

WHO

SYSCOM: ONR

Sponsoring Program: ONR Code 351 Power, Propulsion and Thermal Management

Transition Target: Future Group 3 VTOL UAVs

TPOC: David Gonzalez
david.r.gonzalez32.civ@us.navy.mil

Other Transition Opportunities: Legacy UAVs, small generators for ground power, Auxiliary Power Units (APUs), Advanced Air Mobility (AAM) or "air taxis", hybrid-electric propulsion for Future Vertical Lift, DARPA Ancillary, Navy Blue Water Maritime Logistics Program

Notes: Rotary wing aircraft can operate from ships with a relatively small footprint but are less efficient in terms of range or time on station than fixed wing aircraft. The Navy recently retired the MQ-8C Fire Scout helicopter UAV, and there is a need for rotary wing UAVs that can operate at sea with limited infrastructure and logistics. These aircraft could expand capabilities for ISR, resupply, and strike. The photo above is a Sikorsky (Lockheed Martin) concept for a VTOL UAV that they are developing as part of the DARPA ANCILLARY program which could benefit from a lightweight, efficient generator.

Since its founding in 1961, Creare has commercialized a wide range of technologies—especially by spinning off new firms, licensing to other firms, and occasionally marketing its own products—while remaining principally an engineering services company. Our efforts in commercialization predate the advent of SBIR and include the establishment of numerous independent product businesses in fields as varied as plasma-arc torches, precision motion controls, color ink-jet printers, computational fluid dynamics, cryogenic machining, and boothless audiometers. SBIR projects resulted in the creation or direct assistance in the growth of five of these spin-off companies. In total, these product firms and new ventures now generate revenues of over \$1.61 billion per year and employ over 3,400 people. To date, we can trace over \$7.7 billion of revenues at Creare, our technology licensees, and our spin-offs to commercialization of Creare SBIR projects.



<https://news.lockheedmartin.com/2024-05-22-Sikorsky-Flight-Tests-Scalable-Rotor-Blown-Wing-UAS-for-DARPA-Project>

WHAT

Operational Need and Improvement: The Navy is seeking to develop next-generation Unmanned Aerial Vehicles (UAVs) that are capable of operating at low cost and with limited logistics. Many next-gen concepts involve Vertical Takeoff and Landing (VTOL) capability which allows the UAV to takeoff vertically without a runway and then transition to more efficient horizontal flight. These aircraft will require lightweight, efficient propulsion systems suitable for VTOL operations.

Specifications Required: In this program, Creare and UAV Turbines are developing a very lightweight (about 30 lb) turbogenerator for Group 3 UAVs. The generator produces 43 kWe power with SFC less than 0.7 lb/hp-hr.
For general UAV applications:
-14 to 60 SHP,
-SFC < 3 lb/hp-hr,
-Specific power > 2 hp/lb.
-Compatible with marine environments and vertical or horizontal operation.

Technology Developed: Creare and UAV Turbines are developing a lightweight turbogenerator that meet's the Navy's requirements for future Group 3 VTOL UAVs. Our generator is based on use of gas foil bearings (GFBs) which eliminate the oil lubrication and cooling system. We are also developing an advanced 43 kWe high-speed starter-generator, and are using lightweight materials in our design that are marine compatible.

Warfighter Value: This combination of power density and efficiency will enable VTOL UAVs with maximum capability for a variety of missions including resupply, ISR or strike. Lightweight propulsion allows the aircraft to takeoff either with more fuel, or a heavier payload, including sensors or munitions. Efficiency extends the aircraft's range or time on station. VTOL UAVs can takeoff from a small ship and then transition to efficient horizontal flight. They are also able to operate as swarms for missions such as ISR or defense.

WHEN

Contract Number: N68335-24-C-0540 **Ending on:** Sep 30, 2026

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Complete Design Concept Meeting Navy Reqs	Low	Model performance meets reqs	3	1st QTR FY25
Rotor Component Test	Medium	Validated bearings and displacement at speed	4	4th QTR FY26
Turbogenerator Demonstration Test	Medium	Demonstrated performance	5	4th QTR FY28
Aircraft Adoption of Generator	Medium	Sales or licensing	6	2nd QTR FY29

HOW

Projected Business Model: Turbogenerator IP will be held by UAV Turbines to market the engine in their product line. UAV Turbines intends to market the engine as the Monarch 5 VTOL, a lightweight version of their Monarch 5 SWIFT engine. UAV Turbines recently entered into an agreement with HopFlyt to supply Monarch 5 Swift engines for their Cyclone UAV targeting long-range maritime cargo applications. The Monarch 5 VTOL would be a next generation propulsion upgrade for the Cyclone UAV. We also intend to market the turbogenerator to defense primes such as Sikorsky for their future VTOL UAV propulsion needs.

Company Objectives: Creare's business objective is to perform valuable R&D for the Navy to ensure future R&D business. By aiding in the development and transition of this technology, we help the Navy meet its future VTOL UAV objectives. UAV Turbines seeks to supply turbogenerators to military or commercial customers as a manufacturer of small UAV engines.

Potential Commercial Applications: Conventional UAVs (non-VTOL) such as MQ-1C Gray Eagle
Very lightweight generators for ground power
Auxiliary Power Units (APUs) for commercial aircraft
Auxiliary Power Units (APUs) for military ground vehicles
Urban air mobility (UAM) or advanced air mobility (AAM) or "air taxis". Most air taxis are being developed with all-electric (battery) power systems that are significantly restricted in their range.
Contact: Darin Knaus, Engineer
dak@creare.com (603) 727-2715