Serial batching scheduling of deteriorating jobs to minimize the makespan

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Abstract. The production and transportation collaborative scheduling problem is studied when the jobs processing time is deteriorating. Several single machine scheduling problems under the circumstances of deteriorating jobs processing time are analyzed, of which the objectives are respectively minimizing the makespan, minimizing the number of tardy jobs, minimizing the total jobs completion time, and the accordingly optimization algorithms are designed. Based on the research results of the single ma-chine scheduling problem, the production and transportation collaborative scheduling problem with buffer area is considered, and corresponding mathematical model is established, of which the objective function is to minimize the makespan. Besides, the production and transportation collaborative scheduling problem without buffer area is also studied, and the mathematical model is established based on the constraint condition of no buffer area, of which the objective function is to minimize the makespan. The properties of optimal solution are analyzed, new lower bound is derived, and a heuristic for the problem is constructed. The results of simulation experiments show that when the number of jobs are larger than 260, the average and maximum relative gaps of the heuristic are both less than 0.01%.