RFID Applications in Boeing Aircraft Production and Maintenance

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Automated Identification Technology at Boeing

QUALITY, PRODUCTIVITY, AFFORDABILITY
(Information system enabling visibility and traceability of assets and parts)

FLYAWAY

Aircraft Part Marking & Tracking
CAS RFID Integrated Solutions

NON-FLYAWAY

Asset Tracking & Location System
Work In Process
Time & Temperature Sensing System

- Automated Identification Technology
- (Bar code, Active & Passive RFID, GPS)
- Common across many programs
- Distributed across multiple sites
Value Proposition | Aviation Industry

Tracking and tracing of aircraft parts in production and maintenance phase brings value to all stakeholders in the aviation ecosystem.

- Improved accuracy of the “As Built” and “As Delivered” configuration – Aircraft Readiness Log (ARL) parts
- Helps us provide an expanded ARL list to the airlines
- Improving situational awareness due to shared data environment
- Accelerate decision-making capability

“Airplane-Out” data back to the OEM

- Automated management of parts delivery and distribution
- Optimization of inventory due to improved end-end visibility
- Historical lifecycle data from the operators
- Accurate status of part condition from the field
- Common process across different customers

- Alternative and highly efficient method of ICA compliance
- Fast and reliable configuration management
- Supply chain visibility and inventory reduction
- Maintenance cost reduction

Supply Chain

Production

Maintenance
Quality | Improvement in accuracy

• Data collection with RFID readers reduces chance of errors in transposing data – applicable to Supply Chain, Airlines, Production – Collected data automatically updated to a centralized database

• On-the-spot verification and validation of the collected data minimizes error propagation

Little manual data entry – minimizes “fat finger” errors
Productivity | Flow time reduction

- Ability to collect data from a distance
  - Non-line-of-sight propagation
  - Parts installed behind panels

- One example in production environment:

**Manual process**
- Printed ARL

**Automated Inspection**
- Hand-held RFID Reader

**Significant benefit in flow time reduction for all the stakeholders**
Maintainability | Consistent and Reliable Data

• Performance
  – RFID tags comply with SAE AS 5678 standards to ensure consistent quality of the tags deployed in harsh environment

• Interoperability
  – Data stored on the RFID tags conforms to ATA Spec 2000 data encoding standards

• Maintenance
  – Update and maintain parts history during operation
  – Easy access to “back-to-birth” records
  – Minimizes effort in leasing and transfer of ownership process

Reduction in maintenance cost to airlines
Next steps

• Production
  – Boeing continues to research and carry out extensive studies for how RFID technology can provide benefits to the aviation industry.

• Aftermarket
  – Commercial Aviation Services has developed and tested a service offering for operators that helps to further amplify the benefit in the aftermarket.

All the key stakeholders of aviation industry need to work together to realize the maximum potential
Forward

• On-airplane RFID use involves unique environmental constraints and regulatory requirements.
• Boeing is offering an RFID-based, centrally managed maintenance program which:
  – Significantly reduces maintenance lead times, configuration defects, redundant tasks and cost
  – Provides stable and reliable component and configuration data supported by a comprehensive technology platform
  – Can be tailored to specific operator requirements
  – Is fleet-agnostic
RFID Integrated Solutions

A comprehensive solution including:

- Centrally Managed RFID-Based Maintenance Program
- Maintenance Procedures
- Training
- Hardware
- Software
- Retrofit Guidance
- Technical Oversight
- Continued Support and Post-Retrofit Services
Alaska Airlines Validation

• Developmental partner since the program inception

• Worked together to co-develop, test and validate the first five applications

• Results of operational testing have exceeded expectations

• Alaska will have contributed ~4000 hours of technical evaluation and validation support
Validation of Business and Technical Assumptions

- 10 ASA M&E organizations reviewed and approved all product development documents including:
  - ~5000 pages of document review
    - Business and systems requirements
    - Operational scenarios
    - Technical procedures
- 167 revisions made
System Performance

- Performed system interference checks
- Confirmed that there will be no EMI / EMC interference between RFID and airplane systems in any ground-based configuration
In-Service Tests

- Fujitsu high-memory RFID and MacSema contact-memory technologies exceeding technical performance expectations
- RFID and CMB exceeded thermal cycle and min/max thermal equilibrium expectations
- Distance and speed of low-memory interior tags exceeded read range and distance expectations
Typical Aviation Results

• 737 Life Vest Check
  – Before: 1 hour
  – After: < 2.5 minutes

• 737 Oxygen Generator Check
  – Before: 4 hours
  – After: <1.5 minutes

• Demonstrated usability and effectiveness:
  – End-user acceptance; AMTs performed all UAT procedures
  – 100% reliability

• 99% lead time reduction
Conclusion

• Aviation use of RFID is different from other industries and has unique challenges.

• Boeing has developed a specific aviation solution to help our customers harness the power of RFID technology.
  – Not a technology solution but an alternative maintenance program which is enabled by technology
  – A comprehensive solution, centrally managed by Boeing
  – An adaptable solution configured to the operator’s requirements
  – A fleet-agnostic solution
  – A method of compliance with instructions for continued airworthiness
World-class customer support, anywhere, anytime.

Learn more at: boeing.com/boeingedge/

Thank you!