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Space

Starship launches, then explodes

A test of SpaceX's biggest rocket didn't quite go as planned

Leah Crane

STARSHIP has finally launched, but it didn't go smoothly. The SpaceX rocket, the biggest and most powerful to ever fly, lifted off from the Starbase launch facility in Texas on 20 April in its first full test. Shortly after liftoff, it exploded.

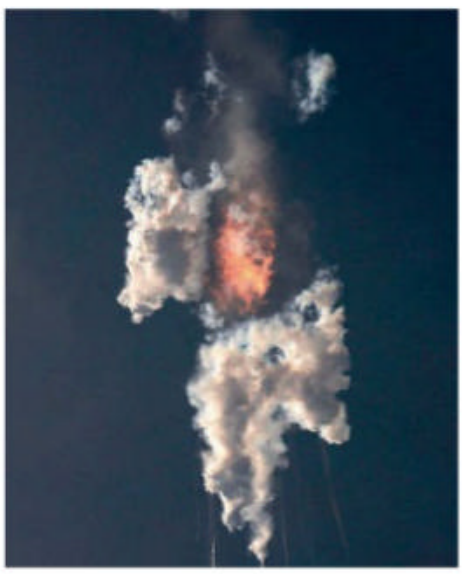
It has been a long road for Starship – testing of smaller prototypes since 2019 saw a few successful "hops" of up to 10 kilometres in altitude, but also four malfunctions, three of which resulted in the destruction of the prototypes.

Those tests were all prototypes of the eponymous top part of Starship, the piece of the craft that is planned to eventually house astronauts. The bottom part, called the Super Heavy booster, houses the 33 Raptor engines that propelled Starship off the launchpad.

But less than 5 minutes after liftoff, something went wrong. At that point, Starship and Super Heavy were intended to separate, with Super Heavy splashing back down in the Gulf of Mexico and Starship continuing onward for a 90-minute flight. They didn't separate, and the whole spacecraft began to tumble. Then, it exploded.

"I don't think anybody, Elon Musk included, expected this launch to go perfectly," says space analyst Laura Forczyk. Musk is the CEO of SpaceX. "I would have been shocked if it had been 100 per cent successful this first time," she says.

SpaceX's Starship takes off on 20 April (left) then explodes (right)



L: JONATHAN NEWTON/WASHINGTON POST/; REUTERS/JOE SKIPPER/ALAMY

The explosion occurred when the spacecraft was attempting to rotate so that Super Heavy could return to the ground upright, which has never been done before.

The cause of the tumbling and explosion isn't clear, and SpaceX will have to figure that out before the firm can decide what its next steps are. There were some issues with pressurisation, which caused the first launch attempt on 17 April to be cancelled and a brief delay in the 20 April launch, but it is unclear whether those could be related to the failure of Starship and Super Heavy to disconnect from one another.

"SpaceX is going to determine what went wrong, they are going to improve on the process and they are going to try again. I think we should expect to see multiple tests this year," says Forczyk. "They have many customers that are waiting on this rocket – they have NASA, they have private customers, they have other government interest, so there's a lot waiting on this rocket becoming operational."

Despite the explosion, the test wasn't a complete failure. It demonstrated that Starship can get off the ground, which wasn't a given. "I don't see any reason why today's failure would be a major setback," says Forczyk.

This test flight was the first big step in SpaceX's journey to other worlds. Starship has two crewed flights tentatively planned for later in 2023, and it is intended to carry humans to the moon and eventually Mars, but it will presumably have to be tested further for safety first. ▮

Technology

Edible computer chips could guide robots in the body

MEDICAL robots controlled by edible computer chips could deliver drugs inside the body.

Soft robots that can operate inside the human body are a busy area of research, but they tend to be remotely controlled from outside the body with magnets. Simple computers made from flexible tubes and devices that operate hydraulically – known as microfluidic computers – have been in development for some time to give these robots more complex abilities, but they tend to be made from materials that can't be digested, such as silicon.

Shuhang Zhang at the Swiss Federal Institute of Technology Lausanne and his colleagues are investigating how to create those same designs from material that is safe to eat.

They created a single NOT logic gate – one of the fundamental building blocks that all computer chips are made of – from ethyl cellulose, which is commonly used to create the shell of pills. In the right combination and number, such gates could be used to build simple computers.

A NOT gate takes an input and converts it into the opposite value. The team's prototype gate has two input tubes: one that provides a continuous flow of pressure, like a power supply, and another that represents the data input. When a high-pressure input is supplied – representing a 1 inside a classical computer – a valve is forced shut and the output tube has a low pressure, representing a 0. When a low-pressure input is supplied, representing a 0, the valve opens and the logic gate produces a high-pressure output, representing a 1 (arXiv, doi.org/j668).

"Our target is to build something that could be swallowed that works inside our body"

"Our target is to build something that works outside the body, and after that something that could be swallowed – but not chewed, to keep the integrity of the structure – that works inside our body," says Zhang. ▮

Matthew Sparkes