

# The Global Aerospace Industry

*Size & Country Rankings*

16 July 2018

**AeroDynamic**  
ADVISORY

**TEAL GROUP**  
CORPORATION





# Aerospace is one of the world's most important industries, yet there is no consensus on its size and composition



**The best industry data is kept by national industry associations...yet their definition of “aerospace” varies**



**Some associations include non-aerospace, defense and security. It is unclear that out-of-country activities are excluded from estimates. It is also unclear that civil and military operator MRO data is included.**



**This joint assessment from Aerodynamic Advisory and Teal Group includes sub-tier supply chain activities and MRO**

# AeroDynamic Advisory and Teal Group created an independent global aerospace industry size estimate based on a clear definition...



## Aerospace Industry Definition

*The aerospace industry includes all in-country activities pertaining to the development, production, maintenance and support of aircraft and spacecraft*

### Included in Definition

- Aircraft manufacturing\*
- Space manufacturing\*
- Missile & UAV manufacturing\*
- Airborne defense electronics
- Simulator & ground support equip.
- MRO - transport aircraft
- MRO - military aircraft
- MRO - BGA aircraft
- Research & development

### Excluded from Definition

- Airline operations
- Satellite broadcasting services
- Defense - ground, maritime, C4ISR
- Non-aerospace defense electronics
- Training services
- Induced economic activity in other sectors

\* includes engines, systems, aerostructures & subtier suppliers

# ...and followed a four-step process to standardize national aerospace industry estimates

1

**Collect national industry association baseline data**



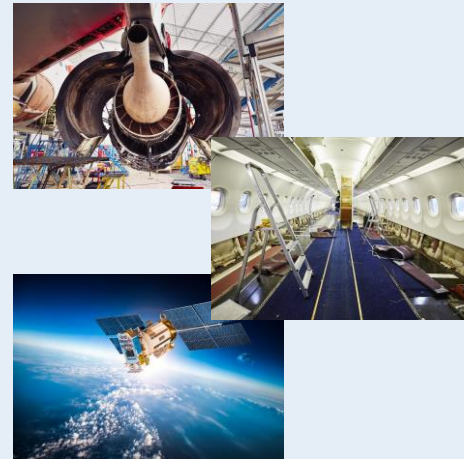
2

**Subtract non-aerospace and out-country activities**



3

**Add activity not included in industry association data**



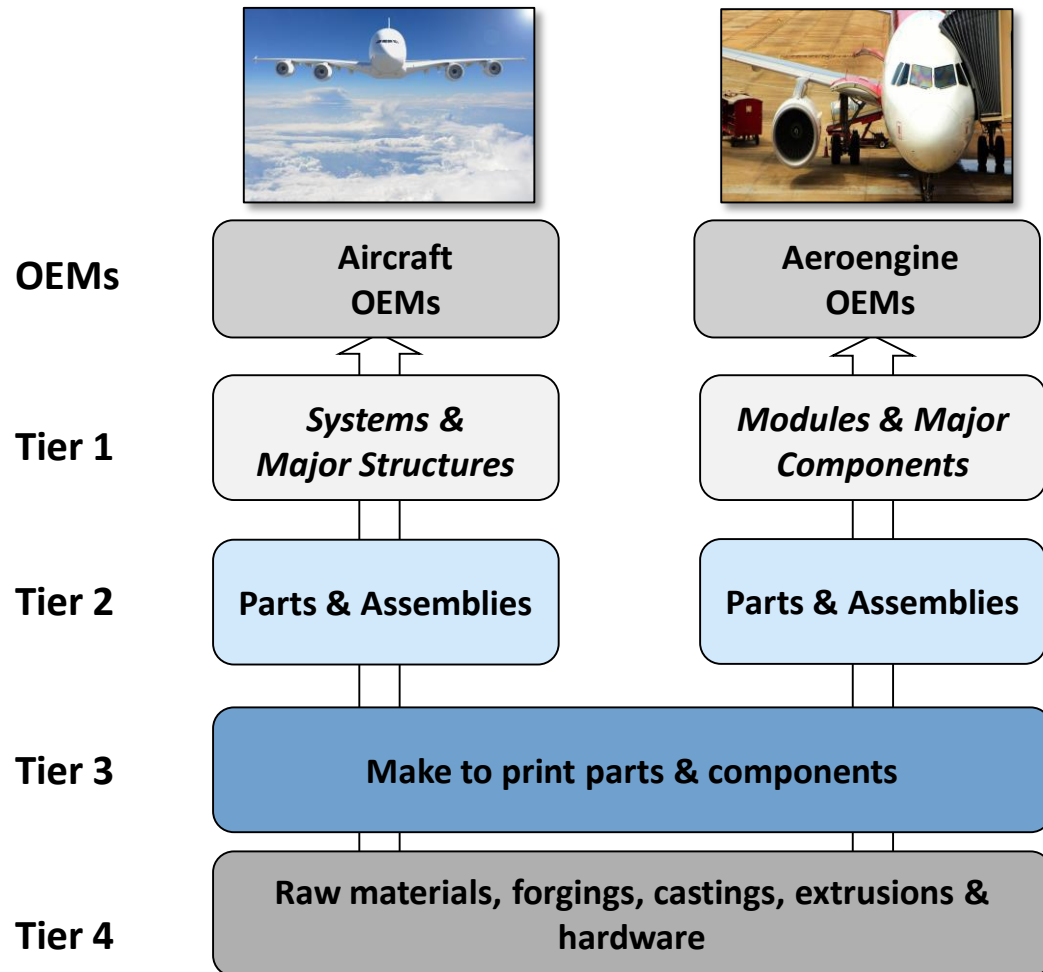
4

**Add estimated activity for countries lacking an industry association and/or verifiable data**

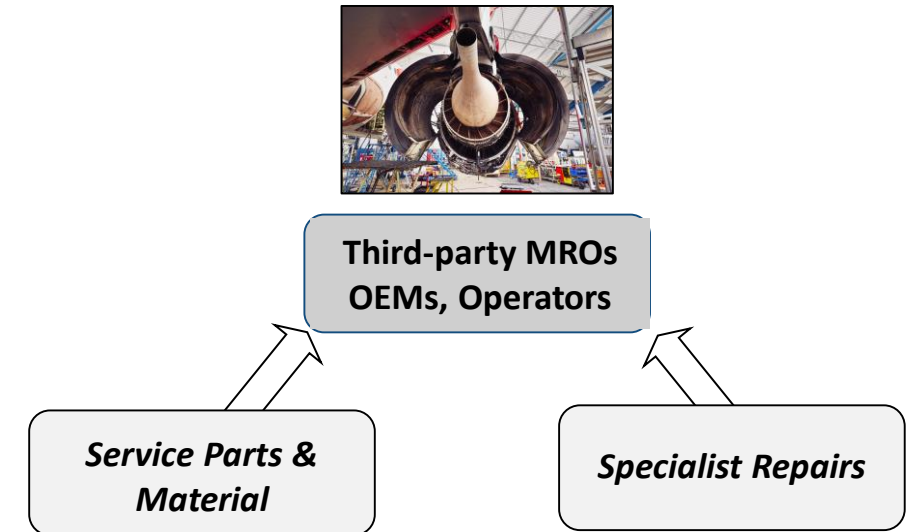


# The assessment includes sub-tier supply chain activities and a full accounting of maintenance, repair and overhaul (MRO) activity

## Aerospace Manufacturing Supply Chain Structure



## Maintenance, Repair & Overhaul + Upgrades

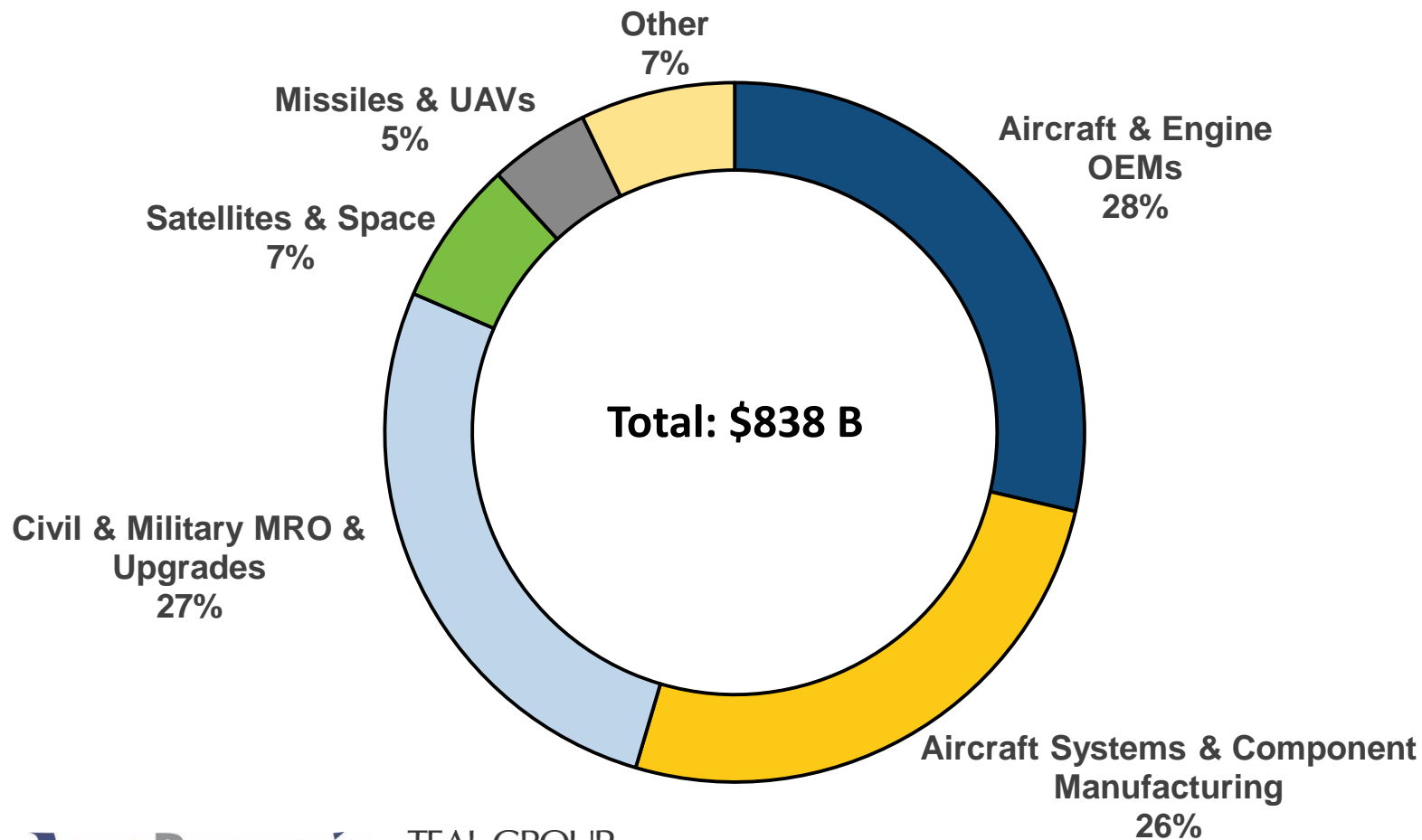


- “Wrench-turning” MRO activities and upgrades conducted by MROs, OEMs and operators are worth \$160-170 billion in civil and military sectors
- There is another \$60 billion in service (spare) parts, material and specialty repairs consumed in MRO “wrench turning”



# The global aerospace industry is worth \$838 billion; OEMs and sub-tier manufacturers comprise 54% of all activity

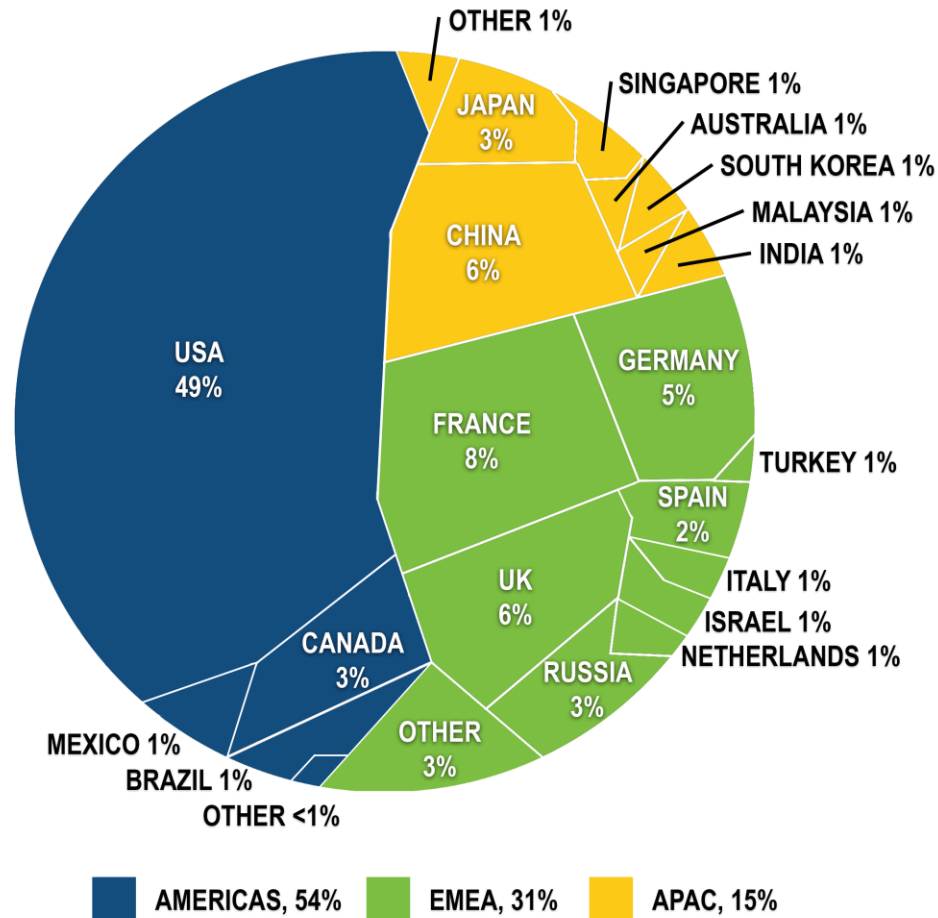
2017 Global Aerospace Industry



- Civil and military aircraft and engine OEMs and their extended supply chains account for nearly half of the global aerospace economic activity
- Maintenance, repair, overhaul, and upgrades generated 27% (just over \$200B) in economic activity
- Other activity, including simulator manufacturing, defense electronics not otherwise captured, and research performed by government or non-profit associations accounts for just over 7% of activity

# The US accounts for 49% of the global aerospace industry

2017 Global Aerospace Industry - \$838 Billion



- The US boasts deep and broad civil and military aerospace clusters, and accounts for half of all aerospace activity
- France has the second largest industry, followed by China, the UK and Germany
- The Americas is the largest region (54%), followed by Europe, Middle East, & Africa (31%) and Asia-Pacific (15%)

# The Top Ten countries comprise 87% of the global industry

## 2017 Global Aerospace Industry – Top 10 Countries

Ranking	Country	Industry Size (\$B)
1	United States	\$408.4
2	France	\$69.0
3	China	\$61.2
4	United Kingdom	\$48.8
5	Germany	\$46.2
6	Russia	\$27.1
7	Canada	\$24.0
8	Japan	\$21.0
9	Spain	\$14.4
10	India	\$11.0

- The aerospace industries of the top ten countries are worth \$731 billion – 87% of the global industry
- The United States comprises almost 49% of the world aerospace total, more than the next 25 countries combined

**TOTAL \$731B**



# The US and France alone make up 57% of the global aerospace industry total

## #1: United States - \$408.4 B

- High and rising defense procurement budgets ensure military segment growth into next decade
- Share of total world aircraft output value at 50% with upward direction with F-35, 787
- Extremely strong trade position reflects export market dominance in most key segments (exceptions: second place in single aisle jets, and no regional aircraft market position)
- Biggest civil airframer (Boeing), biggest military airframer (Lockheed Martin), biggest engine OEM (GE), and biggest systems OEM (UTAS/RC). Very high level of space systems innovation and development.
- World leader in UAVs, by any measure: dollar volume, variety of systems, technology

## #2: France - \$69.0 B

- Second only to US as airframer; remarkable track record as aeronautical leader; very high ratio of exports. Second only to US as components, avionics, and other subsystems provider, too
- Last country in Europe with true combat aircraft self-sufficiency; Rafale success helping with broader military standing, and future development prospects
- Extremely diverse exposure to Jetliner, combat, business aircraft, rotorcraft, space, and missiles markets
- High level of government support for new product development and export sales
- Big weakness: Airbus twin aisle market uncertainty, A380 uncertainty

# China now boasts the third largest national aerospace industry and continues to grow

## #3: China - \$61.2 B

## #4: UK - \$48.8 B

- Continued focus on copying Western jetliner designs and building existing Western jetliners in-country.
- Lowest percentage of export sales of any top ten aerospace producer; minimal presence on Western platforms.
- Efforts to replicate Western vertical supplier bases for indigenous development programs represent a very expensive and risky approach to industry development.
- Historical focus on building, replicating, modifying, and sustaining Russian fighters; now shifting towards experimental stealth fighters (J-20, J-31) and new indigenous military aircraft (Y-20).
- Overall, very high levels of expenditure and employment; very low levels of productivity, output, and profit.
- Third largest aerospace industry but largest aerospace trade deficit in the world
- Despite these problems, China on par to be largest jetliner market in the world, with very high resources and tremendous talent.

- Very high ratio of exports to domestic consumption; heavy presence on US and European platforms. Special Relationship with US still key.
- Exiting role as military prime (civil prime status abandoned over a decade ago); world leading role as risk-sharing partner.
- Increasing defense procurement without domestic content a concern.
- Big questions: trade relations with Europe (and the world) post-Brexit; access to Europe-wide programs and development funding
- Very high ratio of aftermarket and sustainment work relative to new-build.
- Extensive global holdings and work by UK companies not in our numbers.

# Germany and Russia together account for \$73 billion of the \$838 billion total

## #5: Germany - \$46.2 B

- Growing Airbus single aisle facility in Hamburg; A320 added to portfolio this year
- Very high ratio of exports
- Low defense spending damaging competitiveness and sustainment work
- Highly innovative subsystems and manufacturing technology development aided by strong R&D funding
- High level of international partnerships; considerable work performed elsewhere and not in our Germany total
- Tornado replacement, next-generation combat aircraft will play large roles in determining industry's future direction; cooperation with France (rather than UK) may be problematic

## #6: Russia - \$27.1 B

- Very high ratio of military to civil work; attempting a civil comeback with MS-21 and CRJ929
- High ratio of exports to domestic use
- Two key export markets at risk; China moving towards indigenous developments, India moving towards Western aircraft
- Other export markets highly problematic (Libya, Algeria, Syria) or Former Soviet Union
- Risky model of using intellectual property as contribution towards Joint Ventures. FGFA with India seems to have gone wrong; CRJ929 with China at risk too

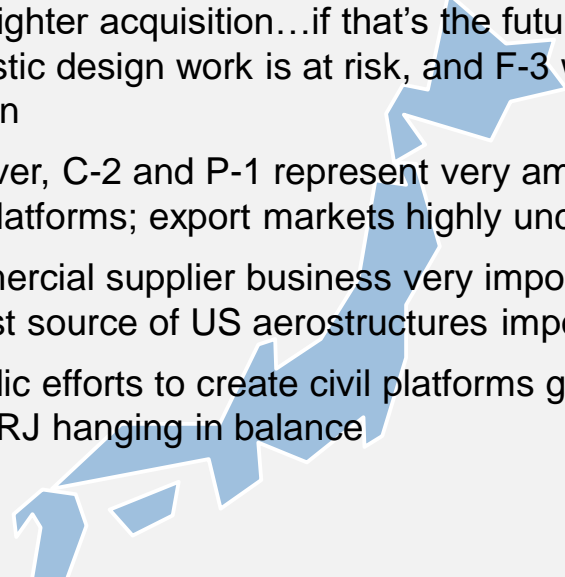


# Canada and Japan have similar sized aerospace industries

## #7: Canada - \$24.0 B

- High level of vertical domestic content on Bombardier platforms; this has created deeper national risk
  - Transition from failed Bombardier C Series to potentially successful Airbus A200 may threaten national aero output if Airbus moves work
  - Positive: Bombardier now able to prioritize and restore strong business jet market position
  - Negative: Highly uncertain future for Bombardier regional platforms
  - Pratt & Whitney Canada remains second most important company, with strong growth prospects, followed by Bell Helicopter; many successful smaller providers
  - Low defense budget a concern; limited defense market exposure. F-35 work at risk with RCAF fighter decision
- 

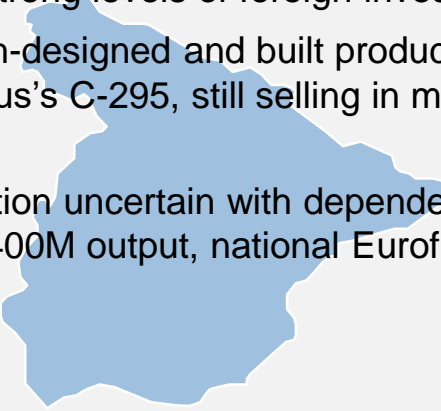
## #8: Japan - \$21.0 B

- Historic willingness to pay much higher prices for defense platform domestic assembly and content
  - F-35 acquisition represents a return to off-the-shelf fighter acquisition...if that's the future, domestic design work is at risk, and F-3 won't happen
  - However, C-2 and P-1 represent very ambitious new platforms; export markets highly uncertain
  - Commercial supplier business very important; biggest source of US aerostructures imports
  - Periodic efforts to create civil platforms generally fail; MRJ hanging in balance
- 

# While both in the Top Ten, Spain and India only account for 1% each of the global total

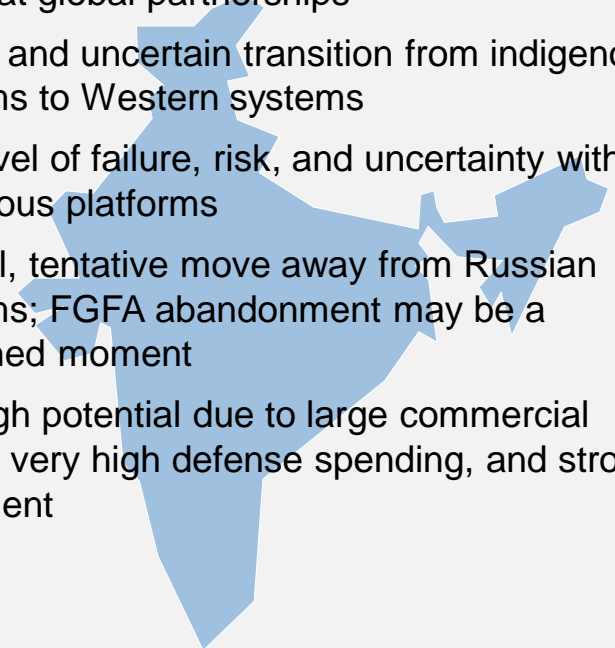
## #9: Spain - \$14.4 B

- Large number of small and mid-sized supplier companies with emphasis on composites, subsystems, and space systems
- Relatively low percentage of work performed out of country; strong levels of foreign investment
- Last Spanish-designed and built production aircraft, Airbus's C-295, still selling in modest numbers
- Future direction uncertain with dependence on dwindling A400M output, national Eurofighter line



## #10: India - \$11.0 B

- Difficult and uncertain transition from autarky and state-owned companies to private sector firms aiming at global partnerships
- Difficult and uncertain transition from indigenous platforms to Western systems
- High level of failure, risk, and uncertainty with indigenous platforms
- Gradual, tentative move away from Russian platforms; FGFA abandonment may be a watershed moment
- Very high potential due to large commercial market, very high defense spending, and strong local talent



# The next ten countries are headlined by Israel, Mexico and Italy

## 2017 Global Aerospace Industry – Countries 11-20

Ranking	Country	Industry Size (\$B)
11	Israel	\$10.3
12	Mexico	\$9.5
13	Italy	\$9.2
14	Brazil	\$7.2
15	Singapore	\$7.2
16	South Korea	\$6.9
17	Netherlands	\$4.6
18	Australia	\$4.5
19	Turkey	\$4.2
20	Malaysia	\$3.7

**TOTAL \$67.3B**

- Israel's aerospace industry is dominated by Israel Aerospace Industries (IAI) a government owned company involved in everything from commercial and military aircraft to missiles, drones and avionics
- Fast-rising Mexico boasts hundreds of low cost fabrication facilities
- Embraer and its local supply chain comprises most of Brazil's total
- While the aerospace industries of most countries in Western Europe are focused on fixed wing air transport aircraft, a large portion of Italy's aerospace industry is dedicated to rotary wing aircraft



# The next ten largest countries have industries worth \$26 billion

## 2017 Global Aerospace Industry – Countries 21-30

Ranking	Country	Industry Size (\$B)
21	Belgium	\$3.6
22	Taiwan	\$3.2
23	Sweden	\$3.1
24	UAE	\$2.9
25	Switzerland	\$2.5
26	Indonesia	\$2.3
27	Thailand	\$2.2
28	Austria	\$2.1
29	Norway	\$2.0
30	Ireland	\$2.0

**TOTAL \$25.9B**

- Belgium has both aerospace manufacturing and some MRO, although most of the former Sabena Technics, which was affiliated with the Belgian airline Sabena, is based in Bordeaux, France
- Thailand's aerospace industry is primarily focused on sub-tier component manufacturing, raw material production, and MRO activity
- Although Ireland is one of the world's largest aircraft leasing hubs, this activity is considered aviation rather than aerospace and is not included in the total
- Indonesia has ambitions to grow an indigenous aircraft OEM industry

# Saudi Arabia, Portugal and South Africa headline the next ten countries which total \$12 billion

## 2017 Global Aerospace Industry – Countries 31-40

Ranking	Country	Industry Size (\$B)
31	Saudi Arabia	\$1.9
32	Portugal	\$1.9
33	South Africa	\$1.8
34	Philippines	\$1.6
35	Poland	\$1.3
36	Morocco	\$1.1
37	Czechia	\$0.90
38	Finland	\$0.80
39	Greece	\$0.62
40	Denmark	\$0.47

- Countries 31-40 are primarily focused on MRO and low-cost manufacturing
- Eastern European countries like Poland and Czechia are hubs for airframe MRO and low-cost sources for the engine supply chain
- Morocco has more than 100 aerospace facilities focused on aerostructures, components and wire harnesses

**TOTAL \$12.4B**

# The aerospace industries of #41 – #45 countries are worth \$1.5 billion

## 2017 Global Aerospace Industry – Countries 41-45

Ranking	Country	Industry Size (\$B)
41	Tunisia	\$0.43
42	Romania	\$0.39
43	Hungary	\$0.33
44	New Zealand	\$0.22
45	Chile	\$0.15

**TOTAL \$1.5B**

- Tunisia is a growing low-cost source for European OEMs
- Hungary has a growing aerospace cluster with over 130 companies



# Thank you for your attention!



[www.aerodynamicadvisory.com](http://www.aerodynamicadvisory.com)



[www.tealgroup.com](http://www.tealgroup.com)

# Presenter Biographies

**Richard Aboulafia**  
**Vice President – Research**  
**The Teal Group**  
[raboulafia@tealgroup.com](mailto:raboulafia@tealgroup.com)



Richard Aboulafia is Vice President of Analysis at Teal Group. He manages consulting projects in the commercial and military aircraft field and analyzes broader defense and aerospace trends. He has advised numerous aerospace companies, including most prime and many second- and third-tier contractors in the US, Europe and Asia. He also advises numerous financial institutions on aerospace market conditions.

Richard writes and edits Teal Group's *World Military and Civil Aircraft Briefing*, a forecasting tool covering over 135 aircraft programs and markets. He also writes publicly about aviation and defense, with regular columns in Aviation Week and Space Technology and at Forbes.com. His articles have also appeared in the Wall Street Journal, Slate, AIAA's Aerospace America, the Financial Times, Professional Pilot, and other publications.

Frequently cited as an aviation industry authority by trade and news publications, Richard has appeared on numerous television news and radio programs including ABC, BBC, Bloomberg, Reuters, CBS, CNN, NBC, NPR and PBS. He has spoken at numerous conferences, and presents a yearly lecture to the Eisenhower School for National Security and Resource Strategy Industry Study program.

Before he joined Teal Group in 1990, Richard analyzed the jet engine market at Jane's Information Group. He has a Masters degree in War Studies from King's College, University of London and a Bachelors degree from George Washington University.

**Kevin Michaels**  
**Managing Director**  
**AeroDynamic Advisory**  
[kmichaels@aerodynamicadvisory.com](mailto:kmichaels@aerodynamicadvisory.com)



Kevin Michaels is Managing Director of AeroDynamic Advisory, a specialty consulting firm focused on the global aerospace and aviation industries. He has 31 years of experience, including hundreds of consulting engagements for leading aviation and aerospace companies across the globe.

Kevin is a globally recognized expert in the aerospace manufacturing and MRO sectors, and has significant expertise in business-to-business marketing, customer satisfaction, M&A advisory, technology assessment, cluster development, and strategic planning. His experience spans all major market segments, including air transport, business & general aviation, and military.

Previously, Dr. Michaels was a Vice President with ICF International's Aerospace & MRO consulting practice from 2011 - 2016. He was a co-founder and partner with AeroStrategy from 2001-2011, until its acquisition by ICF. Dr. Michaels was also the Director of Strategic Development with Rockwell Collins Government Systems, and Principal with The Canaan Group, an aerospace consultancy. He began his career as a project engineer with Williams International.

Dr. Michaels holds BS - Aerospace Engineering and MBA degrees from the University of Michigan, and MSc and PhD degrees in International Relations from the London School of Economics.

He is a contributing columnist to Aviation Week & Space Technology and chairs the advisory board of the University of Michigan's Aerospace Engineering Department. In 2016, he joined the Board of Directors of aircraft parts distributor Proponent..