

Indian spacecraft on course to enter Mars orbit (Update)

September 23 2014, by Katy Daigle



In this Sept. 11, 2013, file photo, Indian engineers work on the Mars orbiter spacecraft at the satellite center of Indian Space Research Organization (ISRO) in Bangalore, India. The Indian spacecraft is due to slip into Martian orbit Tuesday, Sept. 23, 2014 (Wednesday morning in India). It's India's first interplanetary mission, and no nation has been fully successful getting to the red planet on its first try. (AP Photo/Aijaz Rahi, File)

India will soon know if its first interplanetary mission will achieve its goal, when a spacecraft built with homegrown technology for a

remarkably low price tag of \$75 million begins its final maneuvers into orbit around Mars.

If the Mars Orbiter Mission, affectionately nicknamed MOM, takes its position on Wednesday as planned, India will join the U.S., the European Space Agency and the former Soviet Union in the elite club of Martian explorers.

The next few hours will be crucial as the Indian Space and Research Organisation commands a series of maneuvers to position the spacecraft in its designated orbit around the red planet.

Reaching Mars orbit would mark a milestone for India's space program in showing the world that it's capable of complex missions and could reliably act as a launching pad for commercial, navigational and research satellites.

"We have to excel," space agency chief K. Radhakrishnan said.

Succeeding would also mark a major feat for the developing country of 1.2 billion people, most of whom are poor. At the same time, India has a robust scientific and technical educational system that has produced millions of software programmers, engineers and doctors, catapulting many into the middle class.

More than half the world's previous attempts—23 out of 41 missions—have failed, including one by Japan in 1999. The United States had its first success with a 1964 flyby by a spacecraft called Mariner 4, returning 21 images of the surface of the planet. The former Soviet Union reached the planet in 1971, and the European Space Agency in 2003.



In this Nov. 5, 2013 file photo, the Polar Satellite Launch Vehicle (PSLV-C25) rocket lifts off carrying India's Mars spacecraft from the east-coast island of Sriharikota, India. With home-grown technology and a remarkably low budget of about \$75 million, India could become the first nation to conduct a successful Mars mission on its first try. If the Mars Orbiter Mission, or MOM, settles into orbit in the morning Wednesday, Sept. 24, 2014, as planned, the country will join the U.S., European Space Agency and the former Soviet Union in the elite club of Martian explorers. (AP Photo/Arun Sankar K, File)

India's space scientists were giddy on Monday when the orbiter reached the outer sphere of Mars' gravitational pull. The craft's main liquid engine fired successfully after being dormant for 300 days as the spacecraft traveled 666 million kilometers (413 million miles) since leaving Earth's gravitational sphere on Dec. 1.

"The spacecraft is healthy. It has completed 98 percent of its journey to Mars," Radhakrishnan said. The Indian space agency confirmed that MOM had a "perfect burn for 4 seconds as programmed" that adjusted its trajectory.

Prime Minister Narendra Modi, who planned to witness the satellite's final insertion into orbit from the agency's command center in Bangalore, arrived in the southern city on Tuesday night.

The 1,350-kilogram (nearly 3,000-pound) orbiter would join NASA's Mars Atmosphere and Volatile Evolution mission, or Maven, which reached its position around the red planet on Sunday at a cost of \$671 million—nearly 10 times MOM's cost.

Maven's chief investigator, Bruce Jakosky of the University of Colorado, said the U.S. team was rooting for the Indian mission. "We're sending them the best wishes from the entire Maven team," he said Monday.

There are three more satellites already circling the planet—NASA's Mars Reconnaissance Orbiter and Mars Odyssey, and the ESA's Mars Express. On the Martian surface, NASA's Curiosity and Opportunity rovers are rolling across rocky terrain.



In this Nov. 5, 2013 file photo, Indian Space and Research Organization Chairman, K. Radhakrishnan, poses for the media with a model of the Mars orbiter after its successful launch at Sriharikota, India. With home-grown technology and a remarkably low budget of about \$75 million, India could become the first nation to conduct a successful Mars mission on its first try. If the Mars Orbiter Mission, or MOM, settles into orbit in the morning, Wednesday, Sept. 24, 2014 as planned, the country will join the U.S., European Space Agency and the former Soviet Union in the elite club of Martian explorers. (AP Photo/Arun Sankar K, File)

India has said the spacecraft—also called Mangalyaan, meaning "Mars craft" in Hindi—is chiefly meant to showcase the country's ability to design, plan, manage and operate a deep-space mission. Already, India has successfully launched a lunar orbiter, Chandrayaan-1, which discovered key evidence of water on the Moon in 2008.

MOM's scientific goals include using five solar-powered instruments to gather data that will help determine how Martian weather systems work and what happened to the water that is believed to have once existed on Mars in large quantities. It also will search Mars for methane, a key chemical in life processes on Earth that could also come from geological processes.

None of the instruments will send back enough data to answer these questions definitively, but experts say the data will help them better understand how planets form, what conditions might make life possible and where else in the universe it might exist. Some of the data will complement research expected to be conducted by Maven.



In this Nov. 5, 2013, file photo, a rocket carrying the Mars orbiter takes off from

the east-coast island of Sriharikota, India. The Indian spacecraft is due to slip into Martian orbit Tuesday, Sept. 23, 2014 (Wednesday morning in India). It's India's first interplanetary mission, and no nation has been fully successful getting to the red planet on its first try. (AP Photo/Arun Sankar K, File)

The spacecraft is expected to circle the planet for at least six months, following an elliptical orbit that gets within 365 kilometers (227 miles) of the planet's surface at its closest and 80,000 kilometers (49,700 miles) at its farthest.

Radhakrishnan said that while the space agency hopes to soon put a rover on the Moon and to launch another space mission to study the Sun, its main focus will remain developing technologies for commercial and navigational satellite applications.

More information: Indian Space and Research Organization:
www.isro.org/

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