

Equipment

In our laboratories, we have equipment for a wide range of textile production processes – such as weaving, braiding, knitting, warp knitting and nonwoven production, for example:

- Double rapier weaving machine for processing highly sensitive materials and complex geometries, e.g. in CMC component reinforcements
 - Unival 100 shedding device with single-thread control
 - Tangential creel for rotation-free feeding
 - Warp beam attachment for positive and negative yarn feed
 - Linear fabric take-off up to 3 m for distance and 3D geometries
- Semi-automatic laboratory looms
- Variation weavers for tubular, flat, pack, spiral, core, sheath and branch braids, e.g. as component reinforcements in CMC tube structures
- 4 x 4 Variation braiders
 - 4 x 4 impellers arranged in a square
 - stitch size 140 mm
 - up to 32 clappers
 - 24 pneumatic switch points
 - separately controllable and programmable points
 - 9 core and 16 filler yarn feeders
- Radial braider

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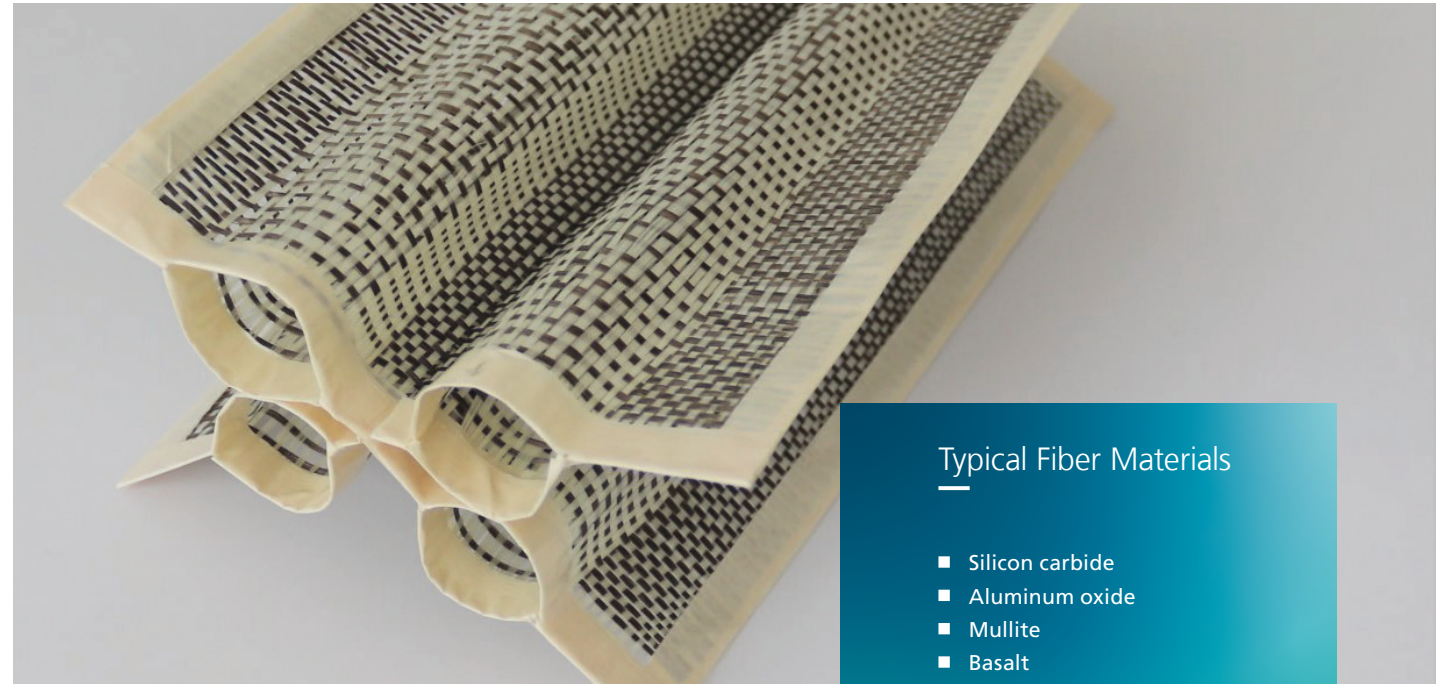
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Textile Processing of Inorganic Fibers

Textile reinforcement structures improve the properties of components made of ceramic fiber composites (CMC) for use in the high-temperature range with regard to fracture toughness, impact behavior, corrosion, wear and thermal shock resistance.

Fraunhofer Center HTL with its Application Center TFK is working on the development of textile manufacturing processes with which inorganic fibers – in particular ceramic fibers – can be processed into 2D and 3D structures designed to withstand loads close to the final contour. This is associated with an enormously improved lightweight construction potential with increased durability. New applications are emerging, for example, in the aerospace, thermal engineering and automotive industries.



Typical Fiber Materials

- Silicon carbide
- Aluminum oxide
- Mullite
- Basalt
- Carbon
- Glass

Weaving and Braiding

Woven and braided structures are the first choice for textile preform development from inorganic materials. Our plant technology covers almost the entire spectrum of weaving. On laboratory looms, sample variants can be implemented in a resource-saving manner. The latest flexible weaving technology is available for processing highly sensitive inorganic materials to produce spacer fabrics and three-dimensional fabric structures in a wide range of finenesses. In the braiding sector, we can use variation and radial braiding technology to produce very complex braids for a wide range of applications. The development focus is on multidimensional textile preforms for load-case-appropriate component design.

Services

Application Center TFK offers R&D for the optimal design of textile structures as well as their processing, manufacturing and testing.

- Design of complex multi-dimensional textile structures close to the final contour and in accordance with the load
- Simulation-based structure and binding development
- Processing of sensitive inorganic and organic high-performance fibers and standard materials
- Sample production
- Qualitative and quantitative testing methods for characterisation of fibers, textile structures and components