



Influence of heat treatment on corrosion resistance of press hardened steel coated with AlSi and ZnNi.

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The ultrahigh strength boron manganese steels, also known as PHS (press hardened steels), are strategic materials for the automotive industry, satisfying safety needs and fuel reduction requirements by means of the lightweight design concept, a current trend for new vehicles. It is possible by the hot stamping process which consists in heating a steel blank to the austenitization temperature, transferring it to press tooling, forming and quenching to fully martensitic transformation. At the end of process, the steel achieves tensile strength up to 1,500 MPa. The transference step from furnace to press is a critical stage because it might promote deleterious steel oxidation. The use of metallic coatings avoids this outcome. AlSi coatings have been the most applied on PHS. Alternative coatings such as electroplated ZnNi are under investigation to evaluate their potential for replacement of AlSi coatings, besides to keep up with the high projected world demand. Zinc based coatings are advantageous comparatively to AlSi ones because they provide cathodic protection to steel substrates. In this study the influence of hot stamping heat treatment on corrosion resistance of 25MnB5 steel coated by AlSi and electroplated ZnNi has been investigated. The tests include open circuit potential measurement, electrochemical impedance spectroscopy and anodic polarization curves. The samples have been tested as received and after the heat treatment which consists in heating the sample at 900°C by 10 minutes and then, fast cooling in water. It is expect that the heat treatment changes the corrosion resistance due to the intermetallics formation at the coating layer as a consequence of diffusion.

Keywords: PHS, ZnNi, AlSi, heat treatment, electrochemical corrosion test.