

Case study

Boeing

Air Worthy



At a glance

Industry: Aerospace

Application: Inventory tracking

Program Results: Boeing will track 1,750 tagged parts. Part repair and replacement will be easier.

RFID tags help Boeing Co. track parts, reduce inventory

Boeing Co. 747, 777 and 767 widebody jets move from components to finished airplanes on a super-sized assembly line at the company's Everett, Wash., design and manufacturing complex. The company's next-generation jetliner, the 787, will be assembled there as well, using some of the most advanced composites and design processes known to the aerospace industry.

The airline industry is extremely competitive. Boeing and European rival Airbus vie for every plane sale with intensity. That's why aerospace experts around the world let out a collective gasp in 2004 when Boeing and Airbus announced they were working together to issue the same RFID (radio frequency identification) requirements to their suppliers.

The reason for the cooperation was sheer common sense. One Boeing 747 has about 6 million parts. Multiply that by the number of Boeing and Airbus jetliners in the world and you have a gazillion mission-critical parts to track. Over the years, airline manufacturers have developed elaborate procedures and fail-safe systems to

ensure the parts placed on their planes are approved and certified. And because of the enormity of the task, they have developed similarly elaborate inventory systems.

Enter RFID, a technology capable of tracking a part from manufacture to installation and beyond. An RFID "tag," or computer chip and tiny antenna, can provide a complete history of individual aircraft parts. The information can be added to or deleted as the part proceeds through a supply chain. And the information on that tag can be read anywhere along the way by a stationary RFID reader or an RFID reader-enabled mobile computer without the line of sight required by barcodes and from as far away as several feet.

Boeing selected RFID to track from 1,700 to 2,000 mission-critical parts on each of its 787 jetliners, parts that particularly expensive or require frequent maintenance and replacement.

Now, Boeing's line-replaceable units carry barcode identification labels, sometimes located on the back of units. If a mechanic needs to check the cockpit to see which one of three computers needs to be repaired, he has to get on his back with a flashlight in one hand and a mirror in the other to search for the particular serial number in question. RFID will allow him to walk into the cockpit with an RFID reader and locate the computer in question with a couple of clicks.

Similarly, a worker checking oxygen tanks on an aircraft currently has to open every bay containing those parts. With the use of RFID tags, the worker can use an RFID reader while standing in a certain zone of the aircraft to "read" the entire inventory within a specific distance.

"Information stored on the RFID tag will enhance parts traceability and reduce cycle time to solve in-service problems by improving the accuracy of information exchanged between customers and suppliers," said Lou Mancini, vice president and general manager of Boeing Commercial Aviation Services, in a company statement. Not only will the RFID tags make it easier to track and repair aircraft parts, they'll reduce data entry errors and the risk that suspected unapproved parts (which range from parts that simply have become separated from their documentation to a rare truly counterfeit part) make it onto an aircraft.

Setting the pace

Incorporating RFID into Boeing manufacturing processes required extensive testing and Federal Aviation

Authority approval to ensure the type of passive UHF RFID tags used for inventory tracking will not interfere with a plane's air worthiness.

Only weeks before a scheduled 90-day test on a FedEx MD-10 freight liner in October, 2004, the Boeing Co. turned to Intermec Inc. to create the type of RFID smart label the trial would require.

Boeing already uses thousands of Intermec automatic data collection devices. But this time the product Boeing needed most couldn't be found in an Intermec product lineup – or anywhere else. No one had a UHF tag in production that could be mounted on metal. Boeing representatives met with Intermec RFID experts. "We got their understanding, input and support to be a partner on this with Boeing," said Ken Porad, Boeing program manager for the Automated Identification Program.

Intermec RFID engineer KVS Rao developed a smart label with a 1x2-inch UHF RFID tag mounted on a 2x3-inch traditional barcode label. Called the 915 MHz metal-mount puck tag, the smart label contains the aircraft part number and serial number. Intermec produced more than 40 labels for testing on various parts of the aircraft. Some tags had to be able to withstand intense heat, while others had to prove they could function in extreme cold. And the tags had to perform within a frequency range that could operate pretty much anywhere in the world. Intermec partner POS Data programmed the tags and printed the labels.

Only a few weeks after Boeing's initial request, the Intermec and Boeing teams, equipped with tags, readers and other related RFID equipment, headed for Memphis, Tenn., for the test.

"The pilot was a success," said Tim Thul, business development manager for Intermec's industrial segment. "All the tags were able to be read." The FAA determined that passive UHF tags were no risk to flight operations, clearing the way for airlines to begin implementing the cost-savings and efficiency-enhancing programs RFID makes possible.

Working together

In October, 2005, Boeing provided suppliers its RFID standards for use on the 787. Suppliers will apply tags to designated parts. So far Boeing has identified 1,750 individual 787 parts it wants tagged, Porad said.

Boeing and Airbus have worked together to ensure tags and labels designed for these aerospace applications will be accepted by both companies. If Airbus also requires RFID-tagged parts at some point, the number of tags required each year could reach two million, Porad told a supplier meeting.

"Boeing customers are eager to take advantage of automated identification technology, especially the capabilities and benefits of RFID," said Mike Bair, 787 vice president and general manager. "Introducing this advancement on our newest airplane makes good sense."

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