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Simulation of two kinds of hot stamping processes of ultra high-strength steel

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ABSTRACT

In recent years, for the demand of energy conservation and security improvement, high-strength steels (HSSs) are increasingly being used to produce safety-related automotive components. Besides for complete high-strength parts, HSS is also used for the manufacturing of some components with tailored properties which means different strength designed in different zones. In this work, two kinds of hot stamping processes including complete and partitioned mould cooling, respectively, for just high-strength and tailored properties were studied. The whole hot stamping process, including heating, feeding, forming, quenching, and Air cooling, were simulated in the Finite Element Program LS-DYNA. The volume fractions, microconstituents, temperature field, and hardness profiles, obtained by simulation show promising agreement to the corresponding experimental observations. Thus, the numerical method can provide guidance for the mold design and process parameter optimization for hot stamping and improve the mechanical properties of HSS parts.

KEYWORDS: high-strength steel, hot stamping, microstructure, hardness estimation