

# **Development of a procedure for the assessment of material potentials under consideration of the weld seam quality for multi-material applications in the FDM process**

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## **Abstract.**

Due to the great popularity of the Fused Deposition Modeling (FDM) process, more and more new materials become commercially available. The functionality of the FDM process allows the use of multiple materials, and this is known as multi-material printing. By integrating different materials into one component, component properties, such as mechanical properties like tensile strength, can be influenced. In particular, the combination of fiber-reinforced with non-reinforced materials is a field of application that will be investigated in this work. The aim of this study is to develop a procedure for assessing the suitability of different materials for multi-material printing in the FDM process. This enables the evaluation of different material combinations for the FDM process. The analysis of the material suitability for multi-material applications in the FDM process is carried out with the help of the evaluation of the weld seam quality. In this regard, a test method as well as test specimens are used, which ensure an evaluation of the processing suitability of different materials which is independent of the machine as well as the data preparation. In addition, suitable conditions must be defined for manufacturing the test specimens using two different materials. Single-strand test specimens are used in order to be able to draw conclusions about the weld seam quality. The weld seam quality is evaluated in relation to varying nozzle temperatures and build chamber temperatures. Finally, the suitability of the materials for multi-material applications in the FDM process are evaluated.