

Web Summary - Fatigue of 3D Printed Layered Materials

Fatigue is the number one source of failure in mechanical parts. This fact has triggered a wide range of new technology development and research for a long time. Additionally, rapid advances have been made in 3D printer technology in recent years - that resulted in low cost and easy accessibility. This manufacturing method is rapidly gaining popularity, and it also happens to allow for a high level of customizability in material structure. For instance, it is possible to print multi-material parts. Combining all these trends directs mechanical designers to an area that has not been examined much. This was the underlying motivation for this study to examine the fatigue characteristics of layered (multi-material) 3D printed technology. This project set up an experimental apparatus to test the toughening mechanism - that has previously been observed in static loading - and take it a step further to examine it in cyclic loading. This was achieved by a plate bending setup, that results in tensioning both surfaces of the plate over the period of one cycle. Additionally, a tensile pre-load was applied to increase loading. The resulting displacements were then captured using digital image correlation.

