Aviation RFID in Perspective

A little of the past, a lot of the future

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Industry Credentials

- 17 years at United Airlines TechOps
- 20 years consulting in aviation
- Primary architect and author of ATA Spec2000 Chapter 9 standards
  - Barcode part marking
  - RFID part marking
  - Cradle-to-Grave Traceability
  - Barcode/RFID shipping label standard

What Problem is Aviation Solving?

1. Data is being entered by hand poorly, and then stored in databases forever – bad decisions continue to be made for years based on that data
2. We need more data but it is too hard to collect, so we do without it (or someone makes an 'analytical guess')
3. Our data lasts for decades due to safety and regulatory requirements – because our airplanes do!

Good data is like having lots of clean water – if you have it, you can make coffee, tea, lemonade or drink it straight! And we need that with aviation data.

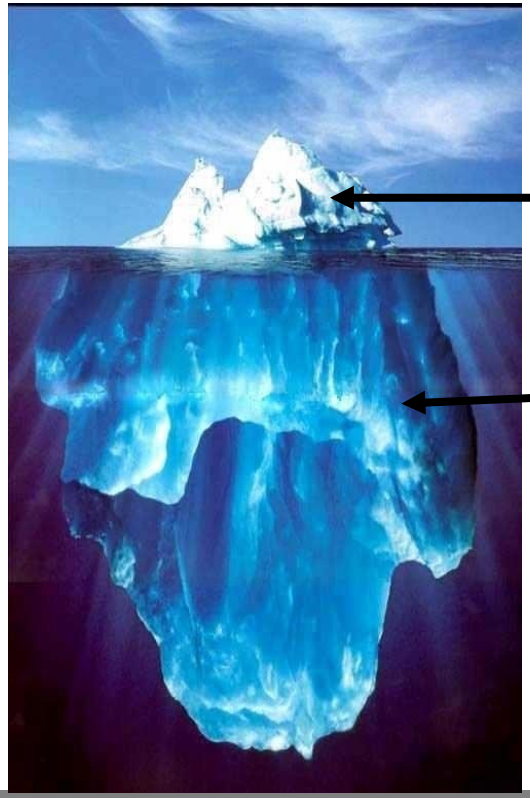
Aviation's Solution?

- Automatic data collection – RFID and/or barcodes
  - Must keep fat fingers, poor eyesight, and poor writing out of the data process
- Use intelligent data for entering into our systems
- Use Transparent Data Collection®
  - Gather data at the source in digital form and transmit it in digital form so it doesn't get changed

Why Use RFID/Barcode ?

To Avoid Errors !

Errors follow the Iceberg Principle



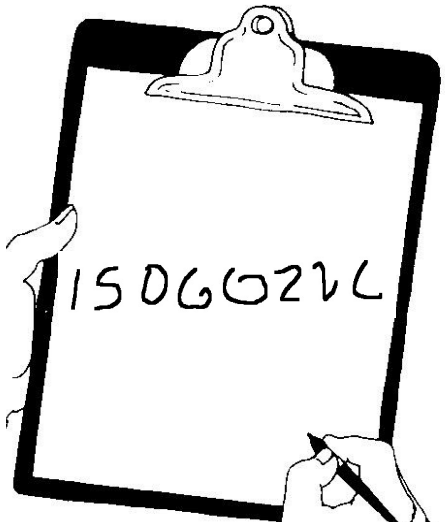
10%

If this is what you're seeing …

90%

This is what you're not seeing !
(and these errors will hurt you!)

Ever seen characters like this?



ISOGOZL

What's your interpretation?

Is this a problem in your company?

A little History…

- **15 years ago aviation couldn't presume network connectivity from anywhere**
  - We need to fix airplanes out on the tarmac, or in huge hangars, and everywhere around the world – not exactly a controlled environment…
  - WiFi standards were just solidifying but not available in airplane locations
  - 3G cellular was not ubiquitous
  - We couldn't read a generic RFID tag, connect to a database and understand what the part is we're holding in our hand – we needed data on the part itself
  - The process had to work anywhere around the world because we all need the same Birth Record data on the part.
- This RFID system design still gives us the freedom and flexibility to do our job wherever it needs to be done.

How does Aviation do it better?

- We give every part a social security number (SSN)
  - Really, only the important serialized parts (OEM does)
  - But concept can be applied to every part you want to track, whether the OEM has tagged it or not
- The SSN provides a cradle-to-grave ID for that item so that every one in the supply chain calls it the same thing. This Traceability aspect is key in our industry.

SSN for Parts

Your company's unique CAGE Code

+

Your unique Serial Number for the part

Example: CAGE: 3RVP8 Serial #: ABC123-1

SSN: 3RVP8ABC123-1

This is the part's identity cradle-to-grave

And the same method the DoD uses in IUID

Intelligent Data

What's this Number?

263265930

Part Number ?

Serial Number ?

Employee Number ?

Location ?

SSN without the dashes ?

Order Number ?

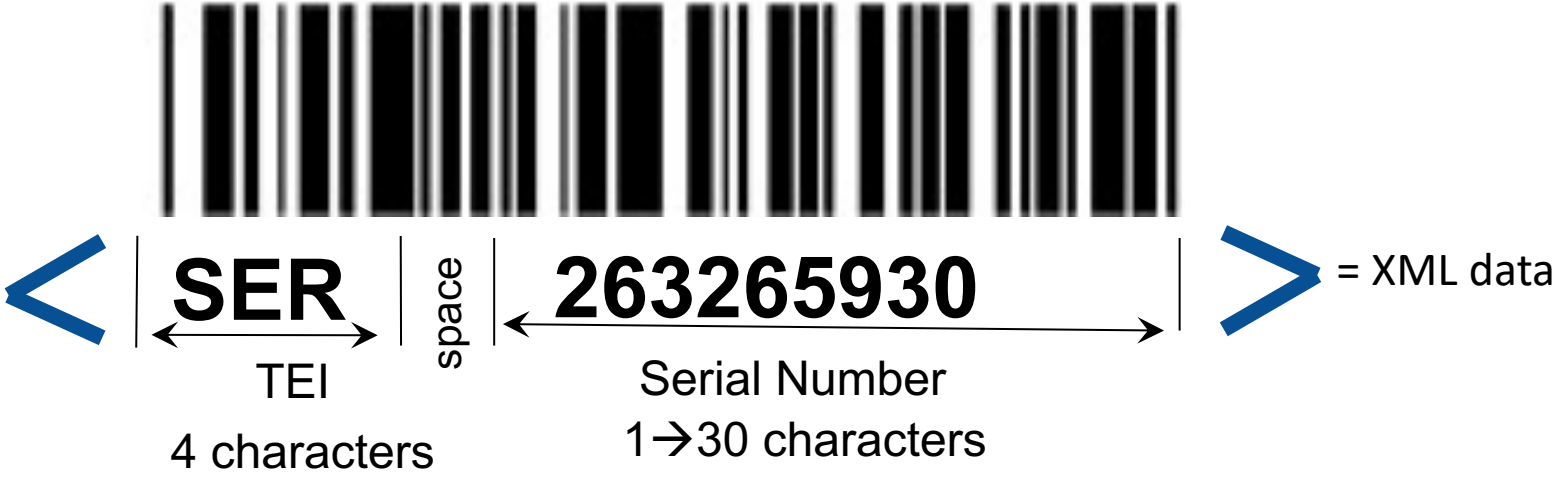
Does the computer know ? How??

This is a NAKED number with no intelligence whatsoever !

Spec2000 uses Intelligent Data

Example of an Intelligent Number – same whether barcode or RFID

Spec2000 Serial Number showing the Text Element Identifier (TEI)



Simple, plain text, WYSIWYG, easy for people - easy for computers

Birth Record Data

- Spec2000 defines Birth Record data:
  - CAGE Code (CAG or MFR or SPL)
  - Unique Serial # (SER)
  - Original Part # (PNO)
  - Date of Mfgr (DMF)

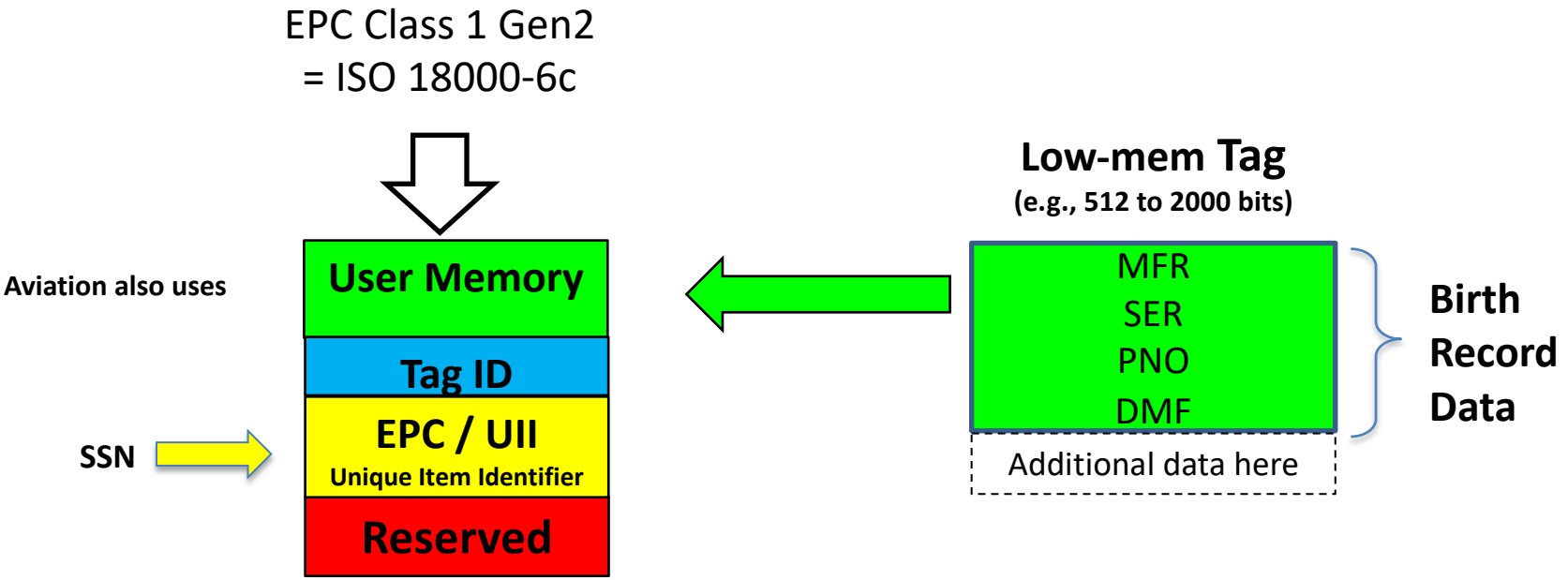
Key data that every participant across supply chain wants to know

Beyond Birth Record data

- In aviation, also need to know the Current Part # (PNR) which is always needed to install or repair a part
- Using RFID, this data is found in the memory beyond the Birth Record data in either a single or dual record tag
- The Spec2000 standard allows lots of flexibility to add additional data your business thinks is important.
- Spec2000 mandates a minimum amount of key data, but allows much more.

Spec2000 RFID User Memory Standards

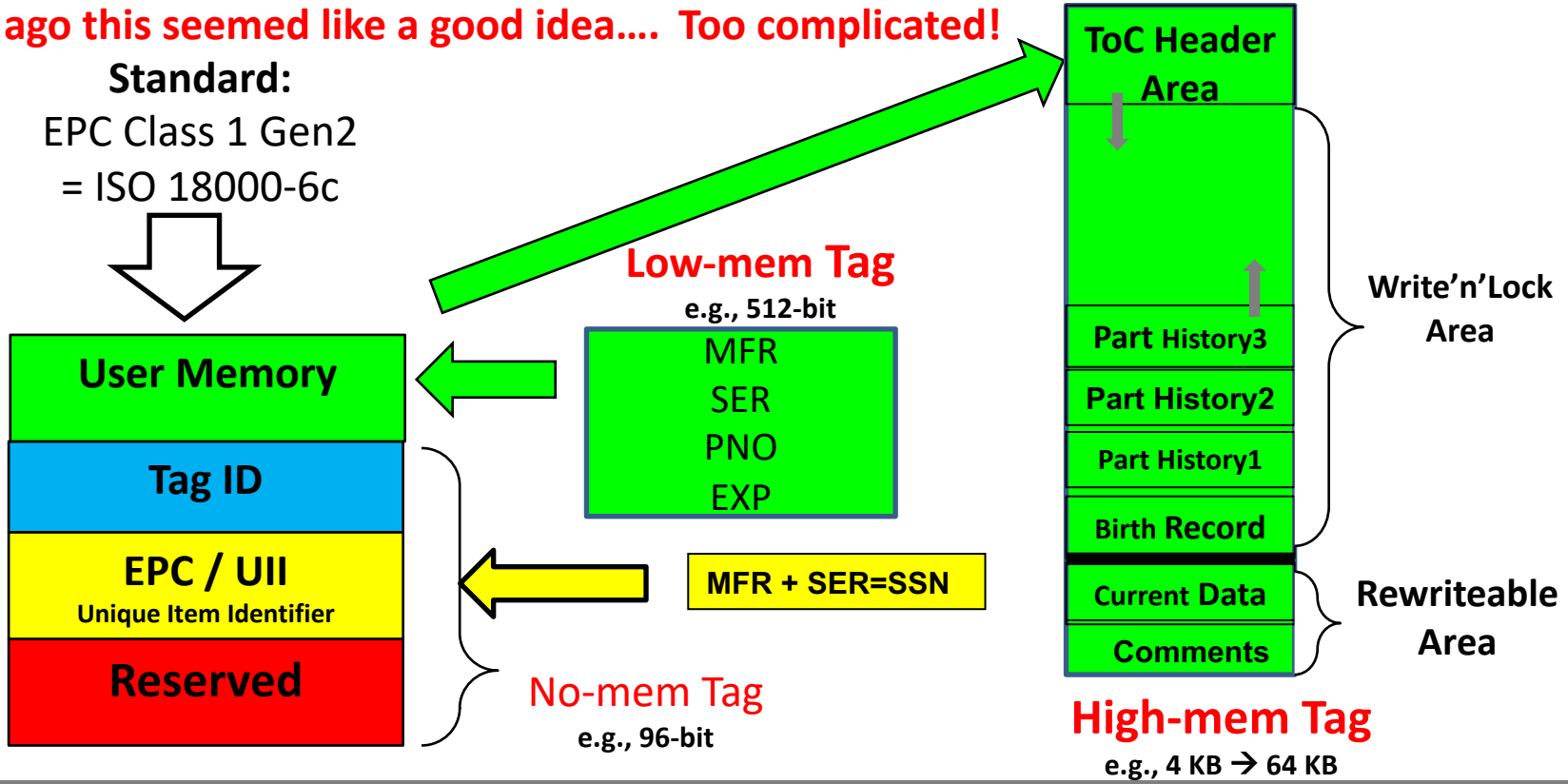
RFID tag structure – EPC standards-based (not proprietary)



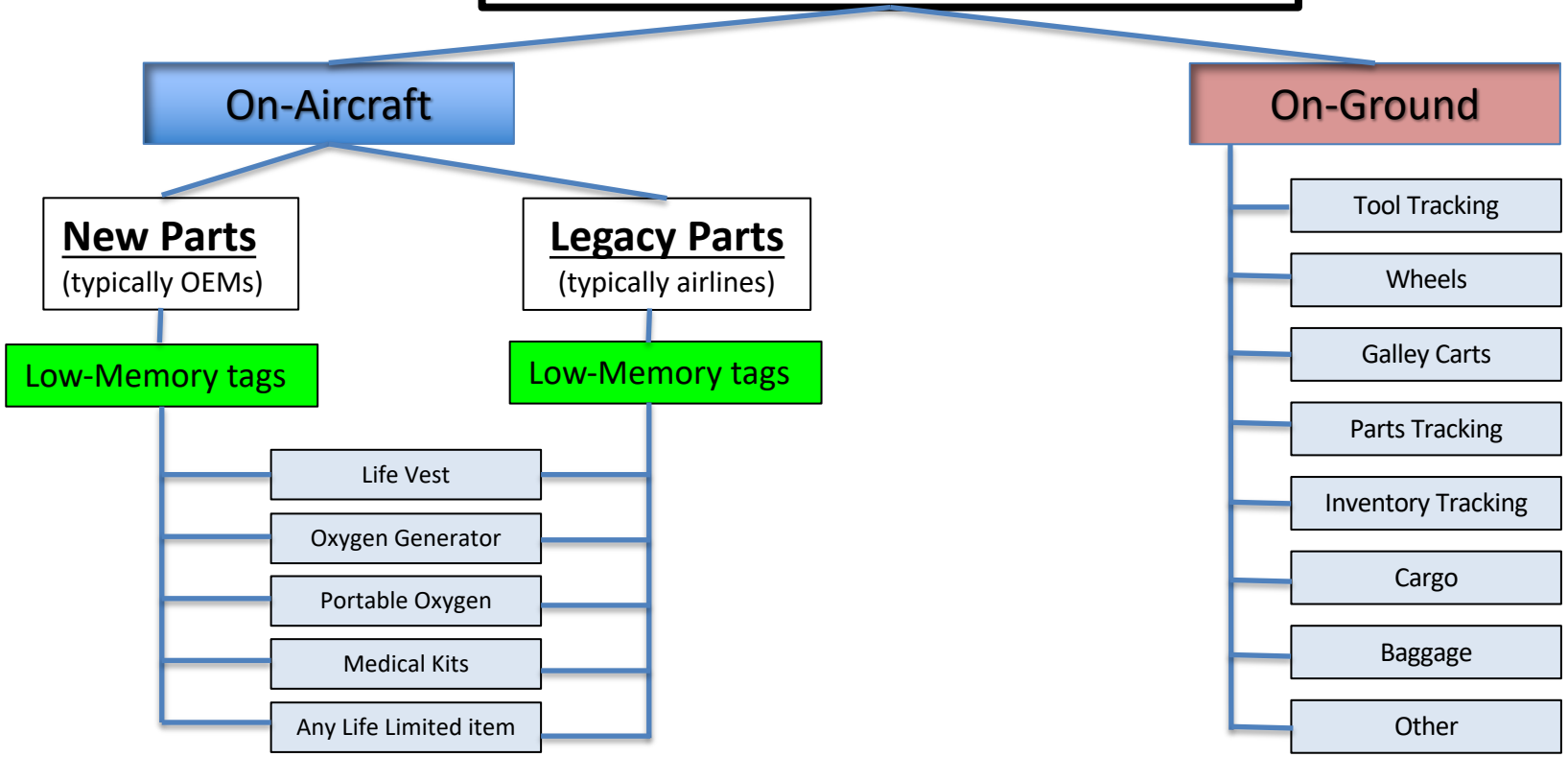
Spec2000 RFID User Memory Standards

15 years ago this seemed like a good idea…. Too complicated!

Standard:
EPC Class 1 Gen2
= ISO 18000-6c



Aviation RFID Solutions



On-Aircraft Solutions

Adult Life Vests

Infant Life Vests

Crew Life Vests

Oxygen Generators

Crash Axe

Wheelchair

Wheelchair storage strap

Seatbelt Extension

Portable Oxygen Bottles

Supplemental Oxygen Bottle

Halon Fire Extinguisher

Water Fire Extinguisher

Radio Beacon / Emergency Locator Transmitters (ELTs)

Medical kits

First Aid Kit

Automated external defibrillators (AEDs)

Enhanced Emergency Medical Kit (EEMKs)

Flashlights

Megaphone

Polar Gear

Slide/Raft Inflation Assembly

Portable Breathing Equipment / Smoke Hood (PBEs)

Equipment Furnishing Manual

Demo Equipment Pouch

Baby Bassinet

Slide/Raft Assembly

Slide/Raft Lighting System Battery

Survival Kit

EPAS Battery

Smoke Detector Battery

Required Paperwork

Tamper Seals on Vest Containers

Tamper Seals on Lav Components

Tamper Seals on Secure Panels

Tamper Seals on Galley Carts

Galley Carts

Seat Covers (cleaning cycle count)

Anything else you need to track

On-Ground Solutions

Tool Check-out/Check-in

Calibrated Tool Tracking/Prevent Check-out

Mechanic Clock-in/Clock-out

Wheel Tracking/Consumption

Flame Cabinet Chemicals

Stockroom Life Limited Parts

Stockroom Inventory

Stockroom Check-out

Transfer to other Stockroom

Expense Bin Automated Refurbishment

FIFO Tracking

Geiger counter mode to find parts

Seat Cover Cleaning Cycle tracking

Rebuild of Slides/Raft and Subcomponents

Galley Cart Tracking

ULD Tracking

Cargo Tracking

GSE Tracking / Location

Vehicle Tracking / Location

Parking Lot Access

Security Gate Access

Employee Access to Buildings or Specific Rooms

Delivery Tracking – Receiving to Delivery Point

WIP Tracking – Work in Process

Just about anything else you want to track…

Aviation RFID Providers

- Aerospace Software Developments
- EAM
- Brady
- Tego

Note: Not all providers offer a full suite of on-aircraft and on-ground solutions

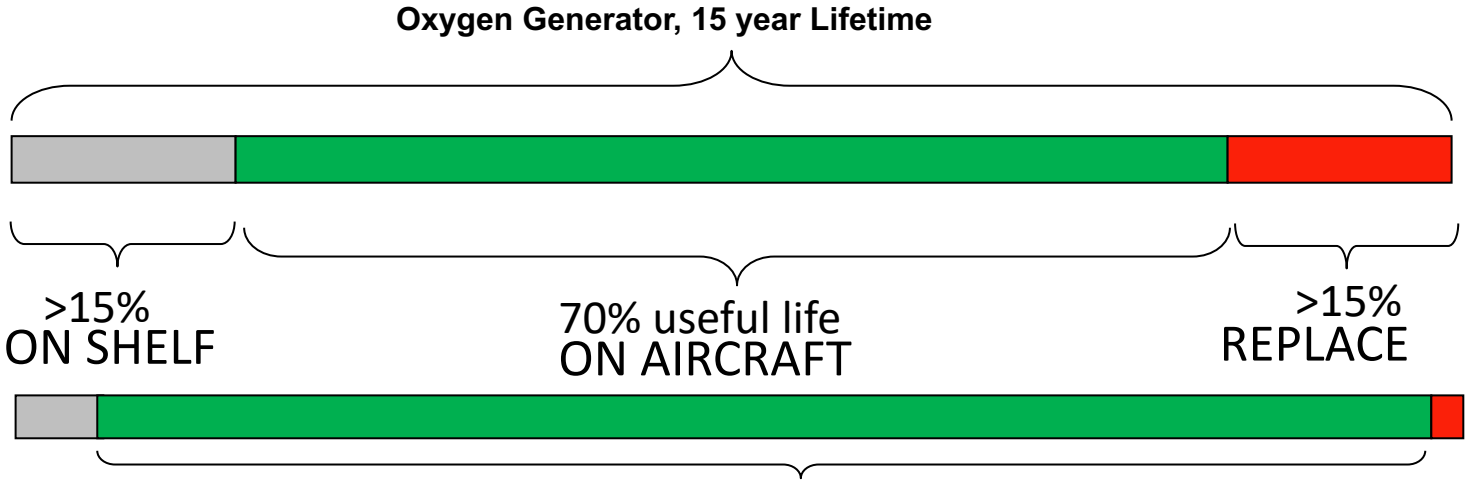
How good is the technology?

B767-300 installed life vest check – cockpit, F/A seats, First, Economy, Spares

254 installed vests in 35 seconds! All present and none going to expire.

Benefits

- From previous slide: speed, labor savings, data accuracy
- Accurate forecasting of material needs
- Material cost savings are significant also:



With RFID data, we can stretch the green time to more than 90%

Spec2000 is continuing to Evolve

- Airlines and suppliers are developing new application and uses for RFID data, like
  - ELP (Embedded Life Parts) – allows OEMs and Airlines to track and replace subcomponent parts embedded in a slide/raft without removing the slide from the plane
    - BIG savings in time, cost and safety not having to de-install a slide
  - RFID shipping labels from OEM to Airline
    - Find that one box you are looking for to address the AOG
  - New filter bits so the readers can find the parts they want faster
  - Location Tags to define fixed locations like an aircraft or a delivery drop point

- And we are still hoping for the DoD to get interested in RFID Part Marking!
  - Got any ideas?

Connect with me for any questions:

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And thanks for your time!

THANK YOU