Prediction of cutting forces and instantaneous tool deflection in micro end milling by considering tool run-out

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PII: S0020-7403(17)31426-1
DOI: 10.1016/j.ijmecsci.2017.12.019
Reference: MS 4083

To appear in: *International Journal of Mechanical Sciences*

Received date: 27 May 2017
Revised date: 28 November 2017
Accepted date: 10 December 2017

Please cite this article as: Xuewei Zhang , Tianbiao Yu , Wanshan Wang , Prediction of cutting forces and instantaneous tool deflection in micro end milling by considering tool run-out, *International Journal of Mechanical Sciences* (2017), doi: 10.1016/j.ijmecsci.2017.12.019

Highlights

- Influence of tool run-out (axial and tilt offset), tooth trajectory, variable entry and exit angles, and size effect on cutting forces in the micro end milling process is evaluated.

- Instantaneous tool deflections are determined based on the distributed load acting on the cutting edge and the tool is assumed to be the continuous Timoshenko beam

- The tool run-out parameters and cutting forces coefficients are calibrated by the measured cutting forces.

- Simulation and experiment results show a good agreement to validate the proposed tool deflection model.