Fokker

GKN GKN AEROSPACE

LEADING
the Future of
Maintenance

RFID

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Sep 28, 2017

RFID

THE FUTURE OF ROTABLES MANAGEMENT

BARCODING AND RFID TECHNOLOGY ON AN IOT PLATFORM

Philosphy of connecting things
Business impact

Accurate
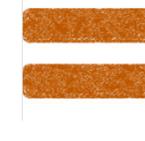Streamlined
Efficient operations

| Visibility ⬆ | Measurability ⬆ | Business processes ⬆ | Business Savings ⬆ |

Accurate
Streamlined
Efficient operations

RFID market research
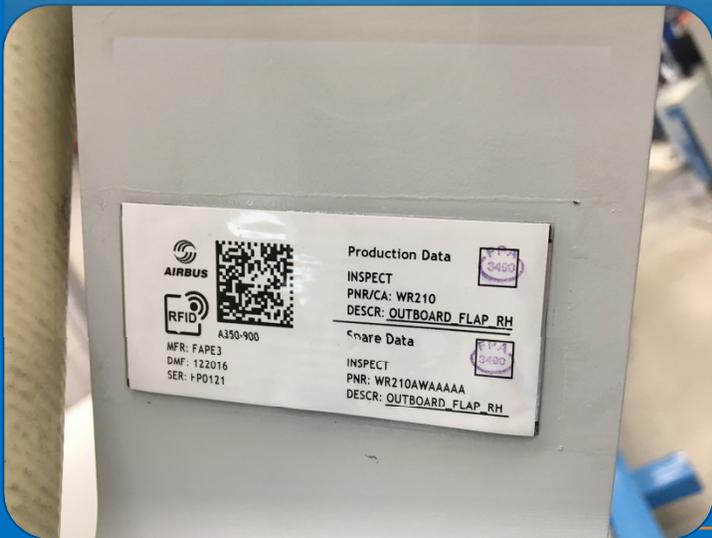## Aerospace industry shows an increasing heavy usage of RFID technology

	Manufacturer	Aerospace OEM	Operator	(A)MRO
Maturity	High ●●●	High ●●●	Low ●○○	Low ●○○
Reason for usage	Optimized logistics and Optimized operations Data mining	Optimized logistics and Optimized operations Data mining	Data mining	Optimized logistics and Optimized operations Data mining Quality assurance
Companies	TATA STEEL, GE, SCANIA	AIRBUS, BOEING, MEGGITT	KLM, Lufthansa, Emirates	SIA ENGINEERING COMPANY, AAR, Lufthansa Technik
Restriction by regulations	Low ●○○	Medium ●●○	Low ●○○	Medium ●●○
Popular products	Low frequency, low memory active tag Low frequency, low memory tag **(passive)** Ultra high frequency (UHF), low memory tag **(passive)** UHF, high memory tag **(passive)** Asset management Tooling management	Low frequency, low memory tag **(passive)** Ultra high frequency (UHF), low memory tag **(passive)** UHF, high memory tag **(passive)** Asset management Tooling management	Software for data gathering	Ultra high frequency (UHF), low memory tag UHF, high memory tag Asset management Tooling management Emergency equipment management Rotables Management

Airbus uses RFID tags >3000 parts

Production Data
INSPECT
PNR/CA: WR210
DESCR: OUTBOARD_FLAP_RH

Spare Data
INSPECT
PNR: WR210
DESCR: OUTBOARD_FLAP_RH

RFID
A350-1000
MFR: FAPE3
DMF: 102016
SER: FP5005

Production Data
INSPECT
PNR/CA: WR210
DESCR: OUTBOARD_FLAP_RH

Spare Data
INSPECT
PNR: WR210AWAAAAA
DESCR: OUTBOARD_FLAP_RH

RFID
A350-900
MFR: FAPE3
DMF: 122016
SER: FP0121
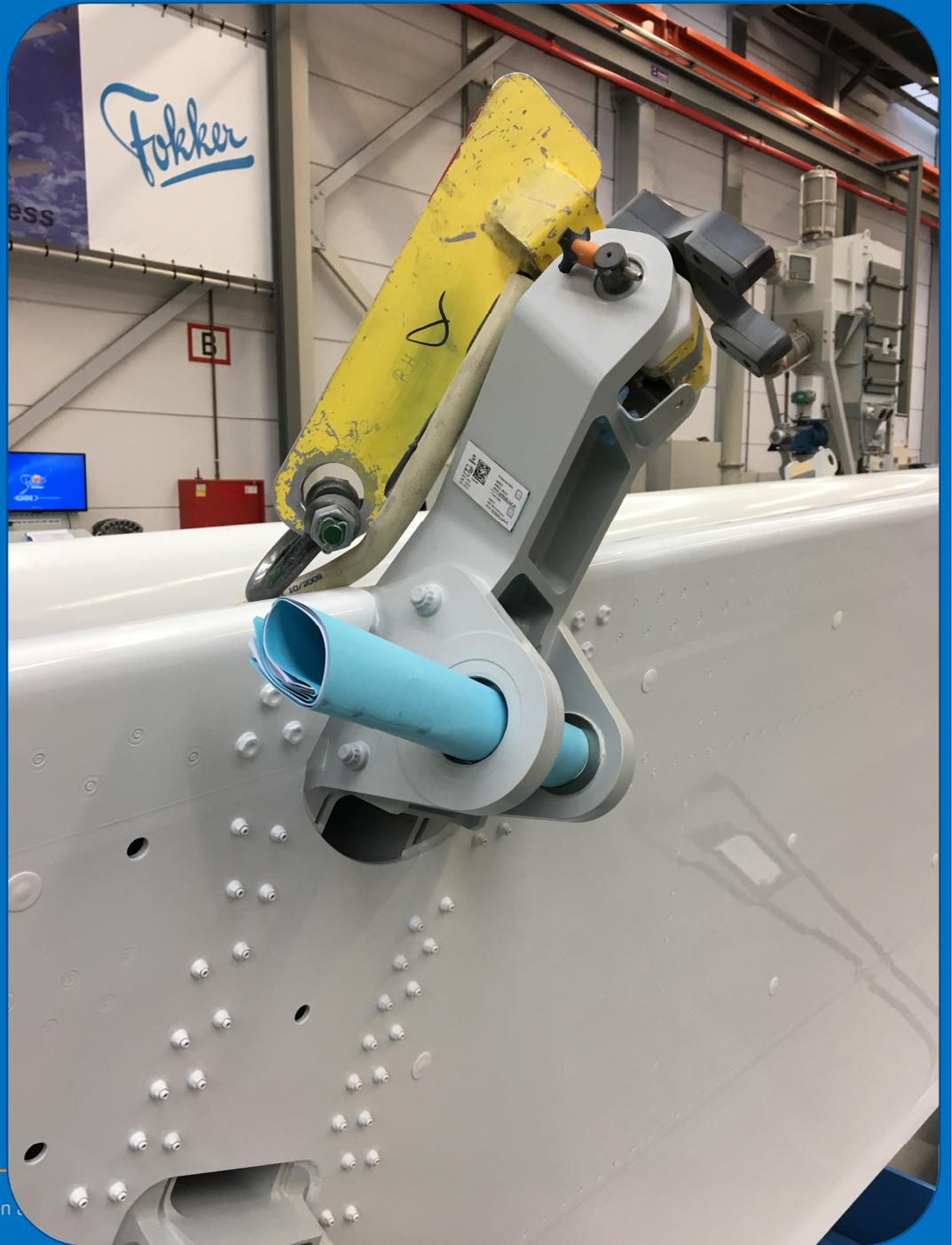
RFID Technology maturity roadmap

Benefits of RFID technology include in short term efficiency and accuracy gains, as well as inter supply chain collaboration in the long run

Inter supply chain collaboration

5 **Maximization**
- Data transparency across supply-chain partners
- Shop and maintenance track records available to all customers
- Drive innovation through-out the supply chain

New service development

4 **New business**
- Use capability to secure new business
- Add RFID retrofitting to CMRO portfolio

Process transparency & Seamless real-time data

3 **Data mining**
- Availability of accurate data used for continuous improvement
- Better forecasts, planning, lower inventory, etc.

Quality enhancement & Rework prevention

2 **Accuracy gains**
- Improving accuracy and traceability of components
- Decrease losses, disputes, rework across sites
- Optimized quality assurance (less troubleshooting)
- Improved customer satisfaction

Process optimization

1 **Efficiency gains**
- Optimized logistics, eliminating waiting time
- Workflow automation - Reduction in human overhead (direct support)
- Optimize first time right in value stream (less rework)

Advantages RFID
Driving (internal) customer value

Internal processes

RFID technology optimizes pull-process and visual management throughout the value stream

- Real-time tracking WIP, visible for everyone
- Improving efficiency (~~waiting time~~)
- Proactive critical alerts of WIP status
- Elimination of rework (~~human error~~)
- Real-time 3D Dashboards

Rotables Management

Improved inter supply chain collaboration and improved logistics, decreasing TAT and stock levels

- Inter supply chain collaboration
- Optimized logistical processes (~~waiting time~~)
- Optimized quality assurance in supply chain
- Improved data mining globally (continuous improvement)
- Global visibility of components

Disadvantages RFID
Several disadvantages of RFID technology do exist and need to be taken into account and/or mitigated

Internal processes

RFID optimizes the pull-process and visual management throughout the value stream

- Readability of the tags need to be validated

- Alterations to a site's lay-out will influence a tag's detectability

- Covering all area's with readers to ensure no 'blind spots' is costly

- No plug and play functionality available, resulting in high maintainability and cost for improvements and alterations

Rotables Management

Improved inter supply chain collaboration and improved logistics, decreasing TAT and stock levels

- Customers and suppliers will need to be educated in using RFID technology

- Interface with Pentagon will be costly

- It will take several years before most eligible components will have been tagged (expected 70% in 5 years)

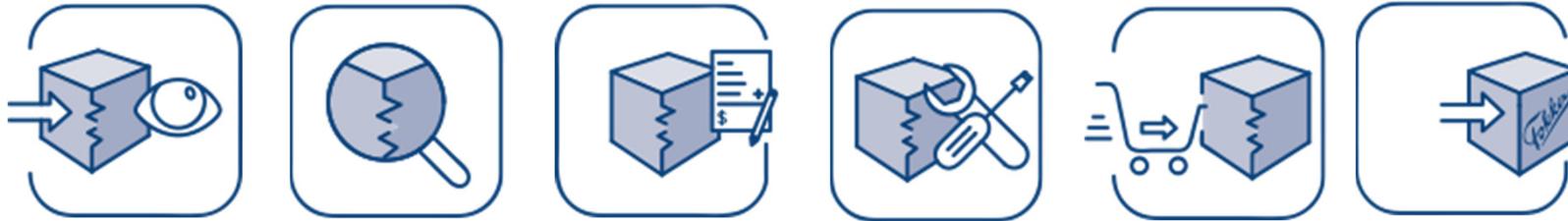- Not all components can be tagged with a high memory, sustainable tag
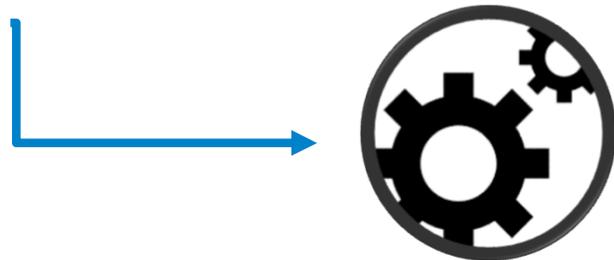
Value Stream Map, Future state

Legend

Location and Information to dashboard and Pentagon

W Automatic workflow update

Task time versus actual time measurement

Picture of future state value stream map
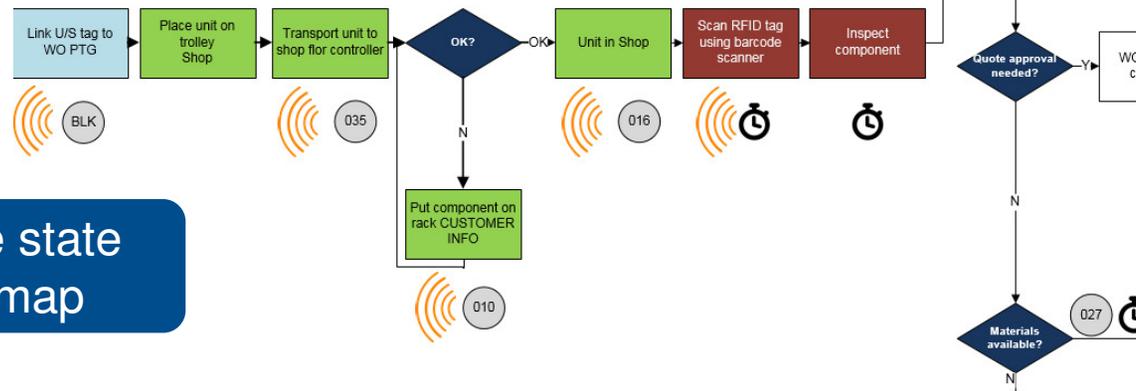
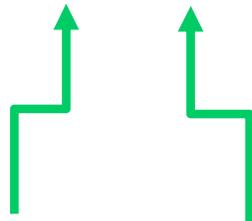# Connecting – Internal Processes

Middle ware

Internet

Value Stream Map – Guiding principles (I)

VSM was aimed at eliminating waiting time, rework and maximizing the value added time

- The focus of incorporating RFID is on maximizing the value added time in the total lead time of the value stream of components (in-house repairs, closed loop as well as commercial).

- The aim is to remove double entries in ERP that are currently taking place.

- To provide real-time control of the total value stream (task times, first time right, zero misplacements etc.)

- Establish a pull-system throughout the component value stream.

Value Stream Map - Guiding Principles (II)

Ultra-high frequency tags, with or without memory will be used:

ID tag

- Type of tag: Memory, ultra-high frequency permanent tags.
- Goal: Information carrier
- Installed by: Authorized technician (ensure functionality is not compromised)
- Updated by: Direct Support of Workshops, in line with international specifications
- Period: Permanent (20 years or more)

U/S, S/V and Component ID label

- Type of tag: No memory, ultra high frequency tags
- Goal: PN/SN identification, optimization of logistics
- Installed by: Logistics, receiving, warehouse, Aircraft hangar
- Period: From first moment of registration till delivery

Kaizen bursts unique to RFID technology

7 Unique kaizen bursts that improve the overall performance of the value stream by eliminating human error, waiting time, over processing and unnecessary troubleshooting

BURST

BENEFITS

1   RFID U/S, S/V and removal tag as UHF low memory tag   Immediate PN+SN recognition throughout value chain, visual management

2   24/7 Trace of components   Eliminates human error and troubleshooting personnel, Optimizes Quality Assurance

3   MOD status, internal overhaul date, who last worked on component on high memory tag   Eliminates human error, over processing and troubleshooting

4   Encode RFID with PN + SN   Eliminates human error, over processing and manual processing steps

5   Automates workflow changes due to location change   Eliminates waiting time, over processing

6   Real-time 3D dashboard   Visual Management

7   Apply ANDON with RFID integration   Eliminates waiting time, optimizes pull system

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Kaizen burst with generic solutions

4 Generic kaizen bursts that improve the overall performance of the Abacus value stream by eliminating human error, waiting time, over processing and unnecessary troubleshooting

1	Pull system	Waiting time
2	Push info to shop floor and Logistics	Waiting time
3	Departmental SLA into (middleware)	First time right, waiting time, troubleshooting
4	Shipping confirmation	Quality assurance to (internal) customer

Business Scenario: RFID + Barcoding
Guiding principles and conditions

- VSM guiding principles

+

- Conditions:

1) Low cost, traceability of components in the shops via dashboards
2) Usage of middleware to facilitate information gathering and data mining
3) Automatic workflow updates in ERP
4) Automate closing of WHS transfers
5) Enhance Quality Assurance at order dispatch (no miss shipments)
6) Boost First-Time-Right in internal processes
7) Automatic prioritization for personnel involved
8) Shop floor controller to manage troubleshooting | Operator center
9) In shop use barcoding technology, outside shop RFID tech.
10) Plug and Play solution for RFID middleware and hardware + key-user Fokker

Value Stream Map – Guiding principles (I)
VSM was aimed at eliminating waiting time, rework and maximizing the value added time

- The focus of incorporating RFID is on maximizing the value added time in the total lead time of the value stream of Abacus components (in-house repairs, closed loop as well as commercial).

- The aim is to remove double entries in PTG that are currently taking place.

- To provide real-time control of the total value stream (task times, first time right, zero misplacements etc.)

- Establish a pull-system throughout the component value stream.

RFID + Barcoding Design Schiphol
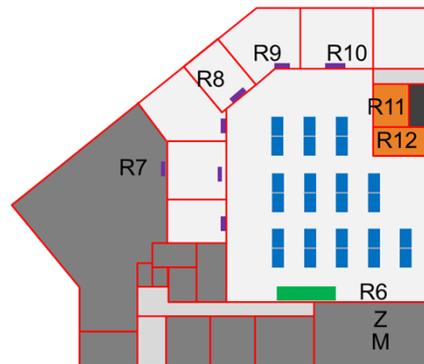## Effective roll-out at Schiphol will be Proof of Concept

Floor Plan – Ground floor: logistics
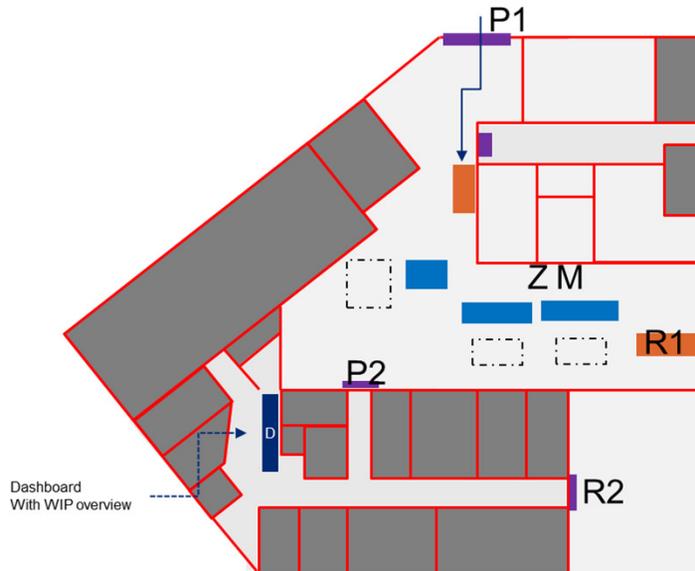
Floor Plan – Level 1 –
Avionics shop & Power Generating shop
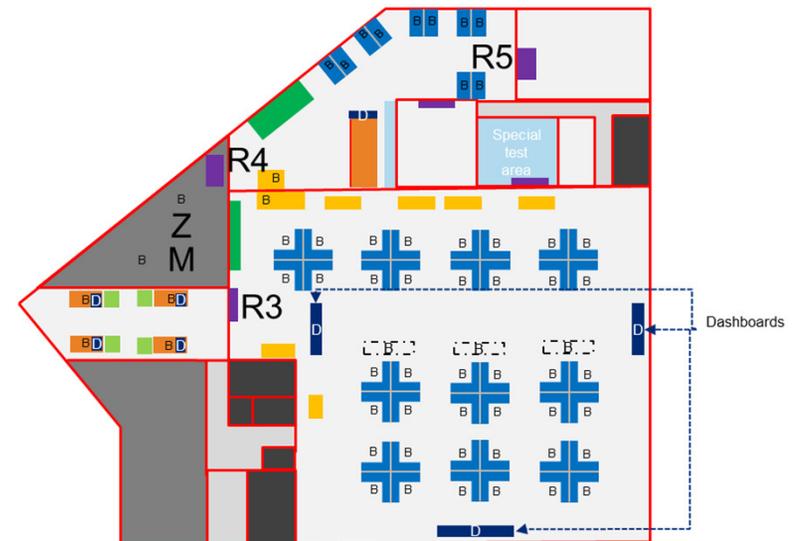

Floor Plan – Level 2 – Hydraulics shop

Investment & Activities

Hardware	Software & Licenses	Professional services
Zebra printer	IOT platform	Site Survey, System Requirements, SOW
Zebra RFID handheld	WIP application	Project Management
RFID readers	Handheld device license	Rotables Solution Configuration
RFID reader	Fixed device licenses	ERP integration
RFID antenna		User interface
RFID Antenna cables		Reports, alerts, dashboards
Photo cell		Installation/Deployment
		Training
20%	**35%**	**45%**

RFID on rotables management
Financials shows a payback period < 3 years
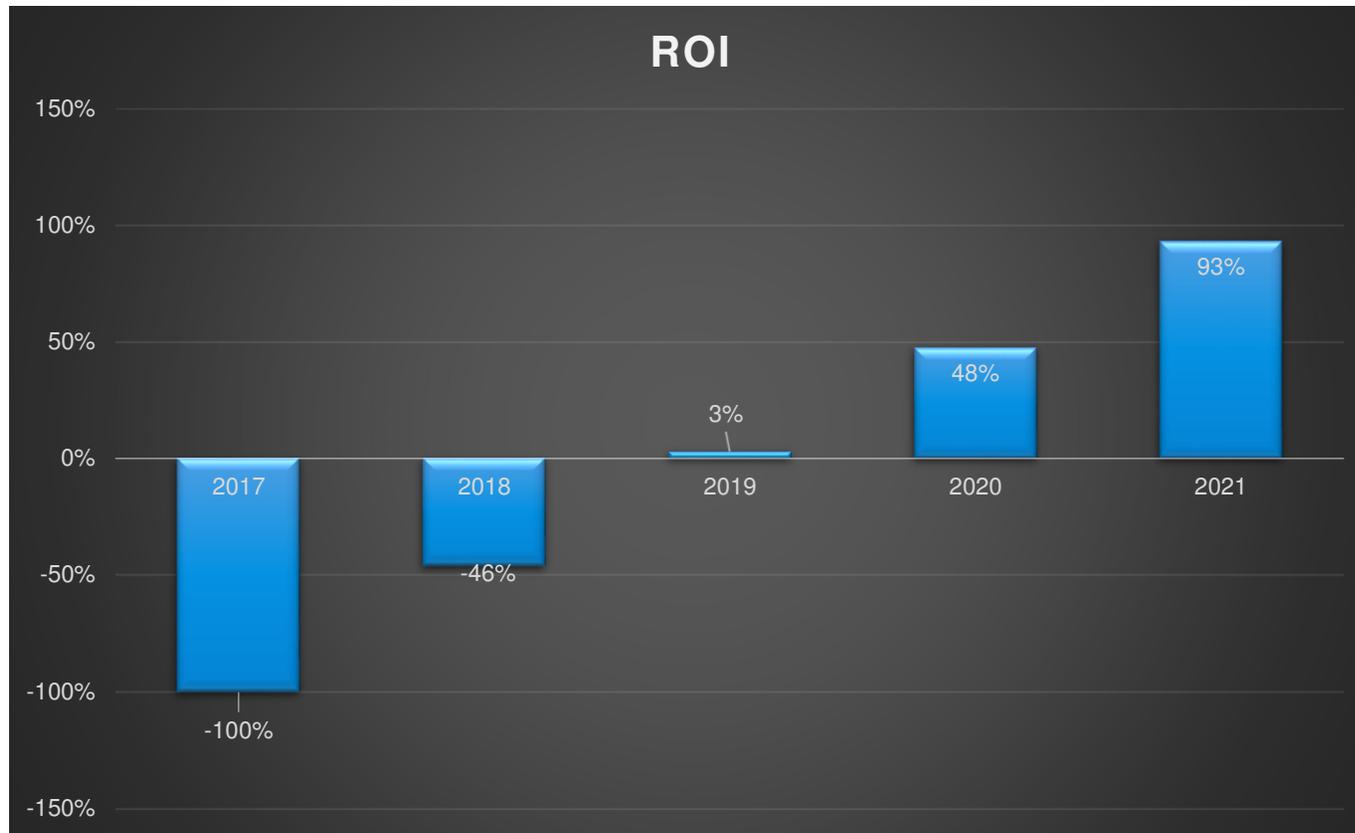
Summary
RFID technology to further improve competitive edge in rotables management

- Incorporating RFID technology will enable Fokker Services to achieve direct business savings.

- It will enable Fokker Services to reduce the TAT in the component repair cycles with 30% due to the reduction in waiting time and optimization of processing time, using RFID technology.

- This results in an increased turnover rate and that subsequently lowers the stock levels

- In the middle to long run, RFID technology will increase the transparancy and the inter-supply chain collaboration between Fokker Services and its customers.

- Incorporating RFID technology in rotables management will be an unique selling point for Fokker Services to get new business.

- The next steps should be aimed at incorporating the RFID technology at Schiphol site, deliver proof of concept and then roll it out globally.

RFID discussion

- Wat zijn de grootste enablers voor implementatie
  - Organisatie, wet- en regelgeving, functionaliteit, cash etc.

- Gaat in de toekomst de totale keten van service componenten open met elkaar om, om zo alle data uit te wisselen

- Blijft RFID gebruikt worden als identificatiemiddel, of gaan we uiteindelijk naar slimme componenten die naast informatie voortbrengen deze ook bij zich houden
  - Gaan we informatie delen met behulp van systeemkoppelingen zoals dat nu al regelmatig gebruikt wordt of gaat dit via het component die eventueel tijdens gebruik ook data verzameld

Thank you for Your attention