ALUMINIZING OF THE Cr15Al5 ALLOY SURFACE BY HOT-DIPPING IN THE MELT

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Optical (a) and SEM image (c), the diffraction pattern taken from the surface of the coating (b) and the distribution of chemical elements in the diffusion zone (d) after dipping of the Cr15Al5 alloy in the silumin melt (740 °C for 10 min)
Heat treatment of aluminized samples

The structure of the coating after HT at 800 °C for 1 h (a) and 20 h (b)
The structure of the sample with the coating after HT at 1000 °C for 5 h (a), 20 h (b), the distribution of chemical elements throughout the coating thickness (c) and the diffraction pattern taken from its surface (d)
Appearance of coated sample after electrolytic etching

The structure of the Cr15Al5 alloy in the initial state (a) and with an aluminide coating formed on the surface (b) after HT at 1000 °C for 20 h.
Conclusion

- To form an aluminide coating on the surface of the Cr15Al5 alloy, the composit obtained by dipping into the silumin melt must be heat treated at 1000 °C. The coating obtained has a variable phase composition: FeAl (Cr, Si) / Fe₃Al (Cr, Si) / Fe (Al, Cr, Si) and its surface hardness is ~ 3.5 GPa.

- Grain growth in the base material and a decrease in the density of carbide inclusions with their segregation along grain boundaries lead to a significant decrease in microhardness compared to the initial state (from 2.1 to 1.6 GPa).