Stochastic Scheduling Subject to Preemptive-Repeat Machine Breakdowns: Models, Propositions, and Optimal Policies

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Abstract:
We consider a class of stochastic scheduling problems featured by preemptive-repeat machine breakdowns, i.e., if a machine breaks down during the processing of a job, the work done on the job prior to the breakdown is lost and the job will have to be started over again. Our study is built on a general setting, which allows: (i) the uptimes and downtimes of the machine follow general probability distributions; (ii) the breakdown process depends upon the job being processed; and (iii) the processing times of the jobs are random variables following arbitrary distributions. We consider two possible cases for the processing time of a job interrupted by a breakdown: (a) it is re-sampled according to its probability distribution; or (b) it is the same random variable as that before the breakdown. Both static and dynamic policies are derived. Our main works in recent years on this subject will be summarized and presented.