

SUCCESS STORY

New Era of Airborne and Spacecraft Thermal Management Takes Flight

SOLID STATE POWER AMPLIFIER THERMAL MANAGEMENT

TOPIC NUMBER: AF161-086

CONTRACT NUMBER: FA9453-17-C-0478

SBIR COMPANY NAME: THERMAVANT
TECHNOLOGIES

TECHNICAL PROJECT OFFICE: AFRL/RV,
KIRTLAND AFB, NM

SPONSORING ORGANIZATION: AIR
FORCE RESEARCH LABORATORY, SPACE
VEHICLES DIRECTORATE

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THE BASICS

- Oscillating heat pipes for affordable and reliable phased arrays
- Allows for efficient heat dispersal in advanced electrical equipment
- Simple, lightweight, cost-effective



Photo by Tech. Sgt. Brigette Waltermire.

THERMAVANT TECHNOLOGIES HAS REVOLUTIONIZED THE OSCILLATING HEAT PIPE TECHNOLOGY FOR AIR AND SPACECRAFT COMMUNICATIONS, OPTICAL EQUIPMENT, AND COOLING SENSORS BY REMOVING THE THERMAL-MECHANICAL OBSTACLES THAT HAVE PREVENTED ADVANCED ELECTRONICS FROM BEING DEPLOYED IN LIGHTWEIGHT, AFFORDABLE, AND RELIABLE PHASED ARRAYS AND ANTENNA STRUCTURES.

With the support of SBIR/SSTR, Missouri-based ThermAvant Technologies has developed oscillating heat pipes (OHP) for affordable and reliable phased arrays that allow efficient heat dispersal in advanced electrical equipment.

ThermAvant Technologies grew from the research team at Missouri University's Mechanical Engineering Department, and developed the OHP design with the help of SBIR/SSTR contracts.

Oscillating heat pipe technology allows air and spacecraft electrical equipment to be cooled in a simple, lightweight, and cost effective manner that far outstrips any previous cooling effort, and replaces conventional cooling methods that are both heavier and lower performing.

With the number of future orders growing, they have attracted additional funding and engineering resources to expand their team and facility.

BEHIND THE TECHNOLOGY

Before ThermAvant developed the OHP technology, communications were limited by the space and weight that was devoted to ensuring that the delicate internal mechanisms did not overheat.

In air and space flight, technology must be smaller and more compact, to save on space and weight. This created an overheating problem in electronic devices, which the Air Force was eager to solve.

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ThermAvant Technologies oscillating heat pipe technology replaces the traditional solid thermal conduction and active pumped design with a passively pumped design with a variety of material options, which allows for a compact and lightweight heat sink.

ThermAvant began development of the technology at the University of Missouri with a research team that included the mechanical engineering department. As the team gained the support of the Air Force SBIR/STTR Phase I and Phase II contracts, the technology developed and now has garnered many outside contracts due to its effectiveness.

Since completing the technology, ThermAvant has gained more than half a dozen private-party contracts, as well as several NASA contracts for other related projects.

As the technology develops as well as the opportunities that it created, the company plans to expand. Already, ThermAvant has created a new facility to allow for continued expansion and is set to continue growing.

SBIR FUNDING AND AFRL'S EXPERTISE WERE CRITICAL

The Small Business Innovation Research program and AFRL's expertise were essential in the adaptation of the oscillating heat pipe design for use in spacecraft systems.

"The project has enabled ThermAvant to be selected by NASA for multiple Phase I and Phase II SBIR contracts underpinned by the OHP technology that the AFRL/RV seeded here at ThermAvant Technologies," said Joe Boswell, CEO and co-founder of ThermAvant Technologies. "They would not have been possible without this SBIR effort."

The SBIR funding allowed them to build prototype units for prime contractors to evaluate and compare to the conventional thermal-mechanical solutions. It also allowed them to mature the manufacturing readiness for near-term transition to production. 🌐

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