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DEVELOPMENT OF AN NC CONTROLLER FOR NEXT GENERATION CNCS

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Abstract. *The CNC industry is experiencing a revolutionary change in its fundamental data model and the way to drive the machine tools using this new data model. This data model is called STEP-NC. The purpose of this research is to investigate an intelligent STEP-NC controller, which involves a STEP-NC Parser and a motion controller. The STEP-NC Parser is programmed in VC++ in conjunction with the STIX library. All STEP-NC entities such as Workplan, Workingsteps, machining features, operations and machining strategy, can be extracted by the Parser. The motion controller consists of a Digital Signal Processor (DSP) and a Complex Programmable Logic Device (CPLD). The DSP is responsible for tool path programming and servo controls whereas CPLD controls the position of an axis as well as other interfaced devices. This STEP-NC controller has the advantages of being modular, open, simple in structure, bi-directional in data flow and feature-based.*
Keywords: CNC, STEP-NC, Tool path, Motion control

1. **Introduction.** Over the years, flexible manufacturing has been developed to meet the needs for the production of smaller batches of different parts. These systems used groups of Computer Numerically Controlled (CNC) machines that could be reprogrammed to make different parts combined with automated transport systems and storage. These CNC machines became the central elements in the systems such as flexible transfer lines, flexible manufacturing systems (FMS) and flexible manufacturing cells (FMC) [20].

CNC machine tools complete the product design and manufacturing lifecycle, and more often than not they have to communicate with upstream sub-systems such as CAD, CAPP and CAM. In the case when neutral data exchange protocols such as SET, VDA, and IGES (Initial Graphics Exchange Specification) are used, information exchange can happen between heterogeneous CAD and/or CAM systems. This is however only partially successful since these protocols are mainly designed to exchange geometrical information and not totally suitable to all the needs of the CAD/CAPP/CAM industry. Thus, the international community developed the ISO10303 [1] set of standards, well known as STEP.