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**TOPIC TITLE:**  
Instrumented Test  
Coupons and  
Monitoring System  
for Improved Material  
Performance  
Evaluations

**CONTRACT  
NUMBER:**  
FA8501-13-C-0026

**SBIR  
COMPANY  
NAME:**  
Luna Innovations  
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Roanoke, VA

**TECHNICAL  
PROJECT  
OFFICE:**  
Air Force Life Cycle  
Management Center  
Product Support  
Engineering  
Robins AFB, GA

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*A Luna Innovations employee installs a corrosion and coating evaluation system into an accelerated test chamber. The system was developed with support from the Air Force SBIR/STTR Program and the Air Force Commercialization Readiness Program. (Courtesy photo)*

## **NEW TECHNOLOGY EXPECTED TO PLAY PIVOTAL ROLE IN REDUCING AIRCRAFT CORROSION COSTS**

The Air Force is taking aim at its multi-billion dollar aircraft corrosion challenges through a partnership with a Virginia-based small business.

Luna Innovations Inc., with support from the Small Business Innovation Research/Small Business Technology Transfer (SBIR/STTR) Program, developed technology that improves upon the laboratory evaluation of aerospace coatings and provides service-life estimates for coatings in actual environments. Having a better way to measure the effectiveness of coatings that protect aircraft structures from corrosion and environmentally-produced cracks will allow the Air Force to accelerate the adoption of new coatings while reducing the risk associated with their integration.

The Air Force Life Cycle Management Center recently selected Luna Innovations' corrosion and coating evaluation system – known as CorRES – as part of its efforts to measure the severity of aircraft service environments through base deployments. The system is expected to help the Air Force reduce its nearly \$6 billion annual cost of addressing aircraft corrosion.

“The CorRES system is well aligned with Air Force Life Cycle Management Center goals for improved corrosion management and sustainment practices,” said David Ellicks, a senior materials engineer at the Air Force Corrosion Prevention and Control Office. “CorRES is also being considered for use as part of the Air Force's new accelerated corrosion test system at the Air Force Research Laboratory.

## **CURRENT TESTS OFTEN LACK CRITICAL DATA**

Since corrosion-inhibiting primers are the first line of defense for maintaining aircraft structural integrity, ensuring new products match or exceed the performance of legacy products is paramount.

The problem is that conventional coating test methods are subjective measures of performance. Expert examination of coated panels are often presented in a pass/fail format. These tests focus on aesthetic performance and do not provide data of localized corrosion processes that represent the greatest risk to aircraft structures. As a result, they lack critical coating system characteristics needed for developers or users to select the best coating for a given application.

The uncertainty associated with conventional coating tests presents a risk for the introduction of new, safer and environmentally sound coatings for aerospace applications.

## **BEHIND THE NEW TECHNOLOGY**

Luna Innovations' CorRES measures the ability of coatings to protect aircraft structures. It can be used for laboratory or outdoor coating testing and includes sensor panels that can be painted and tested like traditional materials. The sensor panels measure the ability of a coating to protect a substrate from the environment, or in the case of coating defects, the ability to inhibit corrosion.

Each system produced by the company includes continuous environmental measurements of temperature and humidity. A module for evaluating the ability of coatings to protect alloys from stress corrosion cracking and corrosion fatigue is also part of the system. Data collection and storage is fully automated so that environmental measurements, along with corrosion rate and crack velocity, are continuously measured throughout a test.

This Air Force SBIR/STTR Program – with additional support from the Air Force Commercialization Readiness Program – allowed Luna Innovations to advance the technology from a basic concept to a fully commercialized product.

It has since been used by the Air Force, the Navy, aircraft manufacturers and aerospace coating manufacturers. Additionally, the sensors that form the basis of the coating measurement system are aligned with the U.S. national standard for monitoring atmospheric corrosion and coating performance.



U.S. AIR FORCE

### **AIR FORCE SBIR/STTR PROGRAM**

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