BRANCHED BIOMIMETIC

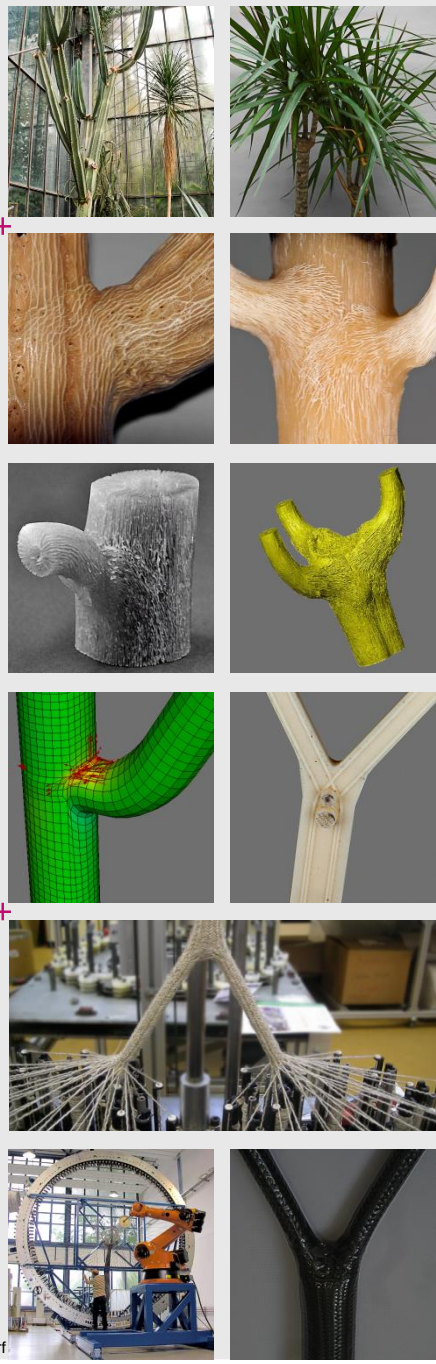
FIBER-REINFORCED STRUCTURES

The light and stiff branchings of arborescent monocotyledons and cacti served as role models for the translation into technical structures at lab scale. Potential technical applications are highly loaded nodal points, e.g. axel carriers in automotive engineering.

Arborescent monocotyledons such as Dragon trees (*Dracaena* sp) and columnar cacti (e.g. *Cereus* sp) are promising biological concept generators for branched technical compound structures. The ramifications of these plants possess a pronounced fiber-matrix-structure and a marked hierarchical organisation, which consists of isolated fibers and fiber bundles or wood strands that run in a partially lignified parenchymatous matrix. Thereby their structure highly differs from other woody plants.

The structural organisation and the biomechanics of the biological role models were analysed and characterised by modern imaging techniques, e.g. SEM or Computer Tomography, and various material testing methods. The obtained results were transferred to a CAD-model and the material behavior under static and dynamic stresses was simulated by numerical methods.

The braiding-pultrusion technique is predestinated to transfer the branched biological role models into bio-inspired technical products. Within the scope of this R&D-project existing production processes are optimised and also new methods are developed. A first patent is pending and is already put into practice to produce demonstrators on lab scale.



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