

## American Launch: SpaceX Dragon-2 Demo Flight

27 May 2020 4:33pm EDT first attempt

**30 May 2020 3:22 pm EDT “America has launched”**



Joining the live coverage of the first launch attempt I was impressed to see the two Tesla “wing-door” crew transporter vans delivering the two astronauts Doug Hurley and Bob Behnken to the historic launch pad 39A “in style”, to be lifted on top of the Falcon 9 launch vehicle through an airport-like “gangway” and strapped into their custom tailored seats and finally sealed in airtight.

Falcon 9 is a two stage launch vehicle built by the Elon Musk’s private company SpaceX. Demonstrating the Public Private Partnership (PPP), the Falcon 9 first stage carries the NASA “worm logo”. Both, the Falcon 9 first stage and the Dragon crew capsule are reusable.



Falcon 9’s first stage will be guided back to Earth to touch down under its own power minutes after separation from the second stage to hover down vertically on a SpaceX provided pontoon platform to be secured and refurbished and used again.

The Dragon crew capsule will be recovered after a parachuted splash down to be reused for further flights. Recovery of crew and capsule by a specialized ground team is possible at 2 different sites by two new identical ships provided by SpaceX in the Atlantic and the Gulf of Mexico.

In the so called “white room” the crew is supported by three engineers dressed in futuristic black suits, rather than the usual white clean room suits. This close out team looks more like the “frog-man” outfit used for capsule recovery. The spaceship looks very roomy and sports a stylish interior design.



*Doug Hurley and Bob Behnken during launch countdown looking at the 3 touchscreens*

Except the astronauts were in a laying position, they could have been seated at a control room console. In front of them is an array of three big touch screens, displaying all necessary information and procedures, a row of push-buttons in easy reach is arranged below the screens. The flight is performed by the two astronauts Doug Hurley (commander, left seat) and Bob Behnken (joint operations commander, right seat) but the capsule is designed for a total crew of seven.

The two astronauts are clad in their white and black launch and re-entry “Star-Suits” the most modern custom tailored SpaceX design of suits, which go very well with the 3-D printed white helmets and the white and black interior design of the capsule. The suits can be pressurized, provide breathing, cooling and communications and are designed as “suit integrated seat” i.e., the astronauts simply plug in their umbilical cords into their seats and are all set.



Contrary to previous escape systems, Dragon uses a “push-system”: eight Super-Draco abort engines distributed around the lower skirt of the capsule are able to separate the capsule from the rest of the rocket within seconds and enables the crew to either come back to Earth via parachute or abort to orbit. This capability was demonstrated by a real life test with an unmanned capsule, exploding the Falcon 9 rocket right after lift-off.

As one of the NASA commentators explained in an interview with Elon Musk, one of the goals of flying into space and to the ISS from American soil again would be to inspire kids with the “space access dream” and could possible also ignite the inspiration for “kids to become the Elon Musk of the next generation.”

Another goal is to bring cost down with the now available new reusable Falcon 9 rocket and the spaceship to enable interested commercial or private paying customers to participate in spaceflight. This will be the beginning of the “commercial crew ,program” marked by this first launch as one of the commentators pointed out. The commercial crew development program was started by Mike Griffin, the legendary NASA Administrator (2005-2009) in 2006 with the Commercial Orbital Transportation Services (COTS) program, to develop and outsource the responsibility for transporting astronauts to and from the ISS by a commercial company under NASA contract.

The launch attempt on May 27 was cancelled 17 min before the actual lift off time with both stages already fueled due to bad weather conditions.

The second launch attempt on May 30, 2020 was threatened by weather conditions again, however after a smooth run through the launch countdown and fueling procedures, at 3:22 pm EDT the commander Doug Hurley finally in a cool voice could decided: “light the candle” – and the crew Dagon spaceship was blasted into a new and revived era of human spaceflight.



After approximately 19 hours after launch the spaceship flew and docked automatically to the ISS, but its manual override capability, which can be initiated by the astronauts or from the ground was extensively exercised by the crew before the smooth automatic docking of the Dragon-2 capsule to the ISS at around 11:00 a.m. EDT on May 31, 2020 occurred.

As can be seen in the image above the Dragon crew capsule, also known as “Endeavour”, is attached to a service module, the trunk (left), which will be jettisoned before re-entry. The upper half of the trunk is covered with solar cells (appearing black), powering the capsule systems. The lower half acts as radiator, dissipating and rejecting heat into to space. Ground control is provided throughout the powered flight primarily by the SpaceX Core Team at Hawthorne Cal., and the launch team at Kennedy Space Center (KSC). Houston JSC is handling all joint operations with the ISS.

Hatch opening finally occurred after safe mode configuration of the Dragon-2 capsule on May 31, 1:02 p.m. EDT.

The new arrivals were greeted enthusiastically by the ISS crew Chris Cassidy, Ivan Vagner and Anatoly Ivanishin, congratulations followed in an official ceremony lead by NASA Administrator Jim Bridenstine at JSC Houston.

Since the retirement of the Shuttle (STS) launch system in 2011 the only access of international crews to the ISS was by buying available seats on the reliable Russian Soyuz launch system.

With this successful Dragon-2 test flight (“American Launch”) America is back after more than nine years being able to again launch astronauts from American soil into space and return them safely to Earth.

Well done Elon Musk and NASA!



*Hatch open view from the astronauts seat inside the Dragon-2 capsule (left).*

*Hatch opening preparation as seen from inside the ISS (right)*



*ISS crew with the two new arrivals: Chris Cassidy (station commander, middle), Ivan Vagner and Anatoly Ivanishin (left), Doug Hurley and Bob Behnken (right)*

## References

[1] NYT: <https://www.nytimes.com/2020/05/27/science/spacex-launch-nasa.html>

[2] NASA live stream: <https://www.youtube.com/watch?v=pyNI87mXOkc>