

Research Project Title: Investigation and development of viable 3-axis CNC machining strategies and techniques for Small Intricate Wooden Objects (SIWO)

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This research builds on the results of a previous joint GMIT Letterfrack - Industry Innovation Voucher research project, which involved developing the design of a prototype wooden chassis for a tablet. Currently, the manufacture of the wooden chassis is very expensive, largely due to the significant amount of post-processing required. This negatively effects the feasibility of bringing this product to market. The use of 3 axis CNC's for intricate work has been found to be uncommon within the wood manufacturing industry. Consequently, there is a lack of experience in machining Small Intricate Wooden Objects (SIWO) such as the tablet chassis in a cost-effective manner.

Therefore, the overall aim of this research is to investigate and develop viable 3-axis CNC machining strategies and techniques for SIWO. Primarily this research will involve conducting a comprehensive series of tests using the 3-axis CNC in GMIT Letterfrack. A case study methodology will be employed using the Industrial partner from the previous project. Testing and validation of all proposed machining strategies and techniques will be applied to tablet's wooden chassis. Two previous versions of the tablet named Beta and Kappa respectively will be analysed and will influence the new version called the Lambda. These tests will involve addressing questions pertaining to: end grain/short grain challenges, material selection, Jigs and holding devices, optimum equipment/tooling and skill requirements.

This research project will develop a set of generic good practices in the form of design principles and programming recommendations for 3D wood machining on a 3-axis CNC router, with an emphasis on quality and efficiency. These principles will take the form of a framework to assist designers of such products in order to enable more favourable designs for 3-axis CNC manufacture. This research project is partly funded by MicroPro Computers, Dublin.



Figure 1: Small Intricate Wooden Object – Wooden Chassis of a Tablet