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Next Generation Fuels

University of Dayton

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NEWS

Tuesday April 19, 2016

Next Generation Fuels

The University of Dayton Research Institute has been awarded a cooperative agreement from the Air Force Research Laboratory with a \$70-million ceiling for research and development advanced fuels and combustion technologies to meet evolving Air Force needs.

The seven-year award, which will be incrementally funded, will cover research, development, demonstration and evaluation of fuels and combustion technologies designed to address challenges related to operation at high and low fuel temperature extremes, fuel biological contamination, engine combustor emissions, materials and systems compatibility, thermal management, as well as affordability and environmental concerns.

Steve Zabarnick, head of the Research Institute's energy and environmental engineering division, said advancements in aerospace fuels, combustion and related technologies are critical to supporting the development of next generation aircraft and engines for Department of Defense and commercial use.

"Aircraft are being designed to fly increasingly faster, higher and 'smarter,' using more electronics," Zabarnick said. "But the greater demand for power puts increased stress on fuels, engines and combustion systems in a variety of ways. Our goal is to better understand what happens to these materials and systems under extreme operating conditions, as well as to develop and improve fuels and combustion technologies that will better meet the demands placed on them."

In addition to powering aircraft, jet fuel pulls double duty as the primary coolant for propulsion systems, Zabarnick said. As aerospace systems become more advanced, generating more power – and heat – fuel temperatures rise as well, increasing the risk of fuel degradation which can result in degraded engine performance and mission readiness.

Conversely, fuels can be exposed to extremely cold temperatures for prolonged periods in aircraft flying at high altitudes, which affects the ability of fuel to flow and ignite freely.

"Research and development in fuels with improved properties, as well as engine systems that can tolerate extreme temperatures, will play a key role in enabling the development of advanced aircraft," Zabarnick said.

Reduced aircraft engine particulate emissions also will be a priority under the program. Researchers will investigate petroleum and bio-based fuels, as well as improved additives, bio-contamination mitigation and enhanced combustion technologies, with a goal of developing more affordable, efficient systems that minimize polluting emissions.

"We will work with the Air Force to develop new technologies and evaluate advanced materials. These efforts involve a range of studies from fundamental scientific work in the laboratory to application in the field," Zabarnick said. "We have worked alongside the researchers in AFRL's fuels and energy branch for more than 25 years to develop and transition technologies that significantly enhance the state of the art in fuels, combustion and related technologies. This collaboration has resulted in an internationally recognized and respected fuels research team, and this new program will allow us to further our science and engineering contributions to military and commercial aviation."

For more information and interviews, contact Pamela Gregg, University of Dayton Research Institute communications administrator, at 937-229-3268.