

Department of the Navy SBIR/STTR Transition Program

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NAVAIR 2020-849

Topic # N18A-T001

Cooling System for Laser Enclosure

Bascom Hunter Technologies

WHO

SYSCOM: NAVAIR

Sponsoring Program: PMA-299 H-60 Multi-Mission Helicopter Program, PMA-264 Anti-Submarine Warfare Systems Program

Transition Target: The initial transition target is the H-60 with a Real-Time Active Imaging Laser Payload.

TPOC:
(301)342-3378

Other transition opportunities:

When the fundamental cooling system is completed, many rotary and fixed wing aircraft applications could benefit from the system. Aircraft that are used for surveillance and reconnaissance could be candidates and these may include the MQ-8 Fire Scout, RQ-4 Global Hawk, MQ-9 Reaper, and EA-18G Growler.

Notes: An SH-60 Blackhawk helicopter assigned to Helicopter Anti-Submarine Squadron Seven (HS-7) hovers off the bow of the aircraft carrier USS Enterprise CVN 65.



<https://media.defense.gov/1998/Aug/04/2002017283/-1/-1/0/323361-G-CKL84-590.jpg>

WHAT

Operational Need and Improvement: Many Naval platforms use a combination of imaging systems with laser emitters for the purpose of real-time active imaging, laser designation, and range finding capabilities. Due to the high output energy requirements from the lasers, there is a need for the development of an additional cooling system for laser enclosures to supplement the conventional closed liquid loop cooler. This requirement is mainly driven by the fact that laser head can heat up faster than the rest of the system and ambient temperatures can be much higher than the internal temperature of the laser enclosure.

Specifications Required: The cooling system needs to provide precise temperature of the payload over the entire extreme temperatures of military operation (-50F to 140F). Total cooling capacity requires up to 2kw of cooling. Both a chilled liquid loop as well as cooled air loop must be provided. The overall size is limited to 15 in. x 16 in. x 30 in with weight of 50.0 lbs. The standard system operates from 115 VAC, 400 Hz 3 phase power.

Technology Developed: Bascom Hunter is developing an advanced vapor cycle cooling system (VCS) architecture identified as the Flexible Efficient Cooling System (FECS) that utilizes an efficient variable speed positive displacement compressor, compact heat exchangers, highly efficient fans, and a unique control system. The FECS packaging is designed to handle the extreme shock and vibration requirements of military equipment. The FECS is also designed for the full range of environmental conditions such as salt fog, and sand and dust. By adjusting the compressor speed the amount of cooling and power used can be controlled. This allows the system to operate efficiently at various operating conditions.

Warfighter Value: As missions rely more heavily on electronics and laser technologies, cooling these systems will become more critical. FECS can provide an effective and efficient means in providing cooling specifically for the unique laser and electronics loads which will be independent. With our efficient operation, that means more power and energy can be directed to other systems on the aircraft. The overall system size and weight will make the system an option to be used on multiple platforms. If integrated with multiple platforms the supportability challenges are reduced.

WHEN

Contract Number: N68335-20-C-0067 **Ending on:** September 30, 2021

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Phase I Fabrication and test of Engineering Lab Level Prototype.	Med	System performance testing met all of the basic thermal performance requirements .	4	November 2018
Phase II System Design Configuration Defined	Med	Successful completion of Critical Design Review (CDR)	5	September 2020
Phase II Fabrication of the Vapor Cycle System Prototype	Med	Successful completion of a preliminary acceptance test.	5	March 2021
Phase II Design Verification Testing	Med	Thermal Performance test results meet or exceed the specification requirements.	6	May 2021

HOW

Projected Business Model: Bascom Hunter will manufacture the FECS at our Baton Rouge LA facility. Our current footprint will allow us to enter into Low Rate Initial Production quantities with scale-up occurring after monthly shipment quantities exceed ten (10). Bascom Hunter is ISO9001:2015 Certified and is pursuing AS9100 by Dec 2020.

Company Objectives: Bascom Hunter is working to become a premier thermal management solutions provider. We are interested in our customers needs and how we can help with our solutions. In order to maximize our effectiveness, we would be interested in meeting with Electronics Systems Providers (next tier level up) to understand integration opportunities. Our business model includes organic growth as well as acquisitions. Having a better understanding of our customer's challenges will help drive our growth activities.

Potential Commercial Applications: Electronic cooling needs continues to grow in the commercial aircraft industry. The performance capability of our VCS will provide benefits to those platforms requiring some additional cooling capability. Applications may include small equipment bays requiring liquid or air coolant flow, or small cabin aircraft requiring cabin cooling.

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