



Boeing RFID Progress

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GoldCare Service Development
5/18/2010

Video

- Improving Efficiency with the use of RFID



Overview

- RFID Video
- Benefits of a RFID enabled airplane
- Boeing Progress
 - 787
 - Standards and Regulations
 - Technology Maturity
 - Pilots and Proof of Concepts
- Boeing's Approach
- Next Steps

Benefit of RFID on Airplane Parts

Supplier



- Standardize information on parts.
- Inventory management.
- Improve supply chain management and asset visibility.

Airline



- Provide as-flying configuration.
- Aircraft Readiness Log process.
- Point-of-use information.
- Safety, quality efficiency.

MRO



- Manage rotables.
- Enable maintenance actions.
- Spare parts visibility.

Boeing's Journey – Press Release 2005

Boeing Introduces Radio Frequency Identification on 787 Dreamliner

SEATTLE, Oct. 3, 2005 -- **Boeing [NYSE: BA] announced plans to introduce radio frequency identification (RFID) "smart labels" on maintenance-significant parts of the 787 Dreamliner. RFID technology will improve configuration control and help airlines reduce costs by managing part maintenance and repair histories.**

"Boeing customers are eager to take advantage of automated identification technology, especially the capabilities and benefits of RFID," said Mike Bair, 787 vice president and general manager. "Introducing this advancement on our newest airplane makes good sense."

RFID is an automated identification technology that uses radio frequency waves to transfer data between a reader and items that have RFID devices affixed. The "smart labels" contain a microchip and antenna and operate at internationally recognized standard frequencies. Similar to a bar code, the RFID tag stores data but offers enhanced data collection and significant advantages such as being able to read without a direct view of the RFID label and a dynamic read/write capability.

"Information stored on the RFID tag will enhance parts traceability and **reduce cycle time to solve in-service problems by improving the accuracy of information exchanged between customers and suppliers,**" said Lou Mancini, vice president and general manager of Boeing Commercial Aviation Services.

Boeing plans for the tags to contain unique identification as well as maintenance and inspection data in accordance with industry standards developed for commercial aviation by the Air Transport Association. Typical Dreamliner parts to incorporate RFID smart labels will be serialized end items such as line replaceable units (LRUs) and life-limited parts as well as on-board emergency equipment. Smart labels will be applied during the manufacturing process by the responsible systems and equipment supplier prior to delivering the airplane to airlines.

The FAA published RFID policy in May 2005 which states that passive RFIDs -- transponders that do not have a dedicated power supply and derive their operating power from the reader -- pose no safety risk and are acceptable for use on civil aircraft under specified conditions.

Boeing has successfully completed two in-service evaluations of passive RFID smart labels on a FedEx MD-10 Freighter. The tests showed that passive RFID devices do not adversely affect the simultaneous operation of any aircraft systems or interfere with continued safety of flight.

Regulatory Approvals

- FAA AC20-162 “Airworthiness Approval and Operational Allowance of RFID Systems” (9/08)
- ISO 18000-6C Radio Frequency Usage Regulatory requirement (3/09)

All regulatory approvals are in place for on airplane RFID use.

Standards

- ATA spec 2000 9-5 RFID data standard (5/09)
- SAE AS5678A “Passive RFID Tags Intended for Aircraft Use” (12/06)
- ARINC 673 developed and in approval process for implementation guidelines. (9/09)
- BAC5307-246 published for RFID part marking within Boeing. (10/06)

All standards have been created to use RFID tags on an aircraft.

AS5678 – Letter of Memorandum

- Boeing has drafted and the FAA has approved “Letter of Memorandum – FAA Compliance Exclusion from SAE AS5678”
- Tags will no longer need to go through full AS5678 testing if the part they are affixed to has already gone through the proper testing.

RFID Technical Maturity

- PRO-5157 Technology and Application Readiness Assessment on Passive Radio Frequency Identification (RFID) on Airplane Parts
- Documentation to show technical maturity of RFID.
- Studied low and high memory tags for applicable part usage.
- Evaluated ten readiness categories against the four maturity stages (Discovery, Feasibility, Practicality, and Applicability).

Proved technology is mature and can achieve all identified use cases.

PRO-5157 Technology and Application Readiness Assessment on Passive Radio Frequency Identification (RFID) on Airplane Parts

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CONTENT OWNER:
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[Project Name]

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Industry Work

- The Boeing RFID Service Ready Team has led the world's first and only dedicated AIT deployment workshops with airline customers

- Japan Airlines / American Airlines – 2005 / 2006

- All Nippon Airways – 2005 / 2006

- American Airlines – 2006

- Singapore Airlines - 2007

- JAL / ANA / KHI / MHI / FHI / JASDF – 2008

- Workshops highlighted in several publications including
 - Aviation Week
 - Aircraft Technology Engineering and Maintenance
 - RFID Journal
 - Boeing Frontiers



Boeing's Approach

- Reinstated planning directive for RFID on 787.
- Identify most cost effective components that can benefit from RFID.
- Evaluate each selected part and specify appropriate identification type (low memory, high memory, CMB)
- Work with suppliers to provide information on specific tag necessary on parts.
- Issue RFID planning directive on other airplane programs.

Conclusion

- There are many benefits to suppliers, Boeing, MROs, and airlines by implementing RFID.
- Boeing still intends on tagging parts.
- Presenting to 787 Leadership team to get planning directive re-instated.

Thank You.





Presented by

Klaus Malone
AIRBUS

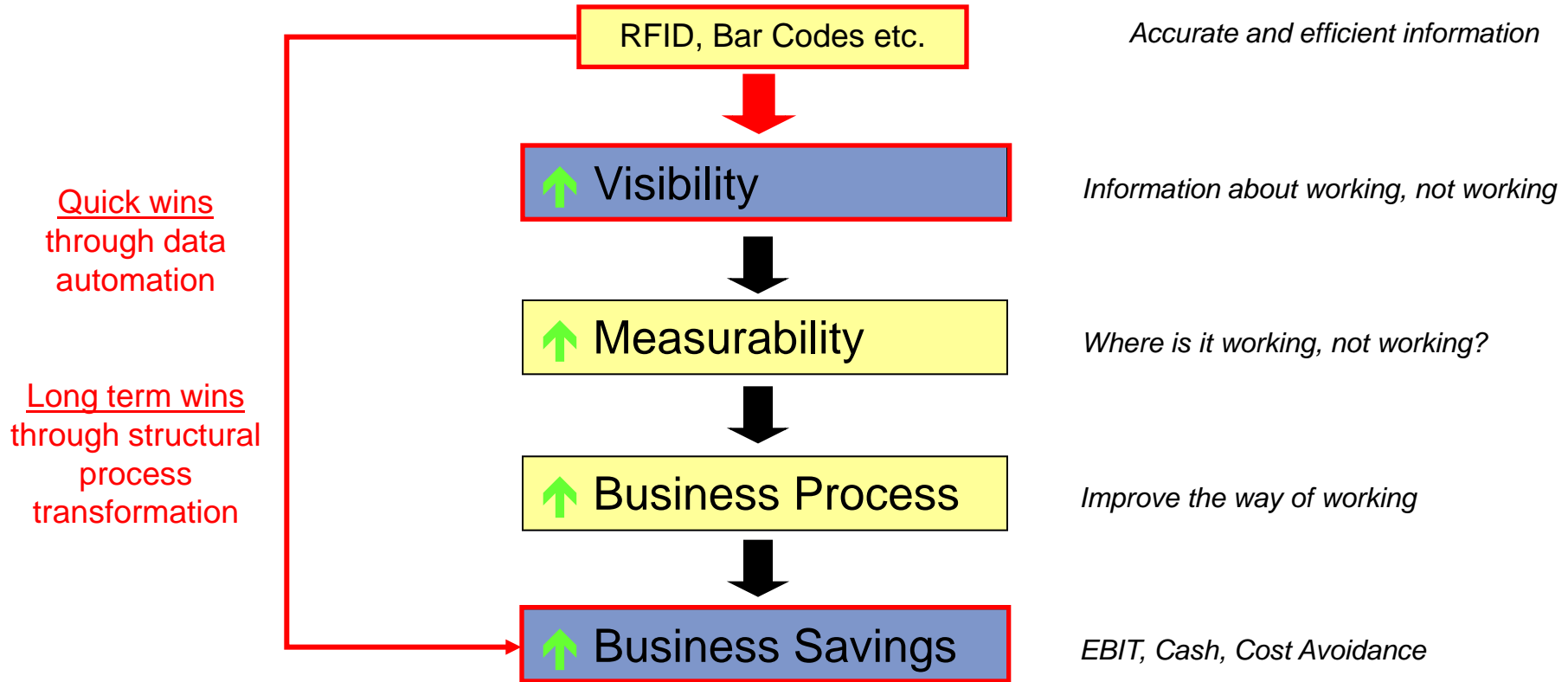


Airbus Executive Overview

Value Chain Visibility & Auto-ID

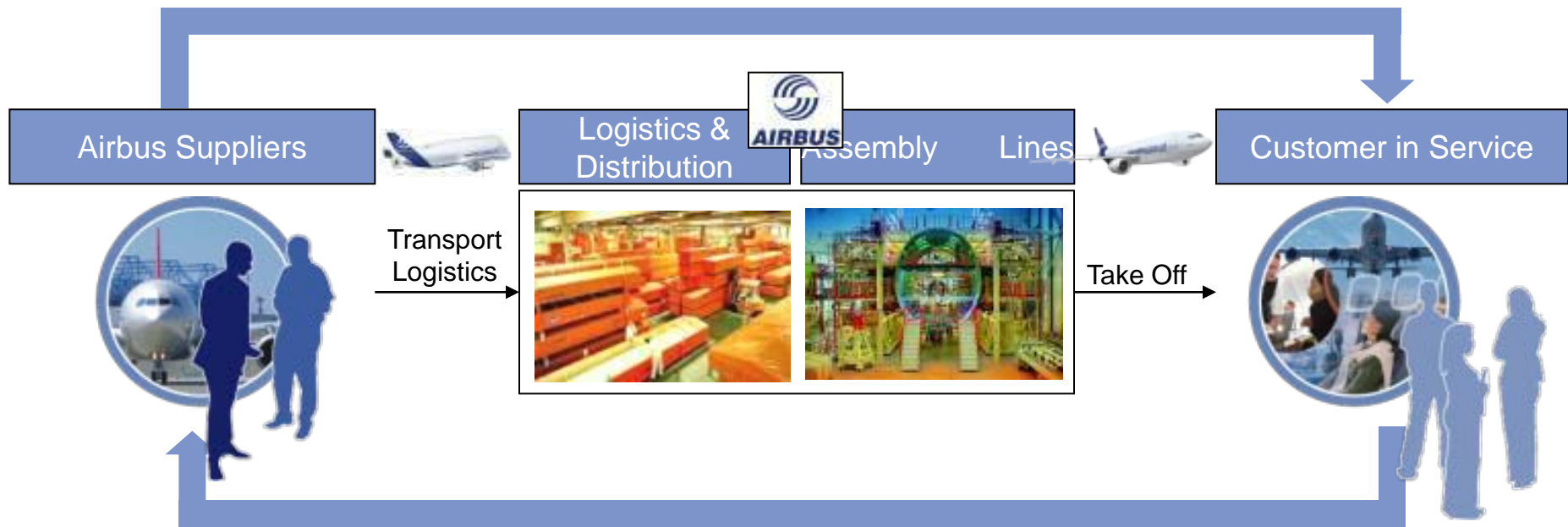


Why Increase Visibility? Why RFID?



Improving visibility is a pre-requisite to improve the “way of working” and deliver business savings

What is Value Chain Visibility and Auto-ID?

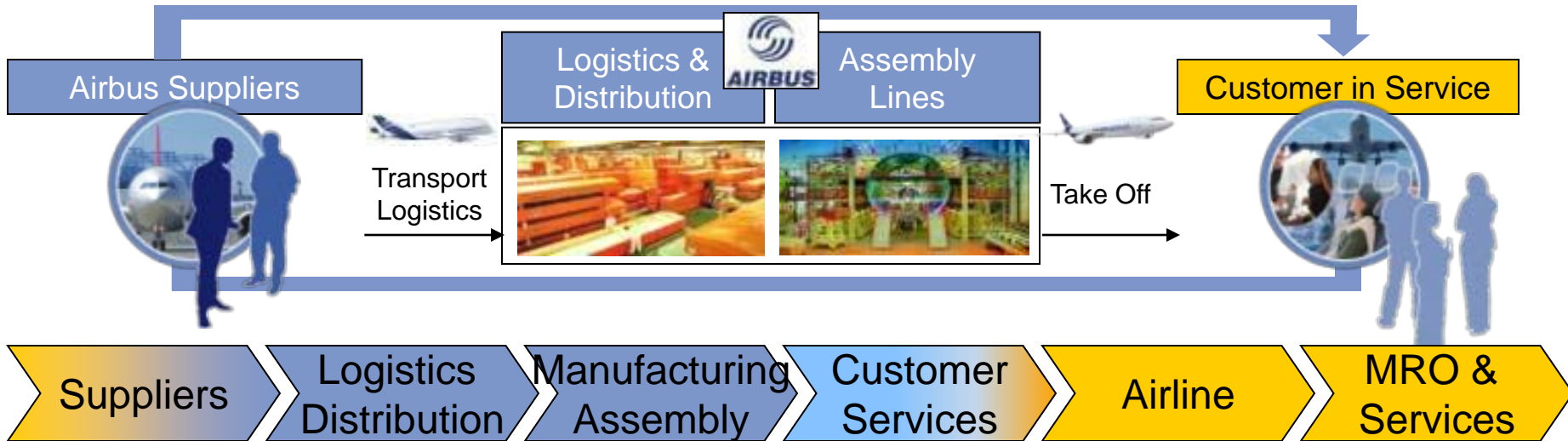


- Company approach to improve business processes through better visibility
- Scope is focused on big picture; Airbus value chain not functional silos
- RFID is seen as a key enabler to improve visibility & business processes






Airbus is taking an integrated and value chain approach for the potential application of Auto-ID across its business processes

VALUE CHAIN VISIBILITY






Two categories of Visibility



NON-FLYABLE

-  Warehouse Logistics and Inventory Management
-  Generic Asset Tracking (Containers, Spares, Tools, Jigs)
-  Global Transport Network
-  As-Built Configuration Management and Attestation
-  Tool Loans and Consignment Stock

FLYABLE

-  Spare parts logistics
-  Optimized Maintenance Process
-  Component repair operations
-  As-Flying Configuration Management Processes
-  Cargo/catering operation

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RELEASE 1 (NON FLYABLE)

Warehouse Logistics



RELEASE 1 (NON FLYABLE)

Warehouse Logistics

SCOPE

Warehouse Logistics and Inventory Management

RFID enhanced shipping labels on delivery boxes

BENEFITS

100% Automated Data Entry

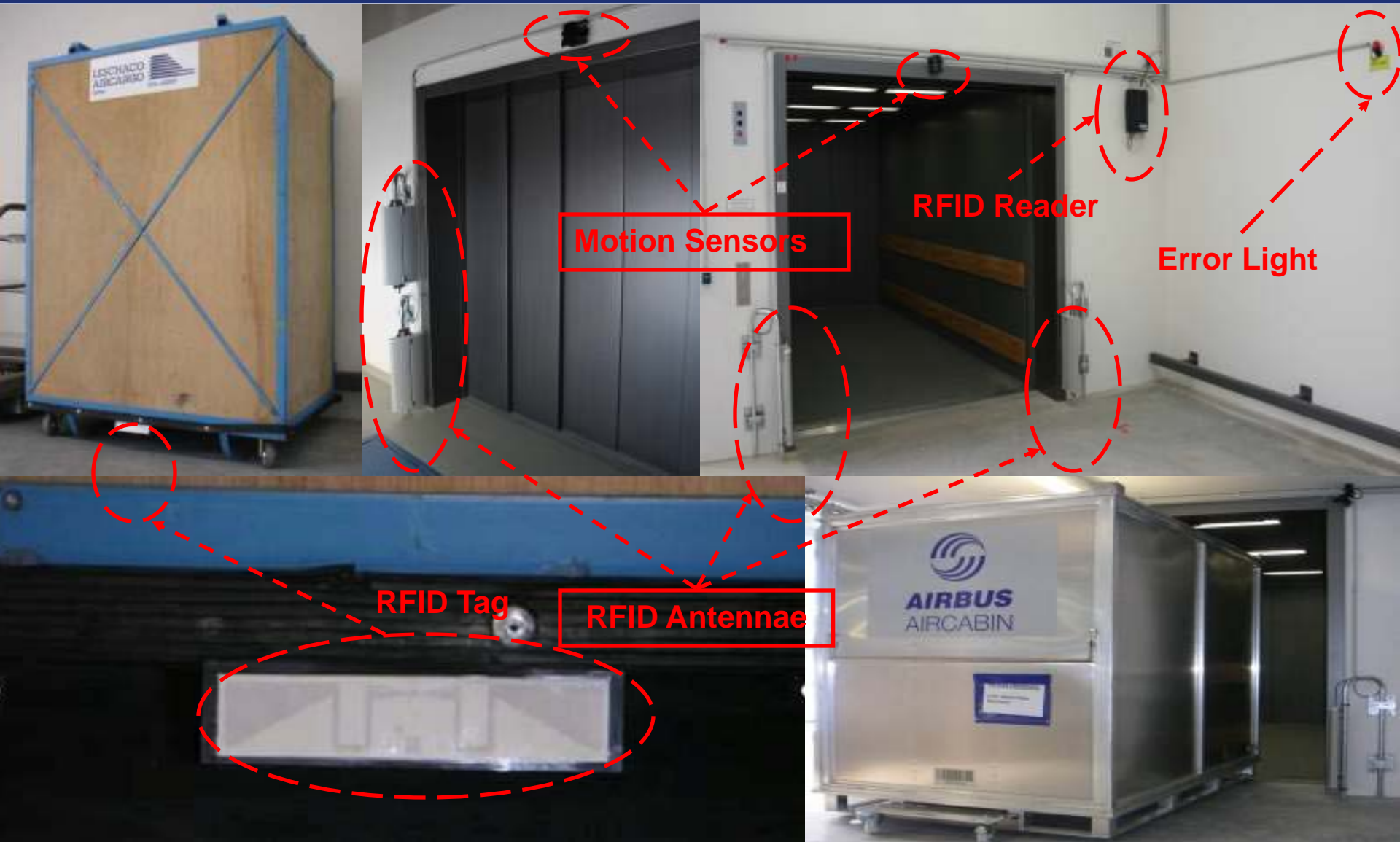
Goods Receipt, Inspection, Move/Pick, Inventory Mgmt

75% Reduction in physical handling time

↑ Labour Productivity, ↓ Inventory

RELEASE 1 (NON FLYABLE)

Distribution



RELEASE 1 (NON FLYABLE)

Distribution

Scope

750 Material Delivery Units (MDUs) containers per A380

Automated life cycle tracking of MDUs from 3PL to FAL

BENEFITS and STATUS TODAY

Streamline processes; right place, right time, first time

Reduce containers by 8% compared to manual process

Pilot Phase Over – Now in Production, 4500 containers

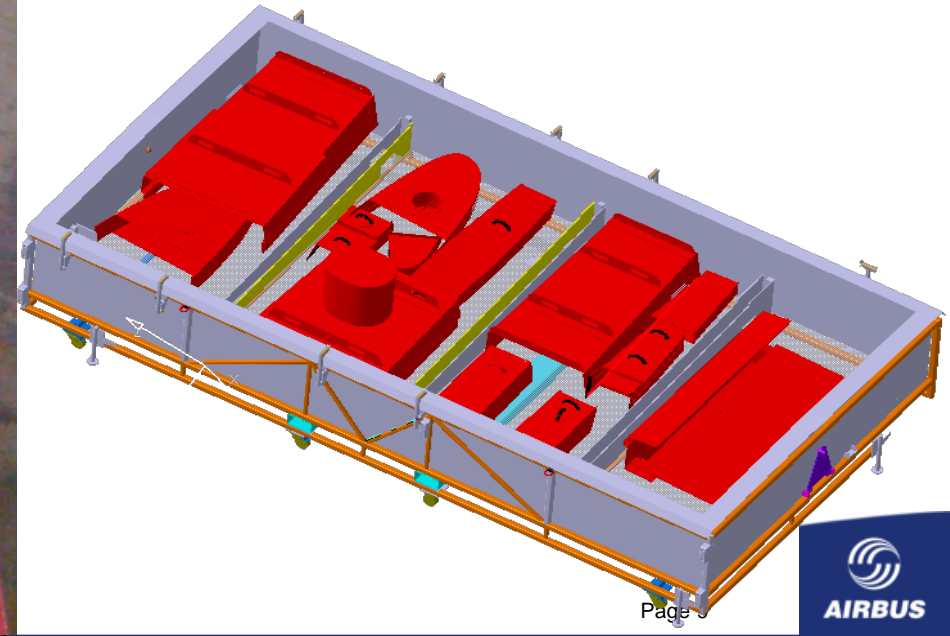
100+ RFID Reader Installations

RELEASE 1 (NON FLYABLE)

Inventory Management



RFID TAG



RELEASE 1 (NON FLYABLE)

Inventory Management

BENEFITS

Automation of inspection activities

Track Crates & Covers between Spain/Toulouse

Increase process reliability & logistics transparency

Minimise lost 'Covers' and associated costs

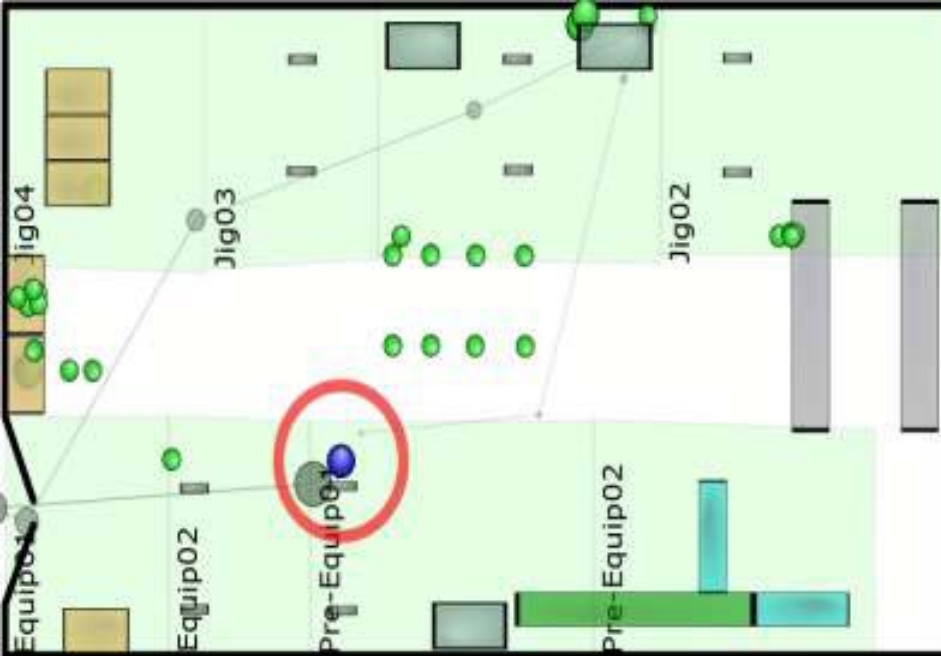
STATUS

Pilot - Completed

Industrialisation - Completed

RELEASE 2 (NON FLYABLE)

Tooling Management



RELEASE 2 (NON FLYABLE)

Tooling Management

BENEFITS

Automated tools booking in/out and workers association

Optimised maintenance and calibration cycles

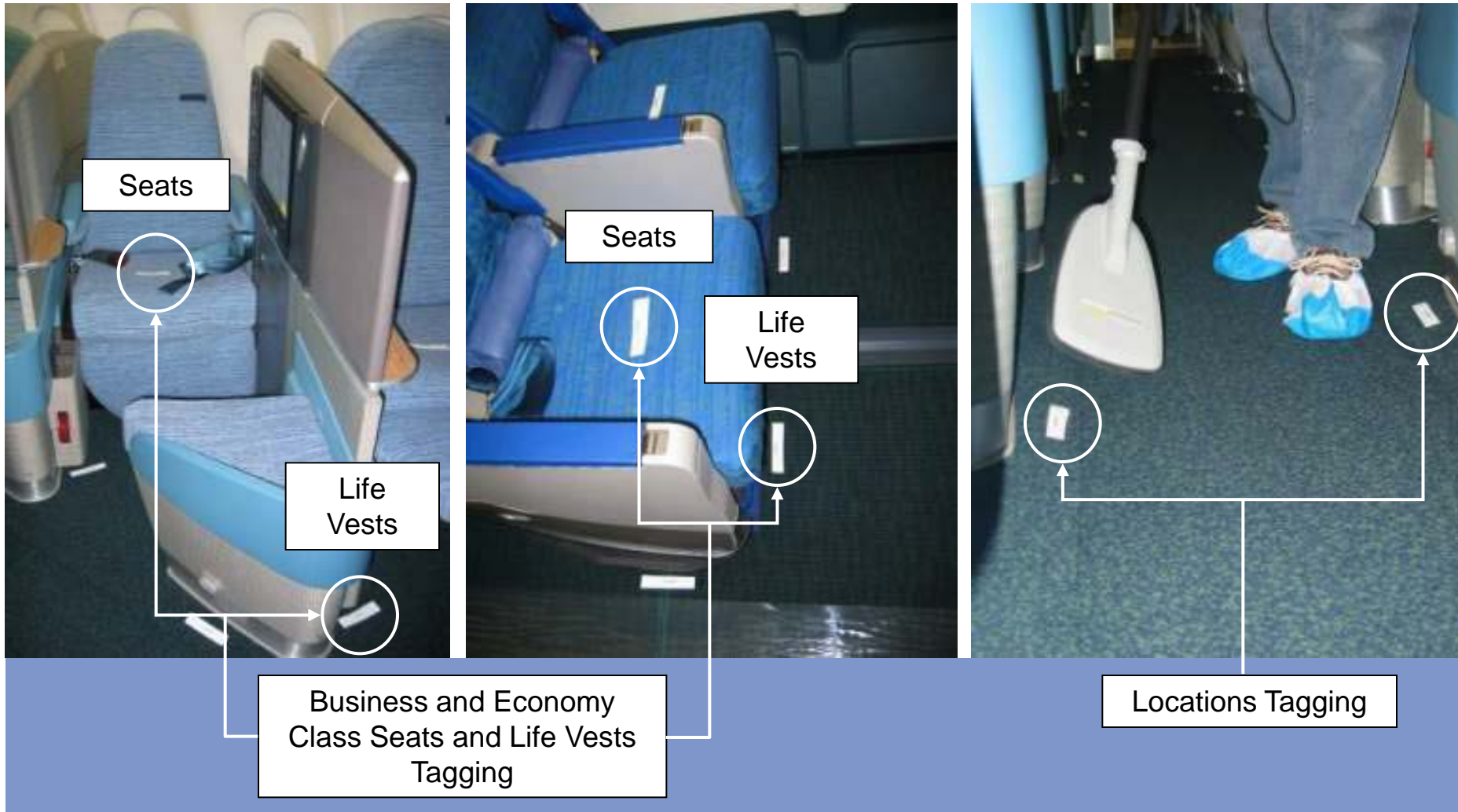
No tools search time, less work stoppage

STATUS

Pilots – Completed

Industrialisation – Completed

RELEASE 2 (NON FLYABLE) Configuration Management



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RELEASE 2 (NON FLYABLE)

Configuration Management

BENEFITS

Automated and Digital Attestation Process

Faster Cycle Time and Reduced Paperwork

Improved Configuration Management

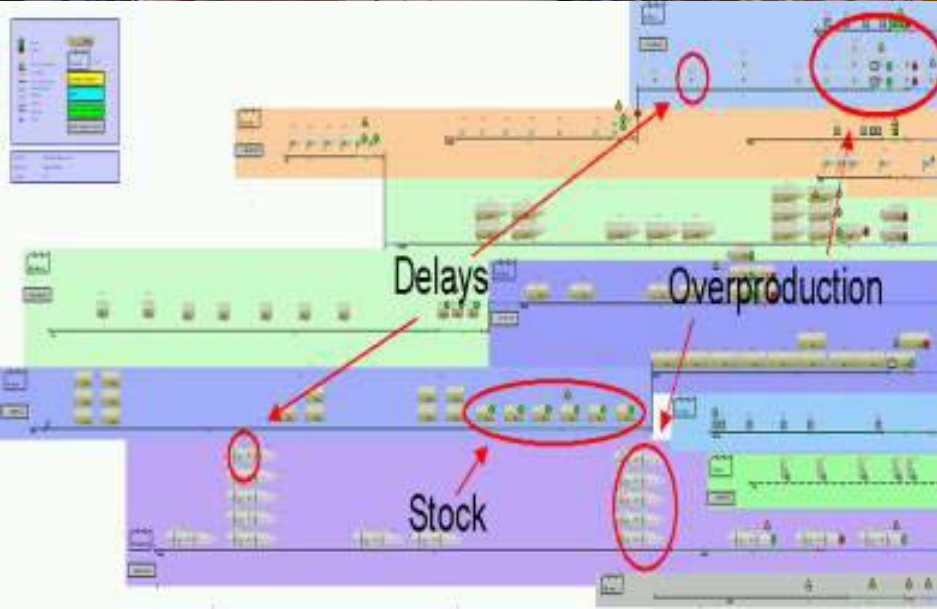
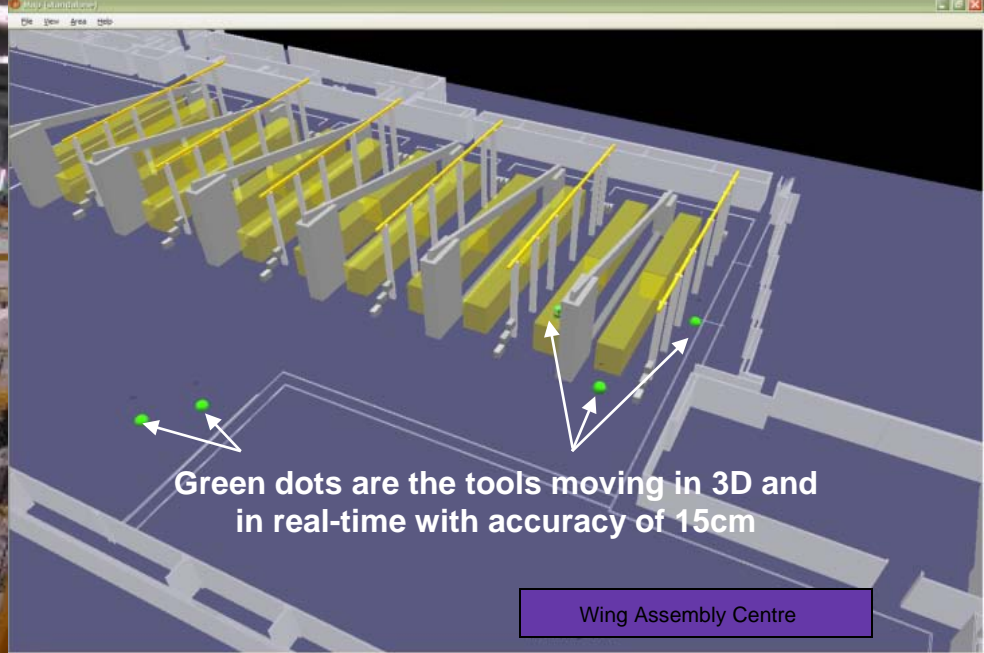
STATUS

Pilot - Completed

Industrialisation – Completed

RELEASE 2 (NON FLYABLE)

Work in Progress (WIP)



RELEASE 2 (NON FLYABLE)

Work in Progress (WIP)

BENEFITS

Automatic and real-time visibility of industrial processes

Automatic monitoring of processes and variations

Key enabler for Lean Improvements

STATUS

Pilot - completed

Industrialisation – EIS June 2010

RELEASE 3 (FLYABLE)

Current Status

Use Case Studies

- 4 opportunity studies completed with airline customers and MRO partners
- All payback within 12 months, strong savings (up to multi-million €/year)

A350 XWB RFID Part Marking Specifications

- Distributed to Airbus suppliers in 2008, based on approved standards
- Working with suppliers to develop RFID solutions for part marking
- Airbus has selected Maintag/Tego as High Memory UHF suppliers

Aerospace RFID Standards Finalised

- ATA Spec 2000 for data structure and high memory management
- SAE AS5678 for performance minima, test conditions and robustness

The introduction of RFID part marking on A350 XWB will help enable customers reduce their maintenance costs

RELEASE 3 (FLYABLE)

Standardization next steps

ATA role in tags on parts standards has been successful

- ▶ Airbus is using the Spec 2000 for A350 RFID part marking
- ▶ Airbus will support adoption within the industry

Next step 1 : RFID passive UHF on tools

- ▶ Re-use of the part marking work => Spec 2000 chap 9-5
- ▶ Same technology => UHF RFID passive high-memory
- ▶ E.g. for booking in and out applications

Next step 2 : RFID for shipping labels on logistics boxes/documents

- ▶ Different standard to be developed
- ▶ UHF low-memory technology
- ▶ E.g. for enabling easier logistic tracking in supply chain

Airbus is actively supporting RFID standardization for the aerospace industry use cases

NEXT STEPS

EADS and Beyond...

EADS Parent Group

- Expansion across multiple business units within EADS Group
- Projects re-using Airbus processes, solutions, contracts and vendors
- Re-use of standards : Faster, cheaper and better

Airlines

- Airbus : catalogue of benchmark RFID processes across aircraft lifecycle
- Not limited to Airbus; generic and applicable to all players in the industry
- Approached by number of airlines to develop and deploy projects
- One project already completed, another underway

Airbus' catalogue of standard processes and solutions is providing value to multiple actors across the value chain

Summary

- Airbus recognises RFID as a key enabler for improving processes
- Airbus is taking an integrated & end to end approach to the use of RFID across all business processes through a single corporate programme
- Airbus is actively working with airline, supply chain and industrial partners to develop an approach that maximises benefits to all actors
- Airbus is working with major industry players, standards bodies and authorities to ensure inter-operable RFID solutions

Airbus is using RFID as a **BUSINESS RADAR** to help build a **DIGITAL** and **FLY BY WIRE** view of the supply chain and its business operations

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How automated data collection utilizing RFID technology benefits airline logistics operations

Adam Martin, Continental Airlines
Marie Zitkova, SITA

The reality in today's MRO operation



Numerous identity tags affixed to parts, often different users recognizing same part under different identity



Stacks of paper accompanying each part's movement

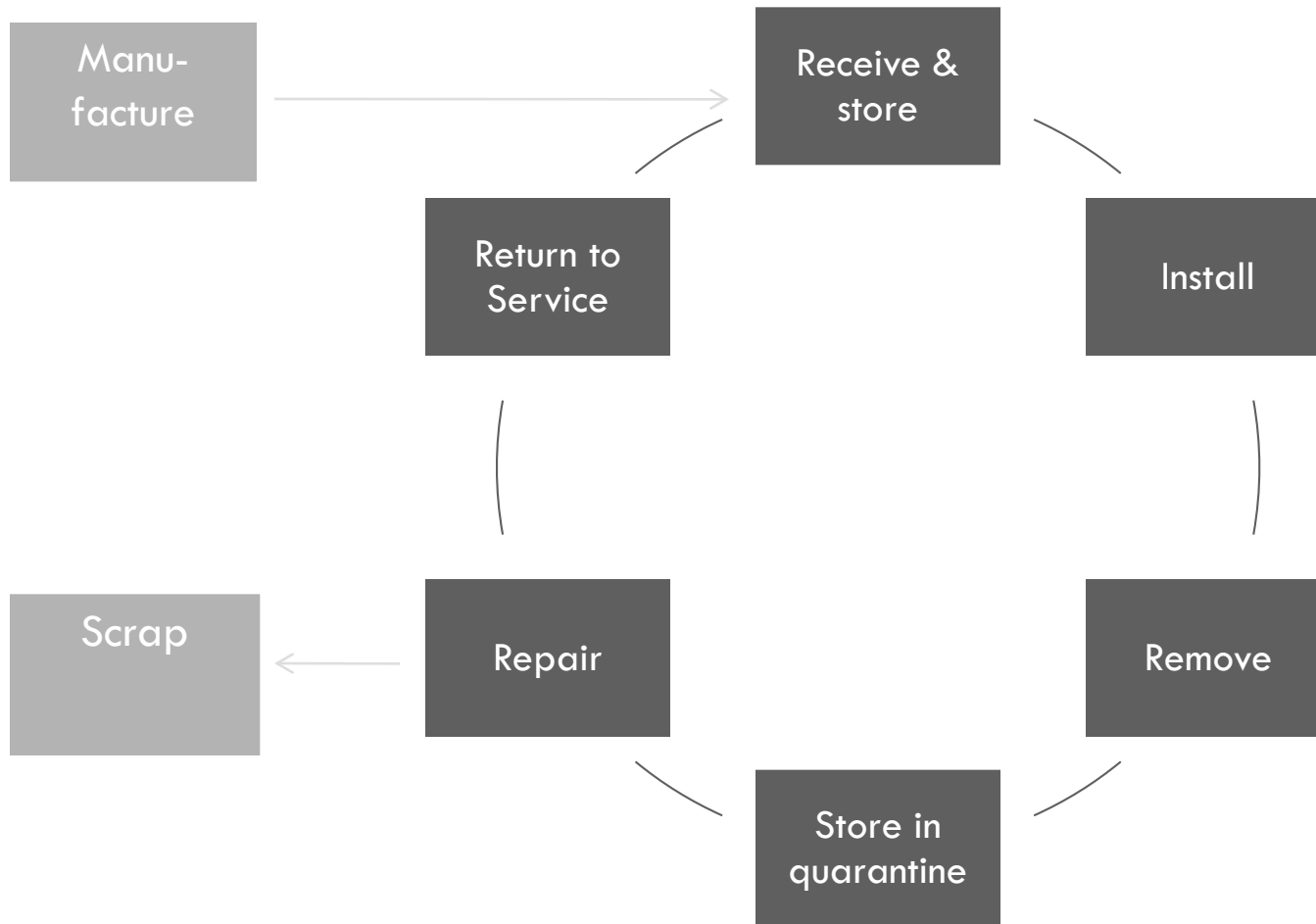


Manual location updates to the airline's back office system



Cumbersome configuration management program

Generic lifecycle of a part



One morning at the receiving station

08:00



- Parts arrive on the dock.
- Receiving clerk opens each box, verifies the part and shipping documents are included and match.
- He retrieves all documents and proceeds to his PC ...



What if...

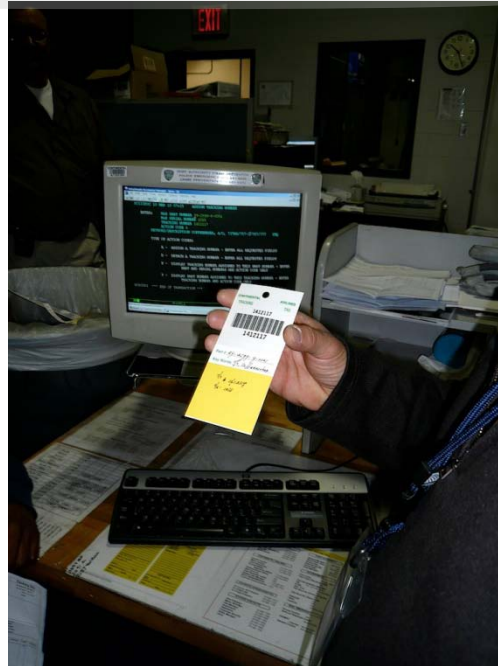
...all parts were RFID tagged and on arrival passed by an RFID gate ?

One morning at the receiving station

08:12



- The clerk locates order, confirms the receipt in the system.
- He prints an internal tracking document and places it in the box
- He attaches a new tracking tag to the part itself.
- He moves the box to inspection



What if...

...the system automatically verified the presence of all electronic documents against unique ID of the part?

One morning at the receiving station

08:20



- The inspector verifies 8130 and other documents
- He verifies the part itself
- He enters data in the system, prints, signs a serviceable tag and attaches it to the part.
- He sends original documents to A/C records



What if...

...8130s and teardown reports were received and authenticated electronically and presented to the inspector as he inspects parts ?

One morning at the receiving station

08:45



- Warehouse staff opens the box to verify the content and documents.
- He updates the stocking location in the system to show “part at disposition”
- He moves the box to the pallet and takes the pallet to the binning location.



What if...

...the part was RFID tagged with its ID readable through the packaging ?

One morning at the receiving station

09:00



- Another warehouse staff comes to unload the pallet.
- He checks each box and handwrites a box label for easy recognition.
- He also handwrites a list if all boxes labelled.
- He moves the box to its designated location.
- He moves to his PC to update the location of all boxes in the System of Record.



What if...

...all location changes could be recorded in the system automatically using an RFID reader?

Technology components needed

Radio frequency allows no line of sight reading

- Part can remain in a box
- Part identification can take place without opening the box
- Part identification can take place if the part is behind a panel

RF

Globally unique ID

- Unambiguous match between a part and its electronic documentation throughout the lifecycle
- Automated retrieval of data
- No need to store paper documents in a box

ID

Mobility

- Using handheld devices, kiosks and intelligent reader gates, mobile workers access information where and when they need it.

Mobility

Electronic form processing

- 8130, Teardown report, Cert. of Conformance
- No need to retype data from paper to systems
- Automated checks of documents (availability, consistency, authenticity)

E-forms

New landscape of capabilities and systems

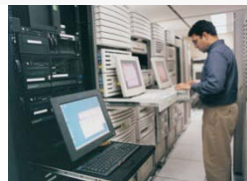
OEM

- Parts are equipped with RFID tags
- Vendors prepare and digitally sign electronic (XML) documents instead of paper (e-8130, teardown report)
- Vendors include unique part IDs on all relevant electronic documents



Data exchange & directory services

- Exchange of electronic documents such as e8130
- Directory services to locate data providers (such as OEM) when electronic documents are missing or incomplete (based on the unique ID of the part)
- Provision of PKI certificates and related directory and validation services



Airline

- RFID infrastructure for tracking of parts
- Ability to process and archive digitally signed electronic documents (teardown report, e-8130)
- Mobile workforce



Part's journey from dock to bin in numbers

58%

... of the time it takes to move a part from the dock to the bin is spent on administrative (read "paperwork") activities that could be automated.

More than
10

...different paper documents and tags are involved in the journey, these could be electronic or automatically identifiable

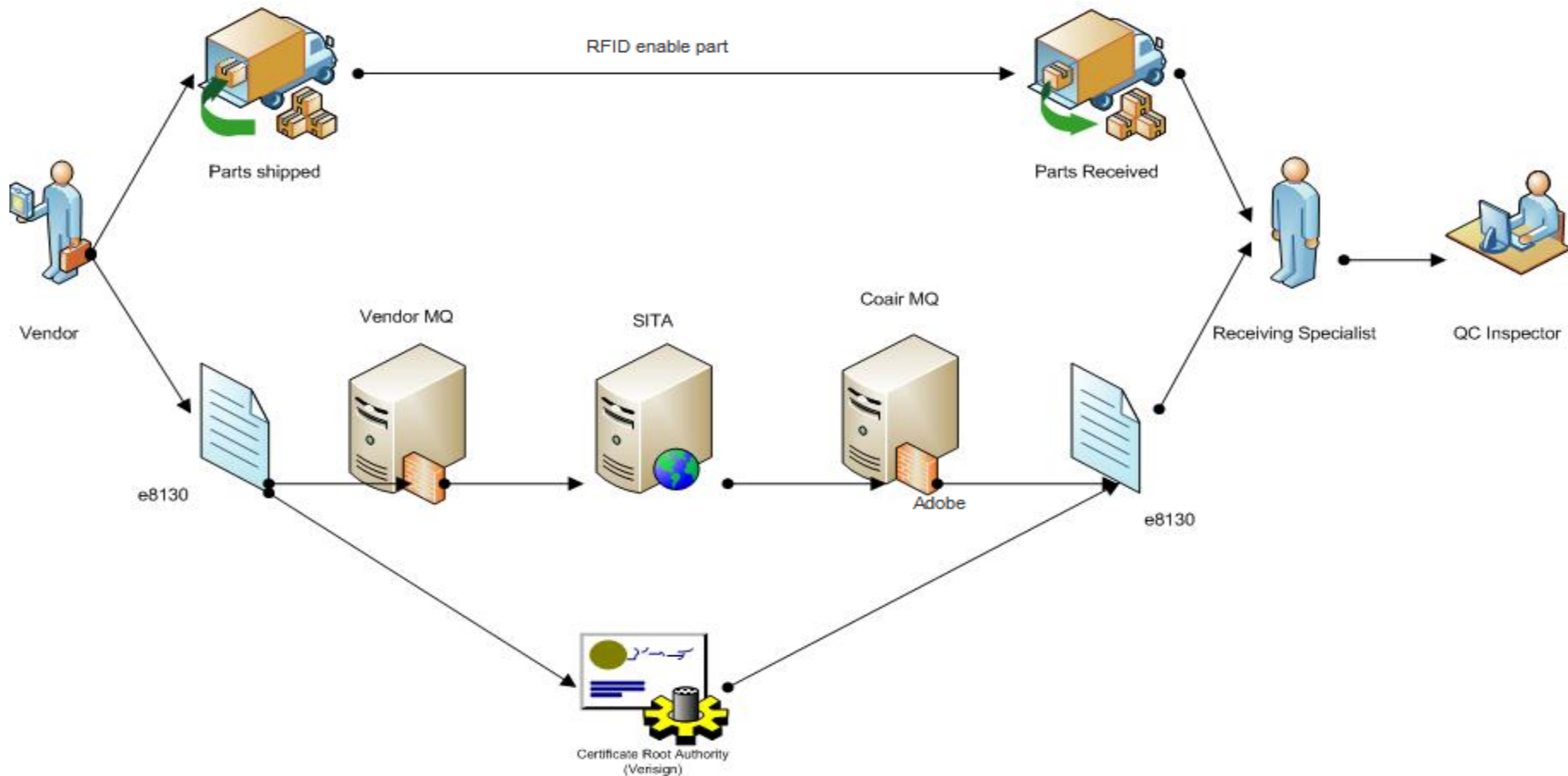
8130, Certificate of Conformance, Teardown report, Shipping advice, Invoice, Asset tracking tag, Box tag, Routing document, ...

20
minutes

... of an inspector's time on average saved per receiving of a single rotatable part. This is a saving on administration activity which does not add any business value as the time can be used for more inspections

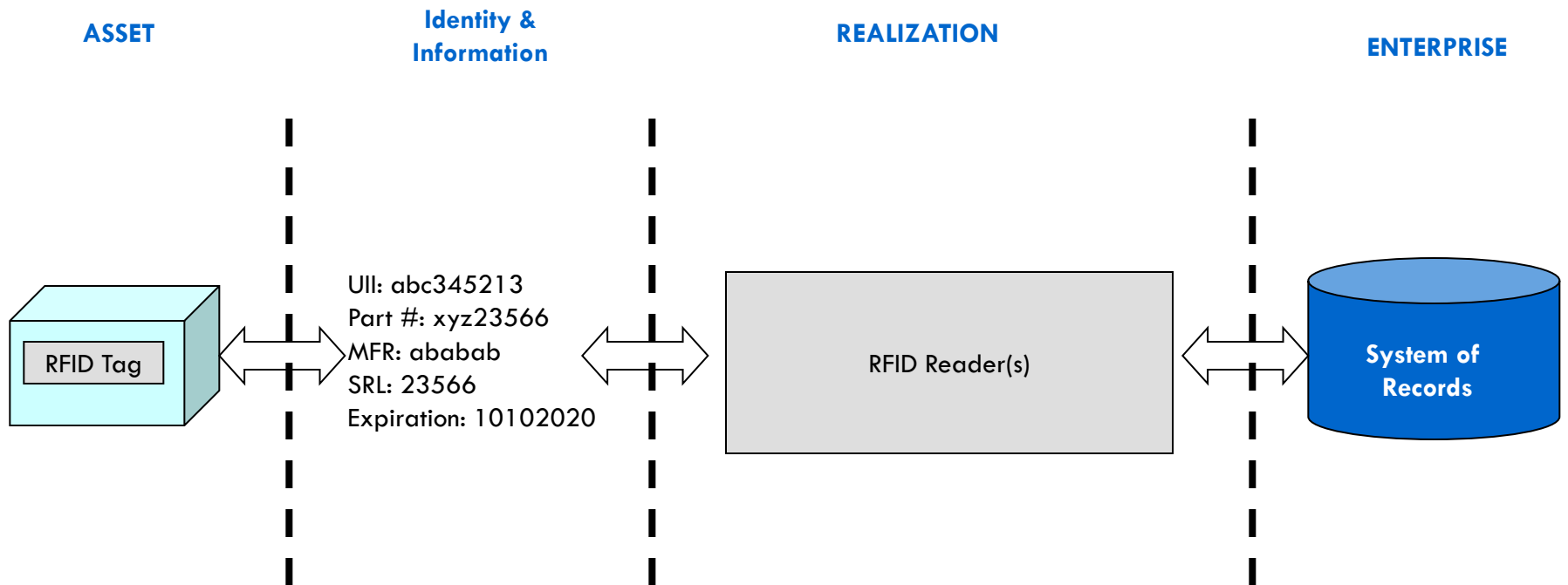
Estimates based on process analysis conducted by SITA and Continental Airlines, results are smoothed to represent generic airline situation.

Continental Proposed RFID/eDocuments Solution



This is not conceptual. It is a matter of putting all of the existing elements together.

RFID Enabled Data Flow Diagram

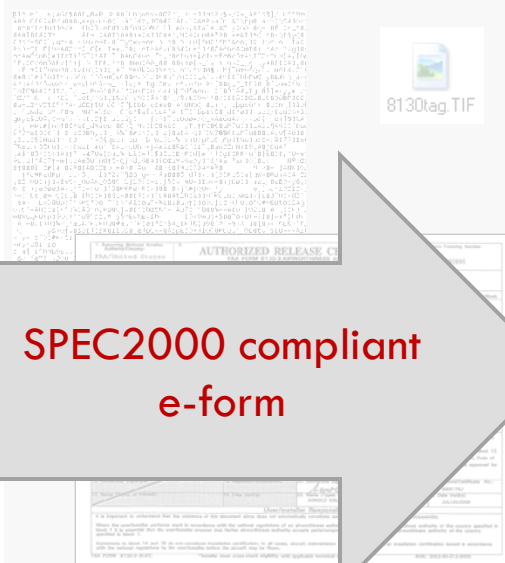


Electronic form processing and SPEC2000

Paper document

- ✗ Electronic form transfer & storage
- ✗ Digital signature possible
- ✗ Import of data to recipient's system
- ✗ SPEC2000 compliant e-form

Scanned image



SPEC2000 compliant e-form

- ✓ Electronic form transfer & storage
- ✓ Digital signature possible
- ✗ Import of data to recipient's system
- ✗ SPEC2000 compliant e-form

Digitally signed XML file

```

<xml version="1.0" encoding="UTF-8" ?>
- <ATA_InformationSet xmlns:sia="http://www.w3.org/2001/XMLSchema-ir"
  version="1" id="TEST2">
- <CertificationData>
- <CurrentCertificate>
- <ATA_PartCertificationForm version="1" id="ID589601188712703">
- <Block2>
- <CETX FVA"6-01" FAA Form 8130-3 </CETX>
- <Block2>
- <Block3>
- <IDN-1188-712703 </IDN>
- <Block3>
- <Block4>
- <IssuerDetails>
- <SRL>58960/SRL>
- <WHO>Honeywell International Inc.</WHO>
- <ADL>1300 W. Warner Road</ADL>
- <CTY>Tempe</CTY>
- <TID>80064-070>
  
```

XML Document

Sample 8130 xml file from ATA

- ✓ Electronic form transfer & storage
- ✓ Digital signature possible
- ✓ Import of data to recipient's system
- ✓ SPEC2000 compliant e-form

XML document linked to a part via unique ID encoded on RFID tag