基于旋转进给电磁场的不规则弯管内表面磁研磨研究

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摘 要：目的 将磁力研磨与单片机控制电磁场结合，提高不规则弯管内表面的质量与使用性能。**方法** 根据静态磁场工艺理论及磁粒运动轨迹模型，通过电流控制电磁场，设计最佳磁路轨迹，进而形成旋转进给磁场，以提高电磁研磨效率。螺旋式分布电磁铁形成磁粒的螺旋加工轨迹，避免磁轭支撑旋转进给加工空间弯管的干涉问题，并且可多段同时加工以提高加工效率。通过静态磁场理论对磁路轨迹分析，研究弯管磨削径向辅助磁极的螺旋磨削进给轨迹。**结果** 针对 SUS304 水龙头内腔表面抛光实验，当磨粒的平均粒径为 250 μm 时，研磨液的用量为 8 mL，转速在 800 r/min 内，经过 50 min 的研磨，工件内表面的粗糙度值由 *Ra* 1.1 μm 降至 *Ra* 0.38 μm。**结论** 基于旋转进给电磁场下辅助磁极的磁力研磨，对改善弯管内表面质量，提高使用寿命有明显作用。

关键词：磁粒研磨；不规则弯管；旋转进给磁场；研磨效率；磁路轨迹；辅助磁极

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Magnetic Abrasive Finishing on Internal Surface of Irregular Bend Pipe Based on Rotating Feeding Electromagnetic Field

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ABSTRACT: The work aims to combine magnetic abrasive finishing with single chip microcomputer control electromagnetic field to improve quality and service performance of internal surface irregular bend pipe. According to theory of static magnetic field and model of magnetic particle trajectory, the optimum magnetic path was designed by controlling electromagnetic field through current and the rotating feed magnetic field was formed to improve the electromagnetic grinding efficiency. The spiral machining track of the magnetic particle was formed by spiral distributed electromagnet to avoid the interference on the elbow bent in rotating feeding process space of magnetic support and improve the processing efficiency by processing in multiple stages. The track of magnetic track was analyzed by the theory of static magnetic field and the feed path of the spiral grinding of the auxiliary magnetic pole in radial direction of bend pipe was studied. For internal surface polishing of SUS304 faucet, when

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