

Advancing the state-of-the-art of multi-material 3D-printing

Stockholm, Sweden, May 2023 – QuesTek Europe is collaborating with Skyrora, Safran Additive Manufacturing Campus, CEA, SLM Solutions, Fraunhofer IGCV, University of the Aegean, f3nice, Exponential Technologies, AVL List, Amires, and CSEM in the Horizon Europe project “Multi-Material Design using 3D Printing” (MADE-3D) led by Paderborn University.

AM enables complex components of metallic materials, and this has been successfully implemented in industry, however, the potential of printing multiple materials in a single component is so far not fully explored. Although this offers new avenues for designing highly efficient functional or structural components, this is faced with many challenges, ranging available materials, limitations in available hardware (printers/powder feeders/recoaters) and material compatibility during printing. The key to achieving high-quality prints is to understand the specific characteristics and limitations of the materials to be printed, and how they may interact during the deposition process; however, this is complex, making traditional trial-and-error a highly costly and inefficient approach to multi-material additive manufacturing (AM, or 3D-printing).

QuesTek’s team of engineers use their experience and expertise to accelerate the development and adaption of multi-material AM technologies. Utilizing advanced material models developed specifically for AM, and captive know-how on joining and functional grading of dissimilar materials, QuesTek can quickly identify the root-cause of processability issues related to multi-material printing, and resolve these by designing new and compatible alloy chemistries for both laser powder bed fusion and direct energy deposition AM.

The multi-material solutions developed in the MADE-3D project are targeting applications within automotive, energy and aerospace industries, ranging from lightweighting of propulsion systems, to enhanced functional performance of e.g., magnetic or electric components in electric motors. QuesTek’s Integrated Computational Materials Engineering (ICME) and Materials by Design® technologies enable development of tailored material solutions for multi-material AM. The solutions aim for 30% improved component performance, 40% increased power density and up to 50% weight reductions compared with existing solutions, developed at 50% of the cost and 30% of the time compared to trial-and-error. The new materials and strategies developed by QuesTek in MADE-3D, are expected to be transferrable to a broad range of applications, paving the way for industrialization of multi-material AM.



Image: MADE-3D project group at the University of Paderborn, Germany (January 2023).

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About QuesTek Europe AB

QuesTek is a global leader in Materials Design and Integrated Computational Materials Engineering (ICME). Founded in 2016 as a corporate joint venture between QuesTek International LLC and Thermo-Calc Software AB, QuesTek Europe brings together QuesTek USA's Materials by Design™ expertise with the computational software development expertise of Thermo-Calc Software. By doing this, QuesTek Europe is able to offer ICME technologies and modelling services, as well as designed novel materials, to the European market. For more information about QuesTek Europe, visit www.questekeurope.com or contact info@questekeurope.com.