



## India's Jet Engine Deal with the US

**For Prelims:** [LCA Tejas Mk2](#), **F414 engine**, [Defence Research Development Organisation \(DRDO\)](#), [critical technologies](#)

**For Mains:** Significance of India's efforts to achieve self-reliance in critical technologies, Potential benefits of cooperation in critical and emerging technology

### Why in News?

Recently, India has announced a significant agreement between the American multinational corporation **General Electric (GE)** and **Hindustan Aeronautics Limited (HAL)**, during Indian PM's state visit to the US. The deal involves the transfer of critical jet engine technologies and the manufacturing of **GE's F414 engine** for India's [indigenous Light Combat Aircraft \(LCA\) Tejas Mk2](#).

- This development marks a crucial milestone in **India's pursuit of advanced combat jet engine technology**.

### Note:

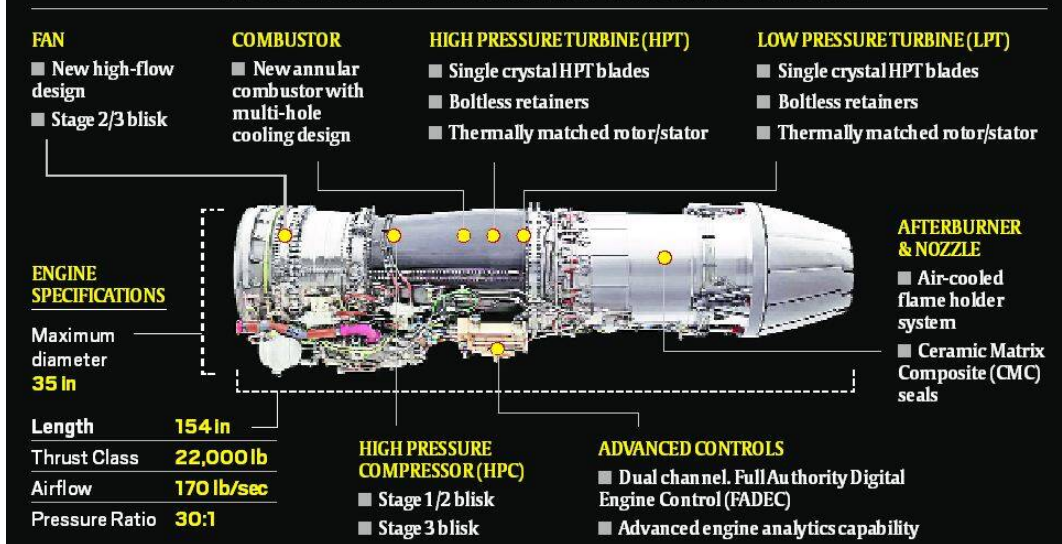
- The **India-US Defence Acceleration Ecosystem (INDUS-X)** was also launched during the ongoing visit of the PM.
- INDUS-X is meant as a platform for Indian and U.S. **start-ups and tech companies** to collaborate for the co-development and co-production of advanced technologies.

### What is GE's F414 engine?

- **About:**
  - GE's F414 engine is a turbofan engine used by the US Navy for over 30 years.
    - It is equipped with a **dual-channel full authority digital engine control (FADEC)**, a **six-stage high-pressure compressor**, an advanced high-pressure turbine, and a "fuel-draulic" system for nozzle area control.
  - It offers **exceptional throttle response, excellent afterburner light and stability, and unrestricted engine performance** when required.
  - The F414 engine has powered military aircraft in eight nations, making it a **trusted choice for modern fighter jets**.

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## INSIDE THE F414 MILITARY AIRCRAFT ENGINE



### India's Engine Requirements:

- For India, the F414 engine holds great significance, particularly in the context of the **LCA Tejas Mk2**.
  - The **Aeronautical Development Agency (ADA)** of the **DRDO** has selected the India-specific version of the engine, known as **F414-INS6**, for the **LCA Tejas Mk2**.
- This strategic decision reflects **India's aim to bolster its indigenous defence capabilities** and reduce dependence on foreign suppliers.
  - Furthermore, there are prospects of utilizing F414 engines for the **Advanced Medium Combat Aircraft (AMCA)**, India's ambitious **fifth-generation fighter aircraft**.

### What is LCA Tejas Mk2?

- The LCA Tejas Mk2 is an upgraded version of the indigenous fighter aircraft developed in India.
- It has the capability to carry **eight Beyond-Visual-Range (BVR) missiles** simultaneously and integrate both **native and advanced weapons** from other countries.
- The LCA Mk2 offers improved range and mission endurance compared to its predecessor, with a **mission endurance of 120 minutes, as opposed to 57 minutes for the LCA Tejas Mk1**.
- It is intended to serve as a replacement for the Jaguars, MiG-29s, and Mirage 2000s as they retire in the coming decade. Manufacturing has already begun, and the aircraft is expected to be rolled out by 2024.

### Why is the India-US Jet Engine Deal Significant?

#### Self-reliance in Critical Technologies:

- Manufacturing engines for combat aircraft requires advanced technology and metallurgy, which only **US, Russia, UK and France have mastered**.
  - **India**, despite its push for self-reliance in **critical technologies**, including cryogenic rocket engines, **has not been able to join this list**.
- The countries that have the technology to manufacture advanced engines for fighter aircraft have been **traditionally unwilling to share** them which is also why the deal is pathbreaking.

#### A Significant Component of iCET:

- The agreement for the transfer of technology was discussed in the talks between India's Defence Minister and the US Secretary of Defence earlier in June 2023 and was a key highlight of **India's National Security Advisor's meeting with his US counterpart**.

when the [US-India iCET](#) was operationalized.

▪ **Development Efforts by DRDO:**

- The DRDO's **Gas Turbine Research Establishment (GTRE)** initiated the development of the GTX-37 engine for the LCA, followed by the ambitious Kaveri engine project in 1989.
  - Despite the development of 9 full prototype engines and 4 core engines and extensive testing, the **engines did not meet the requirements for fighter aircraft** making this deal crucial for its defence capabilities.

▪ **End of Technology Denial Regime:**

- This pact finally lays to rest what former PM of India (in 2008) had described in as the **“technology denial regime”** imposed on India by the West, led by the US.
  - The [Nuclear Suppliers' Group's](#) waiver to the Indo-US nuclear deal marked the end of India's decades long isolation from the nuclear technology.
- This jet engine technology transfer agreement is **another one of the important milestones in this journey.**

## What are India's Recent Developments in Defence Sector?

▪ **India's Indigenous Developments:**

- Successful testing of indigenous weapons and systems, including:
  - **Rustom-2 drone**
  - [Light Combat Helicopter](#)
  - [Man Portable Anti-Tank Guided Missile](#)
  - [Agni-5 intercontinental ballistic missile](#)
  - [Advanced Medium Combat Aircraft.](#)
- Launch and commissioning of indigenous naval vessels, including:
  - [INS Karanj submarine](#)
  - [OPV Vijaya patrol vessel](#)
  - INS Dhruv nuclear missile tracking ship
  - INS Himgiri stealth frigate

▪ **India's Defence Collaboration with Other Countries:**

- Procurement and signing of contracts for defence equipment and platforms from foreign countries, such as:
  - [Barak missiles and Precision Guided Munitions from Israel](#)
  - [S-400 air defence systems from Russia](#)
  - [Rafale fighter jets from France](#)
- Aside from GE, India has been talking to other global jet engine makers for technology transfer such as **Safran SA of France** and **Rolls-Royce of the United Kingdom for the AMCA.**

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