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Thermal Management Solutions

For Immediate Release

Thermacore Porous Layer Technology Cools the World's Largest Solar Telescope

Lancaster, Pennsylvania, April 27, 2016 - Thermacore, Inc. (www.thermacore.com), a leading provider of advanced thermal management and material solutions, has delivered a high-power heat stop for the 41.5-meter tall Daniel K. Inouye Solar Telescope (DKIST), located atop the Haleakalā volcano on the Hawaiian island of Maui. Once operational, the DKIST will be able to provide the sharpest views ever taken of the solar surface, which will allow scientists to learn even more about the sun and solar-terrestrial interactions. The DKIST will allow astronomers to resolve the extremely small, violently active, magnetic fields that control the temperature of the corona and the solar wind that produce flares and x-ray emissions, and help to improve prediction of the way these "space weather" phenomena influence the earth.

A heat stop is an integral part of the design of solar telescopes, and represents one of its larger engineering challenges. Located at the prime focus, the heat stop prevents unwanted solar disc light from heating and scattering on subsequent optics. In a solar telescope such as the DKIST, in addition to blocking light, the heat stop must also dissipate huge amounts of thermal energy. For the DKIST, the heat stop reduces the heat load on subsequent optics from an enormous 12 kilowatts to a minuscule 300 watts (a reduction factor of 40). Designed by Thermacore, the heat stop assembly is actively cooled by an internal system of porous layer heat exchangers that dissipate approximately 11 kilowatts at peak operating load. The heat stop must not only be able to survive this heat load, but it also must remain cool enough not to induce any additional turbulence inside the telescope's dome. As part of the design process, Thermacore was required to demonstrate the efficacy and robustness of its heat stop cooling system across the full range of potential operating conditions, as well as in some "failure mode" scenarios in which the failure of some other component had resulted in the telescope being aligned outside of its design range.

About the Technology

Heat stop cooling is facilitated by Thermacore's Porous Metal Heat Exchanger technology, which utilizes a matrix of well-bonded copper particles to enhance the heat transfer within an array of cooling channels behind the irradiated surfaces of the heat stop. By pumping coolant through the matrix of metal particles, the high local heat transfer can be leveraged by the high surface-area density of the particles, creating unusually effective heat transfer at the primary heat input surface. This cooling approach has demonstrated some of the highest heat flux cooling capabilities ever measured for both water-cooled and gas-cooled applications. "The cooling requirements of the heat stop are very demanding because there will be a high heat load that must be acquired by the coolant with a relatively small temperature difference," according to Dr. Mark North, Thermacore's lead project engineer for the heat stop program. "We developed the Porous Metal Heat Exchanger technology more than a decade ago with support from SBIR funding from DoE and DoD for fusion and laser applications. It's gratifying to see this technology play an important role in this new application."

For an overview of Thermacore's entire business capabilities, download a copy of Thermacore's Business Capabilities brochure at
http://www.thermacore.com/documents/Thermacore_Business_Capabilities_Brochure.pdf.

To learn more about Thermacore, visit www.thermacore.com.

About Thermacore

Founded in 1970, Thermacore specializes in the custom design, development, and manufacturing of highly engineered thermal management and material solutions for a variety of OEM applications across a diversified set of global markets that includes Military/Aerospace, Computer, Communication, Energy Conversion, Medical, Transportation, Test Equipment, and Automotive. With over 40 years of experience in the design, development, and manufacturing of advanced solid conduction assemblies (k-Core® APG system and thermal straps), passive and active two-phase assemblies and systems (heat pipes, vapor chambers, loop heat pipes), liquid cold plates and active pumped liquid cooling systems, cabinet heat exchangers, and custom materials development, Thermacore brings unparalleled engineering design expertise, manufacturing experience, and thermal and material solution performance, quality, and reliability to these markets.

Thermacore employs more than 180 employees at 5 facilities located in the United States (Lancaster, Pennsylvania; Philadelphia, Pennsylvania; Pittsburgh, Pennsylvania; and Ronkonkoma Long Island, New York) and the United Kingdom (Ashington, Northumberland). Thermacore facilities are certified to AS 9100 Rev C., ISO 9001:2008 and ISO 14001:2004 quality standards. For information about Thermacore, visit www.thermacore.com.

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