

SpaceX hops a full-scale Starship prototype for the second time

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SN6 150-meter hop.

Less than one month ago, SpaceX blasted a full-scale prototype of its Starship vehicle to an altitude of 150 meters above South Texas before returning it safely to the ground. On Thursday, the company did it again with the latest version of the vehicle, dubbed Serial Number 6, or SN6.

As outdoor temperatures soared into the mid-90s Fahrenheit shortly after noon, the prototype was loaded with liquid methane and liquid oxygen before igniting its single Raptor engine. This engine, situated off-center, powered the vehicle at a slight angle into the sky, where it moved several dozen meters laterally before descending and coming to rest near the launch stand.

These test flights represent significant technical achievements, as they involved testing out the large, complex plumbing systems for Starship's fuel tanks and rocket engine as well as pushing the thrust vector control system of the Raptor engine in flight.

Now that SpaceX has completed two relatively short hops, the

company's engineers have demonstrated basic control of the vehicle. The time may have come to go higher. SpaceX founder Elon Musk has said the company may attempt several intermediate hops before proceeding to a 20km test flight.

Starting with a factory

These test flights follow an intense period of development work. After a spending more than half a year scaling up its factory operations in South Texas—the company is building spaceships only about two miles from its launch pads near Boca Chica Beach—SpaceX appears to have found its groove as it follows an iterative design philosophy.

SpaceX first hopped its smaller prototype, Starhopper, in July 2019, to about 20 meters. This was the first time the Raptor engine made a free flight. Then, in August of last year, the stubby prototype flew to an altitude of about 150 meters, again making a successful landing.

At the time, the expectation was that SpaceX would progress quickly into building and flying full-scale Starship prototypes. But after rushing to build the first such prototype in September 2019, SpaceX founder Elon Musk decided he needed to first optimize production of the vehicles. In February, he told Ars that he wanted to build a production line for Starships because he wants to construct a lot of them to settle Mars. So he focused on building a factory beneath tents in South Texas.

“Production is at least 1,000 percent harder than making one of something,” he said. “At least 1,000 percent harder.”

Then, this spring, SpaceX began to produce a succession of tanks. Most of them burst during pressure tests before SpaceX could even attach an engine. These were essential learning steps as engineers devised the optimal process to make thin but durable pressurized tanks. Finally, the company flew SN5

in early July and, subsequently, SN6 on Thursday.

Now SpaceX has its factory in South Texas up and running, and Musk and his engineering team appear to be getting a handle on flying the vehicle. So what comes next? SN5 and SN6 may or may not fly again. The company has designed and built a pressurized fuel tank from a new steel alloy, and this will likely be tested to failure.

- Ignition of SN5 on August 4, 2020.
- Starhopper looks on as SN5 lifts off for its 150m hop test.
Trevor Mahlmann
- Roger, roger, SN5—we see you hovering clear five by.
Trevor Mahlmann
- SN5. In flight. Over Texas.
- Turning to orient for landing.
Trevor Mahlmann
- SN5 coming in for a landing. Those legs!

Then, it probably will be time to move on to a full-size Starship that includes the large nose cone and wings. This version, SN8, may be the prototype that ultimately flies to 20km. Finally, NASASpaceflight.com reports that SN9 is undergoing preliminary construction, and parts for SN10 have begun to arrive at the factory in South Texas. Each new version will incorporate lessons learned from earlier iterations.

In short, while a Starship took one small step for a rocket on Thursday, it promised giant leaps in the near future.

Listing image by Trevor Mahlmann

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