Agent-based hybrid tabu-search heuristic for dynamic scheduling

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Abstract: Dynamic scheduling has received widespread attention from academia and industry due to the increasing complexity in manufacturing systems. Highly dynamic and adaptable behaviours are necessary for an improved production efficiency in unstable and constantly changing environments. This paper proposes an agent-based hybrid tabu-search heuristic (AB-TSH) to solve dynamic flexible job-shop scheduling problems. The solution is fully implemented and tested in an industrial environment for seven distinct dynamic scenarios derived from a static scenario using the benchmark of AIP-PRIMECA Flexible Manufacturing System. The scheduling plan is obtained by exploitation using a greedy heuristic on tabu search solution points. The hybrid tabu search heuristic is supported by a multi-agent system that react and re-optimize the scheduling plan in case of disturbances and unpredicted events. The proposed solution demonstrated superior performance in terms of makespan in the majority of dynamic scenarios tested when compared to previous studies in the literature. This improved performance is attributed to the solution's ability to combine the scheduling plan both statically and dynamically.