

The Effect of Austempering Temperature on Anisotropy of TRIP Steel

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Abstract : The high strength and flexibility of TRIP steels are the major reasons for them being widely used in the automobile industry. Deep drawing is regarded as a common metal sheet manufacturing process is used extensively in the modern industry, particularly automobile industry. To investigate the potential of deep drawing characteristic of materials, steel sheet anisotropy is studied and expressed as R-Value. The TRIP steels have a multi-phase microstructure consisting typically of ferrite, bainite and retained austenite. The retained austenite appears to be the most effective phase in the microstructure of the TRIP steels. In the present research, Taguchi method has been employed to study investigates the effect of austempering temperature parameters on the anisotropy property of the TRIP steel. To achieve this purpose, a steel with chemical composition of 0.196C -1.42Si-1.41Mn, has been used and annealed at 810oC, and then austempered at 340-460oC for 3, 6, and 9 minutes. The results shows that the austempering temperature has a direct relationship with R-value, respectively. With increasing austempering temperature, residual austenite grain size increases as well as increased solubility, which increases the amount of R-value. According to the results of the Taguchi method, austempering temperature's p-value less than 0.05 is due to effective on R-value.

Keywords : Taguchi method, hot rolling, thermomechanical process, anisotropy, R-value

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