

Mini- Minutes - Fatigue Design & Evaluation Committee Meeting  
Caterpillar Technical Center - Peoria, IL  
April 15-16, 2003

Tues. April 15, 2003

The meeting was called to order at 8:10 am by chairman John Hakala.

Mr. Robert Sutton, TSD Director, Lab-Based Systems and Components Development Division welcomed the FD&E Committee to the Caterpillar Technical Center.

Mary Wickham, Dan Lingenfelter, and Jeff Nash provided information about local arrangements.

Henry Fuchs Presentations:

1. Correlation and Prediction of Fatigue Crack Growth Data for Different R-ratios, Sudip Dinda, Western Michigan University
2. Characterization of Small Cracks Using Single Crystal Plasticity, Gabriel Potirniche, Mississippi State University.

The following presentations were organized by Caterpillar and the Division Chairs in the "areas of interest" the FD&E Committee members developed at the South Bend meeting in Oct. 2002:

Integrated Steel Casting Simulation with Durability Analysis, Richard Hardin, University of Iowa

Fatigue Testing and Modeling of Axially Loaded Cast Steel," Kyl Sigl

Update on High Mean Stress Axial Loaded Bolt Program," Nate Horn, University of Iowa

OEM Data Management Practice Example, Ray Thompson, John Deere

Streamlining the Road Load Data Process, Mark Pompetzki, nCode

Engineering Data Management, Mike Englerth, MTS Systems

Problem of Residual Stresses in Weldments, Eric Johnson/Jim Wong/Chris Sanger Fatigue Life Prediction of 1045 Steel Specimens at High R-Ratios, Christian Gaier, FEMFAT

Presentations on Virtual Product Development, Ric Mousseau, Un. of Toledo

Weld Assessment Methodology of FEMFAT, Helmut Dannbauer/Dietmar Peiskammer, Magna Steyr

Progress Report on ATV Book, Al Conle, Ford Motor Company - Abstracts are on the web.

Development of Modeling and Simulation Process for Durability Analysis of a Military Vehicle, K.K.Choi, Un. of Iowa

Update of the SAE ATV system-level durability project covering current modeling and analysis methods, Dick Kading

Weld Assessments, Greg Glinka, University of Waterloo

Fatigue Behavior and life Prediction of Riveted Joints, Bing Li, University of Toledo

Weds. April 16, 2003

Weld Challenge - Initiated at the South Bend meeting in October, 2002, the weld challenge was a round-robin fatigue life prediction exercise of a welded structure that had been tested at Deere. Mohammad El-Zein volunteered the sample geometry, test set-up data, and test results. Al Conle set-up the parameters of the challenge and sent it out to the committee via e-mail. Eight committee members presented their predictions at the Peoria meeting. The predictions are shown at:

<http://www.fatigue.org/Weld/Spring-20003/fdebench2.pdf>

#### Planning:

Several suggestions were made on how to continue the weld challenge. Mohammad El-Zein suggested building and testing a new set of weld samples for the next meeting. Mike Messman suggested testing at a lower load - longer life. Al Conle suggested shot peening the welds. Below is a survey of the attending member on areas of interest and ( ) number of attendees willing to do testing, analysis, etc.

- 1) Welds - a) repeat weld challenge, b) shot peen weld - (10)
- 2) Aluminum joints - (7)
- 3) Elevated temperature - SS/weld - (4)
- 4) Bolts - overloads - (10)
- 5) HALT - accelerated testing, extreme conditions - presentation by Josh Horn at the next meeting.
- 6) Plastic - fasteners
- 7) Laser cut steel

#### Action items before next meeting:

Welds: John Bonnen and Peter Kurath volunteered to perform fatigue tests on new Deere weld samples with the same configuration as the phase I weld challenge. Mohammad El-Zein will send John a test fixture and some test samples manufactured at Deere. Jack Champaigne volunteered to shot peen some Deere weld samples. Mohammad will send Jack 6 samples for peening.

Bolts: Ralph Stephens has ~800+ bolts/nuts in four different conditions

(heat treat, coarse/fine threads, etc.) he will make available to anyone to do fatigue testing and analysis. Phil Dindinger and Russ Chernenkoff volunteered to perform fatigue tests. Test procedures will be determined at a later date. Ralph will send Phil and Russ the bolts/nuts.

The next meeting will be held at the University of Iowa on October 14-15, 2003 hosted by Professor Ralph Stephens.

Respectfully submitted,

Russ Chernenkoff