

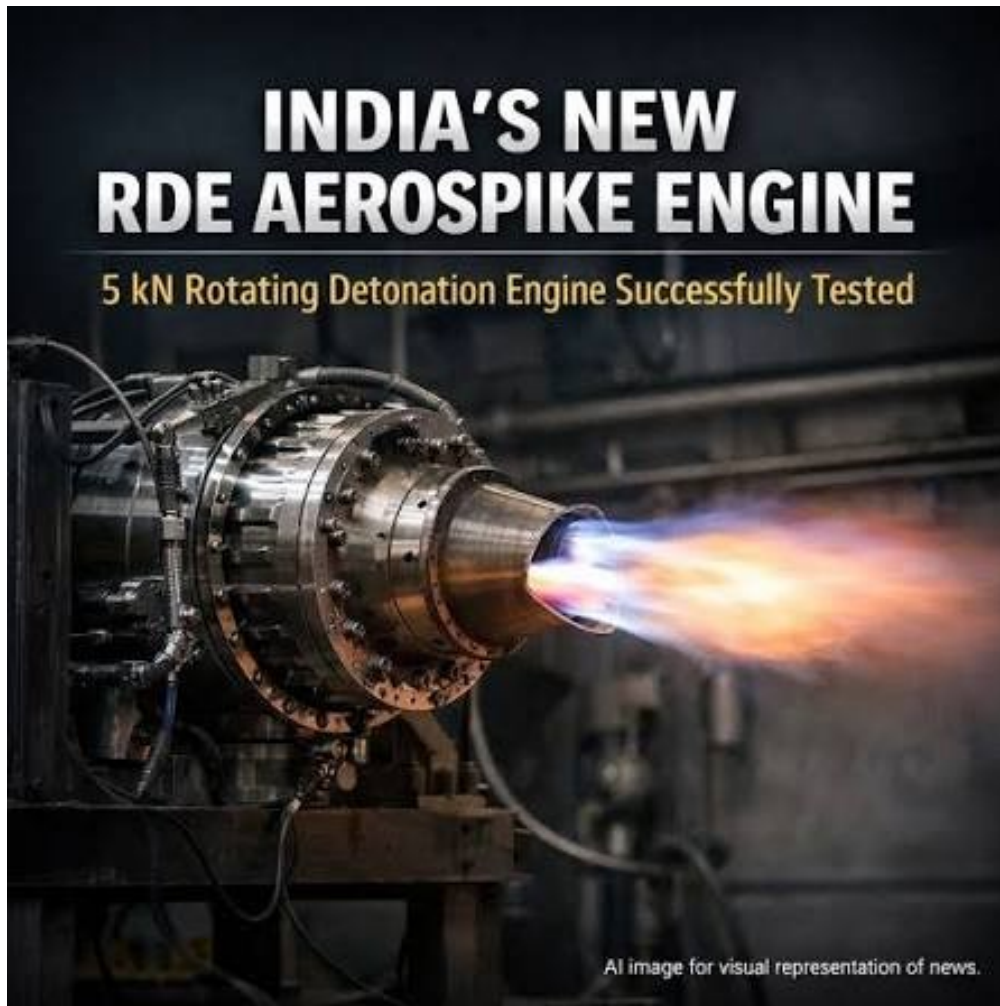
India's First Indigenous 5 kN Rotating Detonation Engine

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Why in News?

IIT Madras, successfully conducted a hot-fire test of India's first indigenously developed 5 kN air-breathing Rotating Detonation Engine (RDE) integrated with an aerospike nozzle.

- The engine achieved sustained multi-second pressure-gain combustion delivering a stable **5 kN of thrust** under operational test conditions.
- **TRL-5 Achievement** - It confirms that the engine's combustion chamber, detonation wave stability, and aerospike nozzle design can withstand realistic physical stresses.
- **Aerospike Nozzle Integration** - The integrated **aerospike nozzle** adjusts naturally to varying atmospheric pressures, providing high efficiency from sea level to high altitudes.
- **Future Target**- D-Propulse aims to develop a fully flight-ready engine by December 2027 for defence platforms, including cruise missiles, target drones, and high-speed Unmanned Aerial Vehicles (UAVs).



About Rotating Detonation Engines (RDE)

- **Working Principle** - Conventional jet engines rely on deflagration (subsonic flame propagation).
- An RDE utilizes pressure-gain combustion, sustaining supersonic detonation waves continuously rotating around an annular channel.
- **Thermodynamic Efficiency** - Delivers ***15-25% higher thermodynamic efficiency*** than traditional air-breathing systems, offering greater thrust with reduced fuel consumption.
- **Simpler Architecture** - Eliminates moving parts inside the combustor, allowing production via precision machining rather than complex turbine assemblies.

Reference

[Economic Times | India's first indigenous detonation engine](#)



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