Active Project (2015 - 2017)

A Miniature Compressor for In-Situ Resource Utilization on Mars, Phase II Project

SBIR/STTR Programs | Space Technology Mission Directorate (STMD)

ABSTRACT

A key objective for NASA's next rover mission to Mars is the demonstration of oxygen production from atmospheric carbon dioxide. Such a technology demonstration may pave the way for a future sample return mission to the Red Planet as well as possibly a future manned mission to Mars. A necessary component in such a demonstration system is a blower or compressor that can deliver the necessary carbon dioxide mass flow to a production plant. Creare proposes the development of a radial flow compressor that is capable of a mass flow rate of more than 400 g/hr. The compressor will be a turbomachine based on our space qualified vacuum pump technology currently operating on the Curiosity rover in the SAM instrument on Mars. In Phase II, we propose to design, build, test, and deliver a compressor that is qualified to TRL 6 and ready for integration into a flight system.

ANTICIPATED BENEFITS

To NASA funded missions:

Potential NASA Commercial Applications: The primary application for the compressor proposed is to compress Martian atmospheric carbon dioxide as part of an in situ resource utilization (ISRU) plant. Furthermore, the same technology will be applicable for larger production plants for a Mars sample return and an eventual Mars human mission. This space qualified compressor may also have applications for other planetary missions to Venus, Enceladus, and Titan, as well as for NASA efforts in the area of atmospheric sampling and climate research.

To the commercial space industry:

Potential Non-NASA Commercial Applications: The commercial potential for a small, high efficiency compressor are numerous. We foresee that this unit will mainly be incorporated in high value analytical instruments for atmospheric sampling and for systems to detect airborne chemical, biological, and nuclear

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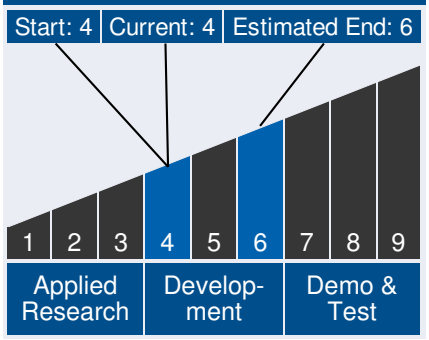
Technology Maturity



Management Team

Program Executives:

- Joseph Grant
- Laguduva Kubendran

Program Manager:

- Carlos Torrez

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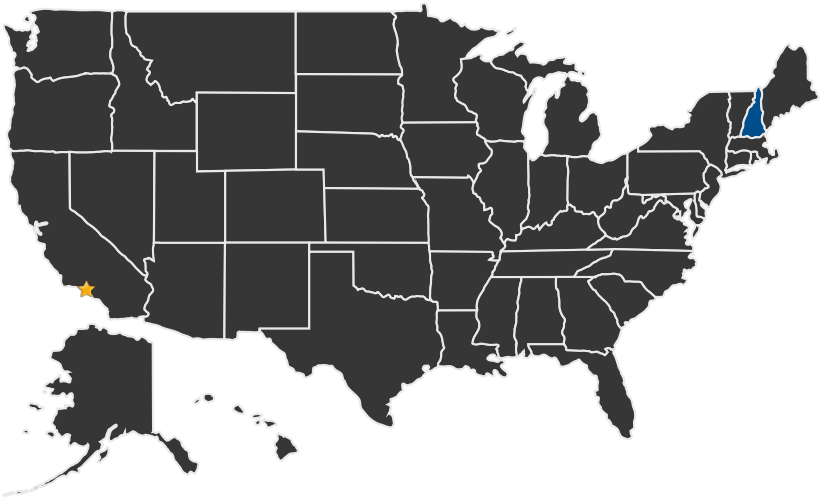
warfare agents.

U.S. WORK LOCATIONS AND KEY PARTNERS



U.S. States With Work

Lead Center:
Jet Propulsion Laboratory

Other Organizations Performing Work:

- Creare, LLC (Hanover, NH)

PROJECT LIBRARY

Presentations

- Briefing Chart
  - (http://techport.nasa.gov:80/file/22756)

Management Team *(cont.)*

Principal Investigator:

- Robert Schoder

Technology Areas

Primary Technology Area:
Human Exploration Destination Systems (TA 7)
└ In-Situ Resource Utilization (TA 7.1)
  └ Resource Acquisition (TA 7.1.2)
    └ High Pressure-Ratio Gas Compressors (TA 7.1.2.3)

Secondary Technology Area:
Science Instruments, Observatories, and Sensor Systems (TA 8)
└ Remote Sensing Instruments and Sensors (TA 8.1)

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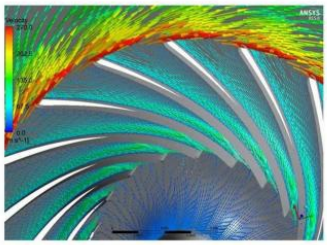
IMAGE GALLERY



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DETAILS FOR TECHNOLOGY 1

Technology Title

A Miniature Compressor for In-Situ Resource Utilization on Mars

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