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*Turbine Health Sensor System*

*Thermal energy used to power wireless sensors that provide early detection of turbine bearing faults...*

## **NEXTREME AND APEI DEVELOPING THERMAL ENERGY HARVESTER FOR TURBINE HEALTH SENSOR SYSTEM**

**DURHAM, N.C., FAYETTEVILLE, A.R. (May 5, 2011)** — Nextreme Thermal Solutions, the leader in microscale thermal and power generation solutions, and Arkansas Power Electronics International, Inc. (APEI), a leader in state-of-the-art power electronics systems, are jointly developing a thermal energy harvesting solution for a wireless sensor system designed to monitor the health of bearings in turbine engines. The energy harvester is based on Nextreme's Thermobility wireless power generation platform and will be integrated into APEI's high-temperature wireless sensor electronics package. The turbine health management system will allow for detection, diagnosis, and prognosis of problems occurring within an engine bearing assembly.

Some of the most mechanically stressed components within turbine engines include the bearing assemblies. Real-time monitoring of temperature, vibration, strain and pressure can provide critical information on the health of bearings for both aircraft turbines as well as power generation systems. By analyzing data from these systems, engine maintenance will not be required until the sensor shows it is necessary, rather than at regularly scheduled intervals, thereby saving a great deal of time and money. Real-time detection and diagnosis of faults in aircraft turbine bearings cannot only alert the pilot that there is a problem in the engine, but also inform the maintenance crew where the actual fault is occurring. Both power generation and aircraft turbine designers can also benefit from data collected during continuous field operation of their engines, allowing for design improvements in safety, reliability, and efficiency of future systems.

The Thermobility power generation technology uses heat as a power source, eliminating the need to use traditional wired power sources or replaceable batteries. When paired with wireless transmitters, the Thermobility solution can provide a source of power for years of maintenance-free operation.

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"The turbine health sensor system will allow for a more cost effective maintenance schedule and extended lifetime of turbine systems, provide early detection and diagnosis of turbine component faults, and potentially help to prevent catastrophic failures," said Ty McNutt, director of business development at APEI. "The addition of Nextreme's thermoelectric energy harvester will reduce the total cost of ownership by eliminating the cost of battery replacement for the sensor system, as well as aiding in the integration and retrofitting of existing turbine engines."

Nextreme will be working with APEI to develop the system requirements, modeling, design and fabrication of a prototype energy harvesting system. Plans call for the development of system to be concluded by the end of 2011.

"The turbine health monitoring system is an excellent fit for our Thermobility power generation platform," said Dave Koester, vice president of engineering at Nextreme. "We are excited about working with APEI on this important and potentially life-saving application."

More information on the Thermobility platform and wireless power generation can be found at [www.nextreme.com/thermobility](http://www.nextreme.com/thermobility). Contact Nextreme at 3908 Patriot Drive, Suite 140, Durham, NC 27703-8031; call (919)-597-7300; e-mail [info@nextreme.com](mailto:info@nextreme.com); or go to [www.nextreme.com](http://www.nextreme.com). Contact APEI at 535 W. Research Center Blvd Suite 209, Fayetteville, AR 72701; call (479) 443-5759 or visit [www.apei.net](http://www.apei.net).

### **About APEI, Inc.**

Arkansas Power Electronics International, Inc. develops state-of-the-art technology in power electronics systems, electronic motor drives, and power electronics packaging. APEI specializes in high density high power electronic solutions and products based on new and emerging materials, such as Silicon Carbide (SiC). The company is based in Fayetteville, Arkansas. For more information, visit [www.apei.net](http://www.apei.net).

### **About Nextreme Thermal Solutions™, Inc.**

Nextreme Thermal Solutions offers electronics cooling and energy harvesting solutions for telecommunications, semiconductor, consumer, medical, aerospace and government markets. The company uses microscale thermoelectric technology and high-volume semiconductor manufacturing processes to address the growing needs for advanced thermal management and clean-energy solutions world-wide. Nextreme also offers sophisticated modeling, design, engineering, and contract manufacturing services to deliver fully-optimized solutions from standard and customized products that solve the most challenging thermal and power generation issues. Nextreme's headquarters and manufacturing facility are based near Research Triangle Park, North Carolina. Visit [www.nextreme.com](http://www.nextreme.com).

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