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PII: S0257-8972(18)31061-2
DOI: doi:10.1016/j.surfcoat.2018.09.088
Reference: SCT 23863

To appear in: *Surface & Coatings Technology*

Received date: 4 July 2018
Revised date: 3 September 2018
Accepted date: 27 September 2018

Please cite this article as: Xiaoli Wang, Qingshuai Meng, Zhou Wang, Jin Gan, Ying Yang, Xunpeng Qin, Kai Gao, Hanlie Zhong, Man Cheng, Xiaoyan Gan , Prediction of the surface characteristic of 42CrMo after spot continual induction hardening based on a novel co-simulation method. Sct (2018), doi:10.1016/j.surfcoat.2018.09.088

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Abstract: Spot continual induction hardening (SCIH) is one kind of selective surface treatments, which has been proven to be appropriate for improving the tribological property and the fatigue behavior of specific areas of treated components. In our work, an electromagnetic-thermal-mechanical-metallurgical coupled numerical model was developed based on a novel co-simulation of ANSYS and ABAQUS/standard via making use of these two commercial finite element softwares' respective advantages to describe the SCIH process. The simulated results agreed well with experimental data in temperature development and the distributions of hardness, phase and residual stresses. The relationship between the inductor velocity and surface characteristics was discussed and the optimization of induction coil velocity was carried out based on the validated numerical model.

Key words: Spot continual induction hardening; Finite element co-simulation; Electromagnetic-thermal model; Thermal-mechanical-metallurgical model; Residual stress distribution

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