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A NEW ROCKET-POWERED VEHICLE TO FILL THE SPACE TESTBED GAP

Abstract

With a growing number of missions planned to the Moon, Mars, and beyond, more advanced space systems and components are being developed. These technologies require a more advanced terrestrial testing platform to reduce risks and ensure mission success. To solve this challenge, Masten is developing a new, vertical takeoff and vertical landing vehicle, Xogdor, to expand its terrestrial tested capacity for government, defense, and commercial customers.

The rocket-powered vehicle will be used to mature critical space technologies, including hazard detection, precision landing avionics, terrain relative navigation, and other entry, descent, and landing systems. It can also be used to test plume surface interactions, payload integration, and payload deployment.

Ultimately, Xogdor will help fill the gap in testing infrastructure by offering a few key benefits:

Higher altitudes faster speeds: Xogdor will test descent and landing technologies at high subsonic speeds at 200+ meters per second. Based on customer needs, Xogdor will also be capable of supersonic speeds to fly to the edge of space on a suborbital trajectory. The vehicle can also serve as a platform for hypersonic testing with minor modifications, such as improved thermal protection. By deploying these speeds on Xogdor, we can test payloads in upper atmosphere and near-space environments with reduced gravity.

Advanced payload accommodations: Xogdor will have payload capacity of at least 200 kg with accommodations that include power, data storage, thermal control, and ground telemetry. Based on customer needs, Xogdor also has the capability to provide a fully pressurized or vacuum environment. These accommodations will allow us to conduct more complex experiments to advance technology readiness for space.

Lower costs and improved performance: Xogdor has a next-generation 6,000 lbf thrust engine built with a new additive manufacturing method that enables fewer parts, lower manufacturing costs, and improved performance. With deep throttling capabilities, the engine is fueled by liquid oxygen / liquid methane, allowing for improved performance over kerosene and higher density performance than hydrogen.

Point-to-point capabilities: With the ability to fly longer ranges, Xogdor also offers more flexibility when it comes to the launch and landing location. This opens the door for point-to-point payload transportation.

Masten aims to complete the development of Xogdor by the end of 2022 and will begin test flights as early as 2023. Test data will be available for the paper/presentation as Masten further develops the vehicle.