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文献翻译示例

here we gose the authors

and here is where he/she lives

摘要：我是摘要

关键词：我是关键词

1 引言

下面，开始正文吧！

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A case study of batch scheduling for an assembly shop

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ABSTRACT

This paper addresses a scheduling problem for a two-stage assembly shop in a machinery factory. At stage one, all parts of jobs are assembled simultaneously on a batch machine with a common processing time and a constant batch setup time. Then the assembled jobs are moved to the second stage to perform system integration with different processing times on a discrete machine. On both machines, a family setup time is required when the processing switches from one family to a different one. The objective is to minimize the weighted sum of makespan, total completion time and total tardiness. A Mixed Integer Programming (MIP) model is developed for solving small-size problems, and three heuristics are proposed for solving medium- and large- size problems. Computational experiments show that RFBFS, a full batch family sorting heuristic combining with rolling horizon scheduling strategy, is better than the other two heuristics in terms of solution quality. Real-life implementation also shows that the performance of RFBFS is significantly better than the current method.

1. Introduction

In this paper, we study a batch scheduling problem for a two-stage assembly shop which is encountered frequently in machinery factories. The problem is similar to the two-stage assembly scheduling problem in the literature (Yokoyama, 2001; Lin and Cheng, 2002; Koulamas and Kyparisis, 2007; Sung and Kim, 2008), where raw materials are fabricated into parts in the first stage and then all the parts are assembled into final products in the second stage. However, the fabrication of parts becomes more difficult and expensive due to the complicated technology and processes, and hence outsourcing of parts (purchasing) has been a routine procedure. Therefore, we model the assembly shop as a two-stage flow shop which consists of module assembly in the first stage and system integration in the second stage.

In the past two decades, technology has kept developing and there has been a need to increase diversity. The combination of these two trends results in multi- function and high-performance products, which makes the production of machinery much more complicated than before. In such an environment, the machinery factories face the following scheduling problems in their shop management:

(1) How to reduce cycle time?
(2) How to reduce work-in-process (WIP)?
(3) How to fulfill timely delivery?
(4) How to deal with insertion of rush orders?

This paper is motivated from a machinery factory in Taiwan, Hemingstone Machinery Co., Ltd., which produces over 10 different products of plastic bag making machines for customer orders. Currently, the orders are sequenced by the EDD rule. To respond quickly to the customer needs, a product (job) is assembled simultaneously by several workers within a frame (see Fig. 1). Due to the space limitation, idle times and waiting times easily occur resulting from the interference of workers. In order to reduce the idle times and waiting times, we propose the strategies of job dividing (derived from the concept of lot splitting) and batch processing to make the shop more efficient. To shorten the completion time, we also perform a strategy of family scheduling where jobs in the same family are grouped into batches to eliminate the family setups (Liao and Liao, 2008; Schaller and Gupta, 2008). As depicted in Fig. 2, the first stage is modeled as a batch machine so that c skilled workers can assemble c jobs separately and simultaneously. The second stage is modeled as a discrete machine in which jobs entering in batches are processed sequentially and leave one by one. As such, most of the idle times due to the interference with each other in the first stage can be diminished, and family scheduling can reduce the job setups and family setups in both stages.

Objective functions are used to evaluate the performance of a scheduling solution approach. In this paper, jobs in a batch share a batch setup and jobs within a family share a family setup. Such batching of jobs may delay the processing of other jobs and cause them to be tardy. To resolve this trade-off, we use a

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