

Preliminary Program

**BOUNDARY LUBRICATION FOR
TRANSPORTATION**

August 3 - 7, 2003

Copper Mountain Resort and Conference Center
Copper Mountain, Colorado

Conference Chair

George Fenske

Energy Technology Division
Argonne National Laboratory

Conference Co-Chairs

Ken Ludema

Department of Mechanical Engineering
University of Michigan

Oyelayo O. Ajayi

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Sunday, August 3, 2003

17:00 – 19:00 Registration
19:00 – 21:00 Dinner
21:00 – 22:00 Opening Reception

Monday, August 4, 2003

07:00 – 08:00 Breakfast

Session I

08:00 – 08:15 Conference Welcome and Overview
Fenske/Routbort, Argonne National Laboratory / ECI

08:15 – 09:00 *In Boundary Lubrication, Is the Boundary a Place or Region*
Ken Ludema, University of Michigan

09:00 – 09:45 *Mixed/Boundary Lubrication - Challenges for Future Injection Systems*
Klaus Meyer, Robert Bosch GmbH

09:45 – 10:15 Coffee Break

10:15 – 11:00 *Boundary Lubrication Issues for Next Generation Aircraft Turbine Engines*
Lewis Rasado, Air Force Research Laboratory

11:00 – 11:45 *Some On-Going Basic Research Projects with Potential to Improve Boundary Lubrication Engineering*
Jorn Larsen-Basse, National Science Foundation

11:45 – 12:30 *Trends in the Lubricant Industry and Understanding the Antiwear Mechanism of Zinc Dithiophosphates through Analysis of the Relationship between Surface Chemistry and Wear*
Jonathan S. Vilaro, Douglas T. Jayne and William B. Chamberlin, The Lubrizol Corporation

12:30 – 13:30 Lunch

13:30 – 16:00 *ad hoc* discussion/free time for recreation

16:00 – 16:30 Afternoon Coffee

Session II

16:30 – 17:00 *Strategies for Formulating Low Friction, Energy-Conserving Lubricants*
Hugh A. Spikes, Imperial College

Monday, August 4, 2003 (continued)

- 17:00 – 17:30 *Boundary Lubricating Films: What Are They and How They Are Formed*
Stephen M. Hsu, National Institute of Standards and Technology
- 17:30 – 18:00 *The Effect of Additive and Basefluid Structures on Characteristics of Engine Oils
and Industrial Lubricants Containing Renewable Basefluids*
Joseph M. Perez, Pennsylvania State University
- 18:00 – 18:30 *Studies of Friction and Wear of Alternate Fuels at Penn State University*
Kimberly S. Wain, Joseph Perez, Elana Chapman and Andre Boehman,
Pennsylvania State University
- 18:30 – 19:00 Discussion
- 19:00 – 20:30 Dinner
- 20:30 – 21:30 Social Hour

Tuesday, August 5, 2003

- 07:00 – 08:30 Breakfast

Session III

- 08:30 – 09:00 *Test Parameters and Methods for Simulation of Boundary Lubrication
Challenges in Aerospace*
Vern Wedeven, Wedeven Associates Inc.
- 09:00 – 9:30 *Importance of the Triboemission Process for Tribochemical Reaction*
Czeslaw K. Kajdas, Warsaw University of Technology, Poland
- 9:30 – 10:00 *Friction and Wear of Tribofilms Formed by Zinc Diakyl Dithiophosphate Antiwear
Agent in Low Viscosity Engine Oils*
J. Scott McQueen, H. Gao and E. D. Black, A. K. Gangopadhyay and R. K. Jensen,
ConocoPhillips and Ford Motor Company
- 10:00 – 10:30 Coffee Break
- 10:30 – 11:00 *Structure of Mechanically and Thermally Formed ZDDP Films Via X-rays*
Jeffrey Hershberger and Oyelayo O. Ajayi, Argonne National Laboratory
- 11:00 – 11:30 *Force Interactions between Substrates and SPM Cantilevers Immersed in Fluids*
Ryan Jones and Douglas P. Hart, Massachusetts Institute of Technology
- 11:30 – 12:00 *Shear Characteristics of a Boundary Film for a Wet Paper Friction Material*
Masao Eguchi and Takashi Yamamoto, Tokyo University of Agriculture and
Technology

Tuesday, August 5, 2003 (continued)

- 12:00 – 13:30 Lunch
- 13:30 – 16:00 *ad hoc* discussion/free time for recreation
- 16:00 – 16:30 Afternoon Coffee

Session IV

- 16:30 – 17:00 *Detecting the Onset of Localized Scuffing with the Pin-On-Twin Fuel-Lubricated Test for Heavy Duty Fuel Injectors*
Jun Qu and Peter J. Blau, and John J. Truhan, University of Tennessee and Oak Ridge National Laboratory
- 17:00 – 17:30 *A Rig Test to Measure Friction and Wear of Heavy Duty Diesel Engine Piston Rings and Cylinder Liners Using Realistic Lubricants*
John J. Truhan, Jun Qu and Peter J. Blau, University of Tennessee and Oak Ridge National Laboratory
- 17:30 – 18:00 *A Proposal of New Technique for Studying Frictional Properties under Boundary Lubrication*
Takashi Yamamoto and Masao Eguchi, Tokyo University of Agriculture and Technology
- 18:00 – 18:30 *New Four-Ball Tester Design*
Joachim Domeier, Ann Arbor Testing & Development, Inc.
- 18:30 – 19:00 Discussion
- 19:00 – 20:30 Dinner
- 20:30 – 21:30 Social Hour

Wednesday, August 6, 2003

- 07:00 – 08:30 Breakfast

Session V

- 08:30 – 09:00 *Mechanisms of Boundary Lubrication with Carbon Coatings*
Maria Isabel De Barros, Jean Michel Martin and Thierry Le-Mogne, Ecole Centrale de Lyon
- 09:00 – 9:30 *Novel Coating Architectures for Improved Boundary Lubrication*
Ali Erdemir, Argonne National Laboratory
- 9:30 – 10:00 *Lubrication Region Transition of Laser Textured Steel Surfaces as a Function of Contact Load and Speed*
Andriy Kovalchenko, Oyelayo Ajayi, Ali Erdemir and George R. Fenske, and Izhak Etsion (Technion, Israel), Argonne National Laboratory and Technion, Israel

Wednesday, August 6, 2003 (continued)

- 10:00 – 10:30 Coffee Break
- 10:30 – 11:00 *Numerical Evaluation of the Potential for Fuel Economy Improvement Due to Boundary Friction Reduction within Heavy-Duty Diesel Engines*
Isaac Fox, Ricardo, Inc.
- 11:00 – 11:30 *Simulation Model – from Hydrodynamic Lubrication to Boundary Film*
Diann Y. Hua, Caterpillar, Inc.
- 11:30 – 12:00 *Shear Instability Mechanism of Scuffing in Lubricated Contacts*
Oyelayo O. Ajayi, Jeffrey G. Hershberger and George R. Fenske,
Argonne National Laboratory
- 12:00 – 12:30 *New Methods to Examine Formation and Properties of Interfacial Films in Sliding Contacts*
Kathryn J. Wahl, U.S. Naval Research Laboratory
- 12:30 – 13:45 Lunch
- 13:45 – 16:00 *ad hoc* discussion/free time for recreation
- 16:00 – 16:30 Afternoon Coffee

Session VI

- 16:30 – 17:00 *Unique Tribological Behavior of Silicon Nitride in Water*
Said Jahanmir, Hooshang Heshmat, and Lewis Ives,
MiTiHeart Corporation, Mohawk Innovative Technology, and the National
Institute of Standards and Technology
- 17:00 – 17:30 *Boundary Lubrication During Chemical-Mechanical Planarization*
Hong Liang, University of Alaska Fairbanks
- 17:30 – 18:00 *Friction and Wear of Inconel 600 and Inconel 690 for Steam Generator Tube in Room Temperature Water*
Young-Ze Lee, University of Alaska Fairbanks
- 18:00 – 18:30 *Spectroscopic Analyses of Lubricating Thin Film*
Shigeyuki Mori, Iwate University, Japan
- 18:30 – 19:00 Discussion
- 19:00 – 21:00 **Conference Banquet**
- Banquet Talk: *Pushing the Boundaries of Tribo-Jargonology*
Peter Blau, Oak Ridge National Laboratory
- 21:00 – 22:00 Social Hour

Thursday, August 7, 2003

07:00 – 08:30 Breakfast

Session VII

08:30 – 09:00 *Water Lubrication of Textured Silicon Carbide*
Koji Kato, Tohoku University, Japan

09:00 – 09:30 *Mixed Lubrication Mode in the Couple Ceramics-Steel at Non-Flat Conformal Contact*
Andriy M. Kovalchenko, Institute for Problems of Materials Science, Ukraine

9:30 – 10:00 *High Accuracy and Fine Finishing Technique of Gear Tooth Using Water-Lubricated Chemical Reactions*
F. Honda, Toyota Technological Institute, Japan

10:00 – 10:30 Coffee Break

10:30 – 11:00 *Evaluating Friction in Automotive Metal Forming Operations – Principles and Methods of Tribology*
Gregory Dalton, TribSys, Inc.

11:00 – 11:30 *Influence of Geometrical Characteristics on the Flow Rate of a Gear Box Stacking*
Michael Chauvin, Renault, France

11:30 – 12:00 *On the Prediction of the Design Criteria for Modification of Contact Stresses Due to Thermal Stresses in the Gear Mesh*
Ebubekir Atan, Izmir Institute of Technology, Turkey

12:00 – 13:30 Lunch

13:30 – 15:00 Wrap-Up, Discussion & Departure