

# AEROSPACE RAW MATERIALS MARKET OUTLOOK



Presented by:

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Metal Market**

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# How One Economist Cut His Teeth In Analyzing The Aerospace Raw Materials Market!



**Alan Greenspan**

**Consultant – Conference Board**

**Early 1950s**

- ***“The [Korean War] buildup was upsetting the market for raw materials and equipment..and it was putting a massive question mark over the business outlook...”***
- ***“I knew the weights of particular aircraft and could surmise the proportions of aluminum, copper, and other materials that went into each type. With all of that in hand, I could estimate demand”***
- ***“Some of the Pentagon’s planners had been surprised by how closely the analysis matched their classified numbers.”***

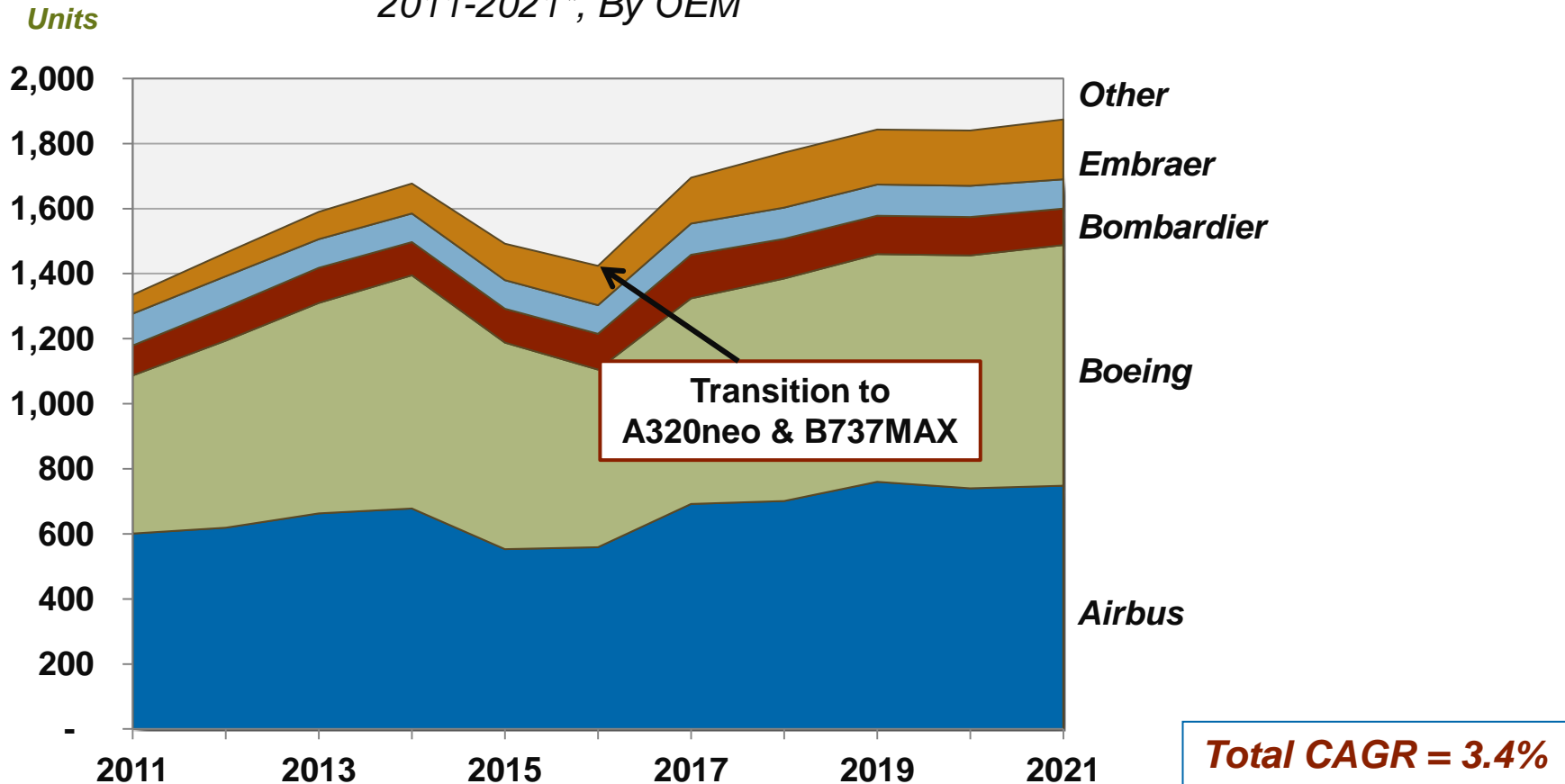
Source: Age of Turbulence (Greenspan)

# Agenda

- **Aerospace Raw Material Demand Outlook**
- Key Events Since AMM 2011

# Air Transport Production Will Increase From 1,200 To Over 1,800 By 2021, Led By Boeing and Airbus

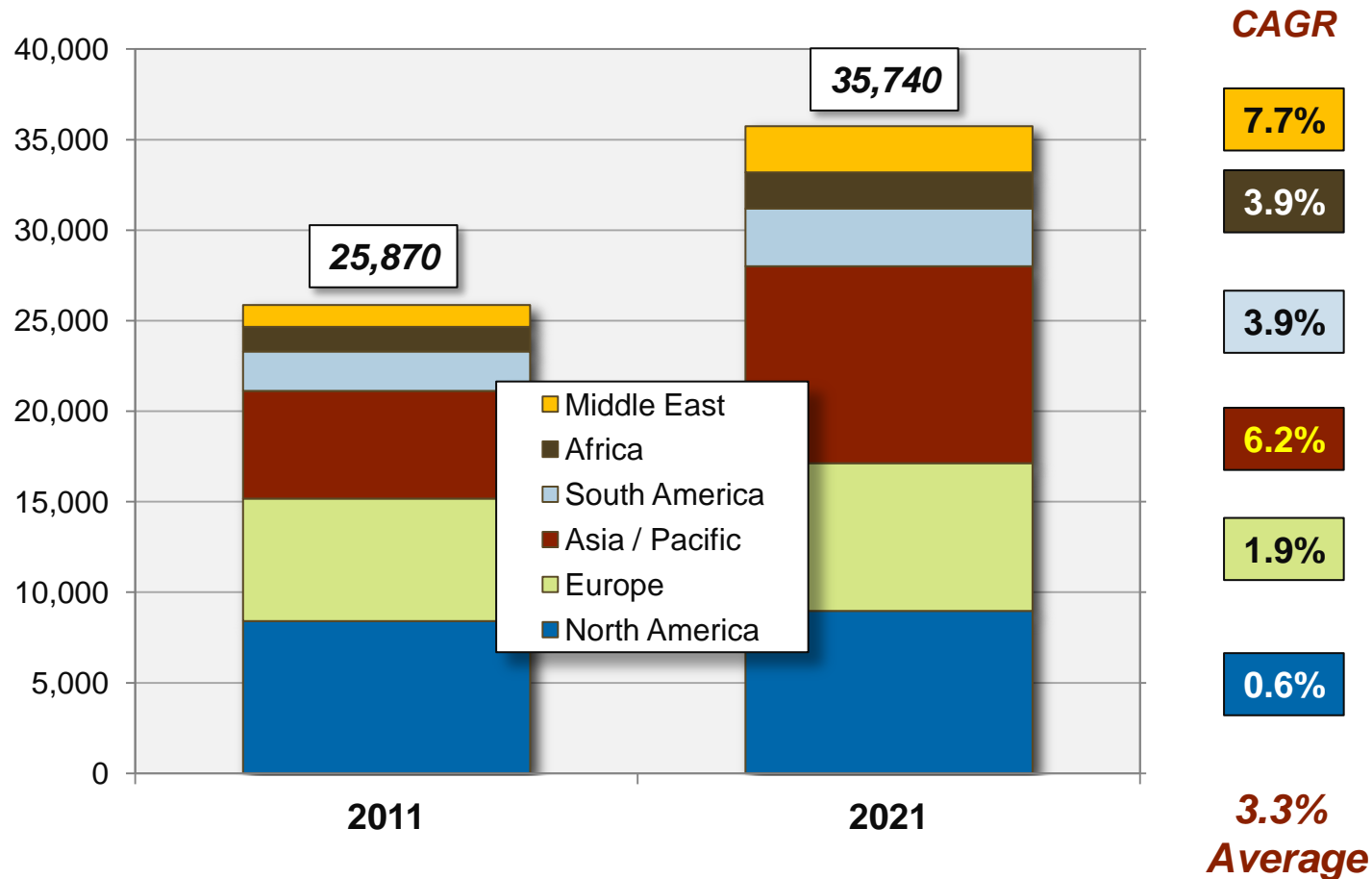
**Air Transport Production Market**  
2011-2021\*, By OEM



\* Drop in production rates from 2014 to 2016 is due to a change in orders, shifting from legacy aircraft to next generation—see following page

# The Air Transport Fleet Will Exceed 35,000 Aircraft By 2021

*Air Transport Fleet Growth\* 2011-2021*



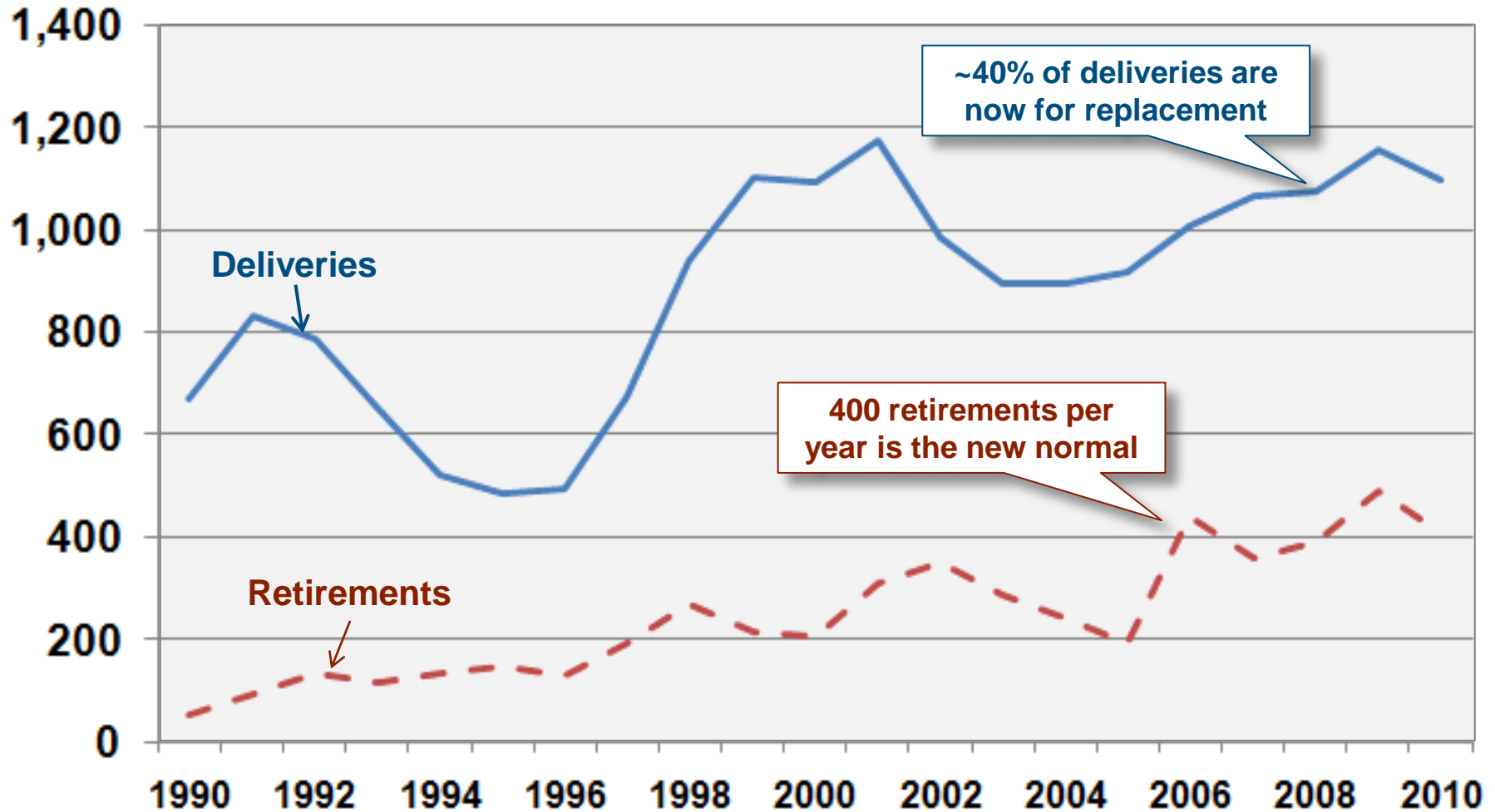
Source: ICF SH&E analysis

\* Includes Turboprops

# High Fuel Prices Are Driving a Structural Increase in Retirements

# Aircraft

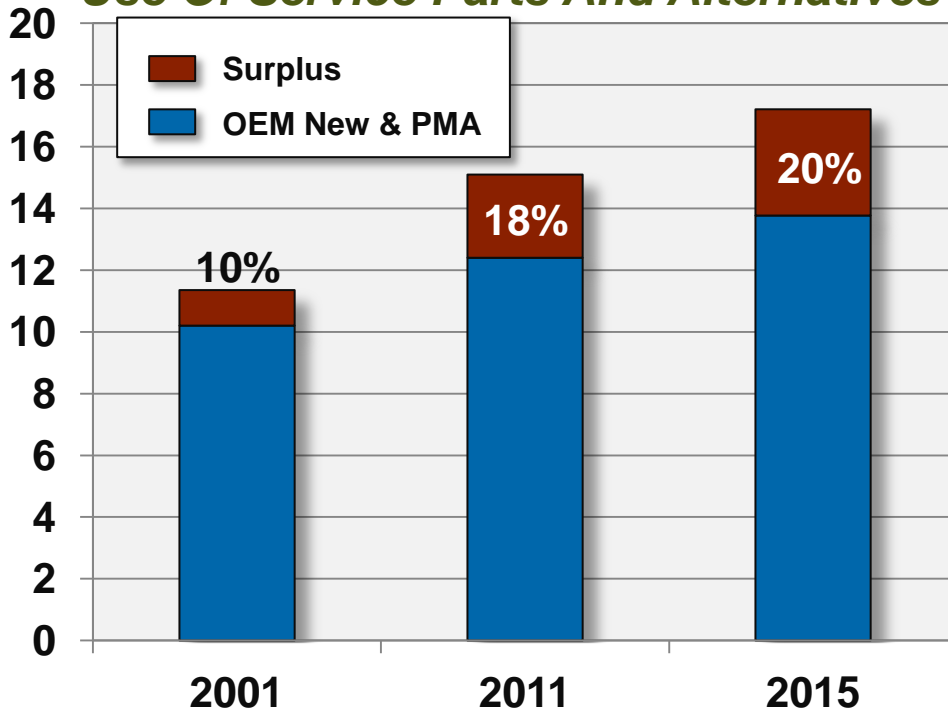
## Air Transport Retirements and Deliveries



Source: Airline Monitor

# As A Result, Surplus Parts Usage Is Becoming A Major Factor In The Air Transport Aftermarket

**Air Transport MRO Market (\$B)**  
**Use Of Service Parts And Alternatives\***



\* Includes engines, components and airframe parts;

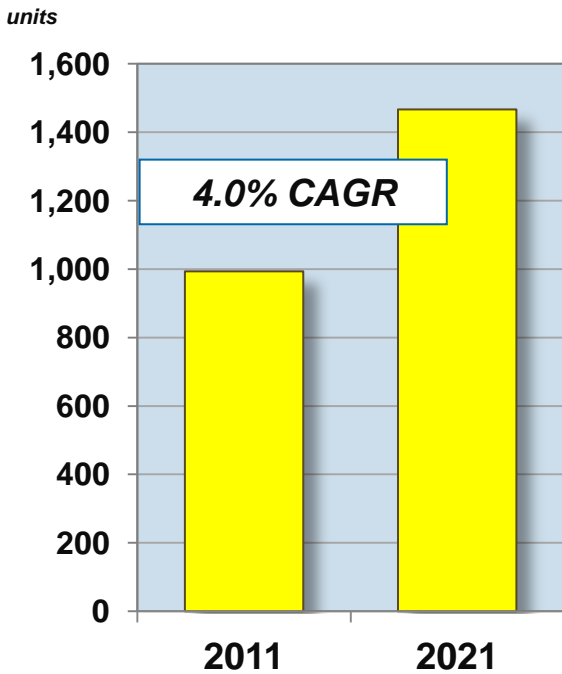
- Thousands of aircraft are now economically obsolete due to a unique blend of high fuel prices, low interest rates, high production rates, and new technology aircraft
- The parting out of many of these aircraft has fueled an increase in surplus parts supply
- Also fueling growth is the financial sophistication of the largest surplus dealers – many are owned by leasing companies or OEMs
- ICF projects surplus penetration of 20% or more by 2015 – six times greater than PMA

Source: ICF SH&E analysis

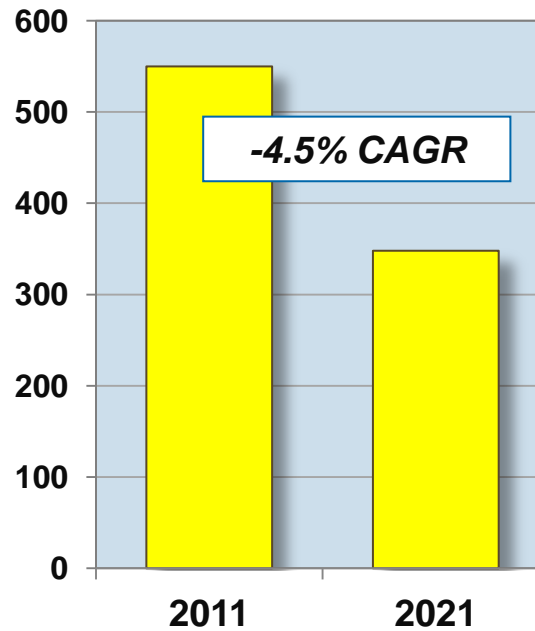
# Production Growth Through 2021 Varies Greatly By Market

## Aircraft Production Forecasts 2011 & 2021

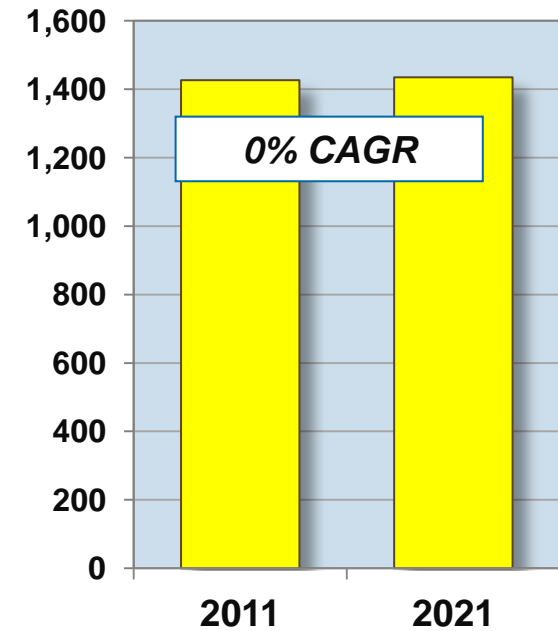
### Business & General Aviation



### Military Fixed Wing



### Rotary Wing

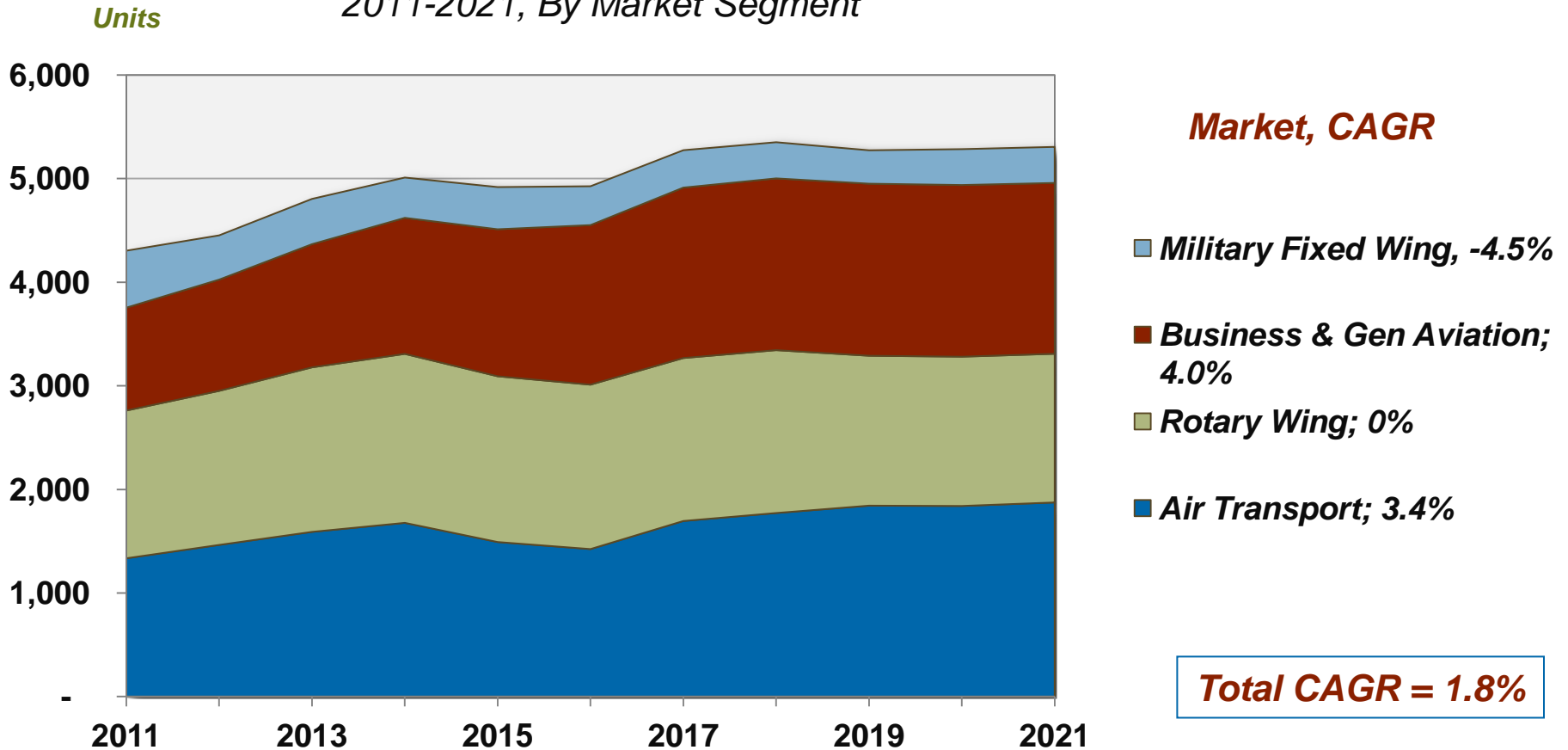


\* Includes Spares  
Source: ICF SH&E



# Annual Aircraft Production Is Projected To Increase From 4,200 to Over 5,000 Units By 2017

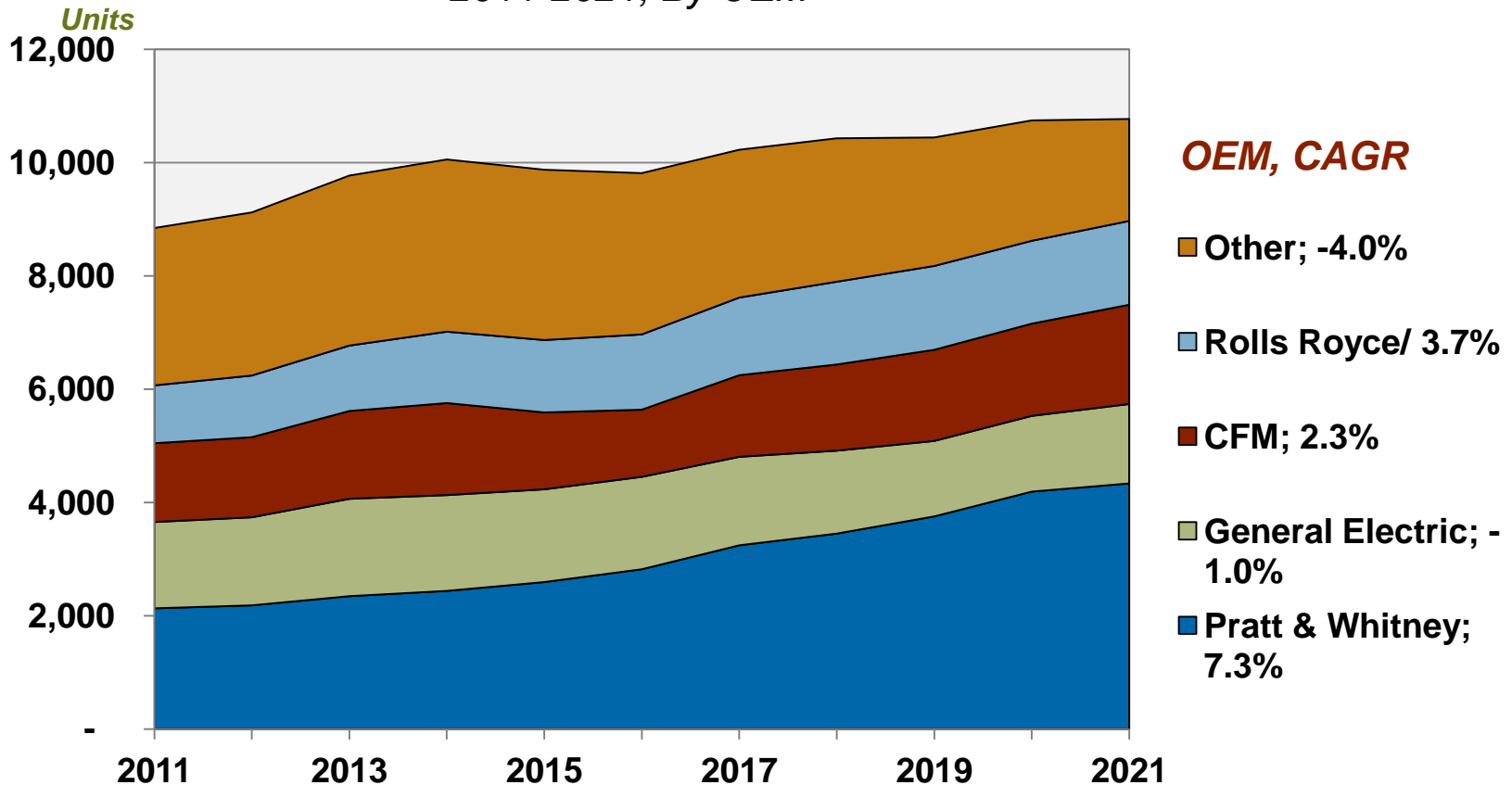
**Aggregate Production Market**  
2011-2021, By Market Segment



Source: ICF SH&E

# Annual Aero-Engine Production Should Exceed 10,000 Units By 2021

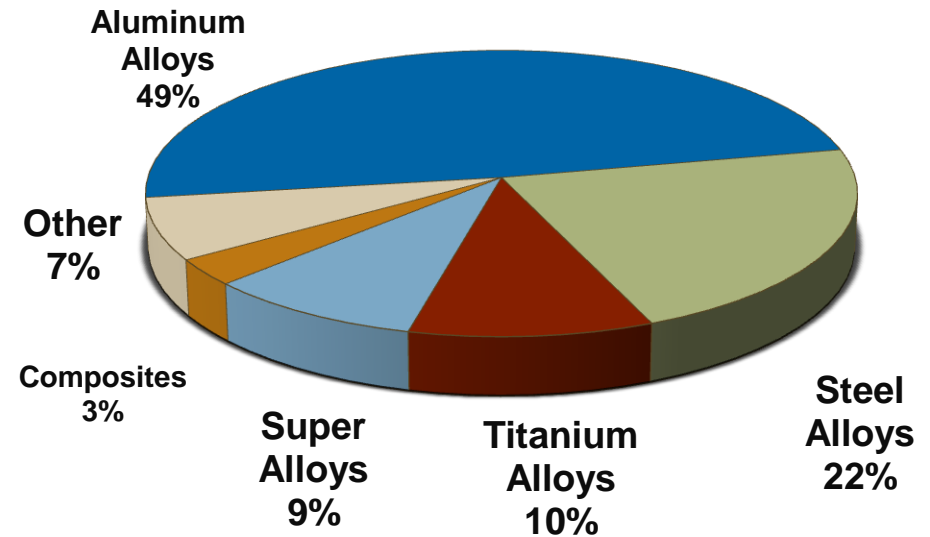
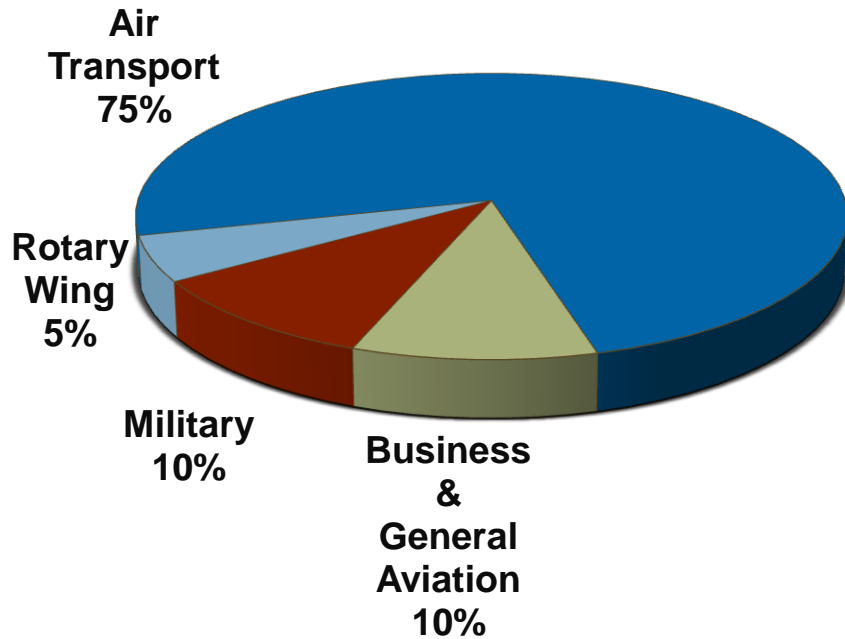
**Aero-Engine Production Market\***  
2011-2021, By OEM



\* Includes Spares  
Source: ICF SH&E

# Total Aerospace Material Demand In Buy Weight Is 1.2B Pounds, Led By the Air Transport Sector

2011 Aerospace Raw Material Buy Weight\*  
1.20 B Lbs



\* Fundamental Mill Demand; Maintenance, repair and overhaul (MRO) included in total;

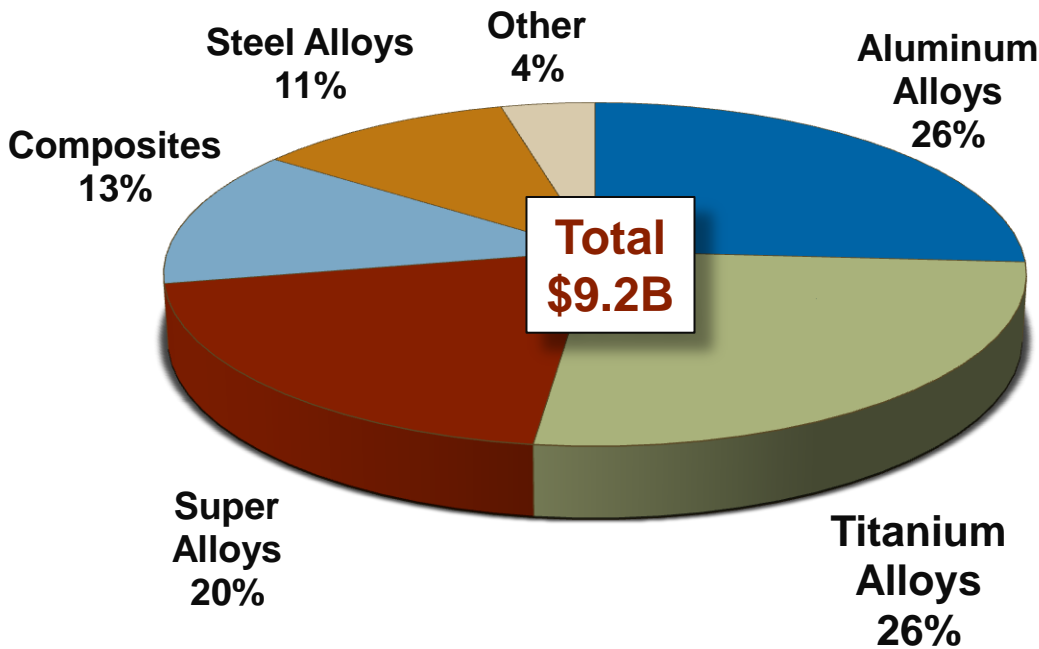
\*\* Includes air transport aircraft used as VIP transport, contributing roughly 12% to the total

Source: ICF SH&E

# The Total Aerospace Raw Material Market is Over \$9 Billion

## 2011 Aerospace Raw Material Value

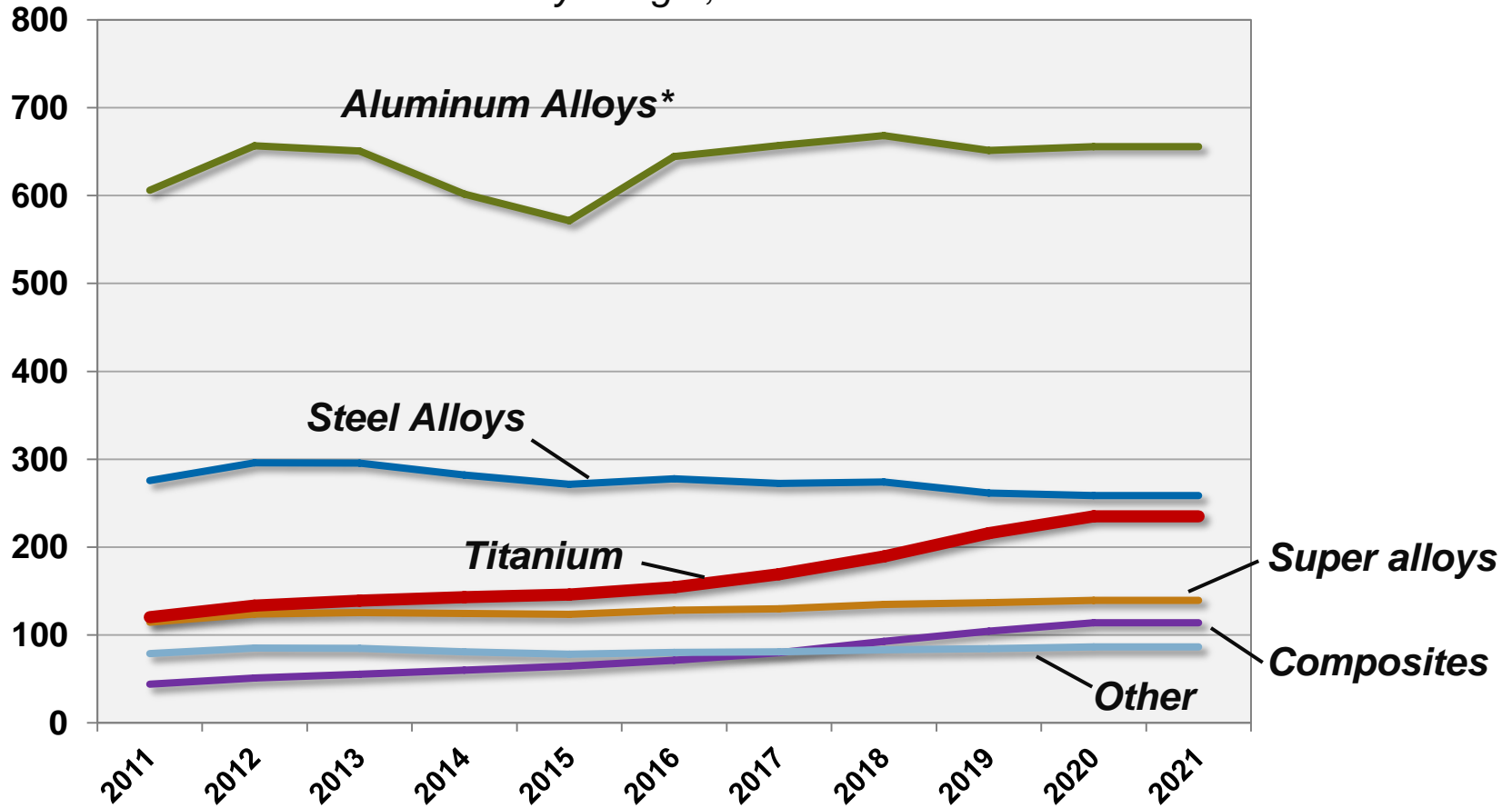
*\$ US Billions, By Aircraft Category*



- Aluminum and titanium are the largest material markets by value – both are worth ~\$2.4B
- Super alloys is third largest category, with a total value of \$1.8B
- Composites is the next largest at \$1.2B

# Aerospace Raw Material Demand Will Ramp Up With Production

**Aerospace Raw Material Demand Forecast**  
*Buy Weight, M Lbs*



\* Includes aluminum-lithium

Source: ICF SH&E

# Agenda

- Aerospace Raw Material Demand Outlook
- **Key Events Since AMM 2011**

## 2011 Was A Great Year For Aluminum...

### Airbus and Boeing Re-engine A320 and B737



- *Avoided doomsday scenario of clean sheet composite single aisles*
- *Dominance of Al ensured until mid-2020s*
- *New generation Al-Li alloys very competitive versus composites*



### A350XWB integrates heavy use of Al-Li into design



*B777x to Follow?*



### Three suppliers announce major Al-Li investments

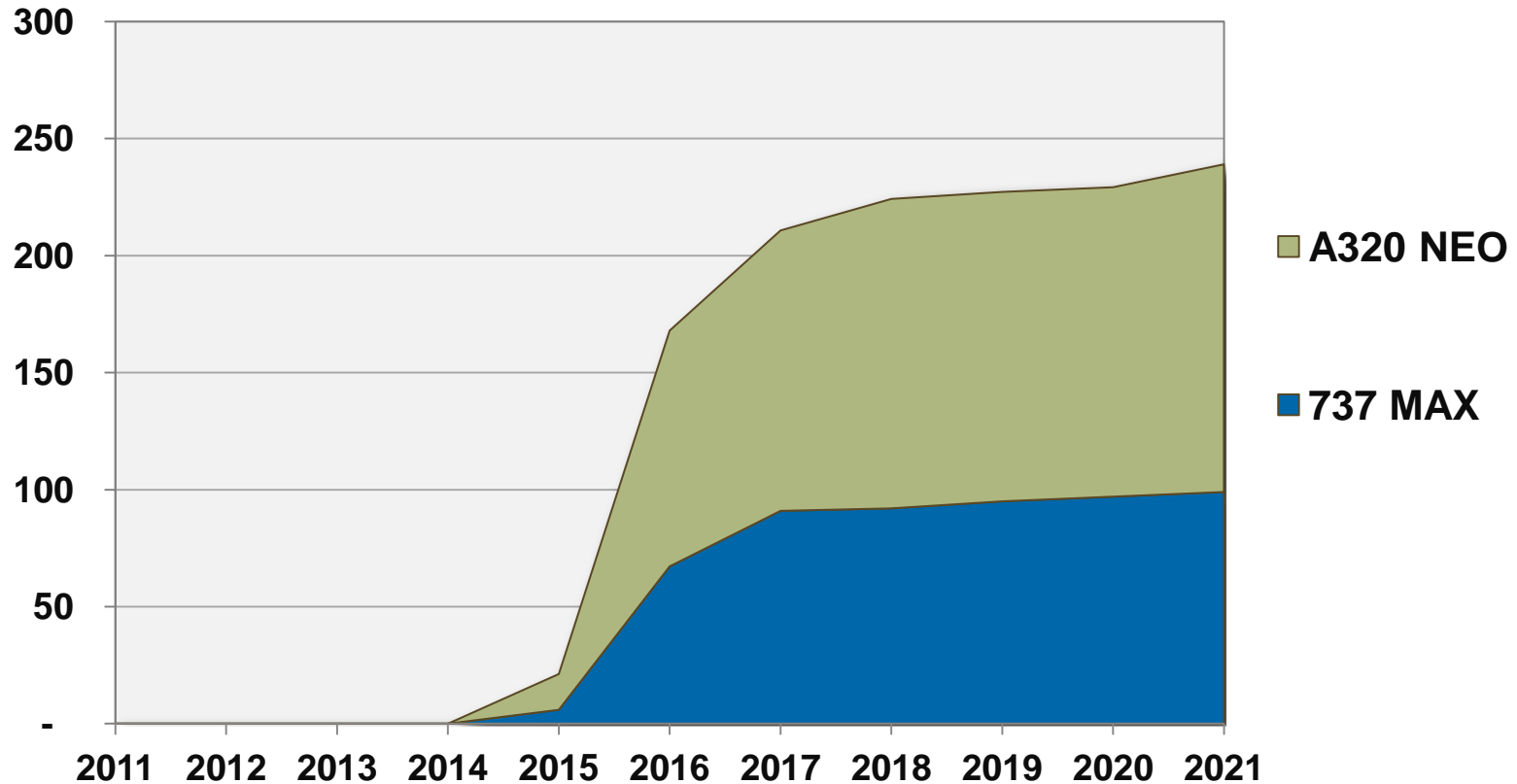


Source: ICF SH&E

# ...And The A320neo And 737 MAX Will Begin To Contribute To Aluminum Demand Mid-Decade

Aluminum Demand From A320 NEO & 737 MAX  
2011-2021

M LBs





# The Latest New – And Big – Event...

## UTC and Goodrich

*largest transaction in aerospace history\**



**What does this mean  
for further Tier 1  
consolidation?**

### AVIATION WEEK

## UTC To Acquire Goodrich for 18.4 Billion

By Madhu Unnikrishnan [madhu\\_unnikrishnan@aviationweek.com](mailto:madhu_unnikrishnan@aviationweek.com), Joseph C. Anselmo [janselmo@aviationweek.com](mailto:janselmo@aviationweek.com)



United Technologies is buying Goodrich for \$18.4 billion, marking one of the largest aerospace and defense (A&D) mergers since a wave of industry consolidation in the late 1990s.

UTC announced the deal late in the evening of September 21, confirming the talks the two companies were rumored to have held since late last week. The deal is for \$127.50 per share of Goodrich, including \$1.9 billion in debt. UTC says it plans to finance the deal through a combination of debt and equity, with the equity component comprising 25% of the deal. The combined company is expected to have sales of \$66 billion. Separately, UTC was expected to report 2011 revenues of \$58 billion, while Goodrich was expected to report revenues of \$8 billion.

UTC plans to borrow about three-quarters of the purchase price. UTC CEO Louis Chenevert said he expects the deal, which still must receive shareholder and regulatory approval, will close in the second or third quarter of 2012. "This acquisition further strengthens our position in the growing commercial aerospace market and enhances our ability to support customers with more integrated systems," Chenevert said.

While the talks were said to be ongoing. Bain & Co. global A&D practice leader Michael Goldberg told Aviation Week that a potential deal would make sense. "A deal would increase the number of subsystems and capabilities between power and propulsion and electronics structures and interiors and would give a larger supplier an opportunity to provide more on each airplane," he said.

In a conference call with analysts on Thursday morning, Chenevert acknowledged that his company has been eying Goodrich for some time. He said robust growth in air traffic, driven by demand in emerging markets, adds to the appeal of a combination, noting that UTC's Hamilton Sundstrand unit and Goodrich both provide a lot of content to new aircraft platforms such as the Boeing 787.

The deal reflects the premium value that Goodrich has established over the last decade, says Jeffries analyst Howard Rubel. "The transactions value Goodrich at 18.2 times our 2012 estimated earnings-per-share and approximately 10.5 times our 2012 estimated [earnings before interest taxes, debt and amortization] of \$1.75 billion," he says.

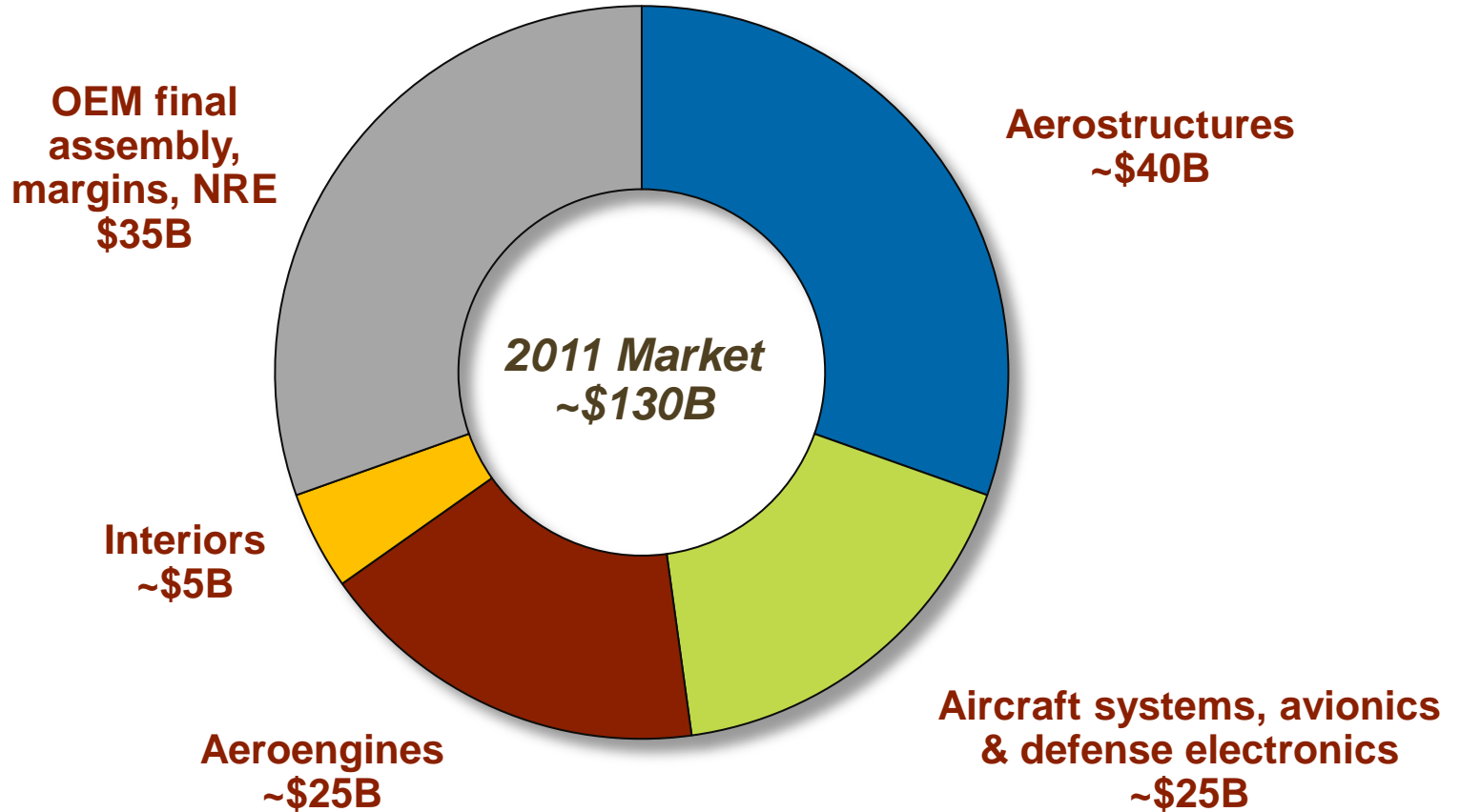
Goodrich CEO Marshall Larsen will become chairman, president and CEO of a combined UTC Aerospace Systems business that includes Goodrich and Hamilton Sundstrand and which will be based in Charlotte.

Larsen noted that 43% of Goodrich's sales are in the aftermarket. And he added that the 30% of Goodrich sales in aerospace and space are spread across many areas—electro-optical surveillance, helicopters, the Joint Strike Fighter—and is vulnerable to defense budget cuts. In fact, Goodrich's defense sales saw organic growth of 8% in the first half of

\* If approved by regulators; next largest were Honeywell-AlliedSignal and Boeing-Douglas Aircraft

# Aerostructures, Systems and Aeroengines Comprise 70% of Aircraft Value

*Aircraft Production Value Breakdown*

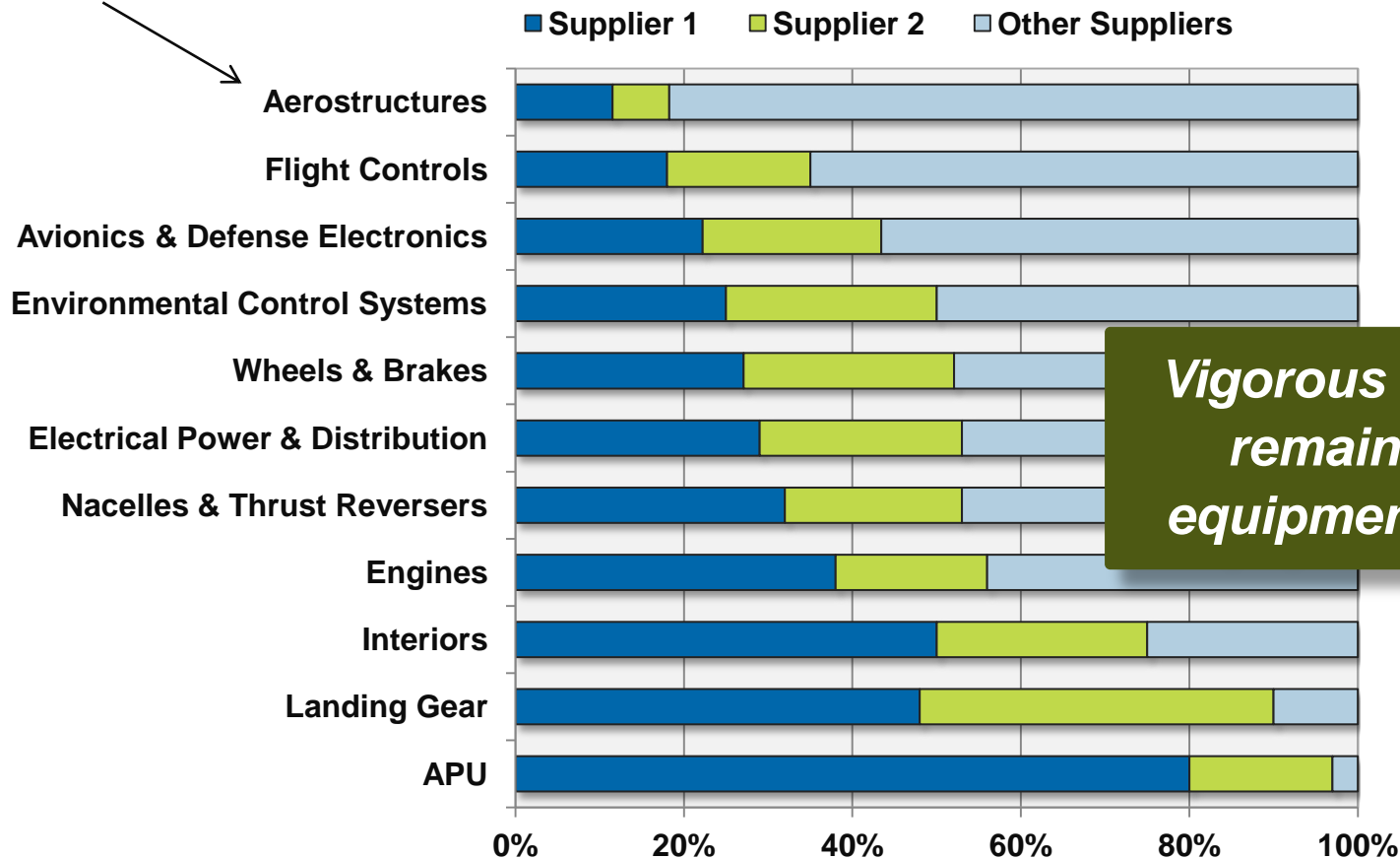


Source: ICF SH&E

# Despite Recent Consolidation, Vigorous Competition Between Tier 1 Suppliers Remains in Most Segments

*Aerostructures relatively fragmented*

### Market Share – Top Two Suppliers



*Vigorous competition remains in most equipment segments*

Source: ICF SH&E

# The UTC/Goodrich Merger, If Completed, Could Usher Stimulate Further Tier I Consolidation...

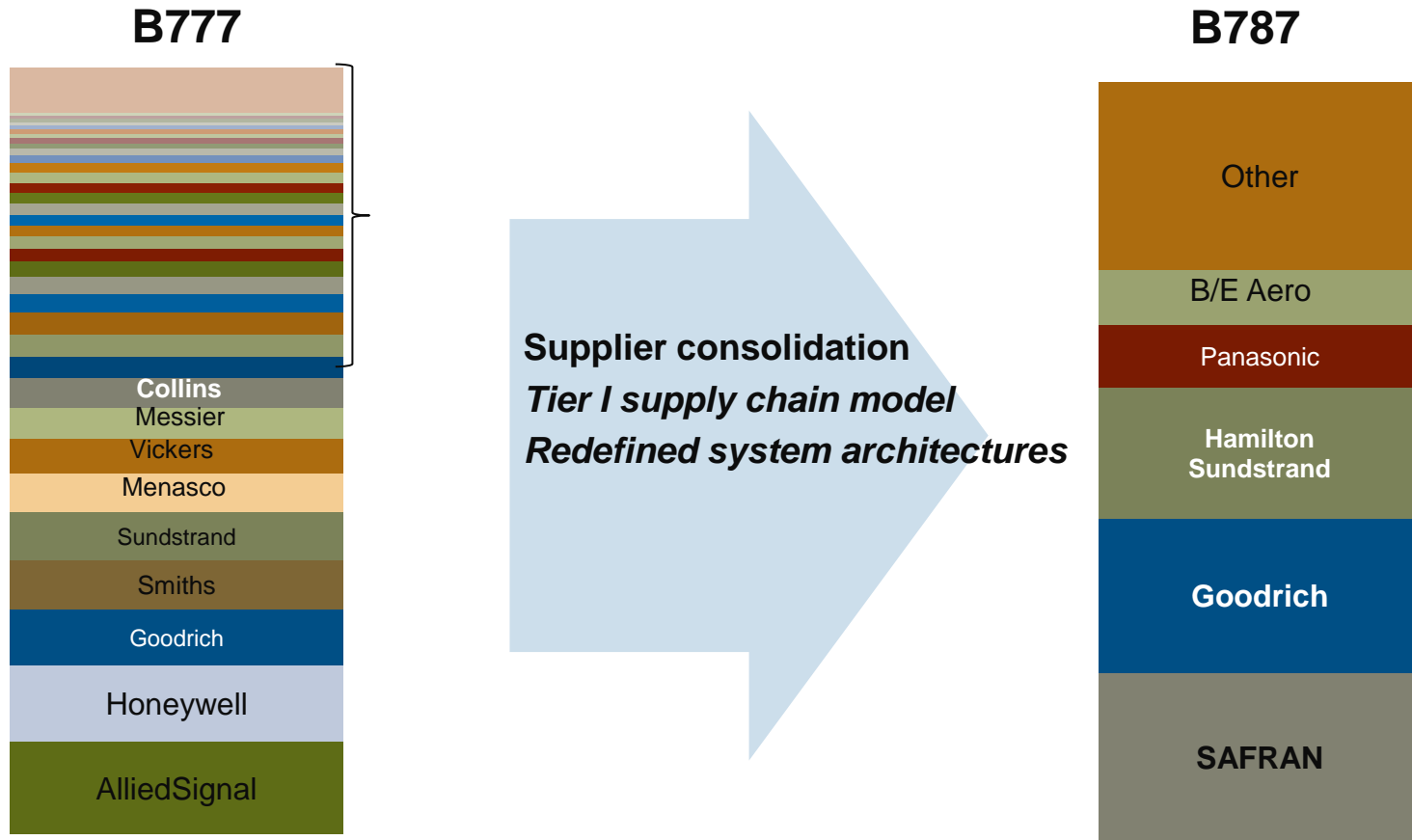


*What does this mean for further Tier 1 consolidation?*



# ...As The Tier I Supply Chain Model Reshapes Spending Patterns With OEMs

Component MRO Spending Distribution  
*B777 versus B787*



**Supplier consolidation**  
*Tier I supply chain model*  
*Redefined system architectures*

Source: ICF SH&E, Airframer, Teal Group

# The Emergence Of Integrated Propulsion Systems Could Reshape The Aeroengine Supply Chain

## Integrated Propulsion Systems



- Combines engine, nacelle, thrust reverser, and engine accessories as an integrated system
- Reduces design redundancies and optimizes overall aircraft performance
- Controlled by single integrator

Source: GE Aviation; ICF SH&E

## Two Major IPS Supplier Groups

GE Aviation

SAFRAN  
AEROSPACE · DEFENCE · SECURITY

NEXCELLE  
A MRAS/Aircelle joint venture

Hamilton Sundstrand  
A United Technologies Company

GOODRICH

UTX/ GR Merger

PRATT & WHITNEY  
DEPENDABLE ENGINES

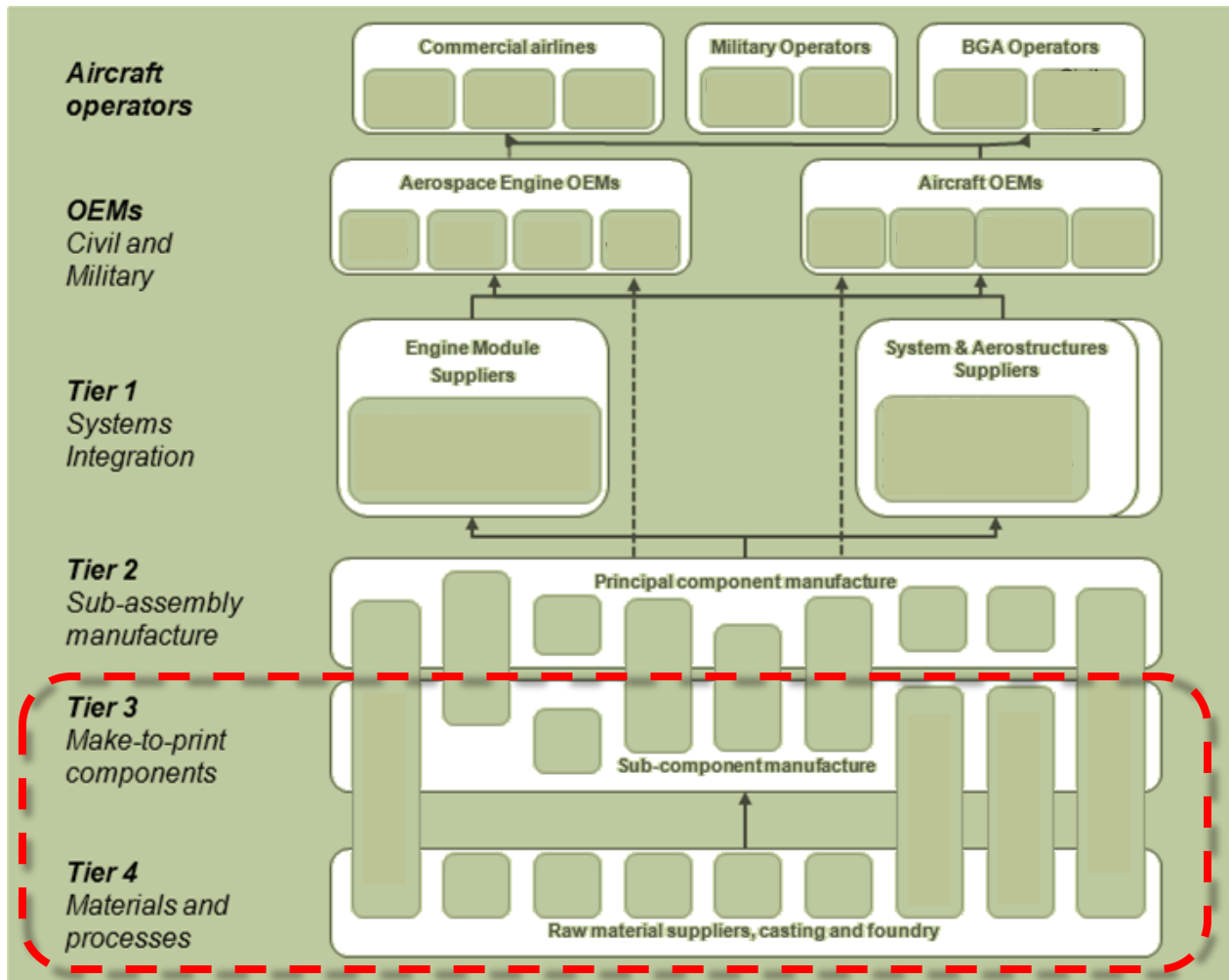
Collaborating on future GTF designs;  
sold IAE stake to Pratt

Rolls-Royce®



# Consolidation Amongst Tier 4 Material And Process Suppliers Is Also Gaining Momentum

## *The Aerospace Manufacturing Supply Chain*



Source: ICF SH&E Analysis

- Leading raw material suppliers and process suppliers are repositioning via vertical integration and consolidation
- This includes forging, casting and machining “process” suppliers
- The upshot: increases bargaining power vs. customers

## Three Blockbuster Deals in 2011 Are Harbingers of Continued Tier 4 Consolidation/Vertical Integration



- ATI acquired Ladish in May 2011 for \$883M
- ATI is now able to offer customers advanced forging, casting and machining assets for titanium alloys, nickel-based superalloys and specialty alloys



- PCC acquired Primus International in June 2011 for \$900M
- Deal significantly expands PCC's machining and final assembly capabilities
- PCC is integrating upstream (raw materials) and downstream (machining)



- In June 2011 Carpenter Technology announced the intention to buy Latrobe in \$558M deal
- Deal was approved by FTC on 2 March 2012
- Brings together two leading aerospace specialty alloy suppliers

Source: Secondary Research



## China Completed Its First Major Acquisition of a Western Supplier – *FACC* – In 2009...

### *Fisher Advanced Composite Components*



- In December 2009, XAC (an AVIC company) acquired Fisher Advanced Composite Components (FACC); AVIC will eventually own 91%
- FACC is a Tier I aerostructures supplier with €265.3 million in revenue and nearly 1,600 employees
- A supplier on the ARJ21 and many other OEMs; particularly strong with Airbus.
- Addresses China's weaknesses in advanced materials and complex mechanical systems; should also assist with certification and supply chain management gaps

*China's first major acquisition of a western aerospace supplier*

## ...And Has Since Followed Through With Three Aerospace Acquisitions in BGA Since 2010



### EPIC AIR (2010)



- General aviation kit aircraft manufacturer based in Bend, Oregon
- Three aircraft under development including piston, turboprop and VLJ models
- Brings composites capability and FAA certification experience

### CONTINENTAL MOTORS (2011)



- Second largest piston aircraft OEM
- Powers many key piston aircraft models from Cessna, Beech, Piper, and others
- Acquired from Teledyne for \$186 million

### CIRRUS (2011)

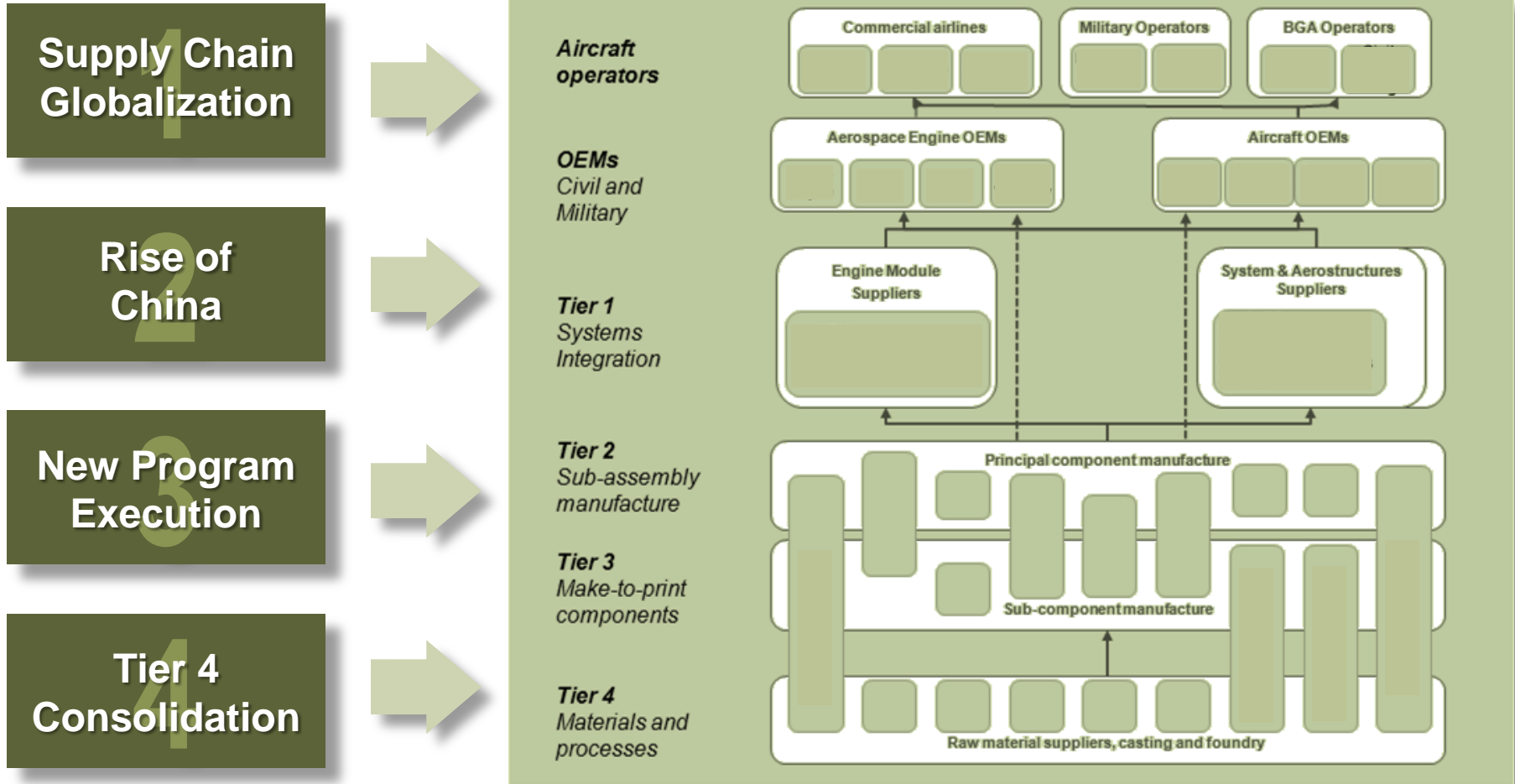


- Iconic GA aircraft OEM that delivered nearly 5,000 new piston airplanes – including the best-selling Cirrus SR22 family
- Gives China piston trainer and personal jet capability (e.g., Cirrus Vision)
- Plans to continue production in North Dakota facilities

Source: ICF SH&E analysis, Press reports

# The Events Of The Past Year Underpin Four Megatrends That Are Reshaping The Aerospace Supply Chain

## The Aerospace Supply Chain



Source: ICF SH&E analysis

# Current Aerospace Supply Chain Trends Have Important Implications

## AIRCRAFT & ENGINE OEMS

- Carefully manage consolidating Tier I supplier base
- Expanding revenue from services
- Emergence of IPS paradigm

## TIER I SUPPLIERS

- More consolidation in wake of UTX-Goodrich
- Build value around Tier I systems solutions

## TIER 2 SUPPLIERS

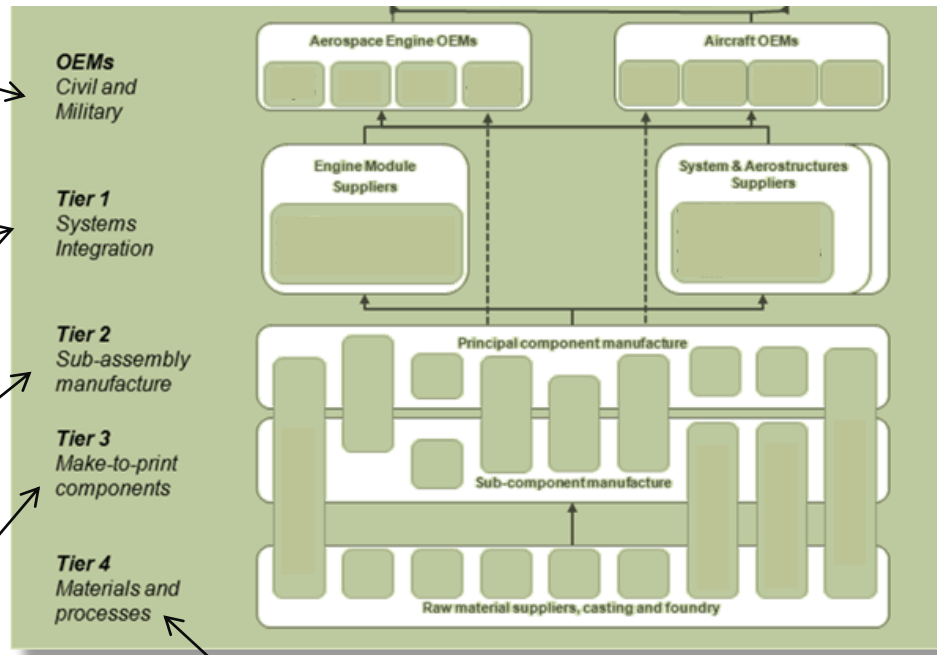
- Monitor make-buy decisions of Tier 1s
- Need IP, low cost, or both
- Key decision: global or local?

## TIER 3 SUPPLIERS

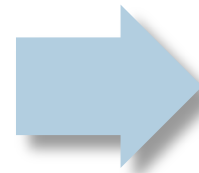
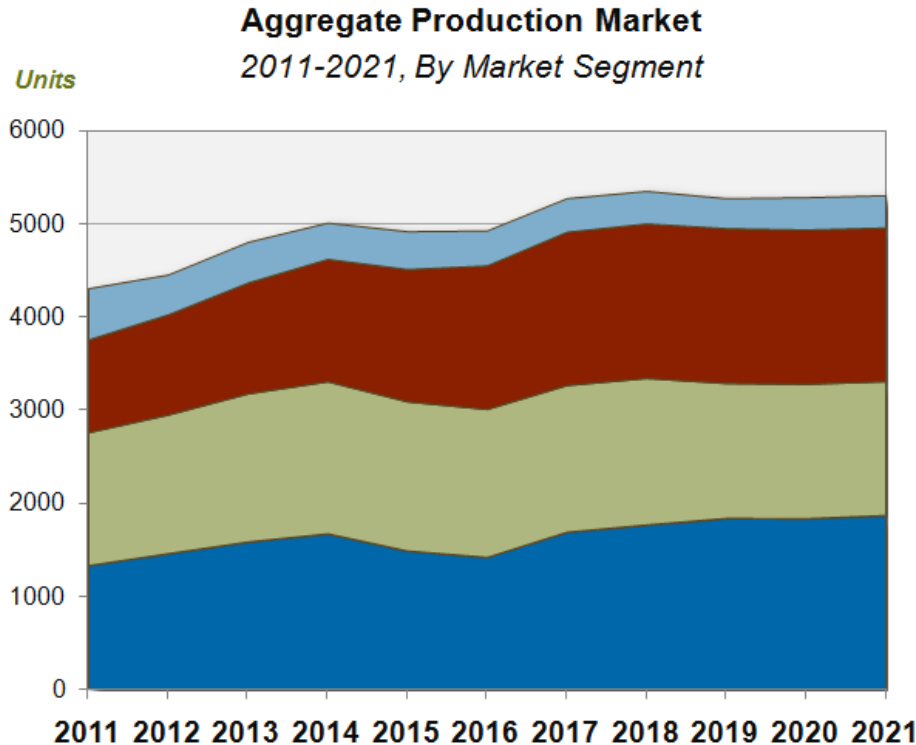
- Increased competitive intensity – more supply from low cost regions
- Incumbents must audit business models

## TIER 4 SUPPLIERS

- Ongoing consolidation & vertical integration
- More capacity in emerging aerospace clusters



# What To Watch: Scheduled Production Rate Increases Could Create Supply Chain “Pinch Points”



**Pinch  
Points?**

- Aluminum mill capacity
- Large press aluminum extrusions
- Rutile
- Titanium machining
- HIP facilities
- Heat treat facilities

**A nagging question: Are sub-tier suppliers properly capitalized for expansion?**

Source: ICF SH&E analysis

# Thanks and Questions



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