

Improvement of superficial hardness of S355JR steel by superficial plastic deformation

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Abstract

Surface hardness plays an important role in lifetime of a mechanical part subjected to friction and wear. Indeed, the hardness can be improved by processes of superficial plastic deformation (DPS), such as the mechanical surface treatment "TMS", in particular the ball burnishing. However, the result of treatment is conditioned by mastery of operation thus ensuring treated parts good mechanical and geometric properties. Experimental work was carried out by applying Ball burnishing process on S355JR steel specimens, in order to observe influence of treatment regime parameters on surface hardness 'Hv'. Two parameters of regime were considered namely: pressure force "Py" and number of passes "i". The relationship between these parameters and microhardness measured at "Hv" surface has been highlighting using factorial design plans 2². Moreover a mathematical model has been obtained allowing prediction of response (Hv) as well as optimization of parameters of treatment regime. The experimental results showed that for surface hardness Hv it is possible to reach a 45% improvement rate for a pressure force p = 20 Kgf and a number of passages i = 3 for this material.

Keywords

Surface hardness, factorial designs, ball burnishing, optimization

Biographies

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