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Experimental Investigation into the Electropulsing Assisted Punching Process of 2024T4 Aluminum Alloy Sheet

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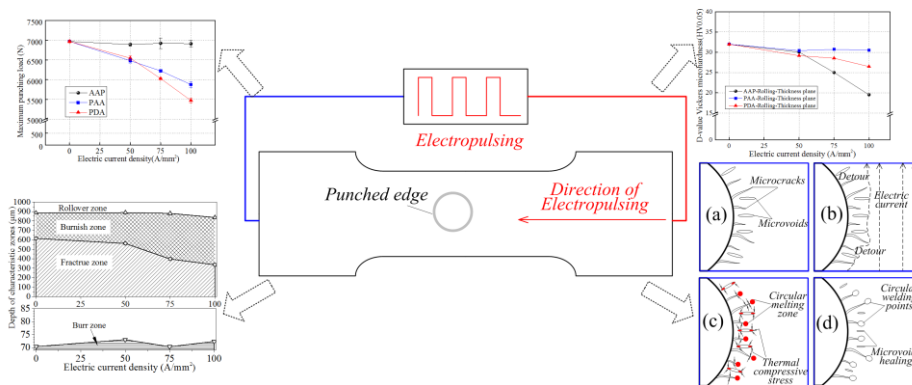
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Graphical Abstract



Abstract

During the punching process of high strength lightweight materials such as 2024T4 aluminum alloy, the severe die wear and edge fracture of the punched part are one of the main concerns of manufacturing industries and the scientific community. Researches have found that the electric current can reduce the metals' flow stress, improve their ductility, and promote the dislocation annihilation below the annealing temperature. Therefore, the electric current was proposed to help improve the punching process of 2024T4 aluminum alloy sheet in this paper. The experiments of electropulsing assisted punching (EAP) were carried out by applying different values of electric current on the specimens at different punching phases. For convenience to compare the punching results, the punching load, the surface quality of the punched profile and edge strain hardening (ESH) were analyzed under different electropulsing ways. In addition, the uniaxial tensile tests of punched parts were carried out to evaluate the influence of electropulsing on the ultimate tensile load of punched specimen with a hole. The

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