ITA Economics Panel
Aerospace & Defense: Major Programs

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October 10th, 2010

Please see addendum of this report for important disclosures.
Where We Are, Where We Are Headed

► What Has Changed In the Past Year
  - Airline capacity discipline has been far better than prior downturns
    - IATA 2010 airline profitability forecasts have increased $14.5B in the past 9 months!
  - BA & Airbus oversold 737/A320 schedules by a larger margin than in prior cycles – Rate Increases Not Cuts This Time Around
  - Strong air freight rebound has bolstered 777F/747-8

► Comml. OEM & A/M Momentum Starting To Lift – See Long Upcycle
  - Announced production rate hikes supported by large, geographically-balanced B/Ls, low interest rates, and favorable traffic-capacity gap
  - Aftermarket coming off 5 Q’s of destock; destock reversal a plus even if economy is lackluster.
  - Bizjets drops are nasty but short (normally 2+ years); upper end has turned; midsize stabilizing

Air Traffic Exceeds Capacity In All Regions YTD

<table>
<thead>
<tr>
<th>Region</th>
<th>ME</th>
<th>LA</th>
<th>Asia</th>
<th>Average</th>
<th>NA Intl.</th>
<th>Europe</th>
<th>NA Dom.</th>
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<tr>
<td></td>
<td>6.2%</td>
<td>6.3%</td>
<td>9.0%</td>
<td>5.6%</td>
<td>5.6%</td>
<td>3.7%</td>
<td>1.3%</td>
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IATA Profitability Forecast Has Continued to Climb

<table>
<thead>
<tr>
<th>Year</th>
<th>2009 Actual</th>
<th>Sep-09</th>
<th>Dec-09</th>
<th>Mar-10</th>
<th>Jun-10</th>
<th>Sep-10</th>
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<tbody>
<tr>
<td>Industry Net Income (SB)</td>
<td>($9.9)</td>
<td>($3.8)</td>
<td>($5.6)</td>
<td>($2.8)</td>
<td>$2.5</td>
<td>$8.9</td>
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Source: IATA
Lots of New Commercial Aircraft Programs In Development

Announced Commercial Development Programs

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<tbody>
<tr>
<td>Boeing</td>
<td>787</td>
<td>747-8</td>
<td>777 replacement or NSA</td>
<td>777 replacement or NSA</td>
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<tr>
<td>Airbus</td>
<td>A350XWB</td>
<td>A320NEO</td>
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<td>Bombardier</td>
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<td>Mitsubishi</td>
<td>MRJ</td>
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Ti Buy-Weights (t)

- A380: 146
- A350: 127
- B787: 116
- B747-8: 76
- B777: 59
- A340: 32
- B767: 18
- B737: 18
- A320: 12

Annual Program Ti Demand (2013E; t)

- B787: 10,440
- B737: 7,200
- A320: 5,220
- B777: 4,838
- A380: 3,650
- B747-8: 1,824
- A350: 1,016
- B767: 216
- A340: 0

Source: Cowen and Company; Timet 2009-10 k
Strong Demand For Ti-Intensive B787 & A350

- A350/787 Demand Strongest Outside Of North America – Asia/Pacific & Middle East
- A350 XWB 900/800 Will Compete With 787 More Efficient Stretch Versions
- Virtuous Ti Cycle - A350 XWB A Late Decade Threat To 777 – BA Has Time To Respond

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>Aircraft</th>
<th>EIS Year</th>
<th>Replaces</th>
<th>Competitors</th>
<th>Backlog</th>
<th>Price ($MM)</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>A350XWB-1000</td>
<td>2015</td>
<td>A340-600</td>
<td>777-300ER</td>
<td>75</td>
<td>$267-$272</td>
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<tr>
<td>Boeing</td>
<td>787-800</td>
<td>2011</td>
<td>767-200ER</td>
<td>A340-200</td>
<td>642</td>
<td>$161-$171</td>
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<tr>
<td></td>
<td>787-900</td>
<td>2013</td>
<td>767-300ER</td>
<td>A330/A350-800</td>
<td>205</td>
<td>$194-$205</td>
</tr>
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Source: Ascend, Airbus, Boeing; Current as of 10.1.10
Boeing 787 “Dreamliner” – We’re Getting Close

► All New Fuel-Efficient Twin Aisle
- 210-250 Long Range Passenger A/C
- “20% More Efficient than Competitors”
- ~15% titanium
- 847 Aircraft on Order
  - 53 announced customers
- Produce 10 A/C per Month By 2013

► F/T Campaign Nearing Completion
- ≈2,500 Flight Hour Test Program
  - 1st Flight December 2009
  - 1,905 hours already completed
- 8 Flight Test Aircraft
- 1st Quarter 2011 EIS Target
  - ANA launch customer

787 Backlog By Region

<table>
<thead>
<tr>
<th>Region</th>
<th>Backlog</th>
</tr>
</thead>
<tbody>
<tr>
<td>A/P</td>
<td>308</td>
</tr>
<tr>
<td>NA</td>
<td>176</td>
</tr>
<tr>
<td>ME</td>
<td>134</td>
</tr>
<tr>
<td>Europe</td>
<td>123</td>
</tr>
<tr>
<td>LA&amp;C</td>
<td>49</td>
</tr>
<tr>
<td>Africa</td>
<td>32</td>
</tr>
<tr>
<td>Unknown</td>
<td>25</td>
</tr>
</tbody>
</table>

Source: Ascend
**A350-XWB**

► **All New Fuel-Efficient Twin Aisle**
- Design to compete with Boeing 787 & 777
- “8% lower op. cost than Boeing’s 787”
- ~14% Titanium
- 528 Aircraft on Order
  - 31 announced customers
- Production Plan
  - 18 in 2013, 51 in 2014 & 83 in 2014

► **Production Began on Sept. 1st, 2010**
- Commences Parts Assembly in Germany
  - Upper wing shell fabrication in process
- Final Assembly - 2011
- 1st Flight in 2012
- 1st Delivery in mid-2013
  - Qatar Airways launch customer

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A350 Backlog By Region

- ME: 220
- A/P: 124
- NA: 80
- Europe: 65
- LA&C: 37
- Africa: 25
- Unknown: 7

**Source:** Ascend
Boeing 747-8 Delivery Slips to Mid-2011

► 4th Generation 747
  ■ Mid 2011 1st delivery (Cargo version)
  ■ 109 a/c on order (76 freighters, 32 passenger)
  ■ Passenger version EIS Q4:11

► Flight Testing In Process
  ■ First Flight February 2010
  ■ 1,600 hour flight test program
  ■ 4th aircraft added to flight test fleet in June 2010

► Flutter Still An Issue
  ■ Inboard flap actuator vibration
    – Made by Nebtesco (Japan)
  ■ BA is re-designing actuator

747-8 Backlog By Region

Europe: 38
A/P: 36
ME: 15
NA: 12
Unknown: 8
LA&C: 0
Africa: 0

Launch Nov. - '05
Production Begins Aug. 2008
1st Delay Nov. 2008
2nd Delay Oct. 2009
3rd Delay Sept. 2010
First Flight Feb-10
Mid 2011

Source: Ascend
All New 737 or 737 Re-engine?

► Airbus may launch re-engine A320 by year-end
  ■ Pratt & Whitney 1000 GTF engines

► Bombardier C-Series Targets 100-150 Seat Category; 90 Orders

► Boeing re-engined 737NG less likely than an all new 737NG design
  ■ Boeing: “Cash operating savings of ~1-2% unlikely to attract much interest from customers”
    – Net 5% fuel savings - 1-2% impact from incr. weight - ~2% impact from higher cost = net ~1-2% cash savings
  ■ Likely to focus on all new single aisle aircraft
    – Composite fuselage, aluminum wing; 150-170 seats; Target 10-12% improvement in cash operating cost

► Boeing targeting 2018 & 2021 for EIS targets for New Single Aisle & 777 update
  ■ Boeing will make a decision in 2012 base on competitive threats on which program to launch first
  ■ Not willing to run two major development programs in tandem – lessons learned from 787/747-8
Boeing’s Single Aisle Transition Cycle Shows Long Overlap

737 Family Backlog & TTM Order Rate

TTM 737 Family Deliveries

Backlog/TTM Deliveries

Source: Ascend
Defense Faces Growing Cutback Pressure

- Large deficit overhang starting to trump threat perception as a priority – more pressure to cut
  - Sec. Gates’s efficiency initiatives target overhead, duplication & excess in the DoD
  - Free up budget for “sustaining force structure and investments in modernization”
  - # of troops +77,500 since F07 (=6%, to ≈1,406,000) -- raises pressure on weapons funding

- Pressure apt to focus on platform part of weapons budget; past weapons declines avg. 5% p.a.

Source: DoD Green Book
Joint Strike Fighter

- 2011 Budget Request of $11.4B ($8.7B for procurement)
- Est. buy weight of 23 mts; Production ramps through 2015, but cuts still possible

**Ti Buy-Weights (t)**

<table>
<thead>
<tr>
<th>Type</th>
<th>Buy-Weight (t)</th>
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<tr>
<td>F-22</td>
<td>39</td>
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<tr>
<td>F-15</td>
<td>36</td>
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<tr>
<td>F-35</td>
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<td>F-18</td>
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<td>F-16</td>
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**Annual Program Ti Demand (t)**

<table>
<thead>
<tr>
<th>Type</th>
<th>Demand (t)</th>
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<tbody>
<tr>
<td>F-35</td>
<td>5,218</td>
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<tr>
<td>F-22</td>
<td>1,180</td>
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<tr>
<td>F-18</td>
<td>871</td>
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<tr>
<td>F-15</td>
<td>544</td>
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<tr>
<td>F-16</td>
<td>272</td>
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Note: Rates Based on 2010E; F-35 based on 230/yr in 2015

**Production Plan**

Source: LMT, BA, Cowen and Company
Questions?