

Project 19: Mechanism of Dwell Fatigue Crack Initiation in Ti-7Al Under Biaxial Tension-Tension Loads Dashboard

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Project Duration

PhD: September 2015 to March 2018

Problem: Stress dwell periods are detrimental to fatigue life of Ti alloys. Biaxial tension-tension failure is not predicted from uniaxial data.

Objective: Under biaxial tension-tension loads, determine microstructural mechanisms of dwell fatigue and define hard and soft grain orientations.

Benefit: Improved life management for biaxially loaded locations.

Recent Progress

- Cyclic evolutions of stress metrics
- Interdependencies of stress metrics, orientations, and loading ratios (i.e., 1:4 and 1:1 X:Y stress)
- Effects of grain neighborhood characteristics on individual grains
- Successfully defended and submitted PhD thesis

Metrics

Description	% Complete	Status
1. Planar biaxial specimen design	100%	●
2. Literature review	100%	●
3. Macroscopic characterization of tension-tension mechanical response	100%	●
4. Microstructural mechanisms of dwell fatigue under biaxial tension-tension loads	100%	●
5. Provide microstructural data for instantiation of crystal plasticity simulations of Ti dwell fatigue	100%	●



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