Passive RFID Technology and Aviation Applications

Where we've been….

Passive Ultra High Frequency (UHF) Radio Frequency Identification (RFID) solutions began to appear in large applications, first in warehouse loss prevention, shipping and logistics applications. That was the low-hanging fruit worldwide given this technology's versatility and performance advantages over traditional barcode, such as RFID's ability to:

- Provide a scanning rate approximately 10X faster when conducting item inventory activities.
- Read tags at a distance of 30' or more.
- Automatically track large numbers of moving assets with fixed UHF readers.
- Find missing items electronically via radio waves.
- Read tags that are hard to reach or not in clear view.
- Embed tags in tools and other objects for permanent identification and authenticity.
- Read tags inside plastic and cardboard containers.
- Read multiple tags at once.
- Read tags subject to changing environmental conditions.
- Update tags with new information regarding the assets to which they are assigned.
- Support barcode hybrid applications by printing barcodes on RFID tags as a backup.
- Encrypt data.
- Reuse UHF RFID tags.
- Incorporate sensors on tags to monitor and record changing environmental cargo conditions such as temperature and humidity.

Over the next few years, passive RFID performance for the aviation industry, (ie, especially metal mount tag development) quickly improved largely due to:

- The creation of the ISO 18000-63 standard. This standard provided a common technical specification for RFID devices operating in the 860^{o}MHz to 960^{o}MHz industrial, scientific and medical (ISM) band used in item management applications. The standard established a common technical specification for RFID devices (i.e., tags and readers) operating in this arena. As a result of this standard, products were designed to help ensure reader and tag compatibility and interoperability worldwide (iso.org/standard/59643.html).
- The Federal Aviation Authority (FAA) issued an advisory circular AC 20-162B dated 10/11/18 for UHF RFID tag manufacturers and installers seeking airworthiness certification for installing passive, battery-assisted passive (BAP), and active radio

frequency identification (RFID) tags and sensors on aviation products and equipment. (faa.gov/documentLibrary/media/Advisory_Circular/AC_20-162B.pdf).

Passive RFID in the Aviation Industry today….

How is passive RFID used in aviation today? With standards in place, both passive tag and reader manufacturers have released standards-compliant tag and reader products to tackle just about any aviation-specific application we have or might encounter. In addition, organizations such as Boeing, Delta, Airbus, FedEx, AirFrance and NASA have successfully tested and deployed passive tags and readers in a variety of maintenance, asset tracking and inventory-related applications.

Today, UHF RFID hardware, tag and software technology is used in such aviation applications as:

- Enhanced Lifecycle Parts Management – Tracking parts from birth to point-of-retirement or sale, parts origin, current location and aggregated MRO maintenance history.
- Tool and Equipment Tracking – Aircraft MRO personnel must automatically verify the correct tools to use on each job and account for all tools when a job is completed. Creating a passive UHF smart toolbox or smart tool crib will result in real-time accurate tool inventories that will reduce traditional paperwork associated with mandated routine maintenance.
- Aircraft Manufacturing – Manufacturers of aviation and aerospace components are embracing passive RFID to better manage their work in-process (WIP) even in harsh environments as well as increase parts inventory visibility at each step of the manufacturing process.
- Emergency Equipment Management (EEM) – Using passive RFID to ensure that all EEM items such as life vests, medical kits, defibrillators and passenger oxygen generators are in-place and serviceable without opening overhead compartments.
- Reducing Routine Maintenance Time – Updating and retaining aircraft components' service history on RFID tags that travel on RFID-tagged assets, with each aircraft generating faster and more accurate MRO support.
- Baggage Handling – The drive to reduce operational costs and mishandling of baggage are operational imperatives for all commercial airlines. To this end, several RFID based projects to prevent and reduce baggage mishandling are underway at airports around the world. Further, the International Air Transport Association (IATA) issued Resolution 753 (iata.org/en/programs/ops-infra/baggage/rfid) to provide guidance in support of these efforts.

UHF passive RFID systems are uniquely capable of reducing operational costs when applied to item management applications such as inventory, asset tracking and MRO activities. Successful enterprise-level design and implementation requires RF knowledge, software integration expertise and on-the-ground implementation experience to achieve expected Return-On-Investment.

DataSpan Holdings, Inc. -- RFID

About the author: Jim Ferguson is Director Data Security Technology, DataSpan Holdings, Inc. He can be reached at jferguson@dataspan.com or 972-207-8317.