MRO Market Update & Industry Trends
Today’s Agenda

- Fleet & MRO Forecast
- 2016: What a long strange trip year it’s been...
- 2017: The year aviation & aerospace blinked...
MRO Forecast
The current commercial air transport fleet consists of under 28K aircraft; over half are narrowbody aircraft.

2016 Global Commercial Air Transport Fleet

By Aircraft Type:
- Narrowbody Jet: 54%
- Widebody Jet: 19%
- Regional Jet: 13%
- Turboprop: 14%

By Global Region:
- North America: 30%
- Latin America: 7%
- Europe: 28%
- Middle East: 25%
- Asia Pacific: 5%
- Africa: 5%
The combination of strong air travel demand and the need to replace ageing aircraft will drive fleet growth at a healthy 3.2% annually.

Source: ICF analysis: CAPA 2016
Current commercial air transport MRO demand is $67.6B; Asia is now larger than North America and Europe in market size.

2016 Commercial Air Transport Global MRO Demand

By MRO Segment

- Engines: 40%
- Components: 22%
- Airframe: 17%
- Line: 8%

By Global Region

- North America: 27%
- Asia Pacific: 30%
- Europe: 26%
- Middle East: 8%
- Latin America: 6%
- Africa: 4%

Source: ICF analysis; Forecast in 2016 $USD, exclusive of inflation
The global MRO market is expected to grow by 4.1% per annum to over $100B by 2026

- Engine and component MRO markets remain the largest segments
- Modifications market will see the strongest growth (e.g. interiors, connectivity)
- Airframe market slows due to reduced man-hour intensity and increased check intervals as new fleets are introduced

<table>
<thead>
<tr>
<th>Segment</th>
<th>2016</th>
<th>2026</th>
<th>CAGR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engine</td>
<td>40%</td>
<td>16%</td>
<td>4.2%</td>
</tr>
<tr>
<td>Component</td>
<td>22%</td>
<td>22%</td>
<td>3.2%</td>
</tr>
<tr>
<td>Airframe Line</td>
<td>17%</td>
<td>16%</td>
<td>5.2%</td>
</tr>
<tr>
<td>Modifications</td>
<td>14%</td>
<td>12%</td>
<td>2.8%</td>
</tr>
<tr>
<td>Engine</td>
<td></td>
<td>$67.6B</td>
<td></td>
</tr>
<tr>
<td>Airframe Line</td>
<td></td>
<td>$100.6B</td>
<td></td>
</tr>
</tbody>
</table>

Source: ICF analysis; Forecast in 2016 $USD, exclusive of inflation
The current Latin American fleet consists of over 2,100 aircraft; with narrowbody aircraft making up more than 50% of the installed base.

Source: CAPA 2016
The Latin American MRO market is expected to grow to approx. $6.4B by 2026, at 5.5% per annum.

- Modifications is the fastest growing MRO segment in Latin America.
- MRO spend on widebodies in Latin America will nearly double by 2026 as the fleet increases by 56%.

Source: ICF analysis; Forecast in 2016 $USD, exclusive of inflation.
2016: What a long strong trip year it’s been...
Driven by low fuel costs and consolidation, the global airline industry achieved record profitability of over $35B USD in 2016.

2016 was a historic year for airline profitability…

Global Airline Profitability, 1997 - 2017F

Source: IATA, ICF analysis
However, record profitability has been largely limited to carriers in North America

...but many airlines continue to struggle

Global Airline EBIT Margin by Region

Source: IATA, ICF Analysis
Follow the Money: Airlines are spending their hard earned profits in three primary areas

1. **Labor ~ 20%:**
   - Profit sharing
   - Wage increases

2. **Capex ~ 38%:**
   - Fleet renewal & cabin upgrades
   - Facilities, offices, lounges
   - Equity partner investments

3. **Investors ~ 42%:**
   - Stock buy-backs
   - Dividends
   - Debt repayment

Source: Company Reports, ICF Analysis
Aviation is experiencing a new golden age of aircraft cabin interiors.

MRO modification market growth drivers include:
- Latest lie-flat seats are now the minimum standard
- Premium economy
- Wi-fi, on-board connectivity
- Capacity (ASM/K) increase (“Cabin Densification”)
- Coming soon: ADS-B Mod program

Commercial Air Transport Modifications Forecast

<table>
<thead>
<tr>
<th>$USD Billions</th>
<th>2016</th>
<th>2026</th>
<th>CAGR</th>
</tr>
</thead>
<tbody>
<tr>
<td>$5.1B</td>
<td>$2.8</td>
<td>$4.8</td>
<td>5.6%</td>
</tr>
<tr>
<td>$8.5B</td>
<td></td>
<td></td>
<td>5.2% Avg.</td>
</tr>
<tr>
<td>Painting</td>
<td>$0.9</td>
<td></td>
<td>5.9%</td>
</tr>
<tr>
<td>Avionics Upgrades</td>
<td>$0.8</td>
<td></td>
<td>5.6%</td>
</tr>
<tr>
<td>Interiors</td>
<td>$0.9</td>
<td></td>
<td>5.2% Avg.</td>
</tr>
</tbody>
</table>

Modifications demand includes labor and material spend
*Passenger-To-Freighter Conversions
**Airworthiness Directives / Service Bulletins
Source: ICF analysis, constant 2016 US$
Amazon is very well positioned to lead a major disruption of the air cargo industry.

Amazon’s Growing Revenue & Shipping Costs

Amazon is investing in airplanes - takes ownership stake in two North American cargo carriers; Atlas Air & ATSG

ATSG subsidiary AMES acquires airframe MRO and freighter conversion specialist PEMCO World Air Services

Source: Amazon SEC Filings
The good news…

After a half decade of economic decline, Latin America is once again poised for growth in 2017.

Note: All GDP Growth are calculated based on constant price (nation currency)
Source: IMF Economic Outlook April 2016, ICF analysis
In 2017, while most countries in Latin America will see modest, but steady economic growth, the big increases will come from Brazil and Argentina.

Note: All GDP Growth are calculated based on constant price (nation currency)
Source: IMF Economic Outlook April 2016, ICF analysis
Latin America is in the midst of an “LCC Renaissance”

- Copa restructuring Copa Colombia into new ultra-LCC called Wingo
- VivaColombia launches subsidiary Viva Air in Peru
- Flybondi plans to launch ultra-LCC in Argentina in 2017
- Chilean based Sky Airline switching its business model to ultra-LCC
- Mexican LCC Volaris announces new subsidiary in San Jose, Cost Rica
There continues to be significant interest and external financial investment in Latin American carriers.

China’s HNA Group will invest $450 million in Brazil’s Azul for a 23.7% stake, in a partnership that will enable the Latin American carrier to enter Asia.

Qatar Airways buys at 10% stake in Chilean-based LATAM, Latin America’s largest airline.

Avianca Holdings SA is studying options including the sale of a controlling stake and is set to receive bids from suitors.

US DOT grants antitrust immunity to Delta-Aeromexico joint venture; Delta executive to become Aeromexico’s COO.

Source: ICF analysis
2017: The year aviation & aerospace blinked...
Commercial aircraft OEM production backlog remains at historical highs

- Emerging market growth
- Very low interest rates
- Previously high oil and commodity prices
- Introduction of new technology aircraft/engines

Source: CAPA, ICF Analysis
Lower fuel costs appear to be reversing aircraft retirements trends

**Industry Impact:**
- **MRO Suppliers - Positive:** Increased spend on older airframes & engines
- **Surplus Market - Negative:** Reduced part-out "feed stock"
  - OEMs: Improved new part sales
  - Distributors: Improved used part values / pricing
  - Operators: Increased material costs
  - PMA Suppliers: Very Positive

Source: CAPA, Airline Monitor, ICF analysis
Four external macro-economic forces are creating headwinds for global airlines and the broader aerospace & MRO supply chain

- Increased airline costs:
  - Aircraft financing
  - Fuel
  - Labor
  - MRO flight hour agreements

- Downward pressure on global GDP growth
- Downward pressure on aircraft valuations
- Potential for increase in aircraft delivery deferrals (backlog risk)
- Middle East airline titans stressed

Advantage = Airbus
THANK YOU!

For questions regarding this presentation, please contact:

Jonathan M. Berger
Vice President • Aerospace & MRO Advisory
jberger@icf.com • +1 404.819.7669
ICF provides a full range of Aerospace & MRO advisory services

- Market Research & Analysis
- Airline Maintenance Benchmarking
- M&A Commercial Due Diligence
- OEM Aftermarket Strategy
- Aviation Asset Valuations & Appraisals
- MRO Information Technology (IT) Advisory
- Strategic Sourcing & Supply Chain Mgt.
- LEAN Continuous Process Improvement
- Military Aircraft Sustainment
ICF is one of the world’s largest and most experienced aviation and aerospace consulting firms

- 53 years in business (founded 1963)
- 80+ professional staff
  - Dedicated exclusively to aviation and aerospace
  - Blend of consulting professionals and experienced aviation executives
- Specialized, focused expertise and proprietary knowledge
- Broad functional capabilities
- More than 10,000 private sector and public sector assignments
- Backed by parent ICF International (2015 revenue: 1.13 billion USD)
- Global presence — offices around the world

New York • Boston • Washington DC • London • Singapore • Beijing