

# SpaceX readies ambitious ISS launch

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The Space X Falcon 9 rocket heads for space after lifting off from Pad 40 at Cape Canaveral in 2010 in Florida, on its first test flight. The weather forecast was largely favorable Friday as SpaceX prepared to launch its Dragon capsule on a bid to become the first private spacecraft to reach the International Space Station.

California-based company SpaceX was poised to launch its Dragon capsule to the International Space Station Saturday in what may be a historic mission for private spaceflight.

The blastoff of SpaceX's Falcon 9 rocket, carrying the unmanned Dragon and over half a ton of cargo toward the orbiting lab, was scheduled for 4:55 am (0855 GMT) from Cape Canaveral Air Force Station in south Florida.

"The fuel is loaded, everything is looking good," said NASA spokesman Michael Curie. At a meeting 60 minutes before the flight, launch managers found "no weather issues that would prevent liftoff," the US space agency said.

The launch marks the first-of-its kind attempt to send a privately built spacecraft to the research outpost, where it plans to do a fly-under followed by a berthing in the coming days.

Until now, only the space agencies of Russia, Japan and Europe have been able to send supply ships to the ISS.

The United States had that capacity too, with its iconic space shuttle that long served as part astronaut bus, part delivery truck for the lab.

But the 30-year shuttle program ended for good in 2011, leaving Russia as the sole taxi for astronauts to the ISS until private industry could come up with a replacement.

SpaceX is the first of several US competitors to try sending its own cargo-bearing spacecraft to the ISS with the goal of restoring US access to space for human travelers by 2015.

The company made history with its Dragon launch in December 2010, becoming the first commercial outfit to send a spacecraft into orbit and back.

"If successful, there is no doubt this is a historic flight," said SpaceX president Gwynne Shotwell. "We really stand in awe of the opportunity to attempt this."

However, she acknowledged that even if liftoff goes as planned, many complicated and risky maneuvers lie ahead as the Dragon attempts to

berth with the space outpost, which has six astronauts on board.

"I think we are going to be biting off our fingers between now and hour 75," she said, referring to the time span between Saturday's launch and berthing, scheduled for Tuesday.

Another key hurdle is the near-instantaneous launch window, which, if not met within seconds, would force the mission to be postponed until May 22, 25 or 29, Shotwell said. Slightly less favorable windows also open on May 23 and 26.

SpaceX founder Elon Musk, an Internet entrepreneur, billionaire and cofounder of PayPal, has publicly fretted over the complicated matter of latching on to the space station, which he described as moving faster than a speeding bullet.

"The space station is zooming around the Earth every 90 minutes, and it is going 17,000 miles (27,000 kilometers) an hour," he told reporters in April.

"So you have got to launch up there and you've got to rendezvous and be backing into the space station within inches really, and this is something that is going 12 times faster than the bullet from an assault rifle. So it's hard."

However, the 40-year-old vowed to keep fans posted by "tweeting live from mission control during launch," for those who follow his Twitter handle, @elonmusk.

Speaking to reporters on Friday, NASA's acting director of Commercial Spaceflight Development Phil McAlister played down expectations for the flight.

"This is a test flight. NASA views test flights primarily as learning opportunities," said McAlister.

"If it gets us in a better posture to fly next time, that is a good thing."

SpaceX has benefited from NASA dollars in its quest but has also poured its own money into the endeavor.

SpaceX and Orbital Sciences Corporation both have billion-dollar contracts with NASA to supply cargo to the ISS in the coming years, and they get NASA funds in exchange for meeting key milestones in their projects.

NASA has given SpaceX about \$390 million so far of the total \$680 million SpaceX has spent on cargo development, Shotwell said.

SpaceX also gets funding from NASA on a separate effort to develop a commercial crew vehicle for carrying astronauts to space, along with competitors Blue Origin, Boeing and Sierra Nevada.

In a few years' time, Shotwell said she hopes SpaceX will be able to undercut the hefty price NASA pays Russia for US astronauts to get a seat aboard the Soyuz space capsule -- around \$63 million a ticket.

With seven seats aboard the Dragon capsule, she said SpaceX could someday offer that to NASA for \$140 million per mission -- about \$20 million per seat.

## **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."

The company aims to be able to send people to space aboard its Dragon spacecraft by 2015.

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-kilogram (1,455-pound) 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.

## 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. Other favorable dates are the 25 and 29, though there is a chance of launch on May 23 or 26 as well.

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](http://www.nasa.gov/multimedia/nasatv/index.html)

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