

India as an Aerospace Hub - Opportunities, Challenges and the Way Forward

The aerospace sector demands perhaps the highest degree of fail-proof quality standards. This combined with unpredictable demand, lumpy orders and extreme pressure on pricing makes the risk of aerospace business significantly high. Aerospace manufacturing for the defence sector is even tougher given that there's only one ultimate client per country - the Ministry of Defence (MoD); the orders are even more unpredictable and lumpy; and the negotiations, approvals and payments can be really test one's patience.

We are living in a globalized world where capital will flow to the most attractive destination in terms of sustained order-book, cost and ease of doing business. India therefore faces stiff competition from places like China, South East Asia, Latin America, and Eastern Europe in addition to the home countries of the global OEMs.

Indian aerospace manufacturing sector could become the sunshine sector for India and create thousands of high-end jobs if it is nurtured by the right policies and actions. It is at an inflection point, like the automotive and telecom sector three and two decades back respectively. It would require sustained support from government to develop critical mass, skill sets and research and development (R&D) capability.



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Rising Market Opportunities in India

Commercial Aerospace

- Global commercial aircraft fleet is expected to grow at a CAGR of around 4% during 2016-2035. Boeing has forecast a need for over 39,600 aircraft to be added during 2016-2035, with approximately 38 percent deliveries to airlines in the Asian region. Airbus has forecast a demand for 33,070 new aircraft deliveries during 2016-2035.
- On an average, around 42% of the demand will be for replacement of the existing aircrafts and 58% will be the incremental growth. Single-aisle airplanes will dominate the world's fleet with around 71% share of new deliveries during 2016-2035. A majority of these deliveries will be around Asia-pacific region - with India, China, South East Asia and the Middle East being key markets for the global aircraft majors.
- The strong pipeline of new aircraft models and production ramp up of existing models, result in increased level of financial and operational pressure on the existing supply chain, providing an opening for Indian companies, if they are keen and hungry. In addition, with increasing noise against globalization and imports, the pressure on global OEMs to 'Make in India' for the Indian market is likely to increase.

Investment by Foreign OEMs in India

- Global aerospace OEMs and Tier-1 suppliers source more than 70% of their systems from suppliers in US and EU. The system integrators and Tier-1s are keen to de-risk and diversify by developing their suppliers in Asian regions, especially India and China, which are closer to the consumption regions.
- Airbus is planning to increase its cumulative sourcing from India to USD 2 bn by 2020 from the current value of USD 500mn. 85% of this will be commercial aerospace. Airbus is planning to add new suppliers from India and looking at developing a supplier base to support its recent win with Indian Air force along with Tata for supplying transport aircrafts.
- Boeing is planning to fulfil its offset obligations (more than USD 2 bn by 2020) through commercial and military aerospace sourcing from current USD 500 mn in 2015, especially for their recently won orders of Apache and Chinook helicopters etc.
- Other global majors such as UTC, Sikorsky, Lockheed Martin, Rolls Royce, Moog etc have also set up manufacturing facilities in India and are developing the supply chain in India for their global requirements.
- The National Civil Aviation Policy (NCAP 2016) released in June 2016 lays special emphasis on promoting civil aerospace manufacturing in the country. Incentivizing civil aerospace sourcing through defence offsets, reaching out to global OEMs to set up their manufacturing facilities in India, promoting MRO facilities in the country are some of the key policy incentives being planned.

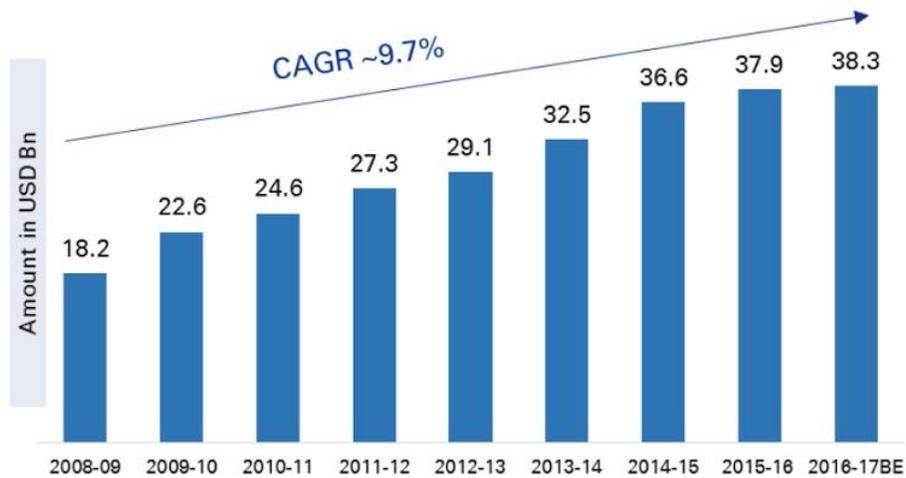
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Opportunities in Defence Aerospace

- Indian defence expenditure has increased at a CAGR of 9.7% from 2008-2016, reaching current levels of USD 38.3 bn in 2016-17. The cumulative capital budget till the end of 12th to 14th five year plan (2012- 2027) for the Indian Air Force (IAF) is projected to be approximately US \$218 billion; out of which 69 percent is towards acquisition of aircrafts and aero engines. IAF will be spending about US \$150 billion on aircraft and aero engine in the next 15 years, and is expected to grow by 10-15% every year. This indicates a large pipeline of orders in military aircraft segment, with a growing need for Indian sourcing partners.

Figure 1: India's annual defence expenditure, 2008-2016



Source: Ministry of Defence, Union Budget, KPMG Analysis
Budget figures from 2009-2016 are revised estimated figures. 2016-17 values are Budget estimates.

Source: <http://www.internetworldstats.com>, Akamai q4-2016-state-of-the-internet-connectivity-report, ITU_S-POL-BROADBAND.17-2016

The Indian aerospace industry is seeing interesting developments. Players from diverse sectors are aggressively paving their way through e.g. the Reliance, Adani Group etc. to capture opportunities arising out of increased push for indigenization. Though the market is dominated by HAL and DPSUs to a larger extent, they are facing difficulty in executing the order-book.

Capital procurements is likely to grow with major procurements of around USD 80 billion over the next decade as shown in the table below. Many of these contracts will be executed indigenously or under "Buy & Make (Indian)" category with indigenious content of over 50%. These will open up significant

opportunities for Indian system integrators and component suppliers. (Source: Ministry of Defence, Media reports, KPMG Analysis)

Aerospace	Naval Systems	Land Systems
USD 40 Bn +	USD 22 Bn +	USD 16 Bn +
Major Contracts	Major Contracts	Major Contracts
Rafale Fighter Jet	Submarines (Project-75I)	Future-Infantry Soldier As a System Program
Avro Replacement Program	Mine Counter Measure Vehicles	Future Infantry Combat Vehicle
Light Utility Helicopter (LUH)	Multi Role Naval Helicopter	M777 Ultra Light Howitzers
A330 Multi Role Tanker	Frigates and Corvettes (Warships)	Light Armored Multipurpose Vehicle
Transport aircraft	P8I surveillance planes	Spike anti-tank guided missile and 275 launchers
Apache, Chinook-Heavy duty attack helicopter	Dornier Surveillance Aircraft	
Tejas- Light combat Aircraft		
Kamov helicopters		
Fifth Generation Fighter Aircraft		

Indian Manufacturing Sector can Move up the Value Chain

India has successfully built a manufacturing sector for capital goods, consumer goods and automotive products. Key drivers were competitive labour cost, large pool of well qualified engineering talent, growing consumption, attractive loan products and attractive policies to attract foreign OEMs.

The Indian aerospace sector is coming of age over the last decade – from complete dependence on platform imports to gradual indigenization by the DPSUs and few Private Sector companies through license manufacturing. In the next phase, the sector is moving towards the inclusion of the Indian private sector companies as partners.

A mature automotive sector in India is ideally suited to become part of the aerospace supply chain. The automotive manufacturing setup deals with large number of components and the suppliers are in different tiers.

An example of aerospace OEMs and the various activities carried out by their Tier 1/2/3 and raw material suppliers, is as shown below:

Level	Products
OEM	Aircraft – Military and commercial
Tier 1	Engine, turbines, jets, engine propulsion systems etc.
Tier 2	Flight control systems, landing gears, interiors, hydraulic and pneumatic systems etc.
Tier 3	Sensors, pumps, motors, cables, connectors, filters etc.
Job shops	Built-to-print jobs as per drawings provided by OEMs or Tier 2/3 manufacturers
Raw material suppliers	Metals, special alloys, specialty chemicals, explosives, gases etc.

A detailed analysis of overlap between aerospace and automotive sector shows that key parameters are similar but far more demanding in the former. The following table outlines some similarities and differences between the two.

Parameter	Aerospace Sector	Automotive Sector
Product	One machine can be configured to produce multiple parts due to low volumes	This might be difficult due to high volumes & set up times constraints
	More product varieties and specifications	Product varieties are relatively lesser and standardized across models on a platform
Payback period	Long as it may take 4-5 years for a new supplier to start making revenues after passing the assessments	Comparatively shorter
Penalties and risk	Suppliers need to pay huge penalties in case of product failures	Penalties are comparatively less stringent
Supply chain	Complex, globalized supply chain	Globalized yet India centric due to large local demand & increased local sourcing by OEMs
Production quantity	Low volumes	Auto sector caters to much broader customer segment and larger volumes
	Most items would be manufactured using batch production techniques	
Selection Criteria	Involves rigorous assessment by OEMs on various parameters with zero tolerance levels	Strict assessment by OEMs but number of parameters & tolerance limits are comparatively less stringent
Resources	Requires highly skilled resources	High production volume can be managed with a mix of skilled and semi-skilled resources
	High component varieties and low volume demands high manpower requirement	
Material Handling	Very demanding and strictly monitored	Comparatively less demanding

In recent past many companies such as Tatas, Mahindras, Aequs, Dynamatic and Bharat Forge have made a successful foray into aerospace supply chain. These have been made by leveraging their past experience and by partnering with global OEMs.

Opportunity in Aerospace Materials

With simplified offset norms, changes in defence procurement procedures (DPP) and easing of FDI restrictions, there is a significant curiosity and interest among private sector companies towards aerospace. Many promoters have pumped in significant sums to adopt technology and build capability. However, the current capability gap between the global and Indian OEMs is significant and may take a few years to bridge.

Aerospace manufacturing needs special alloys of steel, aluminium, titanium etc and composites. Currently about 70% of these raw materials required for aerospace manufacturing is imported into India. This dependence of DPSUs on import of raw material is due to the failure in developing a strong vendor base and the low focus on in-house R&D. MIDHANI is a leading DPSUs supporting the Indian aerospace manufacturing with high end materials. India needs far more research organizations and material development support to overcome the demand-supply gap.

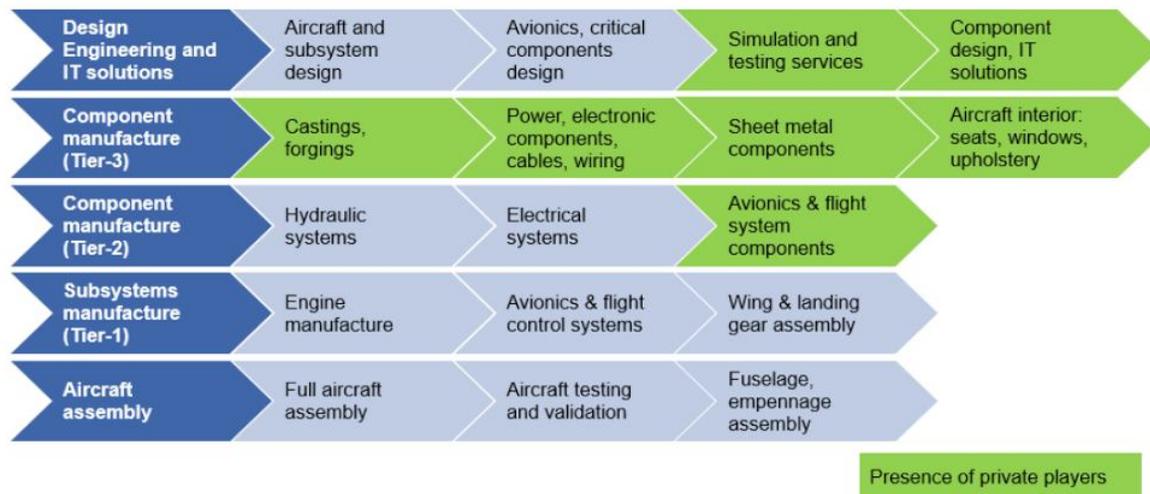
Most metals and composites used in aerospace are imported. The overall scenario is as follows:

Material	Description	Market
Aluminium	2 and 7 series with superior fracture resistance and light weight – used for aeronautical fabrication	Aluminium structural castings are used in aircraft engines and airframes
	5 and 6 series with superior corrosion resistance used for marine fabrication	Alcoa is the world leader in aluminium forgings for aerospace industry and supplies directly to Airbus
	2, 5 and 8 series used for armour applications due to superior ballistic properties	In India, Aditya Birla group plant Hindalco Almex manufactures aluminium parts for a DPSU
Titanium	Used in aircraft, armour plating, naval applications, missiles and spaceships due to high corrosion resistance, high fatigue resistance	Manufacturing of Ti sponge in India is done by SAIL and Kerala Minerals and Metals Ltd (KMML)
	Several grades of Ti alloys developed for various A&D uses	India has a captive demand of Ti from ISRO, IAF, HAL, BDL, BrahMos, IN and IA of 10,000 TPY (tons per year)
		Ti is more compatible with CFRP than Al is, hence the growing demand
Special Steel	For land, marine and missile systems, maraging steel which is corrosion resistant and has an ability to withstand extremes of temperature is used.	The market is dominated by SAIL and to a lesser extent Essar which supplies to DPSUs
		The indigenous technology for maraging steels DMR 249 was developed by Defence Metallurgical Research Laboratory
Composites	Various types of composites are finding use in fabricating aircraft structures, armour, marine structures, land systems etc.	Carbon Fibre Reinforced Polymers (CFRP) are been used in large quantities in B787s and A380s
		Few suppliers in India. TAML and Kineco are the market leaders.

Indian Manufacturers in the Aerospace Value Chain

Currently presence of Indian private sector is limited to Tier 2 or 3 manufacturing, engineering and R&D services domain. To move up the value chain, the government and private sector will have to work together to make strategic investments in select technologies such as advanced materials, stealth technologies, avionics, sensors and cyber security etc.

Another way of moving up the capability maturity index is to be part of joint global programs for development of aerospace equipment. India should then get its best brains to work with global OEMs and create joint technology that helps both parties. The BrahMos program is a shining example. ISRO, which suffered global sanctions after Pokharan-II nuclear tests, is now routinely launching satellites from US, EU, Japan, Singapore etc. The joint programs should not be restricted to only DRDO and DPSUs.



Source: KPMG analysis

Aerospace and Defence Policy Reforms in India

The current government has brought in significant policy reform over the last two years. The new Defence Procurement Procedure (DPP 2016) and National Civil Aviation Policy (NCAP 2016) highlight the intent of the government to alter the status quo and that's a positive sign. Some of the key reforms undertaken are as follows.

- Under NCAP 2016, the government will encourage global OEMs for establishment of aircraft assembly plant in India along with its ancillary industries. It proposes to notify areas with aero-manufacturing activities as Special Economic Zone (SEZ) where the government will provide fiscal and monetary incentives and fast-track clearances to global OEMs and their ancillary suppliers. There would be a seamless issue of offset credits for investments in and sourcing from India on case of aerospace technology and products. To bring down the cost of made-in-India aircraft and components, the government will consider an incentive package to nullify the cost differential between made in India components and their original sources.
- The Defence Acquisition Council (DAC) has given clearance to over USD 55 billion worth of proposals in less than 30 months, giving a huge fillip to the military's long pending modernization. These now need to be quickly converted into actual purchase orders in order to kick-start big ticket investments and technology transfer in India.

- DPP 2016 provided the first preference for any procurement through a new category called the 'Buy (Indian - IDDM)'. IDDM stands for 'Indigenously Designed, Developed and Manufactured' equipment. It is expected to be a game changer as this is likely to encourage Indian Industry to undertake serious R&D to meet the stringent criteria. This is expected to reduce participation of foreign companies and their products through their Indian Partners as meeting criteria of 60% indigenous content would not be so easy to achieve. Under this new IDDM category, the product will be required to have at least 40% indigenous content in case it is designed in India or at least 60% indigenous content if the design is not indigenous.
- Indigenous content (IC) in other categories are as follows. These changes in IC will help in indigenization efforts as foreign OEMs will have to go for higher share of technology transfer in order to win the contracts.

Category	DPP-2013	DPP-2016
Buy (Indian)	30%	40%
Buy & Make (Indian)	30%	50%

- Foreign direct investment (FDI): FDI and FPI have been increased to 49% via automatic route, permissible up to 100% on case by case basis. FIPB will be abolished. There will be no approval required by the high-power Cabinet Committee on Security (CCS).
- Industrial licenses: Over 55% items have been taken out of the licensing requirement. Now, only limited items will require license, allowing wider scope for joint manufacturing and export potential for aerospace components.
- Defence offset reforms: Foreign OEMs will have freedom to choose offset partners over course of contract along with ease of replacement of existing partners, bringing in more competition and efficiency.
- Strategic Partners (SP): This is a significant reform. No Indian company can make large scale investments with small, piecemeal orders from the government. The concept of Strategic Partners has been brought in to create a strong, sustainable aerospace industry in India. The SPs will be given large, long-term orders with due checks and balances.

- Level playing field between public and private sector: Anomalies in Exchange Rate Variation (ERV) and taxation regime has been removed.
- Testing Facilities: DRDO and DPSU testing facilities are being opened up for use by the private sector firms with due checks and balances.
- Blacklisting Norms: Blacklisting norms are being liberalised to ensure it doesn't become counter-productive by stopping supply critical spares and upgrades. Agents have been identified as legitimate business partners. The same may need to be duly empanelled with the MoD and will be open to scrutiny.



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Way Forward

India has always had the potential to become an aerospace hub. It is the inward looking policies and lack of trust towards the private sector that has held India back. Some of the urgent reforms that need to be undertaken are as follows:

- **Procurement lead time:** This is perhaps one of the biggest burning issues. MoD is cognizant of cost of long drawn procurement cycles, especially in case of modern technology which tends to get obsolete very soon. The industry has been urging MoD to reduce the procurement lead time of large capital programs from 7-8 years to around 4 years or less. MoD needs to undertake a thorough Procurement Maturity Assessment (PMA) with the help of military procurement experts from reputed consulting firms. The final decision on what suggestions to accept shall, of course, rest with the government of India.

- **Offset discharge.** Offset policy needs a complete overhaul, wherein we need to apply an outcome based approach. The government can come out with a list of areas, technologies, products, skills that need investment in each of the three fields- aerospace, naval and land systems and measure the outcome, rather than the value of the offset contract. How the OEM discharges it, whether through its Tier 1/ 2 or a third party, in whatever quantities or value should not be a concern. Only the responsibility and liability should be with OEM, with a freedom to invest in a range of pre-defined areas.
- **Promote defence exports:** Defence manufacturing is a capital and technology intensive domain. In order to justify their investments, Indian and global players investing in India's defence sector will be keen to look at the global supply chain. Government should come out with a clear policy on defence exports where the companies will be encouraged to make substantial investments by making India as their global manufacturing base.
- **DPSU reform.** DPSUs have been burdened with tasks that can be done by SMEs. DPSUs shall follow the global model of OEMs wherein they become system integrators and develop a strong supply chain with focus on quality. The concept of L1 (lowest bidder) has been the biggest hurdle in developing a high quality supply chain. The procurement process of DPSUs needs reform wherein focus is not on saving a few dollars but optimizing the best quality for a lower lifecycle cost of the overall final product.

In conclusion, India has a great opportunity to change the status quo and become a key player in the aerospace and defence industry. It has the intellect, manpower and entrepreneurial talent to make that happen. Liberal policies, change in anti-private sector mind-set and close collaboration between government, defence forces, DPSUs and the industry are critical to make that happen. The time to start is now.

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