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Application of the Bees Algorithm to Find Optimal Drill Path Sequence

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Abstract

Optimisation is about finding the best solution to a particular problem. It is applied in many fields, especially in engineering problems. Drilling hole is a machining process that uses a tool with a pointed end or cutting edges to create circular holes in a material. One of the most common problems with drilling multiple holes is machining time. When drilling multiple holes, 70% of the machining time is spent moving and changing tools. Therefore, optimising the drilling sequence is important to reduce the machining time and increase the production of the company. Therefore, this study is conducted to find the optimal drilling sequence of multiple holes. The Bees Algorithm is applied to find the optimal drilling sequence for some benchmark problems including the 5×5 , 7×7 and 9×9 array matrices of holes. The Bees Algorithm was run using R Software. The results found are compared with the results of other algorithms in terms of the drill path length and machining time. The main finding of the study is that the Bees Algorithm found optimal drill path length and minimum machining time comparable to the results of the other algorithms for the 5×5 , 7×7 and 9×9 problems. These results show that the Bees Algorithm can be an alternative approach to find the optimal drilling sequence. © The Author(s), under exclusive license to Springer Nature Singapore Pte Ltd. 2024.

Author Keywords

Bees Algorithm; Drilling sequence; Optimisation

Index Keywords

Benchmarking, Machining centers; Bee Algorithm, Cutting edges, Drilling holes, Drilling sequence, Engineering problems, Machining Process, Machining time, Multiple holes, Optimisations, Pathlengths; Drills

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