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Study on the microstructure and properties of Cu based electric arc cladding layer on the surface of steel substrate

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In this paper, electric arc cladding technology is used to prepare copper / steel composite cladding layer by using silicon bronze solid welding wire and flux-cored welding wire with four different elements of Co, Cr, Ti and Mn. The microstructure and properties are analyzed to improve the performance of copper / steel composite components. The results show that the interface between Cu-Ti and Cu-Cr cladding layer and low carbon steel is not straight. It is found in the top structure that Cu-Co is mainly composed of α-Cu and spherical Fe-Co phase, Cu-Cr is mainly composed of α-Cu and spherical Cr-rich phase, Cu-Ti is mainly composed of α-Cu phase and a large number of metal compounds (iron-titanium, copper-titanium), Cu-Mn cladding is mainly composed of Fe-based solid solution and Cu-based solid solution, and Cu-Si is mainly composed of α-Cu and Fe-rich phase. The MUZ region is not found at the interface in Cu-Co, and the Cu-Si is the narrowest and the Cu-Ti is the widest in MUZ region. In the hardness test, the hardness of Cu-Ti alloy cladding layer is higher, and the hardness of Cu-Mn cladding layer is more stable. Cu-Co has the lowest wear loss and good wear resistance.