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Electrochemical Etching on Titanium Using Three-Dimensional Electrochemical Micromachining Technique
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ABSTRACT

With various industries racing to invent smaller yet better tools and devices, the need for various micromachining techniques and their developments has become more urgent than ever. Electrochemical micromachining (ECMM) is one of the non-conventional machining techniques, known to create precise and accurate metal products with high efficiency and repeatability, with advantages in machining any conductive material, up to the micrometer level. This research was conducted to research the effects of Material Removal Rate (MRR), overcut, and surface roughness on the end-product of the ECMM process in Titanium.

This research will vary the voltage of the machining between 15, 17, and 20V machining voltage, 0.1, 0.12, and 0.15 mm/min feed rate, as well as 10%, 15%, and 20% electrolyte concentration. This will be done on Commercially Pure Titanium with Ti concentration >99.5% with 0.5 mm thickness as its workpiece or anode and a copper tool with 0.3 mm diameter as its tool or cathode.

This research bears the result that the best variation for the highest material removal rate is 20% electrolyte concentration, 15 V machining voltage, and 0.15 mm/min feed rate. The best variation for the lowest overcut is 10% electrolyte concentration, 15 V machining voltage, and 0.15 feed rate and, the best variation for the lowest surface roughness is 15% electrolyte concentration, 17 V machining voltage, and 0.1 mm/min.

Keywords: Electrochemical Micromachining, Titanium, Electrochemical etching