ISRO Succeeds In Reusable Launch Vehicle Mission RLV LEX

The second of five experiments that are a part of ISRO's space planes

The RLV autonomous landing mission (RLV LEX) in Chitradurga in Karnataka was successfully completed by Indian Space Research Organisation (ISRO) in cooperation with the Indian Air Force (IAF) and Defence Space Research Organisation (DRDO), marking an important milestone in the development of India's own reusable launch vehicle that is comparable to a space shuttle. The second of five experiments that are a part of ISRO's efforts to construct RLVs, or space planes/shuttles, that can go to low earth orbits to carry payloads and then return to earth for use again was the Reusable Launch Vehicle Autonomous Landing Mission (RLV LEX) test. On May 23, 2016, ISRO carried out the first experiment on the RLV-TD (HEX) mission successfully.

What is ISRO’s RLV LEX Mission?

One of the key technologies that ISRO had to show was the approach and autonomous landing of the prototype of a reusable launch vehicle on a runway. The RLV-LEX mission allowed the Indian space agency to achieve this milestone. This was the second of the technological demonstration missions for the reusable launch vehicle prototype.

What is ISRO’s RLV-TD ?

One of ISRO's most difficult technologies to build technologies for a fully reusable launch vehicle to offer affordable access to space is the RLV-TD. TThe Indian space agency's position as a supplier of reasonably priced launch services in the multibillion dollar satellite launch market would be further cemented by the new technique. The complexity of both launch vehicles and aeroplanes is combined in the RLV-TD in a manner analogous to an aircraft. With its wings, the RLV-TD is designed to act as a flying test bed for a variety of technologies, including powered cruise flight, autonomous landing, and hypersonic flight. The technology demonstrator was created by highly experienced workers employing specialised alloys, composites, and insulating materials. One of the objectives of RLV-TD is to evaluate integrated flight management, autonomous navigation, guidance and control systems, and thermal protection systems. Future upgrades to RLV-TD will enable it to function as the first stage of an Indian reusable two-stage orbital launch vehicle.

What is ISRO's Purpose in Building a Reusable Launch Vehicle?

To successfully compete in the launch market, which is now controlled by SpaceX and its

reusable Falcon-9 rockets, is the main objective of developing the reusable system. The Elon Musk-led company successfully launched 61 times in 2022 utilising its reusable technology, and it anticipates launching 100 times in 2023. A reusable launch vehicle will help ISRO succeed in this market, which it is aiming for. Testing integrated flight management, autonomous navigation, guidance and control techniques, thermal protection systems, and establishing a hypersonic aerothermodynamic characterization of the wing body are the system's primary objectives. In 2016, Isro tested the RLV-RD in flight from Sriharikota, successfully validating key technologies such autonomous navigation, guidance, and control, reusable thermal protection system, and re-entry mission management.

The Level of RLV Technology Development Worldwide

Reusable spacecraft have been around for a while; the NASA space shuttles have completed numerous human space flight missions. With the private space launch services company SpaceX showing partially reusable launch systems with its Falcon 9 and Falcon Heavy rockets since 2017, the use case for reusable space launch vehicles has resurfaced. Starship is a system of entirely reusable launch vehicles that SpaceX is also developing. With ISRO, a number of commercial launch service providers and governmental space organisations are developing reusable launch systems globally.

The Way Forward

The RLV Orbital Re-Entry Experiment (RLV ORE) milestone is what ISRO hopes to achieve now that the RLV-LEX mission is over, according to the Vikram Sarabhai Space Centre (VSSC). A winged body known as an orbital re-entry vehicle will be launched into orbit as part of this mission using an ascent vehicle adapted from the Geosynchronous Satellite Launch Vehicle (GSLV) and Polar Satellite Launch Vehicle (PSLV) stages currently in use. The orbital re-entry vehicle will orbit the Planet for a predetermined period of time before reentering the atmosphere. The vehicle will thereafter make an automatic landing using landing gear on a runway.