Airbus Perspective on Titanium Sourcing
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The information in this presentation includes “forward-looking statements”. Because such forward-looking statements involve risks and uncertainties, there are important factors that could cause actual results to differ materially from those expressed or implied by such forward-looking statements.
Agenda

- Airbus Commercial situation & outlook
- Evolution of material sourcing
- Perspective on Titanium sourcing
Airbus Procurement Organisation

~27Bn€ Spend in 2011

Eric ZANIN, SVP Material Procurement Airbus
October 7-10, 2012 • Atlanta, Georgia, USA
After a strong recovery, ASK traffic now growing at a slower pace

World ASK year-on-year growth rate (monthly) vs. GDP year-on-year growth rate (quarterly)

August passenger traffic up 3.0%
Air travel is a strong growth market

Source: ICAO, Airbus

Eric ZANIN, SVP Material Procurement Airbus

October 7-10, 2012 • Atlanta, Georgia, USA
## Products and sales to 31\textsuperscript{st} of August 2012

<table>
<thead>
<tr>
<th>Product Family</th>
<th>Firm Orders</th>
<th>Aircraft Delivered</th>
<th>Firm Order Backlog</th>
<th>In Operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>SA</td>
<td>8,630</td>
<td>5,232</td>
<td>3,398</td>
<td>5,071</td>
</tr>
<tr>
<td>LR</td>
<td>2,160</td>
<td>1,277</td>
<td>883</td>
<td>1,257</td>
</tr>
<tr>
<td>LA</td>
<td>257</td>
<td>81</td>
<td>176</td>
<td>81</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>11,863</strong></td>
<td><strong>7,406</strong></td>
<td><strong>4,457</strong></td>
<td><strong>6,896</strong></td>
</tr>
</tbody>
</table>

Source: Airbus Orders & Deliveries
Single Aisle (SA)

1/ **Sharklets**: Flight Test Campaign on going
   - On going on A320 model
   - Starting soon on A321 model
   - EIS Dec 2012

2/ **China FAL**
   - FAL China: Extension of FAL JV (including neo)

3/ **FAL in Mobile, Alabama**
   - Decision announced July 2012
Future Single-Aisle Developments

The way to highest customer value

A320 - Pull in mature & available technologies to continually enhance the aircraft

- Brings step changes in efficiency
- Helps customers deal with incremental cost increases
- A320neo (new engine option) EIS Oct 2015
- Ensures that the A320 remains the undisputed Single-Aisle market leader

A320 neo

A320 Sharklets

Drive new technologies to maturity for a future “Game Changing” a/c

- Brings leap changes in efficiency
- Allows customers to reduce their costs
- Quantum step ahead to new entrants’ products

Source: A30X Update PR1011070-v3

Eric ZANIN, SVP Material Procurement Airbus

October 7-10, 2012 • Atlanta, Georgia, USA
ES in FAL St 40

First CFRP Fuselage in Station 40
FAL inauguration Event

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<table>
<thead>
<tr>
<th>Material</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Composites</td>
<td>72%</td>
</tr>
<tr>
<td>Titanium</td>
<td>10%</td>
</tr>
<tr>
<td>Steel</td>
<td>9%</td>
</tr>
<tr>
<td>Misc.</td>
<td>6%</td>
</tr>
<tr>
<td>Al/Al-Li</td>
<td>3%</td>
</tr>
</tbody>
</table>

**A320 Family Material Breakdown (%) Without Landing Gear**

- **A320**
  - Launched in the 80’s
  - Low know-how on CFRP application
  - Low fuel price
  - Less competition
  - Estimated market potential lower than actual!
...To
A350 & A380– Intelligent Airframes

CFRP: Fuselage, wing box, movables...

Al/Al-Li: Frames, Ribs, Floor beams, Gear bays...

Ti: Landing Gears, Pylons, Attachments, door surrounding, frames...

Eric ZANIN, SVP Material Procurement Airbus

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Composite and Titanium increasing use over time

The increase of Ti amount on Aero-structures is clearly related to CFRP. 90% of the titanium used on aero-structures is Ti-6Al-4V.

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Why is Ti attractive to airframe industry?

- High strength to weight ratio
- Inherent resistance to corrosion.
- Compatibility with CFRP (galvanic and thermal)
- Property stability at moderate temperatures

- Weight saving
- Used for highly loaded structure in geometrically constrained areas (Landing Gear, Pylon...)
- Removal of requirements for anti-corrosion coatings
- Simple and robust design
- Application in medium temperature areas e.g. APU rear fuselage and pylon structures

Trade off between design drivers, performance and cost
Material Procurement strategy

Future Challenges for Airbus Business

➢ Programmes Ramp-up

➢ Increased competition

➢ Commoditytization of Product

Material Procurement Contribution to Strategic Initiatives

➢ Cost improvement via
  ▪ Design optimisation
  ▪ Promoting New Processes
  ▪ Development of New technologies
  ▪ Reduction of waste

➢ Secure Supply Chain Performance

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Opportunities within Titanium Sourcing

- **Titanium a/c content** becomes a significant leverage for Airbus cost optimisation
- **Titanium processes / alloys** are in an early phase of maturity
- **Significant opportunity** for Airbus and Ti S/C (NEO & A350XWB)

<table>
<thead>
<tr>
<th>EADS Cost Base</th>
<th>Procurement cost</th>
<th>Opportunities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Labor, Tax, ...</td>
<td>Added Value</td>
<td>VI</td>
</tr>
<tr>
<td>Procurement</td>
<td>Material</td>
<td>New alloys</td>
</tr>
<tr>
<td></td>
<td></td>
<td>New Proc.</td>
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<tr>
<td></td>
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<td>Redesign</td>
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<tr>
<td></td>
<td></td>
<td>Commercial</td>
</tr>
</tbody>
</table>
Vertical integration
ConBid as a leverage to manage Ti S/C

ConBid (Consolidated Bidding) allows EADS to
- Manage the titanium needs for all its supply chain
- Understand the evolution of the needs in the coming years
- Prepare rates evolution
- Protect the whole EADS Supply Chain in case of a foreseen critical Ti situation
Next steps: A320neo but not only...

The main structural developments for A320neo will be located on pylons and sharklets.

A350-1000 development also requires the development of specific applications, especially in titanium.

**AIRBUS’s mid-term R&D efforts on Titanium alloys will focus on:**

- Improvement of fatigue and damage tolerance properties (new chemistry, optimization of heat-treatment...)
- Reduction of BtF ratio (Direct Manufacturing, extrusion & welding, improvement of manuf. routes)
- New alloys: mid and high temperature resistance (above 600°C) + improved machining capabilities

*Proactive development of such applications will be key to joint development with Airbus*
Conclusion

Today
- Utilisation of CFRP
  - Increased fuel price (weight is a priority)
- Reduced price in the market
- Increased leverage vs steel
  → Higher ti utilisation

Commodity
- Low utilisation
- High price
- Low competition

Strategic development
- Design optimisation
- Development of new Alloys and processes
- Reduction of BtF
- CFRP as a challenger for titanium application

- Inescapable structural material
- Significant market potential
- Key Success Factor for Airbus competitiveness
- Supply Chain remains a key priority

...Your contribution is key
Thank you