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M-Machine Assembly Scheduling Problem to Minimize Total Tardiness with Non-Zero Setup Times

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Abstract : Our objective is to minimize the total tardiness in an m-machine two-stage assembly flowshop scheduling problem. The objective is an important performance measure because of the fact that the fulfillment of due dates of customers has to be taken into account while making scheduling decisions. In the literature, the problem is considered with zero setup times which may not be realistic and appropriate for some scheduling environments. Considering separate setup times from processing times increases machine utilization by decreasing the idle time and reduces total tardiness. We propose two new algorithms and adapt four existing algorithms in the literature which are different versions of simulated annealing and genetic algorithms. Moreover, a dominance relation is developed based on the mathematical formulation of the problem. The developed dominance relation is incorporated in our proposed algorithms. Computational experiments are conducted to investigate the performance of the newly proposed algorithms. We find that one of the proposed algorithms performs significantly better than the others, i.e., the error of the best algorithm is less than those of the other algorithms by minimum 50%. The newly proposed algorithm is also efficient for the case of zero setup times and performs better than the best existing algorithm in the literature.

Keywords : algorithm, assembly flowshop, scheduling, simulation, total tardiness
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