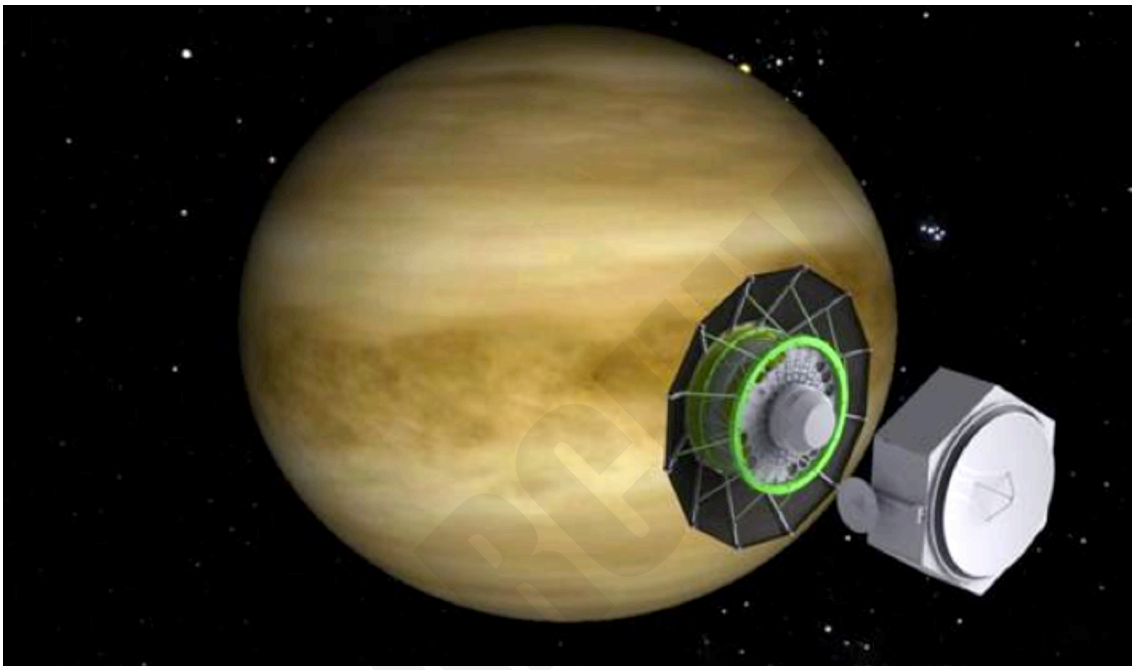
National Aeronautics and Space Administration

NASAfacts

Space Technology
Game Changing Development
Adaptable Deployable Entry and Placement Technology

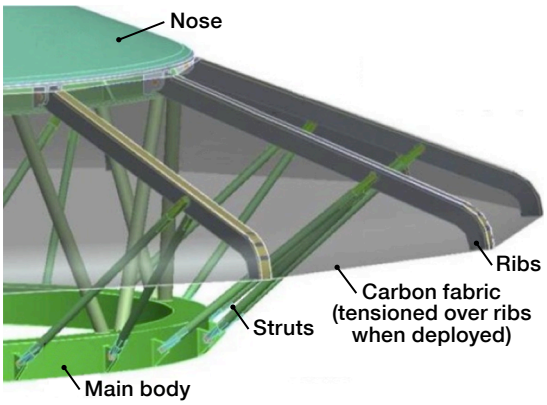


Venus approach of a deployable aeroshell.

The Adaptable, Deployable Entry Placement Technology (ADEPT) project will test and demonstrate a deployable aeroshell concept as a viable thermal protection system for entry, descent, and landing of science and exploration class payload missions.

The ADEPT concept is a mechanically deployable semirigid aeroshell entry system that will achieve increased drag (lower ballistic coefficient) during entry, making it suitable for a variety of Earth or other planetary return missions, including Venus, Mars and Saturn.

Multilayer, woven carbon fabric covers the deployed surface and is supported by ribs. The fabric provides the drag area for the ADEPT deployable concept and its flexibility also allows it to be stowed easily. The pure carbon fabric, with its high thermal conductivity, has demonstrated operational performance at temperatures over 3000 °F.



Mechanically deployable decelerator.

The deployable approach allows mission planners to develop an aeroshell design that fits within existing launch vehicle systems, but transforms into a large-area decelerator prior to entry.

A test article has been built to demonstrate manufacturing, assembly, integration and deployment of the ADEPT concept. The test article configuration is similar to a scaled flight design in order to promote understanding of the behavior of the mechanisms, structural components, and carbon fabric in the stowed, transient, and fully deployed states.

What's Next?

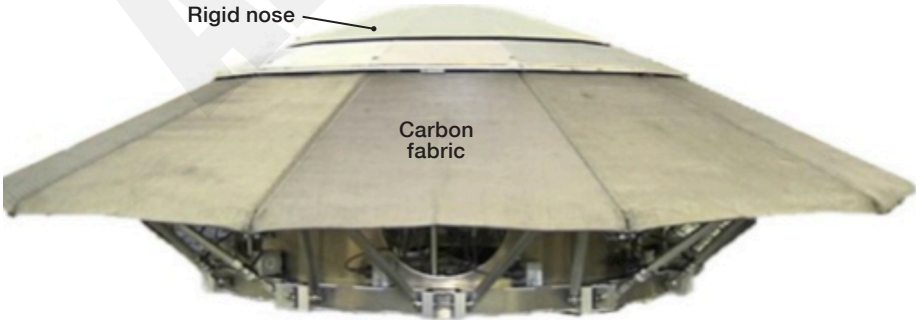
The ADEPT Full-Scale Demonstrator project (FY14-16) will test and validate a full-scale (~6 m diameter) article in space-relevant environments to advance the technology to a technology readiness level of 6. Aerothermal performance of the 3D woven carbon fabric has been demonstrated for a range of biaxial loads through arc-jet testing at flight-relevant heating levels.

The Full-Scale Demonstrator will undergo a series of environmental tests, including simulated launch loads and cold soak, culminating in a series of deployment tests in a thermal vacuum chamber that will demonstrate mechanism reliability and shape stability in the deployed state.

The Game Changing Development (GCD) Program investigates ideas and approaches that could solve significant technological problems and revolutionize future space endeavors. GCD projects develop technologies through component and subsystem testing on Earth to prepare them for future use in space. GCD is part of NASA's Space Technology Mission Directorate.

For more information about GCD, please visit http://gameon.nasa.gov/

Test article stowed and deployed.



2-m ground test article (August 2013).

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