ABSTRACT

In the present era, 3D printing is not just limited to rapid prototyping but has expanded to include final product manufacturing. The increasing utilization of 3D printing for producing final products is driven by the need for specific mechanical properties tailored to unique structures which could be achieved by multi-material 3D printing. The undeniable capability of Digital Light Processing (DLP) 3D printing to create multi-material parts meets this demand effectively.

The study explores the interlayer interaction between two materials in resisting loads, employing a DLP 3D printer to create specimens with varied contact angles for the tensile test and layer thickness for the flexural test. The mechanical test results are then confirmed by the computational simulations.

Thorough analysis revealed that the interlayer contact angle in the tensile test led to crazing failure due to stress concentration. Moreover, a smaller material thickness increased the flexural modulus, distributing stress more evenly to the hard material as a load carrier. Despite difficulties in observing fracture characteristics between different materials, the study suggests a robust interlayer bonding interaction, evident in the specimens withstanding tensile and shear stresses during the respective tests.

Keywords: Digital Light Processing (DLP), multi-material, interlayer interaction