

Simulation-Based Optimization Approach for an Electro-Plating Production Process Based on Theory of Constraints and Data Envelopment Analysis

Authors : Mayada Attia Ibrahim

Abstract : Evaluating and developing the electroplating production process is a key challenge in this type of process. The process is influenced by several factors such as process parameters, process costs, and production environments. Analyzing and optimizing all these factors together requires extensive analytical techniques that are not available in real-case industrial entities. This paper presents a practice-based framework for the evaluation and optimization of some of the crucial factors that affect the costs and production times associated with this type of process, energy costs, material costs, and product flow times. The proposed approach uses Design of Experiments, Discrete-Event Simulation, and Theory of Constraints were respectively used to identify the most significant factors affecting the production process and simulate a real production line to recognize the effect of these factors and assign possible bottlenecks. Several scenarios are generated as corrective strategies for improving the production line. Following that, data envelopment analysis CCR input-oriented DEA model is used to evaluate and optimize the suggested scenarios.

Keywords : electroplating process, simulation, design of experiment, performance optimization, theory of constraints, data envelopment analysis

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