Transformation Of India’s Aerospace Power

Introduction

The transformation of the Indian Air Force (IAF) is critical in shaping India’s aerospace dominance amidst an evolving security landscape. As modern warfare extends across multiple domains, air power remains a decisive factor in strategic security calculus of India. The need for an integrated, technology-driven force has never been more urgent, given the rapid advancements in adversarial air capabilities and the increasing complexity of future conflicts. The IAF's transformation is not just about acquiring cutting-edge platforms but also about enhancing indigenous capabilities, optimising operational readiness, and integrating Artificial Intelligence (AI), cyber warfare, and space-based assets into its doctrine. This modernisation journey demands a balanced approach between force expansion, technological innovation, and strategic foresight to maintain India’s edge in aerospace warfare.

Indian Air Force’s Legacy

Ranked as the 3rd most powerful and 4th largest air force, the IAF projects power beyond continental borders, playing a pivotal role in strategic deterrence, warfighting, Out-of-Area Contingencies (OOACs), Humanitarian Assistance and Disaster Relief (HADR) missions, and defence diplomacy. Since independence, the IAF has been instrumental in national security, demonstrating its strategic and combat capabilities across multiple conflicts and operations. In 1947, it executed strategic airlifts to Srinagar, Poonch, and Leh, securing vital territories. During the 1965 war, it played a decisive role in Chhamb and Lahore sectors, while in 1971, it conducted strikes on Karachi harbor, Airborne operations at Tengail, the Meghna helibridge operations, and precision strikes at the Governor’s House in East Pakistan, decisively crippling enemy defences and bringing about the political capitulation of the erstwhile East Pakistan. On the western front it turned Longewala into a graveyard for Pakistani armor due to relentless airstrikes. In the Kargil War, strikes on Munthodolo logistics base severed enemy supply lines, facilitating a humiliating defeat. The IAF has also been central to OOAC missions in Maldives, Sri Lanka, and United Nations peacekeeping operations across Congo, Somalia, Sudan, and Sierra Leone. In HADR efforts, it led Operation Neer (Maldives), Operation Devi Shakti (Afghanistan evacuation), and Operation Ganga (Ukraine evacuation), alongside critical relief during the COVID-19 pandemic. The Balakot air strikes demonstrated India’s strategic resolve to take the battle deep into enemy territory, while its swift post-Galwan deployment at the Line of Actual Control deterred the People’s Liberation Army and enhanced operational preparedness. The IAF’s legacy of combat excellence and strategic foresight continues to reinforce India’s airpower supremacy.

Emerging Threats

India faces collusive, multi-domain threats from adversaries with strong air capabilities and rapidly evolving technologies. China is advancing its air power with 5th Generation J-35A stealth fighters, H-20 long-range stealth bombers, and a robust space and missile program. It has also commenced trials for the 6th Generation J-36, expected to enter service by 2030, alongside reports of another prototype, the J-50, which boasts advanced stealth and aerodynamic performance. Beyond conventional platforms, China is integrating swarm drones, hypervelocity missiles, Lethal Autonomous Weapon Systems, Directed Energy Weapons (DEWs), cyber warfare, and AI-driven Network-Centric Warfare to enhance its strategic deterrence. Meanwhile, Pakistan is strengthening its air force by planning to acquire 40 J-35 jets to replace aging F-16s and Mirages and pursuing joint production of the KAAN 5th Generation Fighter Jet in collaboration with Turkish Aerospace Industries. These developments present a formidable challenge for India, requiring continuous modernisation, enhanced strategic planning, and integration of emerging technologies to maintain air balance and counter evolving threats.

Indian Air Force Modernisation

The IAF is rapidly adapting to network-centric and multi-domain operations, yet faces significant challenges in its modernisation efforts due to a declining force level (30 squadrons), slow Tejas induction, budget constraints, and a limited R&D base. By 2035, the IAF's fleet is expected to be 70 per cent indigenous, with Light Combat Aircraft Mk1/2 and Advanced Medium Combat Aircraft forming the backbone of its air power. Strategic assets such as Airborne Warning and Control System, Airborne Early Warning, Intelligence, Surveillance, Target Acquisition, and Reconnaissance, hypersonic missiles, and advanced air-to-air/ground missiles (Astra, Akash) are being inducted to enhance combat capabilities. Satcom advancements through new satellite launches, along with AI-driven decision-making tools, swarm drones, and anti-drone technology, are reshaping future warfare tactics.

To sustain operational readiness, the IAF is focusing on serviceability-linked inventory management, integrated training areas, spare stocking, and indigenisation to mitigate supply chain disruptions. Under *Atmanirbhar Bharat* (self-reliant India) collaborations between Defence Research and Development Organisation, Hindustan Aeronautics Limited, private industry, and startups (via the Defence India Startup Challenge and Innovations for Defence Excellence) are fostering indigenous aerospace development. Infrastructure modernisation under the ₹1,200 crore Modernisation of Airfield Infrastructure project is upgrading 37 airfields with Category II Instrument Landing System, Assessment of Functional Living Skills, and Air Traffic Controller enhancements.

The Ministry of Defence's declaration of 2025 as the 'Year of Reforms' aims to accelerate jointness, acquisition speed, and technology transfer while strengthening theatre commands. To address Tejas delivery delays, private sector engagement is increasing, and the recent GE F404 engine supply commitment from the United States (delivery by Mar 2025) is a major milestone. On the training front, IAF is

conducting complex, multidimensional exercises like *Gagan Shakti* 2024 to enhance operational preparedness. Additionally, international cooperation is being reinforced through multinational air exercises such as *Tarang Shakti* 2024, further strengthening India's strategic partnerships. There is also growing emphasis on Humanitarian Disaster Relief operations and Professional Military Education to enhance overall force effectiveness.

As the IAF navigates budgetary and structural challenges, accelerated modernisation, strategic collaborations, and indigenous innovation will be critical to ensuring its combat readiness and technological superiority in the evolving battlespace.

Challenges

As the Indian Air Force (IAF) undergoes transformation to meet the demands of multi-domain warfare, several critical challenges must be addressed to ensure combat effectiveness and strategic dominance. One of the foremost concerns is preparedness for prolonged military campaigns, which requires sustained logistics, force endurance, and high operational availability in a contested battlespace.

The IAF's Aerospace and Satellite-based Intelligence, Surveillance, and Reconnaissance (ISR) capabilities remain crucial for real-time situational awareness, early threat detection, and precision targeting. Enhancing space-based surveillance and integrating ISR assets with network-centric operations will be vital in countering evolving adversarial strategies.

Another key challenge is achieving a full-spectrum Air Defense capability to defend against enemy aircraft, cruise and ballistic missiles, swarm drones, and hypersonic threats. Strengthening multi-layered air defense systems, integrating surface-to-air missile networks, and deploying advanced radar technology will be essential for maintaining air superiority.

The integration of AI-enabled autonomous and semi-autonomous systems is also a transformational challenge. The future of air combat will be shaped by autonomous UAVs, swarm drone warfare, and AI-driven decision-making tools that can enhance operational effectiveness. The IAF must invest in AI research, machine learning algorithms, and real-time battlefield data processing to stay ahead in the next-generation warfare paradigm.

Finally, DEWs are emerging as a game-changer in modern warfare, offering the potential to neutralise missiles, drones, and aircraft with speed-of-light precision. However, challenges remain in scaling up DEWs for operational deployment, integrating them with existing defence systems, and ensuring power efficiency and mobility.

To successfully navigate these challenges, the IAF must focus on long-term force sustainability, space and AI-driven warfare capabilities, next-generation air defence systems, and cutting-edge directed energy technologies. The path to air dominance will depend on how effectively these challenges are addressed through

indigenous innovation, joint defence collaborations, and accelerated modernisation efforts.

Conclusion

Ensuring the IAF's future superiority requires a multi-pronged approach that aligns modernisation with emerging security challenges. Strengthening joint operations, accelerating procurement processes, and fostering deeper private sector collaboration will be key to sustaining long-term operational effectiveness. The evolving nature of threats underscores the need for continuous adaptation, enhanced training methodologies, and investment in disruptive technologies. While challenges remain, the IAF's transformation into a future-ready, technologically advanced air force will reinforce India's strategic autonomy and bolster its role as a dominant aerospace power in the region and beyond.

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