Automation @ Airbus
From the Past to Manufacturing 4.0

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Purpose and Contents

Purpose of the Presentation
... is to give an overview of Airbus level of automation and technologies, and how to go forward.

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History of automation – The Kondratieff waves

The 6th Kondratieff stay for

- Global network
- Big data
- Life sciences
- Artificial intelligence
- Robotic
- Bionic
History of drivers in automation for assembly manufacturing at AIRBUS

1970 - 1985: At low rates assembly technologies were driven by manual work. In comparison to other industries the production rates and the repeatability part-to-part is low. First implementation of automation was done with heavy duty machines. The processes automated were drilling / fastening.

1985 - 1995: Restriction accessibilities led to less automation in fuselage. Open structures boxes, shells were automated. Semi-automatic machines were implemented.

1995 - 2005 Automation only done partially e.g. AROCS [Automatic Riveting of Closed Structures] in BRE for Flaps

2005 - 2015 Further improvements, especially with increasing rates, improve effectivity

2015 – now Integrate complex systems in structure assembly “Automation @ Step Change”. Reduced lead time and with a look on ergonomics leads to development of light and modular automation

Automation was implemented in the past mainly for drilling / fastening with heavy duty machines for open structures. To reduce RC-hours, increase flexibility and reduce cost of non quality
Automation @ Step Change single aisle, AIRBUS Hamburg – Robotic drilling and fastening of orbital joints

- KUKA robot + Alema drilling and fastening end effector for app. 6 800 holes/aircraft
- Automatic referencing
- One-shot drilling and fastener insertion
- No drilling jigs
- App. 50% recurring cost / workload reduction
- Better ergonomic situation for employees
Automation @ Step Change Single Aisle, AIRBUS Hamburg –
Automated drilling with flextrack of longitudinal joints

- Flextrack drilling system (LFT 3.0)
- Automated referencing and one-shot drilling for app. 6500 holes/aircraft
- No drilling jigs
- App. 30% recurring cost / workload reduction
- Better ergonomic situation for employees
Painting – As is situation of the process in the paint booth

<table>
<thead>
<tr>
<th>Step</th>
<th>Task</th>
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<tbody>
<tr>
<td>1</td>
<td>cleaning and degreasing</td>
</tr>
<tr>
<td>2</td>
<td>masking</td>
</tr>
<tr>
<td>3</td>
<td>manual application of CPC *</td>
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<tr>
<td>4</td>
<td>drying / evaporation time</td>
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<tr>
<td>5</td>
<td>Quality check</td>
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<tr>
<td>6</td>
<td>manual rework (if required)</td>
</tr>
<tr>
<td>7</td>
<td>demasking</td>
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* CPC: Corrosion Preventative Compounds
Painting – The vision

We’ll create partly automated solutions inside and outside the fuselage that …

- respects any changes regarding demographic transition phases in future (demographic aging, lack of specialists)
- will improve ergonomics, health and safety as well as environmental aspects
- allows to develop and qualify worker to another level
- are able to work collaborative with a employee or at least in parallel
- are modular and extendable
- are mountable without any additional means (lightweight)
- are flexible regarding its application (multiple use cases)
- will be mounted in an early stage and travel through all process steps
- will contribute to Industry 4.0 and digitalization
- will influence future design changes in a positive way (design to manufacturing ⇒ design to automation)
Painting – The vision

The journey will start with CPC application inside the fuselage and will be followed ...

• by CPC application from outside
• will be developed in future for sealant application
• cleaning operations, painting, drilling, riveting etc.

The mission ...

• to build up an aircraft factory, supported by flexible light weight robots
Painting – Facts and figures of the system

- Install 3 robots in the cargo area
- Working in parallel on a rail system
- Scan the section and create the paint path
- 250 t € savings p.a.
- Enable for additional applications
- Higher qualification for employees
- Worker does no longer work under full protection, in non ergonomic conditions
Painting – Additional projects based on the same robot system (multiple use cases)

Floor panel installation

Collar swaging

- drilling
- marking
- material positioning
- window installation
- glue brackets
Painting – The mission gets reality: Surface Protection Centre

**PROCESS IMPROVEMENTS**

**A** **Hangar humidity** control system for the whole SP-Center area → in line with REACH

**B** **Integration of robotic and flow line concept**
→ reduction of workload
→ elimination of red ergonomic areas
→ independent takting process

**C** **Lead time + operating cost reduction**
→ from 6 to 5 shifts, each shift on 1 station/booth
→ lower maintenance costs

**D** **Vision 2030 conformity**
→ reduction of emission etc.
Build the future for robots at AIRBUS

- Create visions
- Analyse the as is situation
- Robots can support to create the daily work easier for employees
- See the different use cases
- Find solutions