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A comprehensive investigation on temperature dependent plastic deformation behavior of one austenitic stainless steel

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Abstract:

The austenitic stainless steels are widely used in various industries due to its excellent properties. However, because of the martensitic phase transformation during the forming process, the austenitic stainless steels involve much more complex deformation behavior in comparison to the normal structure steels. Here in this paper, the deformation behavior of one austenitic stainless steel-Posco 1.4301, including the hardening behavior, yield behavior and formability behavior under different temperatures are comprehensively investigated by experimental, theoretical and finite element methods. Results show that martensitic phase transformation, which is related with temperature and strain, can greatly influence the plastic deformation behavior. This study provides a comprehensive understanding of the mechanical properties of this austenitic stainless steel and helps to better analyze the more complex deformation process in the future.

Keyword: Martensitic phase transformation; Forming limit; Austenitic stainless steel; Finite element simulation

1. Introduction

Stainless steels have a big potential in forming application for vessels, kitchen, building, and transportation, et al. because of their good corrosion resistance, excellent mechanical properties and

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