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Study on the micro pulsed electro-chemical machining of invar alloy according to electrolyte variables

Seong-Hyun Kim, Kwang-Ho Chun and **Eun-Sang Lee**
Inha University, Republic of Korea

Electro-chemical machining appears to be one of the rather promising micro-machining techniques in many fields. It offers some of advantages including higher machining rate, no tool wear and better precision. Recently, many researches have investigated on special alloys. Invar alloy which is widely used in many industries such as aircraft, frontier display's shadow mask such as OLED, mobile display, biotechnology and aerospace has been applied in this study. Invar is a compound metal of Fe-Ni system and contain 36% Ni. The most distinction characteristic of Invar is the coefficient of thermal expansion is 1.0×10^{-6}cm/°C. Its coefficient of expansion is a very low. Generally, when neutral solutions are used for electro-chemical machining of Invar alloy, debris are produced and stay between electrode and workpiece. It causes the stains on invar alloy and decrease the accuracy. In case of using acid solutions for electro-chemical machining on Invar alloy, there is no debris during the process. But, acid solution reacts with Fe ion in Invar alloy. For this reason, the corrosion is generated on the surface of Invar alloy. In this study, focused mixed electrolyte consists of eydrogen peroxide, acetic acid and sulfuric acid. The performance of each of solutions for electroc-hemical machining has been analyzed. Based on the study, the machinability is compared with each concentration and each solution. Therefore, ions in electrolyte are involved in the electro-chemical machining process to affect machinability characteristic.

Biography

Seong-Hyun, Kim received BS degrees in Mechanical Engineering from HOWON University in 2010 and MS degrees in Mechanical Engineering from INHA University in 2012. He is currently a PhD candidate at the Graduate School of Mechanical Engineering at INHA University in Incheon, Korea. His research fields are in micromachining by using chemical reaction, electro-chemical manufacturing and the development of a ultra-precision machining system.

kimseonghyun@inha.edu

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