Alcoa Aerospace: Value, Technology and Augustine’s Law #16

Aviation Week’s Executive Summit, Denver, CO
June 5, 2012
Cautionary Statement

Forward-Looking Statements

This presentation contains statements that relate to future events and expectations and as such constitute forward-looking statements. Forward-looking statements include those containing such words as “anticipates,” “estimates,” “expects,” “forecasts,” “intends,” “outlook,” “plans,” “projects,” “should,” “targets,” “will,” or other words of similar meaning. All statements that reflect Alcoa’s expectations, assumptions, or projections about the future other than statements of historical fact are forward-looking statements, including, without limitation, forecasts concerning global demand growth for aluminum, end-market conditions, and growth opportunities for aluminum in automotive, aerospace and other applications, trend projections, targeted financial results or operating performance, and statements about Alcoa’s strategies, outlook, and business and financial prospects. Forward-looking statements are subject to a number of known and unknown risks, uncertainties, and other factors and are not guarantees of future performance. Important factors that could cause actual results to differ materially from those in the forward-looking statements include: (a) material adverse changes in aluminum industry conditions, including global supply and demand conditions and fluctuations in London Metal Exchange-based prices for primary aluminum, alumina, and other products, and fluctuations in indexed-based and spot prices for alumina; (b) deterioration in global economic and financial market conditions generally; (c) unfavorable changes in the markets served by Alcoa, including automotive and commercial transportation, aerospace, building and construction, distribution, packaging, defense, and industrial gas turbine; (d) the impact of changes in foreign currency exchange rates on costs and results, particularly the Australian dollar, Brazilian real, Canadian dollar, euro, and Norwegian kroner; (e) increases in energy costs, including electricity, natural gas, and fuel oil, or the unavailability or interruption of energy supplies; (f) increases in the costs of other raw materials, including calcined petroleum coke, caustic soda, and liquid pitch; (g) Alcoa’s inability to achieve the level of revenue growth, cash generation, cost savings, improvement in profitability and margins, fiscal discipline, or strengthening of competitiveness and operations (including moving its alumina refining and aluminum smelting businesses down the industry cost curves and increasing revenues in its Flat-Rolled Products and Engineered Products and Solutions segments) anticipated from its restructuring programs and productivity improvement, cash sustainability, and other initiatives; (h) Alcoa’s inability to realize expected benefits from newly constructed, expanded, or acquired facilities or from international joint ventures as planned and by targeted completion dates, including the joint venture in Saudi Arabia, the upstream operations in Brazil, and the investments in hydropower projects in Brazil; (i) political, economic, and regulatory risks in the countries in which Alcoa operates or sells products, including unfavorable changes in laws and governmental policies, civil unrest, or other events beyond Alcoa’s control; (j) the outcome of contingencies, including legal proceedings, government investigations, and environmental remediation; (k) the business or financial condition of key customers, suppliers, and business partners; (l) adverse changes in tax rates or benefits; (m) adverse changes in discount rates or investment returns on pension assets; and (n) the other risk factors summarized in Alcoa’s Form 10-K for the year ended December 31, 2011 and other reports filed with the Securities and Exchange Commission. Alcoa disclaims any obligation to update publicly any forward-looking statements, whether in response to new information, future events or otherwise, except as required by applicable law.
Alcoa at a glance

- Founded in 1888, developed original aluminum process
- $25B in 2011 revenue, 200+ locations in 31 countries
- Lost workday injury rate of 0.12 - - one-tenth the average of U.S. manufacturers
- *Fortune* magazine’s #1 “Most Admired” metals company
- 120 years of metallics technical leadership, inventing 95% of the aluminum alloys flying today

### Number of Employees (2011)

<table>
<thead>
<tr>
<th>Region</th>
<th>Employees</th>
</tr>
</thead>
<tbody>
<tr>
<td>U.S.</td>
<td>26,000</td>
</tr>
<tr>
<td>Europe</td>
<td>17,000</td>
</tr>
<tr>
<td>Other Americas</td>
<td>11,000</td>
</tr>
<tr>
<td>Pacific</td>
<td>7,000</td>
</tr>
</tbody>
</table>

61,000
Alcoa is composed of three Business Groups

**Upstream**
- Global Primary Products
  - Bauxite Mining
  - Alumina
  - Primary Aluminum
  - Power generation

**Midstream**
- Global Rolled Products
  - Aerospace
  - Automotive
  - Ground Transportation
  - Consumer Electronics
  - Industrial Products

**Downstream**
- Engineered Products & Solutions
  - Aerospace
  - Industrial Gas Turbines
  - Ground Transportation
  - Building and Construction
  - Oil & Gas
  - Industrial Equipment
  - Defense
Alcoa Aerospace is a $3.4B business (2011)

- Fastening Systems
- Precision Castings
- Aero Structures
  - Structural castings
  - Sheet
  - Plate
  - Extrusions
  - Forgings
Airframe Structures and Propulsion: Alcoa’s content runs from nose to tail and from wing-tip to wing-tip.
Law #16 famously spoke to the exponential increase in the sticker price of combat aircraft…

Augustine Law Number 16: “In the year 2054, the entire defense budget will purchase just one aircraft…”

… which placed a spotlight on the first two components of the aircraft lifecycle:

1. When You Conceive & Design It
2. When You Build It
For civil aircraft, however, operating economics place different emphases on different parts of the value chain.

Jet fuel prices have skyrocketed over the past decade …

Jet Fuel Prices (Indexed to Jan 2000)

Jet Fuel as a % of Airline Direct Operating Costs

~14%

2001

~32%

Today

Mission: reduce fuel burn / seat mile

… and now account for about 1/3 of Direct Operating Costs (and growing)

Source: International Air Transport Association
Our solutions were developed to meet a breadth of performance requirements.

As You Conceive & Design It
- Structural design
- Alloy development
- Fastening systems

As You Build It
- Lower mfg and assembly costs
- Capital efficiency
- Drop program risk

As You Prototype & Test
- Rapid prototyping
- Trusted and credible technical experts

As You Fly It
- Lightweight
- Low operating cost
- Aerodynamic
- Electronics mgmt

As You Retire It
- Recyclable
- Sustainable

As You Maintain It
- Corrosion resistant
- Meet emerging inspection interval requirements

A Value Proposition that works for Airframers... and their customers
Demanding performance requires a high level of technical sophistication in our products

Military & Commercial Aerospace Structures

- Able to withstand aero **engine cores** that operate at their **melting points** (~3,000°F)
- Able to cope with **thermal expansion** with a single flight that may begin in the desert at 100+ degrees and fly at 30,000+ feet at sub-zero temperatures
- Able to last for **over 30 years** and cope with the pounding of over 100,000 landings
- Able to support the weight of 50 Toyota Camrys with a one-inch diameter fastener while managing **current dissipation**
And continuous investment in new technologies and capabilities …

Solutions from Alcoa’s **global technology network** fly far beyond **advanced alloys** to **design**, **manufacturing** and **assembly** for all major aircraft wing and fuselage structures.

**World’s largest light metals research center**
From alloys to processes to structures to fasteners – a continuing tradition of investment & innovation leadership.

**50K-ton Forging Press**
~$100M investment restores industry leading forging capability and is now in production.

**New Al-Li Cast House**
~$92M investment secures the future for Alcoa aluminum presence in aerospace structures and propulsion.
With every component a contest of materials, Alcoa is changing the “conventional wisdom”

Boeing 787 & Airbus A350XWB decisions based on best info available…

…but consider recent Al fuselage (CSeries) & Al wing (MRJ) decisions

…and even more recent decisions for new ultra-efficient single & twin aisles

…what’s best for the next aircraft?

“…Alcoa’s 3rd-generation lightweight aluminium lithium (Al-Li) is a viable option…”

“…makes sense in significantly trimming weight…”

Aspire, February 2012
What is the big deal about Aluminum Lithium?

A Unique Combination of Product Attributes

- Lower Density
- Strength & Damage Tolerance
- Corrosion Resistance
- Supply Chain Compatibility

A Powerful Cost, Weight and Risk Value Proposition for Airframers and Airlines

- Lower Aircraft Weight
  - Lighter weight,
  - Less Bulky Structures

- Lower Aircraft Operating Cost
  - Improved Fuel Consumption
  - Improved Wing Aerodynamics
  - Longer Inspection Intervals

- Reduced Capital Expenditures
  - Compatible w Existing Supply Chain
  - Compatible w Existing Assembly Lines

- Reduced Financial Risk
  - New aircraft delivered on time & on cost

Alcoa Proprietary Information
Responding to demand for aluminum-lithium solutions: a global, three pronged investment plan

New casting complex (IN, USA)
- $92M investment
- Unique, long length design
- 20kT capacity
- Round & rectangular ingot
- Production in 2014

Casting expansion (UK)
- Added Ext Ingot Capability
- Producing Q4 2012

Casting expansion (PA, USA)
- 30% Capacity Expansion
- Complete

“... well understood technology …requires little to no modification in the (airframer) production process …”
Aspire, February 2012
Starting at the design table, Alcoa has worked with customers to develop the best material solution available…

<table>
<thead>
<tr>
<th>Boeing 747-8</th>
<th>Boeing 787</th>
<th>Airbus A380</th>
<th>Airbus A350XWB</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Application of advanced metallic technology from the 777</td>
<td>• First aluminum-lithium twin-aisle plate application</td>
<td>• New sheet and plate product alloys</td>
<td>• Aluminum lithium extruded floor beams and seat tracks as already proven on the A380</td>
</tr>
<tr>
<td>• Advanced fastening systems</td>
<td>• Uniquely designed current dissipation fastening system</td>
<td>• Aluminum lithium extruded floor beams and seat tracks as already proven on the A380</td>
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</tr>
<tr>
<td></td>
<td>• Monolithic crown frame forgings</td>
<td>• World’s largest fuselage panels, wing skins and closed die forgings</td>
<td></td>
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</table>
Alcoa Aerospace is Positioned to Meet the Markets Need…

- Providing products that fulfill customer requirements across the **totality of the life-cycle**

- Leveraging our **global technology leadership** to push the envelope of what can be done with materials

- Bringing the best of Alcoa to bear to **reduce fuel burn per seat mile** across all structure and engine platforms

… Forging Our Global Leadership Position on Innovation
Alcoa. Advancing each generation.