

Effect of heat treatment on surface hardness and tribological behavior of XC38 steel—approach by the experiments plans

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Abstract: This work aims at predicting the micro-hardness of XC38 steel using the experiments plans as well as study of tribological behavior of this steel. The heat treatments were considered by adopting the factorial plans 2² methodology at two factors (temperature 'T' and holding time 't'), each at two levels (-1, +1). The results obtained allowed lead to a mathematical model predicting the micro-hardness 'Hv' in every point of the study field. Moreover, the curves of the responses surfaces clearly show the influence of two factors studied (T, t) on 'Hv'. Mechanical characterization of treated samples showed a significant increase in the micro-hardness, which achieve to 76% for the treated sample at 850 °C during 2 h compared to untreated state. An investigation of wear tracks morphology shows that friction under a load of 10 N results in predominant adhesive wear, while a load of 2 N favor abrasive wear.

Keywords : heat treatment, factorial plans, prediction, superficial hardness, tribological behavior