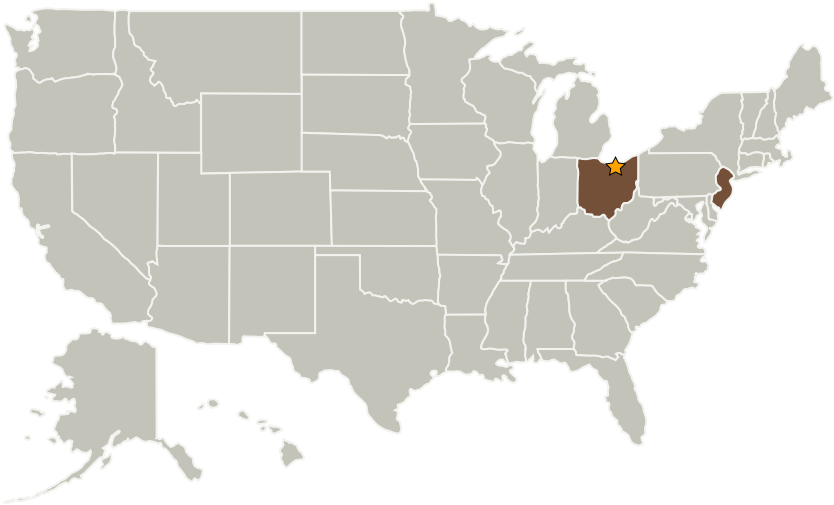
Non-Lubricated Diamond-Coated Bearings Reinforced by Carbon Fibers to Work in Lunar Dust, Phase II

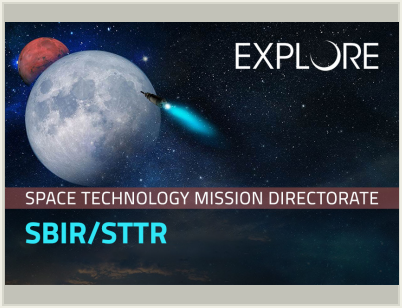
Completed Technology Project (2007 - 2009)

Project Introduction

In Phase I, we made prototype sliding bearings from functionally-graded, diamond-coated carbon-fiber reinforced composite. In dry-sliding experiments, the friction of the diamond-coated composites against lunar dust simulant was low and the wear was so small that it could not be detected. In contrast, all other tested materials experienced rapid abrasive wear. These tests demonstrate that diamond-coated composites are ideal materials for non-lubricated bearings, designed to operate in a lunar dust environment. The primary thrust of Phase II will be a fabrication of sliding, journal and ball bearings and testing them in low temperature vacuum chamber that corresponds to the parameters of the Moon's surface. To implement technology transfer, DMI will partner with established bearing companies. Hence, NASA will have qualified suppliers of different types of precision diamond-coated composite bearings.

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:

Glenn Research Center (GRC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Glenn Research Center(GRC)	Lead Organization	NASA Center	Cleveland, Ohio
Diamond Materials, Inc.	Supporting Organization	Industry Small Disadvantaged Business (SDB)	East Stroudsburg, Pennsylvania

Primary U.S. Work Locations	
New Jersey	Ohio

Project Transitions

November 2007: Project Start

November 2009: Closed out

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX07 Exploration Destination Systems
  └ TX07.2 Mission Infrastructure, Sustainability, and Supportability
    └ TX07.2.5 Particulate Contamination Prevention and Mitigation