Oxygen-Methane Thruster, Phase II

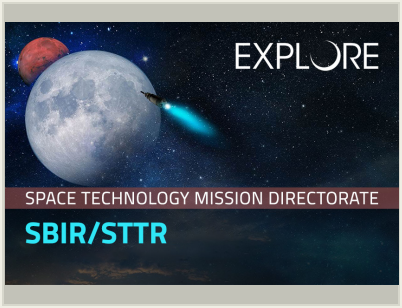
Completed Technology Project (2006 - 2008)

Project Introduction

Two main innovations will be developed in the Phase II effort that are fundamentally associated with our gaseous oxygen/gaseous methane RCS thruster. The first innovation is that of an integrated torch igniter/injector which, provides simple and reliable ignition for the thruster. The second innovation is the thruster's capability to operate with both gaseous and liquid propellants. This innovation enables greater system flexibility that is inherent in the capacity to function over a much wider range of operating conditions. Orion has been approached by several prospective customers concerning affordable, reusable thrusters. In the current commercial market, this does not exist and the commercial sector cannot afford traditional propulsion solutions. For this reason, Orion started developing a thruster that offers the following features: Provides an affordable solution as compared to what is currently available Uses a different manned approach since it is reusable Uses a modular design, which allows for the robust inspection and replacement of parts Uses green propellants and capitalizes on in situ propellant production Provides greater system flexibility since it operates with both liquid and gaseous propellants Not only does the gas/gas operation of the thruster attract companies such as t/Space and Bigleow Aerospace, but its liquid/liquid operation broadens this customer base and makes this design applicable to NASA programs such as the Crew Exploration Vehicle (CEV).

Anticipated Benefits

Potential NASA Commercial Applications: While applications for NASA programs are manifold, the potential for Non-NASA applications appears to offer even greater potential. The rapid growth of the nascent commercial space sector will continue to expand in the coming decades. This industry can be even more demanding in terms of technological advancement, and for an even wider range of propulsion applications. Furthermore, the development schedule for commercial applications will be much shorter. For these reasons, we believe that the development of our oxygen/methane thruster will put us in a good position to meet the needs of the commercial sector. Example applications include RCS propulsion for commercial-off-the-shelf systems, already on the drawing boards, RCS for private space structures, such as Bigelow's Orbiting Space Structures, as discussed in foregoing section 7, as well as others that are just now being conceptualized.



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Marshall Space Flight Center (MSFC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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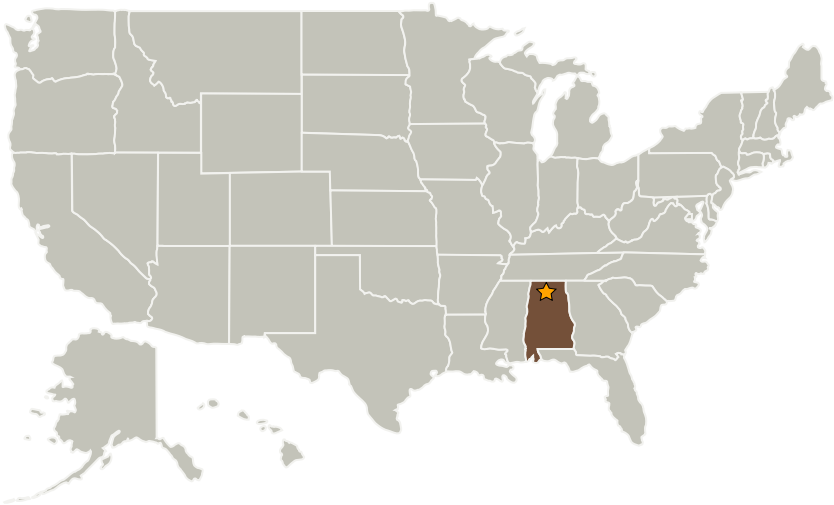
Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
★Marshall Space Flight Center(MSFC)	Lead Organization	NASA Center	Huntsville, Alabama
Orion Propulsion, Inc.	Supporting Organization	Industry	Huntsville, Alabama

Primary U.S. Work Locations
Alabama

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Timothy L Pickens

Technology Areas

Primary:

- TX02 Flight Computing and Avionics
  └ TX02.2 Avionics Systems and Subsystems
    └ TX02.2.3 Vision and Virtual/Augmented Reality Avionics