

# NASA SBIR/STTR Technologies



## A2.01-9150 - A Turbo-Brayton Cryocooler for Aircraft Superconducting Systems

PI: Anthony Dietz  
Creare, Inc. - Hanover, NH

### Identification and Significance of Innovation

Creare's Cryoflight cryocooler is an enabling technology for hybrid turbo-electric aircraft

- > Decoupling power production from propulsion allows radical new designs
- > Large reductions in emissions, fuel burn, and noise possible with this approach
- > Weight targets only achievable with superconducting generators and motors cooled by compact, lightweight cryocoolers

#### Advantages of the Cryoflight Cryocooler

- > High-performance turbo-Brayton cryocooler
- > Efficiency exceeds others available
- > Weight is five times lighter than others
- > Optimized for aircraft superconducting machines

#### Proposed Cryoflight Recuperator

- > Lightweight, compact, high performance
- > Innovative new manufacturing technique

Estimated TRL at beginning and end of contract: ( Begin: 3 End: 4 )

### Technical Objectives and Work Plan

#### Technical Objectives:

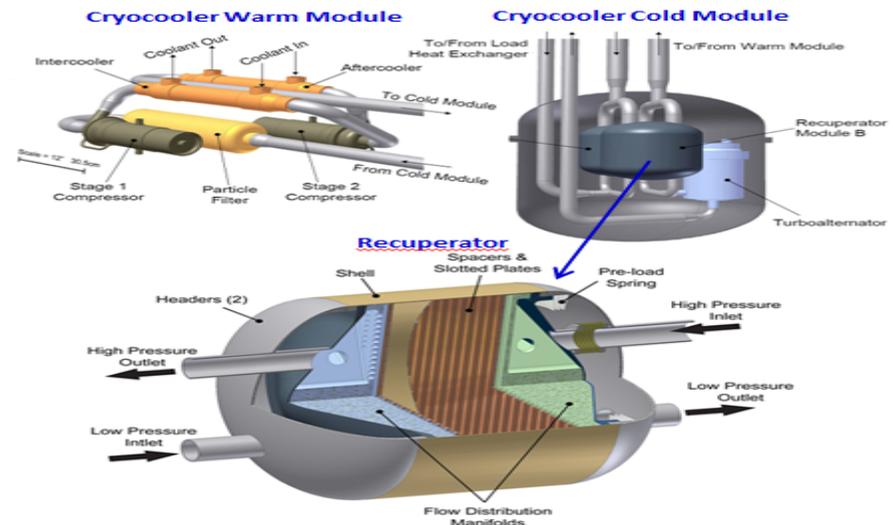
To design, develop, and demonstrate a thermal management system for superconducting aircraft, comprising a lightweight, high-performance Cryoflight cryocooler.

#### Work Plan:

Phase I: Demonstrate feasibility by scoping, sizing, and optimizing a cryocooler for this application and developing a preliminary design of the critical component--the turbomachine

Phase II: Build and demonstrate the turbomachine

Phase III: Build, test, and deliver complete thermal management systems



### NASA Applications

Cooler for superconducting aircraft technology demonstrators

Cooling for cryogen liquefaction and storage for space missions and at spaceports on earth

### Non-NASA Applications

Cooler for production superconducting aircraft

Cooling for superconducting machines in power generation (wind turbines)

Cooling for superconducting power transmission systems (data centers)

### Firm Contacts

Anthony Dietz  
Creare, Inc.  
P.O. Box 71  
Hanover, 037553116  
PHONE: (603) 643-3800  
FAX: (603) 643-4657

**NON-PROPRIETARY DATA**