

BRIEFING CHART

<p>NASA SBIR/STTR Technologies Advanced, Long-Life Cryocooler Technology for Zero-Boil-Off Cryogen Storage PI: Dr. Mark V. Zagarola/Creare Incorporated, Hanover, NH Proposal No.: 07-X9.01-9829</p>	
<p><u>Identification and Significance of Innovation</u></p> <ul style="list-style-type: none"> • Objective: To develop a reliable, efficient, lightweight cryocooler for removing large amounts of heat at temperatures as low as 20 K for cryogen storage. • Innovation: A high performance turbine which decreases cryocooler input power by almost 40% with a commensurate decrease in the mass of the cryocooler support systems (heat rejection radiator, thermal and electrical busses, power generation system, etc.). • Motivation/result: Enable future space exploration missions <p><u>Technology Readiness Level:</u> 3</p>	 <p style="text-align: center;">High Performance Turbine Rotors</p>
<p><u>Technical Objectives</u></p> <ul style="list-style-type: none"> • What are the cryocooler requirements for a particular high-capacity application? • What is the cryocooler input power? • What is the size and mass of the cryocooler? • What is the design speed and performance of the advanced turbine? <p><u>Work Plan</u></p> <ul style="list-style-type: none"> • Define the loads, interfaces, and packaging constraints for the cryocooler. • Develop a conceptual design of the cooler; determine the size and mass of all components in the cryocooler; predict input power; compare mass, size, and performance to competing technologies. • Produce a preliminary design of the cold turbine; quantify the benefits of this technology development in terms of cryocooler mass, size, and performance; support performance predictions with proof-of-concept tests. 	<p><u>NASA Applications</u></p> <p>Space applications include cryogen storage for planetary and extraterrestrial exploration missions, Crew Exploration Vehicles, extended-life orbital transfer vehicles, long-term geosynchronous missions, and in-space propellant depots and extraterrestrial bases. Terrestrial applications include cooling for spaceport cryogen storage and cryogen transportation systems.</p> <p><u>Non-NASA Applications</u></p> <p>Non-NASA commercial applications include cooling for laboratory- and industrial-scale gas separation, liquefaction, cryogen storage, and cryogen transportation systems; high-temperature superconducting magnets in motors and magnetic resonance imaging systems; liquid hydrogen fuel cell storage for the automotive industry; and commercial orbital transfer vehicles and satellites.</p> <p><u>Contacts</u></p> <p>Mark V. Zagarola mvz@creare.com (603) 640-2360</p>

NON-PROPRIETARY DATA