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Simulation framework for determining the order and size of the product batches in the flow shop: A case study

Ištoković, D.[a,*], **Perinić, M.**[a], **Doboviček, S.**[a], **Bazina, T.**[a]

[a]University of Rijeka, Faculty of Engineering, Rijeka, Croatia

A B S T R A C T

The problems of determining the order and size of the product batches in the flow shop with multiple processors (FSMP) and sequence-dependent setup times are among the most difficult manufacturing planning tasks. In today's environment, where necessity for survival in the market is to deliver the goods in time, it is crucial to optimize production plans. Inspired by real sector manufacturing system, this paper demonstrates the discrete event simulation (DES) supported by the genetic algorithm (GA) optimization tool. The main aim is to develop the simulation framework as a support for the daily planning of manufacturing with emphasis on determining the size and entry order of the product batches within specific requirements. Procedures are developed within the genetic algorithm, which are implemented in Tecnomatix Plant Simulation software package. A genetic algorithm was used to optimize mean flow time (MFT) and total setup time (TST) performance measures. Primary constraint for on-time delivery was imposed on the model. The research results show that solutions are industrially applicable and provide accurate information on the batch size of the defined products, as well as a detailed schedule and timing of entry into the observed system. Display of the solution, in a simple and concise manner, serves as a tool for manufacturing operations planning.

A R T I C L E I N F O

Keywords:
Process planning;
Flow shop;
Sequence-dependent setup time;
Batch scheduling;
Discrete event simulation;
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**Corresponding author:*
distokovic@riteh.hr
(Ištoković, D.)

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