

Hypersonic Demonstrator Vehicle Technology (HSDTV)

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Why in the news?

- DRDO recently fired the HTDV and succeeded in the maiden attempt.
- Hypersonic Technology Demonstrator Vehicle (HSDTV)– Hypersonic Technology Demonstrator Vehicle (HTDV), a DRDO initiative for both military and civil purposes.
- It's basically a scramjet-powered hypersonic vehicle.



- The only other countries that possess this technology are the US, Russia and China.
- It can cruise up to a speed of mach 6 (or six times the speed of sound) and rise up to an altitude of 32. km in 20 seconds.
- It has a range of uses, including missiles of the future, and energy-efficient, low cost and reusable satellite-launch vehicle.
- It has been developed by DRDO with Israeli, British and Russian assistance.
- Scramjet Engine Technology Demonstrator-Multi-stage satellite launch vehicles actually carry satellites into orbit, which can only be used once (expendable).
- These launch vehicles carry a thrust oxidizer (70%) along with the burning fuel.
- They're always expensive and hard to make.
- Ramjet, Scramjet and Dual Mode Ramjet (DMRJ) are the three air-breathing engine designs being developed by various space agencies that can use atmospheric oxygen during their travel through the atmosphere to

significantly reduce overall propellant consumption.

- A ramjet is an air-breathing jet engine that uses forward motion to compress incoming air for combustion without a rotating compressor.
- Gas is pumped into the combustion chamber, mixing hot compressed air and igniting.
- Ramjets operate most efficiently at supersonic speeds around Mach 3 (three times the sound speed) and up to Mach 6 speeds.
- Ramjet efficiency begins to drop when the vehicle reaches hypersonic speeds.
- A scramjet engine is an improvement over the ramjet engine as it works effectively at hypersonic speeds, facilitating supersonic combustion. Hence it's called Supersonic Combustion Ramjet, or Scramjet.
- A dual mode ramjet (DMRJ) is a type of jet engine where a ramjet transforms into Mach 4-8 scramjet, which means it can operate efficiently in both subsonic and supersonic combustor modes.