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Investigation on Chromizing of C45 Steel using Response Surface Methodology

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Abstract: The application of C45 steel in shafts studs, general fasteners and keys demand a hard and wear resistance surface. General heat treatment processes improve the core hardness resulting in brittleness of the components. In the present work, pack chromizing is done on C45 steel shafts to improve the surface (Vickers) hardness with a required diffusion depth. The core hardness is maintained at nominal value. The paper investigates the vitality of response surface methodology (RSM) in predicting the optimal combination of pack chromizing parameters to achieve the desired depth of diffusion and surface hardness. Experiments are conducted using Taguchi's L_{18} orthogonal array design and the optimal chromizing parameters are endorsed. The microstructure showing the diffusion depth obtained using optimal parameter setting is also studied.

Keywords: Chromizing, Taguchi, C45 steel, Response surface methodology, Vickers hardness, Optimization, Diffusion depth.

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