

Heat treatment inside the HIP-Unit

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The possibility to combine the densification or compaction of steel parts with a heat treatment has evolved recently by the production of HIP-Units with a rapid quenching device. Since then several studies have been performed to assess the cooling speed and show possibilities to heat treat steels. It was shown before that several alloyed steel grades can be hardened with the method of quenching inside a HIP. This study aims to characterize the impact of high isostatic pressure during austenitization and quenching on the transformation behavior and resulting microstructure of hardenable steels. In order to study the effects of the pressure during quenching two methods have been applied. The first method is to measure the latent heat during isothermal holding inside the transforming steel. The release or uptake of energy reveals information about the succession of the transformation that takes place. Secondly the electrical resistivity of a steel can be used as a sensitive indicator for the existing phases and solution state of steel during continuous cooling after austenitization. The two analytical methods both reveal that isostatic pressure of 170 MPa is sufficient to shift the transformations and hence, increase hardenability of martensitic hardenable steel.

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Materials

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