

## **Experimental and numerical analysis of fatigue life of aluminum Al 2024-T351 at elevated temperature**

### **ABSTRACT**

This paper presents the prediction of the fatigue life of aluminum Al 2024-T351 at room and elevated temperatures under uniaxial loading using finite element simulation. Structural parts such as fuselage, wings, aircraft turbines and heat exchangers are required to work safely at this working condition even with decreasing fatigue strength and other properties. The monotonic tensile and cyclic tests at 100 °C and 200 °C were conducted using MTS 810 servo hydraulic equipped with MTS 653 high temperature furnace at a frequency of 10 Hz and load ratio of 0.1. There was an 8% increase in the yield strength and a 2.32 MPa difference in the ultimate strength at 100 °C. However, the yield strength had a 1.61 MPa difference and 25% decrease in the ultimate strength at 200 °C compared to the room temperature. The mechanical and micro-structural behavior at elevated temperatures caused an increase in the crack initiation and crack propagation which reduced the total fatigue life. The yield strength, ultimate strength, alternating stress, mean stress and fatigue life were taken as the input in finite element commercial software, ANSYS. Comparison of results between experimental and finite element methods showed a good agreement. Hence, the suggested method using the numerical software can be used for predicting the fatigue life at elevated temperature.

**Keyword:** Elevated temperature; Aluminum Al 2024-T3; Fatigue life; ANSYS workbench