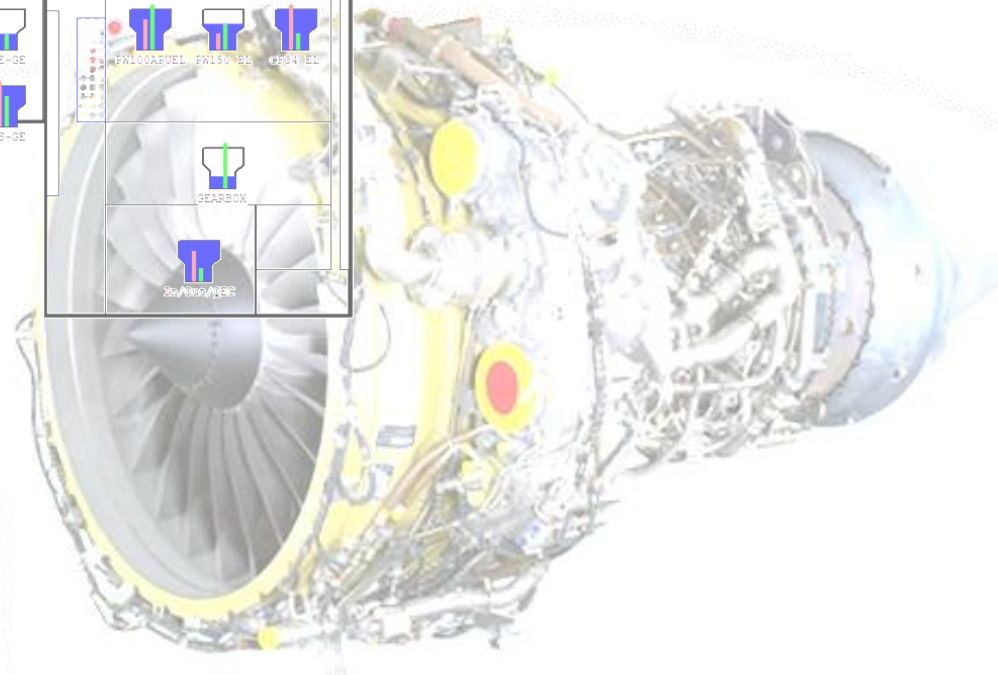
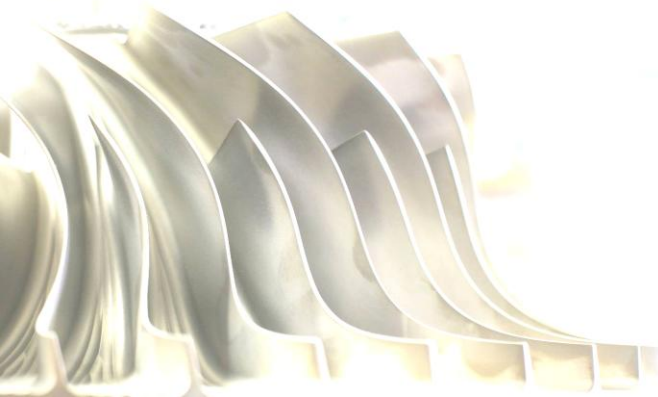
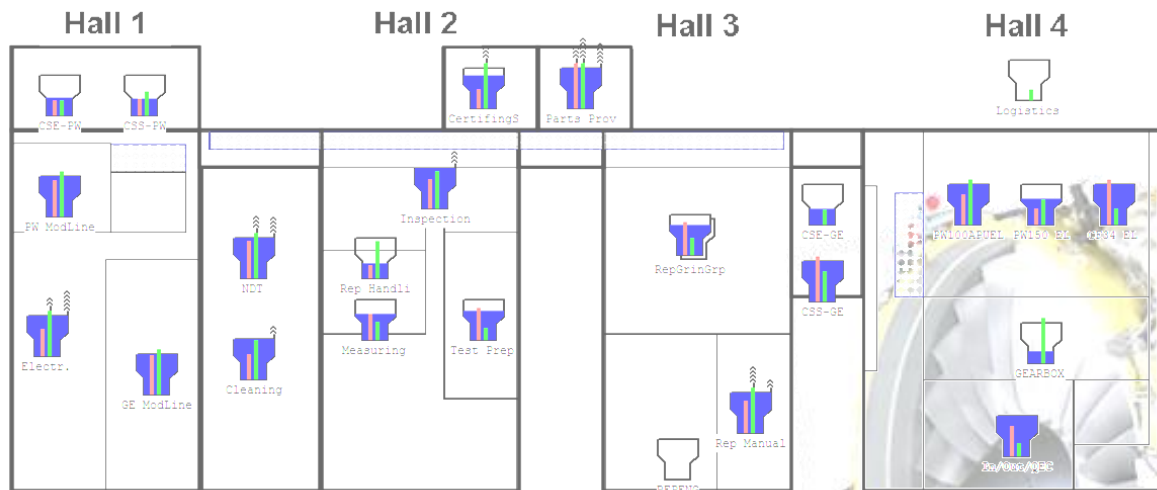




# Production Planning at Lufthansa Technik AERO Alzey (LTAA)



# Lufthansa Technik AERO Alzey – Production System

## Agenda



- 1) Lufthansa Technik AERO Alzey – Company Overview
- 2) LTAA Production System
- 3) Major Production Challenges
- 4) Former Production Monitoring & Control at LTAA
- 5) New LTAA Production System based on Goldratt's Theory
- 6) Goldratt's theory assigned to LTAA's Production System
- 7) IT architecture at LTAA
- 8) Success so far...

# Lufthansa Technik AERO Alzey – Company Overview

## Key Facts for 2012



- Specialized in Turboprop and small Turbofan Engines
- 100% subsidiary of Lufthansa Technik AG
- 490 employees
- 229 Mio. € Revenue
- More than 100 Customers
- 480 Engines repaired and overhauled (per year)
- Service Center in:
  - Tulsa, Oklahoma, USA
  - Melbourne, Australia
  - Buenos Aires, Argentina

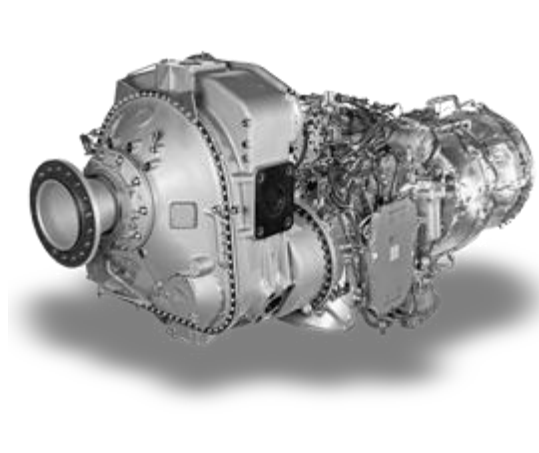


# Lufthansa Technik AERO Alzey – Company Overview

## Competence Center for regional aircraft engines



GE CF34  
Turboprop Engine



PW100 & PW150  
Turboprop Engine

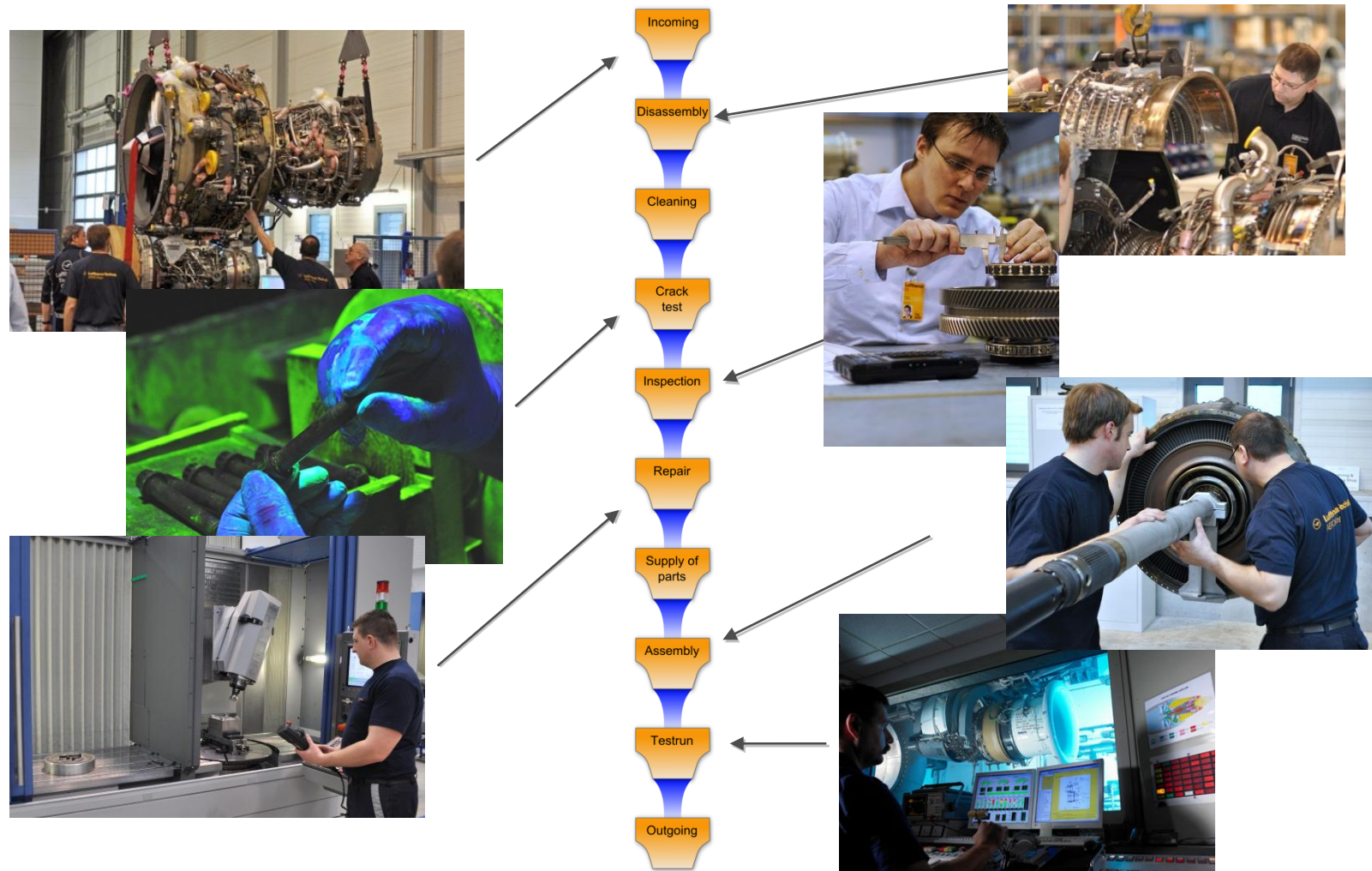


PW 901A  
Auxiliary Power Unit



# Lufthansa Technik AERO Alzey – Company Overview

## Typical workflow at LTAA



# Lufthansa Technik AERO Alzey – Production System

## Major Production Challenges

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- **Engine removals from aircraft mostly driven by unforeseen issues**
  - Shop load forecast difficult
- **Workscope mostly based on findings**
  - Repair can require 100MH or 1500MH
- **Many material sources**
  - Repair of original part, new material, used material
- **Many Customer decisions during shop visit**
  - Mainly cost driven
- **OEM requirements to consider**
  - Deviations from manuals all to be accepted by aviation authority, OEM and customer



# Lufthansa Technik AERO Alzey – Production System

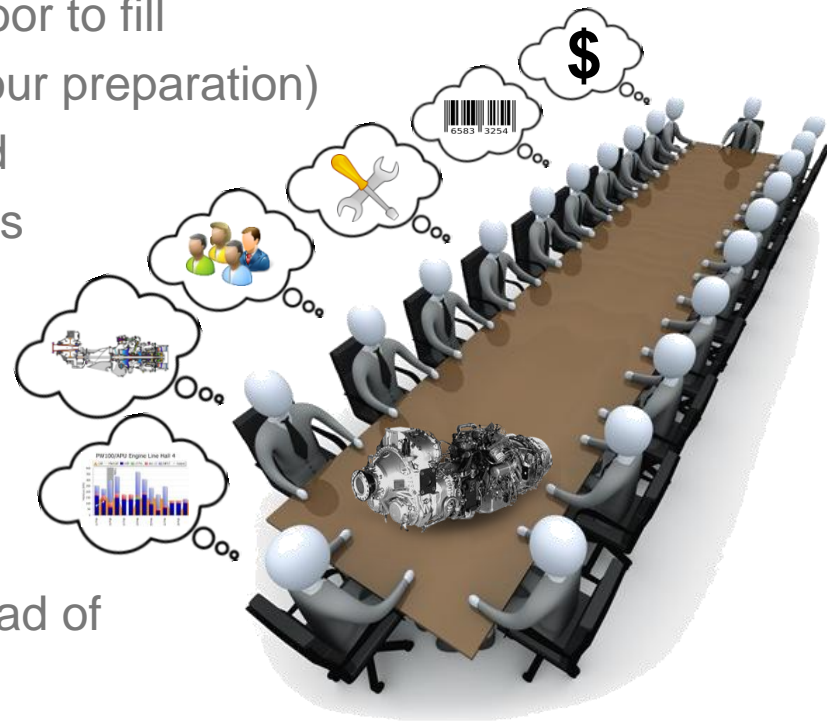
Former Production Monitoring & Control at LTAA

## ■ Daily production meetings

- 90 engines to be discussed
- 25 participants, 2 hours
- Data collection on the shop floor to fill individual spread sheets (1 hour preparation)
- Not all issues were addressed
- No documentation of decisions

## ■ KPIs were only available looking backwards

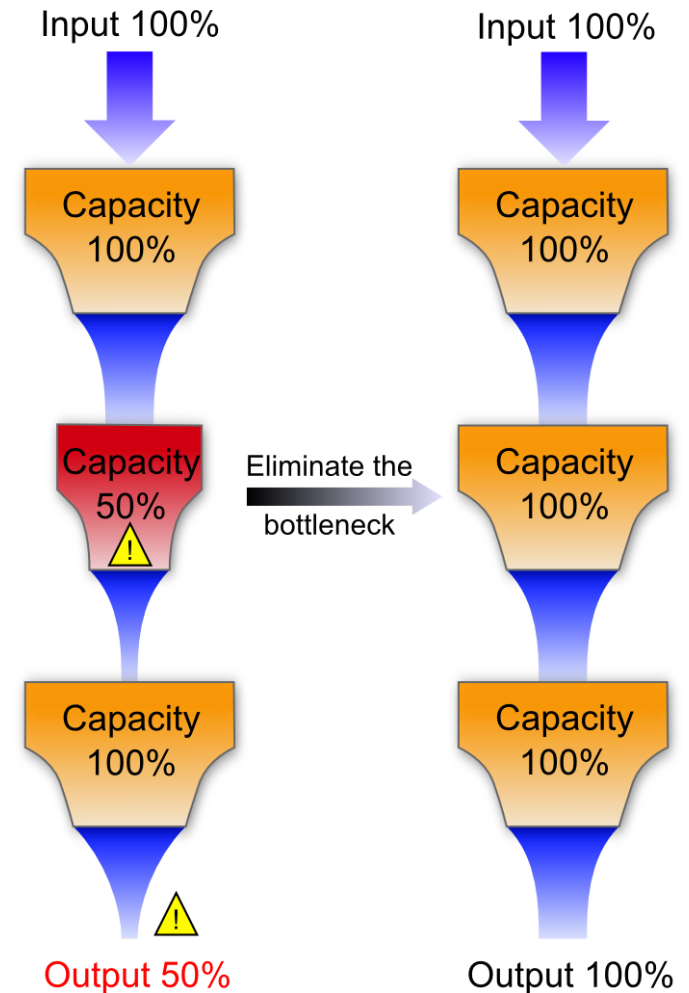
- already too late for corrective actions
- Justification discussions instead of pro-active solutions



# Lufthansa Technik AERO Alzey – Production System

New LTAA Production System is based on Goldratt's Theory

- LTAA's production system is based on Goldratt's Theory<sup>1</sup>
- The throughput of any linear production is always limited by a single „bottleneck“
- In a series of funnels, the „bottleneck“ is the funnel with the smallest outflow surface
- The task is to IDENTIFY and RESOLVE bottlenecks continuously



<sup>1</sup> [„The Goal“ by Eliyahu M. Goldratt and Jeff Cox]





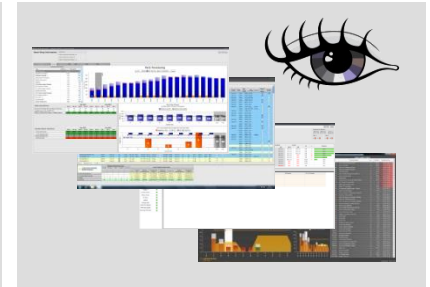
# Lufthansa Technik AERO Alzey – Production System

## Goldratt's theory assigned to LTAA's Production System

- Main Production bottlenecks at LTAA are:
  - Capacity (man power)
  - Material availability
  - Tooling
  - Deviations from OEM technical documentation
  - Production line stops

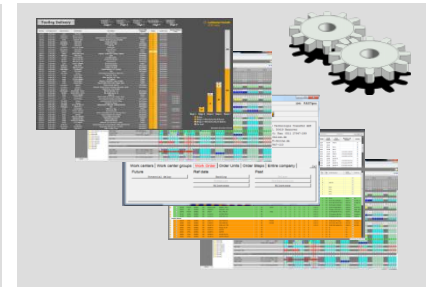
### Identify Bottlenecks

In order to identify a bottleneck, all workflows are visualized to everyone involved in the process – from mechanic to manager



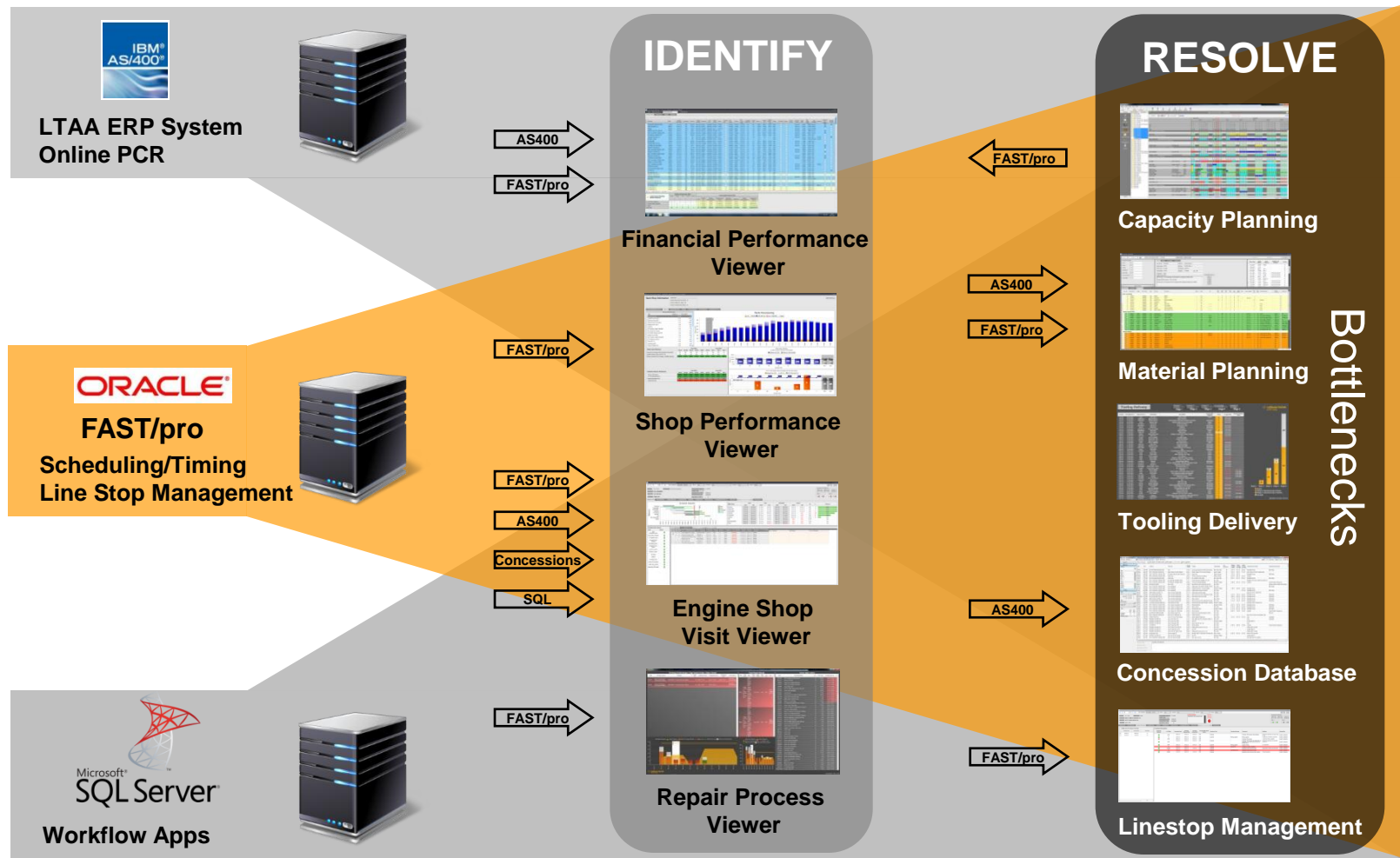
### Resolve Bottlenecks

In order to resolve a bottleneck, all critical workflows are addressed in dedicated workflow databases



# Lufthansa Technik AERO Alzey – Production Planning

IT architecture at LTAA



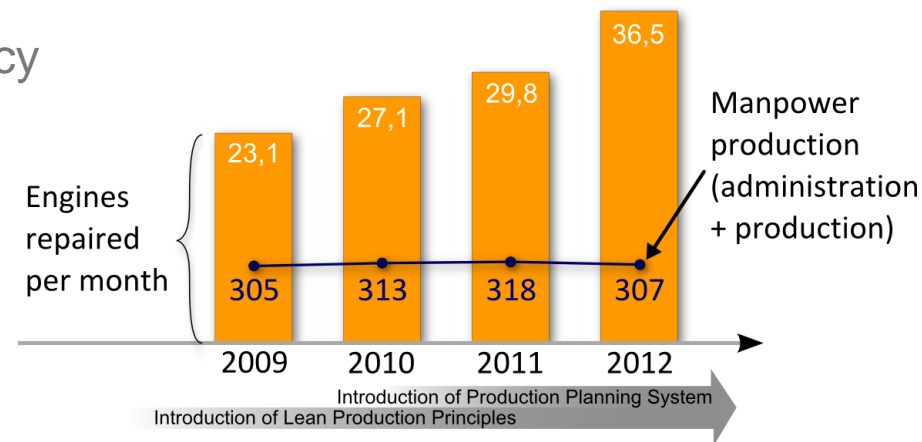
# Lufthansa Technik AERO Alzey – Production System

Success so far...

- Fully transparent production system → all information is available for everybody
- Real-time monitoring and control of all production processes → less communication/meetings necessary
- Each LTAA bottleneck addressed in dedicated workflow databases
- Simulation of the future using FAST/pro Scheduling technology to identify and resolve FUTURE bottlenecks



- Increased work-center efficiency
- All production KPIs enhanced (TAT, CDP, Efficiency, TCRR)<sup>1</sup>
- Significantly higher engine output per month @ same workforce size



<sup>1</sup> [TAT=Turn Around Time, CDP=Customer Delivery Performance, TCRR=Test Cell Rejection Rate]



**Thank you for your attention**

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