**Chen, J.**; **Zhang, Y. F.**; **Nee, A. Y. C.**
**Setup planning using Hopfield net and simulated annealing.** (English) Zbl 0947.90554
Int. J. Prod. Res. 36, No. 4, 981-1000 (1998).

Summary: This paper reports a new approach to setup planning of prismatic parts using Hopfield neural net coupled with simulated annealing. The approach deals with setup planning in two stages, i.e.: (1) sequence all the features of a workpiece according to geometric and technological constraints; and (2) identify setups from the sequenced features. In the first stage, the task of feature sequencing is converted to a Constraint Optimization Problem (COP) which is similar to the Traveling Salesman Problem (TSP). The setup time due to setup and tool changes is incorporated into the 'distance' between features, while the precedence and critical tolerance relationships between features are treated as constraints. The Hopfield neural net approach for TSP, i.e. energy function, is adopted to model the COP mathematically where the constraints are attached as additional penalty functions. Simulated annealing is then used to search for the minimum energy state of the net while avoiding the local minima. The feature sequence obtained aims at minimizing the number of setups and tool changes while ensuring little or no violation of feature precedence relationship, thus keeping critical tolerance violation to a minimum. In the second stage, setups are generated from the sequenced features using a vector intersection approach based on common tool approach directions. A case study is presented to demonstrate the effectiveness of this approach. A comparison study between this approach and an existing integer programming setup planning system is also given which indicates the superior efficiency of the proposed approach when dealing with problems with a large number of features.

**MSC:**

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