

Study on Ultra-Precision Polishing for NiP

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Abstract: The nickel-phosphorus (NiP) coating has corrosion resistance, high hardness, wear resistance, and a series of excellent mechanical properties, such as uniformity, density, good machinability, which is a widely used surface layer in molds. However, cutting marks appear on the NiP coating surface after single point diamond turning (SPDT), leading to diffraction and stray light, which affects the quality of workpieces. Based on chemical mechanical polishing (CMP) approach, this article investigates the effect of malic acid, an environment-friendly pH regulator, on the CMP of NiP coating, and then identify the best formulation of the polishing solution on the self-developed polishing device, to effectively remove the cutting marks. The orthogonal experiment is conducted to determine the optimal formulation of the polishing solution. A surface roughness of 0.26 nm in Sa are successfully achieved on the NiP coating, and the influence of pH on the surface roughness is discussed. This work provides a theoretical basis and technical support for the ultra-precision polishing of NiP coating.
