

Kanate Ploydanai 2011: Algorithm Development for Solving Flexible Job Shop Scheduling Problem. Doctor of Engineering (Industrial Engineering), Major Field: Industrial Engineering, Department of Industrial Engineering. Thesis Advisor: Associate Professor Anan Mungwattana, Ph.D. 76 pages.

Flexible job shop scheduling problem is the most complicated problem among scheduling problems. First, jobs must be assigned to machines, and then jobs in each machine must be sequenced. High quality solutions require a large amount of time to solve. For large problems, optimal solutions are unable to be found due to the computational time required. In this research, a heuristic, called Makespan Tree, is developed to sequence jobs on machines. Next, a genetic algorithm (GA) and particle swarm optimization (PSO) are developed. Both meta heuristic approaches use the Makespan Tree heuristic as a part of their processes in solving the flexible job shop problems with the objective of minimizing makespans.

The computational results for job scheduling problems show that the Makespan Tree outperforms the nondelay by 11.80%, the earliest finish time by 13.60%, and the shortest processing time by 57.41%. The comparisons show that results of PSO has the average makespan 0.97% lower than those of GA.

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Thesis Advisor's signature