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Surface characterization of nitrided aluminum alloyed hot work tool steelVinicius Cardoso Ottani¹, Alberto Moreira Jorge Júnior²¹UFSCAR, Limeira, Brazil ²UFSCar, São Carlos, Brazil

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VEX is an aluminium alloyed tool steel specifically designed for hot work applications that are typically plasma and gas nitrided. Due to the addition of aluminum, VEX shows higher hardness after nitriding than AISI H13 because of aluminum nitride formation. This study aims to characterize the effect of plasma and gas nitriding on the properties and performance of VEX and AISI H13 extrusion dies. For the tests, samples were quenched, tempered to work hardness level and plasma nitrided. Residual stress profile has been carried out by X-ray diffraction. The effect of the residual compressive stress difference on the surface due to nitriding was correlated with the microhardness profiles measured in both materials. Tempering resistance at 600 °C of the plasma nitrided layer was also investigated for 1, 10, 30 and 100 hours and compared to AISI H13. The results showed that VEX performance was superior in severe wear applications due to higher hardness after nitriding, greater diffusion depth and higher resistance to softening.

Keywords

Hot work tool steel

Nitriding

VEX