



Optimized Buffer Allocation and Repair Strategies for Series Production Lines

N. Nahas^{a,*}, M. Nourelfath^b, M. Abouheaf^c

^a Faculté d'Administration, Université de Moncton, Moncton (NB), Canada;

^b Mechanical Engineering Department, Université Laval, Quebec (Qc), Canada;

^c College of Technology, Architecture & Applied Engineering, Bowling Green State University, Bowling Green, USA

References

- [1] Can B. and Heavey, C. "A comparison of genetic programming and artificial neural networks in metamodeling of discrete-event simulation models", *Computers, Operations Research*, Vol. 39, No. 2, pp. 424-436, 2012.
- [2] Dallery, Y., David, R. and XIE, X.L., "An efficient algorithm for analysis of transfer lines with unreliable equipments and finite buffers", *IIE transactions*, Vol. 20, No. 3, pp. 280-283, 1988.
- [3] Demir, L., Diamantidis, A., Eliyi, D. T., O'Kelly, M. E. J., Papadopoulos, C. T., Tsadiras, A. K., and Tunali, S., "A comparison of three search algorithms for solving the buffer allocation problem in reliable production lines", *IFAC Conference on Manufacturing Modelling, Management, and Control*, Vol. 1626-1631, St. Petersburg, Russia, 2013.
- [4] Diamantidis, A. C. and Papadopoulos, C. T., "A dynamic programming algorithm for the Buffer Allocation Problem in homogeneous asymptotically reliable serial production lines", *Mathematical Problems in Engineering*, Vol. 2004, No. 3, pp. 209-223, 2004.
- [5] Diamantidis A.C., Papadopoulos C.T. and Heavey C., "Approximate analysis of serial flow lines with multiple parallel-machine stations", *IIE Transactions*, Vol. 39, No. 4, pp. 361-375, 2007.
- [6] Diamantidis A., Lee J.-H., Papadopoulos C.T., Li J. and Heavey C., "Performance evaluation of flow lines with non-identical and unreliable parallel machines and finite buffers", *International Journal of Production Research*, 2020, DOI: 10.1080/00207543.2019.1636322.
- [7] Gershwin S.B. and Schick I.C., "Modeling and analysis of three-stage transfer lines with unreliable machine and finite buffers", *Operations Research*, Vol. 31, pp. 354-380, 1983.
- [8] Gershwin, S.B., "An efficient decomposition method for the approximate evaluation of tandem queues with finite storage space and blocking", *Operational Research*, Vol. 35, No. 2, pp. 291-305, 1987.
- [9] Gershwin, S.B. and Schor, J.E., "Efficient Algorithms for Buffer Space Allocation", *Annals of Operations Research*, Vol. 93, No. 1-4, pp. 117-144, 2000.
- [10] Helber S., Katja S. and Raik S., "Setting Inventory Levels of CONWIP Flow Lines via Linear Programming", *BuR - Business Research*, Vol. 4, No. 1, pp. 1-18, 2011.
- [11] Hillier, M.C., "Characterizing the optimal allocation of storage space in production line systems with variable processing times", *IIE Transactions*, Vol. 32, No. 1, pp. 1-8, 2000.
- [12] Hoad K., Robinson S. and Davies R., "Automated selection of the number of replications for a discrete-event simulation", *The Journal of the Operational Research Society*, Vol. 61, No. 11, pp. 1632-1644, 2010.
- [13] Kouikoglou V.S. and Phillis Y.A., "An exact discrete-event model and control policies for production lines with buffers", *IEEE Transactions on Automatic Control*, Vol. 36, No. 5, pp. 515-527, 1991.
- [14] Kouikoglou V.S., "Discrete Event Modeling and Optimization of Unreliable Production Lines with Random Rates", *IEEE Transactions on Robotics and Automation*, Vol. 10, No. 2, pp. 153-159, 1994.
- [15] Kouikoglou, V. S., and Phillis, Y. A., "Hybrid Simulation Models of Production Networks", Kluwer Academic/Plenum Publishers, New York, 2001.
- [16] Kose, S. Y. and Kilincci, O., "Hybrid approach for buffer allocation in open serial production lines", *Computers & Operations Research*, Vol. 60, pp. 67-78, 2015.
- [17] Li, J. and Meerkov, S.M., "Production Systems Engineering", Springer, New York, NY, USA, 2009.

- [18] Li J., "Continuous improvement at Toyota manufacturing plant: Applications of production systems engineering methods", *International Journal of Production Research*, Vol. 51, No. 23-24, pp. 7235-7249, 2013.
- [19] Lutz C M, Davis K R. and Sun M., "Determining buffer location and size in production lines using tabu search", *European Journal of Operational Research*, Vol. 106, pp. 301-316, 1998.
- [20] Nahas, N. and Nourelfath, M., "Non-linear threshold accepting meta-heuristic for combinatorial optimization problems", *International Journal of Metaheuristics*, Vol. 3, No. 4, pp. 265-290, 2014.
- [21] Nahas, N. and Nourelfath, M., "Joint optimization of maintenance, buffers and machines in manufacturing lines", *Engineering Optimization*, Vol. 50, No. 1, pp. 37-54, 2018.
- [22] Nahas, N. "Buffer allocation, equipment selection and line balancing optimisation in unreliable production lines", *European Journal of Industrial Engineering*, Vol. 14, No. 2, pp. 217-246, 2020.
- [23] Narasimhamu, K. L., Reddy, V. V., and Rao, C. S. P., "Optimization of Buffer Allocation in Manufacturing System Using Particle Swarm Optimization", *International Review on Modelling and Simulations*, Vol. 8, No. 2, pp. 212, 2015.
- [24] Shi, L. and Men, S., "Optimal buffer allocation in production lines", *IIE Transactions*, Vol. 35, No. 1, pp. 1-10, 2003.
- [25] Vergara H.A and Kim D.S., "A new method for the placement of buffers in serial production lines", *International Journal of Production Research*, Vol. 47, No. 16, pp. 4437-4456, 2009.
- [26] Weiss, S., Matta, A., and Stolletz, R., "Optimization of buffer allocations in flow lines with limited supply", *IIE Transactions*, Vol. 50, No. 3, pp. 191-202, 2018.
- [27] Whitley D, Kauth J., "GENITOR: a different genetic algorithm", Technical Report CS-88-101, Colorado State University, 1988.
- [28] Yan, F.-Y., Wang, J.-Q., li, Y. and Cui, P.-H., "An Improved Aggregation Method for Performance Analysis of Bernoulli Serial Production Lines", *IEEE Transactions on Automation Science and Engineering*, vol. 18, No. 1, pp. 114-121, 2020.
- [29] Koyuncuoğlu M.U. and Demir L., "Buffer capacity allocation in unreliable production lines: An adaptive large neighborhood search approach", *Engineering Science and Technology*, vol. 24, No. 2, pp. 299-309, 2021.
- [30] Herps K., Dang Q.-V, Martagan T. and Adan I., "A simulation-based approach to design an automated high-mix low-volume manufacturing system", *Journal of Manufacturing Systems*, vol 64, pp 1-18, 2022.
- [31] Demir L. and Koyuncuoğlu M.U., "The impact of the optimal buffer configuration on production line efficiency: A VNS-based solution approach", *Expert Systems with Applications*, vol. 172, 2021.
- [32] Vasquez J.O., Gonzalez S.H., Vasquez J.I.H, Fernandez V.F. and Cancino de la Fuente C.I., "Buffer allocation problem in a shoe manufacturing line: A metamodeling approach", *Revista Facultad de Ingenieria, Universidad de Antioquia*, No 103, pp. 175-185, 2022