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超声辅助磁粒研磨TC4平面的光整试验研究

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摘要: 为了提高钛合金TC4表面质量,采用超声辅助磁粒研磨技术对TC4平面进行光整试验研究,研究了磁极开槽宽度与深度在不同比例下的磁场强度大小,及不同超声波振动幅度和磨粒粒径条件下对TC4表面粗糙度值的影响。结果表明:在磁极开槽宽度与深度比为1:1,超声波振动幅度为10 μm,磨粒粒径为200 μm时,研磨加工60 min,钛合金TC4平面研磨前后的表面粗糙度值Ra由原始3.00 μm下降到0.12 μm,表面纹理去除,形貌得到明显改善,TC4平板表面材料力学属性加强,表面摩擦系数降低。

关键词: 超声波;钛合金TC4平面;开槽磁极;磁场梯度;表面粗糙度
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Experimental Study on Ultrasonic-Assisted Magnetic Particle Grinding of TC4 Plane

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Abstract: In order to improve the surface quality of titanium alloy TC4, the TC4 plane was subjected to the skin finishing test by ultrasonic assisted magnetic particle grinding technology. The effects of the magnetic field strength of the magnetic pole slot width and depth at different ratios, the different ultrasonic vibration amplitude and abrasive grains, on the surface roughness of TC4 were studied. The results showed that the surface roughness value Ra of the titanium alloy TC4 before and after planar grinding was decreased from the original 3.00 μm to 0.12 μm when the magnetic pole slot width to depth ratio was 1:1, the ultrasonic vibration amplitude was 10 μm, the abrasive grain size was 200 μm, and the grinding process was 60 min. The surface texture was removed and the morphology was significantly improved. The mechanical properties of the TC4 flat surface material were strengthened and the surface friction coefficient was reduced.

Keywords: ultrasonic; titanium alloy TC4 plane; slotted pole; magnetic field gradient; surface roughness

随着航空制造业的不断发展,国内外航空发动机中大量使用钛合金材料制件,其使用量已占到总

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