



Intuitive Machines

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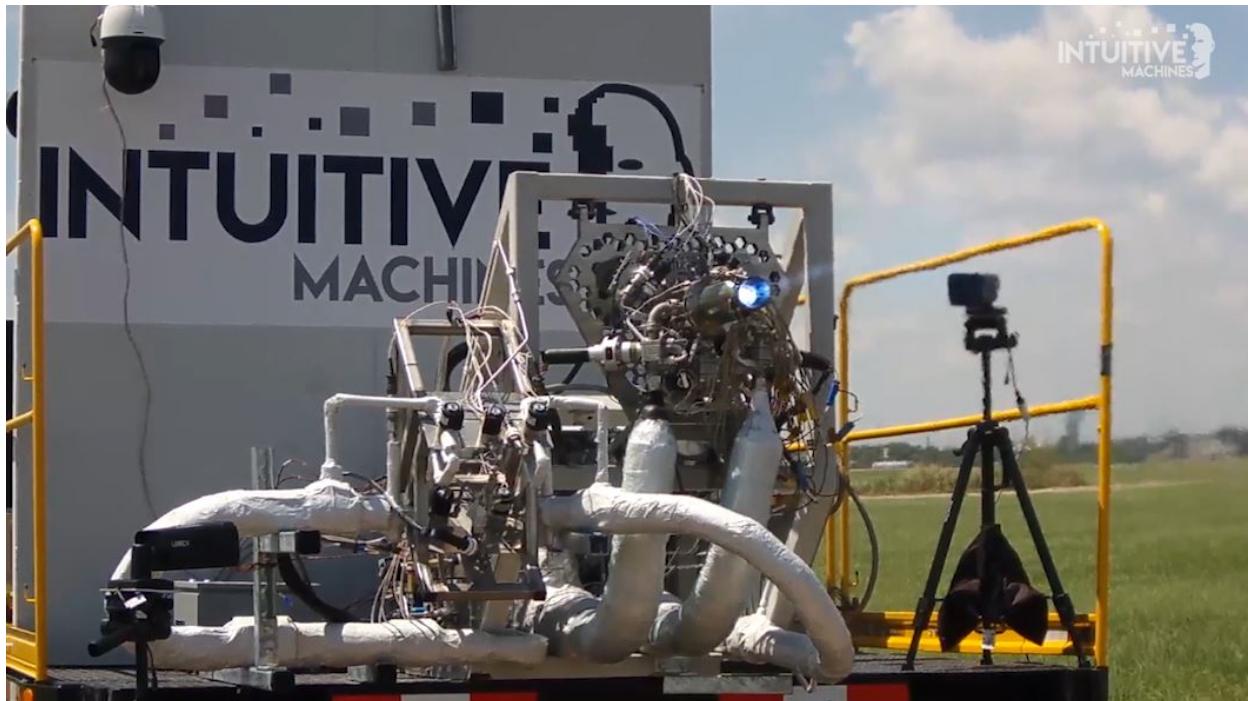
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Nova-C Main Engine & RCS Igniter Test Keeps Houston in the Moon Race

Intuitive Machines is one step closer to becoming the first U.S. private company to land on the moon.

September 4, 2019 Intuitive Machines tested the Nova-C lander's rocket propulsion system for the 8th time at the Houston Spaceport located at Ellington Airport in Houston, Texas. 'Hot Fire 8' was also the first testing of Intuitive Machines' reaction control system (RCS) igniter. The initial Nova-C mission will deliver NASA and commercial payloads to the lunar surface in 2021. The NASA payload delivery service is part of the first NASA Commercial Lunar Payload Services (CLPS) program mission to the moon.

"We are incredibly pleased with the support we have received from the Houston Airport System and the City of Houston to perform our engine tests at the Spaceport," said Dr. Timothy Crain, Vice President of Research and Development at Intuitive Machines. "Houston officials have really lived up to the billing of Space City."



Nova-C's main engine uses a first-in-class deep-throttling liquid oxygen/methane engine. Each successful test is part of an incremental process of establishing conditions for successful ignition, throttling and steady-state operation. During the test, Intuitive Machines engineers and technicians confirmed propellant pressures, temperatures and flowrates for safe and reliable operation of their engine.

Our new RCS systems are being developed to support large human scale landers and the U.S. return to the moon.

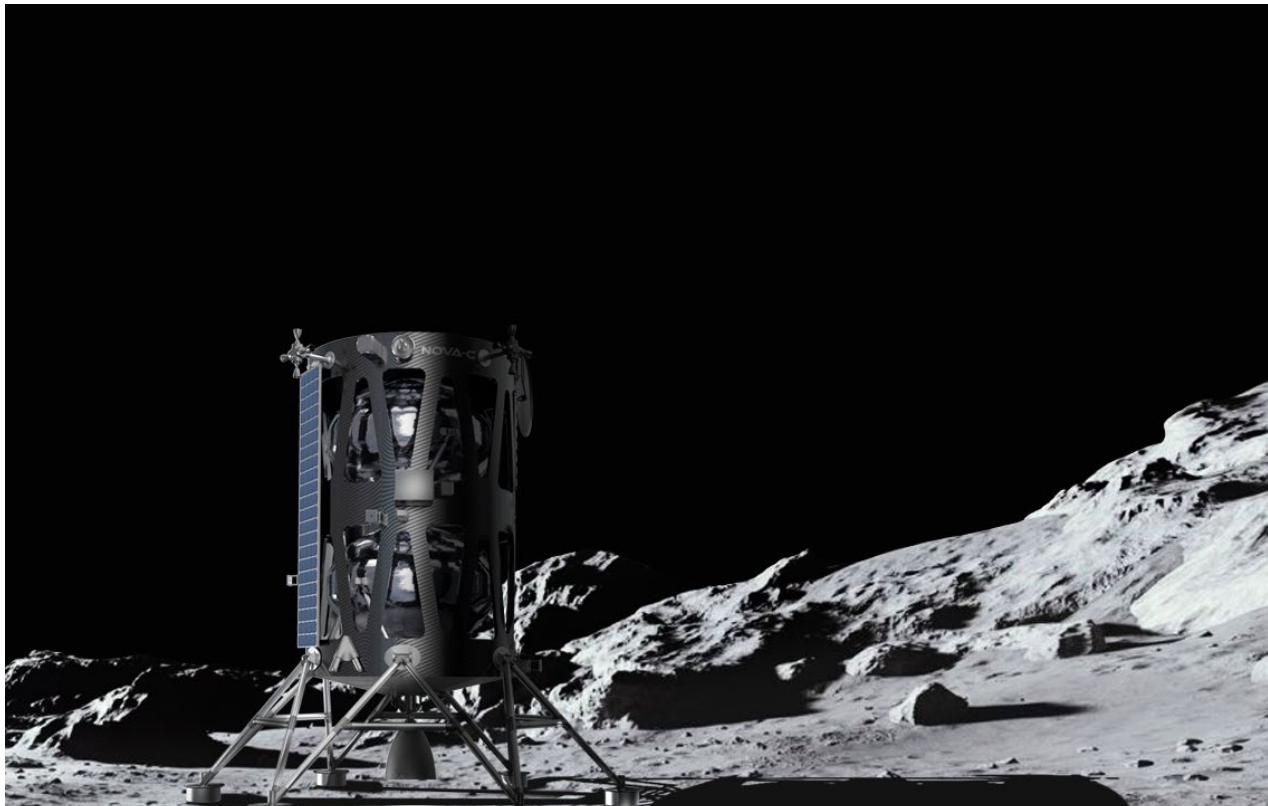
Intuitive Machines uses additive manufacturing in the development of our rocket engines including our small RCS engines. This technology has revolutionized the rocket industry and we find new ways every day to incorporate the unique capabilities of these machines.



Optimal engine performance is paramount for Nova-C's lunar payload delivery mission. The tested propulsion system will execute all major maneuvers once Nova-C separates from the launch vehicle in orbit and will provide over 3,800 meters per second of velocity change for Trans Lunar Injection, Lunar Orbit Insertion and Powered Descent to the lunar surface. During its use in space, the core of the combustion exhaust will reach temperatures in excess of 2,500 degrees Fahrenheit; meanwhile, combustion temperature of the methane inside the engine will be over 5,000 degrees Fahrenheit.

“There’s a narrow range of acceptable performance between underpowered and overheating/meltdown,” said Intuitive Machines Propulsion Lead and main engine designer, Rob Morehead. “Plenty of testing is required to determine how to operate the engine safely while maximizing performance.”

Powered by the liquid methane main engine, Nova-C can deliver at least 220 pounds of space technology and instrumentation cargo to anywhere on the lunar surface. On its maiden mission in 2021, Nova-C will carry 5 NASA CLPS payloads to the lunar surface and transmit scientific data back to Earth during 13.5 days of activity on the moon. Intuitive Machines is in the process of adding additional payloads from other customers to the 2021 mission to fill out the available cargo manifest.



Intuitive Machines Moon Mission Background

NASA awarded Intuitive Machines the first mission task order under the CLPS contract May 31, 2019. It calls for Intuitive Machines to develop, launch and land Nova-C on the lunar surface with a payload of NASA-provided instruments that will conduct science investigations and demonstrate advanced technologies on the lunar surface. The CLPS program is part of NASA’s Artemis program which will send the first woman and the next man to the lunar surface in 2024.

Our Nova-C lunar lander draws direct heritage and lessons learned from NASA's Project M lunar lander and Project Morpheus experience. Project M and its terrestrial counterpart, Project Morpheus, were designed, developed and tested by NASA JSC engineers demonstrate new technologies for planetary landing included autonomous hazard avoidance, precision landing, and high performance cryogenic liquid Oxygen (LOX) and liquid Methane (LCH₄) integrated propulsion. Core Morpheus lander team members left government service and founded Intuitive Machines.

Intuitive Machines Background

Founded in 2013, Intuitive Machines was formed from practical experience in large complex space systems development. The people of Intuitive Machines blend deep technical knowledge with practices honed over 40 years of human spaceflight; practices in risk-based decision-making, redundancy management, fault tolerance and isolation, safety, reliability, maintainability, verification testing, and operations.

Video Links

Main engine and RCS testing NAT/VO

<https://www.youtube.com/watch?v=WB5nq6kGyV8>

Nova-C full scale mockup VO

<https://www.youtube.com/watch?v=5zsPZhyI27I>

Nova-C main engine and RCS test stand work VO

<https://www.youtube.com/watch?v=auLVyHalb50>

Nova-C Moon landing render VO

<https://www.youtube.com/watch?v=Y6NtP2xaydI>