

An Efficient Simulation Algorithm to Compute Collision Probability in a Parallel Machines Model with Buffers

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Abstract

The motivation for this work is in its application to manufacturing systems, and we use a manufacturing model focusing on the following three points: efficiently mass-producing the same product; evaluating the number of products per unit time using tact time; and avoiding collision between materials as much as possible. A parallel machines model was presented in a previous paper as such a manufacturing model, and an efficient algorithm to compute collision probability in this model was also proposed. In this work, we focus on the same parallel machines model but with buffer space added. Buffers are spaces for materials awaiting processing and are used in order to avoid a collision within a manufacturing system. We develop an efficient algorithm to compute collision probability in a parallel machines model with buffers. Moreover, in order to show that our algorithm runs fast in reality, we implement the algorithm on a PC and show its performance through computational experimentation.

Keywords

Collision probability, Computation, Manufacturing model, Parallel machines model.

Biographies

Taiki Otsuka is an Assistance Professor in the Faculty of Business Design and Informatics at Tsukuba Gakuin University, Japan. He received his B.Sc. and M.Sc degrees from Chuo University in 2003 and 2005, respectively. His research and teaching interests include algorithms, operations research, and their applications.

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