

Biocomposites in 3D Printing

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Additive Manufacturing represents a quite new material processing technology. Parts are formed by adding material layer by layer until it is finished without requiring any additional tools. Therefore, using Additive Manufacturing can save time and costs in comparison to commercial production methods particularly when manufacturing complex prototypes or small batch series. Another advantage is its freedom of design.

This presentation focuses on the material extrusion or also called 3D-FLM (Fused Layer Modeling), a specific Additive Manufacturing technology. This work is conducted within two EU-funded network projects*.

It will include the production of 1.75 ± 0.1 mm thick filaments by 2-step extrusion which means that in a first process step granules are produced. The filaments are based on biopolymers with natural reinforcing fillers. Correlations between process parameters, die design, formulation and filament quality are analysed and led to a good reproducible filament quality. The quality of these filaments is defined and determined by constancy and reproducibility of the diameter (two laser scanning device), the homogeneity within the material (computer tomography) and the behaviour during the printing process.

Further investigations regarding the degradation and the rheological properties of the used materials and the influence of humidity in the granules as well as in the produced filament were done. Filling studies of the printed parts for determining the material performance (e.g. mechanical comparisons), printing time and material use were conducted, both with various angles between the printed lines and the filling rate of the printed part.

* This work is mainly supported by the project “Technology and Innovation platform for hybrid materials” as part of the transnational network “Material development” within the European Regional Development Fund (ERDF) in the framework of the Interreg program V-A ‘Austria-Bavaria’ 2014-2020, AB97. The combination with CT measurements is supported by “Competence Center for High-Resolution 3D X-ray Imaging (Com3d-XCT)” and the European Regional Development Fund (ERDF) in the framework of the Interreg V program ‘Austria-Czech Republic’