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电解复合磁力研磨GH4169管内表面的光整研究

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摘要: 为解决GH4169合金管内表面质量问题,降低其表面粗糙度,本文采用电解复合磁力研磨光整加工方法进行了试验,研究了在电解复合磁力研磨条件下,磁粒粒径、电解液温度、电解电压对管内壁表面质量的影响,寻求了最优的工艺参数组合。结果表明,在磁粒粒径为185 μm ,电解液温度为35 $^{\circ}\text{C}$,电解电压为9 V的条件下,采用电解复合磁力研磨法对GH4169合金管内表面加工25 min,管内表面粗糙度Ra可由原始的1.8 μm 降至0.11 μm 。表面缺陷得到有效去除,表面质量得到了明显的改善。管内表面残余应力由+92 MPa转变为-68 MPa,获得了更好的应力状态,提高了表面抗疲劳强度。

关键词: 镍基合金;电解复合磁力研磨;表面粗糙度;残余应力;钝化

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Surface Finishing of GH4169 Tube by Electrolytic Composite Magnetic Grinding

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Abstract: In this paper, in order to improve the surface quality and reduce the surface roughness of GH4169 alloy tube, the electrolytic composite magnetic abrasive finishing method was carried out in the experiment. The effects of magnetic particle size, electrolyte temperature and electrolyte voltage on the inner surface quality of tube under electrolytic composite magnetic abrasion were studied and the optimum combination of process parameters was sought. The results show that the surface roughness of GH4169 alloy tube is reduced from 1.8 μm to 0.11 μm after electrolytic composite magnetic grinding for 25 min under the following conditions: magnetic particle size of 185 μm , electrolyte temperature of 35 $^{\circ}\text{C}$ and electrolytic voltage of 9 V. The surface defects were effectively removed and the surface quality was obviously improved. The residual stress on the inner surface of the tube is changed from +92 MPa to -68 MPa, a better stress state is obtained and the surface fatigue strength is increased.

Keywords: nickel-based alloy; electrolytic composite magnetic grinding; surface roughness; residual

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