A Review of Decarburization Resistant Coating on Cast Steel at High Temperature

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[ABSTRACT]

Decarburization of steels often occurs during the heat treatment procedures, such as reheating of base material, hot rolling, and annealing, in which, the resulting loss of carbon elements degrades the mechanical properties, by way of reduction of tensile strength, worsening of ductility, and development of cracks, etc. It is well known that the typical decarburization is attributed to the diffusion and oxidation elimination of carbon atoms taking place in solid solution, producing non uniform carbon distribution. In order to reduce severe decarburization, coating method has been used to reduce the carbon loss during high temperature treatment of steel. A few efforts were made to impede the decarburization of steel substrates. M. Torkar et al. applied a waste cyclone powder on AISI 1059 steel to reduce the oxidation and decarburization of the steel during the reheating for hot rolling, but the coating could only reduce decarburization above 1200°C. A.M. Medvedev et al. created a barrier protective layer formed from the gas phase on the surface of the steel parts to protect iron-carbon alloys from high-temperature corrosion, but the process was complex and the equipment was expensive. Therefore, it is imperative to develop a simple, economic, and convenient anti-decarburization coating technique, applicable for industrial environment.