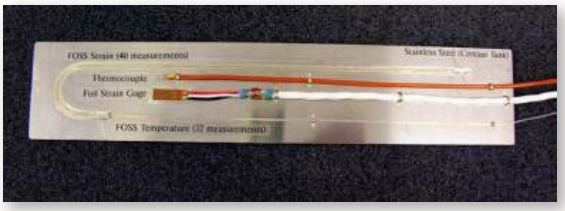
Fiber Optic Sensors For Launch Vehicles Project

Does Not Apply

Space Technology Mission Directorate (STMD)

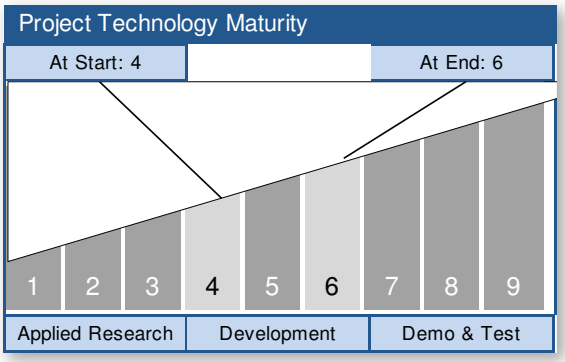
National Aeronautics and Space Administration



ABSTRACT

Demonstrate distributed fiber optic sensor system that is virtually insensitive to adverse environmental conditions for Launch Vehicle operation.

Fiber Optic Sensors for Launch Vehicles



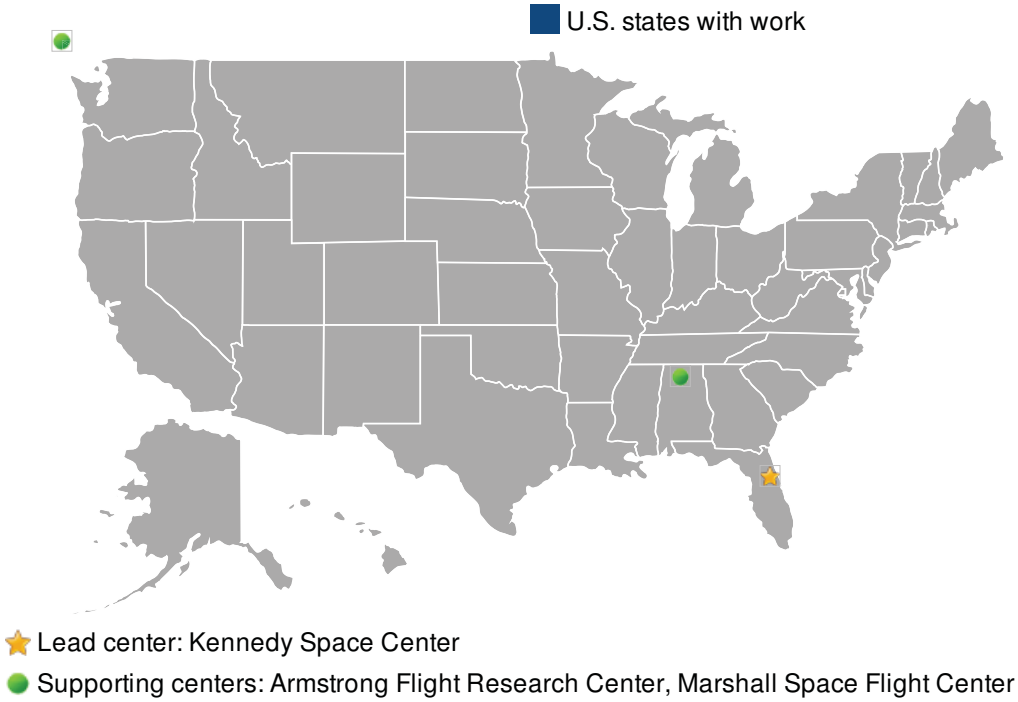
Technology Area: Launch Propulsion Systems TA01 (Primary)
In-Space Propulsion Technologies TA02 (Secondary)

ANTICIPATED BENEFITS

To NASA funded missions:

The concept is to use this technology on an expendable launch vehicle. The multi-center effort also relies on a partnership Dryden is developing with Marshall Space Center, Huntsville, Ala., on determining how to integrate the fiber optic sensors onto a rocket on which a fiber optic sensing system could be ready for testing.

Read more on the last page.



MANAGEMENT

Program Executive:
Ryan Stephan

Project Manager:
Mark Schwabacher

Principal Investigator:
Paul Schallhorn

DETAILED DESCRIPTION

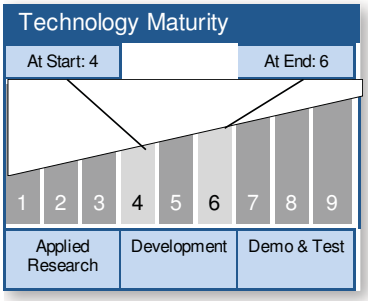
This project will apply the DFRC Fiber Optic Sensor System (FOSS)technology onto relevant launch vehicle environments, including a desired demonstration of a redesigned FOSS on a vehicle within the ELV fleet. NASA Launch Services Program (LSP) at KSC has provided all procurement funding of this project to date (>$1M), including demonstration testing of the FOSS Fiber in both LN2 and LH2 environments. This testing demonstrated that a) the fiber survives at extreme cryogenic temperatures, b) the system accurately measures temperature and strain at these extreme temperatures, and c) the fiber can accurately measure cryogenic liquid level (mass gauging) for future use in propellant utilization systems.

Additionally, LSP has funded two studies with ELV launch providers for feasibility of incorporation of FOSS onto a launch vehicle with their respective fleets. The studies have yielded a significant interest by both providers and provided conceptual designs of implementation for the respective vehicles.

Also, LSP has funded DFRC & MSFC to redesign the FOSS avionics for launch vehicle application. This work is expected to be complete by the end of FY13. It is hoped to have the new FOSS avionics undergo qualification testing in FY14.

TECHNOLOGY DETAILS

Fiber Optic Sensors for Launch Vehicles



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- This technology is categorized as a hardware component or part for other applications
- Technology Area
  - TA01 Launch Propulsion Systems (Primary)
  - TA02 In-Space Propulsion Technologies (Secondary)
  - TA06 Human Health, Life Support & Habitation Systems (Additional)
  - TA07 Human Exploration Destination Systems (Additional)
  - TA14 Thermal Management Systems (Additional)

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TECHNOLOGY DETAILS

CAPABILITIES PROVIDED (CONT'D)

Testing of this system demonstrated that a) the fiber survives at extreme cryogenic temperatures, b) the system accurately measures temperature and strain at these extreme temperatures, and c) the fiber can accurately measure cryogenic liquid level (mass gauging) for future use in propellant utilization systems.

POTENTIAL APPLICATIONS

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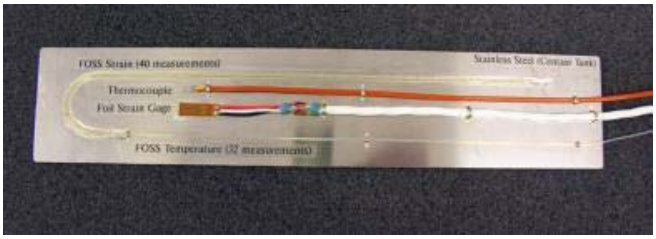
IMAGE GALLERY



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