Effect of Strengthened Hole on the Fatigue Life of 2024-T3 Aluminum Alloy

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Abstract
Split-sleeve cold expansion processing was employed on the 2024-T3 aluminum alloy plate. Fatigue lives were compared according different expansion, and then the relationship of fatigue life and expansion was analyzed. Residual stresses were measured with different expansion， and the fatigue fractograph was analyzed by SEM. The results show that the split-sleeve cold expansion can obtain longer life compared with the non strengthened hole. The maximum fatigue life increased to 12 times with 6% expansion. When over 6% expansion, fatigue life began to decrease. The split-sleeve cold expansion can form beneficial residual compressive stress， and deferred the fatigue crack initiation. The fatigue fractograph shows quasi-cleavage fracture.

Keywords: cold expansion, 2024-T3 aluminum alloy, fatigue life