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不同淬火工艺对7075铝合金厚板残余应力的影响

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摘要: 对7075铝合金厚板进行固溶处理后, 分别采用浸没淬火和喷淋淬火再进行预拉伸处理。运用裂纹柔度法检测2种淬火板和相应的预拉伸板内部的残余应力, 研究不同淬火工艺对铝厚板残余应力产生和预拉伸后重新分布的影响。研究表明: 淬火速率越大, 铝厚板内产生的残余应力也越大, 浸没淬火试样的残余压应力和残余拉应力分别比喷淋淬火试样的残余压应力和残余拉应力大60%和73.6%; 经过预拉伸处理后, 淬火应力得到极大消减, 残余应力被控制在 ± 20 MPa以内, 满足后续加工的要求; 当拉伸量为1.8%, 2.2%和2.5%时, 残余应力的消减效果相当。

关键字: 残余应力; 裂纹柔度法; 铝合金; 预拉伸

Influence of different quenching techniques on residual stress of 7075 aluminum alloy thick-plate

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Abstract: After solution treatment, 7075 aluminum alloy thick-plates were quenched by immersion and spraying separately, then treated by pre-stretching process. Residual stresses of immersing quenched plates and spraying quenched plates, as well as stresses of corresponding pre-stretched plates were measured with crack compliance method. The influence of different quenching techniques on residual stress developing and redistributing after pre-stretching of 7075 aluminum alloy thick-plate were studied. The results show that the faster the quenching speed, the larger the residual stress of aluminum alloy thick-plate. The compressive stress and tensile stress of immersing quenched plates are 61% and 73.6% larger than those of spraying quenched plates, respectively, and after pre-stretching process, the residual stress decreases to the range of -20—20 MPa, which satisfies the machining requirement. Furthermore, for these stretching ratios of 1.8%, 2.2% and 2.5%, the differences of the residual stress relieving effect are quite small.

Key words:

预拉伸对7075铝合金厚板残余应力分布的影响

裂纹柔度法在7075铝合金板残余应力检测中的应用

基于积分法的铝合金厚板深度残余应力分析

铝合金厚板淬火-预拉伸应力预测与测试

铝合金7075T7351中厚板内残余应力的动态测量

预拉伸条件下铝合金焊接残余应力的数值模拟

航空航天铝合金厚板预拉伸

残余应力

消除焊接残余应力的方法

减小焊接残余应力的措施

材料表面残余应力的测量

调整残余应力

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