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Modeling and fabrication of microhole by electrochemical micromachining using retracted tip tool

Weidong Liu¹, Sansan Ao¹, Yang Li¹, Zuming Liu¹, Zhen Luo^{1,2*}, Zhiping Wang³, Renfeng Song⁴

1 School of Materials Science and Engineering, Tianjin University, Tianjin 300350, China

2 Collaborative Innovation Center of Advanced Ship and Deep-Sea Exploration, Shanghai 200240, China

3 School of Aviation Engineering, Civil Aviation University of China, Tianjin 300300, China

4 Ansteel Mining Engineering Corporation, Anshan 114004, China

*Corresponding author at: No.31 Building Room 291, School of Materials Science and Engineering, Tianjin University-Peiyang Park Campus, Tianjin 300350, China. Tel: +86-02227406602

E-mail address: lz@tju.edu.cn

Highlights

- Electrochemical micromachining (EMM) of high-quality microholes on aluminum plate by using retracted tip tool is presented.
- Review of electrochemical micromachining (EMM), development of microtools and modeling of electrochemical machining (ECM).
- A mathematical model to predict the relation between diameter of machined microholes and retracted tip depth of retracted tip tool is developed.
- The experimental verification of the mathematical model is carried out.

Abstract

Accurate microhole is a key feature for many kinds of micro parts widely used in diverse industries. But machining of microhole using traditional processes faces great challenges due to the thermal-mechanical effects. Electrochemical micromachining (EMM) is a potential technique to meet the requirement of high-quality microhole fabrication. However, the currently-used microtools suffer from some drawbacks such as stray dissolution, bell-mouth entrance and excess radial overcut. To overcome these limitations, a novel microtool with retracted tip structure is proposed in this work. A mathematical model has been developed to investigate the effect of retracted tip depth on machining accuracy. And an

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