

Simulation and Genetic Algorithm-based approach for multi-objective optimization of production planning: A case study in industry

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ABSTRACT

To stay competitive on the constantly changing and demanding market, production systems need to optimize their performance daily. This is particularly challenging in labour-intensive industries, which is characterized by highly volatile customer demand and significant daily variability of available workers. The Uncertainty related to the key production parameters in the industry is causing disruptions in long-term production planning and optimization, which leads to the long lead production times, operational risks and accumulation of inventory. To address these challenges, production systems need to ensure adequate operational production planning and optimization of all variables that are influencing the productivity of their systems on a daily basis. To tackle the problem, this study elaborates the application of discrete event simulations and genetic algorithm, using the Tecnomatix Plant Simulation software, to support decision-making and operational production planning and optimization in the industry. The simulation model developed for this purpose considers: customers demand changes, variable production times, operationally available resources and production batch size, to provide an optimal production sequence with the highest number of produced pieces and the lowest total work in process (WIP) inventory per day. To demonstrate the efficiency of the methodology and prove the benefits of the selected optimization approach, a case study is conducted in the textile factory.

ARTICLE INFO

Keywords:

Discrete event simulation (DES);
Genetic algorithm (GA);
Production planning;
Multi-objective optimization;
Textile industry;
Tecnomatix Plant Simulation software

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Article history:

Received 18 May 2023

Revised 8 June 2023

Accepted 28 June 2023



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