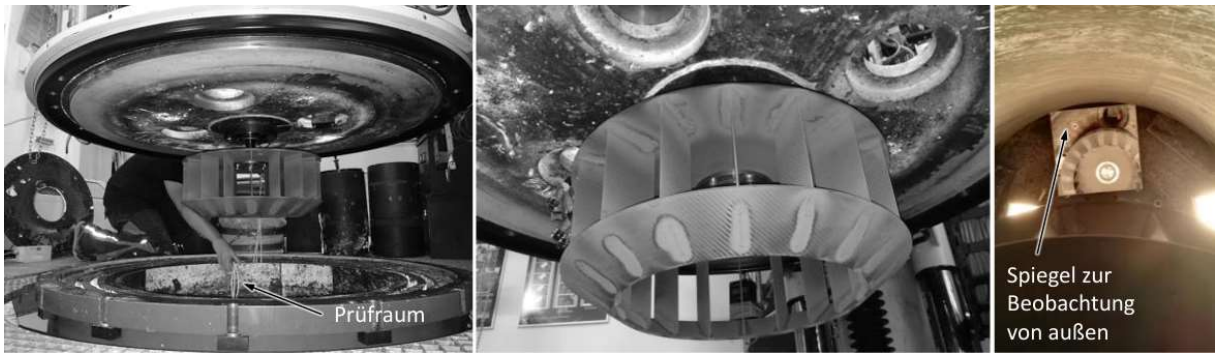
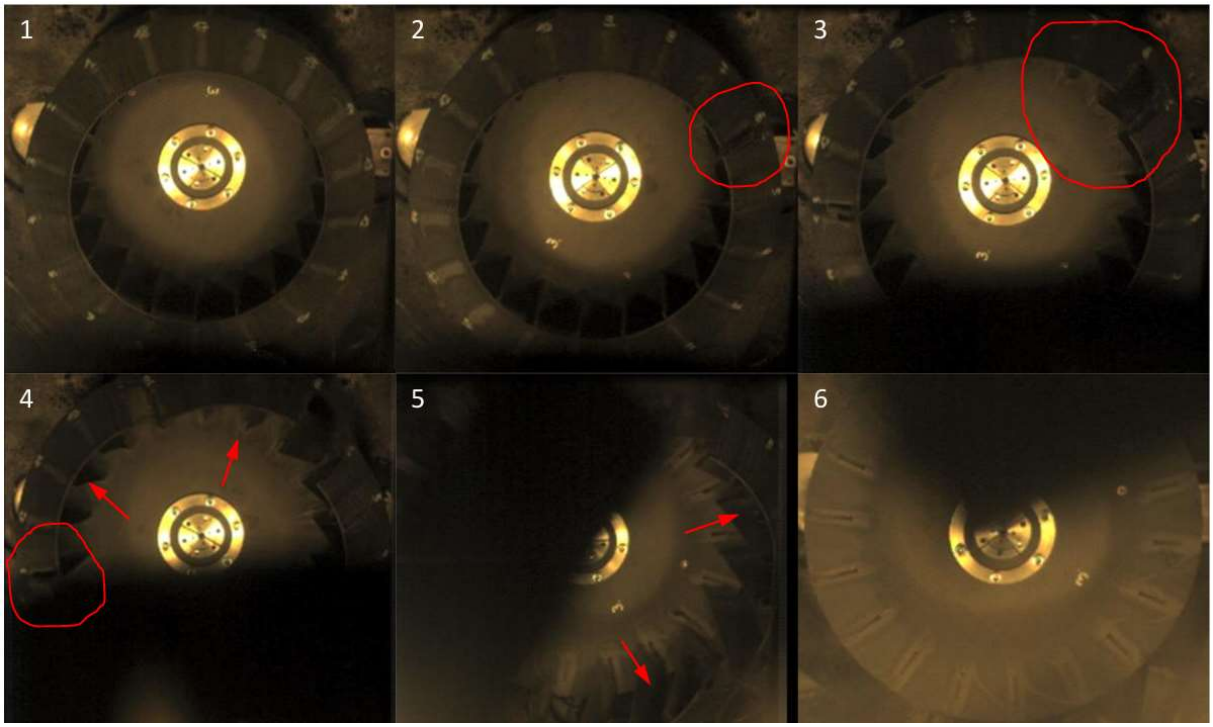
TU Dresden Institute of Lightweight Engineering and Polymer Technology

Die TU-Dresden forscht in verschiedenen Bereichen zu CMC und CFK. // The technical university Dresden conducts research into CMC and CFRP in various areas.

At the Institute of Lightweight Engineering and Polymer Technology (TUD-ILK) at the TU Dresden, extensive R&D work is being carried out in the field of load-adapted lightweight structures. This is based on a cross-material and cross-product approach that covers the entire development chain - materials, design, simulation, production, prototype, quality assurance and costs. On the basis of fundamental research projects, the ILK has a large amount of experience in the development of material and process models, component and process design as well as recycling and circular economy, especially of hybrid and multi-material lightweight structures. A long-standing expertise is the deformation and failure analysis for the design of textile-composite ceramic structures, especially for high-temperature resistant rotor applications. Within the framework of basic and applied research projects, activities include the design and dimensioning of ultrafast rotating anodes made of carbon fibre-reinforced carbons (C/C) for high-performance X-ray tubes, the development of new damage and failure models for Ox/Ox ceramics for use in modern aircraft jet engines, and the design and testing of high temperature-stable C/C fan wheels (figure below) for energy savings in industrial thermal processes. By comparing simulation and experiment,



Test set-up fort he burst test of a C/C fan wheel (Schunk Kohlenstofftechnik GmbH) with more than double the nominal speed @ ILK



High-speed images (1-6) for verification of the numerically calculated structural failure of a C/C fan wheel (Schunk Kohlenstofftechnik GmbH @ ILK

the developed material models are validated by means of real-time deformation measurement. In addition, the analytically or numerically calculated structural failure is verified in component tests, as shown in figure below, using high-speed camera technology, for example in the TUD-ILK rotor test rigs.