

Minutes of the Life Prediction Division..... Chairp.: Al Conle

1. Minutes from the previous (Spring 2001) session were unavailable and could not be approved.

2. Russ Chernenkoff reported on "High Mean Stress Level Tests". The material for this test was a normalized 1045 steel (as per PhaseII from FD&E biaxial project). Testing was on axial samples using stress-control with strain monitored at room temperature. Three sets of tests were conducted:

Set 1 at constant max. stress = 381Mpa,

Set 2 at constant min. stress = -381Mpa,

Set 3 at constant min. stress = 0.0

The data is on the website:

<http://fde.uwaterloo.ca/Fde/Highs0/racccc.html>

3. Chin Chan Chu discussed " Life Prediction for Specimens Subjected to High

Mean Stress Levels." The purpose of the analysis of this test data was to help correlate methods from Tim Topper, University of Waterloo. The portion of cycle that does the fatigue damage is the opening part of a given stress cycle. An intrinsic material fatigue property is:

$$Sop = ? Smax [1-(Smax/Sy )^2] + Smin$$

4. The results of items 2 and 3 above have been accepted for publication in

Int. J. Fatigue paper by C.-C. Chu and R.A. Chernenkoff "Crack Closure-based

analysis of fatigue tests with mean stress."

5. Jeff Nash discussed "Bolt Fatigue."

- Mean stress affects were best predicted by Morrow equations.

- High preloads can drastically reduce fatigue life.

- For grade 9 bolts, half of failures were at the head.

The threads were ground and rolled after heat treatment. The primary failure

was the first engaged thread. Question: have you calculated the local stresses? Answer: no, looking for volunteers.

6. Al Conle discussed information on the website at Waterloo, and demonstrated how we can pick a standard data set for processing and come back with curves and plots. Contributors were Ron Landgraf, NASA, Endo/Morrow, Brian Leis, Peter Kurath, and John Bonnen.

FD&E members are encouraged to contribute more data. He also presented a report on "Using the Hot-Spot Stress Method for Predicting the Life of Fusion Weldsr."