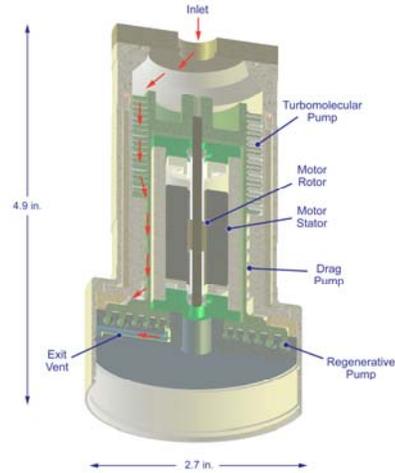


NASA SBIR/STTR Technologies  
 Compact Vacuum Pump for Titan Lander Missions  
 PI: Paul H. Sorensen/Creare Incorporated, Hanover, NH  
 Proposal No.: 09-S1.09-9459

**Identification and Significance of Innovation**

- New, miniature mass spectrometers are being developed at NASA for use in planetary and atmospheric exploration.
- DHS and DoD use similar detectors for toxic industrial chemicals, biological warfare agents, and explosives.
- Compact, Low-power, rugged vacuum systems are needed to support all of the above applications in space and on the ground.
- Creare proposes to design, build, test, and deliver a benchtop compact, low-power, rugged high vacuum system whose performance is optimized for miniature mass spectrometers used in space and on Earth

**Expected TRL Range at the end of Contract (1-9): 5-6**



Cutaway Illustration of a compact Low-power and Rugged Pump for Mass Spectrometer Applications in Space and on Earth

**Phase II Technical Objectives**

- Develop high-speed motor for regenerative pump.
- Fabricate regenerative pump, molecular drag pump and turbomolecular pumps.
- Demonstrate performance of pump design.
- Verify desired lifetime of pump/motor under realistic environmental conditions.

**Phase II Work Plan**

- Task 1: Design Regenerative Pump
- Task 2: Fabricate Regenerative Pump
- Task 3: Fabricate and Assemble Prototype Vacuum Pump System
- Task 4: Test Prototype Pump Performance
- Task 5: Design Compact Vacuum Pump
- Task 6: Manage and Report

**NASA Applications**

- Planetary exploration initiatives.
- Atmospheric measurement instrumentation.
- Environmental monitoring on ISS.
- Health and safety near launch facilities.

**Non-NASA Applications**

- Portable/remote mass spectrometers used to detect chemical and biological weapons, toxic industrial chemicals, and explosives.
- Military and homeland security instrumentation.

**Contact**

Dr. Paul H. Sorensen; Creare Incorporated;  
 phs@creare.com; 603-640-2340