

# SpaceX's historic Falcon Heavy successfully launch

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On 6 February 2018 the gigantic rocket built by the private spaceflight company SpaceX<sup>1</sup> of billionaire Elon Musk<sup>2</sup> successfully lifted off for the first time. It was launched from the historic 39-A launch pad of Cape Canaveral, Florida, traditionally used for the Apollo missions and for the Space Shuttle.



An estimated 100,000 spectators crowded the area's beaches and roadways to watch the rocket launch. Millions more watched the event on livestream through the web and mobile devices.

**Falcon Heavy** is basically made up of three Falcon 9 rockets combined. Because of the high probability of failure of the mission, it was chosen to bring to space a "dummy payload", a demonstrative payload, purely "symbolic", consisting of a red battery electric vehicle (BEV) sports car Tesla Roadster – the electric car manufactured by Elon Musk's other company, Tesla – which thus became the first consumer car in history to be launched into space.

Sitting in the driver seat is a spacesuited mannequin called "Starman".

The red colour intentionally alludes to the Red Planet, as the car will be sent around the sun in an elliptical orbit that will extend farther than Mars' orbit. It is however not supposed to land on Mars or on any planet, also to avoid their harmful contamination with terrestrial bacteria.

Considered in many respects to be the successor of the Saturn V (the most powerful rocket ever), Falcon Heavy is the most powerful booster in operation and is twice as powerful as its nearest competitor, the Delta IV Heavy, built by United Launch Alliance.

It is 230 feet tall (70 metres) and can lift nearly 141,000 lbs. (64 metric tons) of payload to low Earth orbit and 16 to the Red Planet.



<sup>1</sup> SpaceX was founded in 2002, backed by Musk. After successfully developing and flying the Falcon 1 rocket, SpaceX received funding from NASA to develop a spacecraft — the Dragon capsule — that, in 2012, became the first commercial (nongovernment) spacecraft to bring cargo to the International Space Station. To get to space, the Dragon required a heavier-lift rocket called the Falcon 9, which SpaceX developed and then first flew in 2010.

<sup>2</sup> Elon Musk (born June 28, 1971 in Pretoria, South Africa) is founder and CEO of many successful American companies: beside SpaceX (Space Exploration Technologies Corporation), SolarCity and Tesla Motors, he also was co-founder of **Paypal**, the digital payment and money transfer system most used in internet worldwide, that in 2002 was acquired by **eBay** for 1,5 billion dollars.

The rocket has two stages. The first stage has three engine cores (each core being equivalent to the first stage of a Falcon 9 rocket and houses nine engines), with a total thrust of approx. 23000 kN, at sea level.

The two side boosters separated after liftoff and, on February 6, 2018, in a sort of choreographic cosmic ballet, landed back on Earth returning simultaneously at adjacent ground “landing zones” located where it used to be the former Launch Complex 13 of Cape Canaveral Air Force Station, near the Kennedy Space Center.

*Cover commemorating the return of the Falcon Heavy's two side boosters.*

These boosters were already used once: the first was used in May 2016 to put in orbit the Thaicom 8 telecommunication satellite, the second in July 2016 had brought into space the Dragon spacecraft for the CRS-9 cargo mission to the International Space Station.

The central core booster, which was supposed to land on offshore drone ship OCISLY (*Of Course I Still Love You*), missed its target by 100 metres (328 feet) because two of its three engines had failed to fire, and crashed in the Atlantic Ocean at 484 kilometres (300 miles) per hour, and damaged the drone ship.

The first launcher provided with extendable landing legs was, on April 18, 2014, the one that put in orbit Dragon CRS-3, for an ISS cargo mission.

*Cover commemorating the return of the Falcon 9 booster that on August 14, 2017 put in orbit the CRS-12 cargo for the ISS resupply.*



Altogether 24 first stages have successfully soft-returned back to Earth so far and SpaceX is the only spaceflight organization to achieve such a feat in history.

Rocket reusability is for SpaceX an important goal, aiming at lowering the costs of accessing to space. Approximately a SpaceX launch costs 90 million US\$, compared with 350 of the competitors for bringing into space a similar mass. The goal of Musk is to develop a set of new technologies for an orbital launch system that may be reused many times in a manner similar to the reusability of aircraft.

Together, the booster stage and the fairing make up approximately 80 percent of the cost of a launch, with fuel and oxidizers representing 1% of the total cost.

According to Musk "the potential cost reduction over the long term is probably in excess of a factor of 100".

In the next years SpaceX plans to develop the Big Falcon Rocket (BFR), a system that will double the power of the Falcon Heavy. According to Musk, BFR could be used to quickly transfer hundreds of passengers to the opposite side of the world. And then be used to go to Mars.



*SpaceX completed the Falcon Heavy's final static-fire test on January 24th 2018. This was the first time that 27 Merlin engines were tested together*

### **Acknowledgements.**

The covers featured in this article have been produced by the friend Gus Kathman (St. Paul, MN, USA) and is possible to find them – together with other items – by visiting his eBay shop at [www.ebay.com.sg/sch/aquilared/m.html](http://www.ebay.com.sg/sch/aquilared/m.html)