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Analysis and assessment of robotic belt grinding mechanisms by force modeling and force control experiments

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Abstract

A tentative work from the perspective of cutting forces is carried out in this paper to analyse and assess the robotic belt grinding mechanisms. Firstly, a microscopic scale of cutting force model consisting of sliding, ploughing and cutting components is introduced, then the effects of force components on the machined surface roughness are explored based on the force control experiments, and finally a typical case on the robotic belt grinding of aero-engine blade with constant contact force is conducted to validate the practicality and effectiveness of force control. The results reveal two significant findings with respect to the high sliding force percentage and low cutting efficiency in comparison with the robotic belt grinding without force control.

Keywords: Robotic belt grinding; Force control; Surface roughness; Cutting mechanisms

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