Supersonic decelerator project 'on track' for success

November 21 2012, by Rick Smith

The Low-Density Supersonic Decelerator Project will test inflatable decelerators and advanced parachutes in a series of rocket sled, wind tunnel, and rocket-powered flight tests to slow spacecraft prior to landing. This technology will allow NASA to increase landed payload masses, improve landing accuracy and increase the altitude of safe landing-sites. Credit: NASA

(Phys.org)—NASA has completed three key milestones in its development of new atmospheric deceleration technologies to support exploration missions across the solar system.

The Low-Density Supersonic Decelerator project, which is developing technologies to use atmospheric drag to dramatically slow a vehicle as it penetrates the skies over worlds beyond our own, completed three successful rocket sled tests of the "SIAD-R," a Supersonic Inflatable Aerodynamic Decelerator, the first of three innovative deceleration systems now in development. The tests were conducted Oct. 10, Oct. 24

and Nov. 6.

The project is a NASA Technology Demonstration Mission led by NASA's Jet Propulsion Laboratory in Pasadena, Calif.

The SIAD-R, built for NASA by ILC Dover of Frederica, Del., is a balloon-like pressure vessel with a diameter of nearly 20 feet, designed to inflate around a vehicle and slow its entry. The rocket sled tests of the SIAD-R were conducted at the Naval Air Warfare Center Weapons Division at China Lake, Calif.

"The tests demonstrate the ability of the SIAD-R to survive the aerodynamic loads experienced during inflation and operation [while entering the Martian atmosphere]," said Jet Propulsion Laboratory engineer Mark Adler, who manages the supersonic decelerator project. As the rocket-powered sled accelerated down the four-mile-long track at speeds of several hundred miles an hour, the inflatable device experienced aerodynamic loads 25 percent greater than it will face during atmospheric entry at Mars.

That added 25 percent is a built-in safety margin, which ensures the device works properly when it really matters, Adler said—when it eventually must slow down an entry vehicle carrying future robotic explorers.

The team confirmed the inflatable device maintained integrity during the tests—with no rips or damage to the vessel detected. Researchers continue to review data recorded by sensors and instrumentation on the sled and the device, as well as test footage recorded by high-speed cameras placed along the entire sled track.

"It's all gone really well," Adler said. "We have an awesome team, and the folks at China Lake make this possible with their remarkable rocket

sled capabilities."

"The rocket sleds for this test series are the tallest we've ever built, and perhaps the tallest built in the world," said Eric Laskey, head of China Lake's Supersonic Naval Ordnance Research Tracks branch.

"The [NASA and China Lake] team worked well together to design and build this amazing system," he added, praising the team's "flexibility, capability and can-do spirit."

With this series of SIAD-R tests complete, Adler said his team now looks forward to testing the project's next piece of hardware—a massive parachute 110 feet in diameter, intended to further slow the entry vehicle once the SIAD-R (or its larger counterpart, the SIAD-E, which has a diameter slightly larger than 26 feet) has initially chopped the vehicle's speed from Mach 3.5 to Mach 2.

All three supersonic deceleration devices—the two inflatable vessels and the advanced parachute system—will be the largest of their kind ever flown at speeds several times greater than the speed of sound.

The first SIAD-R and parachute supersonic flight test is scheduled for summer 2014. The devices could be used in Mars missions launching as early as 2018.

Provided by NASA