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# 自旋转磁极在合金管内表面精密抛光中的应用

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**摘　要:** 利用磁力研磨法对合金管件内表面进行精密抛光时, 通常在管腔内添加辅助磁极来提高单位空间内的磁感应强度, 从而增大研磨效率. 但添加辅助磁极后, 由磁性磨粒组成磁粒刷的刚性提高, 导致单个磁性磨粒的运动轨迹过于单一, 易在管件表面出现较深划痕. 针对这一问题, 提出对辅助磁极添加一个径向旋转运动, 从理论上分析了单个磁性磨粒的运动轨迹对表面质量的影响, 并对钛合金管内表面进行了精密抛光试验. 试验结果表明: 当管件转速为1 000 r/min、辅助磁极转速为1 800 r/min、磁性磨粒的平均粒径为250 μm时, 研磨效果最佳, 研磨50 min后, 表面粗糙度值稳定至$R_a$ 0.11 μm, 材料去除量可达850 mg, 表面质量得到明显改善.

**关键词:** 旋转磁极; 合金管件; 运动轨迹; 研磨效率; 表面质量
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# The Application of Rotating Magnetic Pole in the Polishing of the Inner Surface of the Alloy Tube

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**Abstract**: When the inner surface of the alloy tube is polished by magnetic abrasive finishing, the auxiliary magnetic pole is usually added in the cavity to improve the magnetic induction intensity in the unit space, thus improving the efficiency. However, after the auxiliary magnetic pole is added, the rigidity of the magnetic particle brush is improved, so that the trajectory of the single magnetic abrasive particle is too single, and a deep scratch is easy to appear on the inner surface. In order to solve this problem, a radial rotation motion was put forward to assist the auxiliary magnetic pole. The influence of the motion trajectory of a single magnetic abrasive on the surface quality was analyzed, and a precise polishing test was made on the inner surface of the titanium alloy tube. At a speed of the tube of 1 000 r/min, an auxiliary pole speed of 1 800 r/min, an average particle size of 250 μm, the polishing effect is the best. After finishing for 50 min, the surface roughness value was reduced to about 0.11 μm, the material removal amount was up to 850 mg, and the surface quality was improved obviously.

**Key words**: rotating auxiliary pole; the alloy tube; simulated trajectory; finishing efficiency; surface quality

随着航空航天、医疗和石油等领域的迅猛发展, 各种新型零件应运而生, 不仅要保证零件的尺寸精度, 还要求零件有良好的表面形貌、抗腐蚀及抗疲劳能力[1−3]. 同时, 由各类管材组成的管路系统是设备的

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