Technological Evolution in Machining Processes with CNC Machines in the Context of the Concept of Industry 4.0

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Abstract

The work related to this research consists of an analysis of the technological evolution of the machining processes with CNC (Computer Numerical Control) machines regarding the new concept of Industry 4.0. The concept fits into the current transformation process for the fourth industrial revolution, such as integrated Cyber-Physical Systems (CPS) within the manufacturing processes using the Internet of Things (IoT) in industrial processes. Faced with technological advances, the processes of Industrial Engineering in machining using CNC machines must undergo adaptations, aiming at substantial increases in the operational effectiveness. Thus, an approach will be made to understand how current processes can adapt to the concept under study when analyzing the evolution of the machining tools for CNC machines in the face of new processes. A thorough study was done to adapt the methodology of Industry 4.0 applying it to the machining processes in CNC Machines. Proposals for future applications are given on the topics studied.

The research methodology is based on a documental analysis research strategy.

The virtual technology in machining tools is still a subject in development, being one of the main factors to be understood in this research. In this study, it will be possible to analyze the main factors that can influence directly or indirectly the production processes of a factory with CNC machines. It will be explored and studied the types of machining processes for CNC machines and the types of machining tools developed with virtual technology.

When dealing with virtual technology, the need for software is addressed. In CNC machining operations, there is a CAM (Computer Aided Manufacturing) software that performs machining simulations for CNC machines. Thus, a study and analysis of a production system involving a CAM software, a tool with virtual technology and CNC machines will be done to verify how this set can

work encompassed and what changes this production model introduces. In the sequence of this study, an idea of a new production system is proposed, allowing for a better understanding of the possibilities for application of new approaches in the future.

Keywords

CNC Tools; CNC (Computer Numerical Control); CAM (Computer Aided Manufacturing); CPS (Cyber-Physical System); IoT (Internet of Things); Industry 4.0