

**PROJECT SUMMARY**

Firm: Creare Incorporated
Contract #: NNX13CC44P
Project Title: Turbo-Brayton Power Converter for Spaceflight Applications

Purpose:

Future NASA space missions require advanced systems to convert thermal energy into electric power. These systems must be reliable, efficient, and lightweight. In response, we are developing turbo-Brayton power converter technology with high efficiency and specific power. Our approach uses gas bearings to provide reliable, maintenance-free, long-life operation. It also consist of discrete components that can be packaged to fit optimally with other subsystems, and its continuous gas flow can communicate directly with remote heat sources and heat rejection surfaces without ancillary heat transfer components and intermediate flow loops.

Research Performed:

We designed a turbo-Brayton power converter for future spaceflight missions by completing the following objectives:

1. We optimized our conceptual design.
2. We developed a preliminary design for the components and converter assembly.
3. We quantified thermodynamic performance.
4. We determined mass and size.
5. We demonstrated critical fabrication processes.
6. We assessed technical risks.

Results:

We completed all of our technical objectives during the Phase I project. The primary objective was to design a turbo-Brayton power converter for future space missions. We performed detailed design, analyses, trade studies, fabrication trials, and evaluations to achieve this goal and transform our concept into a complete preliminary design. This work provides a strong basis for each component and the overall converter assembly, significantly reducing the uncertainty of our projections.

Continuation:

Our approach is feasible and attractive, providing significant benefits for a broad range of applications with power levels from hundreds of watts to hundreds of kilowatts. Phase II continuation will demonstrate key aspects of our technology, provide a path for development of low-mass space power systems, and help establish Creare as a supplier of Brayton converters for space.

Name and Address of Principal Investigator & Firm:

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