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Coordination of production and transportation in supply chain scheduling.

Summary: This paper investigates a three-stage supply chain scheduling problem in the application area of aluminium production. Particularly, the first and the third stages involve two factories, i.e., the extrusion factory of the supplier and the aging factory of the manufacturer, where serial batching machine and parallel batching machine respectively process jobs in different ways. In the second stage, a single vehicle transports jobs between the two factories. In our research, both setup time and capacity constraints are explicitly considered. For the problem of minimizing the makespan, we formalize it as a mixed integer programming model and prove it to be strongly NP-hard. Considering the computational complexity, we develop two heuristic algorithms applied in two different cases of this problem. Accordingly, two lower bounds are derived, based on which the worst case performance is analyzed. Finally, different scales of random instances are generated to test the performance of the proposed algorithms. The computational results show the effectiveness of the proposed algorithms, especially for large-scale instances.

Keywords: supply chain scheduling; batching; transportation; heuristic algorithm
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