AVIATION WEEK Intelligence NETWORK

India Nails Landing On Lunar South Pole

Apurva Mahajan August 23, 2023

Credit: Tauseef Mustafa/AFP via Getty Images

India made history on Aug. 23 by becoming the first country to land a spacecraft near the lunar south pole and just the fourth to achieve a successful touchdown on the surface of the Moon.

The Indian Space Research Organization's (ISRO) 6.1 billion rupee ($73 million) Chandrayaan-3, the country's third lunar probe, soft landed at 8:33 a.m EDT, adding India to the list of countries to land a spacecraft on the Moon after China, the U.S. and the former Soviet Union.

This achievement comes after the partially successful Chandrayaan-2 mission in 2019, which ended when a lander and rover crashed into the Moon during the final-descent phase. The Chandrayaan-2 orbiter remains operational, surpassing its one-year design life. The spacecraft now is being used to support the follow-on Chandrayaan-3.

"This success belongs to all of humanity, and it will help Moon missions by other countries in the future," Indian Prime Minister Narendra Modi said duirng a video call with the Mission Control Center. "I am confident that all countries in the world, including those from the global south, are capable of achieving such feats."

In addition to its lunar exploration initiative, India has placed a spacecraft into orbit around Mars. Its next goal is to fly humans in space and send a probe to Venus, says Muthusamy Sankaran, director of ISRO's U R Rao Satellite Center.

To achieve its lunar landing, Chandrayaan-3's Vikram lander, which contains a 26-kg (57-lb.) rover called Pragyan and various payloads for in-situ scientific experiments, started its powered descent at about 8:15 a.m. when the spacecraft was 30 km (20 mi.) above the surface. Using a trio of engines, the spacecraft slowly lowered its altitude to 7.4 km as its velocity decreased from 1,680 m/s to 358 m/s in 690 sec., according to ISRO's livestream from the Telemetry Tracking and Command Network in Bengaluru.

After both rough and fine braking, the spacecraft entered its vertical descent phase at an altitude of 800 m and slowly reduced both its ve· and horizontal velocity until it touched down on the surface.

Chandrayaan's 40-day journey began with a launch on July 14. The spacecraft performed five Earth-bound maneuvers to raise its orbit, followed by a translunar injection burn on Aug. 1 to send it on a path toward the Moon.

Chandrayaan-3 reached the Moon four days later and put itself into orbit. The spacecraft then gradually lowered its altitude to position itself for the final phase of flight. The lander module separated from the propulsion module on Aug. 17, setting the stage for a deboost maneuver on Aug. 20 ahead of the landing attempt.

"The entire mission operation, right from launch until landing, happened flawlessly as per the timeline," Chandrayaan-3 Project Director P. Veeramuthuvel said.

India's landing came four days after Russia's Luna-25 crashed into the lunar surface during a botched attempt to touch down near the Moon's south pole. Chandrayaan-3 is designed to operate for one lunar day, the equivalent of two weeks.

INDIAN SPACE RESEARCH ORGANIZATION (ISRO)

Copyright © 2023. All rights reserved. Informa Markets, a trading division of Informa PLC.