

The Effect of Plasma Nitriding Process on the Change of Dynamic Parameters of Steel DIN 1654/4

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This article describes the effect of selected parameters of plasma nitriding on the change of dynamic parameters of steel DIN 1654/4. Plasma nitriding is currently used in a wide range of technical applications such as a final operation to improve the mechanical properties of components. This experimental investigation is devoted to the analysis of the influence of plasma nitriding on the notch toughness of structural steel DIN 1654/4 (CSN 41 2042.4). The test of the dynamic fracture behaviour of structural steel was carried out using by instrumental Charpy hammer on the plasma nitrided specimens with V and U notch, manufactured according to standard CSN ISO 148-1. The plasma nitriding was implemented at 500 (°C), process duration $t = 10$ and 20 (h) and variable gas mixture ratio of $24\text{H}_2: 8\text{N}_2$ (l/h) and $8\text{H}_2: 24\text{N}_2$ (l/h). The test results showed that nitrided steel has become more brittle. However, it was found that for different gas composition, the notch toughness has behaved quite diversely. The values of notch toughness of steel in case of gas ratio $8\text{H}_2: 24\text{N}_2$ (l/h) were decreased but for gas ratio $24\text{H}_2: 8\text{N}_2$ (l/h), with extension of time, the notch toughness was slightly increased.

Keywords: Plasma nitriding, Notch toughness

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