The Engineering and Construction of a Large-Capacity CNC Router for Inexpensive Computerized Manufacturing

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This project is centered around the engineering and construction of a large-capacity Computer Numerically Controlled (CNC) router. CNC routers are computer-controlled machines that utilize three or more axes of motion and a spinning cutter to cut and machine a workpiece. CNC routers are very versatile machines, they are capable of producing complex geometries and high tolerances and are capable of performing many functions in a production environment in less time than it would take to accomplish the same feat via traditional craftsmanship. Due to their high costs such machines are rarely available for use by small businesses, schools, or innovative individuals. The goal of this engineering project is to successfully design and construct a CNC machine that is capable of cutting and carving complex and precise geometries out of wood, plastics, and soft metals. The machine includes three axes of linear movement, and possess a working capacity of 122x244x30 cm. The construction of the CNC machine will be done in the most inexpensive manner possible that still ensures a robust and effective machine. Ultimately, many challenges were faced throughout design and construction but a successful prototype was created for a total cost of $1,945. This proved the construction of a CNC router to be cost effective compared to $18,000 for a premanufactured CNC router of similar specifications. The CNC router is capable of tolerances up to 0.013 mm. The project proved to be a success and DIY construction of a CNC router proved to be economical and practical.

Awards Won:

Aerojet Rocketdyne Foundation: First Award of $1500.00