

Design & Fabrication of 3-axis CNC Milling (Project Based Learning in Mechanical Design)

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Abstract

Technical education emphasis more on practical aspects of education and laboratory environment is essential in this approach. Many new pedagogical techniques have been developed and implemented in engineering education; Problem Based Learning/Project Based Learning is one such technique. To accomplish this, a research project is undertaken to design and fabricate a low cost 3-axis CNC milling platform with considerable accuracy after testing various open source software/firmware. GRBL was selected for the current project being more accurate and user friendly interface.

The project was successfully developed aiming to own a simplified system by students as well as academia of schools and colleges of the developing countries enabling to produce the desired components and parts in shortest possible time while cutting down the exuberant costs.

Some of the key features of this project include:

- i) The accuracy range between 96 to 99.5% (Its varies according to the material),
- ii) Rapid prototyping to materialize the manufacturing concepts, and
- iii) Accessible to low budget schools, colleges and even individuals.

Keywords

PBL- Problem/Project Based Learning, CNC- Computer numerical control

Biographies

Bandar Zahid is a final year student of Mechanical Engineering Program at Yanbu Industrial College, Yanbu Al-Sinaiyah, Saudi Arabia.

Dr. Khalid Ababtain (Project Consultant) is a Associate Professor, and Coordinator for BS Mechanical Engineering Technology Program at the Yanbu Industrial College, Yanbu Al-Sinaiyah, Saudi Arabia. He earned B.S. in Mechanical Engineering from King Fahd University of Petroleum and Minerals, Saudi Arabia, Masters and PhD in Mechanical Engineering from Wayne State University, USA. Dr. Khalid has been working on renewable energy for high temperature applications. He has number of publication and patents in the battery field. A battery first of its kind was designed and optimized for high temperature up to 120 0C.

Engr. Fayyaz Nadeem (Project Mentor) is currently a fulltime lecturer and Coordinator of Senior Project Design in Department of Mechanical Engineering Technology at Yanbu Industrial College, Saudi Arabia. Mr. Fayyaz holds a Bachelor of Technology degree in Mechanical from University of Engineering & Technology, Lahore, Pakistan and a Master of Business Administration from Allam Iqbal Open University, Islamabad, Pakistan. He has 7 years of industrial experience and over 12 years teaching experience. He has taught different courses in mechanical engineering department to technician & engineers.