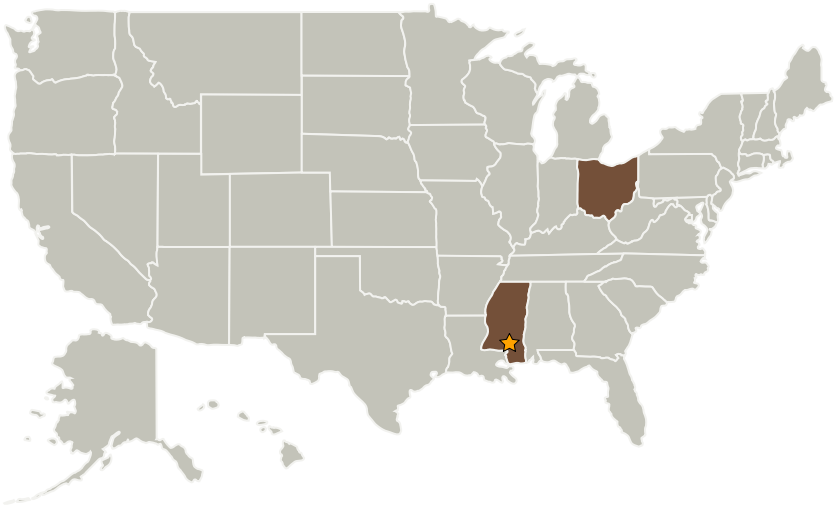
Propellant Conditioning Using Improved Pulse Tube Cryocooler, Phase I

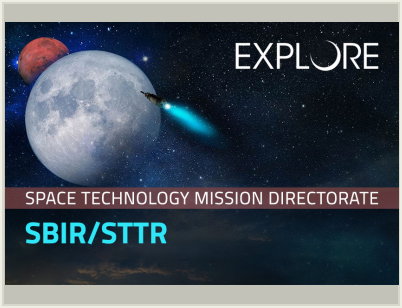
Completed Technology Project (2004 - 2005)

Project Introduction

Application of the proposed technology (an affordable, large-scale, high-efficiency, low-temperature pulse tube cryocooler system), serves two NASA needs: an improved cryogenic propellant conditioning method and an economical technique to maintain the lowest possible liquid propellant feed temperature. These needs exist at a variety of NASA facilities, yet little progress has been made beyond laboratory development. One barrier to acceptance is the cost of manufacturing large scale pulse tubes. Sierra Lobo, Inc. has found that through previous research involving conventional manufacturing techniques, two particular components common to all pulse tube cryocoolers contribute to approximately 50% of the cost. In view of the February 24, 2004, Executive Order encouraging innovation in manufacturing related research and development via the SBIR program, the primary objective of Phase I of this research is to study and develop improvements to the existing pulse tube manufacturing process. If successful, the resulting technology advancement would benefit a variety of current and future NASA programs managed by the Exploration Systems Office and the Science Mission Office, especially those involving long-term cryogenic storage systems. An even greater benefit is expected for the commercial application of pulse tube cryocoolers in facilitating the advancement of distributed high-temperature superconducting power systems.

Primary U.S. Work Locations and Key Partners





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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Stennis Space Center (SSC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Stennis Space Center(SSC)	Lead Organization	NASA Center	Stennis Space Center, Mississippi
Sierra Lobo Inc.	Supporting Organization	Industry Small Disadvantaged Business (SDB)	

Primary U.S. Work Locations	
Mississippi	Ohio

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Alexander Yeckley

Technology Areas

Primary:

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