SpaceX poised for high-stakes space station launch

May 17 2012, by Kerry Sheridan

SpaceX on Saturday aims to become the first private company to send its own cargo ship to the International Space Station, a feat that only a handful of world governments have pulled off.

The high-stakes mission is scheduled to begin before dawn Saturday (4:55 am, 0855 GMT) with the launch of the unmanned Dragon spacecraft aboard a Falcon 9 rocket from Cape Canaveral Air Force Station in Florida.

The bid, if successful, would catapult the company owned by billionaire Internet entrepreneur Elon Musk even further ahead in the race to fill the void left by the shuttle program's end last year and restore America's access to space.

If not, it would be a setback for SpaceX, one of several companies working to build and launch a spacecraft that could tote astronauts to the ISS by 2015, and the first to attempt a cargo mission as a precursor to a manned flight.

"The attention given to this flight creates a set of high expectations and it's still a test flight but the consequences of failure would be very serious," said John Logsdon, space policy expert at George Washington University.

"NASA is putting a big bet on this succeeding."

SpaceX has so far received $381 million from NASA as part of a multi-year $1.6-billion contract to develop the capability to carry cargo to and from the ISS.

NASA has struck a similar deal with a second company, Orbital Sciences, though it has yet to attempt its first cargo mission.

The final flight of the US space shuttle program in 2011 ended a 30-year era of US dominance in human spaceflight and left Russia as the only nation capable of transporting both astronauts and cargo to the International Space Station.

SpaceX is already further ahead than any of its other competitors in the private space race, which also include aerospace giant Boeing, the Nevada-based Sierra Nevada Corporation, and Washington state-based BlueOrigin LLC.

In 2010, SpaceX became the first commercial enterprise to successfully launch its space capsule into low-Earth orbit and back for a safe ocean recovery.

It has also been able to develop the Falcon 9 rocket launch vehicle at a third of the cost -- $1.7 billion -- it would have been for the US space agency to do the same -- $4 billion -- according to a NASA/Air Force Cost Model analysis.

"They are playing with their own money and they have real incentives to hold down costs," said Howard McCurdy, an author and space policy expert at American University in Washington.

"SpaceX is in the lead but whether or not they are going to wind up in the lead at the end, we don't know, that's what makes it fascinating to watch," he told AFP.

"It's like the Kentucky Derby. The winner may be halfway back. We are just going around the first turn right now."

If Saturday's launch is successful, the Dragon will attempt a fly-under of the orbiting lab at a distance of about 1.5 miles (2.5 kilometers) three days later, followed by a berthing bid with the ISS on day four of the mission.

Astronauts already aboard the ISS will use the space station's robotic arm to capture the gum-drop shaped Dragon capsule as it approaches and help it latch on, a high-precision maneuver given that both the lab and spacecraft are orbiting the Earth every 90 minutes.

On day five, astronauts already at the ISS will unload cargo from the Dragon and restock it with supplies to carry back to Earth.

After a two-week stay in space, the Dragon aims to return to Earth for a safe splashdown in the Pacific Ocean off the coast of California.

If weather or other reasons prevent Saturday's liftoff, another opportunity for launch opens on May 22.

In addition to Russia, the space agencies of Japan and Europe also operate cargo ships to the ISS.

Key facts about SpaceX

Space Exploration Technologies is about to become the first private company to attempt to send its own cargo capsule to the International Space Station and back.

Here are some key facts about the company, known as SpaceX, and its mission.

SPACEX

SpaceX was founded in 2002 by billionaire Internet entrepreneur Elon Musk, the co-founder of PayPal. Musk is also currently the chief executive officer of Tesla Motors which builds and sells electric cars.

The Hawthorne, California-based company's mission is "to revolutionize space transportation in order to eventually make it possible for people to live on other planets."

SpaceX employs more than 1,700 people, including a number of former NASA astronauts.

Launch facilities are at the Cape Canaveral Air Force Station and Vandenberg Air Force Base; rocket development facility in McGregor, Texas; and offices in Chantilly, Virginia and the US capital, Washington.

ROCKET

The two-stage Falcon 9 rocket stands at a height of 48.1 meters (158 feet) with the Dragon space capsule on top, and is capable of producing one million pounds of thrust in a vacuum.

All structures, engines, avionics and ground systems are designed, manufactured and tested in the United States.

It is named after the Millennium Falcon, the personal spaceship of the Star Wars characters Han Solo and Chewbacca.

The rocket is powered by nine Merlin engines in the first stage and one in the second stage.

Falcon 9 is powered by liquid oxygen and rocket grade kerosene.

Its first successful launch was on June 4, 2010, followed by a second on December 8, 2010.

SPACECRAFT

Dragon is a reusable spacecraft that was built to carry and return both astronauts and cargo to the International Space Station.

The white capsule stands 4.4 meters (14.4 feet) high and is 3.66 meters (12 feet) in diameter. With its two solar array wings extended, the span is 16.5 meters (54 feet) wide.

Dragon can carry over 3,310 kilograms (7,297 pounds) split between pressurized cargo in the capsule and unpressurized cargo in the trunk.

On this mission, it will carry 521 kilograms (1,148 pounds) of cargo for the space lab and will also aim to return a 660 kg (1,455 lb) load to Earth.

Dragon is also built to carry up to seven astronauts to the ISS on future missions.

The capsule is maneuvered by 18 Draco thrusters powered by nitrogen tetroxide/monomethylhydrazine propellants.

It is protected by the most powerful heat shield in the world, designed in cooperation with NASA and made of a material called PICA-X.

In December 2010, it became the first private spacecraft to reach orbit and back -- a feat previously achieved by only the governments of Russia, the United States and China.

ISS MISSION

May 19: A single, instantaneous launch opportunity from Cape Canaveral Air Force Station is set for 4:55 am (0855 GMT). If that cannot be met, a second opportunity arises on May 22.

May 21: A flyby of the International Space Station is planned for the early morning hours. Live NASA TV coverage begins at 2:30 am (0630 GMT).

May 22: Live coverage of the rendezvous and berthing of the Dragon spacecraft to the ISS begins at 2 am (0600 GMT).

May 23: Live coverage of the hatch opening and entry of the Dragon spacecraft begins at 6 am (1000 GMT).

After about two weeks, the ISS crew will detach it from the space station, and the Dragon will perform a series of engine burns that will move it away from the orbiting lab.

About five hours later, the Dragon should reenter the Earth's atmosphere and splash down in the Pacific Ocean, about 450 kilometers (250 miles) off the West Coast of the United States.

NASA TV is viewable at: www.nasa.gov/multimedia/nasatv/index.html