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Heat Management

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The University of Dayton Research Institute has been awarded an Air Force contract for research and development in advanced power and thermal management technologies for sixth-generation tactical aircraft.

The seven-year program will allow researchers in the Research Institute's energy technologies and materials division to perform basic and applied research and development of materials and technologies for more efficient, compact and lightweight power and thermal management systems. This Air Force Research Laboratory indefinite delivery/indefinite quantity contract has a \$42.2 million-ceiling and allows the Research Institute to compete for individual task orders.

In addition, the Research Institute has been awarded \$1.2 million from GE Aviation Systems for modeling, simulation and analysis of electrical power systems for current and future aircraft.

As aircraft systems become more technologically advanced, they create an increased demand for power - which in turn creates more heat that must be drawn away from those systems, said Bang-Hung Tsao, group leader for Advanced Power Components in the energy technology and materials division. Thermal management is becoming an even greater challenge because of the increased use of lightweight composite structures in current and future aircraft, which don't conduct heat out into the atmosphere as well as aluminum alloys.

Current military jets are designed so that heat is transferred from powerful electronics and systems to the fuel, which keeps the aircraft cool and less detectable by infrared cameras. If the aircraft is at the end of a mission, however, it will have little fuel aboard to absorb the heat energy.

Researches must find a way to provide increased power for flight control and other aircraft systems, but they must also manage and dissipate the heat that increased power will create, Tsao said.

"So in addition to developing technologies for more efficient power systems that can operate at higher temperatures, we must also develop new technologies for integrated thermal management systems that will harvest and store heat and electrical energy for later power needs," he said.

The Research Institute has been awarded \$7.4 million for its first task order under the program, to involve research and development of lithium-ion batteries, nanomagnetic materials, thermal management concepts and other energy conversion technologies.

Each year, sponsored research programs at the University of Dayton provide real-world research opportunities to more than 300 undergraduate and graduate students working with more than 500 professional and faculty researchers from the Research Institute, the School of Engineering and the College of Arts and Sciences.

For more information or interviews, contact Pamela Gregg at 937-229-3268.