

Accepted Manuscript

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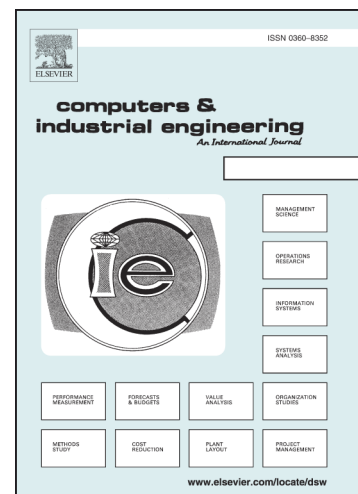
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PII: S0360-8352(17)30521-1

DOI: <https://doi.org/10.1016/j.cie.2017.10.034>

Reference: CAIE 4971

To appear in: *Computers & Industrial Engineering*



Please cite this article as: Dios, M., Fernandez-Viagas, V., Framinan, J.M., Efficient Heuristics for the Hybrid Flow Shop Scheduling Problem with Missing Operations, *Computers & Industrial Engineering* (2017), doi: <https://doi.org/10.1016/j.cie.2017.10.034>

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Efficient Heuristics for the Hybrid Flow Shop Scheduling Problem with Missing Operations

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October 24, 2017

Abstract

In this paper, we address the hybrid flowshop scheduling problem for makespan minimisation. More specifically, we are interested in the special case where there are missing operations, i.e. some stages are skipped, a condition inspired in a realistic problem found in a plastic manufacturer. The main contribution of our paper is twofold. On the one hand we carry out a computational analysis to study the hardness of the hybrid flowshop scheduling problem with missing operations as compared to the classical hybrid flowshop problem. On the other hand, we propose a set of heuristics that captures some special features of the missing operations and compare these algorithms with already existing heuristics for the classical hybrid flowshop, and for the hybrid flowshop problem with missing operations. The extensive computational experience carried out shows that our proposal outperforms existing methods for the problem, indicating that it is possible to improve the makespan by interacting with the jobs with missing operations.

1 Introduction

Flowshop scheduling problems have been largely studied in the literature during the last 50 years (Pan et al., 2014). Due to a rising demand of products, both in variety and quantity, it is commonplace that companies increase their capacity by adding new resources (both physical and human) to some stages in the manufacturing process (Ribas et al., 2010). As a result, some processing stages are formed by several machines, and a flowshop layout turns into a hybrid flowshop, a manufacturing setting that is gaining importance nowadays (Ruiz and Vazquez-Rodriguez, 2010).

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