INDUSTRIAL APPLICATION OF ALL OXIDE CERAMIC MATRIX COMPOSITES

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Oxide ceramic fiber reinforced oxide composites (Ox/Ox CMC) with the tradename “Keramikblech” have been developed starting in the mid 1990ies and are mainly used in the field of industrial furnace construction. Nevertheless, this material, combining fabrics made of oxide fibers Nextel 610 and Nextel 720 with oxide matrices, is still largely unknown in many technical fields.

In this presentation, the material properties and in particular the properties of Ox/Ox CMC based on the low-cost fabrics DF13-4500 and EF13-4500, which are new on the market, will be presented. It will be shown why metal structures can be replaced by Ox/Ox-CMC parts and how designers and engineers who often are not aware of designing components with Ox/Ox CMC can be trained to consider these materials when designing components for high temperature applications.

The potential of Ox/Ox CMC will be illustrated by means of some detailed examples in industrial fields where high temperature and corrosion loads are present. One example is a load-bearing rack in heat treatment processes, where lightweight and inert materials are required to realize short process times. Complex thin-walled lightweight structures are also used in unmanned aerial vehicles as components in the propulsion sector.

In addition to the pure Ox/Ox CMC, hybrid solution approaches for the combination of monolithic ceramics with Ox/Ox CMC are also demonstrated. Here, the good properties of the monolithic and fiber-reinforced materials are combined, demonstrating new application possibilities. For example, a hybrid material will be shown which has been newly developed on behalf of BASF and is now used for components in chemical apparatus engineering.