An Approach of Blocking Flow Shop Scheduling with Unrelated Parallel Machine

林靖國、柯千禾 ; 駱景堯

E-mail: 9607667@mail.dyu.edu.tw

ABSTRACT

In this research, we study the blocking flow shop scheduling with unrelated parallel machine of minimizing makespan. We also consider the sequence independent setup time, processing time, dependent removal and transportation time. To solve the addressed problem two different solving models are developed. First, we propose a 0-1 integer programming model to get optimization solution. But, the mathematical model consumes too much time to solve medium or large size problem, so we propose two heuristic which are based on PSO and GA. During the research, the parameters used is the heuristics that affect the solution quality and efficiency are analyzed and designed. The experimental results are reported, and provided for the references for the further research.

Keywords : non-identical parallel machine ; flow shop ; blocking ; PSO ; GA

Table of Contents

REFERENCES

[1] 駱芳梧，「考量整備及拆卸時間之開放型工廠排程問題究」，大葉大學碩士論文，民國91年。

[2] 洪正鴻，「非等效平行機台之多階段流程型排程求解模式建構」大葉大學碩士論文，民國92年。

[3] Alessandro, M., and Dario, P.,“ Discrete optimization job-shop scheduling with blocking and no-wait constraints, ” European Journal of Operational Research 143 498 – 517(2002).

[4] Chen, Chuen-Lung, Vempati Venkateswara S. and Nasser Aljablem,“ An application of genetic algorithms for flow shop problems, ” European Journal of Operational Research, 80, pp.389-396(1995).

[5] Cheng, T. C. E. and Diamond, J. E., ”Scheduling Two Job Classes on parallel Machines, ” IIE Transactions, Vol. 27, 689-693(1995) [6] Ching-Jong, Liao, Chao-Tang Tseng, and Pin Luarnb,“ A discrete version of particle swarm optimization for flowshop scheduling problems, ” Computers & Operations Research 34 3099 – 3111(2007).

[7] Ching-Jong, Liao and Hsiao-Chien Juan,“ An ant colony optimization for single-machine tardiness scheduling with sequence-dependent setups, ” Computers & Operations Research 34 1899 – 1909(2007) [8] Cleveland, G. A. and Smith, S. F.,“ Using genetic algorithm to schedule flow shop release, ” Proc. Of the Third International Conference on Genetic Algorithm, 160-169(1989).

[9] Debora, P. Ronconi,“ A note on constructive heuristics for the flowshop problem with blocking, ” Int. J. Production Economics 87 39

– 48(2004).
[10] F., Fred Choobineh, Esmail Mohebbi, and Hansen Khoo, “ A multi-objective tabu search for a single-machine scheduling problem with sequence-dependent setup times, ” European Journal of Operational Research 175 318 – 337(2006) [11] Hall, N.G. and Sriskandarajah, C., “ A survey of machine scheduling problems with blocking and no-wait in process, ” Operations Research, Vol. 44, pp. 510 – 525(1996).
[12] J. J. Liang, and P. N. Suganthan, “ Dynamic multi-swarm particle swarm optimizer with local search, ” IEEE 0-7803-9363-5/05 (2005).
[13] J. Kcnncdy and R. C. Eberhart, “ Particle swarm optimization, ”, Proc. IEEE Int ’ l. Conf. on Neural Networks Perth, Australia, IEEE Service Center, Piscataway, NJ, IV:1942-1948(1995).
[14] Ju-Seog, Song, and Tae-Eog, Lee, “ Petri Net modeling and scheduling for cyclic job shops with blocking, ” Computers ind. Engng Vol. 34, No. 2, pp. 281±295(1998).
[15] Kamoun, H., and C. Sriskandarajah. “ The complexity of scheduling jobs in repetitive manufacturing systems, ” European J. Opnl. Res. 70, 3, 350-364(1993).
[16] Kim, D. W., Na, D. G, and Chen, F. F., “ Unrelated parallel machine scheduling with setup times and a total weighted tardiness objective, ” Robotics and Computer Integrated Manufacturing, Vol. 19, 173 – 181(2003) [17] Leticia Cagnina, Susana Esquivel, and Raul Gallard, “ Particle swarm optimization for sequencing problems: A Case Study, ” IEEE, 0-7803-8515-2/04(2004).
[18] Manuel, J., Pereira Lopes, and J.M. Vale ’ rio de Carvalho, ” A branch-and-price algorithm for scheduling parallel machines with sequence dependent setup times, ” European Journal of Operational Research 176 1508 – 1527(2007) [19] M., Ghirardi and C. N. Potts, “ Makespan minimization for scheduling unrelated parallel machines: A recovering beam search approach, ” European Journal of Operational Research 165 457 – 467(2005) [20] Murata, Tadahiko and Hisao Ishibuchi, “ Performance evaluation of genetic algorithm for flow shop scheduling problem, ” IEEE Trans. on Eng. Management, Vol 22, Iss 2, pp.812-817(1994).
[21] Proust, C., Gupta, J.N.D., and Deschamps, V., “ Flowshop scheduling with set-up, processing and removal times separated, ” International Journal of Production Research, 29, 479-493(1991).
[22] Santos, D.L., Hunsucker, J. L. and Deal, D. E., ” Global lower bounds for flow shop with multiple processors ”,European Journal of Operational Research,80, pp112-120(1995).
[23] Srikanth K. Iyera, and Barkha Saxena, “ Improved genetic algorithm for the permutation flowshop scheduling problem, ” Computers & Operations Research 31 593 – 606(2004).
[24] Suresh, V., and Chaudhuri, Dipak., “ Bicriteria scheduling problem for unrelated parallel machines ”,Computers and Operations Research,Vol.30,No.1,pp77-82(1996).
[25] Tamer, Eren, and Ertan Gu··ner, “ A bicriteria flowshop scheduling problem with setup times, ” Applied Mathematics and Computation 183 1292 – 1300(2006) [26] Vince, C., Stefano I., Tapan P. B., and C. Sriskandarajah, “ Minimizing makespan in a blocking flowshop using genetic algorithms, ” Int. J. Production Economics 70 101-115(2001).
[27] X. H. Shi, X.L. Xing, Q. X. Wang, L. H. Zhang, X. W. Yang, C. G. Zhou, and Y. C. Liang, “ A discrete PSO method for generalized TSP problem, ” IEEE, Proceedings of the Third International Conference on Machine Learning and Cybernetics, Shanghai, 26-29 August(2004).
[28] Zhigang Lian, Xingsheng Gu, and Bin Jiao, “ A similar particle swarm optimization algorithm for permutation flowshop scheduling to minimize makespan, ” Applied Mathematics and Computation 175 773 – 785(2006).