

Surface Treatment of Steel by Plasma Boronizing

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ABSTRACT

The use of a plasma environment for the thermochemical heat treatments is firmly established in the fields of nitriding, boronizing and carburizing. Especially, plasma nitriding is now regarded as a mature industrial process of proven economic viability. Attention has turned towards assessing which other thermochemical heat treatments may be carried out in the plasma of a current intensive glow discharge.

At present the processes of boronizing in a plasma from gaseous compounds containing the impregnating element have been most fully studied and are in use in industry. These have been investigated by a variety of works a glow discharge with different mixtures of diborane and hydrogen as well as BCl_3 and hydrogen. The active atmosphere has been diluted by argon or some other inert gas in order to enhance control of boron potential and to reduce the ignition voltage of the glow discharge.

The advantage of plasma boronizing are the possibility of controlling the phase composition of obtained layers, the reduction of duration and lowering the temperature of treatment, and gas consumption economy. An essential role in plasma boronizing treatment plays the gaseous atmosphere. It is the source of boron saturating the surface layer of the treatment workpiece and influences the design of equipment of boronizing reactions and the morphology of boride layer under various plasma conditions.