

Residual stress relaxation and surface hardness of a 2024-t351 aluminium alloy

Abstract

For design it is generally important to consider the residual stress relaxation. In the study for this contribution, 2024 T351 Aluminium alloy specimens were shot peened at three different shot peening intensities, followed by fatigue tests for two loads. Fatigue tests were divided into two stages. The residual stresses and micro-hardness were measured at initial and after each cyclic load for the three shot peening intensities and the two aforementioned sets of loads. The results showed that the residual stresses and micro-hardness of the specimens were decreased. Moreover, the relaxation depended on the fatigue load amplitude. Residual stress relaxation reached 54% of the initial residual stress while the micro-hardness relaxation reached 39% of the initial micro-hardness. Most of the residual stress relaxation occurred during the first cycle. The relaxation of the initial residual stress is severe when there is low shot peening intensity and high applied load, and the reduction of the micro-hardness is depending on the residual stress relaxation.

Keyword: Residual stress relaxation; Surface hardness; 2024-t351 aluminium alloy; Aluminium alloy