

Design and structural analysis of 3D-printed modular furniture joints

Abstract

Modular furniture joint defined as a connection used to connect two or more wood pieces to produce furniture with multiple functions. Notofusy furniture joint made from plywood was less expensive. However, during the manufacturing process, it was occasionally caused tear-out of wood fibre. Therefore, this research has been carried out to investigate and compare the existing material and Fused Deposition Modelling (FDM) fabrication method on the designed modular furniture joint. Finite Element Analysis (FEA) of elasto-plastic method from ABAQUS CAE software and three-point bending test were used to evaluate the structural analysis of designed modular furniture joint. In this research, the final concept selected was able to withstand load up to 730 kg and it only weights 113.59 g. The long-term goal for this research was to evaluate the possibility of producing end products using FDM technology. It was found that FDM contributed to cost effective in low volume production. In this research, the material focused were Acrylonitrile Butadiene Styrene (ABS) and Polyethylene Terephthalate (PETG). However, future studies can be conducted to evaluate the possibility of using other 3D printing materials.