quarter of 2010, followed by an 8-kilobyte chip by the end of last year. "The presence of multiple vendors reflects the fact that the vendors see aviation and other industrial applications as an attractive and fast-growing market."

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Marubeni Chemix's TAGAT 900G tag, designed for attachment to airplane components, has 4 kilobytes of memory.

In 2008, Fujitsu announced the release of a 64-kilobyte EPC Gen 2 tag for use in aviation, though to date, no aircraft company has yet announced plans to use a tag made with the 64-kilobyte chip. In December 2010, however, Boeing announced its intention to provide a part-tracking solution in 2012 utilizing Fujitsu EPC Gen 2 tags with lower memory (see Boeing, Fujitsu to Offer Airlines a Holistic RFID Solution).

The latest Tego-based high-memory tags include Marubeni Chemix's 4-kilobyte TAGAT series, as well as Xerafy's 4- and 8-kilobyte Pico XL, Nano XL and Sky ID tags. Both companies announced this week that their tags are now available for commercial use by aircraft companies and their parts suppliers.

Marubeni Chemix reports that a third-part laboratory recently completed testing of its tag, in order to ensure that the tag meets the requirement of SAE International's AS5678 standard for passive RFID tags intended for aircraft use, while Xerafy says it hopes to do the same by next month. The SAE AS5678 standard spells out requirements regarding a tag's ability to withstand specific variations in temperature, air pressure, vibration, shock and other environmental factors. The tag must utilize a data

format compliant with Chapter 9 of Spec 2000, a set of specifications administered by the Air Transport Association of America (ATA), and must also avoid being a potential source of radio frequency interference and not be susceptible to RF interference from other sources.

Boeing and Airbus are collaborating on developing commercial aviation industry standard requirements for RFID, by joining forces on the ATA's Automated Identification and Data Capture Task Force, which developed the SAE AS5678 and SPEC 2000 standards. The task force includes representatives from airlines, suppliers and airframe manufacturers, with the goal of establishing and maintaining an industry-wide format for RFID tags attached to parts.

Airbus and Boeing plan to permanently affix the high-memory UHF tags to certain parts of the aircraft they manufacture, in order to store each component's history throughout its life. Those records will include the part's date of production, manufacturer and serial number. When components are inspected or maintained, the airline's staff can then encode the specific repair or inspection results onto the tag. All maintenance history can be read and written to the tag via a handheld reader, using software compliant with Spec 2000's Chapter 9-5 (the specific section pertaining to the use of RFID technology on parts). The tagged parts may be installed in either a pressurized or non-pressurized area of an aircraft. Aircraft companies such as Boeing and Airbus require a high-memory tag to accommodate all of this information. For the high-memory tag vendors, the challenge involves not just meeting the AS5678 standard, but also limiting the tag's size and weight.

For this reason, tag vendors have been working with Tego to develop durable tags that can transmit with a read range of at least 50 centimeters (19.7 inches)—the read range generally preferred by the aerospace industry—and sustain the levels of pressure, vibration and heat that could occur on an operational aircraft, while still retaining their data.

Xerafy CEO, Dennis Khoo

Marubeni Chemix's TAGAT tags are made with a 4-kilobyte version of Tego's TegoChip XL RFID chip. During the coming months, the firm also plans to release a model with 8 kilobytes of memory. Yoshihiko Tsujimoto, Marubeni Chemix's RFID tag development leader, says his company strove to meet size and weight requirements established by the industry itself. He declines to name the independent lab that tested the TAGAT tag this month for compliance with the AS5678 standard, but notes, "It's well experienced and well known to U.S. military and aerospace, and has sufficient credibility and facility to conduct AS5678 testing."

The TAGAT 900G measures 49 millimeters by 18 millimeters by 4.4 millimeters (1.9 inches by 0.7 inch by 0.2 inch) and weighs 4.3 grams (0.2 ounce), while the TAGAT 1089G measures 33 millimeters by 33 millimeters by 4.4 millimeters (1.3 inches by 1.3 inches by 0.2 inch), and weighs 5.3 grams (0.2 ounce). To achieve the small size, Tsujimoto says, Marubeni Chemix developed a fabrication process to encapsulate the chip and antenna

within the tag, with a plastic spacer and no additional packaging.

This week, Xerafy announced its partnership with Tego, resulting in the high-memory XL series tags developed by Xerafy over the past few months using Tego's TegoChip XL chips. Both the 4- and 8-kilobyte versions of the XL series are metal-mount tags based on the company's existing X II series of UHF RFID tags, says Dennis Khoo, Xerafy's CEO and founder, and are designed to be small and durable. With Airbus' demand for RFID tags, he says, "We felt [aerospace] was a really compelling application."

The majority of other read-on-metal tags currently on the market, Khoo says, are designed with a spacer that provides an air gap sufficient to shield the tag's antenna from the metal object to which that tag is attached. That design, however, increases tag size. Tag manufacturers, he adds, also generally use an inlay encapsulation that is not able to withstand temperatures beyond 85 degrees Celsius (185 degrees Fahrenheit), as well as other harsh conditions of use. "Xerafy has employed a totally different RF antenna design, material science and encapsulation techniques for the X II series," he explains, "to help the tags survive harsh conditions and still perform impressive interrogation feats."

The Pico XL measures 13 millimeters by 7 millimeters by 3 millimeters (0.5 inch by 0.3 inch by 0.1 inch) and weighs 2.5 grams (0.1 ounce), the Nano measures 26 millimeters by 9 millimeters by 3 millimeters (1.0 inch by 0.4 inch by 0.1 inch) and weighs 4 grams (0.1 ounce), and the Sky ID measures 33 millimeters by 20 millimeters by 4 millimeters (1.3 inches by 0.8 inch by 0.2 inch) and weighs 6 grams (0.2 ounce). Xerafy designed the XL tags to meet the AS6578 specifications, says Moses Chang, Xerafy's sales and marketing manager. The company has accomplished this goal, he states, though it must next put the tag through testing at a third-party lab yet to be determined. He predicts, however, that the testing will be completed in April.

"No one else has put out a tag with as high memory and small size," Chang states. The tag is designed using a specific substrate, he says, with a printed antenna directly on that substrate, and with a spacer inserted between the inlay and the metal.

In December 2010, New Jersey firm RFID TagSource announced that it had developed a tag for use by Airbus and its suppliers (see RFID News Roundup: RFID TagSource Announces RFID-enabled AeroTag for Aerospace and Defense). RFID TagSource's 4-kilobyte AeroTag achieves the 19.5-inch read range requirement, measures 24 millimeters by 44 millimeters by 5 millimeters (0.9 inch by 1.7 inches by 0.2 inch), and weighs 6 grams (0.2 ounce), says Kevin Donahue, the company's managing director. The tag is available now, and is presently undergoing testing for the AS5678 standard for environmental durability at the Federal Aviation Administration's William J. Hughes Technical Center, located in New Jersey. TagSource has joined a Cooperative Research and Development Agreement for collaborative research with the FAA, allowing the firm access to conduct testing within the FAA facility. Because TagSource is undertaking the testing itself, it will follow that testing with verification of the results at an independent lab. Donahue declines to name the lab, but says he expects all testing to be completed by Apr. 1. In addition, he adds, "Everything we're doing is being made in the U.S.," which

could be an important factor for such customers as the U.S. Department of Defense.

In January 2010, Airbus announced that it was employing high-memory EPC Gen 2 RFID tags from French tag provider MAINtag, so that it could track repairable parts for its new A350 XWB planes (see Airbus Signs Contract for High-Memory RFID Tags). MAINtag has already provided 3,000 4-kilobyte tags for flyable equipment destined for the A350 XWB aircraft, including its FLYtag and FLYtag Nano models, says Alexis Beurdeley, the company's sales manager. The FLYtag measures 49 millimeters by 24 millimeters (1.9 ounces by 0.9 ounce) and weighs 8 grams, while the Nano version is 14 millimeters (0.6 ounce) in diameter and weighs 4 grams (0.1 ounce). MAINtag has also been tested and declared to meet the SAE A5678 standard, Beurdeley says, though she, too, declines to name the independent laboratory that conducted the testing. The FLYtag has a maximum read range of 50 centimeters (19.7 inches), while the Nano's read range is closer to 10 centimeters (3.9 inches). At the end of this year, Beurdeley says, MAINtag expects to release 8-kilobyte versions of both tag models.

Another aerospace tag provider is Finnish tag solutions firm Confidex. The company says that a version of its Ironside on-metal high-memory UHF tag, made with the TegoChip XL, complies with the AS5678 standard.

Systems integrator OATSystems, a provider of complete RFID solutions for Airbus and its suppliers, is offering an aerospace parts-tagging solution that includes the TAGAT 1089G, as well as tags made by Xerafy, MAINtag and TagSource. The solution also comes with a handheld reader from Motorola Solutions or Intermec, along with its own software package for managing read data and providing analysis based on that information.

This week, OAT announced that it has sold its packaged solution to Parker Hannifin, so that it can tag and track components to be installed in Airbus A350 XWB aircraft at the point of manufacture, in accordance with Spec 2000. Parker Hannifin, however, has yet to decide which vendor's tags will be used as part of the solution. "Every aircraft supplier has its own requirements," says Prasad Putta, OAT's cofounder and general manager, with regard to size, ruggedization and other factors. The Parker Hannifin installation will initially include only attaching tags to its aircraft parts, reading those tags with a handheld interrogator and storing each tag's ID number with the serial number in the OATSystems software, then shipping each component to its proper customer. During a second phase of the solution, however, says Alan Sherman, OAT's director of marketing, the technology can be used by Parker Hannifin for additional functions, including tracking work-in-progress as parts are manufactured and prepared for shipping, and tracking the location of tools and reusable assets within its facility.

Putta expects additional end-user announcements to be made over the coming weeks, as well as an endorsement of OATSystems' solution by "a major aerospace company."

The release of additional high-memory tag products from a variety of companies is good news for other industries, as well as aerospace, says Puleston of Tego. Not only does it offer a greater variety of options for those in the aerospace industry, he indicates, but other industries have been seeking

high-memory tags that can store data in remote locations that may lack easy access to Internet or cellular connections. "We are seeing a great deal of interest in high memory for maintenance-based applications," he states.