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Investigating Effects of Milling Conditions on Cutting Temperatures through Analytical and Experimental Methods

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Cutting temperatures in milling operations have a significant impact on tool wear, size and shape tolerances and residual stresses of the machined part. Prediction and measurement of cutting temperatures in milling, on the other hand, have some challenges due to the rotary tools resulting in an intermittent process and transient thermal loadings. In this study, novel approaches are presented to model and measure the cutting tool temperature variations during milling. The model is used to predict effects of milling conditions on cutting temperatures particularly to determine a relationship between tool temperature and radial depth of cut. The model predictions are verified by measurements obtained from the developed measurement technique and the literature data.

Keywords: Milling, Temperature, Modeling