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NAVY SBIR TRANSITION PROGRAM

SPOTLIGHT

Company: Luna Labs USA, LLC
Website: www.lunalabs.us
POC: Adam Goff, Materials Fellow
Phone: 434-220-2513
Address: 706 Forest Street, Suite A
Charlottesville, Virginia 22903

Introducing Blockade GC™: Luna Labs' eco-friendly, cost-effective solution to galvanic corrosion

Galvanic corrosion between aluminum and fasteners made from other metals accounts for a significant portion of total maintenance costs for aircraft, ships, ground vehicles and support equipment throughout the DoD and other industries. This issue is especially prevalent in marine environments where exposure to salt fog accelerates corrosion. Traditional efforts to mitigate galvanic corrosion have focused on applying protective coatings to the aluminum surfaces.

Luna Labs has developed Blockade GC™, an innovative coating designed for fasteners and other interface hardware. When applied to hardware such as screws, bolts, nut plates and bushings, Blockade GC hinders corrosion development by reducing electrical contact between components and serving as a barrier to water and contaminants. This non-hazardous, non-chrome, sol-gel coating is safe, environmentally friendly, and low cost. It can be applied at the factory or by qualified applicators.

Blockade GC is the culmination of nearly a decade of development supported by both the Navy and the Air Force. Luna Labs (a research division of Luna Innovations through 2021 and now an independent private company since 2022) started working on the coating in response to a Navy solicitation topic in 2014. When the Phase II award for the original STTR project ended in 2018, the technology showed promise but needed further development. "We were on pause for a little while," recalled Adam Goff, a Materials Fellow for Luna Labs. "The Navy was interested but we couldn't find a clear transition project or platform to go after."

Image courtesy of Luna Labs

Blockade GC liquid application kit.

At that point, the Air Force picked up the ball. In 2020, Luna Labs was selected to participate in the Air Force Commercial Readiness Program (CRP). This program, offered by each of the DoD branches as part of their SBIR/STTR programs, is used to accelerate the commercialization of SBIR/STTR-developed technologies with high potential for rapid transition to meet a defined customer need.

The three-year CRP development effort, which concluded in September 2024, funded formula optimization and coupon-level testing to advance the coating's technology readiness level (TRL) and manufacturing readiness level (MRL).

As a result, Blockade GC is now ready for production and deployment.

Luna Labs engages with a wide range of DoD organizations to conduct field tests. As its first test, coated hardware was recently installed on an HH-60 rotorcraft at Patrick Space Force Base.

"Outside the Air Force project, we have several ongoing efforts specific to the Navy," said Goff. "These stem from interest within the NAVAIR community and our contacts there. This past summer, we coated hardware for NAWCAD to do some installations on an H-1 helicopter and a P-8 aircraft in Jacksonville. Those are awaiting installation. The goal for both those efforts, as well as the Air Force HH-60 effort, is to fly the aircraft and conduct periodic inspections to determine if Blockade reduces galvanic corrosion on those airframes."

To continue these activities, Luna Labs was selected as part of a tri-service team proposal—Navy, Air Force, and Army—through the National Defense Center for Energy & Environment (NDCEE). Awarded in fiscal year 2025, the two-year transition-focused effort is led by NAVAIR with work sub-contracted to Luna Labs. Transitioning Blockade GC means more coated hardware installation on additional aircraft and other critical structures. Luna Labs is actively surveying the DoD community to find as many opportunities as possible for installation and testing of Blockade GC coated hardware.

"Ideally, the results from the on-aircraft testing with NAVAIR will be rolled into the results obtained through the NDCEE project," Goff said.

An additional goal of the NDCEE development effort is to develop a specification that would qualify Blockade GC for DoD use. According to Goff, no existing military or material performance specification currently covers the performance attributes of this coating. "The chemistry is unique," he said. "It's a non-chrome, non-hazardous, environmentally benign coating, based on sol-gel chemistry. There's really nothing out there like it. Part of the NDCEE program is to develop this specification and get the dominoes in place for DoD acceptance of this technology at the end of this two-year project."

Along with developing a specification for the coating itself, a third goal of the NDCEE development effort is to finalize the processes required to apply Blockade GC to hardware components at a large scale. While Luna Labs manufactures and sells the coating, applying it to large quantities of hardware will need to be handled either by maintenance staff at DoD facilities or by qualified third-party suppliers within the industrial base.

"We're looking at both DoD maintenance facility application, where they have full control, as well as creating a supply base of companies qualified to apply the coating according to the military spec. That way the Army, Navy, Air Force, or whoever, could send hardware to these companies for coating application," said Goff.

Having these specifications in place, he said, may be the final hurdle to successfully transitioning Blockade GC. "We've already had product sales. But the challenge remains that there's not a specification and there's not an easy way for the DoD to procure hardware with this coating applied. We're looking to get over

the finish line through this NDCEE program."

Goff has been involved with the development of Blockade GC from its inception. He's excited by the rapid pace of development at the new company. "Since we spun off as a separate entity, we're more agile and can strategically invest in technologies we think are close to market ready. We can focus and refocus to meet the DoD's needs year to year, or even month to month," he said.

"We're a world class research and product development organization. We're a small business, but we've developed expertise throughout the life of this company, including when we were part of Luna Innovations, that addresses almost every facet of material, mechanical and electrical need. We were very versatile, and we've become even more so."

Goff attributes much of Luna Lab's versatility and agility to participation in SBIR programs for the DoD, Department of Energy, and other agencies. "The value of the SBIR program is unparalleled," he said.

"As a small business, we're able to leverage research dollars to solve problems that can significantly improve the lives or the mission of our warfighters. We're able to use these dollars very efficiently. We've had many successes where, through Phase I and Phase II, in a three-year timeframe we've gone from TRL 1 or 2—just concepts—to TRL 7, if not 8, and being field-deployed. We do a lot of non-SBIR funded work as well and that portion of our business is growing every year. Through participation in the SBIR program, we've been able to develop a broad skill set and technology base. We can pull multiple different types of engineering disciplines together under one roof to solve multifaceted problems."

With its Navy SBIR Phase II awards, Luna Labs participates in the Navy STP to broaden the market exposure of strategically selected projects. In the case of Blockade GC, the potential applications of this technology extend beyond aircraft, to any industry dealing with galvanic corrosion and where it makes economic sense to spend a few cents extra per fastener to protect a critical structure. That includes the oil and gas industry, construction, infrastructure, and other industrial sectors.

"From my experience with Navy STP," said Goff, "the reason we chose Blockade GC to go through the program, and why we've chosen other technologies in the past, is that the material has been developed to solve a specific problem but has other versatile applications. We wanted to get it in front of as many people as we could across the Navy and other agencies. It's not just Navy folks who go to Navy STP Innovative Technology Showcase events and search the Navy STP Virtual Transition Marketplace, it's other industries and other agencies as well."

Headquartered in Virginia, Luna Labs is a product development company working with leading companies and key government agencies to solve critical problems. With small business agility and large business capabilities, the company accelerates transformative solutions from concept to product launch for defense and healthcare markets. For further information on Blockade GC and Luna Labs visit www.lunalabs.us.