Commercial Airframes: Trends and Forecasting

Henry S. Seiner
15 May 2018
Forward Looking Statement

Information included within this press release describing the projected growth and future results and events constitutes forward-looking statements, within the meaning of the Private Securities Litigation Reform Act of 1995. Actual results in future periods may differ materially from the forward-looking statements because of a number of risks and uncertainties, including but not limited to the risk that the Merger with Berkshire is delayed or will not be completed and the resulting effect thereof on our future business, financial results and the price of our common stock; the effect the expenses related to the Merger may have on our operating results; the effect of business uncertainties and contractual restrictions while the Merger is pending; fluctuations in the aerospace, power generation, and general industrial cycles; the relative success of our entry into new markets; competitive pricing; the financial viability of our significant customers; the concentration of a substantial portion of our business with a relatively small number of key customers; the impact on the Company of customer or supplier labor disputes; demand, timing, and market acceptance of new commercial and military programs, and our ability to accelerate production levels to meet order increases on new or existing programs in a timely fashion; the availability and cost of energy, raw materials, supplies, and insurance; the cost of pension and postretirement medical benefits; equipment failures; product liability claims; changes in inventory valuations; cybersecurity threats; relations with our employees; our ability to manage our operating costs and to integrate acquired businesses in an effective manner, including the ability to realize expected synergies; the timing of new acquisitions; misappropriation of our intellectual property rights; governmental regulations and environmental matters; risks associated with international operations and world economies; the relative stability of certain foreign currencies; fluctuations in oil & gas prices and production; the impact of adverse weather conditions or natural disasters; the availability and cost of financing; and the implementation of new technologies and process improvements. Any forward-looking statements should be considered in light of these factors. We undertake no obligation to update any forward-looking information to reflect anticipated or unanticipated events or circumstances after the date of this document.
Agenda

- Macro Environment: Traffic, Oil, Airline Profitability
- Market Factors: Orders, Shipments, Backlogs
- Platforms: New Entrants
- Forecast: Titanium Demand
Macro Environment

Traffic, Oil, Airline Profitability
RPMs **doubled** from 1970 to 1980
More than **tripled** from 1980 to 2000
In 2015 it **doubled** the 2000 levels

Asia Pacific and the Middle East have both averaged **approximately 10% growth** for the last 5 years

Historical growth is 5%, and industry has averaged 7% since 2010. In the midst of 12-year “supercycle.”

*Source: Airline Monitor, June 2017*
Regional Traffic Shifts

North America dropped from 80% of world traffic in 1980 to 23% in 2016

Asia Pacific reached the same level of traffic as North America and Europe in 2010, and has exceeded both to date

Middle East is now nearly 10% of global traffic

North America is just under a quarter, Europe is just over a quarter

Asia Pacific region accounts for one-third

Source: Airline Monitor, June 2017
Fuel Costs

Q1 2018 oil prices are in the $65-$70/barrel range

Early 2000s, the price of oil was in the $30-$40/barrel range in today’s dollars

Fuel is 20-30% of an airline’s operating costs

Source: Macrotrends.net
Fuel, as a share of airline expense, peaked in 2008 at 36%
Down to 21% in 2016, expected to drop below 20% in 2017 for the first time in over a decade
Reduced fuel costs lead to increased operating profit, thus more cash on hand to purchase newer models

Source: IATA Airline Industry Economic Performance
Market Factors

Orders, Shipments, Backlogs
2014 was record year for **duopoly** net orders (2,888)
Net orders started to slow down after **peak**

2017 was record year for **industry deliveries** (1460)
Records achieved:
- Airbus, **718**
- Boeing, **763**

Net orders **outpaced** deliveries over last decade
Book-to-build ratios **dropped below** 1:1 in 2009 and again in 2016

*Source: Airbus and Boeing*
Backlog Growth Trend

Backlog continues to grow and has reached record level each year since 2010, even in the face of:

- Cancellations
- Increased retirement age
- Low fuel costs

Source: Airbus and Boeing
Strength of Backlogs

Single Aisle Backlog: 10,696
Widebody Backlog: 2,307

Single aisle backlog will last 6-8 years

Monthly production rates listed for each model are the highest announced rate

Source: Airbus, Boeing; assumes 2019 Boeing and 2020 Airbus rate into perpetuity
Platforms

New Entrants
New Entrants

- A321NEO
- 737 MAX 9
- C919
- MC-21
- E195-E2
- A350-1000
- 787-10
- A330NEO
- A330NEO
- A319NEO
- 737 MAX 8
- 737 MAX 9
- 737 MAX 9
- 787-10
- First flight: 2016
- Entry into service: 2019
Boeing’s NMA

- New configuration details
  - Fifth-generation composite wing
  - “Hybrid” composite fuselage
  - Next-generation digital architecture
  - Very high-bypass turbofan selection
- Larger and with further range than a 757
- Melding of 777 and 787 design features
- Future configuration details will provide more information on titanium’s role in this aircraft
- Industry sources speculation that material pricing may be critical to business case and role of titanium
COMAC

• Major manufacturer in the world’s fastest growing air traffic region

• ARJ
  • Received approval to begin mass production of its ARJ-21 jet
  • 413 orders from 19 customers

• C919
  • First flight May 2017
  • EIS planned for 2020
  • 600 orders from 24 customers
  • Not yet certified in Europe

• C929
  • Twin aisle for EIS in the late 2020s
  • Program is a joint Chinese/Russian venture
  • Speculation: Chinese fuselage and Russian wings
Forecasting

Titanium Demand
20 Year Outlooks


<table>
<thead>
<tr>
<th>Source</th>
<th>2017-2036 Total</th>
<th>Average Annual Growth</th>
<th>77% (4700 out of 6000) of the difference between the GMF and CMO is attributable to variance in Single Aisle Forecast</th>
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<tbody>
<tr>
<td>Airline Monitor</td>
<td>45,134</td>
<td>3.9%</td>
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<tr>
<td>Boeing CMO:</td>
<td>41,030</td>
<td>2.2%</td>
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<tr>
<td>Airbus GMF:</td>
<td>34,910</td>
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</tbody>
</table>
10 Year Variability

10 year forecast comparisons

Airline Monitor

2060 deliveries

Flight International

2078 deliveries

2018 forecast adds over 400 planes in next three years
Each successive forecast has pushed out “inevitable downturn” even further

Teal forecasts ’20 & ’21 are the peak, 1938
Latest Teal and AM agree peak will be 2021
Teal averages 170 fewer planes per year than AM, for a total of 854 planes over the 5 year period

Source: Airline Monitor, Teal
Announced OEM build rates for 2018 to 2019 adds 180 planes, 4x the 2017 to 2018 addition of 45 planes. Remainder of 20 year forecast would be flat if CMO is correct AND if high rates achieved in near term.

Source: Boeing, Airbus, Boeing Current Market Outlook 2017-2036, Airbus Global Market Forecast 2017-2036
Titanium Forecasting

Airbus and Boeing together historically account for more than 95% of titanium structure demand annually.

Airline and Teal peak in 2021.

Airline Monitor recovers more quickly and at a faster rate.

Source: Airline Monitor, Teal, Boeing, Airbus, TIMET Internal buyweight estimates, does not include timing offset or spares factors.
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