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Microbes love metal.



USAF

By Eric Tegler Sep 21, 2016

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The Air Force is aging. "We have the oldest aircraft fleet we have ever had, 27 years old on average," Air Force Secretary Deborah Lee James pointedly observed at this week's annual Air Force Association Conference. Age is a creating a variety of challenges for USAF airplanes including corrosion.

In the past, the Air Force has worried mostly about the damage from environmental factors such as temperature, humidity, and salt water. But materials specialists at the Air Force Research Laboratory (AFRL) recently have come to realize that organic contaminants—mold, mildew, fungi, bacteria—corrode aircraft surfaces more seriously than they had thought. Corrosion caused by living organisms is generated by moisture, humidity, human contact and by the increasing use of drop-in biofuels, and the microbes they bring with them are for all intents and purposes, eating airplanes. While the Air Force spends approximately \$6 billion annually on corrosion issues, up to \$1.2 billion of that could be spent on microbiologically-influenced corrosion.

"Microorganisms can eat away at surface materials, and some of the worst

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areas affected are tight, hard-to-reach areas that maintainers have difficulty disinfecting," said AFRL Biological Materials and Processing team leader Wendy Goodson.

THEY'RE ESSENTIALLY COOKING AN F-16.



Goodson's team has looked into adapting the Joint Biological Agent Decontamination System (JBADS), developed for chemical warfare decontamination, for use in disinfecting airplanes for corrosion prevention. JBADS is an environmentally controlled enclosure in which an entire aircraft can be heated to temperatures of up to 180 degrees F. They're essentially cooking an F-16. This approach could temporarily rid the plane of biocontaminants, even internal structures inaccessible to maintenance crews. JBADS is to be implemented by 2017 for chemical warfare applications.

AFRL research also indicated that the military's increasing use of biofuels brings its own corrosion problem. Processed from organic materials like vegetable oils and animal fats, biofuels provide a host in which microbes thrive. Their presence can create fuel fouling, fuel degradation, and material degradation. Testing has shown that microbes immediately begin affecting steel and other structural materials in fuel tanks.

Currently the Air Force power-washes fuel storage tanks. But that can't remove every trace of microbial matter, Goodson says, adding that microorganisms begin re-infecting the next batch of fuel as soon as it's introduced into the tank. The AFRL team is likewise working to adapt JBADS for use with storage tanks, teaming its disinfection properties with cleaning.

In addition to the use of biofuels, the Air Force's drive to go green is introducing more environmentally-friendly aircraft coatings which may bring microbes along for the ride too. Human contact may transmit microbes as well, but AFRL researchers aren't confident enough of its impact to recommend that maintainers use gloves or take other measures when working on aircraft.

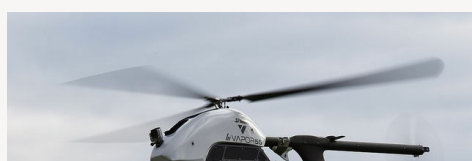
We'll be watching to see if the Air Force can beat its tiniest enemy.

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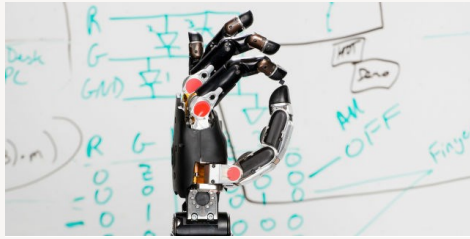
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