Small Business Innovation Research/Small Business Tech Transfer

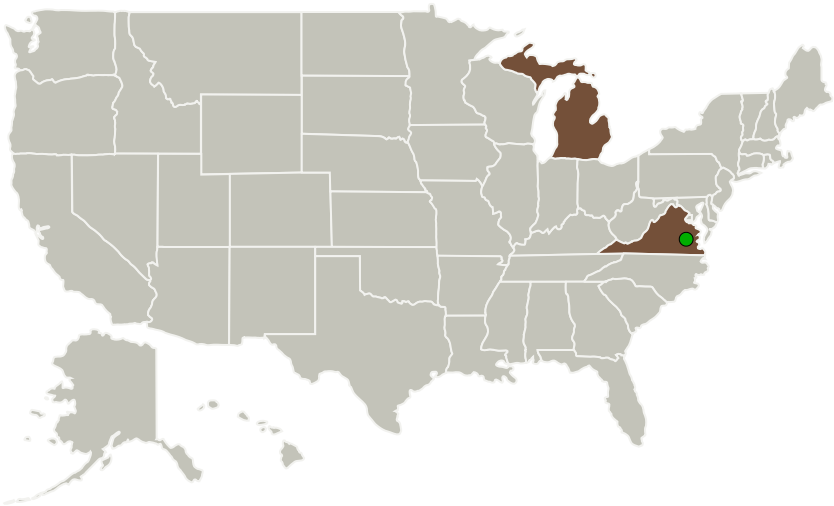
Ultrasonic Additive Manufacturing for Lightweight Metallic Structures, Phase I

Completed Technology Project (2013 - 2013)

Project Introduction

The goal of this program is to demonstrate the use of UAM to additively build reinforcement structures to reinforce cut outs in larger aluminum structural components. The team will work with NASA to scope a 'generic' opening in an aerospace aluminum structure. UAM will be used to perform two reinforcing activities. Firstly, UAM will be used to thicken the cross section of the aluminum component in a selective manner. This will provide additional stiffness through geometric effects without starting with a large billet of material. Secondly, UAM will be used to embed reinforcing materials (such as SiC fibers, steel wire, carbon fiber) in and around the opening to create a true MMC in the region(s) around the opening. Smalll channels will be machined to receive wire reinforcements. UAM will be used to create an embedded layered structure of embedded fiber around the opening. Mechanical testing of windows will be performed to quantify the increase in mechanical performance.

Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
Solidica	Lead Organization	Industry	Ann Arbor, Michigan
Langley Research Center(LaRC)	Supporting Organization	NASA Center	Hampton, Virginia

Ultrasonic Additive Manufacturing for Lightweight Metallic Structures

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Completed Technology Project (2013 - 2013)

Primary U.S. Work Locations	
Michigan	Virginia

Project Transitions

May 2013: Project Start

November 2013: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/138555)*

Images

Project Image
Ultrasonic Additive Manufacturing for Lightweight Metallic Structures *(https://techport.nasa.gov/image/133051)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Solidica

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

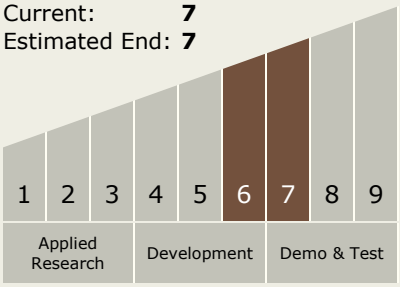
John Sheridan

Co-Investigator:

John T Sheridan

Technology Maturity (TRL)

Start: **6**
Current: **7**
Estimated End: **7**



Technology Areas

Primary:

- TX12 Materials, Structures, Mechanical Systems, and Manufacturing
  └ TX12.4 Manufacturing
    └ TX12.4.1 Manufacturing Processes

Target Destinations

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