Research School for
Operations Management
and Logistics

A Cooperative Parallel Tabu Search Algorithm for the Well-Being-Aware Dual-Resource-Constrained Flexible Job Shop Scheduling Problem

Peyman Yasari
Ghent University

Industry 5.0 promotes human-centric manufacturing, in which production systems must balance performance with the physical and cognitive well-being of operators. While physical ergonomics has received growing attention in scheduling, comprehensive ergonomic assessment and cognitive workload remain largely unexplored. This research extends the Dual-Resource-Constrained Flexible Job Shop Scheduling Problem with a validated assessment of cumulative physical ergonomic loads across assigned tasks and perceived cognitive workload constraints. Because these constraints make exact methods struggle on realistic instances, we propose a cooperative parallel tabu search algorithm. Computational experiments demonstrate its scalability and show that improved operator well-being can be achieved with only a modest trade-off in production efficiency.