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TC4钛合金紧固件孔E-I强化研究

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AN EXPERIMENTAL RESEARCH ON BOLT HOLE STRENGTHENING OF TC-4 TITANIUM ALLOY

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摘要

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摘要 介绍TC4(Ti-6Al-4V)钛合金螺栓孔无衬套冷胀孔干涉配合综合强化的研究结果。实验证明,在给定的条件下,冷胀孔强化的TC4板状空孔试件的疲劳寿命增益系数(LIF)为13,干涉配合螺栓连接的LIF=3,而E-I强化件的疲劳寿命比单纯干涉配合又有成倍提高。电镜断口分析表明TC4合金强化件的疲劳裂纹的形成和扩展与LY12CZ及30CrMnSiA相似,它们不表现为典型的角裂纹,即沿板平面和厚向扩展速率有明显差异。对于TC4合金,在改善疲劳品质上,带衬套冷胀孔强化比无衬套冷胀孔强化好得多。

关键词: 冷胀孔 干涉配合强化 疲劳寿命

Abstract: The results of research of the effects of combined process of hole cold expansion with interference-fit strengthening on improving fatigue life of TC-4(Ti-6Al-4v) titanium alloy when bush is not used are presented. The experiment demonstrates that under the experimental conditions of this investigation the fatigue life improvement factor (Lif) is 13 for cold expanded TC-4 titanium alloy's sheet coupon, and is 3 for interference-fit bolted joint. The fatigue life of cold expansion with interference-fit coupon is double of the value of interference-fit coupon. The results of analyzing fatigue fracture by electron metalloscope show that the initiation and growth of the crack on strengthened TC-4 titanium alloy hole is similar to LY12-CZ aluminium alloy and 30CrMnSiA alloy steel, none of them shows typical corner-crack feature, i. e. there is an evident difference between the crack growth rates along sheet surface and the direction of thickness. Bushing cold expansion is more superior to cold expansion without bush on improving the fatigue property of TC-4 alloy.

Keywords: hole cold expansion interference-fit strengthening fatigue life

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