

The impact of production interruptions in kitting, an analytical study

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Abstract Efficient transport of materials between the stages of the production process is key to minimizing production costs. Kitting — the collection of the necessary parts for assembly into a specific container prior to arriving at an assembly unit — is an attempt at achieving efficient transport and thus reducing these costs. In this paper we discuss the performance of kitting operations, treating it as a Continuous Time Markov Chain. Specially, the impact of interruptions in the production of parts is investigated. To this end, parts arrive in accordance with an Interrupted Poisson Process, interruptions modelling the downtimes during the production.

Our analysis heavily relies on the use of sparse matrix techniques. Results show that this technique is a valuable queuing theoretic numerical approach for estimating the performance of a kitting process in terms of both solution speed and accuracy.

Keywords Kitting process · Continuous Time Markov Chain · Sparse matrix · Production interruptions · GMRES

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