Boeing Approves Intelleflex Chip, Weighs Higher-Memory Fujitsu Tag

With the silicon needed for a 64-kilobit parts tag finally ready, the company is getting closer to achieving its vision for a parts-tagged plane.

By Mary Catherine O'Connor

Jan. 14, 2008—Though dogged by delays, Boeing's initiative to employ passive RFID tags to track the maintenance and repair history of parts for its upcoming Dreamliner 787 family of airplanes may be ready for takeoff by mid-2008, according to Ken Porad, program manager of the automatic-identification program at Boeing Commercial Airplanes Group.

In December, Porad says, the company tested the latest samples of an integrated circuit manufactured by Intelleflex, a semiconductor company based in Santa Clara, Calif. The results, he explains, show that the chips meet the memory and performance requirements Boeing set forth in an April 2006 agreement with the firm. Under the terms of that contract, Intelleflex agreed to produce a chip for an EPC Gen 2-compliant passive RFID tag with 64 kilobits of memory (see Boeing Selects Chipmaker for Parts Tags). The chip prototype, according to Porad, is the fourth Intelleflex presented to Boeing; the first three had unspecified problems, delaying progress by more than a year.

Though the chip design has been finalized, Porad says many other hurdles must still be cleared before suppliers can begin tagging Dreamliner parts. First, he must demonstrate to his superiors at Boeing that passive ultrahigh-frequency (UHF) RFID technology is "at an acceptable level of maturity." He then intends to conduct a test to show that "the Boeing production system can accommodate RFID-tagged parts without disruption."

This, Porad says, will entail tagging a selected part, then sending the tagged part through production, from the point of receipt at a Boeing production facility, through quality-assurance testing and the build cycle, after which the tagged part will be integrated into the body of a plane. Since Porad hopes to conduct this test during the second quarter of this year—after tag converters build the Intelleflex chip into sample RFID tags designed for parts-tagging—he says it will likely be conducted on a 777 airplane, since the Dreamliner will not yet be in production at that time.

If the test shows that the tag does not negatively impact the production process, the next step will be for Boeing to issue specific directives to its suppliers. "The directive will say what is to be tagged, and by when," Porad says, "and how much memory each part tag needs." In October 2005, when Boeing first stated its intention to begin using RFID tags attached to Dreamliner parts as a means of tracking their lifecycle history, the company said it wanted suppliers to apply passive UHF tags capable of holding 64 kilobytes of memory to parts. However, no such tags existed.

Months later, when none of the proposals for the 64-kilobyte chips needed for the tags fit into Boeing's aggressive timeline—it wanted complete 64-kilobyte tags by the fall of 2006—the airplane manufacturer said

it would downgrade its tag memory requirements by a factor of eight, to 64 kilobits, a request Intelleflex indicated it could meet. A tag with 64 kilobits of memory or less, he notes, would suffice for parts or onboard equipment that do not generate long, detailed maintenance and report records and, therefore, do not require high-memory tags to hold that data. "You wouldn't need to put an Intelleflex [64-kilobit] chip on a fire extinguisher," Porad states. For such items, Boeing is considering tags with 512 bits of user memory—more than conventional Gen 2 tags used for supply chain applications, but considerably less than 64 kilobits.

On the other side of the spectrum, however, are aircraft parts with very long in-service histories, and for these Porad would still like to use tags with 64 kilobytes of memory. That's now a possibility. This week, Fujitsu announced that it has developed a 64-kilobyte passive UHF tag, compliant with the EPC Gen 2 standard, that will become available later this year. Porad says Boeing knew Fujitsu has been developing the tag, and that it was nearing completion since Fujitsu has been communicating its progress to Boeing. Fujitsu reports that it has also been in discussions about the tag with other companies in the aviation industry, but declines to name them.

Unlike Intelleflex, Fujitsu is manufacturing both the chip and the full RFID inlay and housing. According to Porad, Intelleflex has contracted tag makers Confidex and Brady to convert its chips into full RFID inlays, as well as package those inlays into a rugged housing that complies with the FAA-approved Aerospace Standard AS5678, passed by the Society of Automotive Engineers (SAE) late last year (see Confidex Ready and Waiting for Boeing to Tag Silicon).

RELATED_ARTICLES The Fujitsu chip uses FRAM memory technology, which has a faster data capture rate than EEPROM, the memory type used in the Intelleflex 64-kilobit chip. That, in addition to its higher memory capacity, will make the Fujitsu tag more attractive to Boeing, Porad says, though its price (not yet been announced, but which will most likely be higher than that of the 64-kilobit tags) and its weight (13.6 grams) could make it inappropriate for tagging some parts, depending on their quantity and sensitivity to weight.

Airbus, Boeing's top competitor, is actively utilizing RFID for tracking parts shipments and for tracking large plane components, but it has not yet initiated any program to attach tags to parts for lifecycle tracking. The firm told *RFID Journal*, in the fall of 2007, that it has no immediate plans to ask suppliers to tag parts for the A380, the A350 or any of its legacy planes, claiming the technology is not yet mature enough for such an application (see Airbus' Grand Plans for RFID). Nonetheless, it is working closely with suppliers to understand how in-service parts marking could be most successfully deployed. Airbus and Boeing have also collaborated on tag data standards (see Boeing, Airbus Team on Standards).

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