



Name: Jeff Horschel
Address: 355 E. 200 S. Apt #3
Springville, UT 84663
Phone: 801-489-3274
Work: 801-422-5189
Email: jdh56@email.byu.edu

Fatigue of Friction Stir Processed 2024-T3 Aluminum for Aerospace Applications

Jeff Horschel

Background and Motivation

Friction stir welding offers many benefits over traditional welding techniques. FSW provides superior material properties to those of other welding processes and possibly riveting. It makes possible the joining of difficult or non-weldable aircraft aluminum alloys. It is also a less expensive process compared to riveting: the cost of riveting is over \$20 a foot, while friction stir welding costs about 17¢ a foot.

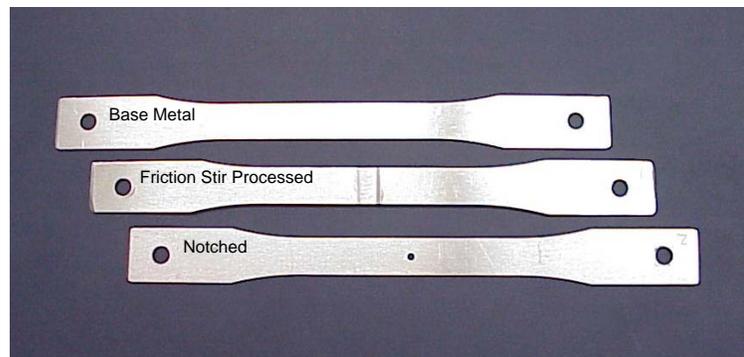
Despite many benefits, extensive implementation of friction stir welding in aerospace applications has been limited only by the amount of available design information, fatigue data in particular, regarding the properties of welded materials.

Goal

To quantify the effect of friction stir welding on fatigue life in comparison to base metal and notched specimens in a tension-tension fatigue test for 2024-T3 Aluminum.

Procedure

The use of a statistical experiment plan will be implemented to mitigate random variation, as well as quantify the difference between three types of specimens: base metal, friction stir processed, and notched. Specimen design incorporates a base line of



unaltered material to establish where the base material sits in relation to military standards, as well as a notched ($k_t=2.5$) specimen, acting as a riveted structure to compare against the friction stir processed specimens. Repetitions and statistical analysis will determine and quantify the difference, if any, between the three treatments. The tests will be axial fatigue tests, simulating aircraft fatigue, and will be conducted in accordance with ASTM standards.

Current Results

