Investigation on Electrochemical Jet Machining of High Volume Fraction SiC_p/Al Composite

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SiC particles reinforced aluminum matrix composites (SiC_p/Al) is a class of materials with a wide potential for application in aerospace and electronic packaging. High volume fraction reinforcement SiC_p/Al is very difficult to machine by conventional methods. This research investigated electrochemical jet machining (ECJM) of 65%-SiC_p/Al composite with absence of and presence of abrasive assistance. The machining capability and material removal mechanism have been analyzed for the jet process. The results show that the material removal mechanism involves corrosion of matrix followed by SiC particles pullout. The presence of abrasives in the ECJM process can remove oxide layer generated at aluminum surface and results in relatively higher machining rate than pure ECJM. The craters due to SiC particles pullout and SiC protrusion due to corrosion of matrix significantly affect roughness of the machined surface.

Keywords: electrochemical jet machining; abrasive assisted electrochemical jet machining; SiC particles reinforced aluminum matrix composite, material removal mechanism.

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