



### F-414 ENGINE DEAL: CHANGING STATUS AND AMCA PROJECT OF INDIA

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At the beginning of 2023, in an interview with The Economic Times, Amy Gowder, President of General Electric (GE) Aerospace Defence & Systems, stated that the US-India agreement on fighter jet engine technology is moving forward as planned and that Hindustan Aeronautics Limited (HAL) would receive a comprehensive technical proposal in a very reasonable timeframe.<sup>1</sup> On June 23, 2023, during the US visit of Indian Prime Minister, GE Aerospace issued a statement regarding the signing of a Memorandum of Understanding (MoU) with HAL, towards joint production of F414 fighter jet engines in India, precisely customised for the Indian Air Force (IAF) Light Combat Aircraft (LCA) MK-II and Advanced Medium Combat Aircraft (AMCA) projects.<sup>2</sup> The deal with GE Aerospace seemed to be moving seamlessly towards finalisation by June this year. However, in May 2024, HAL announced that GE Aerospace Defence & Systems had imposed two restrictions in the ongoing negotiations. The first restriction was that GE Aerospace Defence & Systems would retain the Intellectual Property Rights (IPR) and secondly that any export of fighter jet from India fitted with an F 414 engine would require export clearance from the US.<sup>3</sup>

#### Background

India's pursuit of self-reliance for fighter aircraft engines has been central to its objective of strategic independence in the defence sector. India is one of the few countries in the world that has developed and produced its own fighter aircraft with remarkable success; the Tejas LCA and the soon-to-be AMCA are prime examples. However, the long and difficult road towards developing Indian-made fighter aircraft engines is still far

from over. Even with a strong defence establishment, India's over-dependence on foreign suppliers for critical technologies—like aircraft engines—remains a major roadblock to the country's goal of becoming self-sufficient. India currently produces its own fighter jets, the Tejas Mk-1/1A, entirely with the assistance of foreign-manufactured engines, like the GE-F404. India's operational readiness and strategic independence are jeopardised by this dependence, which primarily exposes the country to possible sanctions, embargoes, and supply disruptions. The Gas Turbine Research Establishment (GTRE), in collaboration with HAL, had been working on the domestic GTX-37 engine since 1982 with the aim of fitting it onto the LCA. In December 1986, GTRE proposed developing the native Kaveri engine for the LCA. However, since its inception, the Kaveri engine project has faced numerous setbacks and delays, mostly due to financial and technical issues. The Kaveri program's prolonged duration, cost overruns, and inability to meet the technical requirements of the LCA forced the Indian government to delink it from the LCA Tejas program in 2008.

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## **Development of the LCA TEJAS MK 1A and the Engine**

In 1983, the government decided to replace the ageing fleet of MiG-21 fighter jets with an indigenously designed and developed new combat platform for the IAF.<sup>4</sup> The Aeronautical Development Agency (ADA) was established as a specialised organisation under the Defence Research and Development Organization (DRDO) to oversee the development of the new combat platform, initially known as the LCA before being renamed 'Tejas.' HAL was tasked with producing the LCA Tejas, while ADA was given responsibility for the platform's design. A replacement GE F404-GE-IN20 engine from GE was chosen as a suitable replacement for LCA MK-I and MK-IA as the Kaveri engine project was delinked. This engine was already in use in the Lockheed F-117 Nighthawk, Boeing F/A-18, and Lockheed Martin F-16 (some variants). Such a deal facilitated India's advancement in the LCA MK-I and MK-IA projects. Thus, in the absence of any indigenous engine, ADA had to install the GE F404 engine from the US that powers the LCA Tejas Mk 1. This engine is part of a family of afterburning turbofan engines in the class of 47 to 85 kN (10,000 to 19,000 pounds) static thrust and was found suitable for LCA Mk 1A. However, for LCA Mk 2 as well as AMCA, the IAF needed a more powerful engine capable of producing a thrust of more than 98 kN (22,000 pounds).

## **Engine for LCA Mk 2 and AMCA**

In order to replace the ageing M-2000 and MiG-29 aircraft, India plans to develop more sophisticated aircraft over the next 30 to 40 years, including the Tejas Mk-II, Advanced

Medium Combat Aircraft (AMCA), and the domestically produced Twin Engine Deck Based Fighter (TEDBF) for the Indian Navy (IN). It was obvious that a more potent and native engine was a necessary condition for this plan to succeed. Since the indigenous capability of producing a suitable engine still remained a distant dream, the government of India engaged France and the US in a suitable deal for the powerful engine to meet the IAF's requirements. During the visit of the Prime Minister to the US in June 2023, this vital need for the Indian military aerospace sector to not only acquire the much-needed engine but also to manufacture it in

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India with the possibility of obtaining some of its technology was discussed. As a result of these high-level talks, finally, the negotiations for the contract and delivery of F414-GE-INS6 commenced with an understanding of not only their production in India but also some part of Technology Transfer.

### **Present Status of Engine Deal**

In May 2024, HAL announced that while the negotiations with GE Aerospace were still underway for the F414-GE-INS6 engine manufacture in India, GE Aerospace expressed their intention to continue to retain the Intellectual Property Rights (IPR) for the engine. In addition, in case of any fighter jet export from India with a GE 414 engine, export clearance from the USA would be mandatory. This means that while HAL may be engaged in the local manufacturing of the engine, the underlying technology and proprietary would remain under the control of GE. Secondly, the US's restriction on export clearance highlights its continued strategic dominance over the application and transfer of cutting-edge technology. The HAL plans to manufacture over 400 of these engines over the next two decades, and with such limitations being imposed, India needs to re-evaluate the deal.

### **Assessment of Why this Change in Deal?**

Such developments in the ongoing engine deal should not be a surprise for India, as the 'arm twisting' deals by the US are more often the norm than the exception. The US and its major companies like GE are known to conduct their business in such shrewd ways. However, such a decision coming at this stage has its roots in many developments in India under the present strong government. A few of these reasons could be:

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(a) India, in the last ten years, has moved to the level of the world's 5th largest economy from 11th by overtaking the UK.<sup>5</sup> Obviously, the Western world, including the US, and China, would likely find it difficult to accept and might take necessary steps to impede any further growth of India in this regard.

(b) India is fast becoming self-reliant (Atmanirbhar) in various fields, including the defence sector, and is increasingly emerging as a preferred exporter in the Global South. Therefore, the US sees India as a competitor in the US-dominated arms market, posing a challenge to the business interests of US companies.

(c) It is also evident that the US is uncomfortable with the present leadership of India exerting its will in Quad on matters pertaining to the Indian Ocean Region (IOR) and refusing to 'tow' the US agenda to be a proxy against China.

(d) Post the successful conduct of the mega G-20 summit last year, where India achieved a diplomatic win by securing a joint statement in the shadow of the Russia-Ukraine conflict, the Western World (including the US) seems wary of sharing, transferring or selling any exclusive technology.

(e) The Indian government is continuing to retain its strong diplomatic relations, both with Russia and Iran, despite diplomatic efforts by the US to persuade India otherwise.

(f) The successful Indo-French deal of 36 Rafale jets seems to be another 'pain point' for the US arms lobby that was pushing for its F-16 C/D and FA-18 E/F variants against competition from Rafale, Gripen, MiG-35 and Typhoon. Further, the ongoing Indo-French Rafale-M negotiation for Indian Navy seems to be another setback to the aviation industry of US.

(g) In addition to the above-stated issues, the US may also be preparing grounds for extracting a deal in its favour in the upcoming 114 Medium Role Fighter Aircraft (MRFA) deal. The 'Make in India' MRFA deal could be linked to the manufacture of the F-414 engine with certain technology concessions as a bargaining chip.

## **Options for India**

The IAF, with its fast-depleting fighter squadron strength and remote chances of any indigenous engine development in the near future, needs to continue aircraft procurement from technologically advanced countries. After limited Rafale procurement, with the revival of Medium Multi Role Combat Aircraft (MMRCA) as 114 MRFA, the IAF needs to fast-track its decision in identifying the most suitable aircraft while the engine deal for powering LCA Mk2 and AMCA continues. Though as a counter to the pressure tactics of the US, India could explore the deal of joint engine development and manufacture with

Safran, France. Last year, both HAL and Safran signed an MoU for joint manufacturing of certain engine components for commercial aircraft.<sup>6</sup> On similar lines, the Indian government may aggressively take up the proposal for joint development of suitable engines for LCA Mk2 and AMCA. However, caution needs to be exercised in light of the recent development in the Rafale M offer from France, where France has hiked the cost of the offer to almost three times the last purchase of 36 Rafale for the IAF.

The recent ongoing conflicts between Russia-Ukraine and Israel-Hamas have brought to the fore the clear lesson that 'AtmaNirbharta' in technology and weaponry is the right way forward, and India has taken adequate measures to move forward on this path.

However, with the fast-changing threat scenarios in the Indian Ocean region (IOR) against the backdrop of emerging technologies like Artificial Intelligence (AI), Quantum computing and Hypersonic weapons, India needs to continue interim procurement of technologically advanced weapons, aircraft and support equipment to retain its edge over the adversaries and capability to safeguard the sovereignty of the nation. Undoubtedly, it's a tightrope walk for the IAF to maintain its inventory, ensuring it remains not only 'manageable' with limited variables but also equipped with the latest technology and weapons. It is evident that not too many options exist for India in terms of balancing the procurement of aircraft from foreign vendors and developing self-reliant capability in manufacturing fighter aircraft, powerful sustainable engines, and related systems. A combo deal of joint engine development with technology transfer along with procurement of fighters may reap better benefits in the present situation.

## Conclusion

India's growth story, especially in the fields of Space and defence, during the last decade, has taken the Western world by surprise and not without reason. India's unique achievement of a successful 'soft landing on the moon' by Chandrayan-3, the successful Mars 'Mangalyan' mission in space and India becoming a net exporter in defence with the Brahmos deal have placed India on the world stage as a force to reckon with. India is pushing ahead with 'AtmaNirbharta' and 'Make in India' initiatives to become self-reliant

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in defence R&D and manufacturing. The F414 engine deal towards manufacturing and technology transfer of exclusive fighter engine technology is an inescapable requirement towards achieving indigenous LCA Mk-2 and AMCA fighter aircraft production. Acquisition of technology is not an easy process, and there is a very high price to pay. The GE Aerospace defence appears to have raised stakes and restrictions in technology transfer during the ongoing negotiations of a joint engine manufacturing deal. Indian government must explore alternatives and exploit its diplomatic status to conclude a deal as soon as possible in order to meet the manufacturing and production timelines of LCA Mk-2 and AMCA.

## Notes:

<sup>1</sup> Manu Pubby, "Fighter Jet Engine Deal with India to Start this Year: GE Aerospace's Amy Gowder", *The Economic Times*, January 10, 2024, <https://economictimes.indiatimes.com/news/defence/fighter-jet-engine-deal-with-india-to-start-this-year-ge-aerospace-amy-gowder/articleshow/106676912.cms?from=mdr>. Accessed on June 02, 2024.

<sup>2</sup> Aditi Hanninamane, "Breaking Boundaries: India's Thrust towards Self-Sufficiency in Fighter Aircraft Engines through GE 414 Technology Transfer", *CESCUBE*, July 30, 2023, <https://www.cescube.com/vp-breaking-boundaries-india-s-thrust-towards-self-sufficiency-in-fighter-aircraft-engines-through-ge-414-technology-transfer>. Accessed on June 02, 2024.

<sup>3</sup> Indian Defence Research Wing, "HAL Confirms F 414 Engine won't Come with IPR", May 20, 2024, <https://idrw.org/hal-confirms-local-made-f-414-engine-wont-come-with-ipr/>. Accessed on June 08, 2024.

<sup>4</sup> Air Marshal B.K. Pandey (Retd), "Powering the LCA TEJAS MK 1A", *SP's Aviation*, n. 10, 2021, <https://www.sps-aviation.com/story/?id=3011&h=Powering-the-LCA-Tejas-MK-1A>. Accessed on June 12, 2024.

<sup>5</sup> World Economic Forum, "This Chart shows the growth of India's Economy", September 26, 2022, <https://www.weforum.org/agenda/2022/09/india-uk-fifth-largest-economy-world/>. Accessed on June 11, 2024.

<sup>6</sup> "HAL, Safran ink MoU to Manufacture Commercial Engine Parts", *BuisnessLine*, October 27, 2023, <https://www.thehindubusinessline.com/companies/hal-safran-ink-mou-to-manufacture-commercial-engine-parts/article67465591.ece>. Accessed on June 16, 2024.



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