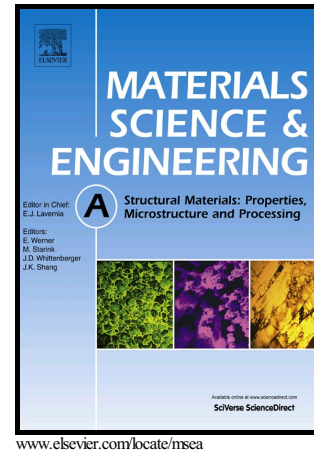


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# Experimental and finite element analyses of plastic deformation behavior in vortex extrusion

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## Abstract

Vortex extrusion (VE) is a single pass severe plastic deformation (SPD) technique which can impose high strain values with almost uniform distribution within the cross section of the processed material. This technique needs no additional facilities for installation on any conventional extrusion equipment. We investigate the deformation behavior of material during VE and compare the results with those of conventional extrusion (CE). These investigations include finite element analysis, viscoplasticity, and microstructural characterization of the processed samples. The results indicate that the VE process can accumulate a higher strain value by applying an additional torsional deformation. The role of this additional deformation mode on the microstructural evolution of the VE sample is discussed and compared with the results obtained on the CE samples.

**Keywords:** Severe plastic deformation, Vortex extrusion, Conventional Extrusion, Viscoplasticity, Microstructure, Finite element analysis

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