National Aeronautics and Space Administration

NASAfacts

Space Technology
Game Changing Development
Future Living in Space

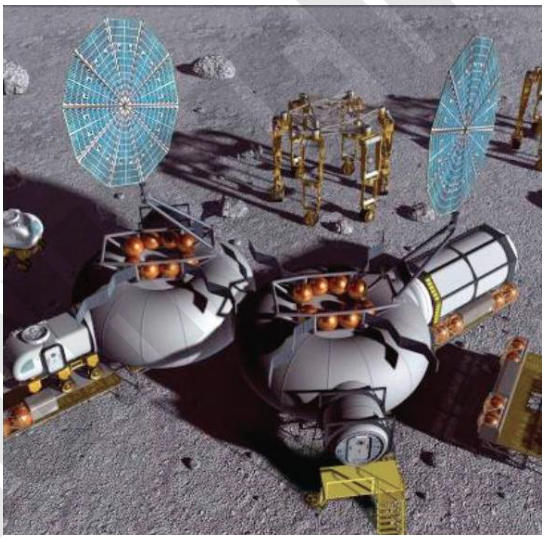
InSTAR: Inflatable Structure Technology Advancement Research

In the future, inflatable habitable modules designed for space applications will have a projected long-term useful life of at least 10 years or longer.

One of the biggest concerns for inflatable structures, particularly for those that will house humans in space, is how to design for "creep"— the slow deformation of a structure under stress while also maintaining long-term durability and damage tolerance capability. Creep is a viscoelastic response of a material as a function of time, temperature, and stress. It is necessary to understand creep behavior in order to design inflated structures that use soft-good webbing materials for restraint layers in inflatable habitatlike structures.

The InSTAR project is a Game Changing project led by NASA's Langley Research Center and discipline experts located at multiple NASA centers, including Johnson Space Center and Ames Research Center. The goal of advancing the inflatable structure technology is to enable the use of inflatable modules for pressurized space elements by reducing the uncertainty and allowing for a robust inflatable structure with design confidence in long duration and end-of-life performance.

The results of the InSTAR effort are recommendations that guide certification for



Conceptual inflatable habitat surface modules.

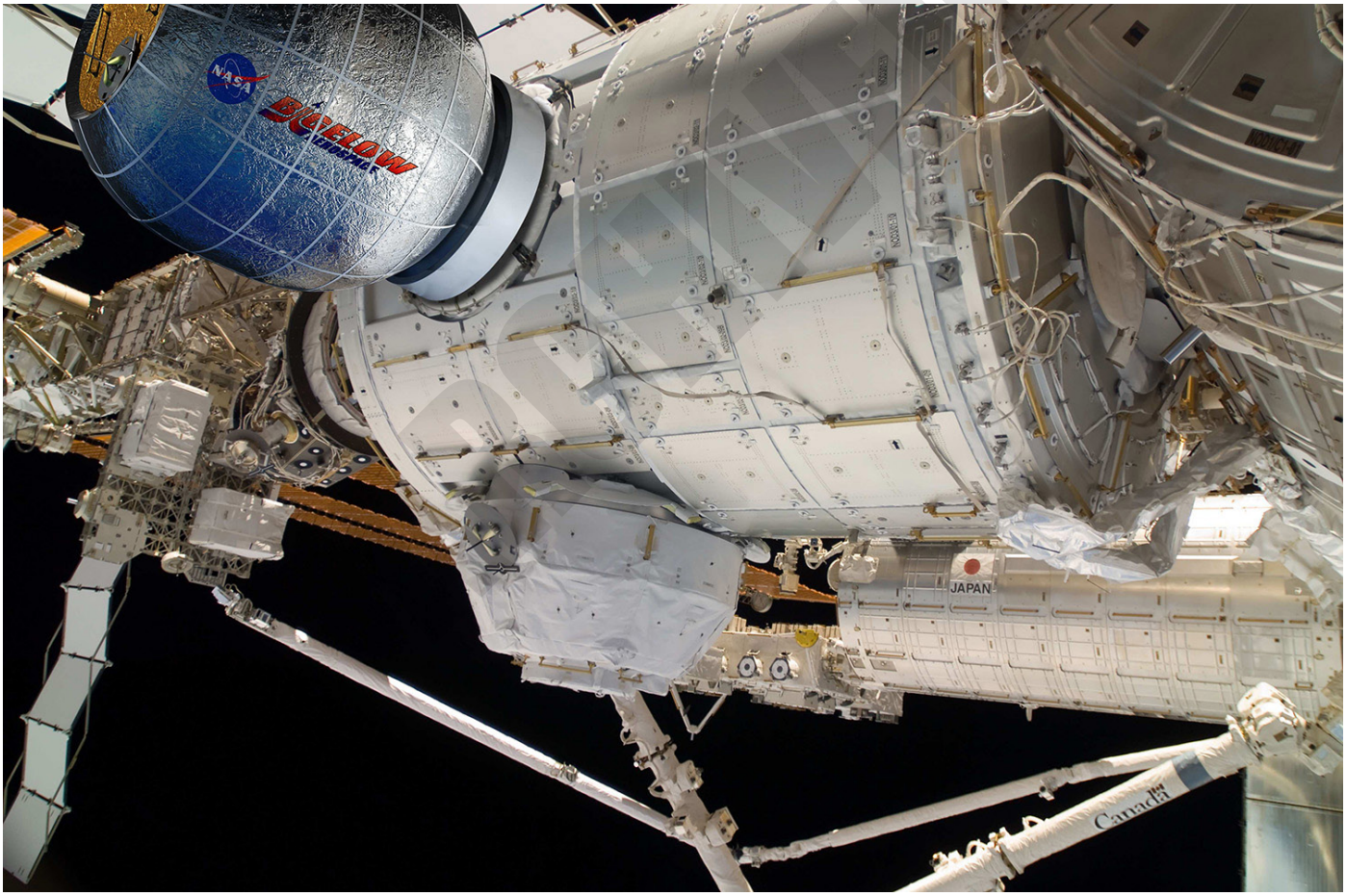
Conceptual inflatable technology demonstrators.

damage tolerant inflatable structures for NASA space missions and specifications guidelines on webbing material being used for the Bigelow Expandable Activity Module, an International Space Station (ISS) flight experiment scheduled for 2015.

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.s

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

Creep-burst assembly testing.



Conceptual ISS inflatable flight module.

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