Report on Roundtable Discussion

on

'The Evolving Contours of Aerospace Power and Atmanirbharta'

22 December 2025

On December 22, 2025, the Centre for Aerospace Power and Strategic Studies (CAPSS) organised a roundtable discussion on the theme, '*The Evolving Contours of Aerospace Power and Atmanirbharta* 'at Air Force Station, New Delhi. The event was conducted over two elaborate sessions and brought together a diverse group of stakeholders, including serving and retired officers from all three Services, representatives from Defence Public Sector Undertakings (DPSUs), academia, think tanks, and government institutions, thereby creating a multidisciplinary platform for deliberations.

Director General, CAPSS, Air Vice Marshal Anil Golani (Retd.), set the tone for the event with his Opening Remarks, highlighting the critical role of aerospace power in safeguarding National Security. He emphasised that the pursuit of comprehensive national security was intrinsically linked to achieving *Atmanirbharta* (self-reliance), and that India's achievement of this objective required focused efforts and a whole-of-nation approach.

Session I: Empowering an Aerospace Ecosystem for Future Growth

Session I, themed, '***Empowering an Aerospace Ecosystem for Future Growth*** discussed various burning issues like the need for a robust 'F**inancial Architecture for Defence Capability Development'**, the formulation and adoption of 'I**ndigenous Standards for Aerospace**, the evolving '**Engineering Education Landscape for Aerospace in India'** and the **Prospects and Challenges of Lateral Entry of Overseas Indian Engineers in Defence Research and Development Organisation (DRDO).** The Session brought out the following recommendations.

Key Recommendations:-

Defence Finance Corporation.

1. Defence R&D capital is risk capital because defence R&D requires large capital commitments, has long gestation periods, and has no certainty of success. Since annual defence budgets are unable to meet the Services' capital acquisition and R&D requirements, a **Defence Finance Corporation** needs to be constituted to ensure the

timely and adequate availability of funds to the DPSUs and the private sector for critical defence R&D and capital acquisition projects.

2. The DFC should not be just another procurement body or another layer of approval, but rather a long-term capital allocation institution, which should provide funding for long gestation research projects at very low interest rates. It would align capital allocation with authority and capability. The funding would be made available to the R&D organisation in tranches, and subsequent tranche allotments would be linked to the achievement of laid-down milestones. This would also preserve optionality. Once the defence product or platform was fully developed, its sale would enable the recipient to repay the DFC.

Military Aviation Certification Agencies

3. There is an urgent need to revamp the Indian civil and military aviation certification agencies, as presently there is a shortage of testing equipment and laboratories. The functioning of the certification agencies is also presently characterised by customary delays on account of bureaucratic hurdles and administrative roadblocks.

4. There is also a lack of formal training and familiarity with the applicable standards in the certification agencies and even in the procurement staff in the Service HQ. To this end, it is necessary to mandate formal training for all procurement and innovation staff at the Service HQ and the certification agencies. It should also include implementing the extant regime in letter and spirit, simplifying the route to certification, cost- and time-appropriate certification requirements, minimal acceptable certification prior to contracting, and full certification costs as NRE in the procurement contract.

5. Certification agencies should be held accountable to the customer, not the developer, as the cost / time and responsibility for the project rests with the customer, not the developer.

Aerospace Engineering Landscape in India

6. Global educational practices showcase that the Indian Government and private higher academic institutions are not adequately integrated with the defence industry. The quality of education in our institutions also needs improvement, as only about 25% of our aerospace engineers are currently employable by industry.

7. The defence industry is not well integrated with the demand and supply in the aviation ecosystem; hence, there is a need for a disciplined tri-sector partnership, supported by government funding and certification, that includes universities, laboratories, and industry manufacturers. While doing so, it must be ensured that the Government-funded R&D projects feed technology to private industry.

8. The focus must also increasingly shift to translational research; wherein integrating technology users into academic programmes should be paramount. Additionally, there should be a '**whole-of-nation** 'approach that includes joint funding of projects by government and private industry.

9. Engineers and scientists should be the joint supervisors/faculty for M.Tech and PhD programs in the universities and colleges.

Lateral Entry of Overseas Indian Engineers in DRDO

10. There is an urgent need to transform brain drain into brain gain and brain circulation. This can happen by aligning the reciprocal expectations of NRI/OCI engineers regarding the work environment, infrastructure, and compensation.

11. There is a need to enhance the student mobility-exchange programmes, procedures for quick academic exchanges, translating academic research to industrial innovation, and leveraging underutilised research infrastructure in Europe.

12. There is a need to establish a clear DRDO policy for overseas lateral entry and create an appropriate environment that enhances growth for both individuals and the organisation. Additionally, DRDO must comply with rigorous selection processes that emphasise and prioritise domain impact, project relevance, and contributions to atmanirbharta.

Session II: Lessons from the Indian Experience in Atmanirbharta

The session focused on India's progress toward self-reliance under the '***Make in India and Atmanirbhar Bharat***' initiatives. The discussions were carried out on **Trends and Trajectory of the 'Make in India 'program (Aerospace)**, **Long-term Challenges of Indigenous Development** and **Lessons from Atmanirbharta Initiatives for SDR Implementation**. The speakers emphasised the need for strategic planning, value-based funding, ecosystem strengthening, and integration across government, industry, and academia. The lessons from the indigenous development of the Marut (HF-24) and LCA, and the licensed manufacture of the AVRO (HS-748) and C295 were highlighted with recommendations for meeting India's ambitions in indigenous development of fighter and trainer aircraft. Learning from past experiences is essential to guide future initiatives.

Key Recommendations:-

Atmanirbharta in Aerospace

1. The '**Make in India** 'initiative in the aerospace sector is slowly gathering momentum with the stated goal of achieving full self-reliance (Atmanirbharta) in the aerospace domain by 2047. However, the growth trajectory is tending to be restricted due to systemic gaps. Timely course corrections are required for addressing these systemic gaps and building a robust and favourable environment for Atmanirbharta. Otherwise, the achievement of full Atmanirbharta by 2047 in the aerospace domain is likely to be delayed.

2. During defence platform / product selection, many industries, startups, and academic institutions often rapidly develop / assemble products with technology transfers from foreign OEMs to meet the project timelines and present the products as indigenously designed and developed. Service procurement agencies must rigorously test and verify the *indigenous content* of defence platforms / products before selecting winners to prevent white-labelling or misrepresentation of technology transfers as original innovations.

3. The allocation of *project funding* should be based on demonstrated value-addition, achievement of performance milestones, and long-term impact rather than on indigenous inputs alone. Contracts for defence products / platforms must include clear, upfront guidelines that impose penalties for timeline extensions to prevent the dissolution or delay of product development.

National Centre for Adversary's Weapons Evaluation & Reverse Engineering

4. There is a need to develop a consolidated national centre (capabilities) for the systematic study of captured fully intact or partially destroyed weapons of the adversary during conflicts.

5. The transfer of tacit knowledge remains a significant challenge and must be explicitly addressed through appropriately structured contracts. Mere licensed production should not be equated with genuine technology transfer.

6. *Reverse engineering* is legal in many countries, and it can reduce the development timelines by approximately 50–60 per cent. All countries do reverse engineering of defence products. The practice of reverse engineering has to be cultivated to develop new technologies and products.

Accelerating Technology Development and Adoption

7. While technology solves real-world problems through deployable products, academia typically contributes at the Proof of Concept (PoC) stage. Further engineering, validation, and scaling are required to transition PoCs into operational products.

8. Going by the present development trends, the indigenous aviation ecosystem would not be able to provide the full spectrum of military aviation capabilities by 2047. The next phase of 'Make in India' should include the strategic acquisition of ailing foreign defence companies to accelerate capability development and technology absorption. (Eg. Embraer of Brazil and Motor Sich of Ukraine were available for acquisition a few years ago).

9. Previous technology / platform development projects, which failed to achieve success should be revitalised with the support of the private industry using spiral development approaches.

Revamping Defence Procurement Policies

10. Exemptions for foreign industries during procurement should be balanced to ensure fairness and a level playing field to the private industry.

11. Certification, standards, and validation, including in joint ventures, must be rigorously ensured to guarantee quality and operational reliability.

12. Several pseudo start-ups or projects are formed solely around conceptual ideas, often backed by well-known professors or academicians, but fail to progress beyond the ideation stage into tangible product development or platform deployment. Government agencies should not base selections solely on the quality of presentations or the reputation of professors or start-ups. Instead, they should prioritise demonstrable value addition and the potential for measurable future impact.

13. Most components of start-up products are open source. The limited proprietary intellectual property (IP) leads to overcrowded competition with minimal differentiation. Therefore, greater emphasis must be placed on the indigenisation of critical components, as well as on the creation, protection, and incentivisation of indigenous IP.

14. Start-ups and MSMEs require differentiated policy treatment. Funding valuations should be aligned with scalability and growth potential. Notably, many defence start-ups are MSMEs, necessitating tailored evaluation and funding frameworks. The defence start-up sector alone cannot sustain a venture over the long term. The growth opportunities must focus on dual-use applications and the development of substantial, defensible intellectual property embedded within the product

SDR Implementation in Tri-Services

15. In the context of *Software Defined Radio* (SDR), multi-band and multi-domain operations are required to enable seamless communication across all systems and all domains. Secure and interoperable joint waveforms should be implemented using indigenous cryptographic algorithms.

Addressing Bottlenecks in LCA & AMCA Development

16. India's endeavour to develop the indigenous supersonic jet fighter aircraft, the LCA (Light Combat Aircraft) programme has faced numerous delays and roadblocks, on account of dependence of foreign aero-engines, limited funding, lack of visionary leadership, and long-term planning. The development project has been stalled and delayed on multiple occasions. Long-term strategic planning for engine production, rapid acquisitions of critical technologies, unambiguous project ownership, decisive decision-making and active user involvement are needed for the success of LCA programme and the subsequent success of AMCA.

17. To fully leverage the limited technological success achieved in the development of the dry Kaveri engine, proposals for reactivation of the project and the further development of the project with the participation of the private industry should be actively

encouraged and supported. Mechanisms should be established to enable complete engine testing, iteration, and eventual integration of these enhancements into operational engines, ensuring that prior R&D investments translate into tangible capability gains.

18. Challenges related to technology absorption and transfer must be systematically addressed to ensure strategic self-reliance. During the induction of a new platform, a roadmap for the indigenisation of each subsystem needs to be planned and implemented in a time-bound manner.

Gainful Conversion of Decommissioned Fighters into Unmanned Aerial System (UAS)

19. The conversion and gainful utilisation of decommissioned fighter aircraft into Unmanned Aerial System (UAS) platforms with air-to-ground weapons must be planned. End-user participation in R&D is equally important to ensure that technologies meet the operational requirements.