

Eind Putsiborg to Access preview-only content Encyclopedia of Optimization 2009, pp 1060-1068

Flow Shop Scheduling Problem

Citations 368 Downloads 200 Citations 9 Comments

Article Outline

Introduction

Variations

Exact Algorithms for the Flow Shop Scheduling Problem

Heuristic Algorithms for the Flow Shop Scheduling Problem

Metaheuristic Algorithms for the Flow Shop Scheduling Problem

References



Within this Entry

- 1. Introduction
- 2. Variations
- 3. Exact Algorithms for the Flow Shop Scheduling Problem
- 4. Heuristic Algorithms for the Flow Shop Scheduling Problem
- 5. Metaheuristic Algorithms for the Flow Shop Scheduling Problem
- 6. References
- 7. References

Related Content
1000 C

References (107)

- 1. Aarts E, Korst J (1989) Simulated Annealing and Boltzmann Machines A Stochastic Approach to Combinatorial Optimization and Neural Computing. Wiley, Chichester
- Aarts E, Korst J, Van Laarhoven P (1997) Simulated Annealing. In: Aarts E, Lenstra JK (eds) Local Search in Combinatorial Optimization. Wiley, Chichester, pp 91–120
- Aarts E, Ten Eikelder HMM (2002) Simulated Annealing. In: Pardalos PM, Resende MGC (eds) Handbook of Applied Optimization. Oxford University Press, pp 209–221
- 4. Agarwal A, Colak S, Eryarsoy E (2006) Improvement Heuristic for the Flow-Shop Scheduling Problem: An Adaptive-Learning Approach. Eur J Oper Res 169:801–815 CrossRef
- 5. Aggoune R (2004) Minimizing the Makespan for the Flow Shop Scheduling Problem with Availability Constraints. Eur J Oper Res 153:534–543 CrossRef
- Aggoune R, Portmann M-C (2006) Flow Shop Scheduling Problem with Limited Machine Availability: A Heuristic Approach. Int J Prod Econ 99:4–15 CrossRef
- Al-Anzi FS, Allahverdi A (2007) A Self-Adaptive Differential Evolution Heuristic for Two-Stage Assembly Scheduling Problem to Minimize Maximum Lateness With Setup Times. Eur J Oper Res 182(1):80–94 CrossRef
- Allahverdi A, Al-Anzi FS (2006) A PSO and a Tabu Search Heuristics for the Assembly Scheduling Problem of the Two-Stage Distributed Database Application. Comput Oper Res 33(4):1056–1080 CrossRef
- Arroyo JEC, Armentano VA (2005) Genetic Local Search for Multi-Objective Flowshop Scheduling Problems. Eur J Oper Res 167(3):717–738 CrossRef
- 10. Bagchi TP (1999) Multiobjective Scheduling by Genetic Algorithms. Kluwer, Boston
- 11. Bagchi TP, Gupta JND, Sriskandarajah C (2006) A Review of TSP Based Approaches for Flowshop Scheduling. Eur J Oper Res 169(3):816–854 CrossRef
- 12. Ben-Daya M, Al-Fawzan M (1998) A Tabu Search Approach for the Flow Shop Scheduling Problem. Eur J Oper Res 109:88–95 CrossRef
- 13. Botta-Genoulaz V (2000) Hybrid Flow Shop Scheduling with Precedence Constraints and Time Lags to Minimize Maximum Lateness. Int J Prod Econ 64:101–111 CrossRef
- Botta V, Guinet A (1996) Scheduling flowshops with precedence constraints and time lags. Proceedings of the Workshop on Production Planning and Control, Mons, Belgium, 16–19
- Campbell HG, Dudek RA, Smith ML (1970) A Heuristic Algorithm for the n-job, m-Machine Sequencing problem. Manag Sci 16:B630–B637
- Carlier J, and Rebaï, I (1996) Two Branch and Bound Algorithms for the Permutation Flow Shop Problem. Eur J Oper Res 90:238–251
- 17. Chang PC, Chen SH, Liu CH (2007) Sub-Population Genetic Algorithm with Mining Gene Structures for Multiobjective Flowshop Scheduling Problems. Exp Syst Appl 33(3):762–771 CrossRef
- Cheng BW, Chang CL (2007) A Study on Flowshop Scheduling Problem Combining Taguchi Experimental Design and Genetic Algorithm. Exp Syst Appl 32(2):415–421 CrossRef
- Chung CS, Flynn J, Kirca O (2006) A Branch and Bound Algorithm to Minimize the Total Tardiness for M-Machine Permutation Flowshop Problems. Eur J Oper Res 174(1):1–10 CrossRef

- 20. Conway RW, Maxwell WL, Miller LW (2003) Theory of Scheduling. Dover Publications INC., Mineola
- 21. Dannenbring DG (1977) An Evaluation of Flowshop Sequencing Heuristics. Manag Sci 23(11):1174–1182 CrossRef
- 22. De Castro LN, Von Zuben FJ (1999) Artificial Immune Systems, Part 1, Basic Theory and Applications. Technical Report, TR-DCA 01/99
- 23. De Castro LN, Von Zuben FJ (2001) Learning and Optimization Using the Clonal Selection Principle. Trans IEEE Evol Comput 6(3):239–251 CrossRef
- 24. Dorigo M, Maniezzo V, Colorni A (1996) Ant System: Optimization by a colony of cooperating agents. IEEE Trans Syst Man Cybern B 26(1):29–41 CrossRef
- 25. Engin O, Döyen A (2004) A New Approach to Solve Hybrid Flow Shop Scheduling Problems by Artificial Immune System. Future Generat Comput Syst 20:1083–1095 CrossRef
- Eren T, Guner E (2006) A Bicriteria Flowshop Scheduling Problem with Setup Times. Appl Math Comput 183(2):1292–1300 CrossRef
- Fink A, Voßb S (2003) Solving the Continuous Flow-Shop Scheduling Problem by Metaheuristics. Eur J Oper Res 151:400–414 CrossRef
- Finke G, Jiang H (1997) A Variant of the Permutation Flow Shop Model with Variable Processing Times. Discret Appl Math 76:123–140 CrossRef
- 29. Gajpal Y, Rajendran C (2006) An Ant-Colony Optimization Algorithm for Minimizing the Completion-Time Variance of Jobs in Flowshops. Int J Prod Econ 101(2):259–272 CrossRef
- 30. Glover F (1989) Tabu Search I. ORSA J Comput 1(3):190-206
- 31. Glover F (1990) Tabu Search II. ORSA J Comput 2(1):4-32
- 32. Glover F, Laguna M, Taillard E, de Werra D (eds) (1993) Tabu Search. JC Baltzer AG, Science Publishers, Basel
- Glover F, Laguna M, Marti R (2003) Scatter Search and Path Relinking. In: Glover F, Kochenberger GA (eds) Advances and Applications Handbook of Metaheuristics. Kluwer, Boston, pp 1–36 CrossRef
- Goldberg DE (1989) Genetic Algorithms in Search, Optimization, and Machine Learning. Addison-Wesley Publishing Company INC, Massachussets
- Gourgand M, Grangeon N, Norre S (2003) A Contribution to the Stochastic Flow Shop Scheduling Problem. Eur J Oper Res 151:415–433 CrossRef
- 36. Gowrishankar K, Rajendran C, Srinivasan G (2001) Flow Shop Scheduling Algorithms for Minimizing the Completion Time Variance and the Sum of Squares of Completion Time Deviations from a Common Due Date. Eur J Oper Res 132:643–665 CrossRef
- Grabowski J, Pempera J (2005) Some Local Search Algorithms for No-Wait Flow-Shop Problem with Makespan Criterion. Comput Oper Res 32:2197–2212 CrossRef
- Guinet A, Solomon M (1996) Scheduling Hybrid Flowshops to Minimize Maximum Tardiness or Maximum Completion Time. Int J Prod Res 34(6):1643–1654 CrossRef
- 39. Gupta JND, Stafford EF (2006) Flowshop Scheduling Research After Five Decades. Eur J Oper Res 169(3):699-711 CrossRef
- 40. Gupta JND, Henning K, Werner F (2002) Local Search Heuristics for Two-Stage Flow Shop Problems with Secondary Criterion. Comput Oper Res 29:123–149 CrossRef
- 41. Hansen P, Mladenovic N (2001) Variable Neighborhood Search: Principles and Applications. Eur J Oper Res 130:449-467 CrossRef
- 42. Holland JH (1975) Adaptation in Natural and Artificial Systems. University of Michigan Press, Ann Arbor
- Hunsucker JL, Shah JR (1992) Performance of priority rules in a due-date flowshop. OMEGA Int J Manag Sci 20(1):73–89 CrossRef

- Jain AS, Meeran S (2002) A Multi-Level Hybrid Framework Applied to the General Flow-Shop Scheduling Problem. Comput Oper Res 29:1873–1901 CrossRef
- 45. Jia C (1998) Minimizing Variation in Stochastic Flow Shop. Oper Res Lett 23:109-111 CrossRef
- 46. Janiak A, Kozan E, Lichtenstein M, Oğuz C (2005) Metaheuristic Approaches to the Hybrid Flow Shop Scheduling Problem with a Cost-Related Criterion. Int J Prod Econ 31(3):504–514
- 47. Jin Z, Yang Z, Ito T (2006) Metaheuristic Algorithms for the Multistage Hybrid Flowshop Scheduling Problem. Int J Prod Econ 100(2):322–334 CrossRef
- Karlor JK, Wang W (1996) Bilevel Programming Applied to the Flow Shop Scheduling Problem. Comput Oper Res 23(5):443–451 CrossRef
- Kennedy J, Eberhart R (1995) Particle Swarm Optimization. In: Proceedings of 1995 IEEE International Conference on Neural Networks 4:1942–1948
- 50. Kirkpatrick S, Gelatt CD, Vecchi MP (1982) Optimization by Simulated Annealing. Science 220:671-680 CrossRef
- 51. Kumar A, Prakash A, Shankar R, Tiwari MK (2005) Psycho-Clonal Algorithm Based Approach to Solve Continuous Flow Shop Scheduling Problem. Exp Syst Appl, in press
- Laha D, Chakraborty UK (2007) An Efficient Stochastic Hybrid Heuristic for Flowshop Scheduling. Eng Appl Artif Intell 20(6):851–856 CrossRef
- Leu S-S, Hwang S-T (2002) GA-Based Resource-Constrained Flow-Shop Scheduling Model for Mixed Precast Production. Automat Construct 11:439–452 CrossRef
- Lian Z, Gu X, Jiao B (2006) A Similar Particle Swarm Optimization Algorithm for Permutation Flowshop Scheduling to Minimize Makespan. Appl Math Comput 175(1):773–785 CrossRef
- 55. Liao C-J, Sun C-L, You W-C (1995) Flow-Shop Scheduling with Flexible Processors. Comput Oper Res 22(3):297-301 CrossRef
- Liao CJ, Tseng CT, Luarn P (2007) A Discrete Version of Particle Swarm Optimization for Flowshop Scheduling Problems. Comput Oper Res 34(10):3099–3111 CrossRef
- 57. Linn R, Zhang W (1999) Hybrid Flow Shop Scheduling: A Survey. Comput Indust Eng 37:57-61 CrossRef
- Low C (2005) Simulated Annealing Heuristic for Flow Shop Scheduling Problems with Unrelated Parallel Machines. Comput Oper Res 32:2013–2025 CrossRef
- Martin CH (2006) A Hybrid Genetic Algorithm/Mathematical Programming Approach to the Multi-Family Flowshop Scheduling Problem with Lot Streaming. Omega, In Press, Available online 26 December 2006. doi: 10.1016/j.omega.2006.11.002
- 60. Morton TE, Pentico DW (1993) Heuristic Scheduling Systems. With Applications to Production Systems and Project Management. Wiley, New York
- 61. Nawaz M, Enscore E, Ham I (1983) A Heuristic Algorithm for the m-Machine, n-Job Flowshop Sequencing Problem. Omega 11:91–95 CrossRef
- 62. Nearchou A (2004) A Novel Metaheuristic Approach for the Flow Shop Scheduling Problem. Eng Appl Artif Intell 17:289–300 CrossRef
- Negenman EG (2001) Local Search Algorithms for the Multiprocessor Flow Shop Scheduling Problem. Eur J Oper Res 128:147–158 CrossRef
- 64. Neppali VR, Chen C-L, Gupta JND (1996) Genetic Algorithms for the Two-Stage Bicriteria Flow Shop Problem. Eur J Oper Res 95:356–373 CrossRef
- 65. Nowicki E, Smutnicki C (2006) Some Aspects of Scatter Search in the Flow-Shop Problem. Eur J Oper Res 169:654-666 CrossRef
- Oğuz C, Zinder Y, Do VH, Janiak A, Lichtenstein M (2004) Hybrid Flow-Shop Scheduling Problems with Multiprocessor Task Systems. Eur J Oper Res 152:115–131 CrossRef

- 67. Sodererg B, Peterson C (1997) Artificial Neural Networks. In: Aarts E, Lenstra JK (eds) Local Search in Combinatorial Optimization. Wiley, Chichester, pp 173–214
- 68. Pinedo M (1995) Scheduling. Theory, Algorithms, and Systems. Prentice Hall, Englewood Cliffs
- 69. Proust C , Gupta JND, Deschamps V (1991) Flowshop Scheduling with Set-Up, Processing and Removal Times Separated. Int J Prod Res 29:479–493 CrossRef
- Rajendran C, Ziegler H (2004) Ant-Colony Algorithms for Permutation Flowshop Scheduling to Minimize Makespan/Total Flowtime of Jobs. Eur J Oper Res 155(2):426–438
- Rajendran C, Ziegler H (2005) Two Ant-Colony Algorithms for Minimizing Total Flowtime in Permutation Flowshops Computers and Industrial Engineering. Comput Indust Eng 48(4):789–797 CrossRef
- Reeves CR (1995) Genetic Algorithms. In: Reeves CR (ed) Modern Heuristic Techniques for Combinatorial Problems. McGraw-Hill, London, pp 151–196
- 73. Reeves CR (2003) Genetic Algorithms. In: Glover F, Kochenberger GA (eds) Handbooks of Metaheuristics. Kluwer, Dordrecht, pp 55–82 CrossRef
- Resende MGC, Ribeiro CC (2003) Greedy Randomized Adaptive Search Procedures. In: Glover F, Kochenberger GA (eds) Handbook of Metaheuristics. Kluwer, Boston, pp 219–249 CrossRef
- Riezebos J, Gaalman GJC (1998) Time Lag Size in Multiple Operations Flow Shop Scheduling Heuristics. Eur J Oper Res 105:72–90 CrossRef
- 76. Rios-Mercado R, Bard J (1998) Heuristics for the Flow Line Problem with Setup Costs. Eur J Oper Res 110:76-98 CrossRef
- Rios-Mercado R, Bard J (1999) An Enhanced TSP-based Heuristic for Makespan Minimization in a Flow Shop with Setup Costs. J Heuristic 5:57–74
- Ruiz R, Maroto C (2005) A Comprehensive Review and Evaluation of Permutation Flowshop Heuristics. Eur J Oper Res 165(2):479–494 CrossRef
- 79. Ruiz R, Maroto C (2006) A Genetic Algorithm for Hybrid Flowshops with Sequence Dependent Setup Times and Machine Eligibility. Eur J Oper Res 169(3):781–800 CrossRef
- Ruiz R, Maroto C, Alcaraz J (2006) Solving the Flowshop Scheduling Problem with Sequence Dependent Setup Times Using Advanced Metaheuristics. Eur J Oper Res 165(1):34–54 CrossRef
- Ruiz R, Maroto C, Alcaraz J (2006) Two New Robust Genetic Algorithms for the Flowshop Scheduling Problem. Omega 34(5):461–476 CrossRef
- Sadegheih A (2006) Scheduling Problem Using Genetic Algorithm, Simulated Annealing and the Effects of Parameter Values on GA Performance. Appl Math Modell 30(2):147–154 CrossRef
- Sayin S, Karabati S (1999) A Bicriteria Approach to the Two-Machine Flow Shop Scheduling Problem. Eur J Oper Res 113:435–449 CrossRef
- Shyu SJ, Lin BMT, Yin PY (2004) Application Of Ant Colony Optimization For No-Wait Flowshop Scheduling Problem To Minimize The Total Completion Time. Comput Indust Eng 47(2–3):181–193 CrossRef
- 85. Smutnicki C (1998) Some Results of the Worst-Case Analysis for Flow Shop Scheduling. Eur J Oper Res 109:66-87 CrossRef
- Solimanpur M, Vrat P, Shankar R (2004) A Neuro-Tabu Search Heuristic for the Flow Shop Scheduling Problem. Comput Oper Res 31:2151–2164 CrossRef
- Soukhal A, Oulamara A, Martineau P (2005) Complexity of Flow Shop Scheduling Problems with Transportation Constraints. Eur J Oper Res 161:32–41 CrossRef
- Steinhöfel K, Albrecht A, Wong CK (2002) The Convergence of Stochastic Algorithms Solving Flow Shop Scheduling. Theoretic Comput Sci 285:101–117 CrossRef

- Suliman SMA (2000) A Two-Phase Heuristic Approach to the Permutation Flow-Shop Scheduling Problem. Int J Prod Econ 64:143–152 CrossRef
- 90. Suresh V (1997) A Note on Scheduling of Two-Stage Flow Shop with Multiple Processors. Int J Prod Econ 49:77-82 CrossRef
- 91. Szwarc W (1983) Flowshop problems with time lags. Manag Sci 29:477-481 CrossRef
- 92. Tang L, Xuan H, Liu J (2006) A New Lagrangian Relaxation Algorithm for Hybrid Flowshop Scheduling to Minimize Total Weighted Completion Time. Comput Oper Res 33(11):3344–3359 CrossRef
- 93. Tasgetiren MF, Liang YC, Sevkli M, Gencyilmaz G (2007) A Particle Swarm Optimization Algorithm for Makespan and Total Flowtime Minimization in the Permutation Flowshop Sequencing Problem. Eur J Oper Res 177(3):1930–1947 CrossRef
- 94. Tian P, Ma J, Zhang D-M (1999) Application of the Simulated Annealing Algorithm to the Combinatorial Optimisation Problem with Permutation Property: An Investigation of Generation Mechanism. Eur J Oper Res 118:81–94 CrossRef
- 95. Toktaç B, Azizoğlu M, Köoksalan SK (2004) Two-Machine Flow Shop Scheduling with Two Criteria: Maximum Earliness and Makespan. Eur J Oper Res 157:286–295 CrossRef
- 96. Townsend W (1977) Sequencing n-Jobs on m-Machines to Minimize Maximum Tardiness: A Branch-and-Bound Solution. Manag Sci 23:1016–1019
- 97. Vallada E, Ruiz R, Minella G (2008) Minimising Total Tardiness in the M-Machine Flowshop Problem: A Review and Evaluation of Heuristics and Metaheuristics. Comput Oper Res 35(4):1350–1373 CrossRef
- 98. Varadharajan TK, Rajendran C (2005) A Multi-Objective Simulated-Annealing Algorithm for Scheduling in Flowshops to Minimize the Makespan and Total Flowtime of Jobs. Eur J Oper Res 167(3):772–795 CrossRef
- Wang C, Chu C, Proth J-M (1996) Efficient Heuristic and Optimal Approaches for n/2/F/∑C i Scheduling Problems. Int J Prod Econ 44:225–237 CrossRef
- 100. Wang C, Chu C, Proth J-M (1997) Heuristic Approaches for n/m/F/ ∑ C_i Scheduling Problems. Eur J Oper Res 96:636–644 CrossRef
- Wang J-B (2007) Flow Shop Scheduling Problems with Decreasing Linear Deterioration Under Dominant Machines. Comput Oper Res 34(7):2043–2058 CrossRef
- Wang J-B, Xia Z-Q (2006) Flow Shop Scheduling with Deteriorating Jobs under Dominating Machines. Omega 34(4):327–336 CrossRef
- Wang L, Zhang L (2006) Stochastic Optimization Using Simulated Annealing with Hypothesis Test. Appl Math Comput 174(2):1329–1342 CrossRef
- 104. Wardono B, Fathi Y (2004) A Tabu Search Algorithm for the Multi-Stage Parallel Machine Problem with Limited Buffer Capacities. Eur J Oper Res 155(2):380–401 CrossRef
- 105. Xuan H, Tang L (2007) Scheduling a Hybrid Flowshop with Batch Production at the Last Stage. Comput Oper Res 34(9):2718–2733 CrossRef
- 106. Yokoyama M (2001) Hybrid Flow-Shop Scheduling with Assembly Operations. Int J Prod Econ 73:103–116 CrossRef
- 107. Yokoyama M, Santos DL (2005) Three-Stage Flow-Shop Scheduling with Assembly Operations to Minimize the Weighted Sum of Product Completion Times. Eur J Oper Res 161:754–770 CrossRef

About this Reference Work Entry

Title

Flow Shop Scheduling Problem Reference Work Title Encyclopedia of Optimization Pages pp 1060-1068

```
Copyright
2009
DOI
10.1007/978-0-387-74759-0_185
Print ISBN
978-0-387-74758-3
Online ISBN
978-0-387-74759-0
Publisher
Springer US
Copyright Holder
Springer-Verlag
Additional Links
```

· About this Reference Work

Topics

- Optimization
- Operations Research, Mathematical Programming
- Algorithms
- Calculus of Variations and Optimal Control; Optimization
- Mathematical Modeling and Industrial Mathematics

Industry Sectors

- Electronics
- Telecommunications
- IT & Software

eBook Packages

- eBook Package english full Collection
- eBook Package english Mathematics

Editors

- Christodoulos A. Floudas ≥⁽¹⁾
- Panos M. Pardalos 🖂 (2)

Editor Affiliations

- 1. Department of Chemical Engineering, Princeton University
- 2. Center for Applied Optimization, Department of Industrial and Systems Engineering, University of Florida

Authors

• Magdalene Marinaki (1)

Author Affiliations

• 1. Department of Production Engineering and Management, Industrial Systems Control Laboratory, Technical University of Crete, Chania, Greece

Continue reading ...

To view the rest of this content please follow the download PDF link above.

Over 8.3 million scientific documents at your fingertips

[©] Springer, Part of Springer Science+Business Media

Flow shop scheduling problem Flow Shop Scheduling Problem ...