

Aluminizing of Carbon Steel

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Abstract

This paper provides a mechanism to study aluminum diffusion microstructure, phase structure and different properties of the aluminized layer in carbon steel.

The results of aluminized treatment in saturated medium lead to the formation of diffusion layer coating that contains iron aluminide and α - solid solution of aluminum in the unit cell of iron.

The effect of aluminizing process parameters on the aluminizing layer, especially the effect of temperature and time, has been shown to increase the depth of the aluminized layer when temperature and time increase, but the effect of temperature is greater than time.

In this research, the effect of corrosion among hostile industrial mediums such as sulfuric acid extended with water 10% H_2SO_4 and nitric 10% HNO_3 to the aluminized layer is studied, and the results confirmed that the corrosion resistance of aluminized steel increases by 4.5 - 10 times compared to the untreated steel. In addition, the effect of nitric acid is greater than the effect of sulfuric acid on an aluminized layer.

The results of the research have significant and important effect on the capacity of mechanical elements prone to oxidization or ,700 ° C and 900 ° C. Whereas oxidation resistance of aluminized steel is 5 - 8 times greater than untreated steel.

The results demonstrate the possibility of using aluminizing coating and they are promising to raise the reliability, oxidation resistance and corrosion resistance, leading to increased life time of machine elements used in power stations and aircraft turbines .

Keywords: aluminizing, diffusion, carbon steel, surface treatment, microhardness, microstructure, oxidation at high temperatures and corrosion.

For the abstract in Arabic see pages (397-406).

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