表面质量控制及检测

磁粒研磨去除 Al 7075 交叉孔棱边毛刺的试验研究

焦安源，张龙龙，刘新龙，陈燕

（辽宁科技大学，辽宁 鞍山 114051）

摘 要：目的 探究磁粒研磨法对去除 Al7075 交叉孔棱边毛刺的影响，提高孔道的研磨质量及毛刺去除效率。**方法** 首先，通过对圆柱型磁极进行轴向、径向开槽，并利用 ANSOFT 软件对磁极进行磁场模拟，分析三种不同形状的磁极的磁感应强度变化；其次，通过磁粒研磨法对交叉孔孔道内壁进行研磨，去除棱边毛刺；最后，测取交叉孔表面微观形貌、材料去除量、毛刺高度和表面粗糙度。**结果** 研磨加工时间为 10 min、磁极转速为 1500 r/min 的条件下，磁极为径向开槽时，材料去除量高达 46 mg，孔道内壁的表面粗糙度由原始 1.5 μm 降至 0.5 μm，孔道表面研磨效果较为理想，棱边毛刺完全去除；当磁极为非开槽时，材料去除量为 40 mg，表面粗糙度下降至 0.65 μm，棱边毛刺几乎完全去除；磁极为轴向开槽时，表面粗糙度下降至 0.8 μm 左右，材料去除量约为 30 mg，剩余毛刺高度约为 5 μm。**结论** 研磨时间为 10 min，磁极转速为 1500 r/min，当磁极径向开槽时，相对于轴向开槽磁极和不开槽磁极，磁粒研磨 Al7075 交叉孔内表面的效果更好，毛刺去除效率更高。

关键词：磁粒研磨；Al7075；交叉孔；毛刺；表面形貌；粗糙度

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Experimental Study of Deburring in Al 7075 Cross Hole Edge Based on Magnetic Particles Grinding

JIAO An-yuan*, *ZHANG Long-long*, *LIU Xin-long*, *CHEN Yan

(University of Science and Technology Liaoning, Anshan 114051, China)

ABSTRACT: The work aims to study the effect of magnetic particles grinding on removing the burr of Al7075 cross hole, and improve the grinding quality and burr removal efficiency. Firstly, cylinder magnetic pole was slotted in axial and radial direction respectively, and ANSOFT software was used to simulate the magnetic field of the magnetic pole to analyze the magnetic induction changes of three different shapes of magnetic poles. Secondly, the inner surface of the cross hole was ground and edge burr was removed by magnetic particles. Finally, the surface morphology, material removal, burr height and surface roughness of cross hole were measured. When the grinding time was 10 min, the magnetic pole speed was 1500 r/min and the magnetic pole was slotted in the radial direction, the material removal was up to 46 mg, the surface roughness of the hole was reduced to *Ra* 0.5 μm from the original *Ra* 1.5 μm, the grinding effect of hole inner surface was ideal, and the edge burr was completely removed. When the magnetic pole was non-slotted grinding, the material removal amount was 40 mg, the surface roughness was reduced to *Ra* 0.65 μm, and the edge burr was almost

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作者简介：焦安源（1978—），男，在读博士，副教授，主要研究方向为机械设计与表面工程。邮箱：cnjoay@163.com

Biography: JIAO An-yuan (1978—), Male, Doctoral candidate, Associate professor, Research focus: mechanical design and surface engineering. E-mail: cnjoay@163.com