

Strain path effect on martensitic transformation in medium Mn steels

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Most of the industrial metals forming processes are characterized by complex strain paths. To make effective use of medium Mn steels in automotive parts, the formability analysis along with the proper understanding of deformation mechanisms and their effect on delayed fracture phenomenon at different strain paths is an important area to be investigated. In the present work, we carried out formability analysis of cold rolled Fe-5Mn-0.2C-0.73Si-0.34Al medium Mn steels at different strain paths. We observed that the samples failed at low effective strain in case of plane strain conditions as compared to uniaxial and biaxial loading conditions. We observed more martensitic transformation during deformation (TRIP effect) in case of plane strain loading condition as compared to uniaxial and biaxial loading conditions. Favored texture development to austenite to martensite transformation could be the reason behind more martensitic transformation in plane strain loading condition.

Keywords: Medium Mn steel, Strain path, martensitic transformation, texture.

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