

**OPTIMUM ADAPTIVE SLICING CONSIDERING THE LAYER STRENGTH OF FUSED DEPOSITION
MODELLING PARTS**

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Abstract: Fused deposition modelling (FDM) is an Additive manufacturing (AM) process where the part tensile strength depends on process parameters like layer thickness, part build orientation and infill density to name a few. Layer thickness is an important parameter and in this work, experiments were conducted using specimens built as per ASTM D638 and ASTM D695 specification to find the effect of layer thickness on the tensile strength and compressive strength respectively. A constitutive model in finite element (FE) based on composite laminate theory was then developed using the experimental data that considers the layer effect. An optimization framework was built using this FE model to find optimal layer thickness for each layer without changing the total layer count. The design variables were the layer thickness and the objective function was chosen to minimize the displacement with dimensional constraint for the given loading condition. Sequential quadratic programming was used for search. Example case studies are presented to illustrate the methodology and results.