

PRESS RELEASE

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EVAL Consortium Successfully Completes Validation of Groundbreaking Aircraft Thermal Management Solution

The EVAL project, a collaborative effort of the [National Aerospace University "KhAI"](#) and [Allatherm SIA](#), has successfully completed the validation of its innovative aircraft thermal management system, driving advancements in the aerospace thermal management field.

Project Overview:

The EVAL project aimed to develop and manufacture a demonstrator of a passive cooling system utilising loop heat pipe (LHP) technology for efficient thermal management of ultra-high bypass ratio (UHBR) engine bleed system valves exposed to harsh environmental conditions. Being a multidisciplinary initiative, the EVAL project combined desk research, design and manufacturing activities, experimental studies and advanced numerical simulation. To implement the following key technical project activities:

- **Selection of Working Fluids:** A widespread assessment of chemical substances was conducted to identify toluene as the working fluid that meets UHBR engine valve heat dissipation requirements while ensuring efficient LHP operation and compliance with aeronautical standards.
- **LHP Demonstrator Design, Manufacturing, and Simulation:** Iterative approach to designing, simulation and manufacturing of the LHP demonstrator in close collaboration with the EVAL Topic Manger Liebherr helped to meet all UHBR engine bleed system criteria, including (1) the valve geometry, dimensions, free space available around, (2) temperature and heat flux conditions within the engine compartment, and (3) parameters of the secondary airflow.
- **LHP Demonstrator Validation and Testing:** An extensive test campaign demonstrated that the proposed LHP demonstrator design is effective in addressing the cooling requirements of the UHBR engine bleed valve for different combinations of heat load and operation temperatures and different orientations in the gravity field. The LHP provides stable operation and reliable heat dissipation within the specified temperature limits (less than 200°C) in almost all ranges of the heat sink temperature and the LHP heat load.

Project Results and Impact:

The EVAL project has advanced LHP technology application in harsh environments, generating new knowledge and methodologies that will benefit future research and development activities in the aerospace and other high-tech sector. The successful demonstration of the passive cooling system contributes to the reliable and efficient operation of UHBR engines, aligning with the objectives of the Clean Sky 2 Programme.

For more information about the EVAL project, please visit the project's public website: <https://eval.khai.edu>.



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