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POINT OF VIEW

Dec 2015



**Aerospace ER&D:
India – Strategic
partnership role**

India's Engineering Research & Development (ER&D) industry has been seeing double-digit growth in the recent past and by 2020, it is expected to reach exports of USD 30-38 billion. This sector is emerging as a vital cog in the global value-chain for customers with its focus on impacting customer bottom-line. With ER&D shifting East (Asia excl. Japan to account for one-fourth of total ER&D spend by 2020), India is expected to further cement its place in the global sourcing arena.

Key themes driving ER&D include sustainability (green tech), miniaturisation and localisation. Digitisation is taking the technology industry by storm, impacting every aspect of business and has opened up new opportunities in the areas of connectivity (IoT>M2M>Engineering analytics), wearable devices, 3D printing, and others. India's ER&D players are now moving from proof-of-concept in these areas to prototyping and beyond, and seeing significant traction. These technologies are further creating opportunities for embedded software, software integration and cyber security.

NASSCOM, in partnership with strategy&, has published a detailed report on India's ER&D sector. While this report gives an overall analysis of 11 verticals, we have identified 4 verticals on which the report has in-depth analysis (Automotive, Aerospace, Energy and Medical devices).

This PoV paper gives highlights of the Aerospace ER&D section. We hope you find this useful; please share your feedback/comments at: research@nasscom.in.

1. Executive Summary	4
2. Global Aerospace ER&D Trends	5 – 7
3. India's Aerospace ER&D Industry	8 – 12
4. 2020 Outlook	13

Executive Summary

Global ER&D

Global ER&D spend is set to touch ~USD 1.7 trillion by 2020, up from ~USD 1.4 trillion in 2013:

- Corporate sector spend, driven significantly by the top 2,000 corporates, is forecast to touch ~USD 850-900 billion (up from USD 700 billion) over the same period
- Six key trends are driving enhanced ER&D spend across multiple sectors globally – Sustainability, Connectivity, Localisation, Software-led differentiation, Digital engineering and Miniaturisation

Aerospace ER&D

Global Aerospace ER&D spend projected to grow from USD 24 billion in 2013 to USD 25-28 billion by 2020

- Going forward, adding new features would gain significance as firms aim for differentiation; greater focus on green technology and more emphasis on safety

India's Aerospace ER&D exports stood at ~USD 1 billion in FY2015, a 6 per cent share in India's total ER&D exports. While third-party service providers dominate this market (~80 per cent share), GICs account for the balance.

- Providing flexible capacity, reduced time-to-market and sharing business risks are emerging as key driver of offshoring; cost savings, a traditional expectation, continues to be an important factor
- As can be seen in the case studies included, Indian ER&D firms have taken on a partnership role to their customers and are delivering significant value

By 2020, offshored ER&D market for aerospace sector will be between USD 4.5-5 billion with India's share in global offshore (aerospace) market expected to grow to 40-50 per cent

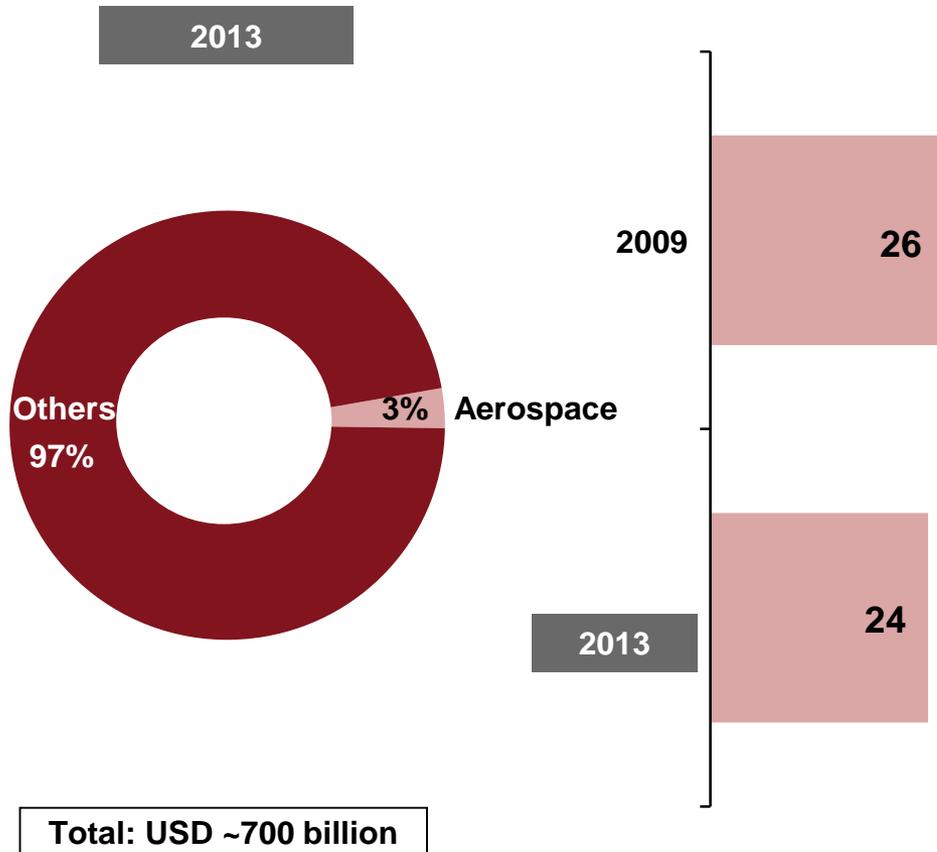
- For India's ER&D industry, opportunities exist in the areas of digitisation, manufacturing engineering & sustenance engineering, avionics; additional opportunity for India would be in providing local engineering support as APAC emerges as an aviation hub

Global aerospace ER&D spend: USD 24 billion in 2013

Global Corporate ER&D¹ Spend

Aerospace ER&D² Spend USD billion

Key Trends



Aerospace ER&D:

- Corporate ER&D spend in aerospace declined in last 3-4 years - primes show negative trend in ER&D spend (e.g. Boeing's R&D spend down 9% in 2009-13)
- Going forward, spend expected to grow by 2-3% annually driven by long-term demand outlook for airline passenger traffic and air cargo
- No major new platform development in the offing; firms focusing on improving efficiency
- Hence, engineering focus expected to shift from design to manufacturing and sustenance engineering

1) Corporate ER&D spend is based on ER&D spend of Top 2,000 firms globally

2) Represents organised spend for firms in the Top 2,000 of ER&D spend; does not include unorganised sector or non-product development engineering spend

3) Others include consumer electronics, semiconductors, telecom, computing systems, machinery, energy, medical devices, automotive, construction, industrial machinery and other smaller sectors like pharmaceuticals, chemicals, biotechnology, software, agriculture, finance/services, consumer household goods, mining, forestry, etc.

Going forward, new features/technologies, environmental factors will be key drivers of ER&D spend

Major Focus Areas of ER&D Spend - Aerospace

Driver	Importance	Trend
New Markets - Consumer Demand (e.g., emerging markets-specific products)		↔
New Products or Segments (e.g., new platforms)		↓
New Features and Technologies (e.g., advanced avionics, next-gen engines)		↑
Fundamental Research (e.g., composites/materials engineering, bio-fuels)		↔
Product Safety (e.g., Air navigations systems, predictive analysis)		↑
Environmental Factors (e.g., lower fuel consumption, reduced emissions)		↑
Government Regulation		↔

Key observations

- In the past, new products, e.g., super-jumbo jets for long-haul flights, was the biggest driver for ER&D spend in aerospace
- Going forward, new features will gain importance as firms increasingly try to differentiate themselves and improve operational efficiencies
- Investment flow into “greener” technology such as fuel-efficient engines, advanced materials
- More emphasis on safety across design, analytics, compliance, real-time monitoring, etc.

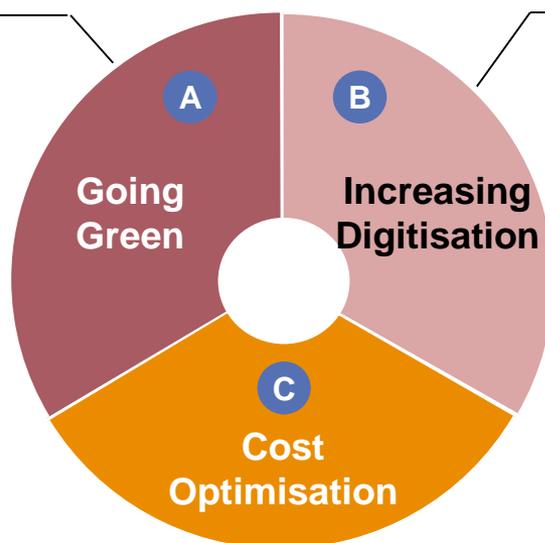
Most Important
 Least Important
 ↑ Shows trend since 2010

Note:
 Represents collective view from both demand and supply side ecosystems
 Source: [NASSCOM-strategy& report - Global ER&D-Reaching the Inflection Point - 2014](#)

Major Trends in Aerospace

Aerospace firms continue to push for ways to go green i.e., increase fuel efficiency, reduce aircraft weight, reduce noise, etc. due to:

- Government policy on carbon emissions
- Increasing fuel cost, etc.



Development of smart avionics

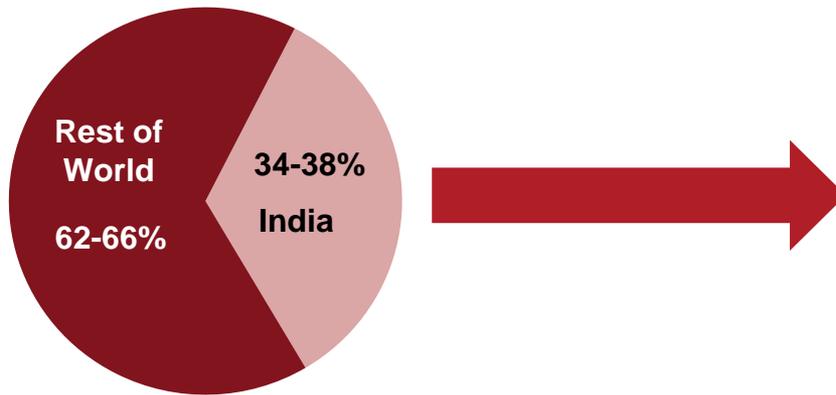
- Digitisation to ensure better control, stability and efficiency
- Building real time monitoring and predictive analytics capabilities
- Air navigation system to improve communication, routing, safety etc.

- OEMs have put a hold on launching new platform programs and instead looking at maximising returns from existing platforms, resulting in an overall cut in the ER&D spend
- Increasing pressures to cut down on costs (bring in efficiencies, consolidate supply chain, etc.) as market gets more competitive

India currently holds about on-third share of total addressable offshored market

India's share in Global Aerospace Offshored market, 2013

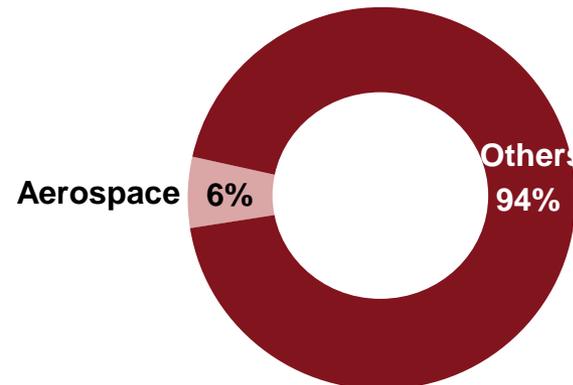
Total = USD 2.7 billion



- India's growing capabilities in avionics, along with resource scalability, language and relatively better IP protection help India to continue this dominating position
- India share expected to be anywhere between 40-50% by 2020

Aerospace ER&D: Share in India's ER&D exports, FY2015

- Aerospace ER&D exports at ~USD 1 billion in FY2015
- ~2.5X growth over FY2010
- Indian service providers dominate this market with ~80% share, GICs – 20%



**India's total ER&D exports:
USD 18 billion**

Note: Others includes consumer electronics, semiconductors, telecom, computing systems, machinery, energy, medical devices, automotive, construction and industrial machinery

Source: [NASSCOM-strategy& report - Global ER&D-Reaching the Inflection Point - 2014](#)

Showcase of work done by Indian players (1/2)

Customer	Business need	Service provider	Benefits
Provides airlines & aircraft lessors with an extensive range of interior equipment & cabin furnishing	Meet various airline interior configuration requirements and short lead time	AXISCADES	<ul style="list-style-type: none"> • 25-30% productivity gains • Reduced design to build time from 8 months to 3 months • Improved profitability by 40 per cent
A leading aerospace group	Meet commercial service launch schedule for a new aircraft programme	Capgemini	<ul style="list-style-type: none"> • Invested in integrated competency building and tools development against a multi-year roadmap • Tool based delivery platform for transnational delivery to integrate into multiple customer centres • Productivity up 20% and consistent quality through Right First Time • Reduced design cycle cost by >10%
One of the world's largest aerospace & defence corporation	Development partner to A&D OEM and its subsystem suppliers	HCL	<ul style="list-style-type: none"> • ~USD 300 million cost savings • Helped client get >USD 35 million offset credit • Potential to provide >USD 75 million offset credit to the OEM
The development agency for Indian Defense programs	Taking ownership of full development cycle for hardware	L&T Tech	<ul style="list-style-type: none"> • First time right reduced iteration time by 30% • Single ownership to develop and certify the product – reduced customer effort by 20% • Innovation in mechanical piping manifest for efficient and reliable pressure sensing mechanism, enabling 70% cost advantage to customer

Showcase of work done by Indian players (2/2)

Customer	Business need	Service provider	Benefits
A leading global aircraft manufacturer	Offers a 'Fully Managed Service' for non-conformance management for aircraft manufacturers	QuEST	<ul style="list-style-type: none"> • QuEST KBE & automation initiatives help streamline & accelerate the managed solution • Developed a pool of checkers and approvers • Delivering to stringent SLA on quality & TAT • Undertaking initiatives to arrest non-conformance generation during production
An Indian Civil Aerospace OEM	Delivering an indigenous Integrated Modular Avionics platform	TCS	<ul style="list-style-type: none"> • Realised prototype in 20 months • Design to build solution • Indigenised solution that can be integrated with latest display and communication protocols, integration of auto generated code from HMI tools like VAPS with SC 1.0 version of APIs
Global aerospace OEM	Design to Certification support of fuselage structure for a passenger aircraft	Tech Mahindra	<ul style="list-style-type: none"> • Improved design concepts • 15% weight reduction, 40% part count reduction • Reduction in effort by 20% • 25% overall cost savings
A leading aerospace equipment and systems supplier	Helps deliver a superior in-flight entertainment experience	Wipro	<ul style="list-style-type: none"> • Achieved low cost manufacturing • Flexible design with spare Ethernet, ARINC, memory interfaces allowed customised implementations based on airline/OEM requirements • Reduced time-to-market by 15% • Easily upgradeable design with features and applications to create premium product variants • IFE server suitable both for retrofit and the line-fit market

Along with cost, reduced time-to-market and shared-risk model emerging as key drivers of offshoring

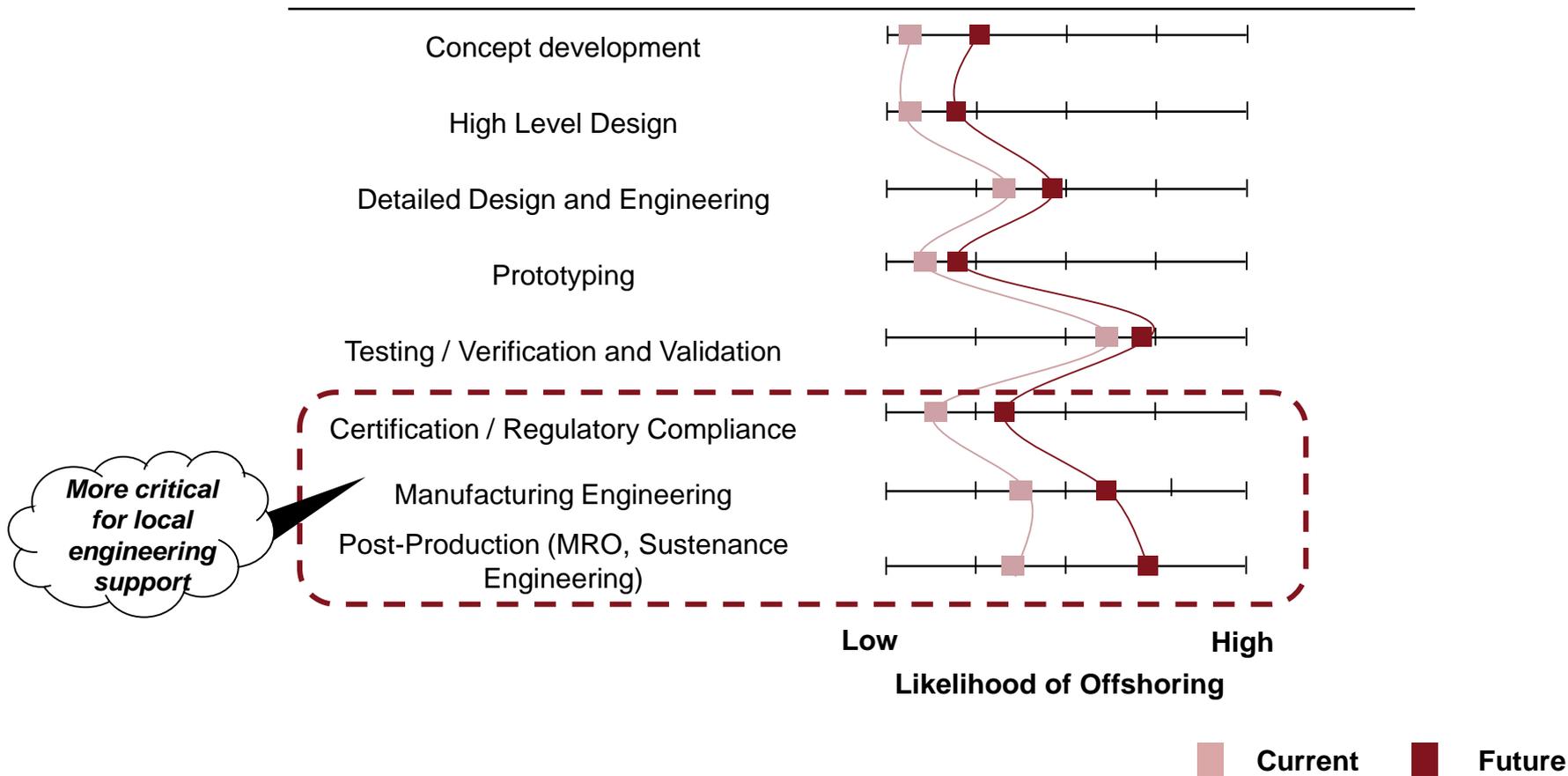
Drivers of Offshoring - Aerospace

Driver	Importance	Trends
Realise Cost Savings		↔
Gain Access to New Technologies		↔
Leverage Industry Best Practices		↔
Provide Flexible Capacity		↔
Gain Access to Emerging Markets		↔
Meet Government Regulations		↓
Localise Products to Different Markets		↓
Decrease Time to Market		↑
Manage Technology Proliferation		↔
Match Customer Footprint		↔
Share Business Risk		↑

 Most Important
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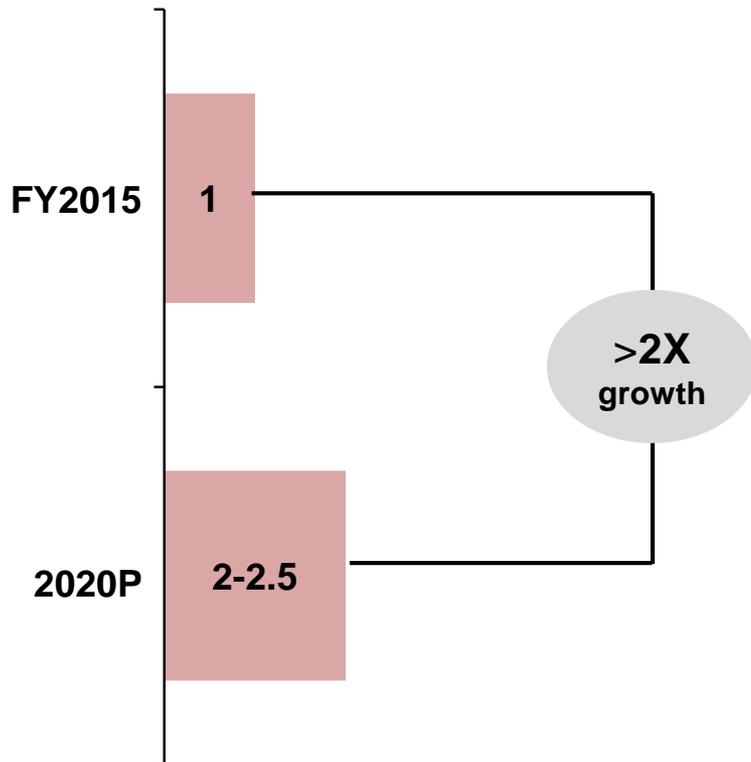
In the future, as APAC becomes an aviation hub, demand for local engineering support to increase

Product Engineering Value Chain



2020: Aerospace ER&D exports expected to cross USD 2 billion

Aerospace ER&D exports - India
USD billion



Key observations

- To account for about 5 per cent share in India's total ER&D exports
- CAGR of ~15 per cent
- India's share in global offshored market (Aerospace-USD 4.5-5 billion) expected at 40-50%

GROWTH OPPORTUNITIES:

- **Avionics** will be the major driver for growth; to account for 30-40% of aerospace ER&D offshored to India
- As APAC emerges as the aviation hub, India could be the leading supplier of **local engineering support**
- **Digitisation**: integrated modular avionics, vehicle health management, fly-by-wireless, more electric architecture, in-flight entertainment, next-gen data analytics

Global ER&D: Reaching the Inflection Point 2015: Full report details



No. of pages: 208

Report details at: www.nasscom.in/global-erd-reaching-inflection-point

Download [Executive Summary here](#).

Table of Content

- Executive Summary
- Global ER&D Landscape
- Vertical Deep-dives
 - Automotive
 - Aerospace
 - Energy
 - Medical Devices
- Outsourcers' Perspective
- Call to Action
- Appendix – Case Studies and Definitions



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