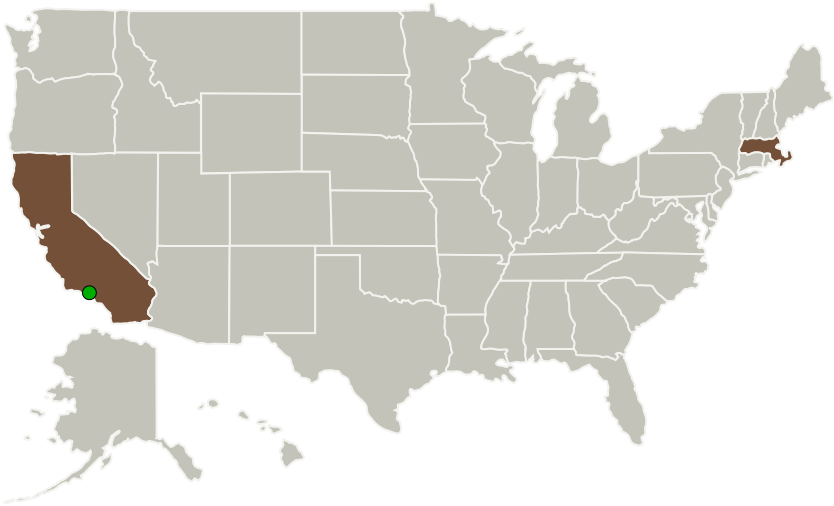
Wide Throttling, High Throughput Hall Thruster for Science and Exploration Missions, Phase I

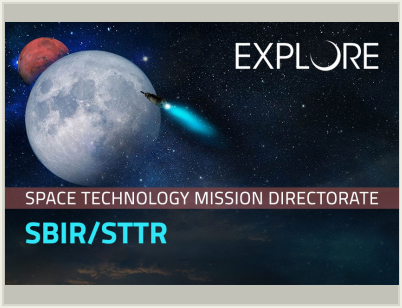
Completed Technology Project (2012 - 2012)

Project Introduction

In response to Topic S3.04 "Propulsion Systems," Busek proposes to develop a high throughput Hall effect thruster with a nominal peak power of 1-kW and wide throttling range in terms of both power and Isp. In Phase I, we will design the thruster, focusing on achieving a magnetic field that shields the discharge channel from ion induced erosion. Our goal is to achieve a propellant throughput of at least 100 kg per kW of input power and a system specific mass of 6 kg per kW. Numerical modeling will play an important role in the thruster design to achieve these lifetime targets. Erosion predictions will be validated by comparing model results to measurements taken in a nominal 600 W thruster during an accelerated lifetime test scheduled take place in 2011 at NASA GRC under separate funding. In Phase II, we build and test a laboratory model thruster capturing the essential magnetic field criteria. The performance, lifetime, and plume properties of the thruster will then be evaluated, and the design will be optimized. Our goal is to reach TRL 5 by the end of Phase II. The complete flight system built in Phase III will include a high power thruster, a hollow cathode, and a propellant feed system. However, the focus of this program will be the thruster.

Primary U.S. Work Locations and Key Partners





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Completed Technology Project (2012 - 2012)

Organizations Performing Work	Role	Type	Location
Busek Company, Inc.	Lead Organization	Industry Women-Owned Small Business (WOSB)	Natick, Massachusetts
Jet Propulsion Laboratory(JPL)	Supporting Organization	NASA Center	Pasadena, California

Primary U.S. Work Locations	
California	Massachusetts

Project Transitions

February 2012: Project Start

August 2012: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/140290)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Busek Company, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

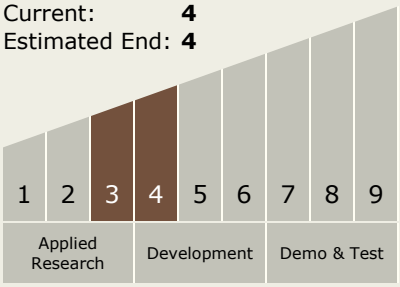
Lawrence T Byrne

Co-Investigator:

Lawrence Byrne

Technology Maturity (TRL)

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



Technology Areas

Primary:

- TX01 Propulsion Systems
  └ TX01.2 Electric Space Propulsion
    └ TX01.2.2 Electrostatic

Target Destinations

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