Application of Multi-objective Genetic Algorithm (MOGA) Optimization in Machining Processes

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Abstract Multi-objectives Genetic Algorithm (MOGA) is one of many engineering optimization techniques, a guided random search method. It is suitable for solving multi-objective optimization related problems with the capability to explore the diverse regions of the solution space. Thus, it is possible to search a diverse set of solutions with more variables that can be optimized at one time. Solutions of MOGA are illustrated using the Pareto fronts. A Pareto optimal set is a set of solutions that are non-dominated solutions frontier. With the Pareto optimum set, the corresponding objective function's values in the objective space are called the Pareto front. The conventional methods for solving multi-objective problems consist of random searches, dynamic programming, and gradient methods whereas modern heuristic methods include cognitive paradigm as artificial neural networks, simulated annealing and Lagrangian approcehes. Some of these methods are managed in finding the optimum solution, but they have tendency to take longer time to converge so that need much computing time. Thus, by implementing MOGA approach that based on the natural biological evaluation principle will be used to tackle this kind of problem. In this chapter authors attempts to provide a brief review on current and past work on MOGA application in few of the most commonly used manufacturing/machining processes. This chapter will also highlights the advantages and limitations of MOGA as compared to conventional optimization techniques.

Keywords Design-of-experiment · Machining · Genetic algorithm · Optimization

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