OPEN SHOP SCHEDULING PROBLEM WITH SETUP, PROCESSING AND REMOVAL TIMES SEPARATED

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ABSTRACT

AN OPEN SHOP SCHEDULE HAS NO RESTRICTIONS ON THE PROCESSING ORDER OF THE JOBS. BECAUSE OPEN SHOP SCHEDULING PROBLEMS HAVE BEEN PROVED AS NP-HARD PROBLEMS TO SIMPLIFY THE STUDI -ES, THE MAJORITY OF SCHEDULING RESEARCH ASSUMES SETUP AND REMOVAL AS NEGLIGIBLE OR PART OF THE PROCESSING TIME. IN THIS RESEARCH, WE CONSTRUCT A MATHEMATICAL MODEL FOR OPEN SHOP SCHEDULING PROBLEM WITH SETUP, PROCESSING, AND REMOVAL TIMES SEPARATED. THE OBJECTIVE IS MINIMIZING TOTAL TARDINESS. HOWEVER, THE MATHEMATICAL MODEL CANNOT GET AN OPTIMAL SOLUTION FOR THE PROBLEM WITH LARGE SIZE. THUS, WE PROPOSE ONE HEURISTIC ALGORITHM THAT BASED ON THE SIMULATED ANNEALING ALGORITHM. THE EXAMPLE ILLUSTRATIONS SHOWS THAT THE HEURISTIC PERF -ORMS WELL BOTH IN SOLUTION QUALITY AND EFFICIENCY.

Keywords: OPEN SHOP, SEQUENCE-INDEPENDENT SETUP TIME, SEQUENCE-DEPENDENT REMOVAL TIME, SIMULATED ANNEAL -ING ALGORITHM

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[7] GONZALEZ, T., AND SAHNI, S.,"OPEN SHOP SCHEDULING TO MINIMIZE FINISH TIME,"JOURNAL OF THE ASSOCIATION FOR COMPUTING MACHINERY, 23(4), 665-679 (1976).

[8] DU, J.Z., AND LEUNG, Y.T.,"MINIMIZING MEAN FLOW TIME IN TWO-MACHINE OPEN SHOPS AND FLOW SHOPS,"JOURNAL OF ALGORITHMS, 14, 24-44 (1993).

[9] PINEDO, M., SCHEDULING: THEORY, ALGORITHM AND SYSTEMS, PRENTICE-HALL, ENGLEWOOD CL -IFFS, NJ (1995).

[10] ACHUGBUE, J.O., AND CHIN, F.Y.,"SCHEDULING THE OPEN SHOP TO MINIMIZE MEAN FLOW TIM -E,"SIAM J. COMPUT., 11, 709-720 (1982).

[11] KYPARISIS, G.J., AND KOULAMAS, C.,"OPEN SHOP SCHEDULING WITH MAKESPAN AND TOTAL CO -MPLETION TIME CRITERIA"COMPUTERS & OPERATIONS RESEARCH, 27(1), 15-27 (2000).

[12] LIAW, C.,"AN ITERATIVE IMPROVEMENT APPROACH FOR THE NONPREEMPTIVE OPEN SHOP SCHEDUL -ING PROBLEM,"EUROPEAN JOURNAL OF OPERATIONAL RESEARCH, 111(3), 509-517 (1999).

[13] LIAW, C.,"A TABU SEARCH ALGORITHM FOR THE OPEN SHOP SCHEDULING PROBLEM,"COMPUTERS & OPERATIONS RESEARCH, 262(2), 109-126 (1999).

[14] LIAW, C.,"A HYBRID GENETIC ALGORITHM FOR THE OPEN SHOP SCHEDULING PROBLEM,"EUROPEA -N JOURNAL OF OPERATIONAL RESEARCH, 124(1), 28-42 (2000).

[15] BRUCKER, P., JOHANN, H., BERND, J., AND BIRGIT, W.,"A BRANCH & BOUND ALGORITHM FOR THE OPEN SHOP PROBLEM,"DISCRETE APPLIED MATHEMATICS, 76, 43-59 (1997).

[16] LIAWLER, E.L., LENSTRA, J.K., AND RINNOOY KAN, A.H.G.,"MINIMIZING MAXIMUM LATENESS IN A TWO-MACHINE OPEN SHOP,"MATHEMATICS OF OPERATIONS RESEARCH, 6(1), 153-158 (198 1).

[17] LIU, C.Y., AND BULFIN, R.L.,"SCHEDULING OPEN SHOPS WITH UNIT EXECUTION TIMES TO MI -NIMIZE FUNCTIONS OF DUE DATES,"OPERATION REASEARCH, 36, 553-559 (1988).

[18] SULE, D.R., INDUSTRIAL SCHEDULING, PWS. PUBLISHING COMPANY, 187-218 (1996).

[19] LIN, H.F.,"A HEURISTIC SOLUTION TO THE TOTAL TARDY COST OF AN M MACHINE NON-PREEMP -TIVE OPEN SHOP SCHEDULING,"SUN YAT SEN MANAGEMENT REVIEW, 3(4), 122-143 (1995).

[20] LIN, H.F., LIU, C.Y., AND LIU, P.Y.,"A HEURISTICS APPROACH TO THE TOTAL TARDINESS IN NONPREEMPTIVE OPEN SHOP SCHEDULING,"INTERNATIONAL JOURNAL OF INDUSTRIAL ENGINEE -RING, 2(1), 25-33 (1995).

[21] LIN, H.F.,"A HEURISTICS SOLUTION TO THE TOTAL TARDINESS AND EARLINESS PENALTIES OF AN M-MACHINE NONPREEMPTIVE SCHEDULING,"JOURNAL OF THE CHINESE INSTITUE OF INDUSTR -IAL ENGINEERING, 15(2), 159-167 (1995).

[22] GILMORE, P.C., AND GOMORY, R.E.,"SEQUENCING A ONE-STATE VARIABLE MACHINE; A SOLVAB -LE CASE OF THE TRAVELING SALESMAN PROBLEM,"OPERATION RESEARCH, 12, 655-679 (1964) [23] LEE, Y.H., BHASKARAN, K., AND PINEDO, M.,"A HEURISTIC TO MINIMIZE THE TOTAL WEIGHT -ED TARDINESS WITH SEQUENCE DEPENDENT SETUPS,"IIE TRANSACTIONS, 29, 45-52 (1997).

[24] YOSHIDA, T., AND HITOMI, K.,"OPTIMAL TWO-STAGE PRODUCTION SCHEDULING WITH SETUP TIM -ES SEPARATED,"AIIE TRANSACTIONS, 11, 261-263 (1979).

[25] SULE, D.R.,"SEQUENCING N JOBS ON TWO MACHINES WITH SETUP, PROCESSING AND REMOVAL T -IMES SEPARATED,"NAVAL RESEARCH LOGISTICS QUARTERLY, 29, 517-519 (1982).

[26] SULE, D.R., AND HUANG, K.Y.,"SEQUENCE ON TWO AND THREE MACHINES WITH SETUP,PROCESS -ING AND REMOVAL TIMES SEPARATED," INTERNATIONAL JOURNAL OF PRODUCTION RESEARCH,21 ,723-732 (1983).

[27] PROUST, C., GUPTA, J.N.D., AND DESCHAMPS, V.,"FLOWSHOP SCHEDULING WITH SET-UP,PROC -ESSING AND REMOVAL TIMES SEPARATED," INTERNATIONAL JOURNAL OF PRODUCTION RESEARCH, 29, 479-493 (1991).

[28] KIM, S.C.,AND BOBROWSKI, P.M.,"IMPACT OF SEQUENCE-DEPENDENT SETUP TIMES ON JOB SHO -P SCHEDULING PERFORMANCE," INTERNATIONAL JOURNAL OF PRODUCTION RESEARCH, 32, 1503 -1520 (1994).

[29] GUPTA, S.K.,"N JOBS AND M MACHINES JOB-SHOP PROBLEMS WITH SEQUENCE-DEPENDENT SET- UP TIMES,"INTERNATIONAL JOURNAL OF PRODUCTION RESEARCH, 20(5), 643-656 (1982).

[30] STRUSEVICH, V.A.,"TWO MACHINE OPEN SHOP SCHEDULING PROBLEM WITH SETUP, PROCESSING AND REMOVAL TIMES SEPARATED,"COMPUTATIONAL OPERATION RESEARCH, 20, 597-611 (1993).

[31] ALLAHVERDI, A., GUPTA, J.N.D., AND ALDOWAISAN, T.,"A REVIEW OF SCHEDULING RESEARCH INVOLVING SETUP CONSIDERATIONS"OMEGA,THE INTERNATIONAL JOURNAL OF MANAGEMENT SCIEN -CE, 27, 219-239 (1999).

[32] HISO, I., SHINTA, M., AND HIDEO, T.,"MODIFIED SIMULATED ANNEALING ALGORITHMS FOR T -HE FLOW SHOP SEQUENCING PROBLEM,"EUROPEAN JOURNAL OF OPERATIONAL RESEARCH, 81, 388 -398 (1995).

[33] ARMENTANO, V.A., RONCONI, D.P.,"TABU SEARCH FOR TOTAL TARDINESS MINIMIZATION IN FL -OWSHOP SCHEDULING PROBLEMS,"COMPUTERS & OPERATIONS RESEARCH, 26, 219-235 (1999).

[33] ARMENTANO, V.A., RONCONI, D.P.,"TABU SEARCH FOR TOTAL TARDINESS MINIMIZATION IN FL -OWSHOP SCHEDULING PROBLEMS,"COMPUTERS & OPERATIONS RESEARCH, 26, 219-235 (1999).