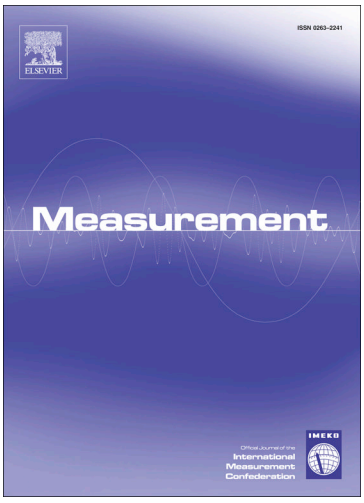


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# An effective hybrid multi objective evolutionary algorithm for solving real time event in flexible job shop scheduling problem

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**Abstract** This paper addresses the multi-objective model for a flexible job shop scheduling problem (FJSSP) to improve the system performance under the condition of machines break down as a real time event. It is important to identify the relevant performance measures to the mentioned problem for examining the system performance. Therefore, minimization of make span and minimization of total machine load variation is considered as two performance measures. Generally, it is very difficult to develop a mathematical model for the real-time situations in FJSSP. Hence, in this paper we divided the research work into two folds: Primarily, a mixed-integer non-linear programming (MINLP) model has been developed to represent the above-mentioned multi-objectives that subjected to constraints without considering machines break down. Secondarily, by incorporating the machines break down as the real-time event the performance of the system is examined. Solving conflicting objectives simultaneously for finding the optimal/near optimal solutions in a reasonable time is a challenge. In this paper, we proposed a new evolutionary based multi-objective teacher learning-based optimization algorithm (MOTLBO) to solve the above-mentioned complex problem. Moreover, to improve the obtained solutions a local search technique has been incorporated in the MOTLBO and comparisons has been made with existing multi-objective particle swarm optimization (MOPSO) and conventional non-dominated sorting genetic algorithm (CNSGA-II). Results found that the proposed multi-objective-based hybrid meta-heuristic algorithm produced high-quality solutions as proved by the tests we performed over a number of randomly generated test problems. Finally, comparisons also made with how the machines break down can affect the proposed systems performance.

**Keywords:** Flexible job shop. Multi-objective evolutionary algorithm. NP-hard. Optimization.