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Measurement of Equivalent Residual Stresses Generated by Milling and Corresponding Deformation Prediction

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Highlights

- We propose a method to measure the equivalent residual stresses generated by milling, which is based on just two material-layers removal;
- We introduce the calculation of the deformation of the workpiece based on the equivalent residual stresses;
- We machined the Ti6Al4V alloy workpiece, measured the equivalent residual stresses, and calculated the deformations;
- We measured the real deformations of the workpiece using laser displacement sensor;
- We compared the predicted deformations and the measured deformations of the workpiece caused by milling induced residual stresses, and found a good agreement between them.

Abstract: We introduce a method to measure the equivalent residual stresses and depths of the affected layers, which are generated in the workpiece during the milling process. These layers lie immediately under the milled surface. After machining, two material layers on the opposite side from the machined surface were chemically removed, and strain changes on the machined surface