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PII: S0924-0136(17)30472-7
DOI: https://doi.org/10.1016/j.jmatprotec.2017.10.023
Reference: PROTEC 15443

To appear in: *Journal of Materials Processing Technology*

Received date: 19-6-2017
Revised date: 15-9-2017
Accepted date: 14-10-2017

Please cite this article as: Ma, Ziyong, Luo, Yuanxin, Wang, Yongqin, On the pitch error in the initial stage of gear roll-forming with axial-infeed.Journal of Materials Processing Technology https://doi.org/10.1016/j.jmatprotec.2017.10.023

On the pitch error in the initial stage of gear rollforming with axial-infeed

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Abstract: Gear roll-forming process demonstrates an innovative energy-material saving and high efficiency forming technology for the powertrain gears. The pitch error in the initial stage has significant impact on the pitch deviation of the formed gears and the lifetime of the rolling tools. In this paper, an analytical model was proposed for predicting the pitch error with consideration of geometric relations and process parameters. Then, the impact factors related to the rolling tools, workpiece and process were analyzed based on the proposed model. To verify the model, Finite Element Method (FEM) simulations and experiments were conducted. The compared results show that the proposed model can well predict the pitch error in the initial stage. Moreover, the root causes of pitch error were revealed and its influence factors were also discussed. This research will lead theoretical foundation for reducing the pitch error in the gear roll-forming process.

Keywords: Gear roll-forming; Pitch error; Initial stage; Contact ratio