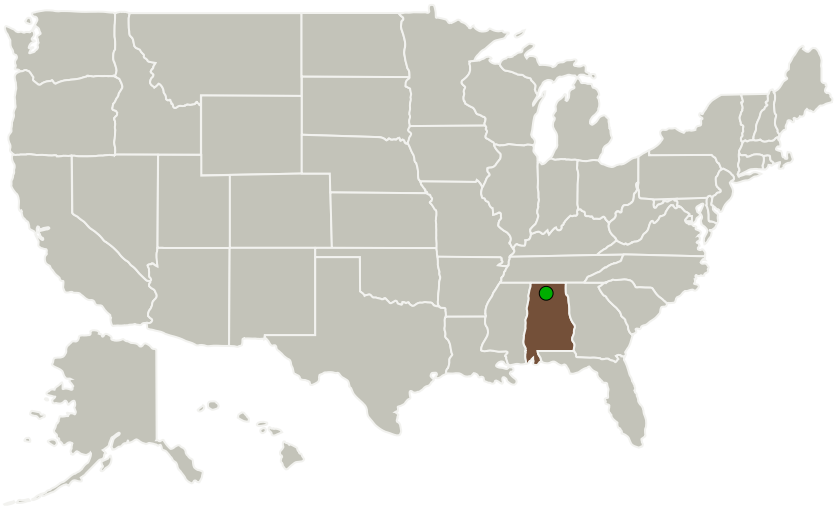
Inlet Cover Treatment to Enhance Zero NPSH Inducer Operation, Phase I

Completed Technology Project (2014 - 2014)

Project Introduction

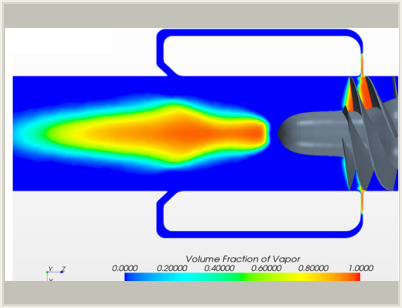
Zero net positive suction head (NPSH)-capable hydrogen pump inducers are a critical component needed to lower the cost and increase the effectiveness of Nuclear Thermal Propulsion (NTP) engines. Zero NPSH pumps need to be able to pump up to 55% vapor fraction by volume without significant head fall-off. Current technology inducers can pump liquid hydrogen up to a limit of about 25% vapor fraction by volume because of choking of the vapor in either the inlet pipe or the inducer blade passage. It is proposed that the Concepts NREC (CN) inlet cover treatment cavitation and stability control device (SCD) will be able to increase the hydrogen vapor volume pumping fraction to the required 55%. The device allows the inducer to operate stably at high blade angles and low flow coefficients which increases the blade passage and the inlet pipe area to delay choking of the pumped fluid.

Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
Marshall Space Flight Center(MSFC)	Supporting Organization	NASA Center	Huntsville, Alabama

Primary U.S. Work Locations
Alabama



Inlet Cover Treatment to Enhance Zero NPSH Inducer Operation Project Image

Table of Contents

Project Introduction 1
Primary U.S. Work Locations and Key Partners 1
Organizational Responsibility 1
Project Transitions 2
Images 2
Project Management 2
Technology Maturity (TRL) 2
Technology Areas 2
Target Destinations 2

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Inlet Cover Treatment to Enhance Zero NPSH Inducer Operation, Phase I

Completed Technology Project (2014 - 2014)

Project Transitions

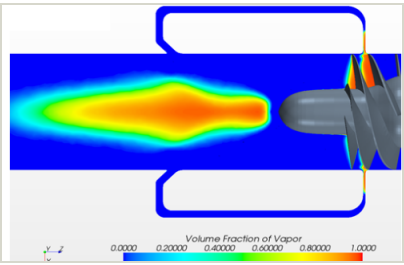
June 2014: Project Start

December 2014: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/137748)*

Images



Project Image
Inlet Cover Treatment to Enhance Zero NPSH Inducer Operation Project Image
(https://techport.nasa.gov/image/126686)

Project Management

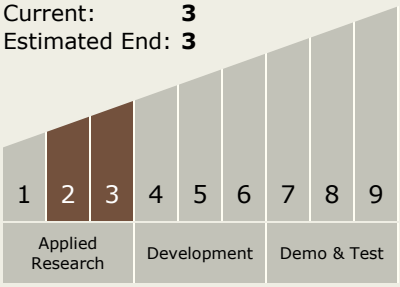
Program Director:
Jason L Kessler

Program Manager:
Carlos Torrez

Principal Investigator:
Kerry N Oliphant

Technology Maturity (TRL)

Start: **2**
Current: **3**
Estimated End: **3**



Technology Areas

Primary:

- TX14 Thermal Management Systems
  └ TX14.1 Cryogenic Systems
    └ TX14.1.1 In-space Propellant Storage & Utilization

Target Destinations

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