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Managing resources for order promising in Available-To-Promise (ATP) systems: A simulation study *

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Abstract

This paper addresses the impact of different decisions concerning the internal management of the manufacturing resources of a company in order to provide its customers with tight and reliable due dates, as well as to build feasible production plans. Clearly, these decisions are related to Available-To-Promise (ATP) systems, as well as to finite capacity scheduling. First, we review the relevant literature on the topic, and identify the main decisions regarding the utilization of manufacturing resources for due date quoting, i.e. order acceptance strategies, order scheduling policies, and order rescheduling. A simulation model is built based on the SWARM platform for agent-based simulation, and the different decisions are analyzed for several scenarios. The conclusions seem to point at the relevance of rescheduling when demand is close to capacity, as well as on the importance of the scheduling policies even when there is a notable capacity slack. Finally, the order-per-order acceptance strategy seems to be more efficient that batching strategies regardless the myopic nature of the former.

Key words: Order promising, Multi-agent systems, Simulation

1 Introduction

In today's dynamic and complex manufacturing environment, an important enabler in gaining competitiveness is the ability of a company to respond quickly and effectively to satisfy customers [1]. For companies adopting a Make-To-Order manufacturing strategy, the first step to do it begins with effectively responding to requests for quotations (RFQs) from customers, which means providing them with tight and reliable due dates. Advanced Available-To-Promise (ATP) systems refer to a variety of methods and tools to enhance the responsiveness of order promising and the reliability of order fulfillment [2]. At the same time, once a company tenders for a job at the customer enquiry stage, it must determine the order routing and plan sufficient capacity to complete the order [3]. Therefore, the idea of combining ATP and finite capacity scheduling systems by altering the production schedule in response to incoming customer orders is gaining in popularity, despite the computational complexity of scheduling problems and the need for short response times [4].

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