

Thermal management technologies and R&D partnerships for space applications

Summary

Profile type	Company's country	POD reference
Technology offer	Germany	TODE20240326004
Profile status	Type of partnership	Targeted countries
PUBLISHED	Commercial agreement with technical assistance Research and development cooperation agreement	• World
Contact Person	Term of validity	Last update
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General Information

Short summary

A German research institute for applied science develops special solutions for thermal management with a focus on Peltier cooling and heat pipes. The institute has focused on special solutions and services for industry that are not typically available at commercial suppliers. The institute is looking for research cooperation partners, particularly for space technology applications as well as for commercial agreements with technical assistance.

Full description

The German institute is focused on applied science and develops high-tech solutions, e.g. for innovative thermal management. The focus is on cooling and temperature control solutions for small and medium thermal loads with Peltier cooling or special heat pipes. The institute's portfolio is complemented by thermal simulations, structural and thermal characterization of materials, components and systems, thermography, and thermal failure analysis.

Applications include:

- Peltier cooling technology: cooling with Peltier coolers is characterized by short response times, high temperature stability and a wide temperature range, also being maintenance-free, operating noiselessly and without vibration. The institute has been conducting research in the field of thermoelectric generators and Peltier cooling modules for more than 20 years and covers the entire production chain: from the design and preparation of basic components to a complete, quality-assured system. For its customers, specific system solutions can be developed, built, and

characterized. The institute not only realizes standard TEC (Thermoelectric Cooler) planar designs, but also works on advanced TEC designs such as the novel tubular TEC design "RO-PELT" (patent pending). Furthermore, the institute is capable of fabricating batches of Peltier cooling modules on its own in-house module production line, also to replace Chinese and Russian suppliers. Another focus of the institute is Peltier module testing. A range of different measuring setups is available, for example for the precise characterization of the thermoelectric properties and long-term stability of modules. On behalf of its customers, the institute can carry out destructive and non-destructive analyses using 3D computer tomography, failure analyses as well as composition analyses using a scanning electron microscope, including the preparation of micrographs.

- Heat pipe technology: heat transfer in a heat pipe takes place via latent heat, i.e. the evaporation and recondensation of a fluid. This type of heat transfer is highly effective. The institute offers heat pipe-related services for industrial and research applications. The focus is on special heat pipe forms that are not commercially available yet: Pulsating heat pipes and switchable heat pipes (i.e. heat switches based on heat pipes). Research activities in the context of heat pipes at the institute cover a broad range of different approaches and methods, from welding and soldering of heat pipes, to wick structures, prototypes (also additively manufactured using 3D printing) to applying various working fluids. Special measurement setups and IR thermography are used to characterize the heat transfer capability of tubular and flat heat pipes. To investigate the internal structure of heat pipes, a state-of-the-art 3D computer tomograph is used. Based on its expertise, the institute is now welcoming partners interested in its thermal management services, particularly in space-related applications. In particular, the institute is now looking for:

1. Companies interested in bilateral collaboration and R&D services provided by the institute, e.g. for space applications under a commercial agreement with technical assistance
2. Companies and R&D institutions active in the field of space technology as partners for project consortia, also with public funding. (Concerning public funding, the preference is on funding programmes where the full costs of the institute are funded. Alternatively, the funding gap may be closed by a contribution from partners).

Advantages and innovations

Commercial suppliers of thermal management solutions are often focused on large-scale applications, using commercially available standardized and mass-fabricated parts. In contrast to this, the institute offers special services that are typically not commercially available.

For Peltier cooling, the institute covers the entire production chain: from the design and preparation of basic components and modules to a complete, quality-assured system. Dedicated labs and setups are available for Peltier module testing: Precise characterization of the thermoelectric properties, long-term stability, destructive and non-destructive analyses using 3D computer tomography, scanning electron microscopy etc. An in-house module production line is available to fabricate batches of Peltier cooling modules that may also substitute Chinese and Russian suppliers. Novel types of Peltier modules (tubular designs) are also possible.

For heat pipes, the focus is on special forms that are not commercially available yet: Pulsating heat pipes and switchable heat pipes (i.e. heat switches based on heat pipes)
Finally (and in contrast to many commercial suppliers), cooperation is also possible within publicly funded projects.

Technical specification or expertise sought

Stage of development

Available for demonstration

IPR Status

Secret know-how

IPR Notes

Sustainable Development goals

- **Goal 9: Industry, Innovation and Infrastructure**
- **Goal 7: Affordable and Clean Energy**

Partner Sought

Expected role of the partner

Type and area of activity of the partner sought:
The institute is open to all types of partners.

Tasks to be performed by the partner sought/Expected role of the partner:

1. Companies interested in bilateral collaboration and R&D services provided by the institute, e.g. for space applications.
2. Companies and R&D institutions active in the field of space technology as partners for project consortia, also with public funding. (Concerning public funding, the preference is on funding programmes where the full costs of the institute are funded. Alternatively, the funding gap may be closed by a contribution from partners).

Type of partnership

Commercial agreement with technical assistance**Research and development cooperation agreement**

Type and size of the partner

- **R&D Institution**
- **Big company**
- **SME 11-49**
- **SME 50 - 249**
- **University**
- **SME <=10**

Dissemination

Technology keywords

- **02011005 - Space Exploration and Technology**
- **04007005 - Heat pipes**
- **09001002 - Analyses / Test Facilities and Methods**
- **09001010 - Thermal material testing**
- **04002008 - Cooling technologies**

Targeted countries

- **World**

Market keywords

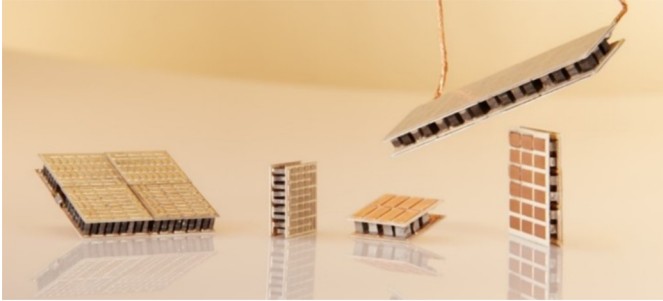
- **03005 - Laser Related**
- **03008004 - Other electronics related (including alarm systems)**
- **03004003 - Other electronics related equipment**

Sector groups involved

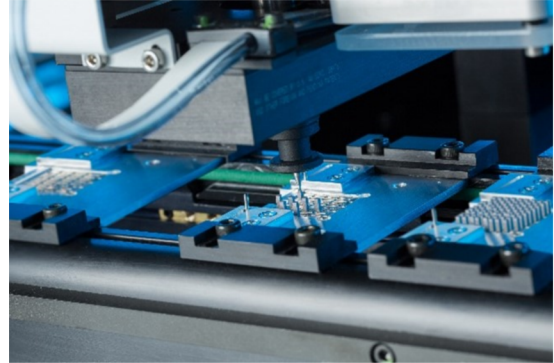
- **Aerospace and Defence**

Media

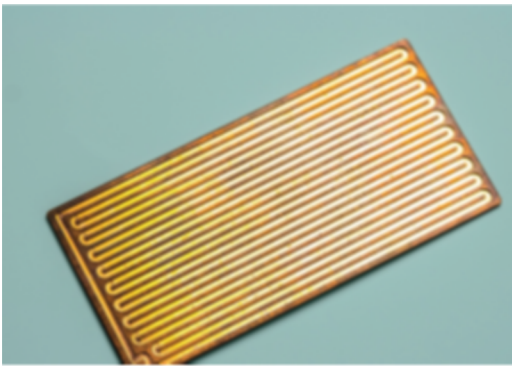
Images



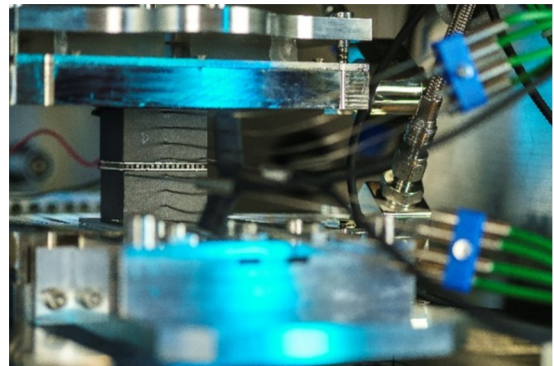
[Examples: thermoelectric modules \(TEC and TEG\) with different layouts and thermoelectric leg sizes](#)



[Automatic pick-and-place machine for thermoelectric legs, used for the fabrication of Peltier modules](#)



[Base plate of a pulsating heat pipe \(PHP\) with milled channels](#)



[Measurement setup for Peltier modules.](#)