عنوان مقاله:

A study on the effect of electric current density on surface roughness and hardness of metallic mesostructures manufactured by rapid tooling and electroforming process

محل انتشار:

سی و یکمین همایش سالانه بین المللی مهندسی مکانیک ایران و نهمین همایش صنعت نیروگاهی ایران (سال: 1402)

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خلاصه مقاله:

Miniaturization of industrial equipment andproducts decreases the dimensions, volume, andweight while increasing the production speed.Nowadays, metallic micro and mesostructures arewidely used in different and influential industriesworldwide, such as automotive, electronics,robotics, biomedical engineering, and aerospace.This study investigates the effect of electric currentdensity on the surface roughness and hardness ofmesostructures manufactured through rapid toolingand electroforming process, which is aninexpensive production process and, meanwhile,can be accurate. Accordingly, a series of polymericmolds are produced using the DLP (digital lightprocessing), and then electroforming is employedto produce metallic mesostructures with patterns ofpolymeric molds. Specimens are made fromcopper, and the study range for the effect of currentdensity on the surface roughness and hardness ofspecimens is ۱-۹ (A/dm^۲). Results show thatincreasing current density increases and decreasessurface roughness and hardness, respectively. Thepresent study demonstrates the importance ofadjusted current density to the surface roughnessand hardness of mesostructured specimensproduced through the electroforming process. Theresults of this study can be used for a more detailedinvestigation of electroforming performance toreduce internal defects, in addition to finding theoptimal current density for manufacturingmesostructures.

کلمات کلیدی:

Mesostructures, Electroforming, Surfaceroughness, Hardness