AVIATION WEEK NETWORK

AEROSPACE MANUFACTURING ASIA-PACIFIC

India
Aerospace Supply Chain 2.0

Vivek Saxena
Managing Director
Advisory Aerospace OSC
Minnesota (USA)
October 31, 2017

Outline

Macro factors

Tailwinds in civil & defense markets

Untangling policy

From HAL & PSUs to IOPs & SPs

Rise of the manufacturing entrepreneur

Implications for future



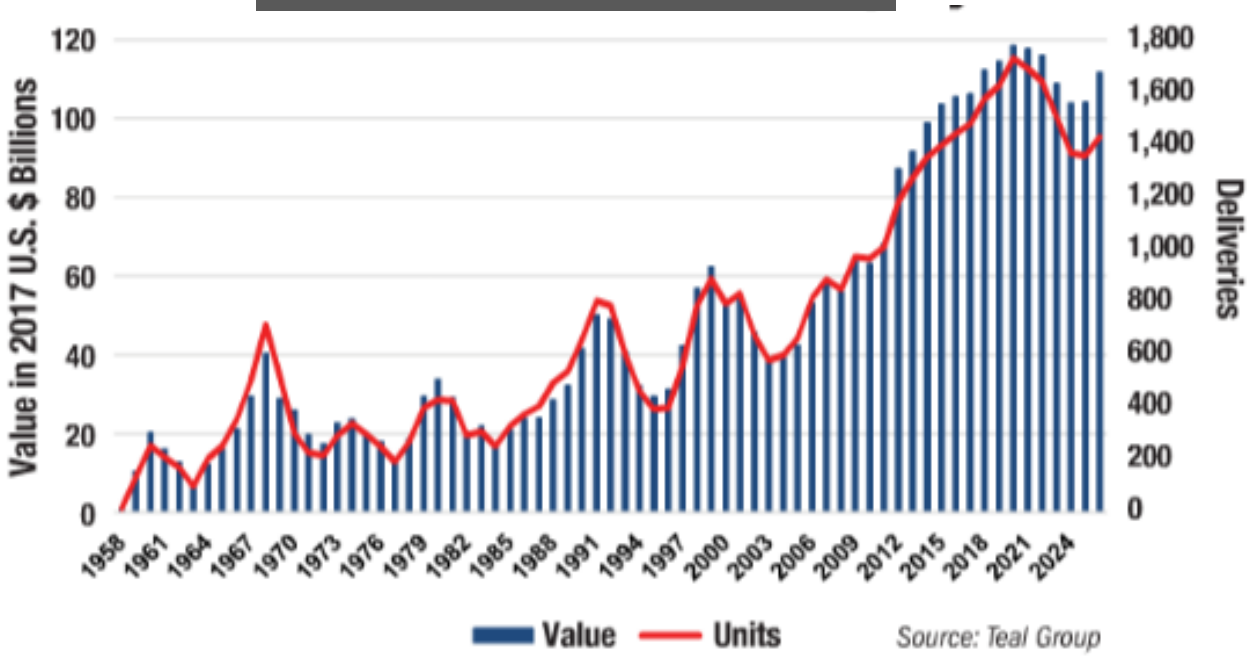




HAL – Hindustan Aeronautics Limited (a Public Sector Undertaking)
PSU – Public Sector Undertaking
IOP – India Offset Partner (usually a Private Indian company)
SP – Strategic Partner (a foreign OEM or Tier 1 partnering with an IOP)

Recap of recent worldwide growth in aerospace manufacturing

Commercial Airline Deliveries



New Aircraft Development

China maintains roughly 20% of world airliner demand
High fuel prices and low interest rates drove recent innovation & new aircraft development programs
Worldwide demand in RPM (revenue passenger miles) remains at a high

India Supply Chain 1.0 - Engineering & IT not Manufacturing

OEM / Tier 1	Engineering / IT	Parts Procurement	Manufacturing
Boeing	Captive Center	Growing	None
Airbus	Captive Center	Growing	None
GE	Captive Center	Limited	None
Honeywell	Captive Center	Slow but Steady	Limited
UTC	JV with Cyient	Reduced Focus	Goodrich Acquisition
Rolls Royce	New Focus	Increasing Focus	JV with HAL

Honeywell Technology Solutions was an early serious mover in India in mid 1990s.
Boeing annual spend in India is about $1B, direct manufacturing content is negligible compared to engineering etc.
Airbus annual spend going from $0.5B to $0.75B; direct manufacturing content is insignificant
UTC spend in manufacturing procurement has not cracked $100M ceiling despite a decade of focus
Significant outsourcing of IT / Engineering services from OEMs to QuEST, Cyient, Wipro, L&T, Infosys, HCL

India Supply Chain 2.0 – Impact of Eight Macro Factors

8. OEM Cost Pressures

Boeing – Partnership for Success
Airbus – Scope+ and consolidation
UTC – *UTV2* & *UT SMARTCHOICE*

7. Local Civil Aviation

20% YOY growth
UDAN / Regional connectivity
Investment in airports / infra

1. Policy & Regulation

Procurement – DPP clarifications
Offset rules simplifications
FDI limits grow

6. Cost of Labor

Labor arbitrage vs. Productivity
Labor content in aero parts
Currency markets

2. Transfer of Technology

US law more restrictive
IP Protection

5. Defense Spending

Largest importer
>$10B offsets in short term
Strategic Partnership Model

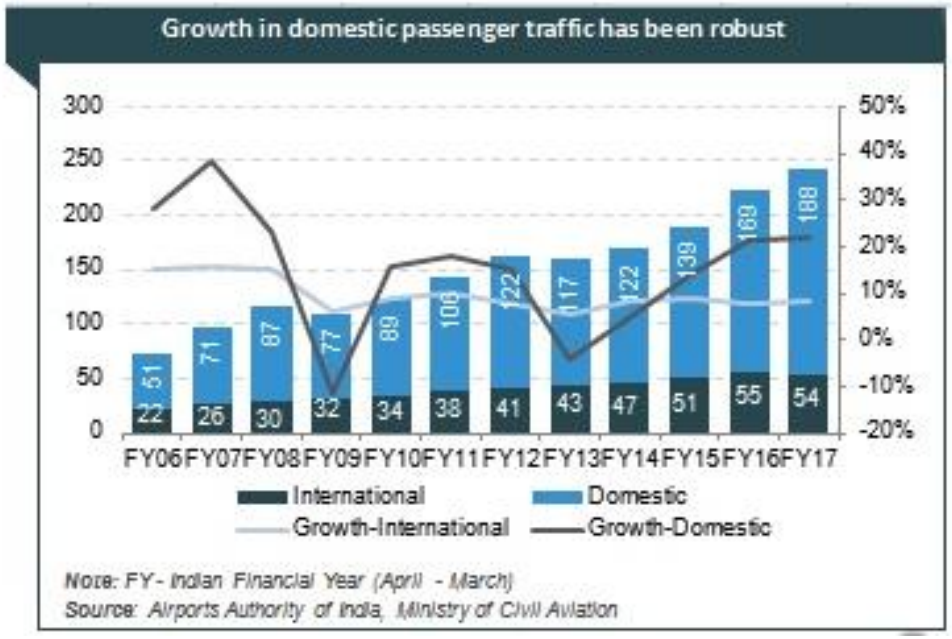
4. Production Capacity

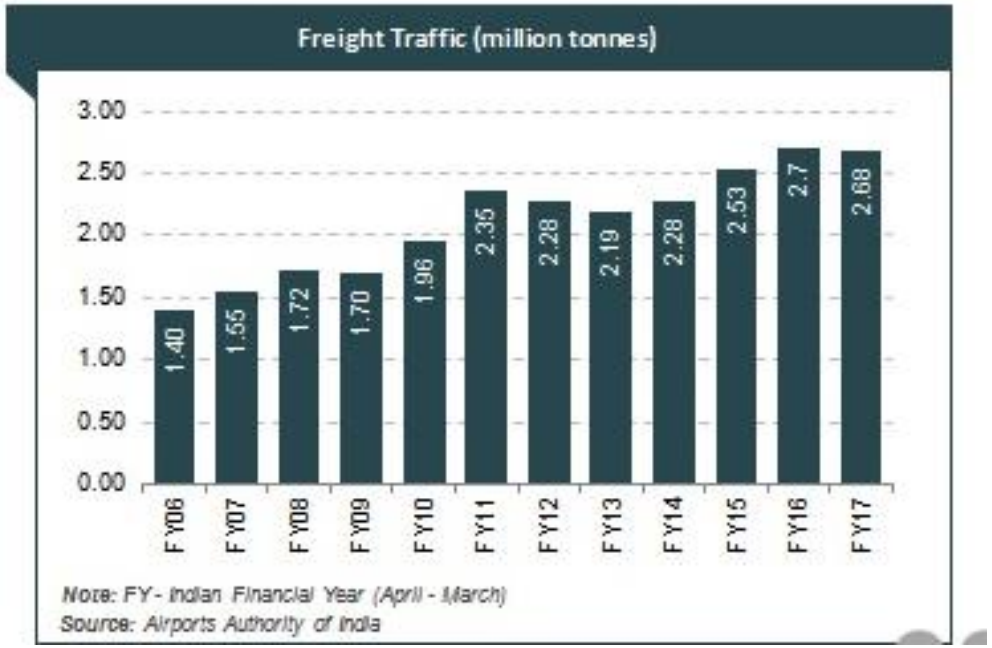
B787-10, B777x, B737MAX
A350-1000, A330NEO
MRJ, C-Series, G500 / 600

3. Talent

Focus on Mfg. talent including shop floor
Engineering talent growing
Expat talent

Tailwinds - India will be the 3rd largest civil aviation market by 2020





$16B market in 2016

Boeing projects India demand of 2100 planes in 20 years, valued at $290B

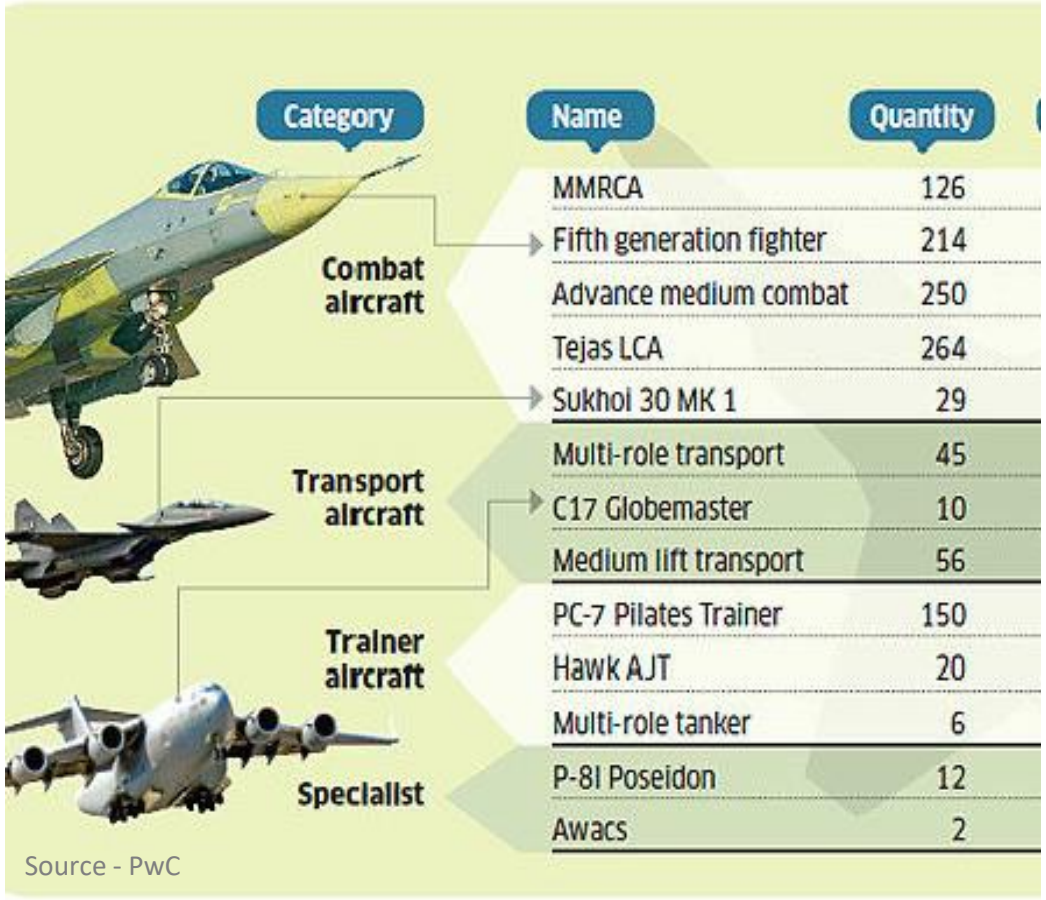
5% of the 20 year global demand

Low penetration; UDAN - $40 regional 1 hour flights

100% FDI allowed in Airport projects or Airlines

Recent history – 1% GDP growth drives >2% aviation growth

Tailwinds - India is the largest defense importer



Category	Name	Quantity
Combat aircraft	MMRCA	126
	Fifth generation fighter	214
	Advance medium combat	250
	Tejas LCA	264
	Sukhoi 30 MK 1	29
Transport aircraft	Multi-role transport	45
	C17 Globemaster	10
	Medium lift transport	56
Trainer aircraft	PC-7 Pilates Trainer	150
	Hawk AJT	20
	Multi-role tanker	6
Specialist	P-8I Poseidon	12
	Awacs	2

Source - PwC

Over $10B in offset obligations already

Offset policy, FDI rules, SPs (Strategic Partnerships) will help immensely

Trickle down effect of large SPs (e.g. 60 Indian & 25 European companies eager to join the DRAL supply chain)

IOPs (Indian Offset Partners) demanding increased levels of technology transfer

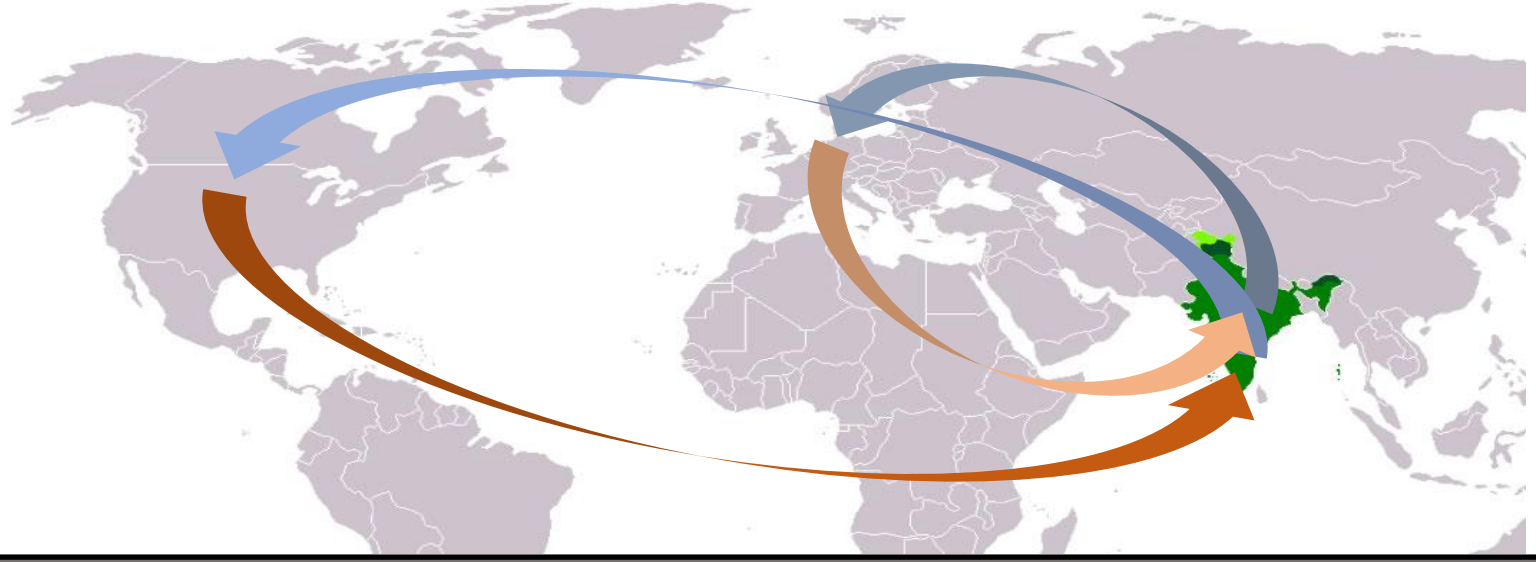
FDI – Foreign Direct Investment
DRAL – Dassault Reliance Aerospace Limited (a JV)

Three distinct cultures in Indian aerospace manufacturing

	HAL / PSUs	Major Corporations / SPs / IOPs	The Entrepreneurs (SMEs)
Features	Govt. Sole Suppliers Bureaucratic Aerospace capabilities	Strong industrials Ability to scale quickly Strategic Partnerships with OEMs	Adjacent Industries / High Tech Nimble Tier 1 / Tier 2 / Tier 3 Partnerships
Talent	Local Dated skills	Imported Trained by skilled partners Ex HAL / PSU talent	Imported Trained by skilled partners Ex HAL / PSU talent
Examples	Rolls Royce – Machining EADS – Licensed helicopters Safran – New JV	TASL – Bell, LM Adani - SAAB Reliance - Dassault WIPRO - IAI Bharat Forge - IAI	Aequs – SAAB, Magellan, Auburt Duval Dynamatic – Aerovironment, IAI SASMOS - Fokker Elmo Samtel – HAL, DRDO, Hanhwha, Thales

SME – Small & Medium Enterprise

Rise of the Manufacturing Entrepreneur – Cross Border Investments



SME Entrepreneur	Global Strategy	Product	Customers
Aequs	JVs – Magellan, SAAB, Auburt Duval Acquisitions – T&K Machnes, SIRA Group, Investment in Spartacus3D	Machined Parts Fabrications Forgings	Airbus, UTC, Boeing, Honeywell, Premium Aerotek, Safran
Dynamatics	Acquisition – Oldland UK Partnerships – Aerovironment, IAI	Sheet metal, Aerostructures Composites	Airbus, Boeing, GKN, Bell, GE, Augusta, Spirit
SASMOS	JV – Fokker Elmo (now GKN Aerospace)	Wire harnesses, Electro-mechanicals, Panels, Boxes	Boeing, MBDA, Honeywell, Meggitt
Jaivel	HQ in Midlands (UK) , Manufacturing in India & UK, Skills training with Boeing	Aerostructures, Engine components, Landing gear parts	Mettis, Pilatus, Hondajet, Augusta, ITP

Tops down and bottoms up – a faster growth of the India Supply Chain 2.0

Strong Government Push
Strategic Partnerships (SP)
Foreign OEM Push

This dynamic puts Indian Aerospace Manufacturing in a distinct & different category - compared to other evolving global clusters

Tier 1, 2 & 3 Entering India
Rise of the Mfg. Entrepreneur
Local Subtiers to support SP

Pull from the bottom (Foreign Subtiers & local SMEs) is making the ecosystem rich & diverse

Much faster pace than the slow moving Strategic Partnerships in terms of actual manufacturing

A decade of learning & hiccups – V2.0 now ready for rapid growth

2007 – 2010	2017 – 2020
Peak of the hype cycle; 'sexy' industry; much publicity	Expectations are more realistic; more global exposure
HAL in the driver's seat	Strategic Private Partnerships, SME Entrepreneurs
Lack of appreciation of Aerospace Business Case	ROI & breakeven better understood & realized by some
Lack of Manufacturing Talent	Partnerships, expat talent & indigenous growth of skills
Lack of appreciation of Quality Requirements	A decade of experience is starting to pay off in Quality
Unclear Offset Policy	Revised & improved offset requirements
Unreasonable Limits on FDI (26%)	49% FDI for Defense JVs and up to 100% for Civil JVs
Critical gaps in value chain (e.g. special processes)	Fuller value chain but gaps in castings / forgings

Future / Implications

India aerospace manufacturing poised for dramatic growth in the next decade

Slow growth in manufacturing talent continues to be the biggest inhibitor

Expect significant M&A involving large companies as well as SMEs

Commodity shift from small machined parts to fabrications, composites, assemblies and engine components

Special processes no longer the bottlenecks but feedstock (Castings & Forgings) is another opportunity

India should invest in manufacturing services like Additive Manufacturing and Industrial Internet of Things (IIoT) – natural growth areas for a software behemoth

Vivek Saxena, PhD
Managing Director
Advisory Aerospace OSC
Vivek.Saxena@AdvisoryAero.Com
734-249-0961 [Mobile]