


Visit Nature news for the latest coverage and read Springer Nature's statement on the Ukraine conflict

S.I.: Scalable Optimization and Decision Making in OR |
[Published: 01 December 2021](#)

Joint optimization of production scheduling and group preventive maintenance planning in multi-machine systems

[Aseem K. Mishra](#), [Divya Shrivastava](#) , [Devesh Tarasia](#) & [Abdur Rahim](#)

[Annals of Operations Research](#) (2021)

281 Accesses | **1** Citations | [Metrics](#)

Abstract

This paper addresses the joint optimization model of production scheduling, work-in-process (WIP) inventory control and group preventive maintenance (PM) planning in a multi-machine system with multi-components. The objective is to obtain optimum production sequence, PM intervals and grouping of components, which minimize the total expected cost per unit time of the system. A new meta-heuristic named Jaya algorithm and two popular algorithms viz. simulated annealing (SA) and particle swarm optimization (PSO) are applied to optimize the objective function. Initially, the optimum group of components is obtained based on the integer multiples of individual PM intervals. Secondly, the job permutation sequence

incorporating group PM intervals is identified with the largest order value (LOV) rule. The shift in optimum PM intervals is realized with an advanced-postpone balancing approach. Computational results reveal that the proposed integrated model along with group PM yields up to 25% cost reductions when compared to the integrated model with individual maintenance as well as 37% savings while no integration is performed. Furthermore, the performance of algorithms is evaluated with large-sized problems. The obtained results show that Jaya and SA yielded comparable results, however, PSO is least productive. Thus, the proposed approach yields better economic performance and brings more improvised solutions as compared to the conventional methods of integrated scheduling and maintenance optimization problems.

This is a preview of subscription content, [access via your institution.](#)

Access options

Buy article PDF

34,95 €

Price includes VAT (India)
Tax calculation will be finalised during checkout.

Instant access to the full article PDF.