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## **The Effect of Temper, Grain Orientation and Composition on the Fatigue Properties of Forged Aluminum Lithium 2195 Alloy**

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### Abstract

Samples of 2195 aluminum alloy were extracted from an aircraft wheel and an open die hand forged billet. A total of 44 aircraft wheel samples and 67 hand forging samples were tested. The aircraft wheel samples were from the hub and tubewell, and were prepared in two tempers: T6 (peak aged) and T8 (cold worked and aged). The hand forging specimens had 3 tempers (T6, T8-4% strain and T8-8% strain) and were cut from transverse (T) direction sections, short-transverse (S) direction section, and from 45° between them (ST45). The study revealed that T8 temper showed longer fatigue life as compared to T6 temper. The anisotropic behavior of 2195 hand forgings showed a trend that NT>NS>NST45. The forged aircraft wheels at different locations and tempers showed similar fatigue life at high stresses. At low stresses, different locations show significant differences in fatigue lives. The 2195 aircraft wheel samples were also compared with samples taken from a similar aircraft wheel but made with 2014 Al-alloy. The results revealed that the addition of lithium significantly improved the fatigue life.

Keywords: Forgings, Fatigue, Aluminum Lithium 2195 Alloy, Anisotropy