The Mechanics of Machining Ultrafine-Grained Grade 2 Ti Processed Severe Plastic Deformation

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Machining of titanium is quite difficult and expensive. Heat generated during the process of cutting does not dissipate quickly, which affects tool life. In the last decade ultrafine-grained (UFG) titanium has emerged as an option for substitution for more expensive titanium alloys. Extreme grain refinement can be readily performed by severe plastic deformation techniques. Grain refinement of a material achieved in this way was shown to change its mechanical and physical properties. In the present study, the microstructure evolution and the shear band formation in chips of coarse grained and UFG titanium machined to different cutting speeds and feeding rates was investigated. It was demonstrated that an improvement in the machinability can be expected for UFG titanium.

Keywords: Ultrafine-grained, Titanium, Machinability, Severe plastic deformtion

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