

System Design and Organizational Management Considerations for a Digital Factory

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Abstract

In today's digital era, accelerators such as technology and sustainability have necessitated the transformation of the manufacturing industry, to become adaptive, connected and cognizant of its own functioning. This paper provides a framework for analyzing the system design and organizational management considerations that need to be followed in adopting the digital factory idea with a specific focus on resource efficiency. One of the priorities of this paper is to develop a model to optimize the energy consumption on the production line of a discrete printed circuit board (PCB) manufacturing company in Canada. Energy efficiency in the manufacturing domain must be seen in a more holistic form, where resource optimizations are supported by Information and Communication Technologies (ICT) based infrastructure. This provides means to better understand how energy is being utilized in the factory floor and what could be done to reduce its usage and cost to the company. Going beyond energy consumption optimization this paper draws a parallel between the data obtained from the model and the various levels of organizational management, to dynamically adapt the digital factory concept to business plans or goals thereby aiding manufacturing companies in thinking strategically and making informed decisions.

Keywords

Resource Efficiency; System Design; Organizational Management; Digital Factory; Information and Communication Technology.

Biography

Pranav Ketharam Pattabi is a second-year M.Eng student at the University of Toronto, Canada specializing in Energy Systems. He earned B.E. in Electrical and Electronics Engineering from Anna University, India. He completed an internship with G.E Power Canada and was instrumental in programming a model to reduce the internal shorting current in Electrodialysis Reversal stacks by greater than 50%. He also served as a consultant in an industrial student project and was instrumental in devising a strategic framework for the implementation of the digital factory concept in a PCB manufacturing firm based in Canada. He is a recipient of the coveted IEEE Student Enterprise award 2015 (one of 13 teams worldwide). He was awarded the Entrepreneurship, Leadership, Innovation and Technology in Engineering (ELITE) and Emphasis in Advanced Manufacturing Management technical specialization certifications by the University of Toronto. He has various other research grants and honors to his name for devising innovative industrial solutions with an emphasis on sustainable energy.