"Make energy a consideration in all we do"

ENERGY express

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ESPC awarded at WPAFB

By Jess Dupree
AFCEC Public Affairs

The Air Force Installation Contracting Agency, or AFICA, awarded an energy saving performance contract, or ESPC, at Wright Patterson Air Force Base, Ohio, March 24.

The $7.7 million project to reduce energy use through energy conservation measures, or ECMs, was awarded to Johnson Controls Government Systems. Construction for the project began mid-April.

"Out of 106 buildings included in the original scope of the ESPC, Johnson Controls identified ECMs

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A C-5 Galaxy flies over the Wright Brothers Memorial, which overlooks the main runway at Wright-Patterson Air Force Base, Ohio. Wright-Patterson is the site of the newest Air Force energy saving performance contract, which was awarded to Johnson Controls Government Systems March 24. (Photo courtesy National Park Service)

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Bio fuel research makes global impact on sustainability and dependency on fossil fuels

By Senior Airman Luke Hill
2nd Bomb Wing Public Affairs

BARKSDALE AIR FORCE BASE, La. — The Air Force Research Laboratory released the results of a three-year study on microbes in the bio fuel supply at Barksdale Air Force Base, Louisiana, Feb. 28.

Bio fuel burns cleaner and also helps reduce dependency on fossil fuels, however, it is a breeding ground for microbes, which are living organisms that feed on the bio fuel and cause damage to equipment. As a result, AFRL, in collaboration with Barksdale and the University of Oklahoma conducted research that is making a global impact on clean energy and fossil fuel dependency.

"Our study on microbes is the most extensive study to date in the U.S.," said William Koff, Water and Fuel Systems Maintenance Fuels Technician, and Barksdale's liaison for the project. "The impact isn't just on Barksdale; the AFRL and University of Oklahoma have already released this information to the Pentagon, commercial industry and international partners. This research is foundational to the development of mitigation and remediation strategies unique to operational missions worldwide."

Biofuel is uniquely susceptible to microbial growth, as the biological component provides a fertile food source for microbes. As they grow, they can cause major damage to equipment, storage tanks and vehicle fleets.

"These microbes contaminate tanks, plug up fuel injectors and pumps, and corrodes supply lines. We experienced this firsthand at Barksdale, which led us to reach out to AFRL to do the in-depth study."

Barksdale worked with AFRL and OU to categorize the microbes in order to understand growth rates and potential damaging effects on materials caused by the microbes. To accomplish this, rigs containing different materials were lowered into four bio fuel tanks and extensively tested over an 18-month period. The team also examined tank cleaning processes to determine

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Senior Airman Jordan Taylor, 2nd Civil Engineer Squadron liquid fuels technician, waits for supplies to be lowered before cleaning a bio fuel tank on Barksdale Air Force Base, Louisiana, April 2, 2014. (U.S. Air Force photo/Staff Sgt. Jason McCasland)

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in 75 buildings," said Morgan Hurst, AFCEC ESPC project manager. "These ECMs will contribute towards Wright-Patterson realizing its energy conservation and renewable energy goals."

Johnson Controls proposed five major ECMs: chiller plant upgrades, energy management control system upgrades, interior and exterior lighting upgrades, mechanical pipe insulation and water conservation upgrades.

"The Wright Patterson energy team is always pursuing the best ECMs in all of our facilities," said Michael Tibbs, 88th Civil Engineer Group energy manager. "This project accomplishes that mindset by touching numerous high energy facilities and will assist us meeting energy- and water-reduction goals. Another key benefit will be lower utility costs while investing new energy efficient technology in numerous facilities."

AFICA issued Johnson Controls a notice of intent to award December 2014. Prior to being awarded the contract, members of Johnson Controls provided a comprehensive audit and analysis of the buildings included in the project's scope to discover opportunities for maximum energy and water savings.

Under the ESPC model, ESCOs compete to finance, design, construct and manage energy projects, and maintain the systems long-term. ESPCs range from 10 years to a maximum of 25 years, with the Air Force paying the ESCO back over the term of the contract from cost savings garnered by the energy efficiency improvements they make.

AFRL research fuels clean energy

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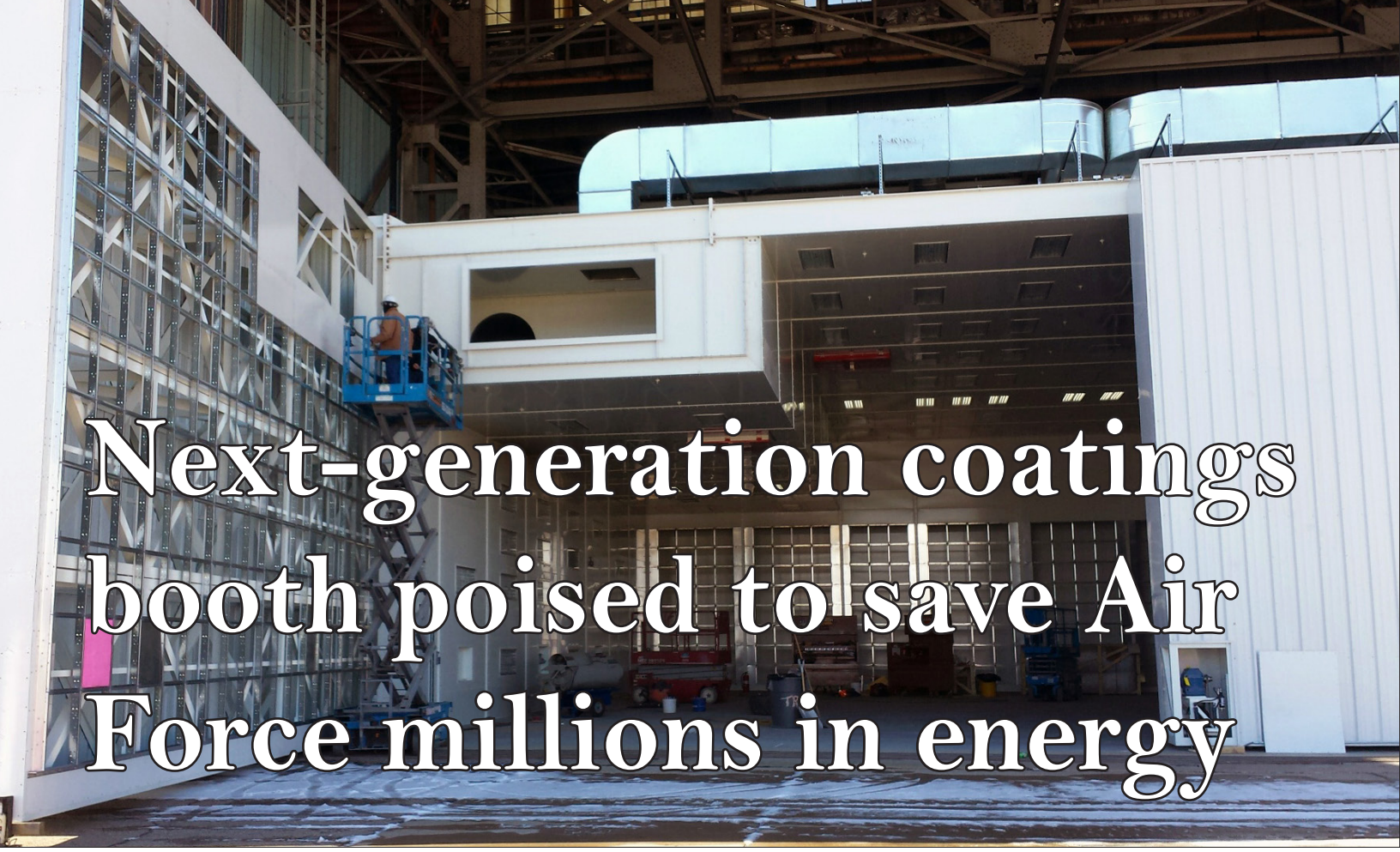
what was most effective. The project proved highly successful, leading to the development of additional AFRL and OU research studies for mitigation strategies, as well as the potential for cross-contamination into the aircraft fleet.

"The fruits of the study are that we have characterized several hundreds of these different microbes and the effects they have on the fuel and equipment. We have also categorized resistant material we can use in the future," said Koff.

Fossil fuels are not only a scarce resource, but they are also harmful to the environment. Controlling usage and dependency on fossil fuels is an important way to protect the environment and this is an international goal of all nations, not just the United States. Barksdale's 2nd Civil Engineer Squadron, OU and AFRL have produced research that will allow for efficient usage of bio fuels on a worldwide level, protecting and sustaining the earth for future generations.

Members of the 2nd Civil Engineer Squadron liquid fuels shop, assist Senior Airman Jordan Taylor, 2nd CES liquid fuels technician, out of a bio fuel tank on Barksdale Air Force Base, Louisinana, April 2, 2014. The fuel tank cleaning process was examined as part of research project investigating the effects of microbes living on the bio fuel and how to mitigate them. (U.S. Air Force photo/Staff Sgt. Jason McCasland)



Next-generation coatings booth poised to save Air Force millions in energy

By Marisa Alia-Novobilski
Air Force Research Laboratory

WRIGHT-PATTERSON AIR FORCE BASE, Ohio (AFNS) — It only makes sense for the Air Force's newest, most complex, multi-role fighter to have the most advanced, state-of-the-art sustainment facilities to ensure enduring power for years to come.

The Air Force Research Laboratory's Advanced Power Technology Office is on the front lines of making this happen for the F-35 Lighting ll.

A next generation F-35 coatings-application booth at Hill Air Force Base, Utah, the first of a series of three planned units, is nearly complete and set to become operational by October 2017. Part of a multi-year, collaborative project with multiple stakeholders from across the Air Force, Defense Department, government and industry, these facilities will enable safer, cheaper and energy efficient sustainment for the force's preeminent fighter now and in the future.

"The F-35 is a huge program for the Air Force and planning sustainment is important. It's important to get it right," said David Madden, the APTO program manager at AFRL's Materials and Manufacturing Directorate. "The F-35 program office came to us and asked for help in designing a cutting edge, state-of-the-art, energy efficient and environmentally friendly facility. We worked with a lot of partners on this — scientists, maintainers, process teams — from across government, academia and industry to make sure everything was right in design. We are excited about the upcoming testing."

The new booths are designed for the application of aircraft coatings, which are critical to the operational life of an aircraft. These coatings enable such things as heat resistance, corrosion protection and more on a platform.

Typical application of coatings is extremely costly in terms of energy consumption as well as environmental impact and safety needs to ensure the health and protection of maintenance staff. Additionally, as an aircraft ages, older coatings need to be removed and replaced — a process that can use considerable amounts of energy.

During the early stages of booth research and design, a significant amount of time was dedicated to consulting with maintainers as well as environmental and technical experts to collect data to help identify and understand specific logistical needs of the F-35 depot teams. Madden said the goal was to maximize the use of commercial technologies, automation and up-front investment to reduce the life-cycle

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A next generation F-35 Lighting ll coatings application booth at Hill Air Force Base, Utah, is set to become initially operational by October 2017. The state-of-the-art coatings booth project, led by the Air Force Research Laboratory's Advanced Power Technology Office, is expected to save more than $330,000 annually in energy through the employment of advanced sensors, control logic and sophisticated software analysis tools to monitor and improve performance over the lifetime of the complex. (Courtesy photo)

Coatings booth, continued from pg. 4

maintenance costs over the long term.

One way this was accomplished was through a project that modeled airflow and circulation. Analysis led to the development of an air recycling process, which reduces the energy cost typically associated with the coating process. By recirculating up to 70 percent of the air in the booth, it is estimated the Air Force can save more than $330,000 in energy annually.

"When coating an aircraft there's a lot of spray and overspray that occurs, and a constant flow of air crosses a work area to take the excess spray away. Typically, 'new' air is forced through the booth to remove the harmful particulates," said Madden. "Using sophisticated computer modeling, our team was able to show on a simulation the pattern of air flow. We then developed an airflow approach that is able to filter out the particulates and reuse the air, saving all kinds of energy typically associated with conditioning new air. Bioenvironmental engineers evaluated the models and determined that the models were good — this is safe."

Another novel aspect of these booths is the use of sensor automation for data collection and metrics that can enable life-long improvements and savings not only at the depot at Hill AFB, but across the Air Force sustainment enterprise.

"Extra flow meters and additional sensors have been included in this booth that may, for example, be able to calculate the amount of energy used per gallon of paint sprayed or measure how much electricity is used for each aircraft completed. We can then use these different ratios from the sensor metrics to determine which are the most meaningful. In this way, we could develop production efficiency metrics that can be compared with traditional booth operations across the Air Force," Madden said.

The new booths also take into account future robotic capabilities and are designed with enough space and clearances to enable the addition of automated technologies for coating applications.

"Rather than trying to fit the most we can in a minimum amount of space, we thoughtfully designed the booth with enough space to be able to add robots at a later date. Through automation, we would be able to move the operator out of the paint area and into a conditioned control booth. This would eliminate the need for excessive personal protective equipment and provides a much safer work environment. Robots are a possible way of the future," Madden said.

By using advanced mechanical systems, sensors and energy efficient technology, the new booths provide an organic capability to Air Force maintainers that will yield millions of dollars of energy savings over the lifecycle of these elite platforms.

"The APTO team is known across DOD for its expertise in facilitating energy efficiency projects. This was a great team collaboration and we've created an organic capability for the Air Force," Madden said.

By employing the state-of-the-art, conventional and advanced materials and processes in its work, the APTO team leads the way in ensuring Air Force supremacy today and for generations to come.

Two F-35 Lighting IIs take flight. The Air Force Research Laboratory's Advanced Power Technology Office participated in research and development for a next-generation coatings application booth for the F-35. This new booth is expected to save the Air Force energy and money using recirculated air technologies. (Courtesy photo)

Reach-Back Center
(888) 232-3721
DSN 523-6995
AFCEC.RBC@us.af.mil

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Please send your comments, story ideas and photos to afcec.pa@us.af.mil.

AFCEC Director Mr. Randy Brown

AFCEC Deputy Directors Col. Charles Kuhl
Col. Charles Kelm

Director of Energy Mr. Robert Gill

Public Affairs Mr. Mark Kinkade

Editor Ms. Jess Dupree

Graphic Designer Mr. Jeff Pendleton