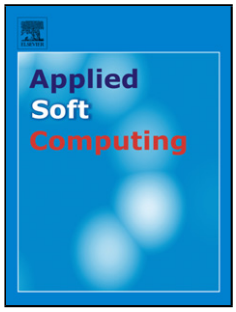

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SIMPLIFYING THE POWDER METALLURGY MANUFACTURING PROCESS USING SOFT COMPUTING TOOLS

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Abstract

The tools of soft computing will aid the knowledge mining in predicting and classifying the properties of various parameters while designing the composite preforms in the manufacturing of Powder Metallurgy (P/M) Lab. In this paper, an integrated PRNET (PCA-Radial basis functional neural NET) model is proposed in different versions to select the relevant parameters for preparing composite preforms and to predict the deformation and strain hardening properties of Al-Fe composites. It reveals that the predictability of this model has been increased by 67.89% relatively from the conventional models. A new PR-filter is proposed by slightly modifying the conventional filters of RBFNN, which improves the power of PRNET even though raw data are highly non-linear, interrelated and noisy. Moreover, fixing the range of input parameters for classifying the properties of composite preforms can be automated by the Fuzzy logic. These types of models will avoid expensive experimentation and risky environment while preparing sintered composite preforms. Thus the manufacturing process of composites in P/M Lab will be simplified with minimum energy by the support of these soft-computing tools.

Key words: Soft computing; Computational Intelligence; Knowledge Mining; Powder Metallurgy; Composite preforms;

1.0 Introduction

Soft computing models have been studied in recent years, with an objective of achieving human like performance in many fields of knowledge engineering. These tools are being successfully applied in material design, improvement and selection as well as in the control of the processes in materials fabrication. Many researchers have attempted to use soft computing tool like neural network for various applications in manufacturing such as, tool wear, TTT