Using RFID to Track and Manage Aircraft Parts

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Rick Lewis, Delta Air Lines
RFID COTS Solutions

- **Technology Solutions**: Aviation and technology consultant
  - Evangelist for Spec2000, RFID and barcodes
  - Primary architect/author of the RFID standard in 2004
  - Displayed first airline RFID solution in 2008
  - Provided Delta a complete solution in 2010
  - Delta continues to expand and is now using:
    - RFIDAeroCheck – presence and expiration date
    - RFIDAeroSecure – daily TSA Security Sweep
    - RFIDAeroTrack – tracking components from Mtc. Base to Line Stations
    - RFIDAeroTag – OEM solutions for tagging new parts
  - All solutions based on CSDD, Spec2000 Chapter 9, and GS1/EPCGlobal standards (certified software)
Delta – RFID Poster Child

- Delta has an RFID tag on every aircraft (cockpit)
- Delta has about 950 tags on every 777 aircraft
  - Also tagging components on 737s, 757s, 767s, MD88s, MD90s, others
- Delta is receiving tagged OEM equipment from several manufacturers
- Our RFID solutions are delivered standalone and complete for quick implementation
- Also integrated with MRO systems like SCEPTRE, SAP, and AMOS
- Delta has received FAA approval to integrate the RFID solutions with their Maintenance Program
Using RFID

• Applying RFID tags to items on aircraft to facilitate quick and accurate confirmation of:
  – Presence
  – Expiration Status
The Goals

• Reduce Material Expenses
  – Material on shelf / Logistics

• Reduce Time
  – Labor

• Compliance
  – Presence
  – Status
We just wanted to know when PARTS were going to expire...
Why So Much on the Shelf?

- Buffer – for the *unknown* demand

- Just In Case – **NOT** Just In Time!

- The Problem flows upstream - 
  Customer ➔ Supplier ➔ Manufacturer

- It costs MONEY to fill a shelf – In Case...
Cost to Manage the End-of-life

• Check, check, check...
  – Access time
  – Unpredictable results
  – Potential damage
  – Reduce check, check, check $

• PLUS
  – Logistics support
  – Disposal/ transportation costs
Increase Part Utilization

• Usually means more checks, but...

• Reduce time to confirm part status
  – Standard date check for 757 ~ 4 hours
  – RFID ~30 seconds
  – Standard date check for 777 ~ 8 hours
  – RFID ~60 seconds

• 500 times faster! Go do other stuff!
The Goals

• Reduce Material Expenses
  – Material on shelf / Logistics

• Reduce Time
  – Labor touch time

• Compliance
  – Presence
  – Status
Oxygen Generator Inspection – The Real World
RFID Strategies

• Legacy Tagging
  – Tag flying inventory
  – Already paid for it!
  – Don’t replace parts to get the technology!

• OEM Tagging
  – Utilize RFID-enabled parts from suppliers
  – Let existing inventory “age-out” of system
Current RFID Tag Types Used

• Passive, EPCglobal, Gen2, Spec2000
• Low Memory – 512 b (Legacy / OEM)
• Flexible form factor
  – Two tag sizes: 3 inch, 6 inch
  – Multiple applications and attach options
Legacy Tagging

Aircraft

Location

RFID Tag ID

item

OR

MFR: 12345
PNO: 111222-03
SER: 1234567
DMF: 20130813
Manual Induction Process – Legacy Parts
Data Matrix-driven Induction Process
Current Part Marking

- Human-Readable
  - Slow
  - Unreadable / hidden from view
  - Increased error potential
OEM Tagging

Location

RFID Tag

item

Aircraft

MFR: 12345
PNO: 111222-03
SER: 1234567
DMF: 20130813

OR

QR Code

DELTA
OEM Part Marking

- Human-Readable
- Machine-Readable
  - 2D barcodes
  - RFID-enabled
- Formatting
  - 2D Format
  - RFID Format
- Spec2000
  - /’s, TEIs, Date format
  - Spaces and hyphens
Scanning An Aircraft
Paradigm Shift?

• An opportunity to:
  – Stop inspecting good parts over and over…
  – Scan aircraft (frequently) to refresh database
  
  – If it only takes a few minutes to confirm presence and status for hundreds of parts, how often would you check?
  
  – Trust your DATA!
## The Data Behind the Picture

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What else?

- Life Vests
- First Aid Kits
- E-EMKs
- AEDs
- Slide Batteries
- EPLS Batteries
- O2 Masks
- Portable O2 Bottles
- Portable Fire Ext

- Fire Ext Bottle Squibs
- Door Assist Bottle Squibs
- Cockpit Security Kits
- Door Slides
- Life Rafts
- Crash Axe
- PBEs
- Cockpit Manuals
Emergency Equipment
Emergency Equipment Scan – B777

- Manual Check – 2 Mhrs
- RFID Check – 10 minutes
There Are Rules

\[ \text{PHYSICS} + \text{PROCESS} = \text{RFID SUCCESS} \]

It's not hard, but there is a process.
Current Status at Delta

- Over 35,000 tags flying
- Eight fleets
- 30 different components
  - 777 Fleet has about 950 tags per aircraft
- Every aircraft has RFID identification tag
- Logistics – Wheel / tire tracking
  - Assembly to delivery
FAA Approval

• To use RFID technology for compliance
  – Presence
  – Expiration

• Integrated with SCEPTRE
  – Maintenance Scheduling
HOW TO SELL RFID

WE WANT TO IMPLANT THIS RFID TAG IN YOU.

THAT VIOLATES MY RIGHTS!

WE WANT TO IMPLANT THIS RFID TAG IN YOU AND IT'S ALSO A CELLPHONE, DIGITAL CAMERA, AND MP3 PLAYER.

WRONG

COOL!

RIGHT →
Delta RFID Vendors

• Technology Solutions, LLC
  – Spec2000 Specialist for RFID

• Aerospace Software Developments
  – Software specific to Aerospace market
  – EPC Certified software

• William Frick and Company
  – Custom label manufacturing / Aviation RFID
THANK YOU