

HED: NASA's Ingenuity helicopter survives first freezing night on Mars

PUBLISH DATE: April 5, 2021

The Ingenuity helicopter survived its first night on the freezing-cold surface of Mars, a major [milestone](#) in the rotorcraft's journey ahead of its historic first flight.

[Temperatures in](#) Jezero Crater, an ancient river delta on Mars and the current site of the Perseverance rover and Ingenuity helicopter, can drop to [minus 130 degrees Fahrenheit](#). That's low enough to do significant damage to the helicopter's electrical and battery components.

On [April 3](#), the helicopter finally separated from the belly of the Perseverance Rover, where it had been stashed since before the rover launched from Earth in July.

Ingenuity went through a series of movements to unfold from beneath the rover, which looked like the metamorphosis of a butterfly, before dropping to the Martian surface.

"This is the first time that Ingenuity has been on its own on the surface of Mars," said MiMi Aung, Ingenuity [project manager](#) at NASA's Jet Propulsion Laboratory [in](#) La Cañada Flintridge, California, [in a statement](#). "But we now have confirmation that we have the right insulation, the right heaters, and enough energy in its battery to survive the cold night, which is a big win for the team. We're excited to continue to prepare Ingenuity for its first flight test."

When Ingenuity does fly, which could happen as soon as April 11, it will be the first powered, controlled flight on another planet. In a nod to the first such [feat](#) conducted on Earth, Ingenuity [carries a swatch of fabric](#) from the Wright brothers' [Flyer](#) plane.

[For several reasons](#), Ingenuity, the first rotorcraft sent to Mars, presented a challenge to the engineers who designed it. It needed to be small enough to tuck up under the rover without endangering Perseverance's mission, which is the first to search for evidence of ancient microbial life on Mars.

Ingenuity also had to be lightweight in order to fly through the Martian atmosphere, which has [less than 1%](#) of the atmosphere present on Earth, while still having enough power to heat itself and survive the frigid Martian nights. The thin nature of the atmosphere on Mars makes it harder to generate lift and [get aloft](#).

Soon after [Perseverance](#) deposited [Ingenuity](#) in the center of its airfield, the rover backed away from the helicopter. This allowed [Ingenuity's](#) solar array to gather critical sunlight.

[On April 5](#), [Perseverance](#) [sent back images](#) of the helicopter's four legs sitting on the surface. The helicopter's blades, currently stacked [one on top of another](#), will be released [no earlier than April 8](#), and the mission team will send commands to the helicopter [to "wiggle" the blades](#).

The helicopter also needs to go through some checkouts of its computers, which will help Ingenuity fly [autonomously](#) through the Martian atmosphere.

Deleted: 0

Deleted: '

Deleted: temperatures of

Deleted: [150](#)

Deleted: .

Commented [SD1]: this is an edit from Pasadena. Not sure why it didn't come across as such.

Deleted: Project

Deleted: Manager

Deleted: ,

Deleted: ¶

Deleted: e

Commented [SD2]: No number according to Smithsonian National Air and Space Museum

Deleted: s

Deleted: 1

Formatted: Font: Not Italic

Deleted: for several reasons

Deleted: just about

Deleted: one

Deleted: percent

Commented [SD3]: EDITOR generate lift and get aloft mean the same thing. Should this be "remain aloft" instead?

Deleted: Ingenuity

Deleted: Perseverance

Deleted: the helicopter's

Commented [SD4]: Moved for clarity. The photo was sent back on April 5, but taken on April 4.

Deleted: Perseveranse

Deleted: -

Deleted: on April 5

Commented [SD6]: EDITOR: Is this the best word? Would something like "will unfurl" be more descriptive?

Deleted: in alignment

Deleted: one

Deleted: [on April 7](#)

Deleted: on Earth

Deleted: autonomously

Now that ~~the helicopter~~ isn't borrowing power and heat from the rover, ~~Ingenuity~~ will send back information on its ~~thermal control systems~~ ~~and power~~ over the next two days. This will allow the helicopter team to configure the settings necessary to make sure Ingenuity survives the 30 days of its mission.

Ingenuity is a technology demonstration, ~~with a short~~ mission, compared to the rover's ~~two-year plan~~ to explore Jezero Crater. Now that the helicopter is on the Martian surface, it has 31 Earth days, or 30 Martian sols, to conduct [up to five test flights](#).

During the first flight, the helicopter will attempt to rise about 10 ~~to 15~~ feet (~~3-5~~ meters) in the air from the middle of its flat, 33-by-33-foot (10-by-10-meter) airfield, ~~travel up to 160 feet (50 meters) and return, touching back down near where it launched~~. The trial should last for ~~no more than 90~~ seconds. Future flights will test the helicopter's ability to fly higher and longer.

~~In a statement, Teddy Tzanetos, deputy operations lead for the Ingenuity Mars helicopter at JPL, said,~~ "Our 30-sol test schedule is frontloaded with exciting milestones. Whatever the future holds, we will acquire all the flight data we can within that timeframe."

Deleted: Ingenuity

Deleted: '

Deleted: the helicopter

Deleted: power and

Deleted:

Deleted: its

Deleted: is short

Deleted: [three-year plan](#)

Commented [SD7]: leave as a number for consistency with the measurement it relates to

Deleted:

Deleted: make a turn, and touch back down

Deleted: about

Commented [SD8]: EDITOR: I find nothing to substantiate this claim

Deleted: 30

Deleted: , " said Teddy Tzanetos, deputy operations lead for the Ingenuity Mars helicopter at JPL, [in a statement](#)

Deleted: "