

**RFID Global Solution's real-time locating system allows Boeing to track its tools as they are used on NASA spacecraft in real time, and to ensure none are left at the launch pad.**

By Claire Swedberg

Nov. 13, 2008—[Boeing](#) is using a real-time location system (RTLS) at [NASA's Kennedy Space Center \(KSC\)](#) to reduce man-hours spent inventorying tools, and ensure that none are left at the launch pad.

Much of the work performed on spacecraft and at the launch pad is conducted at night, so as not to interfere with KSC's daytime activities and limit the impact on the majority of the center's personnel. In the dark, however, tools can be difficult to locate, and that means a diligent contractor must spend as much time as necessary to locate all tools used at the site before leaving. A stray piece of equipment or tool left behind at the pad could be disastrous, since it could damage a spacecraft during takeoff. Harm to even one tile could render the vessel fatally damaged.



*Phil Lintereur*

Boeing takes inventory tracking very seriously. When the company began seeking a system that would safeguard against any lost tools, it also wanted a method for easily tracking many of its 70,000 assets elsewhere at multiple facilities at the Kennedy Space Center. So in 2007, when the firm was using a team of employees to track and inventory its assets on a regular basis by simply seeing them and recording them on paper, Boeing began accepting bids for an RFID-based solution.

Boeing employs RFID in other locations. Its facility in Long Beach, Calif., for instance, uses passive RFID tags to track parts for the manufacture of its C17 Globemaster III and F22 Raptors. It also utilizes passive RFID tags for Rotocraft production in Philadelphia. But in this case, the company needed active RFID tags to provide tracking in real time, says Phil Lintereur, manager of fluids, avionics and propulsions for Boeing's Checkout, Assembly & Payload Processing Services (CAPPS) operation at KSC. "It's always been a challenge to keep track of assets," Lintereur says.

There are several challenges involved in deploying an RFID system at the Kennedy Space Center, however. One is the highly metallic environment, while another entails building a system that would not interfere with RF systems already in use by NASA at the Kennedy Space Center. That required an ultra-wideband (UWB) solution with a frequency set "below the noise floor" of other NASA equipment, says Ron Rose, VP of business development at [RFID Global Solutions \(RFIDGS\)](#), which provided Boeing with its RFID-based RTLS system.

In 2007, Boeing reviewed bids from numerous RFID vendors before selecting RFID Global Solutions. RFIDGS, Lintereur says, was the only vendor that could deliver the frequency required—between 6 and 8 GHz—at an affordable cost, and with a proven track record.

The companies began installing the system later in 2007, which included RFID readers installed in Boeing vans for use at the launch pad. The system was fully functional by February 2008. However, Lintereur says, operation at the launch pad was delayed until April while Boeing awaited NASA approval for the RFID technology. Now, after an initial deployment of about 600 tags, the company plans to attach tags to 3,000 other tools and pieces of equipment, and is again using RFIDGS as the vendor.

The active RFID tags, manufactured by [MSSI](#), are about the size of a quarter. Each comes with an embedded RFID chip with a unique ID number associated in a database to the serial number and description of the tool to which that tag is attached. It also comes with a battery that will last about five to seven years and an antenna. In addition, Rose says, each tag can be set to beacon at a predetermined rate. According to Rose, two-way communication between tag and interrogator, which would enable tags to remain dormant until readers interrogate them, is typically more expensive for both tags and readers, and consumes more battery life.

Boeing has installed 40 fixed readers, primarily on the ceilings and walls of facilities at the space center, such as the [Space Station Processing Facility \(SSPF\)](#). In the case of that building, Rose says, because the ceilings were 100 feet high, the MSSI readers were installed on the walls, allowing a longer read range for readers. Readers can capture the ID numbers of tags up to 160 feet away indoors, then forward that data to Boeing's back-end system, either by a cabled connection, or via the company's existing wireless system. RFIDGS' Global View software, integrated with Boeing's inventory management system, provides a user interface to allow for the commissioning of and searching for particular items, as well as the running of reports on Boeing's SQL database. The readers employ triangulation to pinpoint an asset's location within 3 cubic feet, Lintereur says.

During the next phase of the installation, Boeing plans to upgrade to RFIDGS' latest software suite, known as Visi-Trac Asset Tracking, as well as add additional readers to further tighten the locating capabilities.

Both Global View and Visi-Trac enable Boeing to search for a specific item or perform an inventory of all tagged items at the facility. The system can send an alert to notify users when an item leaves a specific area, such as the building in which it is stored. The Visi-Trac system also offers new capabilities for setting up alerts and reporting, Rose says, and supports the [Microsoft BizTalk](#) platform.

Vans that deliver tools to spacecraft launch pads are also equipped with MSSI fixed readers, as well as laptop computers enabling the van driver to see an inventory of all tagged items located in the truck. As an item is removed from the vehicle, the reader no longer receives transmission from that tag, and RFIDGP's software suite, along with software from [Franwell](#), displays that item on the truck's computer with a red highlight, indicating it is no longer aboard the vehicle. All items on the truck are highlighted in green. When the tools are returned to the vehicle, their status changes back to green on the display. If a driver sees any red highlights on the screen when he is ready to leave, he knows an item is missing. At this point, he can use an MSSI handheld reader to search for the tool around the launch pad.

Data is stored in the van's computer until it comes within range of Boeing's wireless system at KSC. At that point, the status of the van's equipment is transmitted to Boeing's inventory management database.

Lintereur declines to indicate the system's cost, but says he has already seen a return on investment in terms of reduced man-hours spent looking for products, as well as the more intangible benefit of the security it offers NASA by ensuring all tools have been removed from the launch pad site once work is complete. "Now NASA is really excited about it," he says.

The deployment has been fairly smooth, Rose adds, without any major challenges. "The system doesn't interfere with what they do at NASA," he explains, "and is below the signal level threshold, so it's basically nondetectable."