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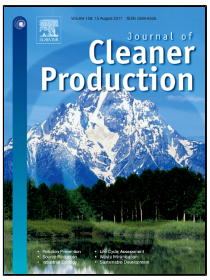

An integrated approach of process planning and cutting parameter optimization for Energy-aware CNC Machining

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Graphical Abstract:

This paper presents an integrated approach of process planning and cutting parameter optimization to minimize the total energy consumption of CNC machining and to balance machine workloads in workshop. The energy characteristics of machining process are explicitly analyzed by considering multiple process flexibilities and the cutting parameters. Then a multi-objective integration model of process planning and cutting parameter optimization is proposed to take the minimum energy consumption and balance of machine workloads as the optimization objectives, which is solved by a Multi-objective Simulated Annealing algorithm. To verify the energy-saving performance of the proposed multi-objective integration problem, case studies are carried out.