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The microstructure and anti-wear property of FeCrV15 and FeCrV15+Cr deposits fabricated via laser deposition on steel base-plate for soil-working tools

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Abstract

The upgrade of the anti-wear property of steel base-plate for soil-working tools was done by depositing chromium–vanadium carbide deposits in situ via powder imbuement of FeCrV15 powder through laser cladding. The created specimens were exposed to microstructural examinations, microhardness, and wear test. The impact of introducing additional chromium into the deposit was likewise explored on the fabricated coatings' microstructure, hardness, and anti-wear properties. It was seen that the additional chromium option expanded the austenitic iron development, diminished the concentration of the precipitated carbides, and brought about a lot bigger grain arrangement of the formed phases, which brought down the grain boundary density prompting a decreased hardness of 553 HV for FeCrV15 +Cr, contrasted with 835 HV for FeCrV15, which are fundamentally higher than 170 HV for the steel substrate. The outcome are deposits free from defects with a solid metallurgical attachment to the substrate. The FeCrV15 deposits showed a better wear-resistant capacity multiple times higher than FeCrV15 + Cr. This incredible wear opposition is accredited to the better formation of VC–Cr3C2 particles and improved grain boundary density because of the grain refinement of FeCrV15 deposits, which are vehemently strengthened in the iron base matrix.