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Authors: Chaojie Liu, Wenfeng Ding, Tianyu Yu, Changyong Yang



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Materials removal mechanism in high-speed grinding of particulate reinforced titanium matrix composites

Chaojie Liu^a, Wenfeng Ding^{a,*}, Tianyu Yu^b, Changyong Yang^a

^aCollege of Mechanical and Electrical Engineering, Nanjing University of Aeronautics and Astronautics, Nanjing 210016, PR China

^bDepartment of Aerospace Engineering, Iowa State University, Ames, IA50010, USA

*Corresponding author. E-mail: dingwf2000@vip.163.com (W.F. Ding), tianyuyu@iastate.edu. Tel/Fax: 86-25-84892901

Revised research highlights

- Material removal mechanics of PTMCs were analyzed by considering both matrix and particles removal.
- Finite element model was established to simulate materials removal in high-speed grinding of PTMCs.
- Removal of reinforcing particles induces a significant fluctuation of the grinding force.
- Resultant stress distribution in alloy matrix and reinforcing particle was discussed.
- Undeformed chip thickness has an important impact on the formation of ground surface defects.

Abstract

A finite element (FE) model was established for high-speed grinding of particulate reinforced titanium matrix composites (PTMCs). The materials removal mechanism, including the grinding force and resultant stress, the removal behavior of alloy matrix and reinforcing particles, have been analyzed. Particularly, the effect of grinding parameters on the surface defects was discussed. The results indicate that, the grinding force has different characteristics when the alloy matrix and reinforcing particle were removed, respectively, and the grinding force fluctuates significantly in the removal process of reinforcing particle. The material

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