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Poster Oral

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Influence of hot-stamping process on the corrosion initiation and properties of corrosion products at the surface of 22MnB5 steel metallic coated with hot-dip Al-Si

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Abstract

22MnB5 is an ultra-high strength steel combined with hot-stamping process, also known as press hardened steel (PHS). It is a strategic material for the automotive industry because it allows safety improvement, lightweight design and consequently reduction of fuel consumption. In order to prevent surface scale and steel decarburisation during the hot-stamping process, the material is often protected with metallic coatings. Hot-dip Al-Si (Si 10 % in mass fraction) is the most used system for hot-stamping application. This study has the objective to characterize the corrosion initiation and the properties of the corrosion products at the surface of samples before and after hot-stamping process. The samples were submitted to several cycles of accelerated corrosion tests in a salt spray chamber. A systematic characterization of the corroded surface was done by means of Raman spectroscopy and scanning electron microscopy combined with energy dispersive X-ray spectroscopy (SEM - EDS). The samples were also immersed in a Cl⁻ containing solution, after which the morphology of the corrosion attacks and the corrosion initiation process were studied. The thermo-mechanical process changes the corrosion mechanism as well as the nature of the corrosion products.

Keywords: PHS, hot-stamping, metallic coating, Al-Si, accelerated corrosion test, Raman spectroscopy.

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