Finding Optimal Material Release Times Using Simulation-Based Optimization

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We present a method for setting release times for jobs with due dates in a stochastic production flow line for which the sequence of jobs has been determined. Unlike other approaches to this problem, ours considers a *transient* situation. Thus, the flow line will typically contain work in process (WIP), that is, jobs that have been previously released to the system.

Our goal is to develop a job release schedule that not only minimizes tardiness but also maximizes flexibility. The philosophy can be characterized as one that seeks to "release as late as possible, but no later!"

Our methodology is based on Monte Carlo simulation and consequent optimization by a method that became known as "stochastic counterpart" or "sample path" simulation-based optimization techniques. We use this method to minimize an expected value objective function that contains terms for tardiness and flow time "costs." We include a discussion of how the cost parameters of this objective function can be obtained by considering a "characteristic curve" for the system. We also discuss means for obtaining sensitivity analysis with respect to due dates and service times distributions parameters. We conclude with a numerical example.

(*Stochastic Systems*; *Simulation-Based Optimization*; *Flow Lines*; *Release Strategies*; *Tardiness*; *Lead Times*; *Manufacturing Executions Systems*; *Enterprise Resources Planning Systems*)