

Challenges and Perspectives in the Development of Ceramic Matrix Composites

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Ceramic matrix composites (CMC) find increasing application as key components in space, aviation, energy, automotive and heat treatment sectors. Lightweight CMC materials strengthen the competitiveness of companies and are one key element for high-tech sustainable products.

However, access to and availability of ceramic fibers is limited, and CMC production costs are still too high. Both factors limit further growth of CMC products on the market.

To overcome these limitations, Fraunhofer-Center HTL develops oxide and non-oxide fibers and CMC together with academic and industrial partners. The HTL covers the whole process chain and is tailoring all kinds of CMCs. Through the variation of fibers and matrices, a wide range of properties can be adjusted. The material development is often supported by simulation to identify the most suitable structure. For the production of samples and prototypes at the HTL, specific equipment on the lab scale and technical scale level is available and used in several research projects. One focus is on the development of continuously working process steps to make the materials more reproducible.

In Germany, the network of Ceramic Composites (part of Composites United e.V.) promotes the industrial use of CMC. The working group "Ceramic Composites" within the CU assists its members in the targeted acquisition of national projects and market studies. Over the last few years, working groups were established and are active along the entire process chain in the areas of machining, virtual product development, hybrid CMC and oxide CMC.

Furthermore, CMC development takes place in Europe, especially in France, the UK and Italy with increasing interest to establish CMC as a new class of material.

The presentation will give an overview of the technical status, challenges and perspective of the CMC development by presenting technical issues and results from exemplary projects.

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