Chatpun Khamyat 2007: The AGV Scheduling Problem with Alternative Pick up and Delivery Nodes. Doctor of Engineering (Industrial Engineering), Major Field: Industrial Engineering, Department of Industrial Engineering. Thesis Advisor: Associate Professor Peerayuth Charnsethikul, Ph.D. 169 pages

The research attempts to examine the model of the Automated Guided Vehicle (AGV) scheduling problem with alternative pick up and delivery nodes (AGVsp-P/D) and heuristic algorithms for solving this problem that can provide the minimum total traveling distance of AGVs with different level of problem sizes. When the original AGV problem is modified by adding the alternative nodes constraints, the problem becomes the AGVsp-P/D. The research proposes a mathematical model of the AGVsp-P/D, the lower bound model which is an integer programming (IP) of the assignment problem with alternative P/D nodes, the branch and bound approach for solving this IP, three heuristic approaches for solving the lower bound, and the modified Eastman's algorithm for solving single/multi AGVsp-P/D. The IP model and solving approaches are programmed using MATLAB 7.0, to tests the model's performances by considering the running time and solutions quality. The inference statistic is applied to analyze the results to verify the effect of problem sizes on both performances.

The main result of this research shows that the formulated mathematical model satisfies all constraints under research assumptions, and represents the AGVsp-P/D correctly. This model, with its solving approaches, can be applied to solve the AGVsp-P/D and related applications. The tested results from MATLAB 7.0 show that the branch and bound solving approach with the modified Eastman's algorithm can run up to 50 nodes on a personal computer with the average running time less than 12 minutes, and heuristic approaches for solving the lower bound model provides near optimal solutions, which the average deviation less than 15%, without solving IP.

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