STLE 64th Annual Meeting & Exhibition

Disney’s Coronado Springs Resort, Lake Buena Vista, Florida
May 17-21, 2009

Preliminary Program Information

☆ 350 technical presentations
☆ 70-exhibitor trade show
☆ 10 one-day education courses
☆ Commercial Marketing Forum
☆ Networking
☆ Special events
☆ Meeting registration form
☆ Plus much more!

Early Bird Discount
Register by April 20 and save $75!
Professional development and technical education you can’t get anywhere else!

In today’s complex lubricants business, companies and organizations are constantly searching for new ways to improve their people, products and processes. The best way to gain that competitive edge is by turning to a source with a proven track record for delivering world-class education, training and value to a wide range of technical professionals—STLE’s Annual Meeting & Exhibition.

The 2009 version of this unique industry event is May 17-21 at Disney’s Colorado Springs Resort in Lake Buena Vista, Florida, about 14 miles from Orlando. With an excellent meeting facility and access to dozens of attractions, Lake Buena Vista is an ideal location for this truly international event. Come join 1,400 of your peers for five days of industry-specific programming that combines technical training, education, new technology and networking.

What makes STLE so good?

STLE’s 64th Annual Meeting & Exhibition reflects a multifaceted and progressive technical focus that contributed to an overall 95% positive rating for the 2008 convention in Cleveland. STLE’s Annual Meeting Program Committee selected more than 350 technical papers that form the heart of the five-day (Sunday through Thursday) meeting. This brochure contains a preview of the technical program, enabling you to select the combination of research-oriented technical papers, applications-based case studies, best-practice reports and panel discussions that is right for your career.

The annual meeting also is the place to enhance your professional skills with 10 one-day education courses taught by world-class instructors. Considering the low cost to attend the meeting, STLE offers a combination of technical training and education that is unparalleled anywhere in the lubricants industry.

This year’s trade show includes more than 80 companies and organizations displaying the industry’s newest products, services and technologies for lubrication professionals. Like the technical sessions and education courses, the trade show is in Disney’s Colorado Springs Resort, allowing you the greatest flexibility in planning your annual meeting itinerary.

Business networking is an invaluable part of the STLE meeting experience. For many people, STLE relationships are the No. 1 problem-solving resource they use in their jobs every day. These contacts are initiated and renewed each year at STLE’s Annual Meeting & Exhibition.

Lake Buena Vista

With such world-famous attractions as Disney’s Magic Kingdom, Sea World, Universal Studios and more, STLE’s 2009 Annual Meeting & Exhibition offers you a chance to combine business with a family vacation. Many meeting participants will bring their families to Lake Buena Vista after the meeting’s conclusion. Learn more about things to do at www.orlandoinfo.com.

The annual meeting registration fee is only $520 for members, $235 less than what non-members pay! For about $100 a day you can participate in five days of industry-specific education, technical training and professional development that simply isn’t available anywhere else.

A one-day member registration fee of just $220 also is available. Both members and non-members have the option of purchasing the Proceedings CD for just $20.

Registration form is on page 75. Make your sleeping room reservation by logging on to www.stle.org.

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www.stle.org  *  847-825-5536  *  PROGRAM GUIDE AND REGISTRATION
Program-At-A-Glance

May 17 – 21, 2009  *  Disney’s Coronado Springs Resort  *  Lake Buena Vista, Florida

Preliminary program schedule as of December 16, 2008. Subject to change.

Sunday  *  May 17, 2009
Registration: 7:00 am – 6:00 pm  *  Laredo 2
Speakers Breakfast: 7:00 am – 7:45 am  *  Fiesta 6
Education Courses: 8:00 am – 5:45 pm
Metalworking 105 – Coronado A
Synthetic Lubricants 203 – Coronado B
Basic Lubrication 101 – Fiesta 7/8
Condition Monitoring 201 – Fiesta 9/10

Monday  *  May 18, 2009
Registration: 7:00 am – 6:00 pm  *  Laredo 2
Speakers Breakfast: 7:00 am – 7:45 am  *  Fiesta 6
Education Courses: 8:00 am – 5:00 pm
Metalworking 125 – Coronado A
Synthetic Lubricants 204 – Coronado B
Basic Lubrication 102 – Fiesta 7/8
Condition Monitoring 202 – Fiesta 9/10
Technical Sessions: 8:00 am – 10:00 am
1A  *  Practical Lubrication Solutions I – Coronado C
1B  *  Engine & Drivetrain I – Coronado D
1C  *  Fluid Film Bearings I: Modeling – Coronado E
1D  *  Lubrication Fundamentals I: ZDDPs and Other Anti – Wear Additives in Engine Oils – Coronado F/G
1F  *  Commercial Marketing Forum I – Fiesta 5
1G  *  Nanotribology I: Modeling and Simulation – Yucatan 1
Keynote Address: 10:30 am – noon  *  Coronado H
“From Inspiration to Innovation” – Disney Institute
Noon – 1:30 pm – Lunch on your own
Commercial Exhibits and Student Posters
12:30 pm – 5:00 pm  *  Veracruz C

Technical Sessions: 1:30 pm – 6:00 pm
2A  *  Practical Lubrication Solutions II – Coronado C
2B  *  Engine & Drivetrain II – Coronado D
2C  *  Fluid Film Bearings II: Theoretical and Experimental Aspects – Coronado E
2D  *  Lubrication Fundamentals II – Coronado F/G
2F  *  Commercial Marketing Forum II – Fiesta 5
2G  *  Nanotribology II: Fundamentals – Yucatan 1
2H  *  Special Session on Coatings I – Panel Discussion “Tribology of Coatings: A Roadmap for Future Scientific Inquiries” – Coronado D

Welcome Reception: 6:30 pm – 8:00 pm  *  Coronado H

Tuesday  *  May 19, 2009
Speakers Breakfast: 7:00 am – 7:45 am  *  Fiesta 6
Registration: 6:30 am – 5:00 pm  *  Laredo 2
Commercial Exhibits and Student Posters
9:30 am – 5:30 pm  *  Veracruz C
Technical Sessions: 8:00 am – Noon
3A  *  Hydraulic Fluids – Coronado A
3B  *  Wear I: Panel Discussion “The Impact of Fuel Economy and Emissions Regulations on Wear of Engines and Drivetrains” – Coronado B
3C  *  Condition Monitoring I: Mini Course and Papers: Mobile Oil Analysis Labs – Coronado C
3D  *  Engine & Drivetrain III: Friction & Fuel Economy – Coronado D
3E  *  Fluid Film Bearings III: Gas Bearings – Coronado E
3F  *  Lubrication Fundamentals III – Coronado F/G
3G  *  Metalworking I – Fiesta 3/4
3H  *  Commercial Marketing Forum III – Fiesta 5
3I  *  Environmentally Friendly Fluids – Fiesta 7/8
3J  *  Nanotribology III: Nanoparticle Research – Yucatan 1
3K  *  Special Session on Coatings II – Yucatan 2
President’s Luncheon/Business Meeting
Noon – 2:00 pm  *  Coronado H
Program-At-A-Glance

May 17 – 21, 2009  *  Disney’s Coronado Springs Resort  *  Lake Buena Vista, Florida

Technical Sessions: 2:00 pm – 6:00 pm

4A  *  Synthetic Lubricants – Coronado A
4B  *  Wear II – Coronado B
4C  *  Condition Monitoring II – Coronado C
4D  *  Engine & Drivetrain IV: Fuel Impact – Coronado D
4E  *  Fluid Film Bearings IV: Modeling – Coronado E
4F  *  Lubrication Fundamentals IV – Coronado F/G
4G  *  Metalworking II – Fiesta 3/4
4H  *  Commercial Marketing Forum IV – Fiesta 5
4I  *  Environmentally Friendly Fluids – Fiesta 7/8
4J  *  Nanotribology IV: Carbon-based Materials (HOPG, CNT, DLC) – Yucatan 1
4K  *  Special Session on Coatings III – Yucatan 2
4L  *  Solid Lubricants (starts at 3:30 pm) – Yucatan 2

Wednesday  *  May 20, 2009

Registration: 6:30 am – 5:00 pm  *  Laredo 2

Speakers Breakfast: 7:00 am – 7:45 am  *  Fiesta 6

Commercial Exhibits and Student Posters

9:30 am – noon  *  Veracruz C

Education Courses: 8:00 am – 5:00 pm

Advanced Lubrication 301 – Fiesta 7/8
NLGI Grease Course – Fiesta 9/10

Technical Sessions: 8 am – Noon

5A  *  Aerospace – Coronado A
5B  *  Wear III – Coronado B
5C  *  Condition Monitoring III – Mini Course and Papers: XRF for Lubrication Analysis – Coronado C
5D  *  Seals I – Coronado D
5E  *  Tribotesting – Coronado E
5F  *  Lubrication Fundamentals V – Coronado F/G
5G  *  Metalworking III – Fiesta 3/4
5H  *  Commercial Marketing Forum V – Fiesta 5
5I  *  Rolling Element Bearings I – Yucatan 1
5J  *  Nonferrous I: Sustainability in the Nonferrous Industry – Coronado E

5K  *  Joint Session: Surface Engineering/Solids Lubricants I – Special Session: Tribological Coatings – Yucatan 3
5L  *  Safety, Health & Regulatory Affairs – Coronado D

Technical Sessions: 1:30 pm – 6:00 pm

6A  *  Ceramics/Composites – Coronado A
6B  *  Wear IV – Coronado B
6C  *  Condition Monitoring IV – Coronado C
6D  *  Seals II: Face Seal Materials Panel Discussion: Fundamental Review and Technology Outlook – Coronado D
6E  *  Tribotesting II – Coronado E
6F  *  Gears & Gear Lubrication – Coronado F/G
6G  *  Metalworking IV – Fiesta 3/4
6H  *  Commercial Marketing Forum VI – Fiesta 5
6I  *  Rolling Element Bearings II – Yucatan 1
6J  *  Nonferrous II: Biobased Applications in the Nonferrous Industry – Yucatan 2

Thursday  *  May 21, 2009

Speakers Breakfast: 7:00 am – 7:45 am  *  Fiesta 6

Registration: 7:30 am – 5:00 pm  *  Laredo

Technical Sessions: 8 am – Noon

7A  *  Grease – Coronado A
7B  *  Surface Engineering III – Coronado B
7D  *  Seals III – Coronado D
7E  *  Tribotesting III – Coronado E
7F  *  Power Generation I – Coronado F/G
7K  *  Nonferrous III: Hot and Cold Nonferrous Forming – Coronado E

Technical Sessions: 1:30 pm – 5:30 pm

8B  *  Surface Engineering IV – Coronado B
8E  *  Tribotesting IV – Coronado E
8F  *  Power Generation II – Coronado F/G

Beverage Breaks are scheduled at 10:00 am and 3:00 pm daily.
STLE 2009 Committees & Industry Councils

All of the following groups helped create the technical program for the 2009 STLE Annual Meeting & Exhibition in Lake Buena Vista, where some 350 papers will be presented. Please join all of STLE in thanking these individuals and groups for their commitment, dedication and hard work. Without their efforts, STLE’s Annual Meeting, the lubricant industry’s premier technical event, would not be possible.

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STLE 2009 Special Appointments

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2009 technical program features some 350 papers and presentations!

STLE's Annual Meeting & Exhibition is the prime venue for technical professionals who want to present, discuss and debate their latest works. These are the presentations that will influence the fast-moving field of tribology and lubricants today and in the future.

With dozens of sessions and more than 350 30-minute technical presentations over four days, STLE's 2009 technical program is the best way for you to keep abreast with advances in virtually every area of tribology. Throw in education courses, special events, a trade show, the Commercial Marketing Forum and professional networking, and STLE's 64th Annual Meeting & Exhibition is the premier tribology event of 2009.

The following pages summarize the 2009 technical program presentations and presenters, as of the end of November. Changes will occur as we get closer to the show. Please check www.stle.org for updates and presentation abstracts. The Program Guide and errata, distributed in Lake Buena Vista, will have the most up-to-date information.

May 18 – 21, 2009  * Disney’s Coronado Springs Resort  * Lake Buena Vista, Florida

Monday, May 18, 2009

Session 1A  * Coronado C
PRACTICAL LUBRICATION SOLUTIONS I

Session Chair: W. Needelman, Donaldson Co., Minneapolis, MN

8:30 am – 9 am
Establishment of a Lubrication Program for Virginia Department of Transportation
C. Stevens, Virginia Department of Transportation, Lynchburg, VA, E. Myers, ExxonMobil Lubricants and Specialties, Richmond, VA

9 am – 9:30 am
Reliable Filtration of High-Viscosity Gear Oils in Draglines
C. Bauer, Pall Corp., Port Washington, NY

9:30 am – 10 am
Dry Air Purging for Water Contamination Control
W. Needelman, G. LaVallee, Donaldson Co., Minneapolis, MN

9 am – 9:30 am
Valvetrain Wear Mechanism with Low Phosphorus Engine Oils
H. Gao, ConocoPhillips, Ponca City, OK, A. Gangopadhyay, Ford Motor Co., Dearborn, MI

9:30 am – 10 am
Effects of Oil Replenishment, Contact Temperature and Pressure at Engine Component Interfaces on the Development and Composition of ZnDTP-based Tribofilms
V. Wong, H. Kariya, Massachusetts Institute of Technology, Cambridge, MA

10 am – 10:30 am  * Break

Session 1B  * Coronado D
ENGINE & DRIVETRAIN I

Session Chair: Victor W. Wong, Massachusetts Institute of Technology, Cambridge, MA

8 am – 8:30 am
The Contact Properties of Wet Clutch Friction Material
M. Ingram, H. Spikes, Imperial College, London, United Kingdom, J. Noles, R. Watts, Infineum USA Ltd, Linden, NY, S. Harris, Infineum UK Ltd, Abingdon, United Kingdom

8:30 am – 9 am
Pin Boss Stress Analysis Coupled with Oil Film Pressure of a Diesel Engine Piston Receiving High Combustion Pressure
S. Chun, Hoseo. University, Asan, South Korea

8 am – 8:30 am
Non-Newtonian Effects in Bearing Behavior: Some Considerations Concerning The Constitutive Laws
B. Bou-Said, INSA Lyon, Villeurbanne, France
Monday, May 18, 2009

Session 1C  continued

8:30 am – 9 am
A Navier-Stokes-Thermal Parametric Study Of A Six-Pocket Hydrostatic Cryogenic Journal Bearing
S. Moldovan, M. Braun, A. Balasoiu, University of Akron, Akron, OH

9 am – 9:30 am
Mechatronics Applied to Elastohydrodynamics
I. Santos, M. Haugaard, Technical University of Denmark, Lyngby, Denmark

9:30 am – 10 am
Imbalance Response of a Partially Sealed Squeeze Film Damper for the Flexible Rotor Model
C. Xing, M. Braun, University of Akron, Akron, OH

10 am – 10:30 am  Break

Session 1D  Coronado F/G

LUBRICATION FUNDAMENTALS I – ZDDPS AND OTHER ANTI-WEAR ADDITIVES IN ENGINE OILS

Session Chair: J. Martin, Ecole Centrale de Lyon, Ecully, France

8 am – 8:30 am
Nanoscale Properties of In-Situ Formed Tribofilms
P. Aswath, R. Mourhatch, B. Kim, University of Texas at Arlington, Arlington, TX

8:30 am – 9 am
Studies of Antiwear Film On 52100 Steel Using Synchrotron Light-Based Techniques
J. Zhou, J. Thompson, J. Cutler, Canadian Light Source Inc, Saskatoon, SK, Canada, M. Kasrai, M. Bancroft, The University of Western Ontario, London, ON, Canada, E. Yamaguchi, Chevron Oronite Co. LLC, Richmond, CA

9 am – 9:30 am
Boundary Film Formation Properties of ZDDP with Other Metal Containing Additives

9:30 am – 10 am
Tribological Characteristics of Ashless Phosphorus and Phosphorus-Sulphur Based Antiwear Additives
J. Benedet, Imperial College, London, United Kingdom, R. Mufti, Castrol Ltd, Pangbourne, United Kingdom, H. Spikes, Imperial College, London, United Kingdom

10 am – 10:30 am  Break

Session 1F  Fiesta 5

COMMERCIAL MARKETING FORUM I

Session Chair: TBD

8 am
TBD

8:30 am
TBD

9 am
Polartech Additives, Inc.

9:30 am
ARN Engineering and MISCO

10 am – 10:30 am  Break

Session 1G  Yucatan 1

NANOTRIBOLOGY I – MODELING AND SIMULATION

Session Chair: A. Martini, Purdue University, West Lafayette, IN
Session Vice-Chair: A. Vadakkepatt, Purdue University, West Lafayette, IN

8 am – 8:30 am
Effects of Misalignment on the Contact Between Two Asperities with Spherical Tops
H. Wang, M. Zou, University of Arkansas, Fayetteville, AR

8:30 am – 9 am
Understanding Atomic Stick-Slip Friction of Metals Through Accelerated Molecular Dynamics Simulation
A. Martini, Y. Dong, Z. Gao, Purdue University, West Lafayette, IN, A. Voter, D. Perez, Los Alamos National Laboratory, Los Alamos, NM, Y. Mishin, V. Ivanov, George Mason University, Fairfax, VA

9 am – 9:30 am
Nanoscale Modeling of Friction Based on Thermal Activation of Dislocation Motion
Y. Liao, A. M’ndange-Pfupfu, S. Eswaramoorthy, L. Marks, Northwestern University, Evanston, IL

9:30 am – 10 am
Molecular Dynamics and Finite Element Coupling Method for Nanoscale Adhesive Contact Problems
G. Liu, R. Tong, L. Liu, T. Liu, Northwestern Polytechnical University, Xi’an, China

10 am – 10:30 am  Break

Save $75 on your meeting registration fee!
April 20 is the Early Bird registration deadline for STLE’s 2009 Annual Meeting & Exhibition. A $75 fee is added to registrations made after that date. The fastest way to register is online at www.stle.org. You also can use the registration form on page 75.
### Session 2A  *Coronado C*

**PRACTICAL LUBRICATION SOLUTIONS II**

**Session Chair:** D. McCoy, The Elco Corp., Cleveland, OH

<table>
<thead>
<tr>
<th>Time</th>
<th>Topic</th>
<th>Speaker(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1:30 pm – 2 pm</td>
<td><strong>Tribological Characterization of Naphthenic-Based Bitumen Oils</strong></td>
<td>L. Bastardo-Zambrano, Nynas AB, Nynashamn, Sweden</td>
</tr>
<tr>
<td>2 pm – 2:30 pm</td>
<td>Directional Friction: Concept and its Realization Using the Hydro-Dynamic Lubrication Technology</td>
<td>Z. Zhang, Q. An, East China University of Science and Technology, Shanghai, China, C. Zhang, University of Saskatchewan, Saskatoon, SK, Canada</td>
</tr>
<tr>
<td>2:30 pm – 3 pm</td>
<td>Reducing The Total Cost Of Ownership In An Oil Flooded Rotary Screw Air Compressor Through The Use Of Synthetic Lubricants</td>
<td>R. Peterson, ExxonMobil Lubricants &amp; Specialties, Fairfax, VA</td>
</tr>
<tr>
<td>3 pm – 3:30 pm</td>
<td><strong>Break</strong></td>
<td></td>
</tr>
<tr>
<td>3:30 pm – 4 pm</td>
<td><strong>H1: Conversion to PAG – A Destination and Journey</strong></td>
<td>L. Kerley, ExxonMobil Lubricants &amp; Specialties, Fairfax, VA, A. Walton, Hershey Co., Memphis, TN</td>
</tr>
<tr>
<td>4 pm – 4:30 pm</td>
<td>Recalibrated Equations for Determining Effect of Oil Filtration on Rolling Bearing Life</td>
<td>W. Needelman, Donaldson Co., Minneapolis, MN, E. Zaretsky, NASA Glenn Research Center, Cleveland, OH</td>
</tr>
<tr>
<td>4:30 pm – 5 pm</td>
<td><strong>Business Meeting</strong></td>
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### Session 2B  *Coronado D*

**ENGINE & DRIVETRAIN II**

**Session Chair:** Victor W. Wong, Massachusetts Institute of Technology, Cambridge, MA

<table>
<thead>
<tr>
<th>Time</th>
<th>Topic</th>
<th>Speaker(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1:30 pm – 2 pm</td>
<td><strong>The Relationship Between Oil Condition and Measured Piston Ring and Cylinder Liner Wear for Heavy Duty Diesel Engines</strong></td>
<td>J. Truhan, P. Kodali, Caterpillar Inc., Peoria, IL</td>
</tr>
<tr>
<td>2 pm – 2:30 pm</td>
<td>Advanced Diagnostics for In-Situ Measurements of Lubricant Composition at the Piston and Liner Interface</td>
<td>S. Watson, V. Wong, Massachusetts Institute of Technology, Cambridge, MA</td>
</tr>
<tr>
<td>2:30 pm – 3 pm</td>
<td>Temperature Measurements of Piston and Liner in an Operating Gasoline Engine</td>
<td>P. Lee, University of Leeds, Leeds, United Kingdom</td>
</tr>
<tr>
<td>3 pm – 3:30 pm</td>
<td><strong>Break</strong></td>
<td></td>
</tr>
<tr>
<td>3:30 pm – 4 pm</td>
<td><strong>Evaluation of Lube Oil Effects on Diesel After Treatment By Accelerated Techniques</strong></td>
<td>B. Bunting, T. Toops, Oak Ridge National Laboratory, Knoxville, TN, K. Nguyen, University of Tennessee Knoxville, Knoxville, TN</td>
</tr>
<tr>
<td>4 pm – 4:30 pm</td>
<td>Using a Chemistry-Sensitive Oil Filter to Control Lubricant Acidity</td>
<td>S. Watson, V. Wong, Massachusetts Institute of Technology, Cambridge, MA</td>
</tr>
<tr>
<td>4:30 pm – 5 pm</td>
<td>Using Linear Sweep Voltammetry for Diesel Engine Oil Condition Monitoring</td>
<td>A. Fentress, J. Sander, Lubrication Engineers, Wichita, KS, J. Ameye, Fluitec International/CleanOil, Calgary, AB, Canada</td>
</tr>
<tr>
<td>5 pm – 5:30 pm</td>
<td>Magnetorheological Smart Automotive Engine Mount</td>
<td>H. Hirani, Indian Institute of Technology Bombay, Mumbai, India</td>
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</table>

### Session 2C  *Coronado E*

**FLUID FILM BEARINGS II – THEORETICAL AND EXPERIMENTAL ASPECTS**

**Session Chair:** B. Bou-Said, INSA-LaMCoS, Villeurbanne, France

<table>
<thead>
<tr>
<th>Time</th>
<th>Topic</th>
<th>Speaker(s)</th>
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<tbody>
<tr>
<td>1:30 pm – 2 pm</td>
<td><strong>Experimental Investigation of Water-Lubricated Foil Journal Bearings</strong></td>
<td>P. Hryniewicz, Polish Academy of Sciences, Gdansk, Poland, A. Olszewski, M. Wodtke, Gdansk University of Technology, Gdansk, Poland</td>
</tr>
<tr>
<td>2 pm – 2:30 pm</td>
<td>Analysis of Flow and Pressure Fields Inside a Shallow, Single Pocket Hydrostatic Bearing</td>
<td>F. Horvat, M. Braun, The University of Akron, Akron, OH</td>
</tr>
<tr>
<td>2:30 pm – 3 pm</td>
<td>Mist(erial) Mechanisms of Lubrication of the Pumpless Refrigeration Compressors</td>
<td>V. Dunaevsky, Ingersoll Rand Climate Control Technologies, Minneapolis, MN</td>
</tr>
<tr>
<td>3 pm – 3:30 pm</td>
<td><strong>Break</strong></td>
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<tr>
<td>3:30 pm – 4 pm</td>
<td><strong>On the Experimental Identification of Active Lubricated Bearings Parameters</strong></td>
<td>I. Santos, Technical University of Denmark, Lyngby, Denmark</td>
</tr>
<tr>
<td>4 pm – 4:30 pm</td>
<td>Momentum and Thermal Parametric Analyses of a Self-Acting, Self-Circulating Porous Slider Bearing</td>
<td>J. Johnston, M. Braun, G. Young, The University of Akron, Akron, OH</td>
</tr>
<tr>
<td>4:30 pm – 5 pm</td>
<td>Feasibility of Applying Active Lubrication to Dynamically Loaded Fluid Film Bearings</td>
<td>E. Estupinan, I. Santos, Technical University of Denmark, Lyngby, Denmark</td>
</tr>
</tbody>
</table>
Session 2C  * continued

5 pm – 5:30 pm
Analysis of a Thrust Bearing With Flexible Pads and Flexible Supports
P. Klit, K. Thomsen, The Technical University of Denmark, Copenhagen, Denmark

5:30 pm – 6 pm
Thermal Effects in a Porous Bearing With Liquid Metal Lubricant Self Circulation
A. Balasoiu, M. Braun, S. Moldovan, Univ. of Akron, Akron, OH

6 pm – 6:30 pm  * Business Meeting

Session 2D  * Coronado F/G
LUBRICATION FUNDAMENTALS II
Session Chair: TBD

1:30 pm – 2 pm
Impact of Organic Friction Modifiers on Lubricant Load Carrying Capacity
D. Chasan, P. Fasano, Ciba, Tarrytown, NY, T. Habereder, Ciba, Basel, Switzerland

2 pm – 2:30 pm
Nano-Scale Properties of Thermal and Tribo-Chemical Films Generated by Fluorothiophosphates as Antiwear Additives
X. Chen, R. Mourhatch, B. Kim, P. Aswath, University of Texas at Arlington, Arlington, TX

2:30 pm – 3 pm
Experimental Study of Fundamental Differences in Wear Protection of Various Antiwear Additives in Boundary Lubrication Conditions

3 pm – 3:30 pm  * Break

3:30 pm – 4 pm
Fuel/Biofuel Dilution and its Effects on Engine Oil

4 pm – 4:30 pm
Role of Soot and Carbon Black on Wear of Ferrous Surfaces
M. Patel, P. Aswath, University of Texas at Arlington, Arlington, TX

4:30 pm – 5 pm
Detection of Biodiesel in Used Crankcase Engine Oil and Some Performance Considerations
M. Boons, M. Morcos, W. Hartgers, S. Roby, G. Parsons, Chevron Oronite LLC, Richmond, CA

5 pm – 5:30 pm
Thermolysis of Bismuth Carboxylates in the Presence of Polysulfides
N. Eckert, R. Hart, The Shepherd Chemical Co., Norwood, OH

Session 2F  * Fiesta 5
COMMERCIAL MARKETING FORUM II
Session Chair: TBD

1:30 pm
The Lubrizol Corp.

2 pm
The Lubrizol Corp.

2:30 pm
Troy Chemical Corp.

3 pm
TBD

3:30 pm
The Lubrizol Corp.

4:00 pm
Croda, Inc.

4:30 pm
Albemarle Corp.

Session 2G  * Yucatan 1
NANOTRIBOLOGY II – FUNDAMENTALS
Session Chair: S. Eswaramoorthy, Northwestern University, Evanston, IL
Session Vice-Chair: A. M’ndange-Pfupfu, Northwestern University, Evanston, IL

1:30 pm – 2 pm
Vapor Phase Lubrication Insights Via Substrate and Gaseous Precursors
M. Dugger, Sandia National Laboratories, Albuquerque, NM

2 pm – 2:30 pm
Development of Self-Healing Boundary Lubrication Molecules
S. Kim, E. Hsiao, Pennsylvania State University, University Park, PA

2:30 pm – 3 pm
In-situ Transmission Electron Microscopy Studies of Nanotribology
S. Eswaramoorthy, L. Marks, Northwestern University, Evanston, IL
### 2009 STLE 64th ANNUAL MEETING & EXHIBITION

#### Monday, May 18, 2009

**Session 2G  * continued***

**3 pm – 3:30 pm  * Break**

**3:30 pm – 4 pm**

Advancement in Nano Tribology with the Use of the Single Point Nanoscratching Technique  
E. Poiré, EP Laboratories, Inc., Irvine, CA

**4 pm – 4:30 pm**

A Novel Tribometer for the Measurement of Friction in MEMS  
I. Ku, T. Reddyhoff, Imperial College, London, United Kingdom; J. Choo, National University of Singapore, Singapore; Singapore, A. Holmes, H. Spikes, Imperial College, London, United Kingdom

**4:30 pm – 5 pm**

Stick Slip Friction at Nanolevel  
K. Singh, S. Baghmar, University of Mississippi, Oxford, MS

**5 pm – 5:30 pm**

An Analytical Solution to an Archard-type Fractal Rough Surface Contact Model  
R. Jackson, Auburn University, Auburn, AL

#### Session 2H  * Yucatan 2*

**SPECIAL SESSION ON COATINGS I**

**Panel Discussion – “Tribology of Coatings: A Roadmap for Future Scientific Inquiries”**

Session Chair: S. Ingole, Texas A&M, University at Galveston, Galveston, TX

**1:30 pm – 5:30 pm**

**Panel:** Tribology of Coatings: A Roadmap for Future Scientific Inquiries

**5:30 pm – 6 pm  * Business Meeting**

#### Tuesday, May 19, 2009

**Session 3A  * Coronado A**

**HYDRAULIC FLUIDS**

Session Chair: L. Rudnick, Ultrachem, Inc, New Castle, DE  
Session Vice-Chair: J. Sherman, BASF, Wyandotte, MI

**9 am – 9:30 am**

A Comparative Study of Novel Synthetic Hydraulic Fluids for Hydraulic Equipment  
S. El Houssamy, Egyptian Petroleum Research Institute, Cairo, Egypt

**9:30 am – 10 am**

Impact of Fresh and Sheared Oil Viscosity Requirements on the Formulation of Hydraulic Fluids  
S. Herzog, Evonik RohMax USA, Inc., Horsham, PA; C. Neveu, Evonik RohMax France, Paris, France; M. Alibert, Evonik RohMax GmbH, Darmstadt, Germany

**10 am – 10:30 am  * Break**

**10:30 am – 11 am**

Shear and Wear of Hydraulic Fluids using Star and Linear PMA Viscosity Modifiers  
B. Schober, B. Filippini, Lubrizol Corp., Wickliffe, OH

**11 am – 11:30 am**

Hydraulic Efficiency Development  
F. Herrero, Lubrizol, Ltd., Hazelwood, United Kingdom; B. Schober, Lubrizol Corp., Wickliffe, OH

**Session 3B  * Coronado B**

**WEAR I**

**Panel Discussion – “The Impact of Fuel Economy and Emissions Regulations on Wear of Engines and Drivetrains”**

Session Chair: D. Eberle, Southwest Research Institute, San Antonio, TX

**8 am – 10 am  * Panel Discussion**

A. Gangopadhyay, PhD, Ford Motor Co., Dearborn, MI

John Truhan, PhD, Caterpillar Inc., Mossville, IL  
Victor W. Wong, PhD, MIT, Cambridge, MA  
Dr. Ardan Morina, PhD, University of Leeds, Leeds, United Kingdom

**10 am – 10:30 am  * Break**

**10:30 am – 11 am**

Nanoscale Insights Into the Mechanism of Soot-Induced Wear: Mechanical and Topographical Properties of Surfaces Exposed to Sooted Lubricants  
D. Yablon, P. Jacobs, P. Kalamaras, M. Webster, ExxonMobil Research and Engineering, Annandale, NJ

**11 am – 11:30 am**

Advances in Modern Wear Measurement for Correlation of Model Tribometer Systems to Realistic Applications  
M. Jech, T. Wopelka, J. Hasnain, F. Franek, Austrian Center of Competence for Tribology, Wiener Neustadt, Austria

**11:30 am – 12 pm**

Wear Analysis of Automobile Clutch Plates – A High Resolution Microscopic Approach  
A. Basu, A. Pandey, V. Choudhary, Indian School of Mines University, Dhanbad, India
CONDITION MONITORING I

Mini Course and Papers: Mobile Oil Analysis Labs

Session Chair: TBD
Session Vice-Chair: C. Chichester, Dow Corning Corp., Midland, MI

Rapid and accurate assessment of fluid condition can often be of paramount importance in ensuring reliable equipment operation in modern industrial environments. Equipment operators increasingly demand shorter turn around times from industrial laboratories in order to make informed decisions about corrective actions to be carried out, should the evaluation results so indicate. Should doubt arise in regard to the obtained data and require repetition of procedures, additional time delay might result in detrimental impact on system components and/or fluid condition. A convenient way to overcome these difficulties is through employment of mobile laboratories equipped with analytical instruments mirroring those found in off-site facilities as closely as possible. This mini-course will present several options for outfitting a mobile laboratory, provide a guided, hands-on tour of the instruments installed and explain which ASTM and/or ISO methods can currently be performed to provide fluid and system assessment expected to be found in a standard laboratory assay.

8 am – 8:30 am
Pros and Cons of Commercial Labs, In-House Testing, at Line Tests, and Mobile Labs
G. Staniewski, Ontario Power Generation, Pickering, ON, Canada

8:30 am – 10 am
Mobile Fluid Condition Monitoring Laboratory; The Future of Modern Industrial Maintenance Practices
J. Duchowski, HYDAC Technology Corp., Sulzbach, Germany

10 am – 10:30 am * Break

10:30 am – 11 am
“Site-Direct” Oil Analysis Completes the Condition Monitoring Goal of Continuous Machine Monitoring
J. Poley, CMI, Miami, FL

11 am – 11:30 am
Novel Corrosion Sensor Based on Capacitive Coupled Electrodes for the Determination of Oil Corrosiveness
C. Schneidhofer, N. Doerr, AC2T Research GmbH, Wiener Neustadt, Austria, B. Jakoby, Johannes Kepler University Linz, Linz, Austria

11:30 am – 12 pm
Performance of FTIR and Chemometrics for Oil Condition Monitoring of Gas Engine Oils
A. Grafl, N. Doerr, AC2T research GmbH, Wiener Neustadt, Austria

Session 3D * Coronado D

ENGINE & DRIVETRAIN III – FRICTION & FUEL ECONOMY

Session Chair: B. Bunting, Oak Ridge National Laboratory, Knoxville, TN
Session Vice-Chair: P. Lee, University of Leeds, Leeds, United Kingdom

8 am – 8:30 am
Development of Fuel Efficient Lubricants as Measured by the Sequence VID Engine Test
T. Miller, A. Boffa, J. Martinez, J. Wang, Oronite, Richmond, CA

8:30 am – 9 am
Motored Engine Friction and Lube Oil Characteristics
B. Bunting, Oak Ridge National Laboratory, Knoxville, TN, J. Qu, Oak Ridge National Laboratory, Oak Ridge, TN, K. Nguyen, W. Rohr, University of Tennessee Knoxville, Knoxville, TN

9 am – 9:30 am
Measuring the Friction and Film Thickness in Real Journal Bearings
R. Baker, C. Hamer, PCS Instruments, London, United Kingdom

9:30 am – 10 am
Liner Surface Improvements for Low Friction Piston Ring Pack
C. Anderberg, Powertrain, Göteborg, Sweden, F. Cabanettes, Z. Dimkovski, B. Rosén, Halmstad University, Halmstad, Sweden

10 am – 10:30 am * Break

10:30 am – 11 am
Friction and Wear of Coatings for Engine Power Cylinder Use
B. Bunting, Oak Ridge National Laboratory, Knoxville, TN, J. Qu, Oak Ridge National Laboratory, Oak Ridge, TN, K. Nguyen, W. Rohr, University of Tennessee Knoxville, Knoxville, TN

11 am – 11:30 am
Ionic Liquids as Possible Additives for Drivetrain Fluids
M. Fox, University of Leeds, Leeds, United Kingdom

11:30 am – 12 pm
Property-Blending Relationships and Tribological Behavior of Ionized Vegetable Oils in Lubricant Formulations
B. Zhmud, M. Roegiers, E-ION s.a., Brussels, Belgium

Session 3E * Coronado E

FLUID FILM BEARINGS III – GAS BEARINGS

Session Chair: I. Santos, Technical University of Denmark, Lyngby, Denmark

8 am – 8:30 am
Developments in the Modeling of Compliant Foundation Foil Gas Bearings
R. Bruckner, NASA Glenn Research Center, Brookpark, OH

8:30 am – 9 am
Design of a High-Speed, Oil-Free Bearing Test Rig
M. Conlon, A. Dadouche, W. Dmochowski, R. Payette, B. Liko, J. Bedard, National Research Council Canada, Ottawa, ON, Canada
9 am – 9:30 am
Experimental Analysis of Circular Air Bearing Dynamic Coefficients
P. Matta, M. Arghir, Université de Poitiers, Poitiers, France

9:30 am – 10 am
A Test Rig for Evaluating Gas Lubricated Bearing Performance
N. Ene, F. Dimofte, A. Afjeh, The University of Toledo, Toledo, OH

10 am – 10:30 am * Break

10:30 am – 11 am
Tests of Wave Bearings with PVD Coatings for Aerospace Transmissions
F. Dimofte, The University of Toledo at NASA GRC, Cleveland, OH, N. Ene, The University of Toledo, Toledo, OH, R. Handschuh, T. Krantz, U.S. Army Research Laboratory at NASA GRC, Cleveland, OH, F. Oswald, NASA Glenn Research Center, Cleveland, OH

11 am – 11:30 am
Application of Modified Direct Algorithm for Multi-Objective Optimization of Air Bearings
N. Wang, C. Chan, Chang Gung University, Tao-Yuan, Taiwan

11:30 am – 12 pm
Multi-Objective Optimization of Air Bearing Using Genetic Algorithms
N. Murmu, Central Mechanical Engineering Research Institute, Durgapur, India

Session 3E * continued

S. Sinnott, University of Florida, Gainesville, FL

8:30 am – 9 am
Effect of Boron Containing Additives on Antiwear Performance and the Properties of Tribofilms Generated by ZDDP and Fluorinated ZDDP
R. Mourhatch, P. Aswath, University of Texas at Arlington, Arlington, TX

9 am – 9:30 am
Contribution of Passenger Vehicles to Air Pollution in America and the Search of Environmentally Benign Engine Oil Additives
K. Komvopoulos, A. Tsai, University of California, Berkeley, CA

9:30 am – 10 am
Comparison of the Experimental Results on Boundary Lubrication Film’s Molecular Orientation Measured by High Sensitivity Polarized Reflection Infrared Spectroscopy with its Molecular Dynamics Simulation Results with Discover, MS
T. Suzuki, AIST, Tsukuba, Japan, W. Suetaka, Tohoku Univ., Sendai, Japan, T. Ikeshoji, AIST, Tsukuba, Japan

10 am – 10:30 am * Break

10:30 am – 11 am
Design of Smart Nanocomposite Coatings for Extreme Tribological Conditions Under Boundary Lubrication
A. Erdemir, O. Eryilmaz, M. Urgen, Argonne National Laboratory, Argonne, IL, K. Kazmanli, Istanbul Technical University, Maslak, Turkey

11 am – 11:30 am
Development and Characterization of Thermal Films on Ferrous Substrates from Antiwear Additives
B. Kim, P. Aswath, University of Texas at Arlington, Arlington, TX

11:30 am – 12 pm
Simulations of Lubricants Between Aluminum and Alumina Surfaces: From Quantum Chemistry to Continuum Models
L. Kong, C. Denniston, M. Muser, University of Western Ontario, London, ON, Canada, Y. Qi, General Motor Research, Detroit, MI
Session 3G ✷ Fiesta 3/4
METALWORKING I

Session Chair: S. Erhan, Polartech Additives, Inc., Bedford Park, IL
Session Vice-Chair: R. Butler, Chemtool, Inc., Crystal Lake, IL

8 am – 8:30 am
Friction in Metal Forming Processes – A Study Using Experiments and Simulation
P. Menezes, K. Kishore, S. Kailas, Indian Institute of Science, Bangalore, India, M. Lovell, University of Wisconsin-Milwaukee, Milwaukee, WI

8:30 am – 9 am
Friction and Transfer Layer Formation in FCC Metals: Role of Surface Texture and Roughness Parameters
P. Menezes, K. Kishore, S. Kailas, Indian Institute of Science, Bangalore, India, M. Lovell, University of Wisconsin-Milwaukee, Milwaukee, WI

9 am – 9:30 am
Environmentally-Friendly Machining Temperature Analysis for Reaming with Minimum Quantity Lubrication
S. Kurgin, J. Dasch, D. Simon, General Motors, Pontiac, MI, G. Barber, X. Wang, Q. Zou, Oakland University, Rochester, MI

9:30 am – 10 am
The Influence of Amine Structure on Performance of Registered Biocides in Metalworking Fluids
P. Brutto, C. Coburn, D. Green, A. Jones, C. Nash, ANGUS Chemical Co., Buffalo Grove, IL, J. Pohlman, Dow Biocides, Buffalo Grove, IL, B. Pyzowski, R. Swedo, ANGUS Chemical Co., Buffalo Grove, IL

10 am – 10:30 am ✷ Break

10:30 am – 11 am
Microbial Biofilms in Metalworking Fluid Systems
T. Williams, D. Reynolds, Rohm and Haas Co., Spring House, PA

11 am – 11:30 am
Non-Tuberculous Mycobacterial Biofilm Development in Metalworking Fluids using the CDC-Bioreactor
L. Rossmoore, C. Cuthbert, C. Cribbs, K. Rossmoore, Biosoan Laboratories, Inc., Warren, MI

11:30 am – 12 pm
A Method to Predict the Useful Life of Water Dilutable Metal Removal Fluids
J. Burke, Houghton International, Valley Forge, PA

Session 3H ✷ Fiesta 5
COMMERCIAL MARKETING FORUM III

Session Chair: TBD

8 am
The Lubrizol Corp.

8:30 am
The Lubrizol Corp.

9 am
ExxonMobil Chemical Co.

9:30 am
Ciba Corp.

10 am – 10:30 am ✷ Break

10:30 am
ARN Engineering and MISCO

11 am
Ciba Corp.

11:30 am
The Dow Chemical Co.

Session 3I ✷ Fiesta 7/8
ENVIRONMENTALLY FRIENDLY FLUIDS

Session Chair: D. Smith, Omni Tech International, Ridgefield, CT
Session Vice-Chair: B. Sharma, NCAUR/USDA/ARS, Peoria, IL

8 am – 8:30 am
Soybean Lubricant Market Opportunities
D. Smith, OmniTech International, LTD, Midland, MI

8:30 am – 9 am
Formulating and Testing of Engine Oils with Bio-Content
F. Lockwood, D. Dotson, The Valvoline Co., Lexington, KY, D. Smith, Omni Tech International, Midland, MI

9 am – 9:30 am
Biobased Electrorheological (ER) Fluids from Suspensions of Modified Starch in Soy Oil
R. Narayan, D. Graiver, Z. Yang, Michigan State University, East Lansing, MI

9:30 am – 10 am
Heavy Duty Engine Oils with Vegetable Oil and PAO Blends
K. Hope, Chevron Phillips Chemical Co., Kingwood, TX, B. Garmier, Renewable Lubricants Inc., Hartville, OH

10 am – 10:30 am ✷ Break
Session 3I  ✷ continued

10:30 am – 11 am
Polyalkylene Glycols and Their Use in Hydraulic Fluids for Environmentally Sensitive Areas
M. Greaves, The Dow Chemical Co., Horgen, Switzerland, G. Khemchandani, The Dow Chemical Co., Freeport, TX

11 am – 11:30 am
Biodegradable Lubricants – Real World Performance
M. Miller, Terresolve Technologies, Eastlake, OH

11:30 am – 12 pm
Conversion to and Performance of Biodegradable Lubricants in Over-Water Applications

Session 3J  ✷ Yucatan 1
NANOTRIBOLOGY III – NANOPARTICLE RESEARCH

Session Chair: M. Zou, University of Arkansas, Fayetteville, AR
Session Vice-Chair: D. Demydov, University of Arkansas, Fayetteville, AR

8 am – 8:30 am
Preparation and Tribological Properties of Lubricating Oil-based Nanofluids Containing Metal or Graphite Nanoparticles
C. Cheol, O. Jemyung, J. Mihee, KEPRI, Daejeon, South Korea

8:30 am – 9 am
In-Situ Studies for Lubrication Mechanisms of Nanoparticles
F. Dassenoy, M. Belin, L. Joly-Pottuz, J. Martin, ECL, Ecully, France, B. Reynard, G. Montagnac, ENS, Lyon, France

9 am – 9:30 am
Advanced Lubrication for Loaded Components
A. Adhvaryu, Caterpillar Inc., Peoria, IL, A. Malshe, University of Arkansas, Fayetteville, AR, A. Erdemir, Argonne National Lab., Argonne, IL, W. Jiang, nanoMech LLC, Fayetteville, AR

9:30 am – 10 am
Design and Study of Molybdenum Sulfide Nanoparticles Based on Multicomponent Chemistry Using Phosphorous and Boron Components
D. Demydov, A. Malshe, University of Arkansas, Fayetteville, AR, A. Adhvaryu, Caterpillar Inc., Peoria, IL

10 am – 10:30 am  ✷ Break

10:30 am – 11 am
Fundamental Understanding Role of Metallic Nanoparticles on the Behavior of MoS2 Nanoparticles through the Study of Chemo-mechanical Properties of Tribofilm
W. Zhang, D. Demydov, A. Malshe, University of Arkansas, Fayetteville, AR, A. Adhvaryu, Caterpillar Inc., Peoria, IL, A. Erdemir, Argonne National Laboratory, Argonne, IL

11 am – 11:30 am
New Inorganic Fullerenes Nanoparticles (MoxW1-xS2): Influence of the Stoichiometry on the Tribological Properties
F. Dassenoy, J. Tannous, M. Belin, J. Martin, A. Bruhacs, W. Tremel, LTDS, Ecully, France

11:30 am – 12 pm
Surface and Interface Analysis of the Tribofilm Formed Using Passive and Active MoS2 Nanolubricant Additives
A. Verma, A. Malshe, C. Thompson, University of Arkansas, Fayetteville, AR, W. Jiang, NanoMech, Fayetteville, AR, A. Adhvaryu, Caterpillar, Peoria, IL

Session 3K  ✷ Yucatan 2
SPECIAL SESSION ON COATINGS II

Session Chair: TBD
Session Vice-Chair: S. Ingole, Texas A&M University at Galveston, Galveston, TX

8 am – 8:30 am
Genesis of Superlow Friction with Nano-smooth Diamond Coatings
M. De Barros Bouchet, C. Matta, Ecole Centrale de Lyon, Ecully, France, T. Gries, L. Vandenbulcke, CNRS, UPR3021, Orleans, France, J. Martin, Ecole Centrale de Lyon, Ecully, France

8:30 am – 9 am
Tribochemical Effects on Friction and Wear Behavior of ta-C Coatings in Dry Conditions
C. Matta, Argonne National laboratory, Argonne, IL, M. De Barros Bouchet, B. Vacher, Ecole Centrale de Lyon, Ecully, France, O. Eryilmaz, Argonne National laboratory, Argonne, IL, T. Le Mogne, J. Martin, Ecole Centrale de Lyon, Ecully, France, A. Erdemir, Argonne National laboratory, Argonne, IL

9 am – 9:30 am
Wear Mechanisms of DLC Coatings
K. Wang, Texas A&M University, College Station, TX, C. Lin, Baker Hughes Inc., Houston, TX, G. Fox, H. Liang, Texas A&M University, College Station, TX

9:30 am – 10 am
Tribological Behavior of Flame Sprayed HA Based Composite Coatings
V. Panavekar, Texas A&M University, Galveston, TX

10 am – 10:30 am  ✷ Break

10:30 am – 11 am
Anti-Friction Coatings, Can This Established Technology Meet Future Challenges of Friction Reduction?
M. Jungk, V. Clerici, Dow Corning GmbH, Wiesbaden, Germany
Tuesday, May 19, 2009

Session 3K * continued

11 am – 11:30 am
Fretting of WC/a-C:H and Cr2N Coatings Under Grease Lubricated and Unlubricated Conditions
B. Leonard, F. Sadeghi, Purdue University, West Lafayette, IN, R. Evans, G. Doll, P. Shiller, The Timken Co., Canton, OH

11:30 am – 12 pm
Friction and Wear Performance of WC/a-C:H Thin Films in Lubricated Rolling Contact
R. Evans, The Timken Co., Canton, OH

Session 4A * Coronado A
SYNTHETIC LUBRICANTS

Session Chair: L. Rudnick, Ultractem, Inc, New Castle, DE
Session Vice-Chair: J. Sherman, BASF, Wyandotte, MI

2 pm – 2:30 pm
Potential Biodegradable Lubricant Materials: Saturated Branched-Chain Fatty Acid Isomers

2:30 pm – 3 pm
Corrosion Properties of Ionic Liquids at Elevated Temperatures and Humid Conditions
N. Doerr, C. Gabler, A. Schneider, AC2T research GmbH, Wiener Neustadt, Austria

3 pm – 3:30 pm * Break

3:30 pm – 4 pm
The Tribological Properties of Phosphonium Derived Ionic Liquids
I. Minami, Iwate University, Morioka, Japan

4 pm – 4:30 pm
Anti-Oxidant Impact Upon Sludge Formation
M. Hoey, P. Rabbat, Ciba Corp., Tarrytown, NY

4:30 pm – 5 pm
Aspects of Selecting the Optimum Fire Resistant Water Glycol Hydraulic Fluid
M. Geaves, Dow Chemical Co., Horgen, Switzerland, J. Knoell, Dow Chemical Co., Freeport, TX

5 pm – 5:30 pm
High Temperature Fretting Wear Mechanisms of a Ti Alloy: A Tribochemical Approach
C. Mary, T. Le Mogne, J. Martin, S. Fouvy, Laboratory of Tribology and Dynamics of Systems (LTDS), Ecully, France

Session 4B * Coronado B
WEAR II

Session Chair: TBD

2 pm – 2:30 pm
Wear Performance of Various Coatings for Stamping Dies
C. Yao, R. Zhang, G. Barber, Oakland University, Rochester, MI

2:30 pm – 3 pm
Dry and Wet Contact Analysis for the Study of Friction and Wear Trends
S. Cai, Penn State University, Hazleton, PA, Y. Zhao, Minnesota State University, St Cloud, MN

3 pm – 3:30 pm * Break

3:30 pm – 4 pm
Wind Turbine Gearboxes: Ensuring Reliability with Optimized Oil Conditioning
D. Kolstad, Porous Media, St Paul, MN

4 pm – 4:30 pm
Wear Test for Motor, Hydraulic and Gear Oils
A. Kiehn, Bardahl Mfg Corp, Seattle, WA

4:30 pm – 5 pm
Material Properties Important to the Metal to Metal Sliding Contact
T. El-Wardany, T. Le Mogne, J. Martin, S. Fouvy, Laboratory of Tribology and Dynamics of Systems (LTDS), Ecully, France

Session 4C * Coronado C
CONDITION MONITORING II

Session Chair: TBD

2 pm – 2:30 pm
Recent Advances in Miniature Infrared Spectroscopy
R. Butler, Chemtool, Inc., Crystal Lake, IL

2:30 pm – 3 pm
Methods for Trending In-Service Grease Consistency with Small Sample Quantities
R. Wurzbach, L. Williams, MRG Power Labs, York, PA

3 pm – 3:30 pm * Break

3:30 pm – 4 pm
Asset Health Management Best Practices
T. O’Hanlon, Reliabilityweb.com & Uptime Magazine, Fort Myers, FL

4 pm – 4:30 pm
Experiences in Lubrication of Ammonia Compressors
I. Mayr, AMI Agrolinz Melamine International, Linz, Austria, F. Novotny-Farkas, OMV Refining & Marketing, Schwechat, Austria, A. Schneider, Austrian Center of Competence for Tribology, Wiener Neustadt, Austria

4:30 pm – 5 pm
Hard Particle Contaminants Affect Performance of Lubricants and Bearings
M. Moon, Bel-Ray Co., Inc., Farmingdale, NJ

5 pm – 5:30 pm
IR Thermography – A Useful Tool for the Condition Monitoring of Power Plant Mechanical and Electrical Components
K. Malik, Ontario Power Generation, Pickering, ON, Canada
5:30 pm – 6 pm
Online Wear Monitoring of Spur Gears
H. Hirani, Indian Institute of Technology Bombay, Mumbai, India

6 pm – 6:30 pm
Acoustic Emission Activities During Incipient Damage Monitoring Under Different Loadings in Rolling Contact Fatigue Process
Z. Rahman, H. Ohba, Toyo Electric Mfg. Co., Ltd., Yokohama, Japan, T. Yoshioka, T. Yamamoto, Tokyo University of Agriculture and Technology, Tokyo, Japan

Session 4D ✡ Coronado D
ENGINE & DRIVETRAIN IV – FUEL IMPACT

Session Chair: Victor W. Wong, Massachusetts Institute of Technology, Cambridge, MA

2 pm – 2:30 pm
A Study of Biodiesel Fuel Impact on Lubricants
D. Chasan, V. Bajpai, P. Fasano, E. Ng, Ciba, Tarrytown, NY

2:30 pm – 3 pm
Modified Artificial Ageing Procedure to Investigate the Influence of Fuel Quality on Engine Oil Condition
A. Grafl, C. Schneidhofer, N. Doerr, AC2T research GmbH, Wiener Neustadt, Austria

3 pm – 3:30 pm ✡ Break

3:30 pm – 4 pm
Impact of Bioethanol-Containing Fuels on Engine Oil Performance
K. Baumann, F. Novotny-Farkas, OMV Refining & Marketing, Schwechat, Austria

4 pm – 4:30 pm
Hard Deposits in the Combustion Chamber of Biogas Fuelled Stationary Gas Engines
N. Doerr, C. Besser, C. Schneidhofer, AC2T research GmbH, Wiener Neustadt, Austria

4:30 pm – 5 pm
Tribological Aspects of a Diesel Injector Operation with Charcoal-Oil slurries
V. Soloiu, G. Molina, Georgia Southern University, Statesboro, GA

2:30 pm – 3 pm
Incompressible and Analytical Study on Strong Coupling Thrust Gas Dearing with Double Herringbone
S. Yao, Harbin Engineering University, Harbin, China

3 pm – 3:30 pm ✡ Break

3:30 pm – 4 pm
Typical Strong Coupling Gas Bearings and Their Comparison
S. Yao, Harbin Engineering University, Harbin, China

Session 4E ✡ Coronado E
FLUID FILM BEARINGS IV – MODELING

Session Chair: M. Braun, University of Akron, Akron, OH

2 pm – 2:30 pm
Comparison of Numerical Methods for Rapid Solutions of Reynolds Equation
N. Wang, S. Chang, Chang Gung University, Tao-Yuan, Taiwan

2:30 pm – 3 pm
Non-Newtonian Effects on Film Formation in Grease Lubricated Radial Lip Seals
P. Baart, P. Lugt, SKF Engineering & Research Centre, Nieuwegein, Netherlands, B. Prakash, Luleå University of Technology, Luleå, Sweden

3 pm – 3:30 pm ✡ Break

3:30 pm – 4 pm
Activation Energy of Tribochemical and Heterogeneous Catalytic Reactions
C. Kajdas, Warsaw University of Technology, Plock, Poland, A. Kulczycki, Institute for Fuels and Renewable Energy, Warsaw, Poland, K. Kurzydlowski, Warsaw University of Technology, Warsaw, Poland, G. Molina, Georgia Southern University, Statesboro, GA

4 pm – 4:30 pm
Influence of Viscosity Modifiers on Hydrodynamic Friction
J. Holtzinger, Imperial College, London, United Kingdom, R. Mufti, Castrol Ltd, Pangbourne, United Kingdom, H. Spikes, Imperial College, London, United Kingdom
<table>
<thead>
<tr>
<th>Time</th>
<th>Session Details</th>
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<tbody>
<tr>
<td>4:30 pm – 5 pm</td>
<td><strong>A New Film Forming Lubricant with Anti-Corrosion Properties</strong>&lt;br&gt;J. Kimler, Lonza Inc., Allendale, NJ</td>
</tr>
<tr>
<td>5 pm – 5:30 pm</td>
<td><strong>Friction Coefficient Comparison of the DLC Films in Ocean Water, Air and Vacuum</strong>&lt;br&gt;R. Statuti, L. Santos, P. Radi, V. Trava-Airoldi, INPE, Sao Jose dos Campos, Brazil</td>
</tr>
<tr>
<td>5:30 pm – 6 pm</td>
<td><strong>Business Meeting</strong></td>
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<td>**Session 4G ** Fiesta 3/4</td>
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<tr>
<td></td>
<td><strong>METALWORKING II</strong></td>
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<tr>
<td></td>
<td><strong>Session Chair:</strong> R. Evans, Quaker Chemical Corp., Conshohocken, PA&lt;br&gt;<strong>Session Vice-Chair:</strong> R. Butler, Chemtool, Inc., Crystal Lake, IL</td>
</tr>
<tr>
<td>2 pm – 2:30 pm</td>
<td><strong>Evaluating the Performance of New MWF Additives by Laboratory Based Test Methods and Correlating Them to Field Performance</strong>&lt;br&gt;S. Erhan, A. Nilpawar, S. Morton, R. Stubbs, Polartech Additives Inc., Bedford Park, IL</td>
</tr>
<tr>
<td>3 pm – 3:30 pm</td>
<td><strong>Break</strong></td>
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<tr>
<td>3:30 pm – 4 pm</td>
<td><strong>Emulsifiers with Improved Lubricity and Foam Suppressing Properties for Water Miscible Cooling Lubricants</strong>&lt;br&gt;M. Stolz, L. Boesing, Sasol Olefins &amp; Surfactants, Marl, Germany</td>
</tr>
<tr>
<td>4 pm – 4:30 pm</td>
<td><strong>Tramp Oil and Cream in Metalworking Fluids</strong>&lt;br&gt;D. Hunsicker, Caterpillar, Inc., East Peoria, IL</td>
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<tr>
<td>4:30 pm – 5:30 pm</td>
<td><strong>Business Meeting</strong></td>
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**Session 4H ** Fiesta 5<br>**COMMERCIAL MARKETING FORUM IV**

<table>
<thead>
<tr>
<th>Time</th>
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<tbody>
<tr>
<td>2 pm</td>
<td><strong>Afton Chemical Corp.</strong></td>
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<tr>
<td>2:30 pm</td>
<td><strong>Afton Chemical Corp.</strong></td>
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<tr>
<td>3 pm – 3:30 pm</td>
<td><strong>Break</strong></td>
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<tr>
<td>3:30 pm</td>
<td><strong>Lanxess Corp.</strong></td>
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<tr>
<td>4 pm</td>
<td><strong>Kyowa Hakko USA</strong></td>
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<tr>
<td>4:30 pm</td>
<td><strong>Lonza Inc.</strong></td>
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**Session 4I ** Fiesta 7/8<br>**ENVIRONMENTALLY FRIENDLY FLUIDS**

<table>
<thead>
<tr>
<th>Time</th>
<th>Session Details</th>
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<tbody>
<tr>
<td>2 pm</td>
<td><strong>B. Sharma, NCAUR/USDA/ARS, Peoria, IL</strong>&lt;br&gt;<strong>Session Chair:</strong> S. Erhan, NCAUR/USDA/ARS, Peoria, IL</td>
</tr>
<tr>
<td>2:30 pm</td>
<td>**B. Sharma, J. Perez, Pennsylvania State University, NCAUR/USDA/ARS, Peoria, IL, S. Erhan, NCAUR/USDA/ARS, Peoria, IL</td>
</tr>
<tr>
<td>2:30 pm – 3 pm</td>
<td><strong>Biobased Lubricants</strong></td>
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<td>H. Benecke, S. Shaffer, D. Garbark, Battelle Memorial Institute, Columbus, OH</td>
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**Session 4J ** Yucatan 1<br>**NANOTRIBOLOGY IV – CARBON-BASED MATERIALS (HOPG, CNT, DLC)**

<table>
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<tr>
<th>Time</th>
<th>Session Details</th>
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<tr>
<td>2 pm</td>
<td><strong>B. Zhao, Y. Chung, Northwestern University, Evanston, IL</strong>&lt;br&gt;<strong>Session Chair:</strong> B. Zhao, Northwestern University, Evanston, IL</td>
</tr>
<tr>
<td>2:30 pm</td>
<td><strong>Tribological and Mechanical Properties of Nanostructured Hydrogenated Amorphous Carbon and Titanium Diboride Films</strong>&lt;br&gt;B. Zhao, Y. Chung, Northwestern University, Evanston, IL</td>
</tr>
<tr>
<td>2:30 pm – 3 pm</td>
<td><strong>Break</strong></td>
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</tbody>
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3:30 pm – 4 pm
Morphology and Wear Mechanisms of PA66/Carbon Nanotubes Injection Moulding Products
Y. Chen, The University of Hertfordshire, Hatfield, United Kingdom, L. Qiu, X. Liu, Taiyuan University of Technology, Taiyuan, China, Y. Xu, The University of Hertfordshire, Hatfield, United Kingdom

4 pm – 4:30 pm
Measurement of Vertically Aligned Carbon Nanotube Array Bulk Friction in Contact with Silicon
C. Korach, SUNY-Stony Brook, Stony Brook, NY

4:30 pm – 5 pm
The Influence of Nano-Particles on the Functional Mechanisms of Additives in Automotive Lubricants
J. Choo, PETRONAS Research Sdn. Bhd., Kajang, Malaysia

5 pm – 5:30 pm * Business Meeting

2 pm – 2:30 pm
Comparison of the Friction Properties of DLC Coatings in DLC/DLC Contacts
B. Vengudusamy, Imperial College London, London, United Kingdom, R. Mufti, Whitchurch Hill, Pangbourne, Reading RG8 7QR, United Kingdom, H. Spikes, Imperial College London, London, United Kingdom

2:30 pm – 3 pm
Material Flow and Stress Analysis at the Interface of Sliding Contacts of Boronized Refractory Metal Using 3D CFD Modeling
S. Ingole, Texas A&M University, Galveston, TX, S. Nagdewe, H. Kim, Andong National University, Andong, South Korea

3 pm – 3 pm * Break

3:30 pm – 4 pm
Cryogenic Friction Studies of Polymeric Solids
D. Burris, University of Delaware, Newark, DE, W. Sawyer, University of Florida, Gainesville, FL

4 pm – 4:30 pm
Expanding the Operational Range and Functionality of Temperature-Adaptive Solid Lubricant Coating Materials
C. Muratore, UTC/Air Force Research Laboratory, Wright-Patterson AFB, OH, J. Hu, UDRI/Air Force Research Laboratory, Wright-Patterson AFB, OH, B. Phillips, A. Voevodin, Air Force Research Laboratory, Wright-Patterson AFB, OH

4:30 pm – 5 pm
Investigation of Contact Pressure Limits of Molybdenum Disulfide Solid Lubricant Films
R. Colbert, J. Keith, University of Florida, Gainesville, FL, D. Burris, University of Delaware, Newark, DE, W. Sawyer, University of Florida, Gainesville, FL

5 pm – 5:30 pm
The Effect of Methane and Acetylene in the Surrounding Test Environment on Tribological Behavior of Non to Highly Hydrogenated DLC Films
O. Eryilmaz, A. Erdemir, G. Kartal, Argonne National Laboratory, Argonne, IL

5:30 pm – 6 pm
Friction and Wear Maps as a Function of Humidity Gradient for DLCH35%
P. Radi, L. Santos, R. Statuti, L. Bonetti, V. Trava-Airoldi, INPE, Sao Jose dos Campos, Brazil

6 pm – 6:30 pm * Business Meeting
Session 5A ✷ Coronado A
AEROSPACE
Session Chair: J. Lucero, NASA Glenn Research Center, Cleveland, OH
8:30 am – 9 am
Metalworking Fluid Management Program: Extending the Life of Metalworking Fluids
M. Hoff, Master Chemical Corp., Perrysburg, OH, B. LaFoe, MSC Filtration Technologies, Enfield, CT, M. Weismiller, Master Chemical Corp., Perrysburg, OH
9 am – 9:30 am
Novel High Temperature Perfluoropolyalkylether Lubricants And Their Additives
R. Sapienza, W. Ricks, METSS Corp., Westerville, OH, J. Howell, Dupont-Krytox, Deepwater, NJ
9:30 am – 10 am
Evaluation of an Alkyl Sulfate Series of 1-Butyl-3 Methylimidazolium Based Room Temperature Ionic Liquids for Use as Space Lubricants
W. Morales, K. Street, NASA Glenn Research Center, Cleveland, OH, R. Richard, Cleveland State University, Cleveland, OH
10 am – 10:30 am ✷ Break
10:30 am – 11 am
Thermal Conductivity Measurements of Select Coolants for Military Applications
11 am – 11:30 am
Development and Transition of Fire Resistant Hydraulic Fluids for Military Aircraft
C. Snyder, L. Gschwender, US Air Force, Dayton, OH
11:30 am – 12 pm
Performance Mapping of Foil Journal Bearings
B. Puleo, R. Bruckner, NASA Glenn Research Center, Brookpark, OH

Session 5B ✷ Coronado B
WEAR III
Session Chair: TBD
8:30 am – 9 am
Lubrication of High-Power Sliding Electrical Contacts Using Metal and Carbon Brushes
N. Argibay, J. Bares, W. Sawyer, UF Tribology Lab, Gainesville, FL
9 am – 9:30 am
Vapor Phase Lubrication of Self-Mated Copper Sliding Electrical Contacts
J. Bares, N. Argibay, N. Mauntler, D. Dickrell, G. Bourne, W. Sawyer, University of Florida, Gainesville, FL
9:30 am – 10 am
Wear of Thermal Oil & Degradation and Onsite Reconditioning
F. Tremblay, A. Mohamed, Groupe LTI, Asbestos, QC, Canada
10 am – 10:30 am ✷ Break
10:30 am – 11 am
Tribology of Metal-on-Metal Bearings at High Inclination Angles
R. Lee, A. Wang, A. Essner, J. Longaray, Stryker Orthopaedics, Mahwah, NJ
11 am – 11:30 am
Liposomes as Potential Biolubricant Additives for Wear Reduction in Human Synovial Joints
I. Etsion, G. Verberne, Technion, Haifa, Israel, A. Schroeder, Hebrew University, Jerusalem, Israel, Y. Merkher, G. Halperin, A. Maroudas, Technion, Haifa, Israel, Y. Barenholz, Hebrew University, Jerusalem, Israel

11:30 am – 12 pm
Tribological Investigation on Effects of Cold Deformation on Wear of 6061 Al-alloy-SiCp Composite Under the Rolling-Sliding Conditions
N. Murmu, S. Mukhopadhyay, Central Mechanical Engineering Research Institute, Durgapur (CSIR), India

Session 5C ✷ Coronado C
CONDITION MONITORING III
Mini Course and Papers: XRF for Lubrication Analysis
Session Chair: TBD
Session Vice-Chair: C. Chichester, Dow Corning Corp., Midland, MI
The purpose of the seminar is to provide an interactive platform to discuss the theoretical and practical aspects of X-ray Fluorescence (XRF) spectrometry in the lubrication industry. The major emphases are the applicability of XRF and the optimal protocol for generating and reporting of reliable experimental results. A live demonstration of the analysis of oil additives and metallurgical (wear metal) components using XRF spectrometry will be conducted. The seminar will be tailored to the novice user stressing the practical advantages of XRF. Topics to be covered include instrumentation, components, and applicability of XRF; ease of use; rapid qualitative analysis and material screening; calibration techniques for quantitative analysis; standard-less analysis; sensitivity of XRF for a wide variety of elements in various matrices; and sample preparation. Time will be allocated for a question-and-answer session for specific and unique challenges.
8 am – 8:30 am
Application of EDXRF for Lubricant Analysis
R. Phillips, Thermo/GasTops, Pensacola, FL
8:30 am – 10 am
The Use of XRF Analysis in Machinery Condition Assessment
R. Phillips, Thermo/Gastops, Pensacola, FL
10 am – 10:30 am ✷ Break
Session 5C: Coronado C

10:30 am – 12 pm
X-ray Fluorescence Spectroscopy for Filter Debris Analysis
A. Toms, GasTOPS Inc, Pensacola, FL

12 pm – 12:30 pm
Business Meeting

Session 5D: Coronado D

SEALS I

Session Chair: R. Salant, Georgia Institute of Technology, Atlanta, GA

8 am – 8:30 am
Comparison of Leakage Performance in Three Types of Gas Annular Seals Operating at a High Temperature
Z. Ashton, L. San Andrés, A. Delgado, Texas A&M University, College Station, TX

8:30 am – 9 am
FEA of Lip Seals - Adjusting the Contact Area for Perfect Working Conditions
F. Bauer, W. Haas, Universität Stuttgart, Stuttgart, Germany

9 am – 9:30 am
Dynamic Analysis of Rubber Lip Seal Using Finite Element Method
W. Li, L. Stephens, University of Kentucky, Lexington, KY

9:30 am – 10 am
Radial Lip Seal System Modeling and Monte Carlo Simulation
K. Warren, S. Stephens, University of Kentucky, Lexington, KY

10 am – 10:30 am
Break

10:30 am – 11 am
Optimizing Microfeatures to Improve Performance in Radial Lip Seals
W. Leachman, S. Stephens, University of Kentucky, Lexington, KY

11 am – 11:30 am
Simulation of a Hydraulic Rod Seal with a Micro-Patterned Sealing Surface
B. Yang, R. Salant, Georgia Institute of Technology, Atlanta, GA

Session 5E: Coronado E

TRIBUTESTING I

Session Chair: N. Gitis, CETR, Campbell, CA

8 am – 8:30 am
Human Corneal Epithelial Cell Responses to Tribological Damage
D. Dickrell, W. Sawyer, B. Keselowsky, University of Florida, Gainesville, FL

8:30 am – 9 am
Quantification of Fabric Sensory Tactility and Correlation with Surface Properties
C. Schwartz, M. Darden, Texas A&M University, College Station, TX

9 am – 9:30 am
Porous UHMWPE Scaffolds Impregnated with Bio-Derived Materials: A New Class of Orthopedic Material
C. Schwartz, K. Plumlee, Texas A&M University, College Station, TX

9:30 am – 10 am
A New Setup for Temperature Dependent Measurement of Starting Torque, Running Torque and Roll-Out Time of Rolling Element Bearing Grease
J. Laeuger, P. Heyer, Anton Paar Germany, Ostfildern, Germany

10 am – 10:30 am
Break

10:30 am – 11 am
A Novel Method for Quantitative Determination of Ultra-Low Wear Rates: Application to Multiphase Al-Si Alloys
D. Shakhvorostov, L. Coatsworth, W. Lennard, P. Norton, University of Western Ontario, London, ON, Canada

11 am – 11:30 am
The Effects of CO2 Pressure in the Tribological Behavior of Interfaces Used in Air Conditioning Compressors
E. Escobar Nunez, A. Polycarpou, University of Illinois, Urbana, IL

Session 5F: Coronado F/G

LUBRICATION FUNDAMENTALS V

Session Chair: TBD

8 am – 8:30 am
Development of a Three-Dimensional Plasto-Elastohydrodynamic Lubrication (PEHL) Model for Point Contact Mixed Lubrication
N. Ren, Northwestern University, Evanston, IL, D. Zhu, Tri-Tech Solutions, Inc., Mt Prospect, IL, W. Chen, Q. Wang, Northwestern University, Evanston, IL

8:30 am – 9 am
On Mechanism of Sucking Force Under Vertical and Tangential Pulling Conditions
T. Washio, National Institute of Advanced Industrial Science and Technology, Tsukuba, Japan, K. Mizuha, Tokyo Denki University, Chiyoda-ku, Japan
Session 5I  * continued

**9:30 am – 10 am**

**Thermal Analysis of Rolling Element Bearings**
F. Pouly, TURBOMECA groupe SAFRAN, Pau, France, C. Changenet, Université de Lyon, Lyon, France, F. Ville, P. Velex, Université de Lyon, VILLEURBANNE, France, B. Damiens, TURBOMECA groupe SAFRAN, Pau, France

**10 am – 10:30 am  * Break**

**10:30 am – 11 am**

**Bearing Optimization Using a 3D-Dynamic Simulation Tool**
V. Vesselinov, V. Bakolas, Schaeffler KG, Herzogenaurach, Germany

**11 am – 11:30 am**

**A New Approach for Fatigue Modeling of Dented Surfaces Under EHL Line Contact**
A. Warhadpande, F. Sadeghi, Purdue University, West Lafayette, IN

**11:30 am – 12 pm**

**A Combined Analytical-Numerical Model for Subsurface Crack Initiation and Propagation Under Rolling Contact Loading**
J. Lai, SKF Engineering & Research Centre, Nieuwegein, Netherlands, S. Ioannides, SKF Group Technology Development, Nieuwegein, Netherlands, H. Kuijpers, SKF Engineering & Research Centre, Nieuwegein, Netherlands

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**Session 5J  * Yucatan 2**

**NONFERROUS I**

**Sustainability in the Nonferrous Industry**
Session Chair: T. Oleksiak, BP Castrol, Naperville, IL
Session Vice-Chair: R. Pruhs, D. A. Stuart Co., Warrenton, IL

**8 am – 8:30 am**

**Aluminum Industry – At the Crossroads of Sustainability**
T. Brackmann, Nichols Aluminum, Davenport, IA

**8:30 am – 9 am**

**The Aluminum Industry’s Sustainability Efforts**
J. Wang, The Aluminum Association, Arlington, VA

**9 am – 9:30 am**

**Sustainable Processes, Green Chemistry, Nano Particles and Other Myths Involved in Non Ferrous and Ferrous Metal Manufacturing Processes**
J. Burke, Houghton International, Valley Forge, PA

**9:30 am – 10 am**

**Use of Ether Carboxylates as Additives to Increase Coolant Life in Non-Ferrous Applications**
A. Michael, Clariant Corp., Mt. Holly, NC

**10 am – 10:30 am  * Break**

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**10:30 am – 11 am**

**Change of a Hot Rolling Emulsion by Balance Additions of a New Formulation – A Case Study**
G. Kudermann, Hydro Aluminium Deutschland GmbH, Bonn, Germany, T. Wirtz, Hydro Aluminium Deutschland GmbH, Hamburg, Germany

**11 am – 11:30 am**

**Filtration Technology for the Aluminum and Nonferrous Metalworking Industry**
B. Terrell, Mann+Hummel, Louisville, KY, J. Haas, Houghton International, Valley Forge, PA

**11:30 am – 12 pm**

**Bears at the Heart of an Environmental Clean-Up in the Steel Industry**
C. Bender, NSK Corp., Ann Arbor, MI

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**Session 5K  * Yucatan 3**

**JOINT SESSION: SURFACE ENGINEERING/SOLIDS LUBRICANTS I**

**Special Session: Tribological Coatings**

Session Chair: T. Scharf, University of North Texas, Denton, TX
Session Vice-Chair: D. Burris, University of Delaware, Newark, DE

**8:30 am – 9 am**

**NASA PS324: A New High Temperature Solid Lubricant Coating for High Temperature Wear Applications**
C. DellaCorte, NASA, Cleveland, OH

**9 am – 9:30 am**

**Microstructure and Tribological Performance of MoS2-Based Composite Films**
J. Hu, R. Wheeler, J. Zabinski, C. Muratore, B. Phillips, A. Voevodin, Air Force Research Laboratory, Dayton, OH

**9:30 am – 10 am**

**A New Strategy of Synthesis of Hard and Tough Coatings with Excellent Adhesion**
Y. Chung, A. Ranade, L. Krishna, Northwestern University, Evanston, IL

**10 am – 10:30 am  * Break**
Wednesday, May 20, 2009

Session 5K * continued

10:30 am – 11 am
Effects of Structure, Doping & Environment on the Tribochemistry of DLC
J. Harrison, G. Gao, M. Knippenberg, P. Piotrowski, J. Schall, US Naval Academy, Annapolis, MD

11 am – 11:30 am
Development of Diamond-Like Carbon Films for Application from Deep Ocean to Orbit Space
L. Santos, V. Airoldi, L. Bonetti, R. Statuti, P. Radi, INPE, Sao Jose dos Campos, Brazil

11:30 am – 12 pm
Spectromicroscopy of Tribochemical Wear of Ultrananocrystalline Diamond Films

Session 5L * Coronado D
SAFETY, HEALTH & REGULATORY AFFAIRS

Session Chair: E. White, Milacron, Inc., Cincinnati, OH

8 am – 8:30 am
Best Practices for Microbial Control and Biocide Treatment of Metalworking Fluids
T. Williams, D. Reynolds, Rohm and Haas Co., Spring House, PA

8:30 am – 9 am
Formaldehyde Release Biocides: A Comparison of Airborne Formaldehyde Measurements to Predicted Values in a Machining Environment
P. Miller, Lubrizol Corp., Spartanburg, SC

9 am – 9:30 am
“Endotoxin and the Respiratory Health of Machinists: A Search for Understanding”
E. White, Milacron, Cincinnati, OH

9:30 am – 10 am
H1 Lubricants for Food Machinery
D. Selby, ExxonMobil Lubricants & Specialties, Fairfax, VA

10 am – 10:30 am * Break

Session 6A * Coronado A
CERAMICS/COMPOSITES

Session Chair: A. Rocha, Texas A&M University, Bryan, TX

1:30 pm – 2 pm
Friction and Wear of PEEK Reinforced with Carbon Fibers in Nitrogen at Normal and Cryogenic Temperature
T. Oyamada, M. Ono, Y. Murai, Mechanical Engineering Research Laboratory, Hitachi, Ltd., Hitachinaka, Japan, H. Miura, T. Kuwano, Hitachi Plant Technologies, Ltd., Tsuchiura, Japan

2 pm – 2:30 pm
PTFE Fiber Reinforced PEEK Composites
J. Vail, University of Florida, Gainesville, FL, D. Burris, University of Delaware, Newark, DE, W. Sawyer, University of Florida, Gainesville, FL

2:30 pm – 3 pm
The Effect of pH Levels and Exposure Times on Polyurethane Scratch Resistance
C. Korach, O. Sha, W. Zhao, SUNY-Stony Brook, Stony Brook, NY

3 pm – 3:30 pm * Break

3:30 pm – 4 pm
Ex Situ Observation of Tantalum Oxides After ECMP
K. Wang, F. Gao, H. Liang, Texas A&M University, College Station, TX

4 pm – 4:30 pm
Friction of Integrated Circuits for Chemical Mechanical Polishing with Varying Slurries
C. Korach, Stony Brook University, Stony Brook, NY, J. Levert, R. Fedele, B. Toman, SUNY Maritime College, Bronx, NY

4:30 pm – 5 pm
Nano- and Micro-scale Abrasivity and Hardness of Lunar Regolith Simulant
K. Miyoshi, K. Ishibashi, Nippon Institute of Technology, Miyashiro-machi, Japan, P. Abel, NASA, Cleveland, OH

5 pm – 5:30 pm * Business Meeting
Wednesday, May 20, 2009

**Session 6B ✷ Coronado B**

**WEAR IV**

Session Chair: TBD

1:30 pm – 2 pm
Temperature Field of a Rotating Cylindrical Workplace in Laser Quenching and Related Parametric Study
H. Xu, Y. Huang, Printing Engineer, Xi’an University of Technology, Xi’an, Shaanxi, China, W. Cheng, Q. (Jane) Wang, Northwestern University, Evanston, IL

2 pm – 2:30 pm
Nanoscale Wear of Silicon- and Carbon-based Atomic Force Microscope Probes

2:30 pm – 3 pm
A Parametric Investigation of a Lab-Scale Electromagnetic Launcher Using Finite-Element Analysis
E. Kimn, I. Green, R. Cowan, Georgia Institute of Technology, Atlanta, GA

3 pm – 3:30 pm ✷ Business Meeting

**Session 6C ✷ Coronado C**

**CONDITIONING MONITORING IV**

TBA

**Session 6D ✷ Coronado D**

**SEALS II – FACE SEAL MATERIALS**

Panel Discussion: Fundamental Review and Technology Outlook
Session Chair: J. Derby, John Crane, Inc., Morton Grove, IL

1:30 pm – 5:30 pm
A Panel Discussion on Face Seal Materials – Fundamental Review and Technology Outlook
Jeff Anderson, ESK Ceramics, Saline, MI – Silicon Nitride, Liquid Phase Sintered SiC

1:30 pm – 2 pm
A Novel and More Accurate Method for Quantifying and Mapping the Sliding Friction Without Wear
E. Poiré, EP Laboratories, Inc., Irvine, CA

2 pm – 2:30 pm
Friction and Wear Measurements of Hard-Carbon and Nitride Coatings Sliding Against 52100 Steel in Commercial Gear Oils at Elevated Temperatures
R. Erck, C. Lorenzo-Martin, O. Ajayi, Argonne National Laboratory, Argonne, IL

2:30 pm – 3 pm
An Instrumented Crank-Slider Mechanism for Wear Testing
N. Muetterties, S. Mukras, K. Kim, T. Schmitz, W. Sawyer, University of Florida, Gainesville, FL

3 pm – 3:30 pm ✷ Break

3:30 pm – 4 pm
Low Earth Orbit Space Tribometer
B. Krick, University of Florida, Gainesville, FL, J. Jones, Air Force Research Laboratory, Wright-Patterson AFB, OH, W. Sawyer, University of Florida, Gainesville, FL

**Session 6E ✷ Coronado E**

**TRIBOTESTING II**

Session Chair: G. Krauss, Energizer Consumer Group, Milford, CT
Session Vice-Chair: N. Gitis, CETF, Campbell, CA

1:30 pm – 2 pm
Joseph Boylan, Morgan AM&T, St. Marys, PA
– Carbon, Graphite Loaded Self Sintered SiC
– Ali Erdimer, PhD, Argonne National Laboratory, Argonne, IL – Surface Treatment

2 pm – 2:30 pm
Paul Faker, Saint Gobain, Niagara Falls, NY – Self Sintered SiC, Controlled Porosity SiC

Dr. Stephen Hsu, George Washington University, Germantown, MD – Boundary Film

Kevin McNeerney, CoorsTek – Ceramic, Reaction Bonded SiC

5:30 pm – 6 pm ✷ Business Meeting

**Session 6F ✷ Coronado F/G**

**GEARS & GEAR LUBRICATION**

Session Chair: C. Ved, Ford Motor Co., Livonia, MI
Session Chair: H. Gao, ConocoPhillips, Ponca City, OK
Session Vice-Chair: C. Phillips, ConocoPhillips, Troy, MI

1:30 pm – 2 pm
Bright Stock Alternatives in Formulating Gear Oils and Greases
J. Vinci, R. Profilet, Lubrizol Corp., Wickliffe, OH

2 pm – 2:30 pm
Influence of Base Oil and Additives of Gear Oils on Friction Power Losses of Passenger Cars
W. Bartz, Technischen Akademie Esslingen, Ostfildern, Germany
### Session 6F  *continued*

**2:30 pm – 3 pm**  
**The Effect of Chemical Boundary Films on Tribological Behavior of Mild Carbon Steel**  
M. Lorenzo Martin, O. Ajayi, R. Erck, G. Fenske, Argonne National Laboratory, Argonne, IL

**3 pm – 3:30 pm  *Break***

**3:30 pm – 4 pm**  
**Fluid Design Impacts on Worm Gear Efficiency Performance**  
J. Carey, A. Galiano-Roth, N. Leon, ExxonMobil Research and Engineering, Paulsboro, NJ

**4 pm – 4:30 pm**  
**Investigations on the Power Losses and Thermal Effects in Gear Transmissions**  
G. Koffel, C. Changenet, F. Ville, P. Velex, Université de Lyon, VILLEURBANNE, France

**4:30 pm – 5 pm  *Break***

**Business Meeting**

### Session 6G  *Fiesta 3/4*

**METALWORKING IV**

**4:00 pm**  
**Motivations and Methodologies Measuring Nanoscale Wear**  
R. Carpick, P. Jaroenapibal, University of Pennsylvania, Philadelphia, PA  
J. Liu, D. Grierson, University of Wisconsin-Madison, Madison, WI  
J. Carlisle, N. Moldovan, Advanced Diamond Technologies, Inc., Romeoville, IL  
H. Bhaskaran, B. Gotsmann, M. Lantz, IBM Zürich Research Laboratory, Zürich, Switzerland  
K. Sridharan, K. Turner, University of Wisconsin-Madison, Madison, WI

**4:30 pm – 5 pm  *Break***

**Business Meeting**

### Session 6H  *Fiesta 5*

**COMMERCIAL MARKETING FORUM VI**

**Session Chair:** TBD

**1:30 pm**  
The Lubrizol Corp.

**2 pm**  
TBD

**2:30 pm**  
TBD

**3 pm – 3:30 pm  *Break***

**4 pm**  
TBD

**4:30 pm**  
TBD

### Session 6I  *Yucatan 1*

**ROLLING ELEMENT BEARINGS II**

**Session Chair:** TBD

**1:30 pm – 2 pm**  
A Voronoi Finite Element/Damage Model for Life Scatter in Rolling Contact Fatigue  
B. Jalalahmadi, F. Sadeghi, Purdue University, West Lafayette, IN

**2 pm – 2:30 pm**  
Free Surface Thin Layer Flow Modeling of Contact Pressure Induced Lubricant Migration in Rolling Element Bearings  
M. van Zoelen, C. Venner, University of Twente, Enschede, Netherlands

**2:30 pm – 3 pm**  
Interference Fit Life Factors for Ball Bearings  
F. Oswald, E. Zaretsky, NASA Glenn Research Center, Cleveland, OH

**3 pm – 3:30 pm  *Break***
Wednesday, May 20, 2009

**Session 6I**  *continued*

3:30 pm – 4 pm
Determination of Fatigue Loads of Complex Systems
A. Degtiarev, S. Lenssen, V. Vesselinov, V. Bakolas, Schaeffler KG, Herzogenaurach, Germany

4 pm – 4:30 pm
Finite Element Analysis of Debris Denting by Spherical Ductile Particles
D. Nélias, INSA Lyon, Villeurbanne, France

4:30 pm – 5 pm
Rolling Contact Fatigue Cracks in the Presence of a Lubricant
R. Balcombe, M. Fowell, A. Olver, D. Dini, Imperial College London, London, United Kingdom

5 pm – 5:30 pm
A Discrete Element Approach for Modeling the Dynamics of Deep Groove and Angular Contact Ball Bearing with Flexible Cages
N. Weinzapfel, F. Sadeghi, Purdue University, West Lafayette, IN

5:30 pm – 6 pm
Sub-Scale Bearing Test for Evaluating Abrasive Land Wear

6 pm – 6:30 pm  * Business Meeting

**Session 6J**  *Yucatan 2*

**NONFERROUS II – BIOBASED APPLICATIONS IN THE NONFERROUS INDUSTRY**

Session Chair: G. Biresar, USDA/ARS/NCAUR, Peoria, IL
Session Vice-Chair: J. Cepec, Allegheny Petroleum Products Co., Wilmerding, PA

1:30 pm – 2 pm
Biobased Fuels and Our Energy Future
C. Kobus, Oakland University, Rochester, MI

2 pm – 2:30 pm
Traction Properties of Biobased Fluids
G. Biresar, G. Bantchev, ARS/NCAUR, Peoria, IL

2:30 pm – 3 pm
Effect of Soybean Oil and EP Additives on Surface Wear Under Boundary Lubrication Conditions
T. McClure, TribSys LLC, Valparaiso, IN, S. Asadauskas, Institute of Chemistry, Vilnius, Lithuania, J. Baltrus, Dept of Energy, Valparaiso, PA, J. Mieczkowski, Fuchs Lubricants, Harvey, IL

3 pm – 3:30 pm  * Break

3:30 pm – 4 pm
Synthesis and Characterization of New Sulfide Derivatives of Vegetable Oils
G. Bantchev, J. Kenar, G. Biresar, USDA-NCAUR, Peoria, IL

4 pm – 4:30 pm
The History of Quenching – The Original Biobased Metalworking Process
D. MacKenzie, Houghton International, Valley Forge, PA

4:30 pm – 5 pm
Particle Size Analysis Of Non-Ferrous Rolling Oil Emulsions Using Light Scattering Techniques
P. Kippax, A. Virden, D. Higgs, Malvern Instruments Limited, Malvern, United Kingdom

5 pm – 5:30 pm
Fatty Alcohols in Oils and Emulsions. Various Methods to Identify and Quantify Them
P. Mortreuil, Alcan-Centre de Recherches de Voreppe, Voreppe, France

5:30 pm – 6 pm  * Business Meeting

**Session 6K**  *Yucatan 3*

**JOINT SESSION: SURFACE ENGINEERING/SOLID LUBRICANTS II**
**Special Session: Tribological Coatings**

Session Chair: O. Eryilmaz, Argonne National Laboratory, Argonne, IL
Session Vice-Chair: D. Dickrell, University of Florida, Gainesville, FL

1:30 pm – 2 pm
Tribological Studies of Temperature-Adaptive Nanocrystalline Lubricant Coating for Machining Applications
W. Jiang, J. Wu, NanoMech, LLC, Fayetteville, AR, A. Malshe, University of Arkansas, Fayetteville, AR

2 pm – 2:30 pm
Intrafilm Shear Accommodation in Nanolaminate Lubricious Oxide Coatings
T. Scharf, B. Mensah, H. Mohseni, M. Romanes, The University of North Texas, Denton, TX
Wednesday, May 20, 2009

2:30 pm – 3 pm
Effect of Substrate Material on the Tribological Performance of PTFE-Based Polymeric Coatings in a CO2 Environment
D. Dascalescu, K. Polychronopoulou, A. Polycarpou, University of Illinois at Urbana-Champaign, Urbana, IL

3 pm – 3:30 pm * Break

3:30 pm – 4 pm
Mechanical Properties and Scratch Resistance of CdSe/PMMA Nanocomposite Coatings
A. Arguelles, H. Wang, C. Gan, M. Zou, University of Arkansas, Fayetteville, AR, Y. Wang. Ocean NanoTech, LLC., Fayetteville, AR

4 pm – 4:30 pm
A Novel Low Friction and Low Wear Polymer Coating for Metal Substrates
A. Polycarpou, J. Zhang, J. Economy, University of Illinois at Urbana-Champaign, Urbana, IL

4:30 pm – 5 pm
Low Friction Surface Coatings Obtained Using Nano-Filled Polymer and Laser Radiation
S. Tesker, S. Veldhuis, G. Foux-Rabinovich, McMaster University, Hamilton, ON, Canada, E. Tesker, Volgograd State Technical University, Volgograd, Russian Federation

5 pm – 5:30 pm * Surface Engineering Business Meeting

Thursday, May 21, 2009

Session 7A * Coronado A

GREASE

Session Chair: P. Shiller, SKF, Canton, OH
Session Vice-Chair: C. Coe, ExxonMobil Lubricants and Specialties, Manassas, VA

8 am – 8:30 am
The Use of Controlled Stress Rheology to Evaluate the Low Temperature Performance of Lubricating Greases
M. Sivik, The Lubrizol Corp., Wickliffe, OH, S. Nolan, Lubrizol Limited, Hazelwood, United Kingdom

8:30 am – 9 am
Study of Additive Response in Prevention of Fretting Wear in Bearing Greases
J. Kaperick, Afton Chemical Corp., Richmond, VA

9 am – 9:30 am
“Shouldn’t Grease Upper Operating Temperature Claims Have a Technical Basis?”
C. Coe, ExxonMobil, Manassas, VA

9:30 am – 10 am
Seizure Life of Angular Contact Ball Bearing
T. Azuma, O. Saita, Y. Oonuki, Kyodo Yushi Co., Ltd., Fujisawa, Japan

10 am – 10:30 am * Break

10:30 am – 11 am
Rheological Investigation of Carbon Nanotube Grease
H. Hong, South Dakota School of Mines and Technology, Rapid City, SD

11 am – 11:30 am
Evaluation of the Effectiveness of Grease Sampling Techniques for Motor Operated Valves
R. Wurzbach, L. Williams, York Laboratories, LLC, York, PA

11:30 am – 12 pm * Business Meeting

Session 7B * Coronado B

SURFACE ENGINEERING III

Session Chair: M. Zou, University of Arkansas, Fayetteville, AR
Session Vice-Chair: I. Etsion, Technion, Haifa, Israel

8 am – 8:30 am
A Review of Engineered Surfaces for Valvetrain Friction Reduction and Wear
A. Gangopadhyay, D. McWatt, R. Zdrodowski, Ford Research and Advanced Engineering, Dearborn, MI

8:30 am – 9 am
Modeling Start-up Friction in Hydraulic Components
J. Garcia, M. Ashlie, J. Lumkes, Purdue University, West Lafayette, IN

9 am – 9:30 am
Analysis of Tribological Behaviour of Cast Iron Textured Surfaces for Cylinder Liners Application
V. Fridrici, J. Keller – Espinouse, P. Kapsa, Ecole Centrale de Lyon, Ecully, France, J. Huard, F2A, Fumel, France
Thursday, May 21, 2009

Session 7B  continued

9:30 am – 10 am
Micro Textures in Concentrated Conformal-Contact Lubrication: Effect of the Original Machined Surface Roughness
N. Ren, Northwestern University, Evanston, IL, T. Nanbu, Y. Yasuda, Nissan Motors, Kanagawa, Japan, D. Zhu, Tri-Tech Solutions, Mt Prospect, IL, Q. Wang, Northwestern University, Evanston, IL

10 am – 10:30 am  Break

10:30 am – 11 am
Micro Textures in Concentrated Conformal-Contact Lubrication: Effect of Bottom Shape Imperfections
T. Nanbu, Nissan Motors, Kanagawa, Japan, N. Ren, Northwestern University, Evanston, IL, Y. Yasuda, Nissan Motors, Kanagawa, Japan, D. Zhu, Tri-Tech Solutions, Mt. Prospect, IL, Q. Wang, Northwestern University, Evanston, IL

11 am – 11:30 am
Numerical Study of Effect of Initial Clearance Between Lubricated Laser – Textured Parallel Surfaces on Friction
F. Meng, R. Zhou, T. Davis, Q. Wang, J. Cao, Northwestern University, Evanston, IL, D. Hua, J. Liu, Caterpillar Inc., Peoria, IL

Session 7D  Coronado D

SEALS III

Session Chair: A. Lebeck, Mechanical Seal Technology Inc., Albuquerque, NM

8 am – 8:30 am
Operating Experience with Mechanical Seals in Reactor Shutdown Cooling Pumps
G. Staniewski, Ontario Power Generation, Pickering, ON, Canada

8:30 am – 9 am
Numerical Study of the Dysfunctions Observed on Hydrostatic Mechanical Face Seals
N. Brunetière, University of Poitiers – CNRS, Futuroscope Chasseneuil, France, E. Galenne, EDF R&D, Clamart, France, I. Pierre-Danos, EDF R&D, Clamart, France

9 am – 9:30 am
Phase Change in Water Lubricated Mechanical Face Seals
F. Migout, N. Brunetière, B. Tournerie, University of Poitiers, Futuroscope, France

9:30 am – 10 am
A Pump Seal Selection Guideline Complementing API 682/ISO 21049
M. Goodrich, Total Raffinage Marketing, Harfleur, France

10 am – 10:30 am  Break

10:30 am – 11 am
Exploring Operation Mechanisms of the Flexible Metal to Metal Face Seal: Part I – Numerical Modeling and Validations
Y. Wang, Y. Li, T. Tian, Massachusetts Institute of Technology, Cambridge, MA

11 am – 11:30 am
Exploring Operation Mechanisms of the Flexible Metal to Metal Face Seal: Part II – Scoring and Leakage Analysis
Y. Wang, T. Tian, Massachusetts Institute of Technology, Cambridge, MA

11:30 am – 12 pm
Face Seals for High Viscosity Oil Sealing
T. Lai, John Crane, Morton Grove, IL

Session 7E  Coronado E

TRIBOTESTING III

Session Chair: G. Krauss, Energizer Consumer Group, Milford, CT
Session Vice-Chair: N. Gitis, CETR, Campbell, CA

8 am – 8:30 am
Friction and Wear of Polypropylene – AISI P20 Mold Steel Tribosystem
N. Restrepo-Zapata, EAFIT University, Medellin, Colombia, J. Vélez R., Universidad Nacional de Colombia, Medellin, Colombia

8:30 am – 9 am
Rolling-Element Fatigue Testing- A Tutorial
B. Vlcek, Georgia Southern University, Statesboro, GA, E. Zaretsky, NASA-Glenn Research Center, Cleveland, OH

9 am – 9:30 am
Diesel Soot Abrasiveness
B. Papke, Shell Global Solutions (US), Houston, TX

9:30 am – 10 am
Boundary Lubrication of Glass – Rubber Sliding Contacts
E. van der Heide, C. Lossie, S. Reinders, K. van Bommel, H. Lenting, TNO Science and Technology, Eindhoven, Netherlands

10 am – 10:30 am  Break
Thursday, May 21, 2009

**Session 7F ✷ Coronado F/G**

**POWER GENERATION I**

Session Chair: A. Sasaki, Kleentek Corp., Yokohama, Japan

Session Chair: T. Olmsted, Forsythe Lubrication Associates Ltd., Hamilton, Ont., Canada

8:30 am – 9 am
Oxidation and Varnish Formation in Turbine Oils Formulated with Antioxidant Systems Containing Phenyl-Alpha-Naphthylamine (PANA) or Alkylated Phenyl-Alpha-Naphthylamine (APANA)

V. Gatto, W. Moehle, T. Burris, Albemarle Corp., Baton Rouge, LA

9 am – 9:30 am
Color Characterization of Membrane Patches for the Oil Degradation Analysis

T. Honda, K. Kodo, H. Aoyama, Y. Iwai, University of Fukui, Fukui, Japan, A. Sasaki, Kleentek Corp., Tokyo, Japan

9:30 am – 10 am
Varnish Control in Turbine Lubrication System Through the Use of Electrostatic Charge Dissipating Filtration

K. Faroog, Pall Corp., Port Washington, NY

10 am – 10:30 am ✷ Break

10:30 am – 11 am
A Study of Single and Complex Antioxidant Systems: Effects on a Group II Base Oil’s Varnish Potential, Sludge Formation and Oxidative Resistance

G. Wagenseller, J. Kuca, Analysts, Inc., Stafford, TX

11 am – 11:30 am
Advanced Maintenance Practices for Fluid Treatment in Modern Power Generation Industry

A. Schmidt, J. Duchowski, HYDAC Technology Corp., Sulzbach, Germany

**Session 7K ✷ Yucatan 2**

**NONFERROUS III – HOT AND COLD NONFERROUS FORMING**

Session Chair: P. Deneuville, ALCAN Centre de Recherche De Voreppe, Voreppe, France

Session Vice-Chair: P. Bartosh, Houghton International, Inc., Parkersburg, WV

8 am – 8:30 am
Can We Still Use Liquid Crystals as Lubricants for Rolling of Aluminum?

P. Deneuville, Alcan Centre de recherche de Voreppe, Voreppe, France

8:30 am – 9 am
A Comparison Between Normal Paraffins, and Severely Hydro-Treated Aliphatic Solvents Used as Aluminum Cold Rolling Coolant Bases

E. Lorence, University of Pittsburgh, Pittsburgh, PA

9 am – 9:30 am
Experimental Study of Aluminum Cold Rolling Fluids

A. Riss, T. Kouvatanovitch, F. Eydoux, TOTAL Lubrifants, Paris La Défense, France

9:30 am – 10 am
The Effect of Lubricant Oleic Acid Content on Aluminum Transfer During Hot Rolling

R. Hunt, P. Deneuville, Alcan CRV, Voreppe, France

10 am – 10:30 am ✷ Break

10:30 am – 11 am
Characterisation of the Tribofilm on a WC-DLC coating under Sliding-Rolling Contact Conditions

K. Mistry, A. Neville, A. Morina, University of Leeds, Leeds, United Kingdom

11 am – 12 pm
Thermodynamics: A Bridge that Links Chemistry and Mechanics in Surface Frictional Contact, and Its Application for Blank Preparation in Coining Industry

T. Ying, U. Tolbert, R. Harrigal, Manufacturing SBU, US Mint, Philadelphia, PA
### Thursday, May 21, 2009

#### Session 8B  ✷ Coronado B
**SURFACE ENGINEERING IV**

Session Chair: R. Evans, The Timken Co., Canton, OH  
Session Vice-Chair: T. Scharf, University of North Texas, Denton, TX

- **1:30 pm – 2 pm**
  Improving Tribological Performance of Elastomer Seals by Surface Texturing  
  I. Etsion, A. Shinkarenko, Y. Kligerman, Technion, Haifa, Israel

- **2 pm – 2:30 pm**
  Fabrication and Tribological Study of Nano-/Micro-Textured Surfaces on Stainless Steel Substrate  
  M. Zou, H. Wang, University of Arkansas, Fayetteville, AR

- **2:30 pm – 3 pm**
  Adhesion and Friction Forces on Silicon Wafers with Dual Surface Modifications at Nano-Scale  
  E. Yoon, A. Singh, D. Pham, K. Na, S. Yang, Korea Institute of Science and Technology, Seoul, South Korea

- **3 pm – 3:30 pm ✷ Break**

- **3:30 pm – 4 pm**
  Characterization and Properties of Yeast Spore Walls by Scanning Probe Microscopy  
  C. Korach, J. Choi, SUNY-Stony Brook, Stony Brook, NY

#### 4 pm – 4:30 pm
**Tribological Properties of Nanocrystalline Diamond Surfaces**  
A. Schneider, D. Steinmueller, M. Roy, AC2T research GmbH, Wiener Neustadt, Austria

#### 4:30 pm – 5 pm
**Sliding Friction Wear of Hydrogenated Pure Copper**  
A. El-Amoush, Al-Balqa Applied University, Amman, Jordan

#### Session 8E  ✷ Coronado E
**TRIBOTESTING IV**

Session Chair: N. Gitis, CETR, Campbell, CA  
Session Vice-Chair: G. Krauss, Energizer Consumer Group, Milford, CT

- **1:30 pm – 2 pm**
  Friction Coefficient Comparison of the DLC Films in Ocean Water, Air and Vacuum  
  R. Statuti, P. Radi, V. Trava-Airoldi, L. Santos, Instituto Nacional de Pesquisas Espaciais – INPE, São José dos Campos, Brazil

- **2 pm – 2:30 pm**
  Test Method for Lubrication in Sheet Metal Forming  
  K. Helmetag, Henkel Corp., Madison Heights, MI, B. Swank, Autoform Engineering USA, Troy, MI

- **2:30 pm – 3 pm**
  Challenges of Investigating Running-In  
  A. Karpinska, D. Proprentner, A. Olver, D. Ewins, Imperial College, London, United Kingdom

- **3 pm – 3:30 pm ✷ Break**

#### Session 8F  ✷ Coronado F/G
**POWER GENERATION II**

Session Chair: G. Khemchandani, Dow Chemical Co., Freeport, TX

- **1:30 pm – 2 pm**
  The Value of Tribology (Part 1), A Macroeconomic View  
  A. Sasaki, Maintek Consultant, Yokohama, Japan, G. Sakhrani, Ferrocare Machines Private Ltd., Pune, India

- **2 pm – 2:30 pm**
  The Value of Tribology (Part 2), The Economic Value of State-of-the-Art Oil Management  
  G. Sakhrani, Ferrocare Machines Private Ltd., Pune, India, A. Sasaki, Maintek Consultant, Yokohama, Japan

- **2:30 pm – 3 pm**
  Review of Varnish Problems of Turbine Oils  
  A. Sasaki, Maintek Consultant, Yokohama, Japan

- **3 pm – 3:30 pm ✷ Break**

- **3:30 pm – 4 pm**
  Counting Particles Under One Micron in Size Has Precluded Many Tribological Studies – Until Now  
  G. Munson, D. McCormick, Fluid Assets, LLC, Madison, CT

- **4 pm – 4:30 pm**
  Greener Wind Turbine Gears  
  O. El-Saeed, REM Chemicals, Inc., Southington, CT

- **4:30 pm – 5 pm ✷ Business Meeting**

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**Make time to visit STLE’s 2009 Exhibition**

The industry’s newest products, services and technologies are on display at STLE’s 2009 trade show, conveniently held in Disney’s Coronado Springs Resort near the technical programs, education courses and networking events. Representatives from 70 of the industry’s top companies are looking to meet with you.

**Show hours:**

- **Monday, May 18 – noon – 5pm**
- **Tuesday, May 19 – 9:30 am – noon & 2-5:30 pm**
- **Wednesday, May 20 – 9:30 am – noon**

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50 2009 STLE ANNUAL MEETING & EXHIBITION  ✷ PROGRAM GUIDE AND REGISTRATION
AM 2009 Education Program Synopsis

The 2009 STLE Annual Meeting & Exhibition features 10 course days of education with two entirely new courses and four significantly revised courses. For those interested in metalworking, STLE offers two introductory-level, one-day courses: MWF105-Metal Forming Basics and MW 125-Basic Health & Safety Course.

STLE's Condition Monitoring Technical Committee assembled a task team that created two new courses at the basic and intermediate levels. The first, CM 101, covers the Basics of Maintenance Strategies and Lubricants. The second, CM 201, covers the Basics of Failure Modes and Detection Methods.

Finally, in conjunction with NLGI, STLE is co-hosting a Basic Applications Grease Course. This course, like STLE's previous collaboration with ABMA last year, has a separate, independent tuition. Advanced Lubrication 301 also has been updated.

Following is an overview of the courses offered in 2009.

Please check the Program Guide distributed on site in Lake Buena Vista to verify course times. Some times might change slightly.

10 World-class Education Courses

ADVANCED LUBRICATION 301: ADVANCED LUBRICATION AND THEORY

Wednesday, May 20: 8 am – 5 pm

This is a focused, higher-level course on tribology, lubricants and lubricant formulation. Experienced professionals, including those who have completed STLE's Basic Lubrication course, will benefit from this more focused and advanced session on lubricant technology. This course assumes fundamental knowledge of lubricants and lubrication principles or completion of Basic Lubrication 101-102. Advanced Lubrication 301 targets individuals employed by oil and additive companies, experienced lubricant end-users and other technical professionals interested in expanding their basic lubrication knowledge.

Key concepts taught in this course include:

* Wear
* Wear mechanisms
* How to diagnose wear problems from equipment failure
* Types of additives used in lubricants, the mechanism of how they work and how they are formulated into additive packages
* Oil rheology and lubricant viscosity theory
* Low-temperature properties of lubricants
* Viscosity Index Improvers
* Low- and high-shear rate properties of lubricants and how these properties are measured.

BASIC LUBRICATION 101: FUNDAMENTALS OF LUBRICATION

Sunday, May 17: 8 am – 5:45 pm

Basic Lubrication 101 is an introduction to lubricants, lubrication principles, base oils, additives and compounded fluids. This course does not require the student to have a formal scientific degree or background, although many technical terms and concepts related to lubricants and their composition are covered. Basic Lubrication 101 is intended for a diverse group, including people involved in technical service, sales, marketing, manufacturing, maintenance and management who want to know more about lubricant products and how they work. The course is designed specifically for those new to the lubrication industry.

Continued on page 54

Three ways to register:
By mail or fax. See page 75 for course registration form.
Online at www.stle.org.
Call STLE at 847-825-5536.
### Basic Lubrication 102: Fundamentals of Equipment Lubrication

**Monday, May 18: 7:30 am – 5:45 pm**

Basic Lubrication 102 is an overview of equipment systems (gears, bearings, pumps, compressors, etc.) and their lubrication requirements. This course, like Basic Lubrication 101, does not require the student to have a formal scientific degree or background, although many technical terms and concepts related to the use of lubricants in various mechanical devices are covered. Basic Lubrication 102 is intended for a diverse group, including people involved in technical service, sales, marketing, manufacturing, maintenance and management who want to know more about how lubricants work in service. This course assumes fundamental knowledge of lubricants and lubrication principles, as presented in Basic Lubrication 101.

### Condition Monitoring 101: Maintenance Strategies and Lubricants

**Sunday, May 17: 8 am-5 pm**

This new course helps prepare participants to implement, execute, evaluate and improve condition-monitoring programs for oil-wetted components. CM 101 begins with justification for condition-based monitoring, followed by an introduction to historically established maintenance strategies, providing understanding of the differences and benefits of each. We continue with an overview of the steps to implement and execute a program and conclude with information on lubricant functions and properties in the context of Condition Monitoring. Sampling procedures and testing instrumentation also are discussed.

### Condition Monitoring 201: Failure Modes and Detection Methods

**Monday, May 18: 8 am – 5 pm**

Condition Monitoring 201, an Intermediate course, begins with an introduction to machinery failure and causal analysis. A discussion on lubricant and machinery failure modes and condition indicators follows. Then various testing methods and techniques for identifying and quantifying such conditions, including potential or impending failures, are presented. CM 201 also provides insight into the pros and cons of on-line, on-site and laboratory analysis for different applications. A discussion on data interpretation, including concepts and case studies, then transitions to data management and integration close the course.

### NLGI Basic Grease

**Wednesday, May 21: 8 am – 5 pm**

This course is a comprehensive overview of all aspects of lubricating grease. Grease formulation components are thoroughly covered, including base oils, the many different thickener types and grease performance additives. Manufacturing technologies are reviewed, as well as grease testing significance and methods. We'll discuss how to select the proper grease for an application and provide examples of both industrial and automotive applications.

### Metalworking Fluids 105: Basics of Metal Forming

**Sunday, May 18: 8 am – 5 pm**

Metalworking Fluids 105 is an updated version of the metal-forming course that we presented two years ago. This course is designed for those involved in developing, working with and using metal-forming fluids in the manufacturing environment. This course is very useful for formulators, technical service representatives, shop floor people and coolant system managers who all need to know more about the fundamental concepts of metal-forming fluids. MWF 105 covers the theory of metal forming, applications and the types and functions of metal-forming fluids and the general chemistries involved. Much of the course focuses on evaluating the failure mechanisms of metal-forming fluids and measures to overcome them. Topics include lubrication, rancidity/microbiology, foam, water quality, corrosion, contamination and filtration.

Among the key concepts:

- Theory of metal forming and applications
- Types and functions of metal-forming lubricants/fluids
- Failure mechanisms for metal-forming lubricants/fluids

Students completing this course will gain information that can help them prepare for the Certified Metalworking Fluid Specialist™ exam.

* continued on page 56
Monday, May 18: 8 am – 4:30 pm

Metalworking Fluids 125 is a one-day introductory course that discusses health & safety issues involved in the use of metalworking fluids. This course is designed for those new to the metalworking fluid industry from the perspectives of a chemical supplier, formulator, fluid maintenance and end-user. Students will be informed about the reasons metalworking fluids can cause health & safety problems and ways to minimize them. Topics covering microbial contamination issues, metalworking fluid and additive toxicology, industrial hygiene and mist effects give students a good feel for the challenges facing metalworking fluid suppliers and end-users. The course is capped by student participation in a metalworking fluid mist case study. Students will be given an opportunity to solve an actual real-world problem.

Among the key concepts:
- Metalworking fluid microbiology
- Controlling microbial contamination
- Toxicology of metalworking fluids and additives
- Industrial hygiene
- Factors affecting the generation of metalworking fluid mist
- The health effects of metalworking fluid microbes.

This is a brief review course for those preparing for the Certified Metalworking Fluids Specialist™ examination.

SYNTHETICS FLUIDS 203: NON-PETROLEUM FLUIDS AND THEIR USES

Sunday, May 17: 8 am – 5:45 pm

Synthetic Fluids 203 provides an understanding of the synthetic materials used as base-oils and additives in compounded lubricants and their uses. There are a myriad new synthetic fluids available to the formulator or end-user, making this a more advanced-level course. This course is designed primarily for formulators and users of lubricating materials. You will learn about nonpetroleum-based lubricants, covering their chemistry as well as properties and general method of manufacture. SF 203 characterizes the various strengths and weaknesses of these fluids, providing insight into the proper cost-effective use of these specialty lubricants. This course assumes fundamental knowledge of lubricants and lubrication principles or completion of Basic Lubrication 101 &102.

SYNTHETICS FLUIDS 204: SYNTHETIC FLUID FORMULATIONS AND APPLICATIONS

Monday, May 18: 8:45 am – 4:45 pm

Synthetic Fluids 204 covers the use of synthetic-based lubricants in general as well as their specialized applications. Often synthetic lubricants are over-engineered for the application. This material will clarify the applications where use of synthetics justifies their price in meeting the requirements of often very difficult lubrication challenges. The objective of this course is to give participants a working knowledge of the preferred synthetic lubricants for use in real-world applications. After taking this course, the student should be able to, with confidence, use and/or specify each material in a wide variety of applications. This course assumes fundamental knowledge of lubricants and lubrication principles or completion of Basic Lubrication 101 &102.
Creativity and innovation are the keys to successful organizations in the 21st Century, and no group has been more successful at utilizing both qualities profitably than the Walt Disney Co.

In this fast-paced and thought-provoking 90-minute presentation, which has been tailored to the lubricants industry, a Disney Institute speaker shares the processes used by WDC’s acclaimed “imagineers” to breathe life into creative ideas.

This is your chance to hear state-of-the-art strategy advice from one of the world’s foremost consulting groups. STLE members will leave this unique workshop with ideas on how to boost the creativity and innovativeness in their organizations.

Program Objectives
1. Increase awareness of the process Disney uses to generate its innovations.
2. Achieve greater understanding of how Disney unleashes people’s imaginations.
3. Be able to describe Disney’s Eight-Step Inspiration-to-Innovation process.
4. Obtain a deeper knowledge of the efforts Disney uses to generate its unique guest experiences.
5. Improve awareness of how Disney designers and operators work.
6. Develop confidence to share and explore adaptations of Disney’s innovation strategies.

Program Agenda
* Welcome and facilitator introduction.
* Discussion of “the Disney difference.”
* Similarities between Disney and other organizations.
* Description of the Disney Chain of Excellence to position the session within a larger business foundation.
* Activity to provide a framework definition of “inspiration to innovation.”
* Video presentation on Disney’s history of innovation—the imperative and recognizable results.
* Program module overview: people as well as process plus details of the process, all intended to protect the integrity of innovations.
* “Blue Sky Brainstorming” with discussion of different types of brainstorming sessions.
* Concept development with explanation of how Disney balances business needs and creative goals.
* Feasibility with connections to market research and guest expectations.
* Detailed design with conceptual rather than engineering-based discussion.
* Production video and discussion of Disney’s project organization chart.
* Discussion of element installation plus test, adjust and “play testing.” Video presentation describing a Disney case study.
* Grand opening. How and why Disney plans this step from the first moment of a project.
* Show quality standards as the key to sustaining the initial vision and learning from and benefiting from in-use insights.
* Visual case studies of Disney examples.
* Video presentation and discussion about cutting-edge examples.
* Closing video and comments.

Presenter is Dr. Jean K. Becker, owner and operator of The Emerald Frog, a management consulting firm providing training to for-profit and not-for-profit businesses.
Exhibition & Sponsorship Opportunities

Disney’s Coronado Springs Resort

1000 West Buena Vista Drive  ⭐ Lake Buena Vista, Fla. 32830 (USA)

Exhibition Date: May 18-20, 2009

Meeting Date: May 17-21, 2009

2009 Exhibition

STLE’s 2009 exhibition complements the annual meeting’s educational programs, technical sessions and Commercial Marketing Forum. You can see, hear, examine and ask questions about products and services targeted specifically to lubricant professionals. STLE’s 2009 trade show is the place to learn about new products, increase your technical expertise and meet representatives from the companies you need to do business with. The exhibition is conveniently located in Disney’s Coronado Springs Resort, close to the technical sessions, education courses, Commercial Marketing Forum and special events.

STLE’s 2009 exhibition features companies from the following product categories:

- Lubricant additives
- Condition monitoring equipment
- Testing and analysis equipment, supplies and services
- Synthetic lubricants
- Metalworking fluids and additives
- Industrial fluids
- Lubrication management services
- Environmental services
- Consulting services
- Publications & journals

2009 STLE Exhibitor Advisory Committee

STLE would like to thank the following individuals and their companies for being part of the Exhibitor Advisory Committee, which sets policies and practices for the trade show.

Andrew Deutscher (chair), Lonza, Inc.
Seth Barron, ExxonMobil Chemical
Gordon Cox, Tannas Co.
Lauren Ereio, Afton Chemical
Amy King, Chevron Phillips Chemical
Marty Meyers, Infineum
Raj Shah, Koehler Instrument Co.

continued on page 62
Other Sponsorship Opportunities
STLE’s 2009 Annual Meeting & Exhibition in Lake Buena Vista offers a number of marketing opportunities for companies and organizations targeting the lubricant professional. In addition to the exhibits, STLE offers:

COMMERCIAL MARKETING FORUM. The CMF is an opportunity to present technical and commercial information about your products and services—something not permitted during the technical sessions. In addition, CMF presenters can distribute literature about their organizations and products, also not permitted during the technical sessions. Past presenters say the CMF is an ideal way to introduce new products or describe improvements in existing products. Many companies combine a CMF presentation with an exhibit booth as a means of creating maximum impact during STLE’s trade show. Forum sessions are 30-minute blocks, consisting of a 20-25-minute presentation followed by time for Q&A.

BONUS: Although not part of the annual meeting, CMF participants are eligible to participate in CMF Plus, a condensed and published version of their presentation that appears in a special edition of TLT, STLE’s monthly magazine. CMF Plus reaches some 7,000 top technical professionals in the lubricants industry.

For more information to or sponsor an event, contact Tracy Nicholas VanEe at 630-922-3459, tnicholas@stle.org.

OTHER OPPORTUNITIES. If you are interested in raising your organization’s profile at the annual meeting (thereby reaching some 1,400 members of the lubricants industry), STLE offers other sponsorship opportunities, including:

- Print advertising in TLT magazine and the popular Annual Meeting Program Guide booklet.
- Personal Itinerary Planner New!
- Badge Lanyards
- Registration Bags
- Educational Materials
- Welcoming Party (Monday evening)
- Presidents Luncheon (Tuesday afternoon)
- Speakers Breakfast
- Refreshment Breaks
- Massage Table Wellness Breaks
- Internet Cafe

2009 Exhibitors
More than 70 organizations are expected to participate in the 2009 STLE Exhibition in Lake Buena Vista. Following is the list of participants as of Dec. 15, 2008.

Afton Chemical Corp.
Angus Chemical
Anton Paar USA
Arch Chemicals
Arkema Inc.
Biosan Laboratories
Cannon Instrument Co.
Chemidex LLC
Chevron Phillips Chemical
Ciba Corp.
Compass Instruments/Falex Corp.
CRC Press
Croda
Crystal Inc. PMC
Dow Biocides
E-ION
ExxonMobil Chemical
Huntsman Corp.
Infineum USA L.P.
Kyowa Hakko
Lambent technologies
Lanxess Corp.
Lonza
Lubrizol Corp.
MISCO Refractometer
PCC Chemax
PCS Instruments
Petrolab Co.
Phoenix Tribology
Pilot Chemical Co.
Polartech Additives
R.T. Vanderbilt
Rhodia
Spectro Inc.
Staveley Services North America
Taminco
Tannas Co.
Taylor & Francis Group
TRIBO Technic
UCON Fluids
VHG Labs
Wiley Blackwell
Zinsser Analytic
STLE Annual Meeting 2009 – Student Poster Competition

STLE is sponsoring a Student Poster Competition at its 2009 Annual Meeting & Exhibition. Awards will be presented to the candidates who have demonstrated outstanding research, writing and verbal skills.

The poster must deal with an aspect of tribology research that can be translated into friction, wear and lubrication. Students from all areas of tribology research are encouraged to participate, including manufacturing, biology, tribotesting, high tech and nanotribology. Specific subjects include aerospace, ceramics, condition monitoring, engine and drivetrain, environmentally friendly fluids, fluid film bearings, gears, health and safety, hydraulics, metalworking, nonferrous metals, power generation, rolling elements, seals, solid lubricants, surface engineering, synthetic lubricants, wear and other relevant topics.

Criteria for submission are:

1. As the lead author, the student should have performed the major portion of the work.
2. The poster must present original work of the student competitor during the 2008-2009 period.
3. Full-time graduate or undergraduate students registered during the 2008-2009 academic year.
4. May submit only one poster as the lead author for consideration.
6. Student’s presence at the poster display is required during the scheduled time in Orlando.
7. Poster board size is 4x4 feet.

Award category:

- **Platinum:** superior scientific and presentation quality
- **Gold:** good technical quality
- **Silver:** overall quality worth.

Questions can be directed to Jose Garcia, chair of the Student Poster Session, via e-mail: jmgarcia@purdue.edu. Or contact Robert Erck, chair of the Annual Meeting Program Committee: erck@anl.gov.

Networking events continued on page 66
The ideal tour for those interested in learning how Walt Disney continuously pushed the limits of technology. During this three-hour tour you’ll hear stories about the early days of Walt’s career and get an up-close view of many of his greatest innovations. Includes:

- **The Walt Disney World Nursery and Tree Farm.**
  See how horticulturists create world-famous topiaries.

- **Textile Services.**
  A state-of-the art laundry facility among the largest in the world.

- **Magic Kingdom Park.**
  Learn how Disney created a 3-D experience that could not be duplicated on the movie screen.

- **The Utilidor System.**
  Visit the underground system of support tunnels that support the park operations overhead.

Disney landscaping is a recognized show in itself, providing color and enjoyment throughout the year. This fascinating program studies various gardens of the World Showcase at Epcot with an expert responsible for maintaining the horticultural “show.”

- Amid dazzling flower beds and exotic plant specimens, study the five principles of the Disney horticulture program.
- Discover how landscaping can develop a theme for the garden.
- Examine unique plant materials and gardening techniques used at our Disney theme Parks.
- Discuss ways to adapt Disney’s techniques at home.
Located about 14 miles from Orlando in the middle of Florida toward the Atlantic side, Lake Buena Vista is home to Walt Disney World Resort and close to many attractions. Just a tad under five square miles, the city is named after the body of water formerly known as Black Lake. Upon the arrival of Disney, the lake was renamed, probably for Buena Vista St. in Burbank, Calif., where Disney’s corporate offices and main studios are located. Several Walt Disney Company business entities have names containing the words “Buena Vista,” a Spanish phrase that translates to “good view.”

Many STLE members will want to bring their families either before or after the annual meeting for a vacation. There is no shortage of ways to have fun in Lake Buena Vista. Following are some of the points of interest to those who want to plan a family vacation.

For more information on these and other attractions, visit www.orlandoinfo.com.

1. Cypress Gardens
About an hour drive from Orlando, Cypress Gardens boasts more than 40 rides (including six roller-coasters) and the world’s tallest spinning-rapids ride. Concerts, water-skiing performances and close-up encounters with native wildlife add to the fun.

2. Dinosaur World
Located in between Orlando and Tampa, this park includes 150 life-sized dinosaur replicas and many activities, including a fossil dig, bone yard, museum, skeleton garden and caves to explore.

3. Discovery Cove
Discovery Cove is where you can immerse yourself in an all-day adventure that allows you to interact with dolphins, birds, fish and rays in an all-inclusive setting. Attendance is limited to 1,000 guests per day at this reservations-only adventure, setting it apart from the other Orlando attractions.

continued on page 70
4. **Kennedy Space Center Visitor Complex**

Just east of Orlando, Kennedy Space Center Visitor Complex gives you the unique chance to tour—up close—NASA's launch and landing facilities. Experience interactive simulators, live shows and jaw-dropping encounters with massive rockets and meet a real member of NASA’s Astronaut Corps.

5. **Sea World**

An Orlando staple, Sea World is the world's premier marine adventure park with 200 acres of world-class shows, thrilling rides and close-up encounters with orcas, dolphins, sea lions, sharks and more. SeaWorld has unveiled the most ambitious entertainment project in the park's history—“Believe.” Nearly four years in the making, Believe showcases majestic killer whales performing awe-inspiring choreography, an elaborate 3-story set including panoramic LED screens and an original musical score written exclusively for this show.

6. **Gatorland**

Founded by the late Owen Godwin in 1949, and still privately owned by his family, Gatorland is a 110-acre theme park and wildlife preserve combining Old Florida charm with exciting new exhibits and entertainment. Known internationally as the “Alligator Capital of the World,” Gatorland provides affordably priced family fun with thousands of alligators and crocodiles, a breeding marsh with boardwalk and observation tower, one-of-a-kind reptilian shows, aviary, petting zoo, swamp walk, educational programs and much, much more.

7. **Universal Studios**

The world’s No. 1 movie- and TV-based theme park, Universal Studios in Orlando takes you behind the scenes, beyond the screen and right into the action of your favorite movies. Rides include The Simpsons, Shrek 4-D, Revenge of the Mummy, Men in Black, Terminator 2 3-D and the E.T. Adventure.

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**Disney’s Magic Kingdom Park**

One of the world’s most visited attractions, conveniently located in Lake Buena Vista, Disney’s Magic Kingdom Park has too many rides, features and adventures to mention. The park is organized around seven key areas: Frontierland, Fantasyland, Tomorrowland, Mickey’s Toontown Fair, Liberty Square, Adventureland and Main Street. A must for those with children.
Facts, Policies & Essential Information about STLE 2009

The 2009 STLE Annual Meeting & Exhibition is sponsored by:

Society of Tribologists and Lubrication Engineers
840 Busse Highway
Park Ridge, IL (USA) 60068
Phone: 847-825-5536
Fax: 847-825-1456
E-mail: info@stle.org.
www.stle.org

Housing Reservations
Housing for the 2009 STLE Annual Meeting & Exhibition and all events on the technical program are held in:

Disney’s Coronado Springs Resort
1000 W Buena Vista Dr, Bay Lake, FL
Lake Buena Vista, Florida 32830
Phone: 407-939-1000; Reservations: 407-934-7639

Attendees are encouraged to stay at Disney’s Coronado Springs Resort, where STLE has guaranteed a room rate of $164 through April 20. Staying at the sponsored hotel reduces STLE’s costs to produce future annual meetings and helps to keep registration fees down. However, STLE cannot guarantee housing at these hotels will be available by April 20. Reservations are made on a first-come, first-served basis, and attendees are urged to make their reservations as soon as possible. You can register online or via telephone. Forms are available at www.stle.org.

Airport Transportation
To the Coronado Springs Resort:

Disney’s Magical Express Shuttle
This service provides free transport to and from Orlando International Airport and Disney’s Coronado Springs Resort—but only if you make a reservation in advance. Otherwise shuttle transportation using the Magical Express Shuttle is $33 round-trip and $20 one way.

To make an advance reservation, log on to www.stle.org or call 407-827-6777.

Taxi
The metered rate is approximately $55 each way.

Dress Code
Business casual dress is appropriate for STLE events at the annual meeting. Speakers in technical sessions and education courses often choose attire that is more formal on the day of their presentations.

Annual Meeting & Education Course Policies
1. All attendees must register. 2. A badge is required for admittance to any technical session or course. 3. Badges are not to be exchanged. Attendees who loan their badges to others will have their badges confiscated and their annual meeting privileges rescinded. 4. Annual Meeting registration includes admittance to the exhibition, technical sessions, Commercial Marketing Forum and all social events, including the Monday evening Welcoming Party and Tuesday afternoon President’s Luncheon. 5. Registration for the 10 one-day education courses includes admittance to the exhibition, technical sessions, Commercial Marketing Forum and all social events, including the Monday evening Welcoming Party and Tuesday afternoon’s President’s Luncheon. 6. Distributing handouts at technical sessions is not permitted. Handouts will be given to education course attendees.

Recording & Photography Policies
No taping—audio, video or digital—is permitted in any of the annual meeting technical sessions. Audiotaping is permitted in education courses with advance permission of the instructors. No video of any kind is permitted.

STLE’s official photographer will take photos of select technical sessions, Commercial Marketing Forum presentations, social events and the trade show on Tuesday, May 20. These photos will be used to promote the 2010 STLE Annual Meeting & Exhibition in Las Vegas. If you do not wish to have your photograph taken, please step out of the photo frame or notify the photographer afterward if the photo has been taken.

Smoking Policy
Smoking is not permitted in the technical sessions, courses, Commercial Marketing Forum, trade show, registration area or any other areas of the facility involved with the STLE Annual Meeting. * continued on page 74
Facts, Policies & Essential Information about STLE 2009

The 2009 STLE Annual Meeting & Exhibition is sponsored by:

Society of Tribologists and Lubrication Engineers
840 Busse Highway
Park Ridge, IL (USA) 60068
Phone: 847-825-5536
Fax: 847-825-1456
E-mail: info@stle.org.
www.stle.org

Advance Registration Information
Registration entitles you to the trade show, technical sessions, Commercial Marketing Forum and all social events, including the Monday evening Welcoming Party and Tuesday afternoon President’s Luncheon. A ticket for the President’s Luncheon is included in your registration bag. Additional luncheon tickets can be purchased for $50 in the registration area.

Advanced Registration Fees:

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<td>STLE Member</td>
<td>$520</td>
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<td>Life Member</td>
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<td>Course fee/day</td>
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For information on the 10 one-day education courses, see page 53.

Cancellations
Requests must be received in writing at STLE’s headquarters no later than April 20, 2009, to receive refund less $50 handling charge. No refunds will be issued after April 20, 2009.

Payment Method
STLE accepts U.S. currency, check drawn on a U.S. bank and major credit cards: Master Card, Visa (preferred), American Express and Discover.

Onsite Registration
You may register onsite in Lake Buena Vista beginning at 3 p.m. on Saturday, May 16, 2009. The registration desk in the Coronado Springs Resort is open daily thereafter through Thursday, May 21. Onsite registrants incur a $75 surcharge.

Reserving Your Hotel Room

The room rate at Disney’s Coronado Springs Resort, home of the 2009 STLE Annual Meeting & Exhibition, is $164/night. You are advised to make your reservation prior to April 20, 2009—however, STLE cannot guarantee that rooms will be available at that date. STLE has arranged a block of rooms at the resort that are sold on a first-come basis. You are strongly urged to make your sleeping room reservation at the Disney’s Coronado Springs Resort as early as possible to guarantee a room at that rate. Reservations at Disney’s Coronado Springs Resort must be made online at www.stle.org. Or you can call the resort at 407-939-1020. The resort has arranged free transportation to and from Orlando International Airport, but you must make your reservation in advance. You are strongly urged to make your reservations at least 30 days in advance. To make your reservation, either call 407-934-7639, or use the convenient application form available at www.stle.org.
2. Registration Category
All monies must be in U.S. dollars. Fee includes technical sessions, the trade show, the Commercial Marketing Forum, the Monday evening Welcoming Party and the Tuesday afternoon Presidents Luncheon. If you are registering for an education course, please skip to Section 3. Add $20 (USD) for technical session proceedings CD. Place an X on the appropriate line.

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For one-day registration, circle: Mon Tues Wed Thur
One-day registration does not include luncheon ticket. See Part 4 to order.

3. Education Course Selection (see page 53 for course descriptions).
All courses are one day, and the price includes your annual meeting registration fee, entitling you to the education course and technical sessions, the trade show, the Commercial Marketing Forum, the Monday evening Welcoming Party and Tuesday afternoon President’s Luncheon. Course admission by ticket only. Please verify course times in the Program Guide distributed in Lake Buena Vista, as some times might change. Add $20 if you wish to purchase the Proceedings CD.

<table>
<thead>
<tr>
<th>Course Name</th>
<th>Day</th>
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<tbody>
<tr>
<td>Advanced Lubrication 301</td>
<td>Sun, May 17, 8 am-5 pm</td>
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<tr>
<td>Basic Lubrication 101 Fundamentals</td>
<td>Mon, May 18, 8-5:45 pm</td>
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<tr>
<td>Basic Lubrication 102 Applications</td>
<td>Wed, May 20, 7:30 am-5:45 pm</td>
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<tr>
<td>Condition Monitoring 101</td>
<td>Mon, May 18, 8 am-5 pm</td>
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<td>Condition Monitoring 201</td>
<td>Wed, May 20, 8 am-5 pm</td>
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<td>Metal-removal Fluids 105</td>
<td>Wed, May 20, 8 am-5 pm</td>
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<td>Metalworking Fluids 125</td>
<td>Wed, May 20, 8 am-4:30 pm</td>
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<tr>
<td>NLGI Basic Course</td>
<td>Wed, May 20, 8 am-5 pm</td>
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<tr>
<td>Synthetic Lubricant Fluids 203</td>
<td>Wed, May 20, 8 am-5:45 pm</td>
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<tr>
<td>Synthetic Lubricants Applications 204</td>
<td>Wed, May 20, 8:45 am-4:45 pm</td>
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</tbody>
</table>

4. Presidents Luncheon
Luncheon is Tuesday, May 19, from noon to 2 p.m. and honors STLE volunteers and award winners. The luncheon is included in your annual meeting registration fee, but please indicate whether you plan to attend so we can obtain an accurate attendance count. You may purchase additional tickets for non-registered guests for $50.

Presidents Luncheon – Tuesday, May 19, Noon-2 p.m.

- [ ] I will attend
- [ ] I will not attend
- [ ] I need ______ extra tickets at $50 per person = $_______

Section 4 total: $_______

5. Payment Information: Note – All payments must be in U.S. dollars.

Total costs from Sections 2, 3 & 4: $_______

- [ ] Check enclosed
- [ ] Visa
- [ ] MasterCard
- [ ] AMEX
- [ ] Discover

Name as it appears on card: ___________________________
Signature: ___________________________
Expiration Date: ___________________________ Credit card total: $_______

Cancellation requests must be received in writing no later than April 20, 2009, to receive refund less $75 handling fee. No refunds will be issued after that date. Mail or fax this completed form to: STLE, 840 Busse Highway, Park Ridge, IL (USA) 60068. Fax: 847-825-1456.
2009 Technical Session Authors Index

Note: This list is the preliminary index as of December 16, 2008, and does not include education course instructors. For the most up-to-date author's listing, see the Program Guide distributed on site in Lake Buena Vista.
<table>
<thead>
<tr>
<th>Authors</th>
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<tbody>
<tr>
<td>Peterson, R.F.</td>
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<tr>
<td>Pezdirnik, J. A.</td>
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