The Mechanics of Machining Ultrafine-Grained Ti-6Al-4Mo Alloy Processed Severe Plastic Deformation

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The physics features of the cutting process of ultrafine-grained metals produced by the method of severe plastic deformation are considered. The aim of the research was to evaluate, whether the grain size of titanium alloy has an influence on the characterization of chips, the cutting force components, the surface roughness and the microhardness in the cutting process. The experimental data of the machineability of titanium alloy Ti-6Al-4Mo with sub microcrystalline structure are presented in the paper. The features of the chip formation, the changes of the chip ratio and the components of the cutting force are examined. The main characteristics of the cutting mechanics are calculated and based on the experimental values. Also the experimental values of the surface finish roughness and microhardness are shown. It is established, that the change in the structure of the metal has an ambiguous effect on machineability by cutting. Further investigation of the machineability of metals with a submicrocrystalline structure will allow to choose the efficient mechanical treatment.

Keywords: Ultrafine-grained, Titanium alloy, Machineability, Severe plastic deformtion

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