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电解-磁力研磨钛合金的工艺参数优化

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摘要: 为了改善钛合金零部件的表面质量,降低其表面粗糙度,基于电解-磁力研磨复合加工工艺,选用烧结法制备的 Al_2O_3 系球形磁性磨料,对钛合金样件进行表面光整加工。采用响应面法获得了工件表面粗糙度关于电解电压、主轴转速及进给速度的 2 阶响应曲面函数及显著影响工件表面粗糙度的关键因素。实验结果表明,优化的电解 - 磁力研磨参数如下: 主轴转速 1 000 r/min,电解电压 15 V,进给速度 2.5 mm/s。在优化的工艺参数下对钛合金样件电解-磁力研磨 10 min,样件的表面粗糙度由原始的 1.7 μm 下降到 0.13 μm,表面微裂纹和微观形貌得到明显改善,提高了零件的寿命。

关 键 词: 钛合金; 电解; 磁力研磨; 响应面法; 表面粗糙度
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Optimization of Process Parameters for Electrolytic Magnetic Abrasive Grinding of Titanium Alloy

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Abstract: In order to improve the surface quality of titanium alloy parts, and reduce the surface roughness, based on the electrolysis magnetic grinding composite processing technology, the Al_2O_3 series spherical magnetic abrasive grains prepared by sintering method was selected and then the surface finishing was performed on the titanium alloy samples. The response surface methodology was used to obtain the 2 order response surface function and the key factors that affected the workpiece surface roughness significantly, including the electrolytic voltage, spindle speed and feed rate, getting the better electrolysis magnetic grinding parameters: spindle speed 1 000 r/min, electrolytical voltage 15 V, feed rate 2.5 mm/s. Under the optimized parameters, the titanium alloy sample was treated with electrolysis magnetic grinding for 10 min, the sample surface roughness was from the original 1.7 μm down to 0.13 μm, the surface micro crack and micro morphology have been improved obviously, and the service life of the spare parts has also improved a lot.

Keyword: titanium alloy; electrolysis; magnetic abrasive; response surface method; surface roughness

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