

Section by Section Focus

FY14 CL-IRAD Poster Session
TechPort Data Template
10/3/14

ADD-ON CARD

START TRL: 3 FINISH TRL: 4

• **TAB NUMBER(S):**

- TA 12.1.1 Lightweight Structure
- TA 12.2.1 Lightweight Concepts
- TA 12.2.5 Innovative Multifunctional Concepts

HAT NUMBER(S): 12.1, 12.2 Inflatable: Structures & Materials for Inflatable Modules

FTE (#): 2 at JSC

PROCUREMENT (\$): \$50k

LEVERAGED RESOURCES: Creep testing co-funded by BEAM, and JSC ES

MSC NUMBER:

CO-DEVELOPERS: NASA LaRC, JSC, and ARC.

TAKE-AWAY: NASA Inflatable Structures development is moving beyond BEAM and Transhab technology to provide lightweight habitable structures with more capabilities and longer life for future exploration missions.

POSTER

TITLE: Lightweight Materials and Structures – Inflatable Structures Technology Development

Project Management: Lynn Bowman (LaRC),

JSC Lead: Molly Selig

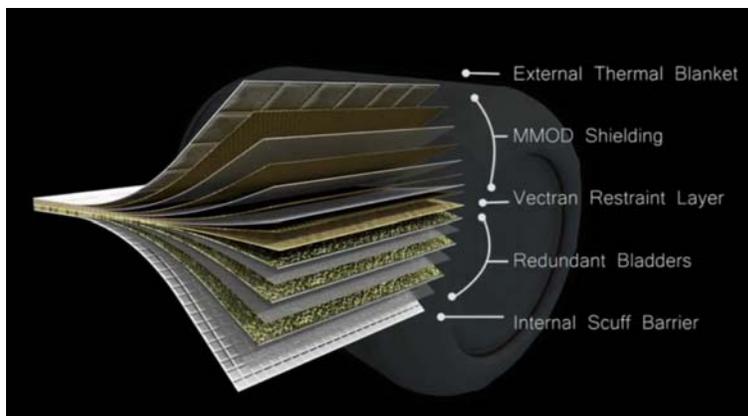
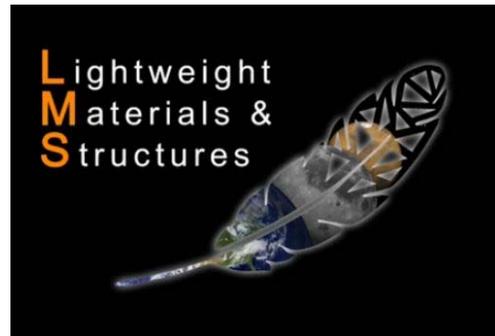
OVERVIEW: Inflatable Structures are a solution to the mass and volume constraints for exploration missions.

- Minimalistic Airlock Soft Hatch
 - Developing an ultra-compact airlock by eliminating the need for a large metallic bulkhead and hatch.
 - Enabling EVA capability on missions which cannot afford to carry a traditional metal airlock (EAM, Orion, ARM, etc.)
 - Outcome: Design, pressurized testing, demonstration
- Advanced Materials
 - Investigating inflatable bladder materials that are flexible and durable at extreme cold temperatures
 - Eliminating the need for heavy, power-hungry heaters to protect polymers before deployment
 - Outcome: Cold temperature flexure testing
- Restraint Material Creep Testing
 - Establishing the long term properties and end of life behavior of the structural restraint materials
 - Improving structural reliability and allowing tighter design limits that reduce restraint layer weight
 - Outcome: Strap level creep test data and analysis of creep burst test data

INNOVATION: NASA development will move beyond BEAM and Transhab technology to provide lightweight habitable structures with more capabilities and longer life.

INFUSION: Airlocks and habitats for EAM, AES, ARM, etc.

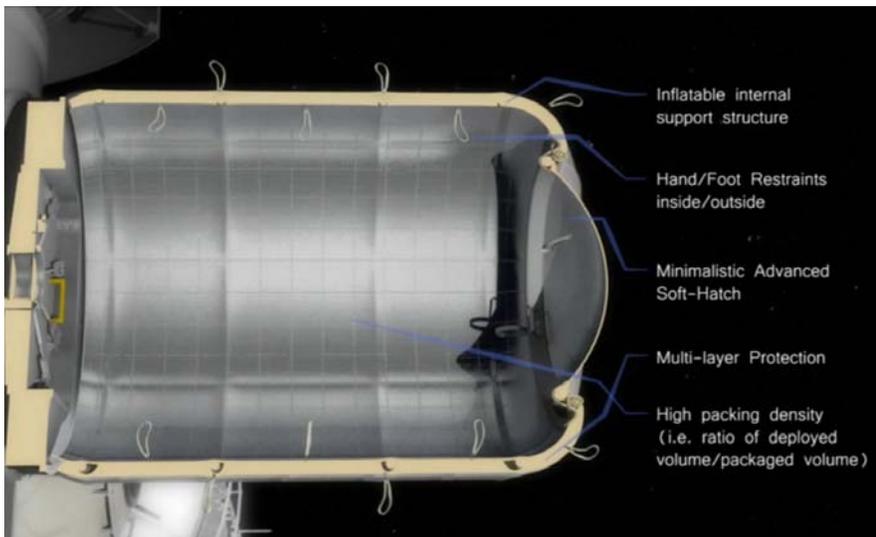
PARTNERSHIPS: Lightweight Materials and Structures is a partnership between Langley Research Center, Johnson Space Center, and Ames Research Center.



Layers of an Inflatable Structure



EAM Inflatable Airlock packaged for launch



Inflatable Airlock deployed

JSC Technology Stakeholders

Customers:

- Missions
 - National
 - NASA
 - Commercial Cargo
 - Commercial Crew
 - Commercial Space (including launch operations, satellites & servicing, space tourism, etc.)
 - International
 - ISECG
 - Commercial Space
- Programs and Major Projects
- Testbeds, Facilities, and Other Intermediaries
- Societal
 - Industrial
 - Business

Collaborators:

- Other NASA centers and Headquarters
- Other federal labs
- Other federal agencies
- Academia
- Research organizations
- International space agencies or businesses

Sponsors:

- JSC Center Director
- OCT
- STMD
- OCE
- HEOMD/SMD/ARMD
- U.S. Congress
- Administration (including OMB, & OSTP)
- General Public