

Foreword

A bulk of research in job shop scheduling is dealing with problems where finding a solution schedule with minimum makespan is desired. Recently, also tardiness objectives received attention because on-time order fulfillment is of increasing importance particularly in pull-oriented supply chain systems. Keeping job due dates is a prerequisite for avoiding stock outs and for serving customers within promised delivery times. In case of highly utilized machine capacities, however, not every jobs might be producible on time. In such situations the minimization of the total tardiness of the jobs turns out as an appropriate objective for production scheduling. The book of Jens Kuhpfahl investigates scheduling methods, more precisely local search based heuristics, for the job shop problem with total weighted tardiness (JSPTWT) as objective. The operation research literature treating this problem class dates back over fifteen to twenty years. In this relatively short period an area of intense research has developed which is systematically reviewed and refined by the author. Based on the well-known disjunctive graph model for the classical minimum makespan problem, he analyses existing neighborhood search operators for the JSPTWT and derives new definitions to modify solution schedules in so far unknown ways. Feasibility guarantees and connectivity properties are proved analytically for these neighborhoods and their performance is compared empirically. To reduce computation times, a fast method for assessing the schedule quality, called Head Updating, is proposed. These and further components are thoroughly integrated into the metaheuristic framework of a Greedy Randomized Adaptive Search Procedure (GRASP) delivering a new state-of-the-art method for the JSPTWT. Although research in deterministic machine scheduling is highly developed, the book succeeds in closing existing gaps and contributing new ideas to the design of scheduling heuristics. I wish it a great success.

Christian Bierwirth

Job Shop Scheduling with Consideration of Due Dates
Potentials of Local Search Based Solution Techniques
Kuhpfahl, J.

2016, XXV, 190 p. 37 illus., Softcover

ISBN: 978-3-658-10291-3