

Effect of the Alloying Elements on Mechanical Properties of TWIP Steel

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Abstract : The influence of the alloying element on mechanical properties and micro structures of the Fe-22Mn-0.6C-0.6Si twinning induced plasticity (TWIP) steel were investigated at different temperatures. This composition was fabricated by a vacuum induction melting method. This steel was homogenized at 1200°C for 8h. After heat treatment it was hot-rolled at 1100°C to 6 mm thickness. The hot rolled plates were cold rolled to 3 mm and annealed at 700 800 and 900 °C for 60 and 150 minute and then air-cooled. X-ray diffractometry (XRD), optic microscope and field emission scanning electron microscope (FESEM), hardness and tensile tests were used to analyse the relationship between mechanical properties and micro structure after annealing process. The results show that, the excellent mechanical properties were obtained after heat treatment process. The tensile strength of material was decreased and the ductility of material was improved with increasing annealing temperature. Ni element were increased the mechanical resistance of specimens and because of carbide precipitation the hardness of specimen annealed at 700 C is higher than others.

Keywords : high manganese, heat treatment, SEM, XRD, cold-rolling

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