A METHODOLOGY FOR INTEGRATED BUFFER DESIGN AND MANAGEMENT IN REPETITIVE CONSTRUCTION PROJECTS

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ABSTRACT

One important challenge of production systems in both manufacturing and construction is the management of the harmful impacts of variability. While both industries have commonly used buffer-based production strategies to deal with the variability issue, construction is characterized for using intuitive, non-general and wasteful buffering strategies. For overcoming these limitations, this paper describes a conceptual approximation for an integrated buffer (Bf) design and management methodology using Work-In-Process (WIP) in repetitive building projects. The Bf design component uses the Multiobjective-Analytic-Model (MAM) and Simulation-Optimization (SO) modeling, while the Bf management component uses the Rational-Commitment-Model (RCM), an operational decision support tool based on statistical analysis. Each individual component has been previously tested and validated in different case projects.

This integrated methodology provides a comprehensive approach to deal with variability using WIP Bf, which explicitly considers: (i) a general production framework which covers the production levels from top to bottom; (ii) a general modeling framework which is suitable to any repetitive building project; and (iii) a sound theoretical framework for describing different production scenarios in repetitive building projects. The main characteristics, advantages, perspectives and limitations of the integrated methodology are addressed in the paper.

KEY WORDS

Buffer design and management, work-in-process, multiobjective analytic models, simulation-optimization, rational commitment model, repetitive construction projects.

INTRODUCTION

Variability management is one the most recognized challenges in production systems in both manufacturing and construction industries. To understand the effect of variability on production processes, Hopp and Spearman (2000) distinguished two kinds of variability in manufacturing systems: 1) the time process of a task and 2) the arrival of

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