DuroBast – Durable and resource-saving composite structural components, based on innovatively pretreated and processed bast fibres

The development of innovative bio-based and thermoformable, natural fibre-reinforced plastics for the production of structural components in various applications is the goal of the joint project "DuroBast". The partners involved are working together on approaches along the process chain from the fibre to the intended application fields of automotive interiors, sports equipment and public transport.

Only fibres from domestic, European cultivation are selected. Pre-conditioning and innovative pre-treatments of the fibres, yarns and fabrics result in a reduction of the moisture absorption of the fibres and composites by about half of the value of untreated fibres. The aim is to make them available for applications in which use for natural fibre-reinforced plastics has not been possible to date due to their high sensitivity to water absorption and inadequate mechanical properties.

Innovative yarn spinning techniques allow the use of well and inexpensively available fibres that are not typically used for yarn and textile production. In addition, yarns produced in DuroBast are optimized for use as reinforcements in composites with improved mechanical strengths. The yarns are then woven into textiles that meet end-use requirements while being compatible with current manufacturing practices.

Biobased plastics, among others, are also being investigated as the polymer matrix in order to achieve 100 % biobased materials. The composites are produced as semi-finished products by compression moulding with thermo-plastic matrix materials. The thermoplastics are either consolidated with the natural fibre fabrics in the form of films, or hybrid yarns and fabrics are produced that consist of both natural fibres and thermoplastic fibres. In the latter, the thermoplastic fibres melt during compression moulding to form the matrix. Here, the processing parameters are analysed and optimized to achieve complete wetting of the fabrics and to prepare the process for later industrial production. The formability of the organic sheets is also the subject of investigation.

Innovative characterization methods provide new information on failure mechanisms and the performance of the materials, as well as realistic predictions of their service life under various conditions. The resulting findings can be used to further optimize the materials in the future. In parallel, an economic analysis is being carried out to estimate the material and production costs of the individual manufacturing steps.