Gorham PMA & DER Conference
San Diego, CA
21 March 2017

Presented by:

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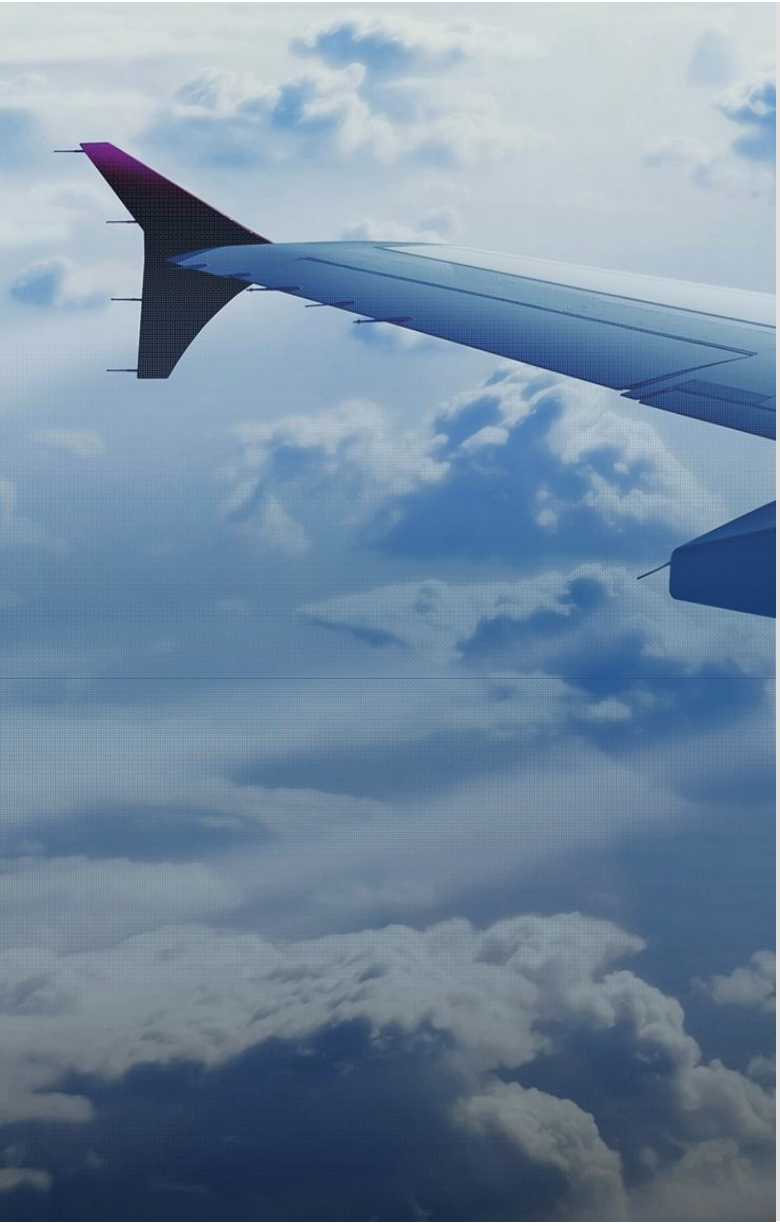
Market Outlook & Industry Trends



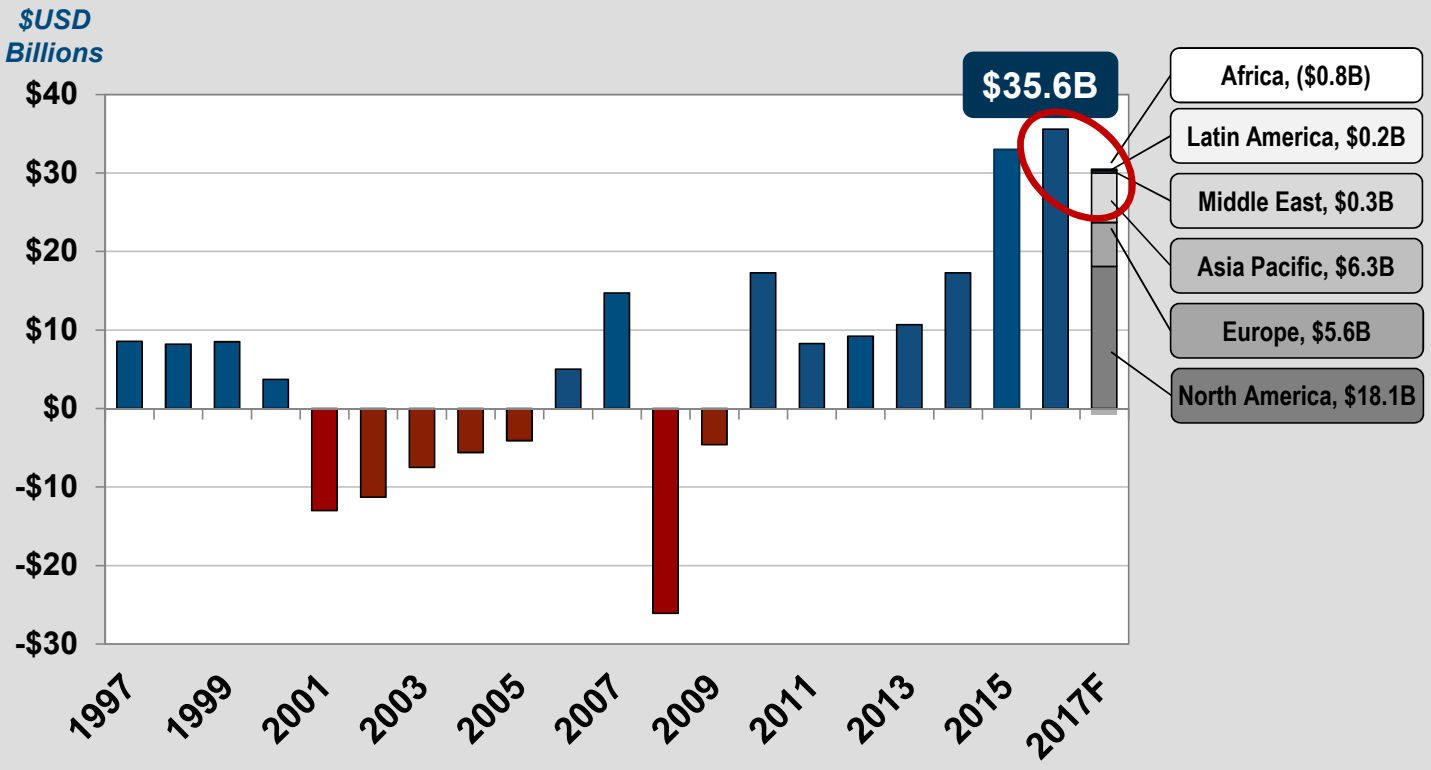
Today's Agenda

- State of the Airline Industry
- Fleet & MRO Market Overview
- Alternative Materials
- Key Industry Trends

Driven by low fuel costs and consolidation, the global airline industry achieved record profitability of over $35B USD in 2016

2016 was an historic year for airline profitability…

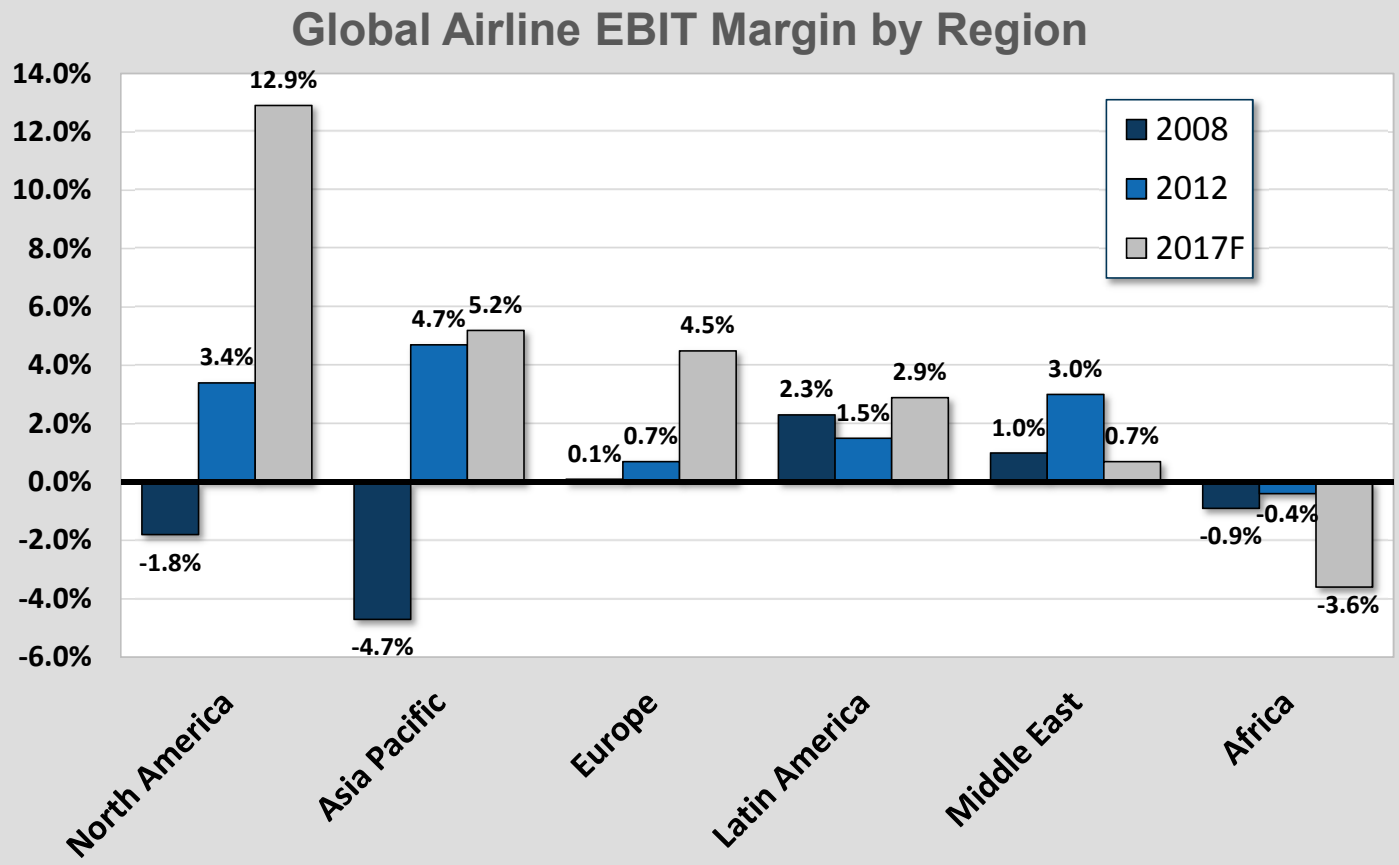
Global Airline Profitability, 1997 - 2017F



Source: IATA, ICF analysis

However, record profitability has been largely limited to carriers in North America

…but many airlines continue to struggle

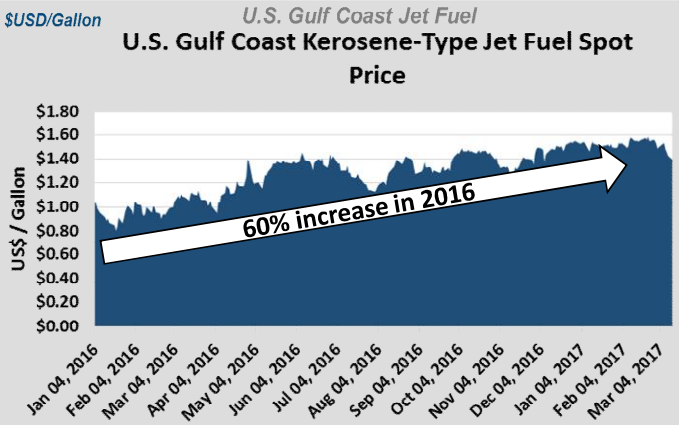


Source: IATA, ICF Analysis

Four external macro-economic forces are creating headwinds for global airlines and the broader aerospace & MRO supply chain

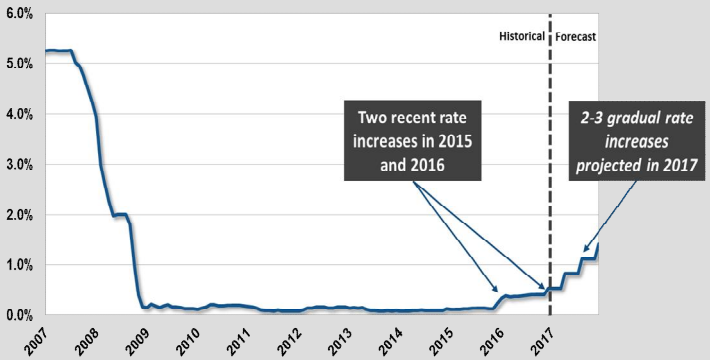
- **Increased airline costs:**
  - *Aircraft financing*
  - *Fuel*
  - *Labor*
  - *MRO flight hour agreements*
- **Downward pressure on global GDP growth**
- **Downward pressure on aircraft valuations**
- **Potential for increase in aircraft delivery deferrals (backlog risk)**
- **Middle East airline titans stressed**
- **Advantage = Airbus**

Fuel Costs



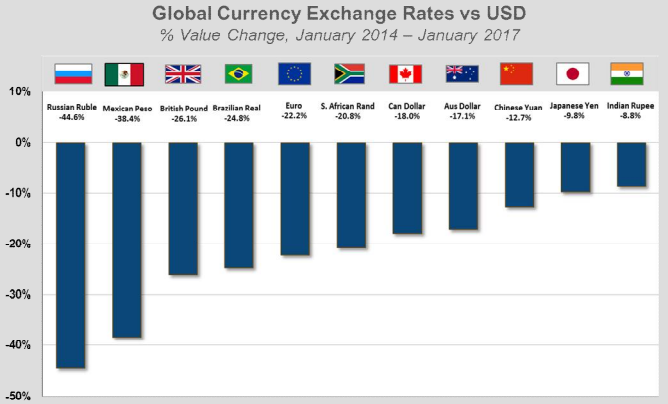
Growth of Populism/Nationalism & Impact to Global Trade

U.S. Interest Rate Increase



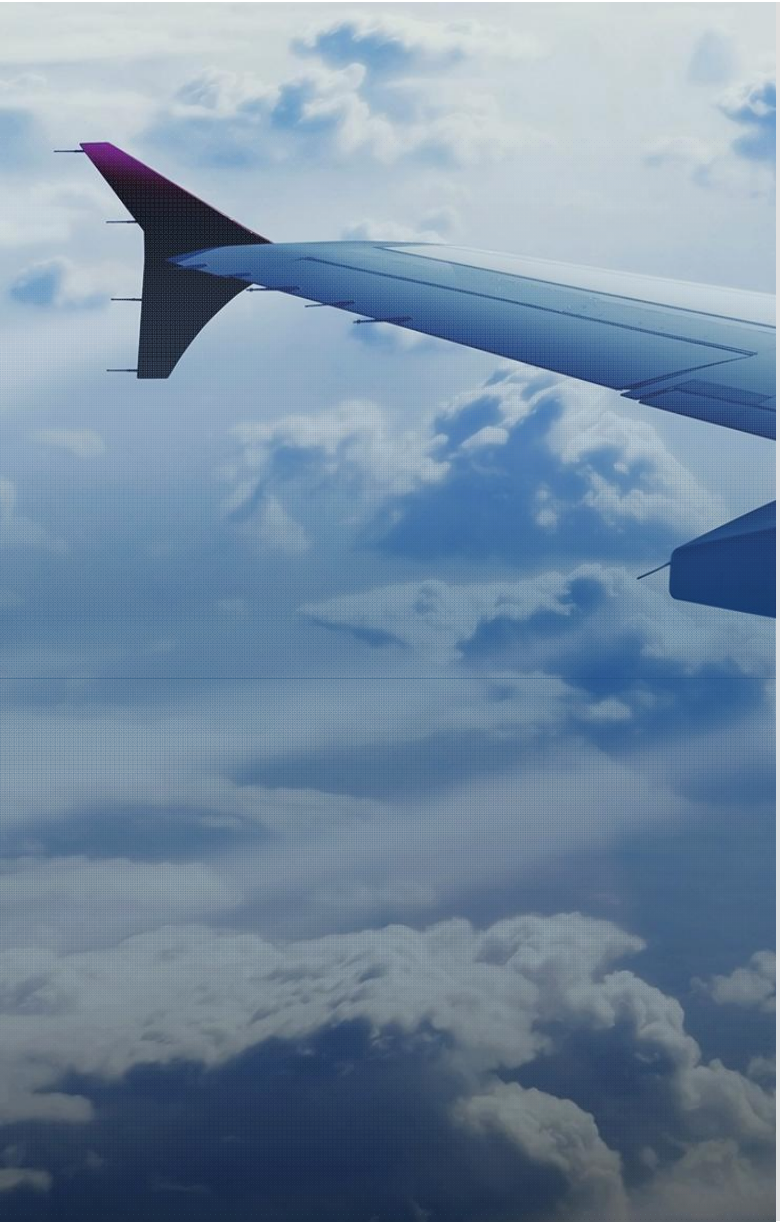
Source: Federal Reserve Bank

Strengthening US Dollar



Source: X-Rate historical exchange rates, ICF analysis

Source: ICF analysis



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- State of the Airline Industry
- **Fleet & MRO Market Overview**
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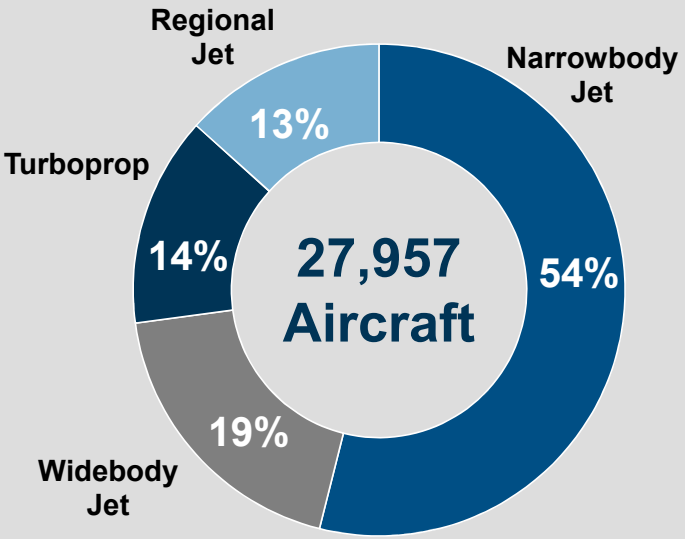
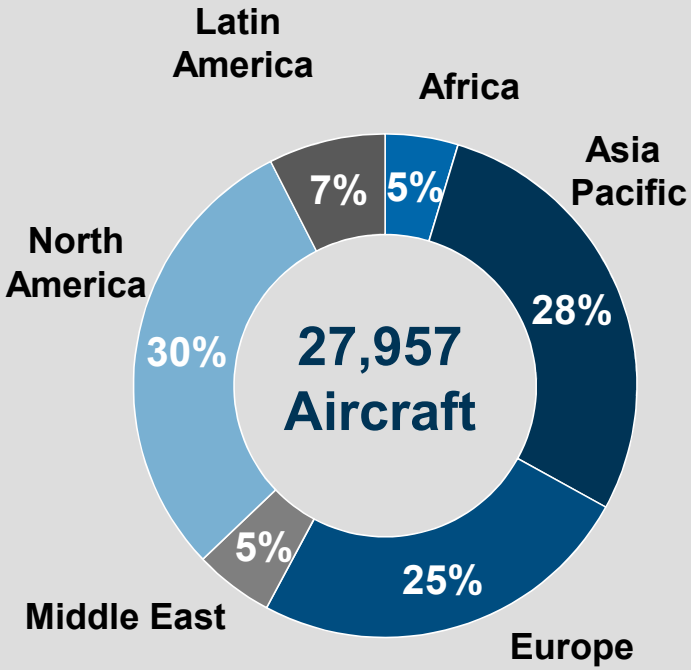
The current commercial air transport fleet consists of almost 28K aircraft; over half are narrowbody aircraft

2016 Global Commercial Air Transport Fleet



By Aircraft Type



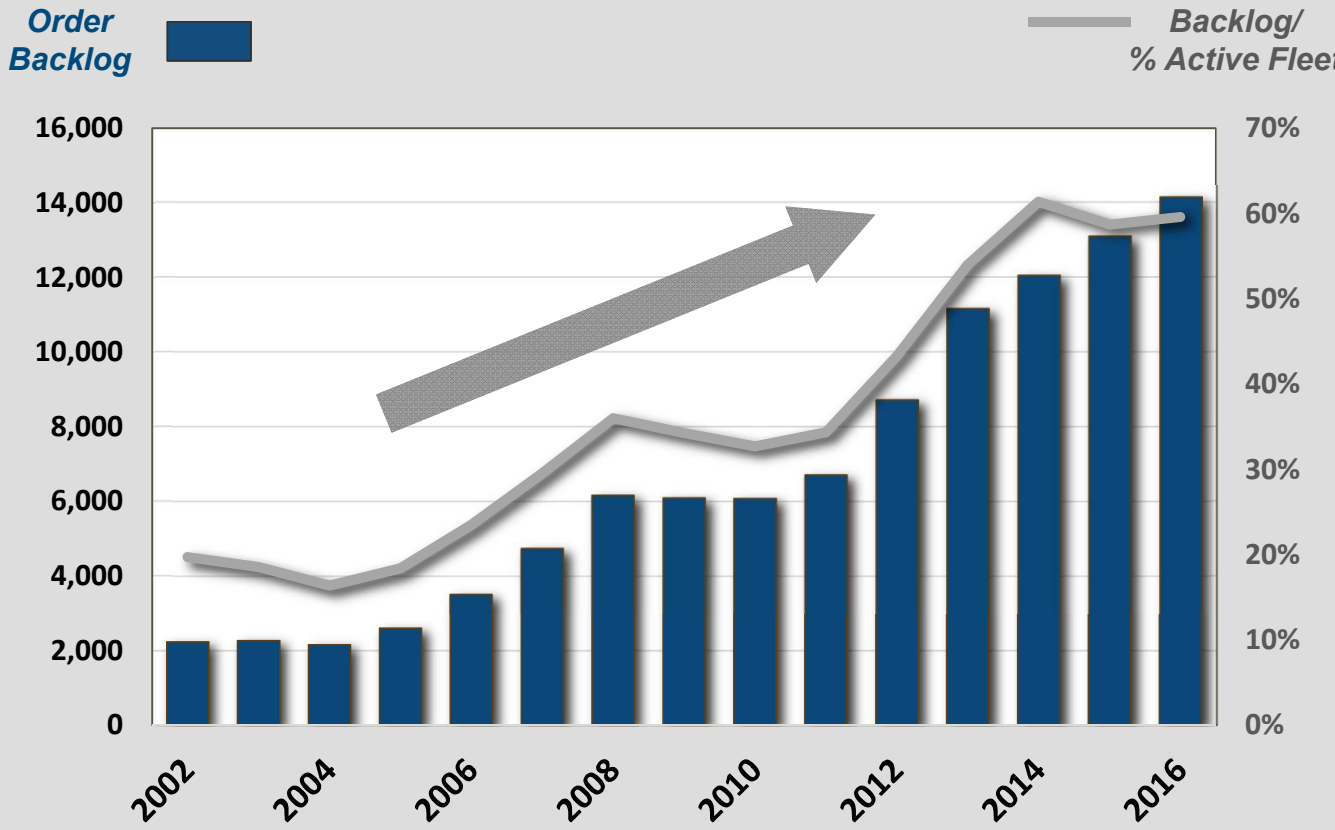
By Global Region

Source: CAPA 2016

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

Commercial Aircraft OEM Production Backlog



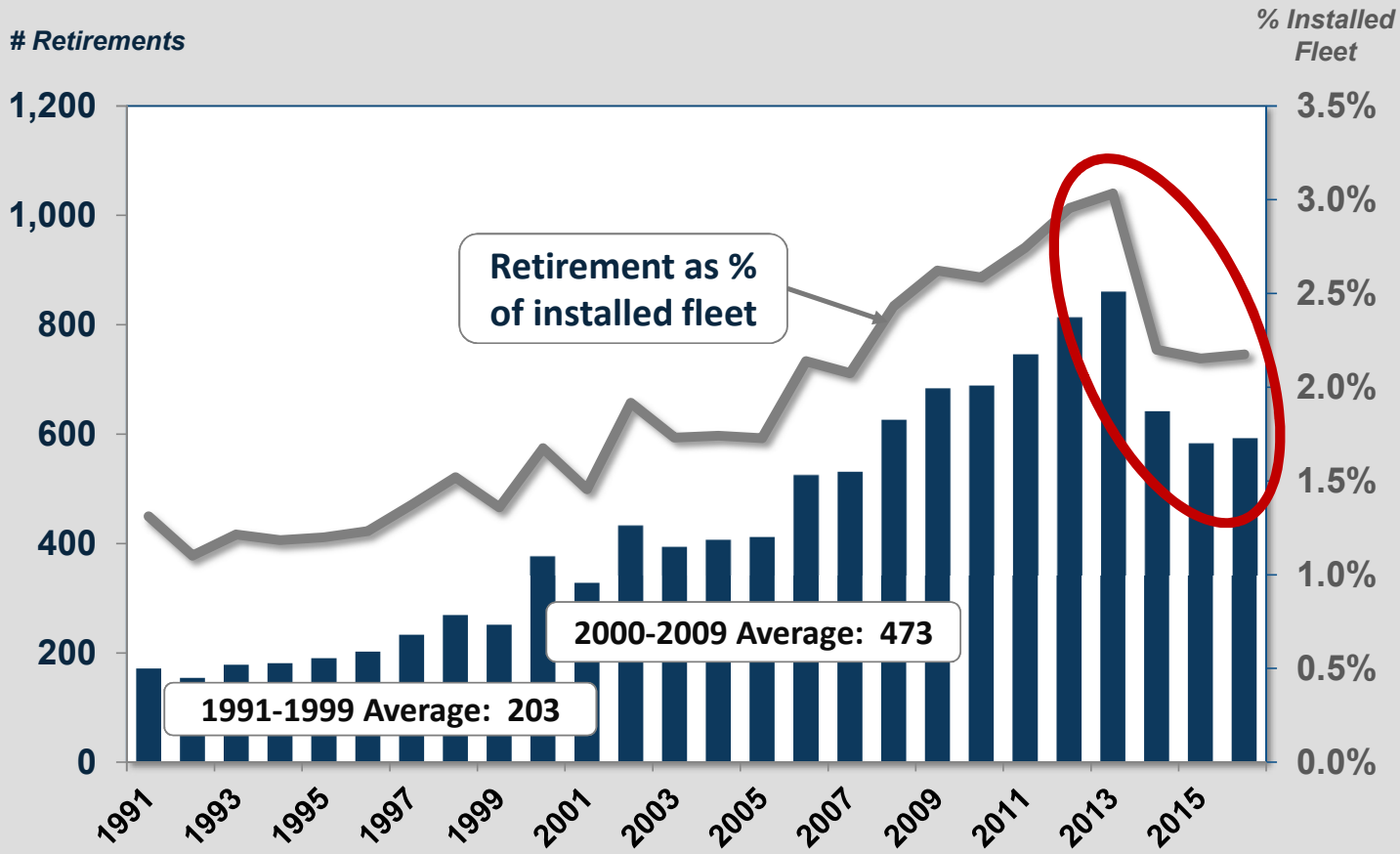
Source: CAPA, ICF Analysis

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**

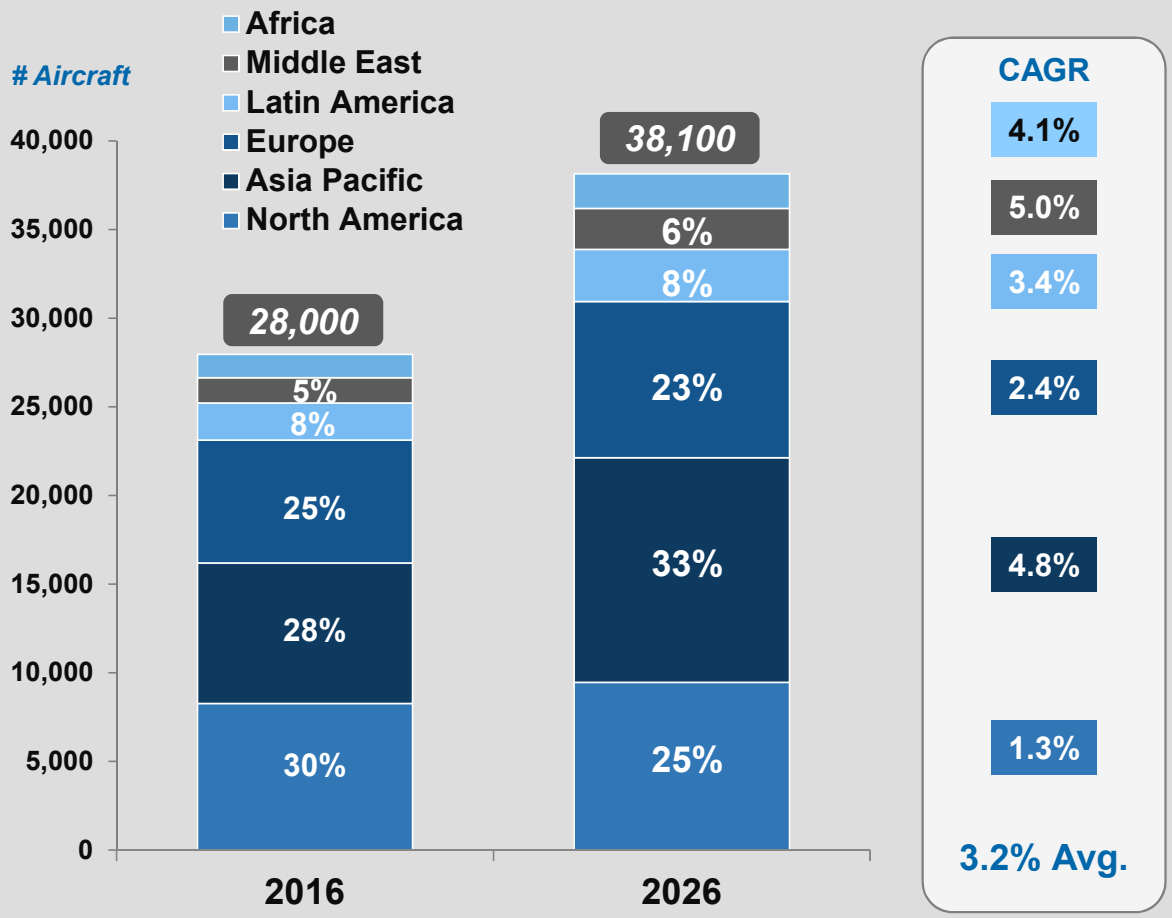
Commercial Air Transport Annual Aircraft Retirements



Source: CAPA, Airline Monitor, ICF analysis

The combination of strong air travel demand and the need to replace ageing aircraft will drive fleet growth at a healthy 3.2% annually

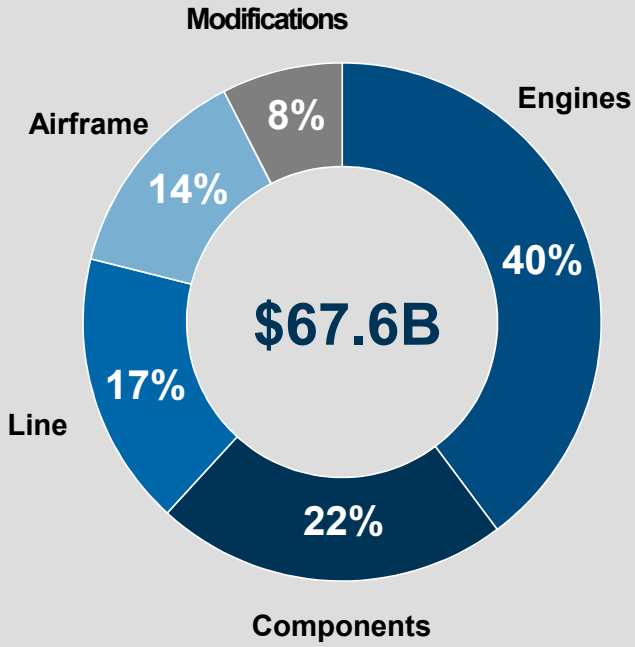
10 Year Global Air Transport Fleet Growth



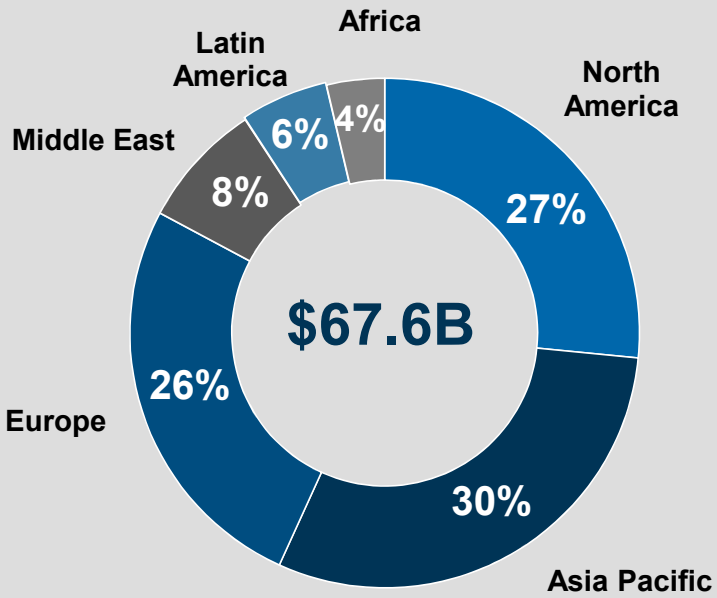
Source: ICF analysis: CAPA 2016

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



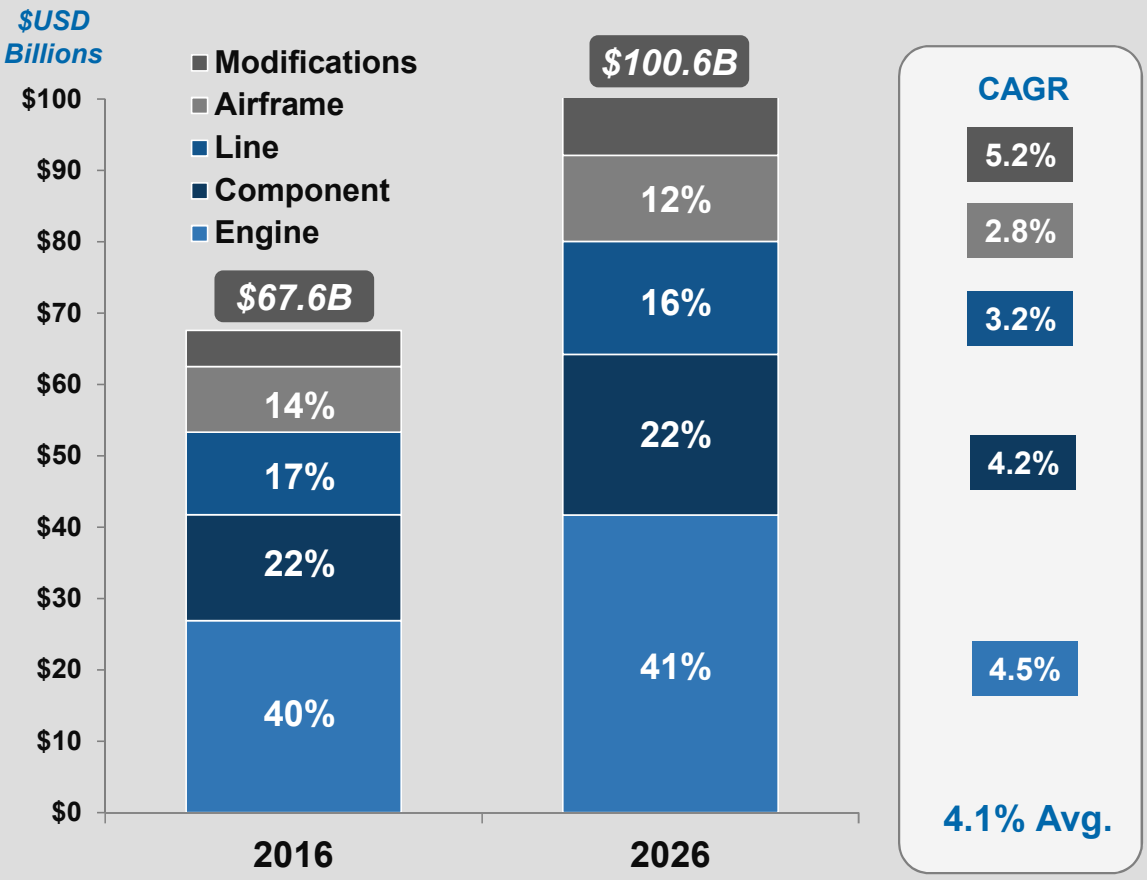
By Global Region

Source: ICF analysis; Forecast in 2016 $USD, exclusive of inflation

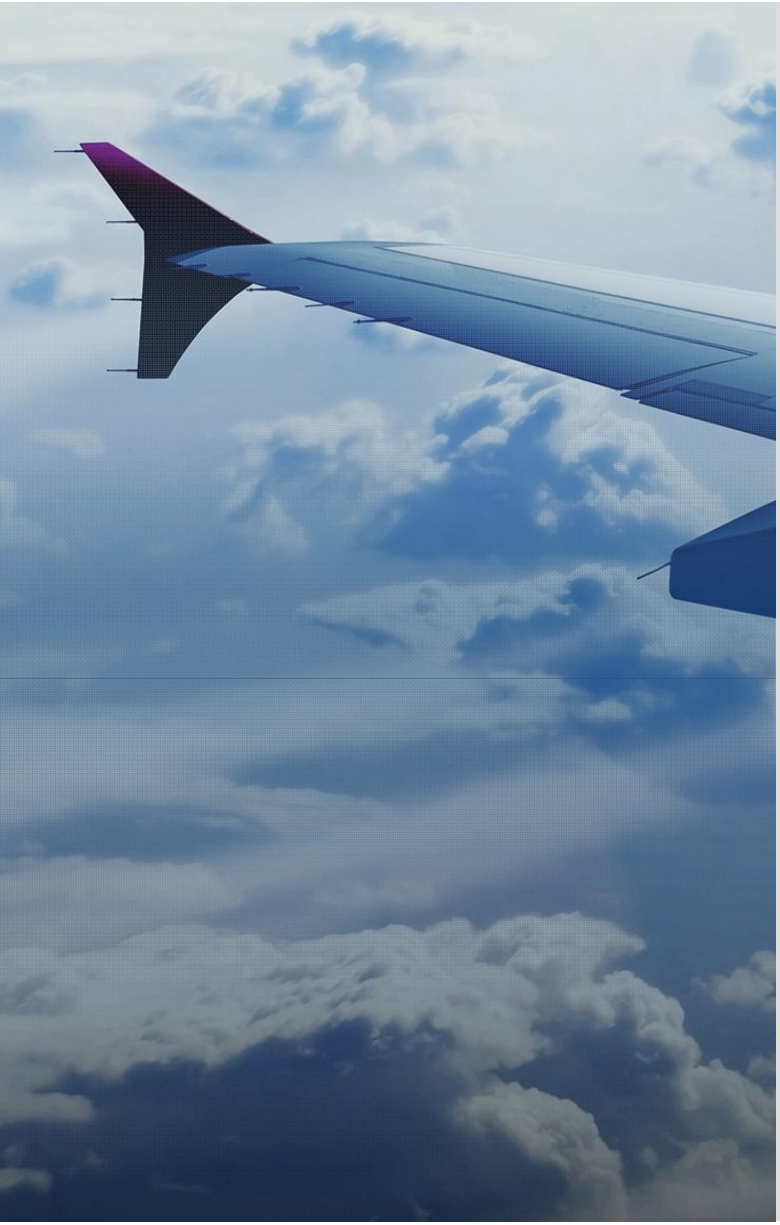
The global MRO market is expected to grow by 4.1% per annum to over $100B by 2026

- 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

10 Year Global Commercial Air Transport MRO Demand Growth



Source: ICF analysis; Forecast in 2016 $USD, exclusive of inflation



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There two primary reasons operators are aggressively seeking non-OEM supplied parts …

1. Cost savings
2. Part availability

… And we traditionally focus our discussion around three alternatives OEM-supplied parts:

Surplus

Three types of surplus material:

1. Used Serviceable Material (USM)
2. New Material
3. Used, unserviceable material

DER Repair

- DER (Designated Engineering Representatives), FAA approved engineers who can approve technical data for repairs and modifications outside the CMM
- Design Organization Approval (DOA), a blanket approval for an MRO organization to develop internal repairs

PMA

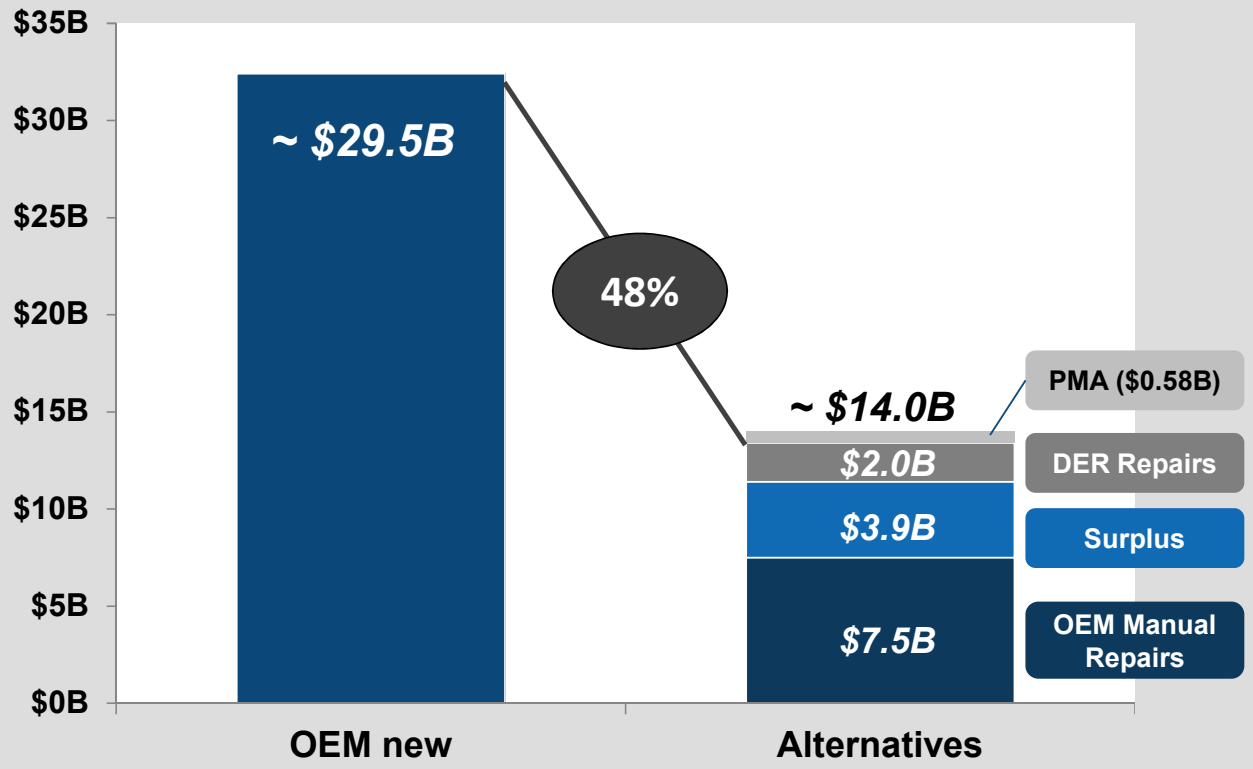
- PMA (Parts Manufacturer Approval) is approval granted by the FAA to a non-OEM manufacturer of aircraft parts
- Two types of PMA:
  1. Licensed
  2. Competitive

Lower *Perceived Risk* *Higher*

Source: ICF analysis

In 2016, operators spent almost $30B on OEM new parts and an additional $14B on alternatives

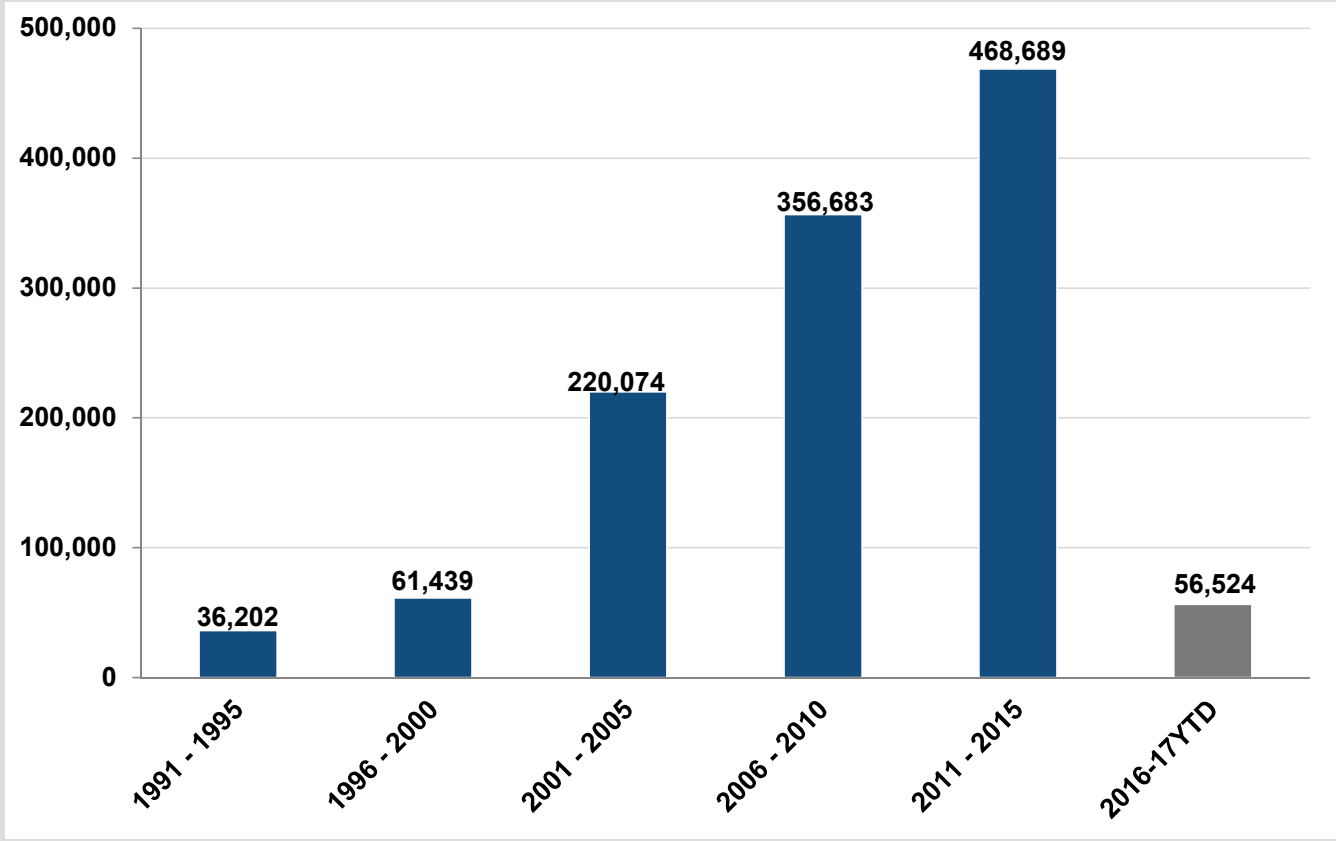
2016 OEM New Material Demand vs. Alternatives



Source: ICF analysis

The volume of PMA approvals has been steadily growing since 1990, with over almost 525,000 new approvals granted since 2011 … however, the pace in 2016 and 2017 appears to have dropped significantly

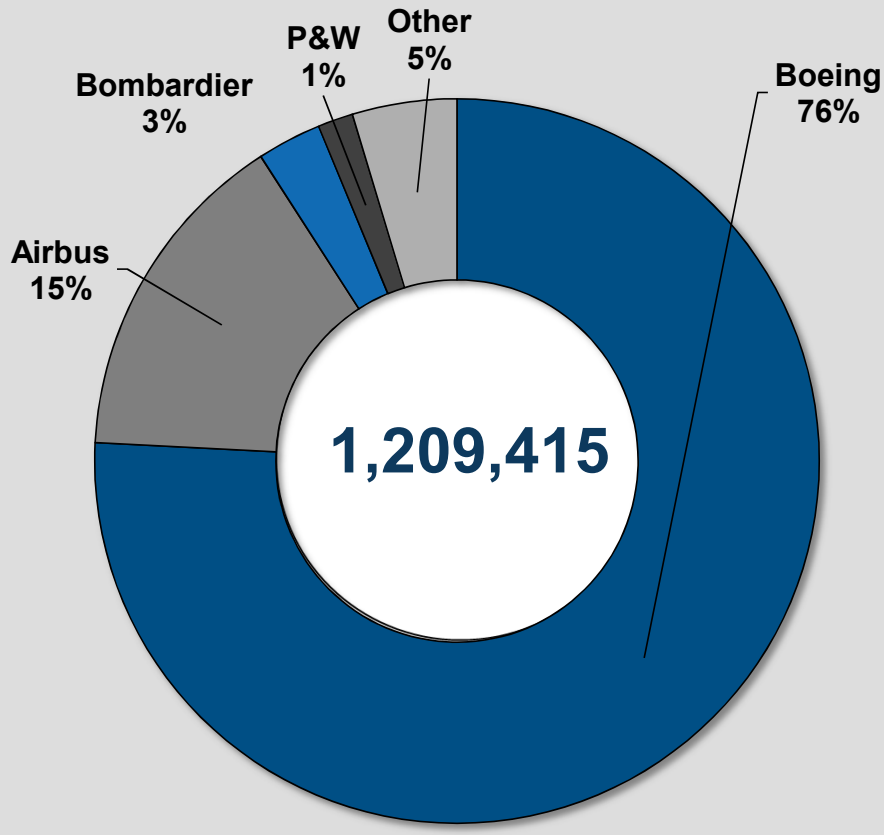
FAA Approved PMA Part Numbers by Year Approved



Source: Federal Aviation Administration – PMA Database extract 19 March 2017

There are over 1.2 million total PMA parts that are FAA approved, of which over 75% are for Boeing aircraft

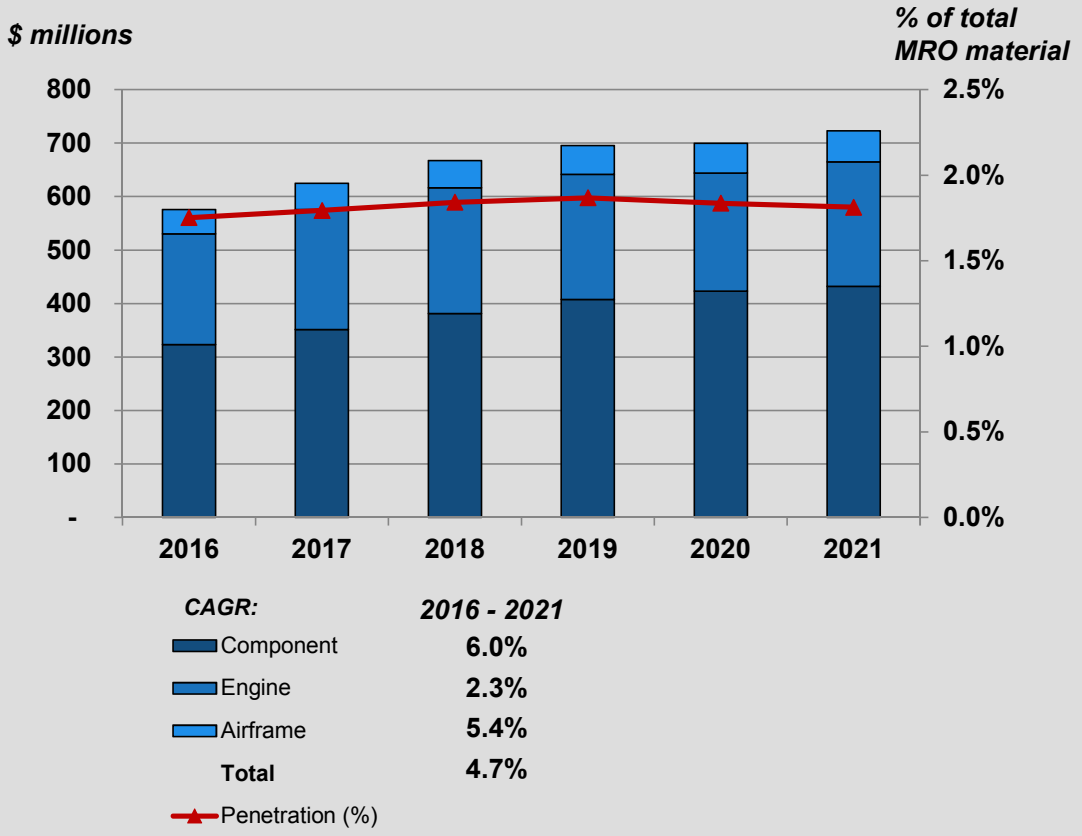
FAA Approved PMA Part Numbers by OEM



Source: Federal Aviation Administration – PMA Database extract 19 March 2017

PMA growth is has declined from the "good old years" but is healthy at 4.7%

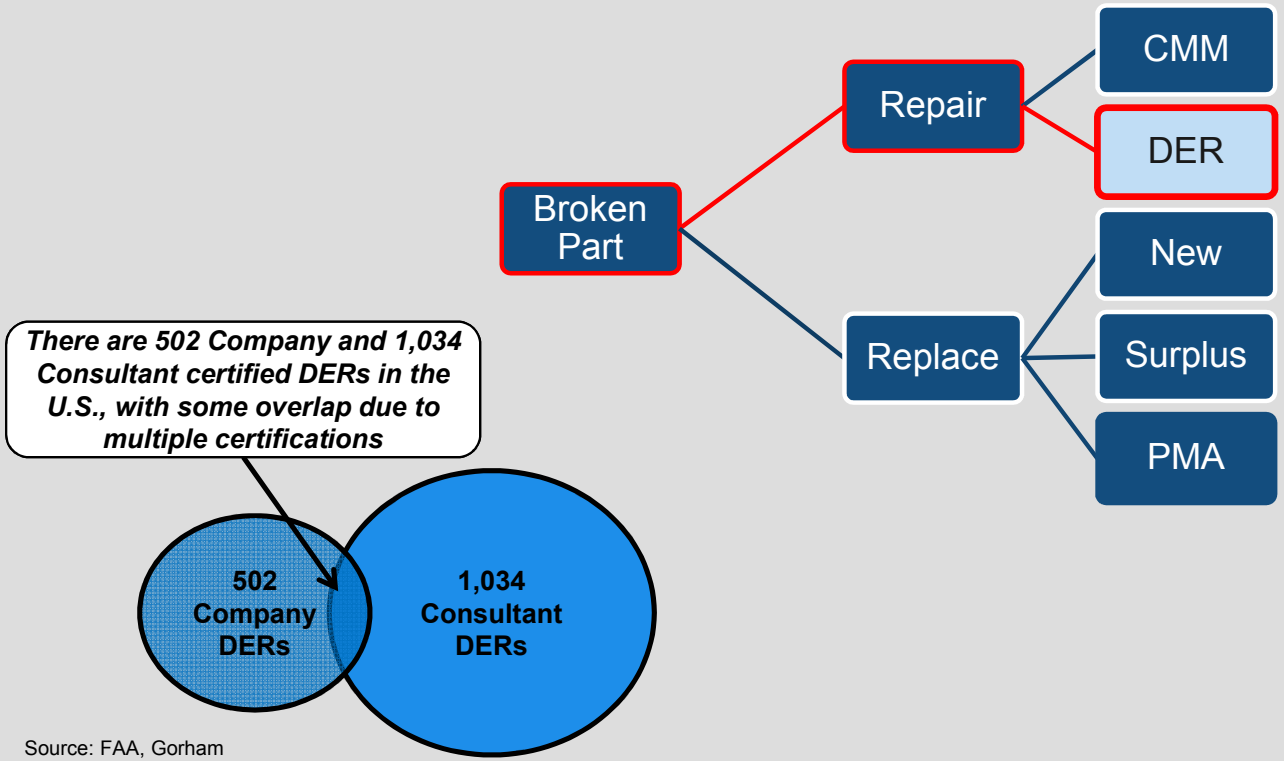
Air Transport PMA Market Forecast In $ Millions (2016-2021)



Source: ICF
Forecast in 2016 USD, exclusive of inflation

The DER method is an alternative repair process to the OEM component maintenance manual (CMM)

With over 500 Company and 1000+ Consultant DERs in the US, DER repairs are an increasingly important alternative

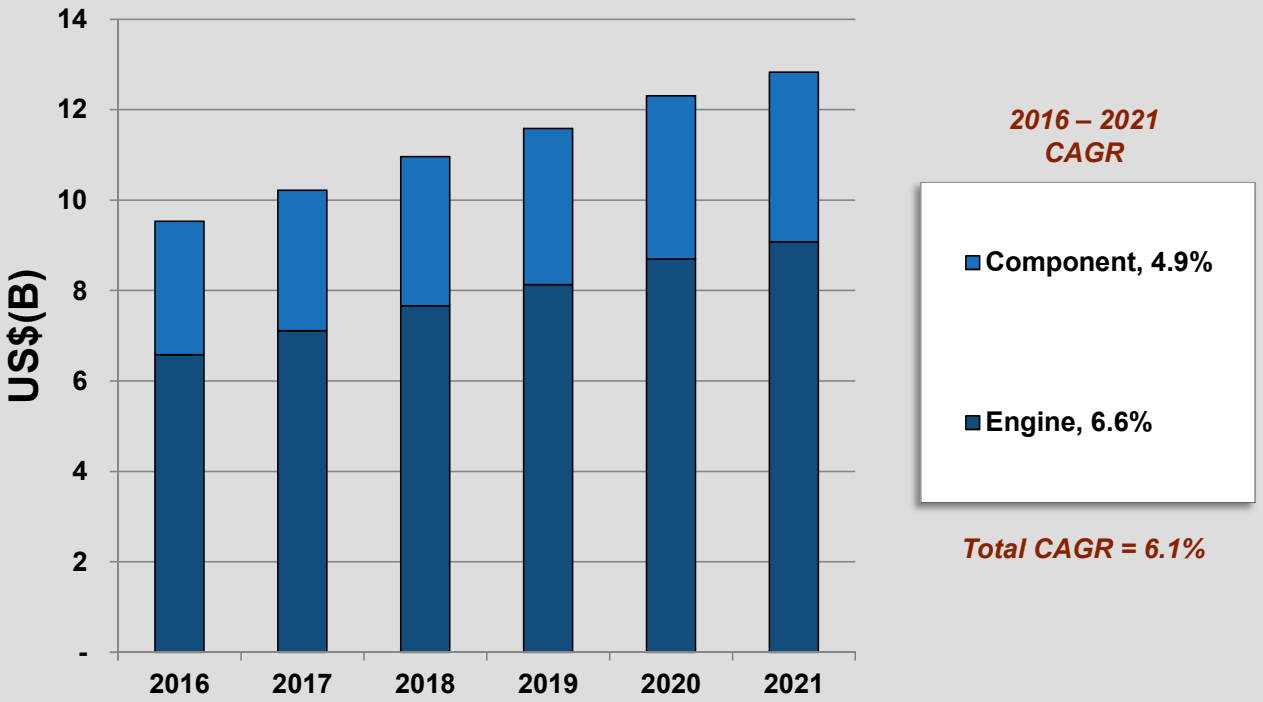


Source: FAA, Gorham

The parts repair market is projected to grow from $9.5B today to almost $13B in 2021

- In aggregate, inside and outside parts repair activity is worth almost $10 billion, with 70% of the activity directed towards engines
- Engine parts repair will remain the largest portion of the parts repair market, and will also be the fastest growing.
- The engine parts repair market will grow from $6.6B to $9.1B, while the component repair market will grow from $3.0B to $3.8B by 2021.

Air Transport Parts Repair Market In $ Billions (2016-2021)



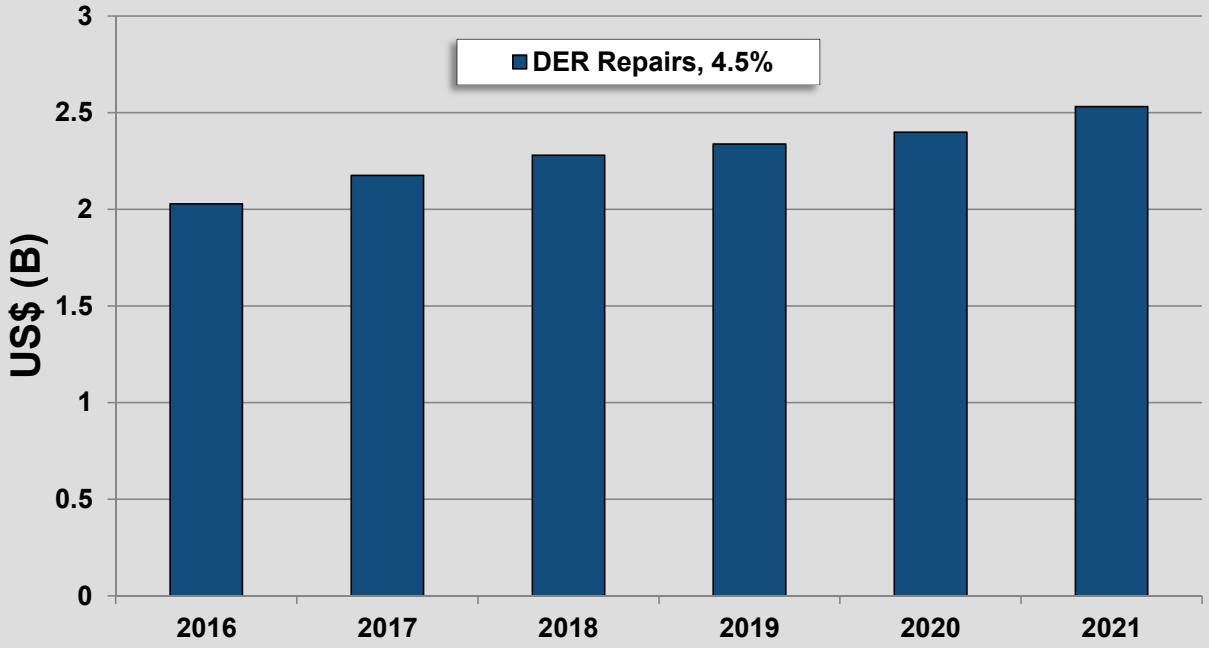
Forecast in 2016 USD, exclusive of inflation

Source: ICF analysis

ICF forecasts the air transport DER market to grow 4.5% annually over the 2016-2021 period to $2.5B

- The DER market will grow from $2.0B today to $2.5B by 2021, representing 4.5% annual growth
- Growing OEM market share of the aftermarket for engines and components compounded by the growing used serviceable part availability will slow DER market growth
- Component DER will grow faster driven by continued growth in surplus market which generates increased demand for repairs of unserviceable units

Air Transport DER Market Forecast In $ Billions (2016-2021)



"Surplus have increased the demand for component DER - because the unserviceable surplus parts needs to be repaired. Biggest customer for DER is ourselves.

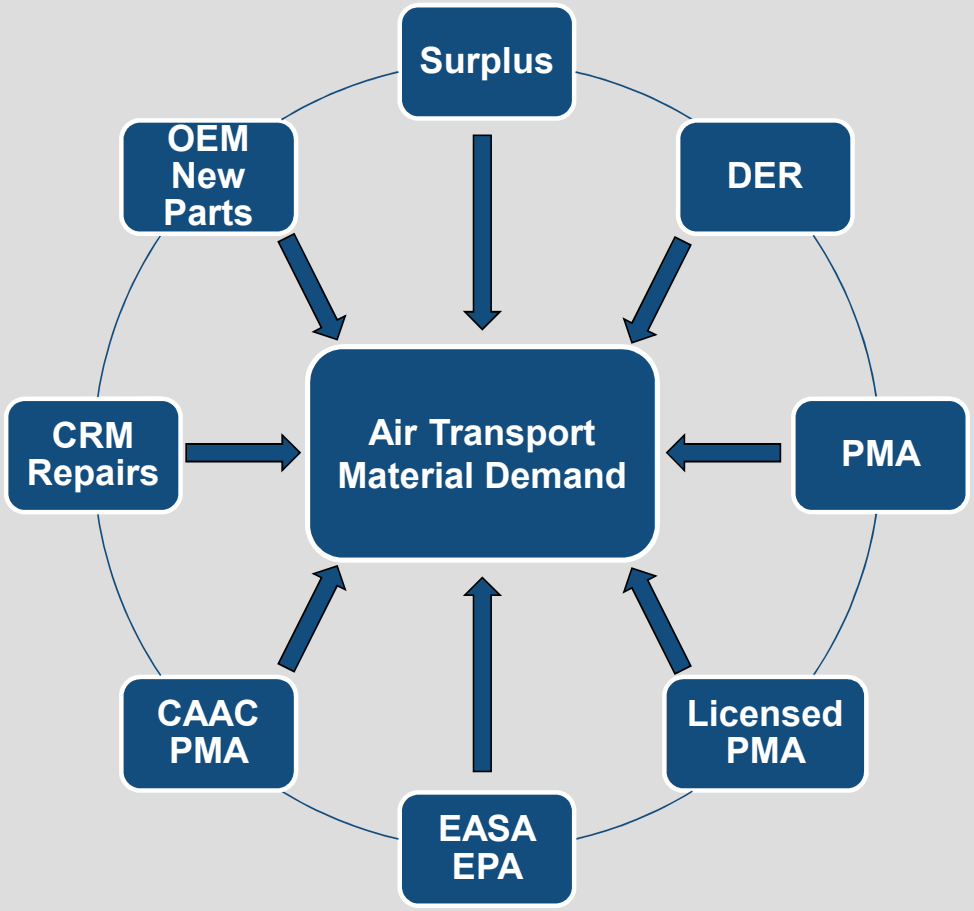
- Major PMA / DER Supplier

Forecast in 2013 USD, exclusive of inflation

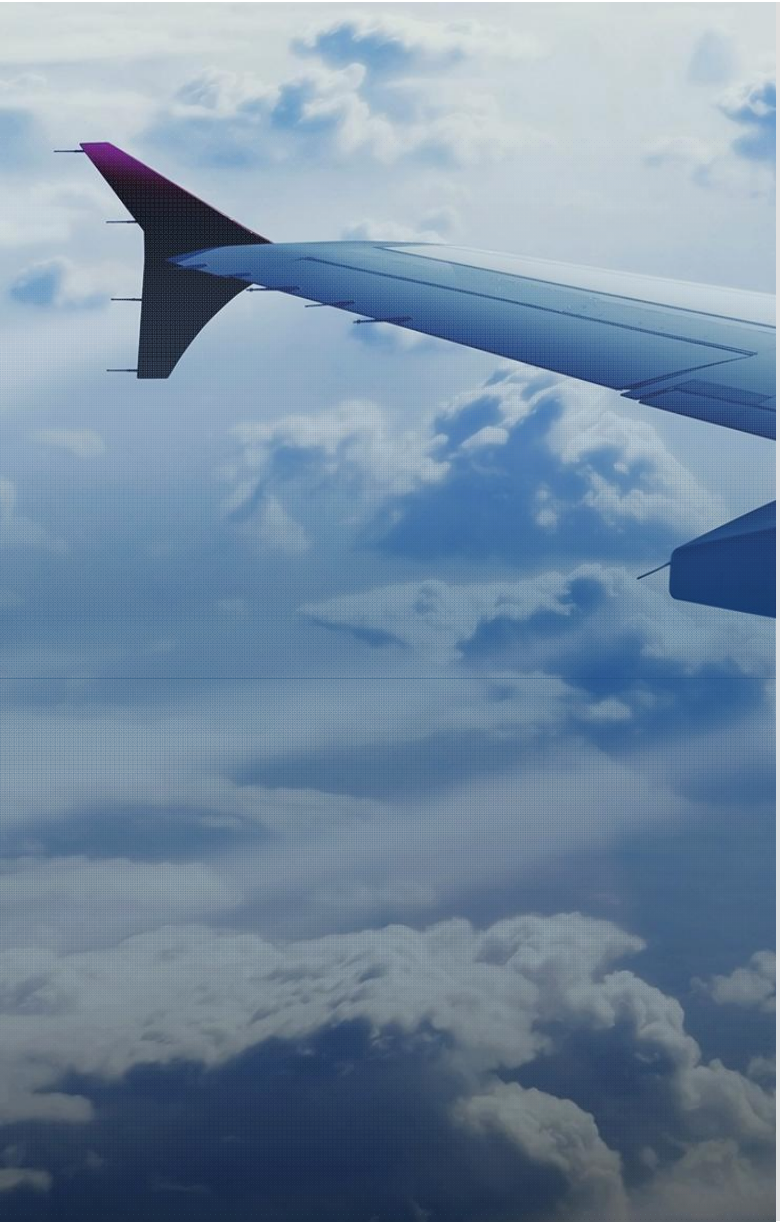
Source: ICF analysis

While we often focus on PMA, Surplus & DER; we need to keep the full spectrum of alternatives in mind

Operators & MROs can choose from at least eight alternatives to fulfill their material demand



Source: ICF Research



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- State of the Airline Industry
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There are four key constraints to PMA/DER market growth

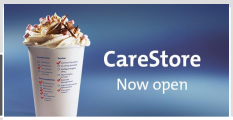
1. Lessor Restrictions
2. OEM Strategies
3. Availability of surplus parts
4. Operator's technical capability & capacity

Lessor Restrictions

Operator Technical Capability & Capacity

PMA & DER Material Demand

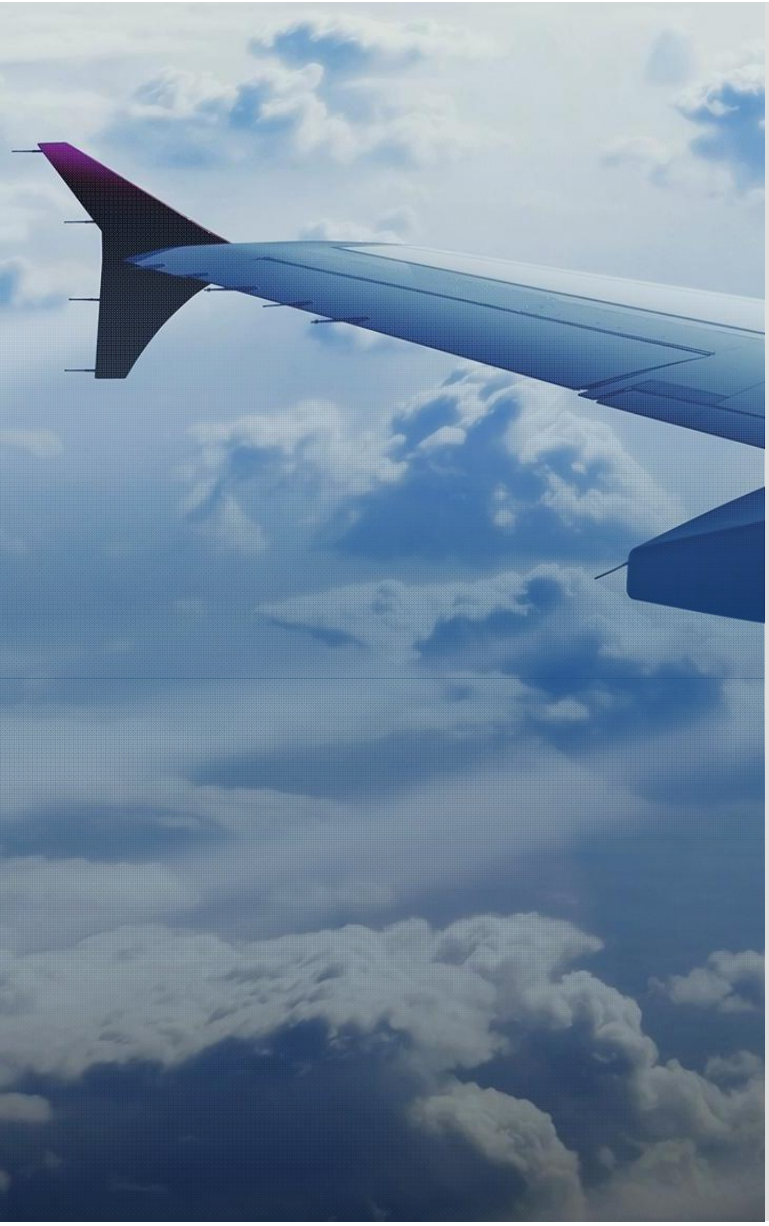
TRUEngine™ program



OEM Strategies

Availability of Surplus Parts

Source: ICF analysis



In Summary…

- While airlines are performing well as a whole, profits are focused primarily on North American operators, so cost reduction remains a priority
- In order to control and reduce material spend, airlines must have a comprehensive OEM alternative strategy
- PMA parts, DER repairs, and surplus material are valuable material sourcing solutions that drive tangible cost savings and improve part availability
- As long as certain airlines continue to have restrictive PMA policies, Lessors will continue to include conservative language in their lease agreements
- Education is the only solution

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THANK YOU!

For questions regarding this presentation, please contact:

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