applied sciences

Review

Use of Thermal Coatings to Improve the Durability of Working Tools in Agricultural Tillage Machinery: A Review

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Abstract

This article presents an in-depth analysis of the application of thermal deposition techniques, in particular thermal spraying, to improve the properties of materials used in agricultural components that work the soil, such as agricultural plows (mainshare and foreshare). Due to the difficult operating conditions, characterized by abrasive wear, mechanical shocks, and chemical exposure from various soils, these surface coatings aim to increase the durability and corrosion resistance of the materials of components intended for working with the soil. The study investigates thermal deposition methods and their effects on the microstructure, hardness, and friction resistance of the obtained layers. The study highlights experiments that reveal significant improvements in mechanical properties, highlighting superior behavior in real conditions of agricultural use. Nevertheless, soil types significantly influence the abrasive wear rate of the components and also their corrosion, which depends on the soil pH. The results confirm that the use of thermal deposition represents a sustainable and effective solution for extending the life of plows, thus reducing maintenance costs and increasing the efficiency of agricultural processes. This research contributes to the optimization of agricultural equipment, providing an innovative approach for adapting plows to the increasing demands of agricultural exploitation.

Keywords: plasma spraying; mechanical properties; microstructural properties; corrosion resistance; agriculture; mainshare and foreshare; soil

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