

# EXPERIMENTAL DETERMINATION OF TYPE OF FRACTURE PLA SPECIMENS IN THE FUNCTION OF PRINTING CONDITIONS

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## Abstract

*Fused Filament Fabrication (FFF) represent one of the technologies to process polymer materials in the way of rapid prototyping. Parts produced by this method not so rarely have good mechanical properties in the tangential direction in relation to the direction of the layers, but at the same time poor in the normal direction. In order to produce a part that has desired mechanical properties in all directions, it is necessary to precisely established printing conditions, which is one of the goals of this paper. Tensile strength experiments were conducted on bio-based plastic PLA (polylactic acid) specimens. Specimens were produced on a 3D printer, with printing speed from 40 up to 120 mm/min, and nozzle temperature from 170 up to 210 °C. It was established that tensile strength has a great dependence on the printing conditions. Also, the type of fracture varies depending on printing temperature. Although there is a trend of maximal deformation growth with increasing printing temperature, at lower printing temperature, more ductile fracture of the specimens occurs. Increasing the printing temperature, fracture of the specimens becomes more brittle. At the transition from one to another, tearing of the specimens occur. Such results play a key role in the successful implementation of such a processing type of polymer materials in the automotive, aerospace, medical, etc. industries.*

## Keywords

Fused Filament Fabrication, PLA, Rapid prototyping, Tensile strength

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