Improving Collaboration with Cabin Suppliers

Bernd Feldvoss
Service Package Manager PLM Data Exchange
Airbus Operations GmbH
Agenda

• Company Overview
• Airbus Toolset
• Cabin Customization
  • Airline
  • Design Agencies
  • Equipment Suppliers
• Airbus 3D Representation Formats
• Collaboration within Cabin
• ProSTEP iViP activities
• STEP AP242
• JT Open TRB
• Summary/Conclusion
History

Putting Europe back on the civil aviation scene

1967
French, German and British governments agreement on the development of an European aircraft

1970
Creation of Airbus Industrie GIE (Grouping of Economic Interest)

1972
A300 first flight
World’s first twin-aisle twin-engine widebody aircraft

1982
A310 first flight
Two men cockpit

1983
A300-600 first flight
A modern version of A300

1987
A320 first flight
A new family, the widest single aisle cabin
First fly-by-wire flight controls & side stick controllers

1991
A340 first flight
Four engines, long-haul aircraft

1992
A330 first flight
Two engines, long-haul aircraft

1993
A321 first flight
Expanding the A320 family

1994
A319 first flight
Expanding the A320 family

1995
A300-600ST first flight
History

The world leading aircraft manufacturer

Airbus integrated company
A340-600 first flight
2001

5,000th aircraft order
2004

A350XWB Industrial launch (Extra wide-body)
2006

A400M first flight
2009

10,000th aircraft order
7,000th aircraft delivery
2011

Final assembly of the first A350XWB
First-ever commercial “Perfect flight” with an A319 – cutting CO2 emissions by more than 40%
First U.S. production facility in Mobile, Alabama
2012

2002

3,000th aircraft delivery
A318 first flight
Expanding the A320 family
A340-500 first flight

2005

A380 first flight

2007

5,000th aircraft delivery
First Chinese production facility in Tianjin

2010

6,000th aircraft delivery
A320neo Industrial launch new engines option

2011

10,000th aircraft order

2012

Final assembly of the first A350XWB
First-ever commercial “Perfect flight” with an A319 – cutting CO2 emissions by more than 40%
First U.S. production facility in Mobile, Alabama
Airbus: a global company

- Part of Airbus Group
- The world’s leading aircraft manufacturer
- One integrated company
- More than 7,600 aircraft in operation
- 59,000 Employees - more than 100 nationalities

2013 Aircraft orders (net) valued at: US$225 billion
2013 deliveries valued at: US$81.2 billion
More than 13,815 orders
Over 380 operators
More than 8,256 deliveries
Airbus today

Industrial sites and engineering centres
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Collaboration within Cabin – Airbus Toolset

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A380 IS 
(“4+1”)

One IS by Natco + One common IS

A400M IS 
(“Fourfold”)

One IS multiplied by 4 + One common IS

A350 IS 
(“Single 1”)

One central IS
Collaboration within Cabin – Airbus Legacy cDMU

Interfaces: \( n \times (n-1) = 12 \)

With Harmonization of

- Processes
- Data
- IT Architecture and formats

CATIA V4, CATIA V5 Optegra

CATIA V4, CATIA V5 VPM

CATIA V4, CATIA V5 Optegra PRIMES

CADDS5, CATIA V5 Optegra

CADDS5, CATIA V4, CATIA V5 Optegra

A - D

A - F

A - UK

A - E

Hamburg

Bremen

Toulouse

Madrid

Filton
Collaboration within Cabin – Airbus Toolset

A320 Family/A380/A330

PDM
- GILDA-FR
- TAKSY-GR
- SPRINT-SP
- PRIMES2-UK
- PRIMES CR

DMU tools
- Dvise
- Dvise
- TRENDS
- DMU Server
- CADSS5
- CATIA V4
- CATIA V4

Authoring
- CADSS5
- CATIA V5
- See XP

A400M

DMU tools
- Dvise
- TRENDS
- DMU Server
- VPM
- CATIA V5
- See XP

A350 XWB

PDM Link SSCI

DMU tools
- Dvise
- TRENDS
- DMU Server
- VPM
- CATIA V5
- See XP
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Cabin Customization

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- Airline

- Design Agency

- Equipment Supplier/Manufacturer
Cabin Customization

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Example

- initial customer design concept
  - 3D data based
- Customer request for change
  - “Installation of a sofa compartment”
- Airbus interface assembly creation
  - 3D data based
- 1st concept fit check assembly
- final concept fit check assembly

- CGM Customer Guidance Meeting
- ITCM Initial Technical Coordination Meeting
- CDF Contractual Definition Freeze
- VHO Version Hand Over
- PDR Preliminary design review
- CDR Critical design review
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Airbus 3D Representation Formats

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3D Usage

3D LTA / Retention

3D Exact, Parametric, PMI, ...

3D Integration

3D Exchange

3D Visualization (3D Tessellated Geometry)

Convergence to AP242 when industrial / feasible

Configured PS & meta-data

AP242 PS

AP242 & AP214

JT / AP242 (tessellated)

AP242 (tessellated)

AP242 PS

AP242 PS

AP242 PS

CATProduct

CATPart

CGR (design context)
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Collaboration within Cabin – Discussion

• **Product Structure & Meta Data**
  - PLM XML, STEP AP214 or STEP AP242 XML (preferred & target)
    - Product Structure
    - Meta Data
      - Release Status (in work, publish, released)
      - English Description
      - Original Part ID (for communication in case of renaming)
      - Effectivity (MSN validity)

• **Geometry (JT ISO V1)**
  - JT (incl. 3 LOD’s)
  - Material
  - Geometry properties (volume, center of gravity, …)
  - Always millimeter as unit

• In case only JT delivered → JT per part or monolithic?
• Incremental Exchange should be supported
Collaboration with Cabin – Challenges

• Correct CATIA Version/Release
• IP Protection (native CATIA data with History, parametric, constraints etc.)
• Naming / Numbering
• Level of Details (BoM, moveable parts etc.)
<table>
<thead>
<tr>
<th>Reference</th>
<th>Source Data</th>
<th>Elysium Neutral Format</th>
<th>Healing for JT</th>
<th>JT</th>
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<tr>
<td>CATIA V4</td>
<td>CATIA V5R17</td>
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<td>LOD</td>
<td>XT</td>
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<tr>
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<td>Hybrid</td>
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<td></td>
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<td></td>
<td>Polygon</td>
<td>BREP</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>LOD + XT</td>
<td></td>
</tr>
</tbody>
</table>

| Models      | 187         |
| CATparts    | 2104        |
| CATproducts | 664         |
| Processing Time (H:M:S) | weeks       | 29:19:07 | 00:18:00 | 00:10:44 | 00:06:30 | 00:10:52 |
| Size (MB)   | 1469        | 943        | 266       | 347      | 49        | 87        | 134       | 301       |

Objective is to take into account of STEP AP242 as soon as available
A380 Flight Crew Rest Compartment

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### A380 Compartment

#### Input Filename
5zk001bl511_B.jt

#### Conversion
NX → JT → CATIA V5R21

<table>
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<th>Translator</th>
<th>Translation Time</th>
<th>Output File Size</th>
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<tr>
<td>174 MB</td>
<td>JT -&gt; V5 R21</td>
<td>00:15:53</td>
<td>530 MB</td>
</tr>
</tbody>
</table>
Collaboration with Cabin – future way of working in project under discussion

Errors detected

Native CAD → Export JT → Validate JT → Errors detected

Airbus Rename → JT to V5 Translate → Compare & Validate

Investigation with STEP AP242 when tools available

Release to Airbus
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Collaboration within Cabin – Used Documents

- ProSTEP iViP association
  - JT Content Harmonization
  - Recommended Practices for AP242 XML Assembly Structure
  - JT Workflow Forum Use Cases
  - 4th JT Benchmark
Collaboration within Cabin – ProSTEP iViP activities

- JT Workflow Forum
  - Use Cases with derived Requirements and Guidelines
  - Content Harmonization

- JT Implementor Forum
  - Focus on Interoperability of JT Converters and Applications
  - Test Rounds and elaboration of Implementation Guidelines

- JT Application Benchmark
  - Quality Assurance
  - Comprehensive Results

VDA
Verband der Automobilindustrie
Collaboration within Cabin – JT Workflow Use Cases
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Collaboration within Cabin – STEP AP 242 status (1/2)

- Preparation of STEP AP 242 Recommended Practices for CAD, e.g.: 3D PMI semantic, composite
- Finalization of PDM Implementer Forum White paper, focused in priority 1 in the development of recommended practices for AP 242 PDM XML BO model
- Preparation of AP 242 benchmark N°1, with the support of several organizations: ProSTEP iViP, AfNet, etc.
- Kickoff Confcall of STEP AP 242 ED2 project: 2\textsuperscript{nd} Sept. 2014
Collaboration within Cabin – STEP AP 242 Cax IF testing

- Testing of STEP AP 242 interfaces by the Cax IF
Example of Test Round 34J, for Apr. – Sept. 2014

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Collaboration within Cabin – STEP AP242 benchmark

Scoping

Relevant Documents/Specifications:
- STEP AP 242 IS
- Related AP 242 Recommended Practices (newest releases)

Relevant Software:
- Based on software (COTS) provide by vendors
  Benchmark Steering Group hast to define which ...
  - CAD-Systems
  - PDM Systems
  - Translators
  - Viewers

Timeframe:
- Preparation: 09 – 12/2014
- Benchmarking: 01 – 06/2015

Project Budget: ≈ 100.000 €
- 80 % in 2015 (2014: 20.000 € for preparation)

ProSTEP iViP – The Future Starts Today
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• JT Supplier Collaboration White Paper

LEVERAGING JT IN THE GLOBAL SUPPLY CHAIN

Brief Introduction of the topic....
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Collaboration with Cabin – Summary/Conclusion

- Independent of CAD tools (version, release etc.)
- Reduce file sizes
- Improve lead time
- Usage of open international standards
- Improve Quality e.g. by preventing conversions for visualization by viewer
Bernd Feldvoss
Service Package Manager PLM Data Exchange
Phone: +49 40 743 78589
Cell: +49 175 26 25 556
Bernd.Feldvoss@airbus.com