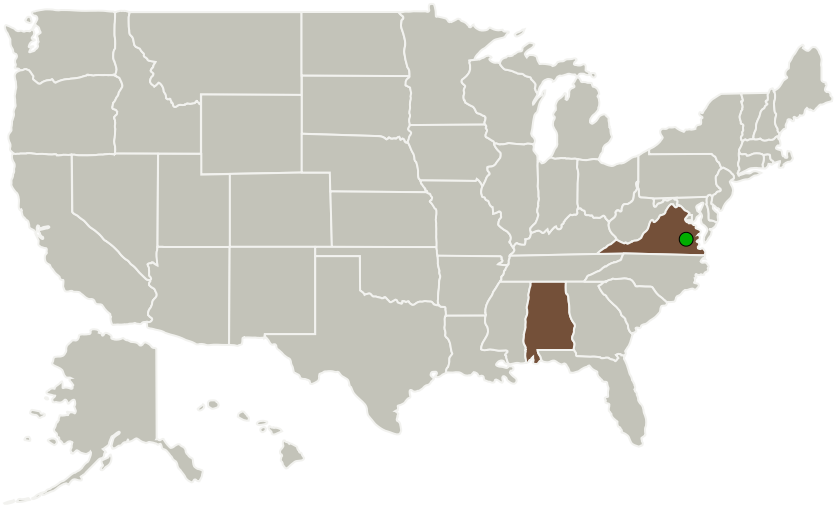
Reduced Cost Composite Hot Structures with Oxidation Protection, Phase I

Completed Technology Project (2014 - 2014)

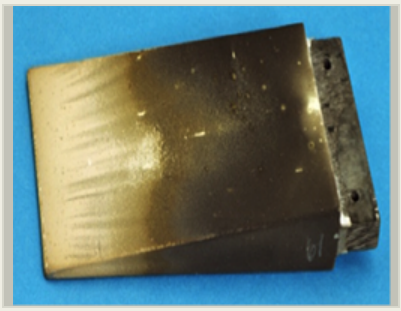
Project Introduction

Innovative, low cost high performance technologies are critical to the affordability of future space missions. Carbon/carbon (C/C) composites have significant advantages over metallic solutions. However, C/C composites are generally known to have high costs and protracted lead times. Recent efforts by ATK Aerospace Group and Plasma Processes have focused on increasing capability of 2D C/C, while reducing cost and lead-time. Optimization studies by ATK have reduced manufacturing schedule by up to 60% and improved mechanical performance. Plasma Processes has developed protective coatings for C/C deposited via additive manufacturing techniques that have performed well in flight tests. These recent advances can reduce the cost and inert mass of future hypersonic and launch vehicles. However, additional efforts are needed to optimize economical oxidative protective solutions for C/C. The objective of a proposed Phase I is to merge advancements in C/C composite manufacturing with additive manufacturing coating application techniques to yield economical hot structures for future hypersonic vehicles.

Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
Langley Research Center(LaRC)	Supporting Organization	NASA Center	Hampton, Virginia



Reduced Cost Composite Hot Structures with Oxidation Protection Project Image

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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Primary U.S. Work Locations	
Alabama	Virginia

Project Transitions

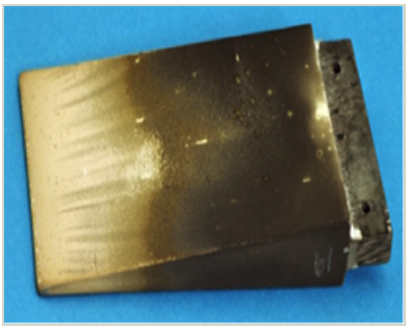
June 2014: Project Start

December 2014: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/137695)*

Images



Project Image
Reduced Cost Composite Hot Structures with Oxidation Protection Project Image
(https://techport.nasa.gov/image/131924)

Project Management

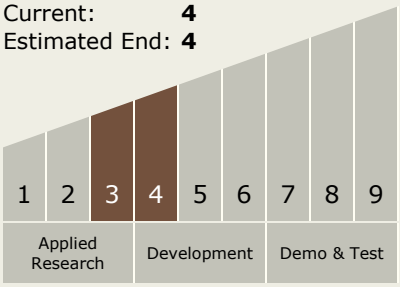
Program Director:
Jason L Kessler

Program Manager:
Carlos Torrez

Principal Investigator:
Daniel A Butts

Technology Maturity (TRL)

Start: **3**
Current: **4**
Estimated End: **4**



Technology Areas

Primary:

- TX12 Materials, Structures, Mechanical Systems, and Manufacturing
  └ TX12.1 Materials
    └ TX12.1.1 Lightweight Structural Materials

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System