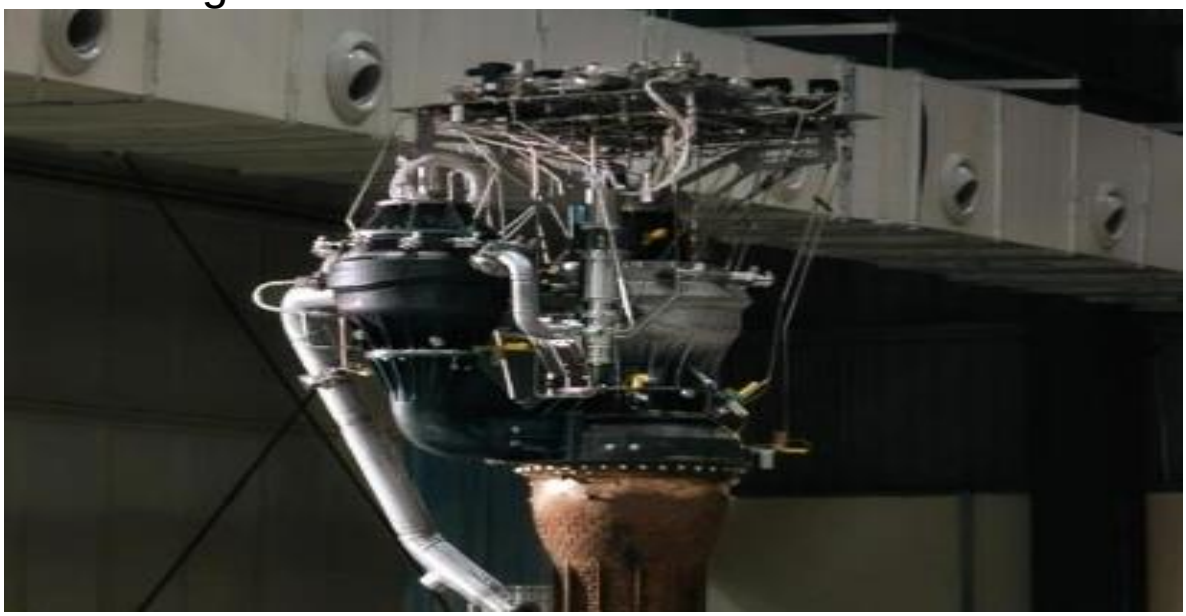
The EVEREST Rocket Engine

Context: Bengaluru-based space start-up Astrobase Space Technologies unveiled EVEREST, India's first privately built 800 kN Full-Flow Staged Combustion (FFSC) LOX-Methane rocket engine.



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- EVEREST is an indigenous, high-thrust (80-tonne class / 800 kN) liquid-propellant rocket engine that utilizes Liquid Oxygen (LOX) as the oxidizer and Liquid Methane as the fuel (a combination known as Methalox). Built using advanced metal 3D-printing technologies, it is specifically designed for next-generation, reusable medium-lift launch vehicles.

Developed By: Astrobase Space Technologies (founded in 2024 by former ISRO scientist Devakumar Thammisetty and entrepreneur Neeraj Khandelwal).

Institutional Support: Supported under the Indian National Space Promotion and Authorization Centre's (IN-SPACe) Technology Adoption Fund.

Aim: To provide high-efficiency, reliable, and clean-burning propulsion for indigenous reusable launch vehicles, unlocking medium-lift payloads of up to 30 tonnes to Low Earth Orbit (LEO) while enabling rapid launch turnaround times.

How It Works?

- **Dual Preburners**: Unlike conventional cycles, the engine routes 100% of both fuel and oxidizer through two separate preburners.
- **Turbopump Powering**: A fuel-rich preburner powers the fuel pump, while an oxidizer-rich preburner drives the liquid oxygen pump.
- **Zero Waste Efficiency**: The hot gases exiting both preburners are fed directly back into the main combustion chamber. No propellant is dumped into the atmosphere, ensuring maximum utilization and lower turbomachinery thermal stress.

Key Features:

- **High Thrust & Specific Impulse**: Delivers a maximum thrust of 800 kN (80 tonnes) with an exceptional specific impulse (approx 340 seconds), translating to superior fuel efficiency.
- **Clean-Burning Methalox Propellant**: Utilizing LOX and methane prevents soot build-up (coking) inside turbopumps and combustion chambers, greatly simplifying post-flight inspection and refurbishment.
- **Wide Throttle Control**: Features a dynamic throttling range from 50% to 110%, an indispensable capability for controlling descent speeds during vertical rocket landings and recovery operations.
- **Additive Manufacturing (3D Printing**): Components were built using India's largest industrial metal 3D printers in Bengaluru, enabling faster manufacturing cycles and complex internal cooling channels.
- **Robust Testing Roadmap**: Fully integrated hot-fire testing is slated to begin at Astrobase's private 21.5-acre test site in Anantapur, Andhra Pradesh, with plans to build and test ~20 engines prior to its inaugural orbital flight target.