

DEVELOPMENT OF AN AUGMENTED REALITY-BASED G-CODE GENERATOR IN A VIRTUAL CNC MILLING SIMULATION

HWA JEN YAP¹, YUN SUENPAI L², SIOW-WEE CHANG³ & KEEMSI AHYAP⁴

¹Department of Mechanical Engineering, Faculty of Engineering, University of Malaya, Kuala Lumpur, Malaysia

³Institute of Biological Sciences, Faculty of Science, University of Malaya, Kuala Lumpur, Malaysia

⁴Department of Electronics and Communication Engineering, University Tenaga Nasional, Selangor, Malaysia

ABSTRACT

In a computer numerical control (CNC) milling process, simulation is integral to ensure that the resulting work piece has very little error. This boils down to the accuracy and effectiveness of the G-code generated by the simulation in comparison with the actual CNC milling process. This study presents a system revolving around augmented reality (AR) programming to assist in the generation of G-codes for a virtual CNC milling simulation process. The proposed system allows the operator to understand the relation between G-codes and the position of the cutter through AR-based simulation. The system can be used to train novice machinists and observe the milling simulation before the actual machining operations. The G-code generation is based on a tracking and registration algorithm that calculates the related coordinates aided with a heads-mounted-display (HMD). The coordinates are saved on a separate file, which contains the coordinate of the cutter and current material removal rate (MRR), and transferred to a G-code program. The generated codes are then validated with commercially available simulation tools and it was found that only a deviation of no less than 5% exist, proving that the developed methodology is a viable method to substitute conventional means for simulating CNC milling.

KEYWORDS: Augmented Reality, G-Code, and CNC Milling