Department of the Navy SBIR/STTR Transition Program

Distribution Statement A: Approved for public release, distribution is unlimited NAVAIR 2015-1048

Topic # N122-114

Robust Power Conversion/Conditioning Technologies for High Power Aircraft Applications

RCT Systems, Inc.

WHO

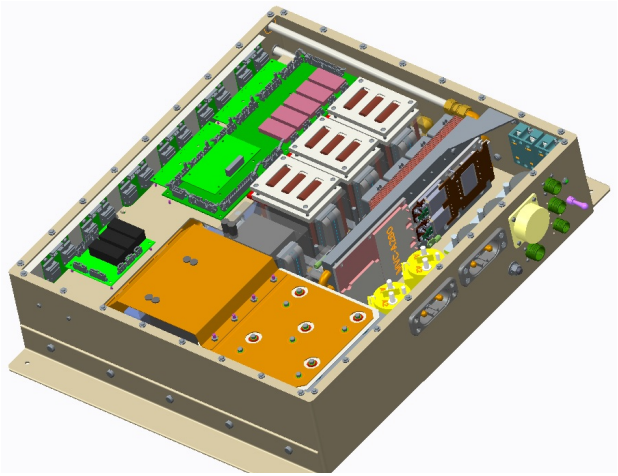
SYSCOM: NAVAIR

Sponsoring Program: PMA-242 Direct and Time Sensitive Strike Weapons

Transition Target: Rotary or Fixed Wing Aircraft

TPOC:

Other transition opportunities: Navy shipboard electric weapons systems, particularly future LCS Class Mission Module; USAF Airborne electric weapons program; US Army/USMC future ground based, or vehicle based electric weapon programs



Preliminary Power Conversion & Conditioning System (PCCS) Layout

WHAT

Operational Need and Improvement: Solving the technical challenges associated with developing and demonstrating a high density, high efficiency power conversion and conditioning device for high power, low duty cycle, rotary wing aircraft-based applications.

Specifications Required: - High vdc output (estimated between 270 and 500 vdc)
- Estimated power level of 100 to 150 kwe for a minimum duration of 30 seconds.
- Estimated duty cycle shall vary between 10 to 25% over a period of one-hour
- Voltage tolerances of +/- 1 to 5% during the duty cycle
- Minimize output voltage ripple amplitude throughout operation, with a maximum allowance of 6.0 volts.
- May include a dedicated thermal management system (tms), or can include requirements for interface to existing/planned aircraft tms.

Technology Developed: Development of innovative high power density, high efficiency power conversion and conditioning technologies to support high power, low duty cycle applications. An innovative architecture will draw constant power from the generator while simultaneously firing the weapon and storing electrical energy in pulse power batteries and/or super capacitors for the next shot. The use of SiC power modules operate at elevated frequency and temperature, increasing power density, while reducing EMI filter and cooling requirements.

Warfighter Value: Air platforms, and in fact all ground based or vehicle based systems require robust, reliable and stable electric power systems. Buffering aircraft electrical power generation and distribution systems from the effects of high power pulse loads is absolutely critical to the proper functioning of all avionics, flight control and critical safety systems.

WHEN

Contract Number: N68335-14-C-0275 **Ending on:** December 30, 2016

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Preliminary Design Review (PDR)	Low	Completed PDR	2	November 2014
Critical Design Review (CDR)	Med	NAVAIR approved CDR	3	April 2015
PCCS Prototype Manufacturing	Med	Complete Manufacturing	3	January 2016
PCCS Prototype Testing	Med	Successfully complete Factory Testing	4	February 2016

HOW

Projected Business Model: Develop & test prototype PCCS system during Ph II. In Ph III transition to aircraft platform product development, testing and air worthiness certification, working with airframers/systems integrators on specific platform integration needs. Depending on required production volume/rate, either produce the PCS system in house, or license technology to a production house.

Company Objectives: The go to developer for high power, high efficiency PCCS systems for defense electric weapons applications. Potential prime contractors of interest include Lockheed Martin, Boeing, Northrop Grumman, General Dynamics (Bath Iron Works, Electric Boat), Huntington Ingalls Industries (Shipbuilders/Airframers/system integrators/weapons systems developers), along with Raytheon and General Atomics among others

Potential Commercial Applications: Commercial and private aviation electric power stabilization. Applicable to electric vehicles and especially to commercial work vehicles with pulsed loads. Exceptionally suited for commercial cruise lines in filtering and smoothing large vacillating hotel loads.

Contact: Dennis Mahoney, VP Business Development
dmahoney@rct-systems.com 410-694-8044