

DISSERTATION REPORT ON
“Design and Manufacturing of Low-Cost Prototype CNC Milling Machine
for Mass Production Oriented Small Scale Industry”

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ABSTRACT

The project mainly aims to design and execute computer generated CNC program (G-CODES and M-CODES) or manually written CNC program for milling machine of low cost, such that the machine can be used in mass production of cutting Acrylic plate, Aluminum and Woods oriented small scale industries.

Most NC (Numerical Control) today is **Computer Numerical Control (CNC)**, in which computers play an integral part of control. In modern CNC systems, end-to-end component design is highly automated using **Computer-Aided Design (CAD)** and **Computer-Aided Manufacturing (CAM)** programs.

Increase in the rapid growth of technology significantly increased the usage and utilization of CNC systems in industries but at considerable expense. The idea on fabricating a low cost CNC milling machine came forward to reduce the cost and complexity in CNC systems. This project discusses the development of a low cost CNC milling machine which is capable of 3-axis simultaneous interpolated operation. The lower cost is achieved by incorporating the features of a standard PC interface with micro-controller based CNC system in an Arduino based embedded system. The system also features an offline G-Code parser and then interpreted on the micro-controller from a USB. Improved procedures are employed in the system to reduce the computational overheads in controlling a 3-axis CNC machine, while avoiding any loss in overall system performance.

KEYWORDS: Arduino Uno Microcontroller, Dongcheng Spindle, Nema 17 Stepper Motors, PololuA4988 Stepper Motor Driver, GRBL. Software, G-codes, M-codes