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Abstract

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Research Article

Prediction of Continuous Cooling Diagrams for the Precision Forged Tempering Steel 50CrMo4 by Means of Artificial Neural Networks

Florian Nürnberger,[1] Mirko Schaper,[1] Friedrich-Wilhelm Bach,[1] Iryna Mozgova,[2] Kostjantyn Kuznetsov,[2] Anna Halikova,[3] and Olga Perederieieva[3]

[1]Institut Für Werkstoffkunde, Leibniz Universität Hannover, An der Universität 2, 30823 Garbsen, Germany
[2]Faculty of Applied Mathematics, Dnipropetrovsk National University, Prospekt Y. Gagarina 72, 49010 Dnipropetrovsk, Ukraine
[3]Faculty of Information Technologies, National Mining University of Ukraine, Prospekt Karla Marksa 19, 49027 Dnipropetrovsk, Ukraine

Abstract

Quenching and tempering of precision forged components using their forging heat leads to reduced process energy and shortens the usual process chains. To design such a process, neither the isothermal transformation diagrams (TTT) nor the continuous cooling transformation (CCT) diagrams from literature can be used to predict microstructural transformations during quenching since the latter diagrams are significantly influenced by previous deformations and process-related high austenitising temperatures. For this reason, deformation CCT diagrams for several tempering steels from previous works have been investigated taking into consideration the process conditions of precision forging. Within the scope of the present work, these diagrams are used as input data for predicting microstructural transformations by means of artificial neural networks. Several artificial neural network structures have been examined using the commercial software MATLAB. Predictors have been established with satisfactory capabilities for predicting CCT diagrams for different degrees of deformation within the analyzed range of data.