Aerospace Business - India

Thirunavukkarasu R.
Petchi S.

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- Indian Civil Aerospace Market
- Indian Defence Aerospace Market
- Government Aerospace Companies
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Indian Civil Aerospace Market

- Indian aviation sector with a growth rate of 18%
- India retains the second-highest growth rate worldwide
- 9th largest civil aviation market.
- 163 Million passengers in 2013.
- 3rd largest aviation market by 2020.
- 800 aircraft by 2020.
- India plans to increase the number of operational airports from 100 to 250 by the year 2030.

Indian Civil Aerospace Market

According to the Investment Commission of India, Investment opportunities of US $110 billion are being envisaged up to 2020.

- US $80 billion in new aircraft
- US $30 billion in development of airport infrastructure

References: Wikipedia, Airbus and Boeing websites
Indian Defense Aerospace Market

- Military expense of USD 45.2 Billion with 2.2% of GDP

- World ranking 8 as per International Institute for Strategic Studies

- Projections for 2045 India’s Spending in Purchasing Power Parity (PPP) stands at USD 654 Bn.

References: https://en.wikipedia.org/wiki/List_of_countries_by_military_expenditures
Government Aerospace Companies

Hindustan Aeronautics Limited

National Aerospace Laboratories

Defence Research and Development Organisation

Indian Space Research Organisation
Hindustan Aeronautics Limited

- HAL is an Indian state-owned aerospace and defence company based in Bangalore, Karnataka.

- HAL built the first military aircraft in South Asia.

- It is currently involved in the design, fabrication and assembly of aircraft, jet engines, helicopters and their spare parts.

- Several facilities located across India, operated by HAL include Nasik, Korwa, Kanpur, Koraput, Lucknow, Bangalore and Hyderabad.

- Hindustan Aeronautics Limited (HAL) was ranked 40th in flight International’s list of the top 100 aerospace companies last year.

HAL supports Airbus and Boeing

- Airbus A320 Forward Passenger Doors
- Boeing 777 Uplock Box Assembly
- Boeing 737 Freighter Conversion Kits
- Boeing F/A 18 Gun Bay Door
- Boeing P-8 I Weapon Doors & Tailcone
- Eurocopter Ecureuil composites
- Boeing 3D-Modelling / Digitisation of Drawings

References: http://www.hal-india.com/; Wikipedia
Hindustan Aeronautics Limited

## Systems purchased
- Engines
- Aircraft sub systems
- Avionics Systems
- Raw materials
- BOI Items

## Systems Supplier
- Airbus
- Zodiac Aero Electric
- Honeywell
- UTC Aerospace
- Israel Aerospace industries
- Tyco Electronics
- Thyssenkrupp Materials
- Aleris Aluminium Koblenz GmbH
- Metalliages

## Challenges faced
- Attrition
- Project schedule delay
- Cost overrun

References: [http://www.hal-india.com/](http://www.hal-india.com/); [Wikipedia](https://en.wikipedia.org/wiki/Hindustan_Aeronautics_Limited)
# Hindustan Aeronautics Limited

<table>
<thead>
<tr>
<th>Name of the Joint Venture</th>
<th>Purpose of JV</th>
<th>JV Partners &amp; Shareholding Pattern</th>
</tr>
</thead>
<tbody>
<tr>
<td>BAeHAL Software Ltd</td>
<td>Design, develop &amp; market Software, Firmware and Computer programmes</td>
<td>BAe Systems PLC, UK - 11%, BAe HAL Employees - 40% Welfare Trust, India, HAL - 49%</td>
</tr>
<tr>
<td>Indo Russian Aviation Ltd</td>
<td>Supply of all types of Aircraft (Russian Origin) Engines, Accessories, Aggregates, Systems &amp; Spares of all kinds of aviation equipment.</td>
<td>Russian Firms: RAC- MiG, -31%, Ryazan SIP, -10%, Avizapchast Plc, -6% Indian Firms: ICICI Bank - 5%, HAL – 48%</td>
</tr>
<tr>
<td>Snecma HAL Aerospace Pvt. Ltd</td>
<td>To establish a Center of Excellence for production of Precision Aero Engine components and assemblies as an Export Oriented Unit.</td>
<td>Snecma, France - 50% HAL – 50%</td>
</tr>
<tr>
<td>International Aerospace Manufacturing Private Ltd</td>
<td>Manufacturing compressor rings, turbine blades and nozzle guide vanes.</td>
<td>Rolls-Royce Overseas Holdings Ltd, UK - 50% HAL – 50%</td>
</tr>
<tr>
<td>Multirole Transport Aircraft Limited</td>
<td>Co-design / develop and Co-produce Multirole Transport Aircraft</td>
<td>UAC-TA &amp; Rosoboron export Russia - 50% HAL – 50%</td>
</tr>
<tr>
<td>HATSOFF Helicopter Training Pvt Ltd</td>
<td>Military and civil helicopter pilot training services through operation of a flight training devices to be operated by the company</td>
<td>CAE Inc, Canada - 50% HAL – 50%</td>
</tr>
<tr>
<td>Tata HAL Technologies Ltd</td>
<td>Engineering design services in aero structures and also the captive offshore and onsite workload from OEMs including offset programme</td>
<td>TATA Technologies Ltd, India- 50% HAL – 50%</td>
</tr>
<tr>
<td>HALBIT Avionics Pvt. Ltd</td>
<td>Design, Development &amp; Marketing of aircraft simulators &amp; all related applications for Indian &amp; International markets</td>
<td>Elbit Systems, Israel- 26%, Merlin Hawk, Associates, India - 24%. HAL – 50%</td>
</tr>
</tbody>
</table>
National Aerospace Laboratories

- National Aerospace Laboratories (NAL), is India's second largest aerospace firm after Hindustan Aeronautics (HAL).

- CSIR-NAL mandate is to develop aerospace technologies with strong science content, design and build small and medium-sized civil aircraft, and support all national aerospace programmes.

- NM5 - Five Seater - General Aviation Aircraft, country’s first public-private partnership (PPP) for development of civil transport aircraft in collaboration with M/s Mahindra Aerospace Pvt Ltd (MAPL).

SARAS - Multirole light transport aircraft, SARAS is the first civilian aircraft designed and developed in India. Two prototypes have been built and flown.

Hansa

Saras

Hansa

Indian Space Research Organisation

- Established in 1969, Head Quarters in Bangalore with annual budget of USD 1.1 Billion
- Extra-terrestrial exploration - First mission to the Moon: Chandrayaan-1
- Mars Orbiter Mission (Mangalayaan), India is the first country to enter Mars orbit in first attempt. It was completed at a record cost of $74 million.
- ISRO'S Mars mission is the cheapest so far. Just Rs. 450 crore. "That is Rs. 12 per km. Equivalent to Auto Fare.
- Antrix Corporation Limited, the commercial arm of Indian Space Research Organization (ISRO), has finalized contracts to launch 16 satellites of six countries in the coming years
- PSLV launched 40 foreign satellites

Indian Private Aerospace Companies

- Taneja Aerospace and Aviation Limited
- Mahindra Aerospace
- TATA Advanced Systems Limited
- Dynamatic Technologies Limited
## Aerospace Product Companies

<table>
<thead>
<tr>
<th>Company Name</th>
<th>Products and Services</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Taneja Aerospace and Aviation Limited (TAAL), Hosur, Near Bangalore</strong></td>
<td><strong>Aircraft Structural Manufacturing:</strong>&lt;br&gt;Only Private sector company manufacturing entire aircraft in India&lt;br&gt;Partenavia P68C- 6 seater aircraft build and fly&lt;br&gt;Thrope T211- Sports aircraft build and fly&lt;br&gt;Saras- Aircraft structural build&lt;br&gt;Hansa- Fully composite aircraft build&lt;br&gt;PSLV, GSLV – Sub booster rocket structure&lt;br&gt;<strong>Maintenance Centre:</strong>&lt;br&gt;TAAL has DGCA maintenance approval for Cessna and light transport aircraft&lt;br&gt;Air Works India MRO uses TAAL facilities&lt;br&gt;Airfield – Accommodate A320, 737, ATR series</td>
</tr>
<tr>
<td><strong>Mahindra Aerospace, Bangalore</strong></td>
<td><strong>Manufacturing:</strong>&lt;br&gt;Aircraft sheet metal parts&lt;br&gt;Surface treatment &amp; NDT&lt;br&gt;Heat treatment&lt;br&gt;Aero structural assembly&lt;br&gt;<strong>Strategic Partnerships:</strong>&lt;br&gt;Magellan Aerospace- Metallic components and major structural assembly&lt;br&gt;Airbus group company- Premium Aerotec - Multi year contract to supply metallic components&lt;br&gt;GE Aviation- Produce small, metallic complex structural sheet details and assemblies</td>
</tr>
</tbody>
</table>

# Aerospace Product Companies

<table>
<thead>
<tr>
<th>Company Name</th>
<th>Products and Services</th>
</tr>
</thead>
</table>
| **Dynamatic Technologies Limited, Bangalore** | **Aircraft Structural Manufacturing:**  
Wing and Rear Fuselage of the India’s Pilotless Target Aircraft - LAKSHYA  
Ailerons & Wing Flaps for the Intermediate Jet Trainer HJT-36  
Major Airframe Structures for the Sukhoi 30 MKI Fighter Bomber  
Flap Track Beams for the Airbus Single Aisle A-320 Family  
Parts for CH-47 Chinook helicopters  
**Strategic partnerships and Contracts awarded:**  
Airbus tier-1 supplier for flap-track beams for A320 and A330  
JV with AeroVironment for UAV |
| **Tata Advanced Systems, Hyderabad** | **Aero structures Manufacturing:**  
Sikorsky- S92 cabin  
Lockheed C-130 Hercules centre wing boxes and empennages  
Pilatus PC-12NG  
UAV - Indian Armed Forces for surveillance  
UAV- Israel Aircraft Industries  
**Missile Systems**  
**Radar Systems**  
**Command and control systems**  
**Homeland security solutions**  
**Optronics systems** |

# Aerospace Engineering Service Companies

<table>
<thead>
<tr>
<th>Company Name</th>
<th>Capabilities</th>
<th>Customers</th>
<th>Head count</th>
<th>Turnover</th>
</tr>
</thead>
<tbody>
<tr>
<td>Axis Cades Digitech, Bangalore</td>
<td>Design, Analysis, PLM, Systems and Tech Pub</td>
<td>Airbus, Fokker, Boeing, REIMS Aviation</td>
<td>1229</td>
<td>USD 13.6 million</td>
</tr>
<tr>
<td>Infosys, Bangalore</td>
<td>Design, Analysis, PLM, Systems and Tech Pub</td>
<td>Airbus, Boeing, Gulfstream, Bombardier</td>
<td>179,523</td>
<td>USD 2.26 billion*</td>
</tr>
<tr>
<td>Wipro Technologies, Bangalore</td>
<td>Design, Analysis, PLM, Systems and Tech Pub</td>
<td>Airbus, Boeing, Gulfstream, Bombardier</td>
<td>158,200</td>
<td>USD 8 billion*</td>
</tr>
<tr>
<td>Tata Consultancy Services, Bangalore</td>
<td>Design, Analysis, PLM, Systems and Tech Pub</td>
<td>Airbus, Boeing, Lockheed Martin</td>
<td>319,000+</td>
<td>USD 15.5 billion*</td>
</tr>
<tr>
<td>HCL Technologies, Bangalore</td>
<td>Design, Analysis, PLM, Systems and Tech Pub</td>
<td>Airbus, Boeing, HAL, Bombardier, UTC Aerospace systems</td>
<td>106,107</td>
<td>USD 5.95 billion*</td>
</tr>
<tr>
<td>Quest Global, Bangalore</td>
<td>Design, Analysis, PLM, Systems and Tech Pub</td>
<td>Airbus, Boeing, Bombardier, Pratt &amp; Whitney, Rolls Royce</td>
<td>9900+</td>
<td>USD 500 million</td>
</tr>
<tr>
<td>Fair Tech Engineering Service Private Limited, Bangalore</td>
<td>Design, Analysis, Product support, testing and Software</td>
<td>Airbus, Boeing, HAL, Bombardier</td>
<td>500</td>
<td>USD 1 Million</td>
</tr>
</tbody>
</table>

References: Wikipedia, *- Overall revenue which includes software services
Foreign Aerospace Companies in Bangalore

- Honeywell
- UTC Aerospace Systems
- GE Aviation
- TEXTRON
- SAFRAN
- MOOG
# Foreign Aerospace Companies in Bangalore

## What do they produce

<table>
<thead>
<tr>
<th>Company Name</th>
<th>Products built in India</th>
</tr>
</thead>
<tbody>
<tr>
<td>UTC Aerospace Systems</td>
<td>Evacuation Systems, Aircraft Interiors systems- Lighting, Cargo and Specialty Seating systems, Sensors and integrated systems- Wiper, Motor drive system, Actuation systems</td>
</tr>
<tr>
<td>Honeywell</td>
<td>Turboprobe engines, Auxiliary Power Units (APU), Avionics, Indian engineers play a key role in Technology development</td>
</tr>
<tr>
<td>GE Aviation</td>
<td>MOU signed with Mahindra aerospace to collaborate on manufacturing opportunities for aero structures.</td>
</tr>
<tr>
<td>Textron</td>
<td>Engineering service</td>
</tr>
<tr>
<td>Safran</td>
<td>High-tech components for CFM56 aircraft engines, jet engines and carbon brakes, Largest ever biometric project (Aadhaar Program)</td>
</tr>
<tr>
<td>Moog</td>
<td>Servo motor R&amp;D and manufacturing in India</td>
</tr>
</tbody>
</table>
Airbus India Presence

Airbus Company and its operations

- Engineering Centre
- Airbus Training India
- Sonovision-Aetos
- 500 direct employees
- More than 5,000 local jobs

Procurement worth of 400 million dollars from Indian suppliers in 2014

Industry Partnerships

- Tata Consultancy Services
- QuEST, AxisCades
- Infosys, HCL, Geometric, Tech Mahindra

Research & Technology and University Partnerships

- Hindustan Aeronautics Ltd.
- Dynamatic Technologies
- Quest Global
- Tata
- Mahindra and AEQUUS

- Airbus Innovations Group
- Tata Institute of Fundamental Research- Mathematics of Complex Systems

Two-years, part-time Aero MBA programme by the TBS & IIMB

**Boeing India Presence**

### Boeing Company and its subsidiaries
- Headquartered in Delhi
- Research & Technology centre in Bangalore
- Field service offices in Mumbai and Delhi
- Jeppesen in Hyderabad
- Narus in Bangalore
- Continental DataGraphics in Chennai

### Industry Partnerships
- HCL
- Infosys
- Wipro
- Tata Consultancy Services
- Cyient (formerly-Infotech)
- Hindustan Aeronautics Ltd.
- Bharat Electronics Limited
- Dynamatic Technologies Tata Advanced Materials Limited (TAML)

### Research & Technology and University Partnerships
- NAL - Collaborative research in aerodynamics
- IISc - Research in materials-sciences
- DST-Aerospace manufacturing
- Building a Skilled Aerospace Talent Pipeline
- Nettur Technical Training Foundation (NTTF).

Aerospace Eco Systems in Bangalore

Aero SEZ

- Country’s first aerospace SEZ has been set up in Belgaum in November, 2009
- Aerospace SEZ in a 250-acre space near the new airport in Bangalore
- Defence Manufacturing Hub & HAL’s component manufacturing site in Chitradurga district
- Hindalco houses an alumina plant produces metallurgical alumina

Talent Pool

- Pool of skilled technical manpower – HAL, DRDO, ISRO, NAL, IISC, IIMB based in Bangalore
- Global manufacturers are comfortable outsourcing to India due Presence of technical skills and fluency in the foreign language
- Infuse $ 500 million into the economy in ten years.

Government policies

- 100% Foreign Direct Investment on automatic route in all areas, except air traffic services.
- 100% tax exemption for airport projects for a period of 10 years
- Defence Offset Policy minimum of 30% > Rs. 3 billion

Reference: http://www.advantagekarnataka.in/
Make in India

- Enhance skill development.
- A major new national program
- Designed to facilitate investment
- Protect intellectual property
- Build best-in-class manufacturing infrastructure.
- Foster innovation

References: http://makeinindia.com/
Make in India – Major Projects

DMIC
• Delhi-Mumbai Industrial Corridor (DMIC) as a global manufacturing and investment destination
• KPMG’s ‘100 Most Innovative Global Projects’ as one of the world’s most innovative and inspiring infrastructure projects

DMIC states
• Uttar Pradesh, Haryana, Rajasthan, Madhya Pradesh, Gujarat & Maharashtra
• Contribute 43% to the country’s GDP
• More than half of India’s industrial production & exports

Other four corridors
• Bengaluru-Mumbai Economic Corridor (BMEC)
• Amritsar – Kolkata Industrial Development Corridor (AKIC)
• Chennai-Bengaluru Industrial Corridor (CBIC)
• East Coast Economic Corridor (ECEC) with Chennai Vizag

References: http://makeinindia.com/
Make in India - Aviation

Reason to invest

• The Indian aviation sector is likely to see investments totalling USD 12.1 Billion during 2012-17
• USD 9.3 Billion is expected to come from the private sector.
• More than 85 international airlines operate in India and 5 Indian carriers connect over 40 countries.

Growth Drivers

• Greater focus on infrastructure development; increasing liberalisation – Open Sky Policy
• AAI driving modernisation of airports, Air and Navigation Systems.
• Investment in airports is encouraged under the Public Private Partnership (PPP) Policy of the Government of India.

FDI Policy

• 100% FDI is permitted for greenfield airport projects under the automatic route
• Basic customs duty exemption
• Exemptions under the Income Tax Act for infrastructure development

References: http://makeinindia.com/
Conclusion

Challenges:
- Access to technology
- Funding
- Raw material availability and its high cost
- Certification processes

Opportunities:
- Potential opportunities in the “design to build” lifecycle are tremendous
- Rapidly developing engineering services/R&D expertise
- Potential global hub for both manufacturing and MRO
- Low cost & High skill manufacturing
- Large commercial aircraft market with rising passenger traffic
- Increasing military and defence expenditures