



**GRAPHICAL USER INTERFACE FOR SURFACE  
ROUGHNESS PREDICTION OF CNC MILLING  
MACHINE**

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## **ABSTRACT**

MATLAB is a programming platform specially designed for engineers. It can function to analyse data, develop algorithms even create models and applications. In this research, MATLAB Graphical User Interface (GUI) is used to develop a user-friendly program that can predict surface roughness of Aluminium 6061 in CNC milling machine. Three main machining parameters which are spindle speed (rpm), depth of cut (mm) and feed rate (mm/min) were investigated to find its relationship towards surface roughness. On top of that, the types of cutting path chosen to be studied were parallel, morph spiral and true spiral. 10 runs of experiments with different machining parameters for each cutting path were analysed throughout this research. The percentage error between the surface roughness prediction and experimental surface roughness value from research data were determined to justify the reliability of developing this project GUI. From the results obtained, the average percentage error for the three cutting paths was less than 10 % meaning that the modelling equations used to develop the GUI are accurate. On top of that, the optimum surface roughness produced in this research is from morph spiral with 1.013  $\mu\text{m}$  which is the lowest surface roughness produced compared to parallel and true spiral. The machining parameters for spindle speed should be at maximum level (300 rpm) while feed rate and depth of cut at minimum level (550 mm/min and 0.5 mm respectively) to achieve the optimum surface roughness for each cutting path.