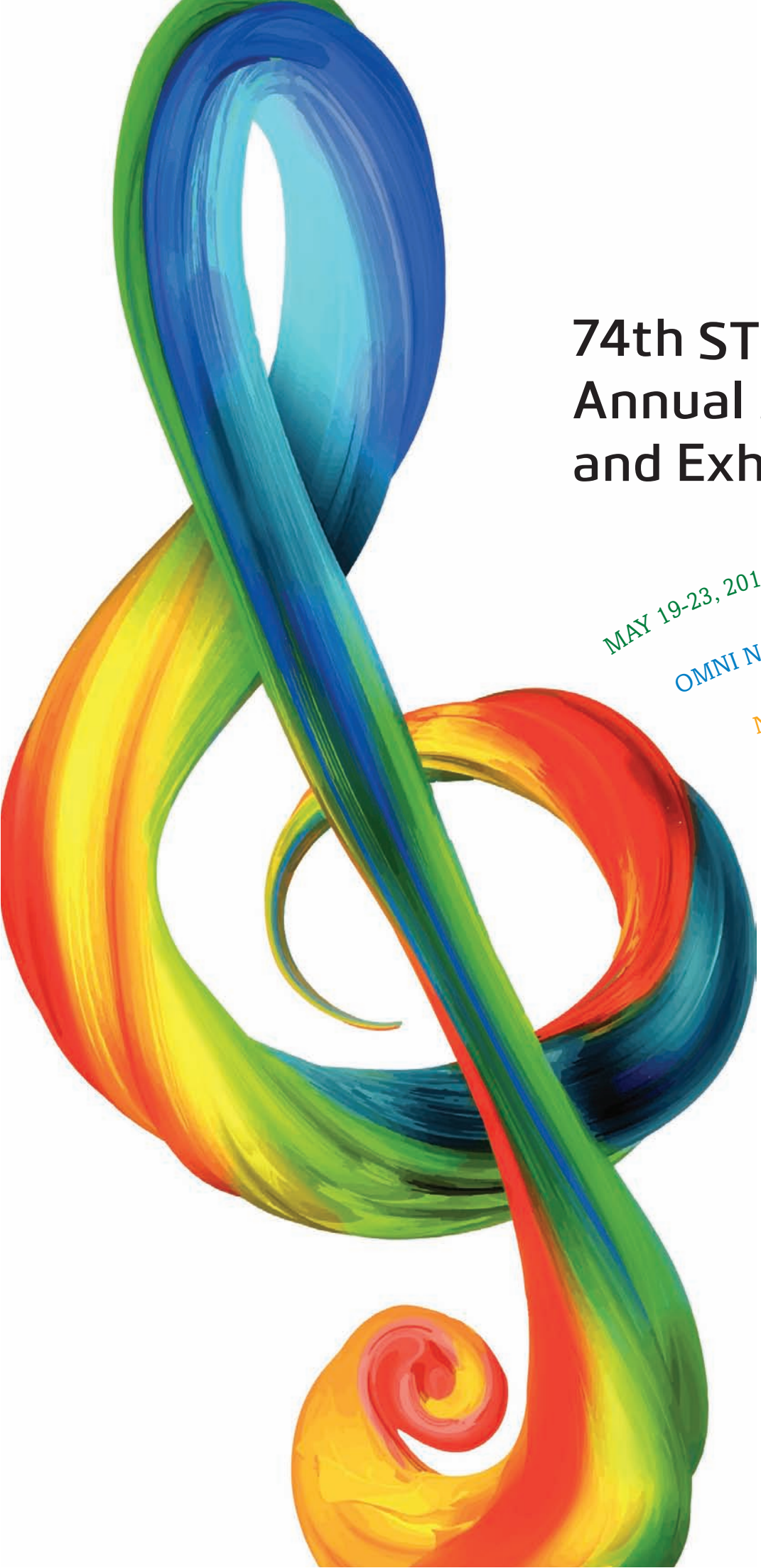


ADVANCE PROGRAM
REGISTER BY APRIL 23
AND **SAVE $100!**

74th STLE Annual Meeting and Exhibition

MAY 19-23, 2019

OMNI NASHVILLE HOTEL

NASHVILLE, TENNESSEE (USA)

stle Nashville

#STLE2019

Message from the Chair

Join your industry colleagues in Nashville!

Dear Industry Professional,

I'd like to extend a personal invitation to join me for STLE's 74th Annual Meeting & Exhibition, May 19-23, 2019, at the Omni Nashville Hotel in Nashville, Tennessee. Start making plans now to engage with nearly 1,600 of your peers in the field of tribology and lubrication engineering from around the world who will be participating in an extraordinary combination of technical presentations, education courses, exhibits and related business and social activities.

The Annual Meeting is always at the top of the list of benefits derived from STLE membership, and this year's program promises to be stronger than ever. There will be a wealth of information and business contacts waiting in Nashville for those who attend. STLE's Annual Meeting Program and Education Committees, working together with our headquarters staff and paper solicitation chairs (PSCs) representing STLE's 20 technical committees, have developed an excellent program of more than 500 technical-presentations devoted to all areas of tribology research and lubrication best practices, with presenters from academia, government and industry.

In addition to being recognized as one of the industry's premier technical meetings, the STLE Annual Meeting is also valued as an opportunity for enhancing your professional credentials through education and certification opportunities.

The STLE education program is growing in popularity with companies seeking a competitive advantage in today's faster-paced international business arena, where employee professional development has become an imperative. In a survey taken after the 2018 Annual Meeting, participants rated education courses as the most valuable portion of the event in terms of meeting their business needs. 12 industry-specific courses will be presented in Nashville taught by the top experts in their respected fields.

For more experienced professionals, the STLE Annual Meeting is often the place where individuals sit for one of STLE's four technical certification exams: Certified Lubrication Specialist™, Certified Metalworking Fluids Specialist™ and Oil Monitoring Analyst I & II™.

To learn about the industry's newest technologies, products and services, visit the exhibition, which is included in the meeting registration. More than 120 companies will have booths, demonstrations and information about how they can help you understand your lubrication systems, improve their performance and save energy.

Program details, housing and other information about the meeting are all included in this brochure for your convenience. If you require further information or assistance, please contact STLE headquarters at (847) 825-5536 (USA), or visit our website at **www.stle.org/annualmeeting** for program updates.

I hope to see you in Nashville this May!

Sincerely,

Ryan

Dr. Ryan Evans (The Timken Co.)
Chair, 2019 Annual Meeting Program Committee

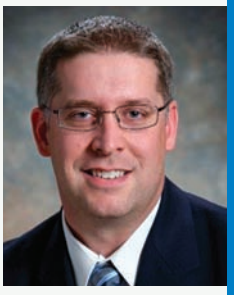


PHOTO COURTESY OF NASHVILLE CONVENTION & VISITORS CORP.

CONTENTS

General Information & Policies

The 2019 STLE Annual Meeting & Exhibition is sponsored by:
Society of Tribologists and Lubrication Engineers
840 Busse Highway, Park Ridge, Illinois (USA) 60068
Phone: (847) 825-5536 • Fax: (847) 825-1456
Email: info@stle.org • Web: www.stle.org

nashville TENNESSEE

stle

About STLE

The Society of Tribologists and Lubrication Engineers (STLE) is a not-for-profit professional society founded in 1944 to advance the science of tribology and the practice of lubrication engineering in order to foster innovation, improve the performance of equipment and products, conserve resources and protect the environment. Headquartered in Park Ridge, Ill. (a Chicago suburb), STLE is the leading technical organization serving more than 13,000 industry professionals and 250 companies and organizations that comprise the tribology and lubrication engineering business sector.

STLE offers its members industry-specific education and training, professional resources, technical information, certification programs and career development.

About Our Annual Meeting & Exhibition

STLE's conference is where some 1,600 members of the tribology research and lubrication engineering communities gather for five days of industry-specific technical education and professional development. Highlights include some 500 paper presentations, a 120-exhibitor trade show, the popular Commercial Marketing Forum and an opportunity to establish business contacts and friendships with your peers from around the world.

Annual Meeting & Education Course Policies

- **All attendees must register.**
- **All attendees receive a badge with their registration materials. The badge must be worn at all times and is required for admittance to any technical session, education course and the trade show.**
- **Badges may not be exchanged. Attendees who loan their badges to others will have their badges confiscated and their annual meeting privileges rescinded.**
- **Annual Meeting registration includes admittance to the trade show, technical sessions, Commercial Marketing Forum and all social events, including the Monday evening Networking Reception and Tuesday afternoon President's Luncheon.**
- **Distributing handouts at technical sessions is not permitted. Handouts will be given to education course attendees.**
- **Disseminating material or conducting business in the exhibit hall is not permitted if you are not an official exhibitor.**

Recording Policy

Audio or video recording is not permitted in any of the annual meeting technical sessions or Commercial Marketing Forum presentations. Audio recording is permitted in the education courses with advance permission of the instructor. No video of any kind is permitted.

Photo Policy

STLE's official photographer will take photos of select technical sessions, Commercial Marketing Forum presentations, social events and the trade show. These photos will be used to promote the May 3-7, 2020, STLE Annual Meeting & Exhibition in Chicago, IL (USA). If you do not wish to have your photograph taken and published, please step out of the photo frame or notify the photographer afterward if your photo has been taken so the image can be deleted.

Cellular Phone Policy

In order to not disturb speakers or fellow attendees, please keep cellular telephones on vibrate and leave the room to talk.

Dress Code

Business casual dress is appropriate for STLE events at the annual meeting. Technical session and education course speakers often choose attire that is more formal on the day of their presentations.

Attendee Roster

The official attendee roster will be made available on the STLE website (www.stle.org) in April 2019 prior to the annual meeting.

Download the STLE 365 App!

Find all the conference details and up to date schedule in the Annual Meeting section of the all-new STLE 365 App (located under the Events Apps section). Download free from the iOS App Store or the Google Play Store (just search for **STLE 365**).

Registration Information

Meeting registration entitles you to all the technical sessions, trade show admission (Monday through Wednesday), Commercial Marketing Forum and all social events, including the Monday evening Networking Reception and Tuesday afternoon President's Luncheon (ticket required).STLE Education courses are $365 per course with full registration. Please see the registration form on page 7.

2019 STLE Annual Meeting **Registration Rates**

Individual			Single-Day
	Early Bird by April 23 (Save $100!)	After April 23	Monday through Thursday
STLE Members	$715	$815	**$325**
Speakers	$715	$815	
Presenters	$715	$815	
Non-members	$1,030	$1,130	**$450**
Life Members	$155	$155	
Student Members	$50	$50	

Onsite Registration

You may register onsite at the Omni Nashville Hotel, beginning at Noon on Saturday, May 18, 2019.

The STLE registration desk is open daily thereafter through Thursday, May 23. Onsite registrants incur a $100 surcharge. Advance registrants may pick-up badges and registration materials at the registration desk during the following hours:

- **Sunday, May 19** – 7 am – 6 pm
- **Monday, May 20** – 7 am – 6 pm
- **Tuesday, May 21** – 7 am – 6 pm
- **Wednesday, May 22** – 7 am – 6 pm
- **Thursday, May 23** – 7 am – Noon

Cancellations

Requests must be received in writing at STLE's headquarters no later than April 23, 2019, to receive refund less $100 handling charge. No refunds will be issued after April 23.

Payment Method

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

How To Register

Online

Visit **www.stle.org** to register at your convenience, 24/7.

Phone

Call STLE headquarters at (847) 825-5536 and register using a major credit card.

Mail

Use the enclosed registration form (see page 7) and send your completed form and payment by mail to STLE headquarters.

Fax

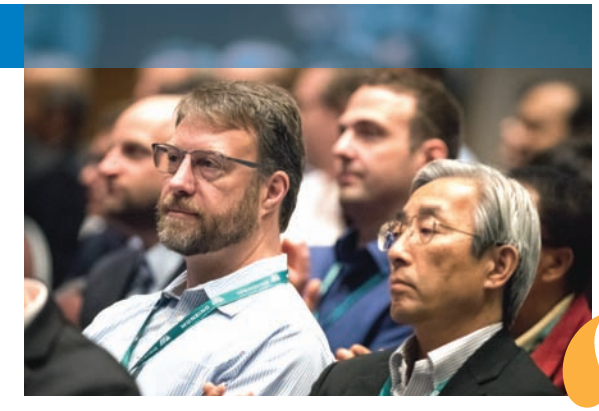
Complete the enclosed registration form and submit via fax to (847) 825-1456.

Non-Members Welcome: Two Options for Attending

STLE's core annual meeting audience is our membership of tribology researchers and lubrication professionals from around the world. However, non-members are welcome at the conference and encouraged to attend. Participating in our conference is the best way to gain an overview of STLE's many products and services and meet your peers in the tribology and lubrication engineering communities.

STLE offers full and one-day annual meeting registration options. Because non-members pay a higher meeting registration rate, the best way to attend is by joining the society. Cost of membership is less than the difference between the member and non-member annual meeting registration rates. So you actually save money by joining STLE and coming to the meeting as a member than you would if you came as a non-member – plus you get all the other benefits of STLE membership!

However, if your company does not permit you to join a professional society, another option is to pay the non-member registration rate for the annual meeting. If you do, **you'll also receive a one-year free STLE membership – a $150 value.**



2019 Annual Meeting Exhibition Hours

Omni Nashville Hotel

Monday, May 20 • Noon-5 pm

***Dedicated hour of trade show time from 3-4 pm. No other annual meeting activity during this time.**

Tuesday, May 21 • 9:30 am – Noon & 2 – 5:30 pm

***Trade show closes for two hours for the President's Luncheon & STLE Business Meeting from Noon to 2 pm. Also, there will be a second dedicated hour of trade show time from 3-4 pm. No other annual meeting activity during this time.**

Wednesday, May 22 • 9:30 am – Noon

"STLE is one of the best organizations for education, sharing technology and networking. The STLE Annual Meeting can't be missed."

"STLE Annual Meetings provides a great opportunity to meet fellow tribologists and to stay updated with current and upcoming research topics."

"The networking alone is worth the price of admission!"

stle Nashville MAY 19-23, 2019

To learn more about the benefits of STLE and to access a membership application, log on to **www.stle.org** or call STLE headquarters at 847-825-5536.

Get Social with Us!

Stay connected and keep up with the chatter using the hashtag **#STLE2019** when joining the conversation and stay up-to-date with meeting information and much more!

Twitter | **@STLE_Tribology**

Facebook | **Facebook.com/STLE**

Instagram | **@STLE_Tribology**

Future Industry Meeting Dates

2019 STLE Tribology Frontiers Conference
The Drake Hotel Chicago
Oct. 20-23, 2019
Chicago, Illinois

75th STLE Annual Meeting & Exhibition
Hyatt Regency Chicago
May 3-7, 2020
Chicago, Illinois

76th STLE Annual Meeting & Exhibition
Hyatt New Orleans
May 16-20, 2021
New Orleans, Louisiana

77th STLE Annual Meeting & Exhibition
Walt Disney World Swan & Dolphin
May 15-19, 2022
Orlando, Florida

Need a Visa? **International attendees can request an invitation letter for the 2019 STLE Annual Meeting & Exhibition. For more information, contact Merle Hedland at (630) 428-2133, mhedland@stle.org.**

Housing & Room Reservations

Housing for the 2019 STLE Annual Meeting & Exhibition is at:

Omni Nashville Hotel
250 Fifth Avenue South
Nashville, Tennessee 37203
(615) 782-5300

The **Omni Nashville Hotel** is created specifically to be an authentic expression of the city's vibrant music culture. Across from the Music City Center, this downtown Nashville hotel is a one-of-a-kind experience, fully integrated with an expansion of the Country Music Hall of Fame® and Museum on three levels.

Located on Fifth Avenue between Demonbreun and Korean Veterans Boulevard, Omni Nashville Hotel's design is a modern expression of the city's distinct character, incorporating natural materials, exposed steel and regional limestone. The multi-story hotel and expanded museum share meeting and entertainment space and bring additional restaurants and retail venues to this dynamic destination in downtown Nashville and blocks away from the city's major attractions. The Omni Nashville Hotel is about a 15-minute drive from the Nashville International Airport, and lies within a 20-minute walk of the center of Nashville.

Omni Nashville Hotel Amenities

24-hour reception

Five restaurants and three bars/lounges

Spacious guest rooms with refrigerator, laptop safe and flat-screen TVs

Complimentary 24-hour fitness center

Rooftop urban pool deck with spectacular views of the Nashville skyline

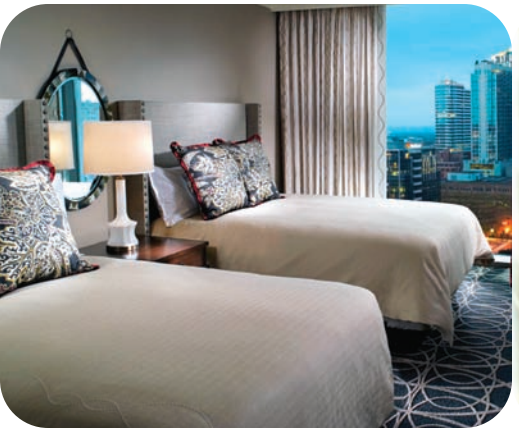
STLE Annual Meeting Rates

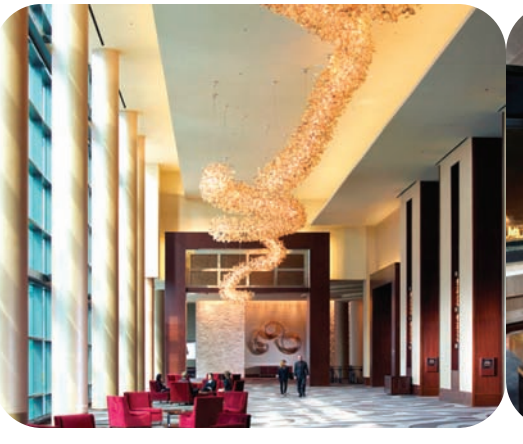
- $239 single occupancy
- $249 double occupancy

Attendees are encouraged to stay at the Omni Nashville Hotel, as doing so helps STLE reduce the costs of future annual meetings. STLE has negotiated a rate of $239 (single room)/$249 (double room) a night (taxes are not included) at the Omni Nashville Hotel through April 23, 2019. U.S. Government rate rooms are limited; proof of federal government employment must be shown at check-in or higher rate will be charged. U.S. Government rate is the prevailing government rate.

Reserve Your Room By April 23, 2019

- Call to make hotel reservations at (800) 843-6664
- Be sure to provide the group code: **STLE 2019 Annual**
- Make all hotel reservations changes or cancellations directly with the Omni Nashville Hotel
- Visit **www.stle.org/annualmeeting** for a shortcut to the hotel registration website





For meeting registration and room reservations, visit **www.stle.org/annualmeeting**. All annual meeting events are at the Omni Nashville Hotel. **April 23, 2019,** is the cutoff date to receive discounted pricing at the Omni Nashville Hotel. Housing is assigned on a first-come, first-served basis, and STLE does not guarantee room availability after April 23. If you plan on attending the 2019 STLE Annual Meeting, you are urged to make your room reservations as soon as possible

STLE 2019 Annual Meeting & Exhibition Individual Registration Form

Omni Nashville Hotel | Nashville, TN (USA) | **May 19-23, 2019**

IN A HURRY? Register online at www.stle.org/annualmeeting

MAIL OR FAX THIS FORM TO: STLE, 840 Busse Highway, Park Ridge, IL (USA) 60068. Fax: 847-825-1456.

Registration Information (Please complete separate forms for each individual from your organization). • **My STLE Member # is:** _____

Title: ___ Mr. ___ Mrs. ___ Ms. ___ Dr. ___ Professor First name for badge: _____

First Name: _____ Last Name: _____

Company/Institution Name: _____

Address: _____

City: _____ State/Province: _____

Zip/Mail Code: _____ Country: _____

E-mail: _____ Fax: _____

Phone: _____ Onsite Cell Phone #* _____

Emergency Contact Name* _____ Emergency Contact Phone #* _____

***STLE does not sell conference attendee cell phone numbers. This information is requested for use only by STLE for conference updates and in case of onsite emergencies.**

❑ **Speaker or Presenter?** Session Number or Paper Title: _____

NOTE: Registration includes technical sessions, trade show admission, Networking Reception, Commercial Marketing Forum, plus one complimentary ticket to the President's Luncheon. STLE Education Courses are $365 with full meeting registration except for ABMA Bearings Course ($650).

Cancellation requests must be received in writing no later than April 23, 2019, to receive refund less $100 handling fee. No refunds issued after that date. Mail or fax this form to: STLE, 840 Busse Highway, Park Ridge, IL (USA) 60068 Fax: (847) 825-1456. Questions? Call (847) 825-5536.

Annual Meeting Registration Rates

Members/Speakers/Presenters: $715 – Non-members: $1,030

Life Members: $155 – Student Members: $50

After April 23 add $100

STLE Education Courses: Discounted rate with full meeting registration ($365 per course) except for ABMA Bearings Course ($650). Lunch included.

Sunday Education Courses, May 19, 2019 (8 am – 5 pm)

Please ✔ one course only!

❑ ABMA Bearings and Their Lubrication
❑ Advanced Lubrication 301: Advanced Additives
❑ Advanced Tribology 301: Nanotribology
❑ Automotive Lubrication 201: Diesel
❑ Biolubricants and Biofuels
❑ Hydraulics 201: Hydraulic Fluids and Systems Overview
❑ Metalworking 115: Metal Removal Fluids
❑ Synthetic Lubricants 203: Non-Petroleum Fluids and Their Uses

Wednesday Education Courses, May 22, 2019 (8 am – 5 pm)

Please ✔ one course only!

❑ Advanced Lubrication 302: Advanced Lubrication Regimes
❑ Basic Lubrication 103
❑ Metalworking 130: Metal Treatment Chemicals
❑ Synthetic Lubricants 204: Basestock Selection and Applications

Social Functions (Please ✔ all that apply)

❑ Monday, May 20 – Networking Reception (free). Qty: _____
❑ Tuesday, May 21 – President's Luncheon *(one complimentary ticket included).*
❑ Tuesday, May 21 – Additional President's Luncheon guest ticket ($50)

Ala Carte Offerings

❑ STLE education course and lunch only. Annual Meeting registration not required or included. **Members:** $550 per course. **Non-members:** $775 per course.

❑ ABMA Bearings Course ($650) with or without separate meeting registration. Lunch included.

Single-Day Registration Admission

Members: $325. **Non-members:** $450

❑ Monday, May 20 (Technical Sessions & Trade Show Only)
❑ Tuesday, May 21 (Technical Sessions & Trade Show Only)
❑ Wednesday, May 22 (Technical Sessions & Trade Show Only)
❑ Thursday, May 23 (Technical Sessions Only)

Payment Information

❑ Payment Enclosed ❑ Payment Type: _____

Credit Card #: _____

Exp. Date: _____

Name on Card: _____

Payment Amount: $ _____ . _____

Signature: _____

NOTABLE ATTRACTIONS*

Cheekwood Estate and Gardens

Johnny Cash Museum

Broadway Historic Entertainment District

Country Music Hall of Fame and Museum

Adventure Science Center

Nashville Zoo

Grand Ole Opry

Ryman Auditorium

Schermerhorn Symphony Center

Bicentennial Capitol Mall State Park

Welcome to Nashville

Nashville is the capital and the most populous city in the state of Tennessee and lies on the Cumberland River in the north-central part of the state. It is usually called the "Country Music Capital of the World," or more often "Music City USA," however, in recent years, Nashville has done much to escape its country music image and become a regional center of culture and commerce. Major corporations such as Dell, Nissan, GM Motors, Bridgestone, USB Financial Services, AT&T, Google and Microsoft have operations located in this charming Southern city.

Nashville is quickly becoming a fun and enjoyable destination, and draws the most tourists internationally out of any city in the United States. *The New York Times* gave Nashville the moniker of the "it" city, and the overall progressive and loving environment, along with the diverse $100 billion economy consisting of heath care, music, tech and automotive industries, have made people want to visit and live in the Music City.

The city is home to the world-famous Grand Ole Opry and the Country Music Hall of Fame and Museum, the historic Belmont Mansion, The Hermitage (the former home of U.S. President Andrew Jackson), Tennessee State Museum, as well as an abundance of shopping and entertainment attractions in the Historic Broadway District. Nashville is also home to several leading educational institutions, including Vanderbilt University.

*For more information about Nashville and things to do, visit **www.visitmusiccity.com.**

2019 *Nashville* Daily Schedule-at-a-Glance

*As of Dec. 4, 2018

stle Nashville MAY 19-23, 2019

Saturday, May 18

Noon – 6 pm
Onsite Registration

Sunday, May 19

7 am – 6 pm
Onsite Registration

7 – 7:45 am
Speakers Breakfast

8 am – 5 pm
Education Courses
(*registration required)

6:30 – 8 pm
Student Networking Reception (Location TBD)

***Registration required**

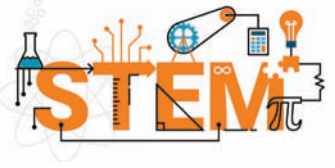
Schedule is subject to change. Please visit **www.stle.org/annualmeeting** for the most current information. **All annual meeting events are held at the Omni Nashville Hotel.**

Monday, May 20

7 am – 6 pm
Onsite Registration

7 – 7:45 am
Speakers Breakfast

8 – 10 am
Technical Sessions and Commercial Marketing Forum



8 am – 2 pm
Tribology STEM Camp

10 – 10:30 am
Refreshment Break

10:30 am – Noon
Opening General Session
Keynote Speaker: Jeff Hemphill, Chief Technical Officer, Americas, Schaeffler Group USA Inc.

Noon – 1:30 pm
Lunch (on your own)

Noon – 5 pm
Commercial Exhibits and Student Posters

1:30 – 6 pm
Technical Sessions and Commercial Marketing Forum

3 – 4 pm
Exhibitor Appreciation Break

6:30 – 8 pm
Networking Reception

Tuesday, May 21

7 am – 6 pm
Onsite Registration

7 – 7:45 am
Speakers Breakfast

8 – 10 am
Technical Sessions and Commercial Marketing Forum

9:30 am – Noon
Commercial Exhibits and Student Posters

10 – 10:30 am
Refreshment Break

Noon – 2 pm
President's Luncheon/ Business Meeting

2 – 6 pm
Technical Sessions and Commercial Marketing Forum

2 – 5:30 pm
Commercial Exhibits and Student Posters

3 – 4 pm
Exhibitor Appreciation Break

Wednesday, May 22

7 am – 6 pm
Onsite Registration

7 – 7:45 am
Speakers Breakfast

8 am – 5 pm
Education Courses
(*registration required)

8 am – Noon
Technical Sessions and Commercial Marketing Forum

9:30 am – Noon
Commercial Exhibits and Student Posters

10 – 10:30 am
Refreshment Break

Noon – 1:30 pm
Lunch (on your own)

1:30 – 6 pm
Technical Sessions and Commercial Marketing Forum

3 – 3:30 pm
Refreshment Break

Thursday, May 23

7 am – Noon
Onsite Registration

7 – 7:45 am
Speakers Breakfast

8 – 10 am
Technical Sessions

8:30 am – 12:30 pm
STLE Certification Exams
(*registration required)

10 – 10:30 am
Refreshment Break

3 – 3:30 pm
Refreshment Break

stle Nashville Technical Sessions

Choose from more than 500 papers and presentations!

The following is the preliminary 2019 STLE Annual Meeting technical program that will be updated right up until the meeting in Nashville. Please visit **www.stle.org/annualmeeting** for the most current information. Registrants also will receive a Program Guide at the meeting with updated information.

***As of Dec. 4, 2018 – Subject to Change.**

Monday, May 20, 2019

1A | Materials Tribology I

8 – 8:30 am | Tribology of Polybenzimidazole-Polyetheretherketone (PBI-PEEK) Blend

Janet Wong, Imperial College London, London, United Kingdom

8:30 – 9 am | Mechanical and Thermal Performance of Interpenetrating Versus Singular Networks of Dynamically Crosslinked Polymers

Zhijiang Ye, Ballal Ahammed, Nethmi De Alwis, Dominik Konkolewicz, Mehdi Zanjani, Miami University, Oxford, OH

9 – 9:30 am | Experimental Investigation into the Combined Effects of Roughness and Stiffness in Soft-Material Adhesion

Abhijeet Gujrati, Tevis Jacobs, University of Pittsburgh, Pittsburgh, PA, Siddhesh Dalvi, Ali Dhinojwala, The University of Akron, Akron, OH

9:30 – 10 am | Experimental Measurements of Roughness-Dependent Adhesion in Hard-Materials Contacts

Luke Thimons, Abhijeet Gujrati, Tevis Jacobs, University of Pittsburgh, Pittsburgh, PA

10 – 10:30 am – Break

1B | Lubrication Fundamentals I

8 – 8:30 am | Behaviors of the Molecule in Chemisorption Layer

Haoyu Li, Liran Ma, Jianbin Luo, Tsinghua University, Beijing, China

8:30 – 9 am | Connecting Discontinuous and Continuous Tribological Models

Guytri Kastane, Institut Pprime, Montpellier, France, Mathieu Renouf, University of Montpellier, Montpellier, France, Noel Brunetiere, Institut Pprime, Futuroscope Chasseneuil Cedex, France

9 – 9:30 am | On the Surface Lift-Off Transition in Rough Surface EHL Contacts

Jonny Hansen, Marcus Björling, Roland Larsson, Machine Elements, Luleå University of Technology, Luleå, Sweden

9:30 – 10 am | Novel Insight into Tribology of Carbon Black Soot Particles in Engine Oil

Deepak Halenahally Veeregowda, Angela Tortora, Ducom Instruments Europe B.V, Groningen, Netherlands

10 – 10:30 am – Break

1C | Engine and Drivetrain Special Program on Electric Vehicles I

8 – 8:30 am | Efficiency and Emission of EVs in Comparison to IC Engines: A Life Cycle Analysis

Kenneth Holmberg, VTT Technical Research Centre of Finland, Helsinki, Finland, Ali Erdemir, Argonne National Laboratory, Lemont, IL

8:30 – 9 am | An Insight into E-Mobility

Dean Tomazic, FEV North America Inc., Auburn Hills, MI

9 – 9:30 am | Automotive Fluids for Electrified Vehicles

Scott Halley, The Lubrizol Corp, Wickliffe, OH

9:30 – 10 am | Open Discussion

10 – 10:30 am – Break

1D | Gears I

8 – 8:30 am | Complex Esters – A New Oxidatively Stable Lubricity Additive

Kevin Duncan, Croda, East Yorkshire, United Kingdom

8:30 – 9 am | Efficiency Testing for Industrial Gearboxes

Paul Norris, Jakub Jelita Rydel, Chip Hewette, Helen Ryan, Afton Chemical, Bracknell, Berkshire, United Kingdom

9 – 9:30 am | A Short-Term Hot Hardness Evaluation of Advanced Aerospace Gear Steels

Cody Wassel, Aaron Isaacson, Sean McIntyre, Todd Palmer, Pennsylvania State University, State College, PA

9:30 – 10 am | A New Thermally-Coupled Model for Prediction of Gearbox Power Losses

Kharthik Chakravarthy, Amir Kadiric, Imperial College London, London, United Kingdom

10 – 10:30 am – Break

1E | Commercial Marketing Forum I

8 – 8:30 am | Evonik Oil Additives, USA

8:30 – 9 am | Chevron Phillips Chemical Co.

9 – 9:30 am | The Dow Chemical Co.

9:30 – 10 am | Functional Products Inc.

10 – 10:30 am – Break

1G | Wind Turbine Tribology I

8 – 8:30 am | Comparison of Ultrasonic Load Measurements on an Operational Wind Turbine Bearing with Those Predicted by Ricardo SABR

Benjamin Clarke, Gary Nicholas, Rob Dwyer-Joyce, The University of Sheffield, Sheffield, United Kingdom, Michael Wheeldon, Jonathan Wheals, Ricardo, Leamington Spa, United Kingdom

8:30 – 9 am | Onsite Condition Monitoring for Offshore Wind Turbine Gearbox Lubricant Based on Colorimetry

Kyoko Kojima, Hitachi, Ltd., Kokubunnji, Tokyo, Japan

9 – 9:30 am | Monitoring Load and Lubrication in a Wind Turbine Gearbox Rolling Bearing in the Field

Gary Nicholas, Rob Dwyer-Joyce, The University of Sheffield, Sheffield, United Kingdom

9:30 – 10 am | Characterization of White Etching Areas in Annealed AISI 52100 Processed by High Pressure Torsion Tests

Luis Wilches Peña, Ling Wang, Brian Mellor, University of Southampton, Southampton, Hampshire, United Kingdom, Alexander Schwedt, Joachim Mayer, RWTH, Aacheb, North Rhine-Westphalia, Germany, Walter Holweger, Schaeffler Technologies AG & Co. KG, Herzogenaurach, Bavaria, Germany

10 – 10:30 am – Break

1J | Nanotribology I

8 – 8:30 am | Experimental Investigation of Friction and Wear Behavior of 52100 Steel Against Nano-Coated Mild Steel Subject to Refrigerant Lubrication

Muhammad Bhutta, Zulfiqar Khan, Bournemouth University, Bournemouth, Dorset, United Kingdom

8:30 – 9 am | Development of Next Generation Coolants Using Nanofluids for Meeting Future Cooling Challenges in EV and Hybrid Vehicle Applications

Simon Tung, Innovation Technology Consulting, Rochester Hills, MI

9 – 9:30 am | Influence of Copper Oxide and Tungsten Carbide Nanoparticles on Micropitting Under Boundary Lubrication

Sougata Roy, Yosef Jazaa, Sriram Sundararajan, Iowa State University, Ames, IA

9:30 – 10 am | Synergistic Effects Between Silver and Palladium Nanoparticles in Boundary Lubrication

Chanaka Kumara, Harry Meyer, Jun Qu, Oak Ridge National Laboratory, Oak Ridge, TN

10 – 10:30 am – Break

1K | Metalworking Fluids I

8 – 8:30 am | Computational Study Aimed at Determining the Kinetics of Branched Esters Against Aminolysis

Mark Fennimore, Quaker Chemical, Conshohocken, PA

8:30 – 9 am | An Innovative Edger Rolling Oil for Steel Plants

Natarajan Sivasurian, S. Paul, R. Mahapatra, P. Bhatnagar, D. Saxena, S.S.V. Ramakumar, Indian Oil Corporation Limited, Faridabad, Haryana, India

9 – 9:30 am | Metalworking Fluids and Chloride Corrosion on Iron Alloys

John Burke, Alan Cross, Houghton International, Norristown, PA

9:30 – 10 am | Polyalkylene Glycol as Performance Wear Lubricant Additive on Straight Oil

Eduardo Lima, Dow Chemical Co., São Paulo, Brazil

10 – 10:30 am – Break

1L | Nonferrous Metals I

8 – 8:30 am | Static Multiple Light Scattering as a Tool to Characterize Stability and Size of Nonferrous Fluids

Christelle Tisserand, Formulaction, Worthington, OH

8:30 – 9 am | Friction Reduction on Anodized Alumina by Impregnating Ashless Fillers

Svajus Asadauskas, Tadas Matijosius, Center for Physical Sciences and Technology, Vilnius, Lithuania

9 – 9:30 am | Update on Challenges in Machining Aluminum Alloys

Neil Canter, Chemical Solutions, Willow Grove, PA

9:30 – 10 am | Aluminum Staining: Achieving Performance Without Sacrificing Fluid Longevity

Nicole Webb, ANGUS Chemical Co., Buffalo Grove, IL

10 – 10:00 am – Break

1M | Fluid Film Bearings I

8 – 8:30 am | On the Static Load Performance of a Large Size, Heavily Loaded Spring Supported Thrust Bearing

Rasool Koosha, Luis San Andrés, Texas A&M University, College Station, TX

8:30 – 9 am | Design of Numerical Optimization for Gap-Compensated Hydrostatic Bearing

Nenzi Wang, Yu-Wen Chen, Hsin-Yi Chen, Chang Gung University, Tao-Yuan, Taiwan

9 – 9:30 am | Experimental Study into Self-Levitating Sliding Contacts

Rafal Gawarkiewicz, Michal Wasilczuk, Gdansk University of Technology, Gdansk, Poland, Tadeusz Stolarski, Brunel University London, London, United Kingdom

9:30 – 10 am | The Performance of Small Centre Pivoted PTFE Thrust Bearings in Low- to Medium-Speed Applications

Stephen Dixon, John Butler, Paul Bruce, Michell Bearings Ltd., South Shields, Tyne and Wear, United Kingdom

10 – 10:30 am – Break

2A | Materials Tribology II

1:30 – 2:30 pm | Self-Organization in Materials Subjected to Severe Plastic Deformation: Relevance and Application to Wear Resistance of Metallic Alloys

Pascal Bellon, Robert Averback, University of Illinois at Urbana-Champaign, Urbana, IL

2:30 – 3 pm | Adhesion, Self-Welding and Static Friction Coefficient of Ni Alloys at Elevated Temperature

Md. Saifur Rahman, Andreas Polycarpou, Texas A&M University, College Station, TX

3 – 4 pm – Exhibitor Appreciation Break

4 – 4:30 pm | Understanding the Role of Protective Metal Oxides in Nanoscale Tribocorrosion

Alex Lin, Xiao-xiang Yu, Laurence Marks, Northwestern University, Evanston, IL

4:30 – 5 pm | Evaluation of Friction Performance and Wear Reduction of Boronized Steels

Brandon Wong, Philip Egberts, University of Calgary, Calgary, Alberta, Canada, Eugene Medvedovski, Endurance Technologies Inc., Calgary, Alberta, Canada

5 – 5:30 pm | Elevated Temperature Nanomechanical & Nanotribological Behaviors of Ni Alloys Surface Oxides: Part I – Experimental Study

Md. Saifur Rahman, Andreas Polycarpou, Texas A&M University, College Station, TX, Sepehr Salari, Ali Beheshti, George Mason University, Fairfax, VA

5:30 – 6 pm | Elevated Temperature Nanomechanical & Nanotribological Behaviors of Ni Alloys Surface Oxides: Part II – Finite Element Study

Sepehr Salari, Ali Beheshti, George Mason University, Fairfax, VA, Md. Saifur Rahman, Texas A&M University, Collage Station, TX

6 – 6:30 pm | The Wear Mechanism of Flexspline Materials Regulated by Novel Amorphous/Crystal Oxide Form Evolution on a Frictional Interface

Caixia Zhang, Zhifeng Liu, Jianhua Wang, Institute of Advanced Manufacturing and Intelligent Technology, Beijing University of Technology, Beijing, China

2B | Lubrication Fundamentals II

1:30 – 2 pm | Fluid Properties and Testing Parameters that Impact Lubricant Shear Stability

Sona Sivakova, Bart Schober, The Lubrizol Corp., Wickliffe, OH

2 – 2:30 pm | Hyperbranched Polymers for Shear Stable Viscosity Index Improvers

Lelia Cosimbescu, Deepika Malhotra, Pacific Northwest National Laboratory, Richland, WA, Robert Erck, Argonne National Laboratory, Lemont, IL

2:30 – 3 pm | EHD Friction at Very High Pressure

Hugh Spikes, Jie Zhang, Imperial College London, London, United Kingdom

3 – 4 pm – Exhibitor Appreciation Break

4 – 4:30 pm | Development of a Refined Full Cavitation Model Considering Vapor and Air

Yan Wang, Xuesong Li, Xiaodong Ren, Chunwei Gu, Tsinghua University, Beijing, China

4:30 – 5 pm | Multi-Scale Modeling of the Lubrication Between Rough Surfaces

Noel Brunetiere, Arthur Francisco, Institut Pprime, Futuroscope Chasseneuil, Cedex, France

5 – 5:30 pm | Impact of ZDDP Degradation – Influence of Engine Oil Condition on Friction and Wear

Nicole Doerr, Serhiy Budnyk, Andjelka Ristic, Marcella Frauscher, Adam Agocs, AC2T Research GmbH, Wiener Neustadt, Austria

2C | Engine and Drivetrain Special Session on Electric Vehicles II

1:30 – 2 pm | Challenges and Opportunities with Lubricants for HEV/EV Vehicles

Arup Gangopadhyay, Ford Motor Co., Dearborn, MI

2 – 2:30 pm | New Challenges for Tribologists and Lubrication Engineers From Vehicle Electrification

Chris Shamie, Schaeffler Group USA, Brighton, MI

2:30 – 3 pm | Fuel Economy Testing Using a Prius Engine

Peter Lee, Dan Worcester, Southwest Research Institute, San Antonio, TX

3 – 4 pm – Exhibitor Appreciation Break

4 – 4:30 pm | Newly Developed Lubricants for the Challenges of Electric Drivetrains

Tobias Bender, Fuchs Lubricants Co., Wedel, Germany, Thomas Kraft, Gerd Jacobs, Erik Schuster, Rolf Luther, Bernhard Hagemann, Fuchs Schmierstoffe GmbH, Mannheim, Germany

4:30 – 5 pm | Challenges and Outlooks for Transmission Fluids in Electric Vehicles

Hong Gao, Shell Global Solutions, Houston, TX

5 – 5:30 pm | Understanding Base Oils and Lubricants for Electric Drivetrain Applications

Yungwan Kwak, Atanu Adhvaryu, Xinggao Fang, Christopher Cleveland, Afton Chemical Corp., Richmond, VA, Susie Hurley, Afton Chemical Limited, Bracknell, United Kingdom

5:30 – 6 pm | Open Discussion

2D | Gears II

1:30 – 2 pm | Softening Mechanisms in Carburized Aerospace Gear Steels During Short-Term Exposure to High Temperature

Aaron Isaacson, Pennsylvania State University, State College, PA, Cody Wassel, Sean McIntyre, Pennsylvania State University Applied Research Laboratory, University Park, PA, Todd Palmer, Pennsylvania State University, Wayne, PA

2 – 2:30 pm | Fatigue Calculations for Rough Surface Contacts with Measured and Synthesized Run-In Surface Roughness

Hassneen Asadi, Pwt Evans, Alastair Clarke, Kayri Sharif, Cardiff University, Cardiff, United Kingdom

2:30 – 3 pm | Influence of Specific Film Thickness and Surface Roughness Properties on Micropitting Damage

Amir Kadiric, Benjamin Wainwright, Pawel Rycerz, Imperial College London, London, United Kingdom

3 – 4 pm – Exhibitor Appreciation Break

4 – 4:30 pm | Development of a CEC-Pitting Test Method for Gear Lubricants – Measures to Reduce Scattering and Micropitting Generation in Gear Pitting Tests

Christopher Illenberger, Institute of Machine Elements Gear Research Centre (FZG), TU Munich, Garching, Germany

4:30 – 5 pm | A Model for the Formation and Wear of Oxide Tribofilms on Aerospace Steels Under High-Speed Boundary Lubrication Conditions

Sean McIntyre, Pennsylvania State University, Wayne, PA, Stephen Berkebile, Nikhil Murthy, US Army Research Laboratory, Aberdeen Proving Ground, MD

5 – 5:30 pm | A Model for Gear Life with Surface and Subsurface Survival: Tribological Effects

Guillermo Morales-Espejel, SKF, Nieuwegein, UT, Netherlands

5:30 – 6 pm | Industrial Gear Oil Models Based on High-Viscosity Naphthenic Base Oils and Viscosity Index Improvers

Thomas Norrby, Linda Malm, Nynas AB, Nynashamn, Sweden

2E | Commercial Marketing Forum II

1:30 – 2 pm | Colonial Chemical Inc.

2 – 2:30 pm | ExxonMobil Chemical Corp.

2:30 – 3 pm | Kao Chemicals GmbH

3 – 4 pm – Exhibitor Appreciation Break

4 – 4:30 pm | LANXESS Corp.

4:30 – 5 pm | ANGUS Chemical Co.

5 – 5:30 pm | Evonik Oil Additives USA

2G | Wind Turbine Tribology II

1:30 – 2 pm | Determining Mechanical Properties of White Etching Areas in Carburized 8620 Steel Using Spherical Nanoindentation

Jonathan Leung, Richard Neu, Georgia Institute of Technology, Atlanta, GA, Vikram Bedekar, Rohit Voothaluru, The Timken Co., North Canton, OH

2 – 2:30 pm | Evaluating the Effect of Heat and Surface Treatments on the Formation of White Etching Cracks

Benjamin Gould, Aaron Greco, Nicholaos Demas, Argonne National Laboratory, Argonne, IL

2:30 – 3 pm | Effect of Lubricant Stability on White Etching Area Evolution Under Severe Dynamic Load Sliding Contact

Kodoor Sreeraj, Linto Davis, P. Ramkumar, Indian Institute of Technology Madras (IITM), Chennai, Tamil Nadu, India

3 – 4 pm – Exhibitor Appreciation Break

4 – 4:30 pm | The Role of Sulfur in Limiting Oil Drain Interval in Wind Turbine Main Gearbox Lubricants

Michael Blumenfeld, David Holt, Tabassumul Haque, ExxonMobil Research and Engineering, Annandale, NJ

4:30 – 5 pm | Initiation Mechanism of White Etching Cracks Under the Influence of Electric Current

Ling Wang, Viktorija Rumpf, University of Southampton, Southampton, United Kingdom, Alexander Schwedt, Joachim Mayer, RWTH Aachen University, Aachen, Germany, Walter Holweger, Schaeffler Technologies, Herzogenaurach, Germany

5 – 5:30 pm | Real Scale Test of an Innovative Sensor-Set for Early Risk Detection of White Etching Cracks at a 2.7-MW Wind Turbine Gearbox

Freia Harzendorf, Ralf Schelenz, Georg Jacobs, RWTH Aachen University, Aachen, Germany, Walter Holweger, Schaeffler AG, Herzogenaurach, Germany, Torsten Bley, Hydac Electronic GmbH, Saarbruecken, Germany,Soeren Barteldes, QASS GmbH, Wetter, Germany

2H | Testing in Soft Tribology

Tribotesting & Biotribology Joint Session

1:30 – 2 pm | Relating Sensory Perception to the Tribology of Milk

Grace Hully, Izzy Roots, Tom Welham, PCS Instruments, London, United Kingdom, Philippa Cann, Marc Masen, Imperial College London, London, United Kingdom

2 – 2:30 pm | Test Methods with Natural and Artificial Specimen for Biotribological Applications

Florian Rummel, Kartik Pondicherry, Anton Paar GmbH, Ostfildern, Germany

2:30 – 3 pm | Finger-Pad Gripping: Understanding the Influential Factors

Raman Maiti, Wei Li, Zeng Lu, Stephen Matcher, Matt Carre, Roger Lewis, University of Sheffield, Sheffield, United Kingdom

3 – 4 pm – Exhibitor Appreciation Break

2J | Nanotribology II

1:30 – 2:30 pm | Invited Talk

2:30 – 3 pm | Why Many Liquids Appear to Solidify During Squeeze-Out – Even When They Don't

Hongyu Gao, Martin Müser, Universität des Saarlandes, Saarbrücken, Germany

3 – 4 pm – Exhibitor Appreciation Break

4 – 4:30 pm | Dynamic Behavior of a Droplet Under Vibration Condition

Jing Xu, Jiadi Lian, Guodong Liu, Shaochao Fan, Jing Ni, Hangzhou Dianzi University, Hangzhou City, China

4:30 – 5 pm | Effect of the Dispersion of Nanoparticle Additives on Their Lubricity for Use in Metalworking Fluids

Shilpa Beesabathuni, Yan Zhou, Yixing Philip Zhao, Houghton International, Norristown, PA

5 – 5:30 pm | Interfacial Nano-Mechanics of Friction Modifiers

Kazushi Tamura, Kenji Sunahara, Hiroyuki Tatsumi, Motoharu Ishikawa, Idemitsu Kosan Co., Ltd., Ichihara, Japan, Masashi Mizukami, Kazue Kurihara, Tohoku University, Sendai, Japan

5:30 – 6 pm | Study of the Nanoscale Wear Behaviors of Gallium Nitride Using Molecular Dynamics

Pengzhe Zhu, Beijing Jiaotong University, Beijing, China

6 – 6:30 pm | Study on the Quantitative Evaluation of the Surface Force Using a Scanning Probe Microscope

Wataru Yagi, Tomomi Honda, University of Fukui, Fukui, Japan, Kazushi Tamura, Idemitsu Kosan Co., Ltd., Ichihara, Japan

2K | Metalworking Fluids II

1:30 – 2 pm | Comprehensive Investigations of Tribology Properties of Metalworking Fluid Chemistries on Multi-Metals

Yixing Philip Zhao, Houghton International, Norristown, PA

2 – 2:30 pm | Go Figure: Using Analytics and Statistics in Metalworking

Emil Schnellbacher, Formulas & Solutions, LLC, Allen Park, MI

2:30 – 3 pm | Coolant Emulsion Properties and Field Performance of Metal Removal Fluids

Yixing Philip Zhao, Houghton International, Norristown, PA

3 – 4 pm – Exhibitor Appreciation Break

4 – 4:30 pm | New Innovations in Rust Preventive Sustainability

Amelia Hadler, Jennifer Clark, Gregory Moran, Eric Rodeheaver, Britt Minch, Lubrizol Corp., Wickliffe, OH

4:30 – 5 pm | Vulnerability and the Art of Metalworking Fluid Formulation

Nicole Webb, Soraya Krasczcyk, Clayton Cooper, ANGUS Chemical Co., Buffalo Grove, IL

5 – 5:30 pm | Parts Cleaning Fundamentals – Importance of Cleaning and Rinsing

Suresh Patel, Chemetall, New Providence, NJ

2L | Nonferrous Metals II

1:30 – 2 pm | Thermal Behavior of Polyformates of Milkweed and Soybean Oils

Rogers Harry-O'kuru, James Xu, USDA-ARS-NCAUR, Peoria, IL, Girma Biresaw, USDA-ARS-NCAUR-BOR, Peoria, IL

2 – 2:30 pm | Development of Novel and Safer Dt-MPM Antioxidants and MoIn Multifunctional Corrosion Inhibitors for Industrial Applications

Ashok Cholli, Polnox Corp., Lowell, MA

2:30 – 3 pm | Effect of Isomerization on the Physical and Tribological Properties of Oleic Acid

Girma Biresaw, Robert Dunn, Grigor Bantchev, Rogers Harry-O'kuru, USDA-ARS-NCAUR-BOR, Peoria, IL, Helen Ngo, USDA-ARS-ERRC, Wyndmoore, PA

3 – 4 pm – Exhibitor Appreciation Break

4 – 4:30 pm | Scuffing Performance of Brass-Cast Iron Contact Pair in Hydraulic Fluid

M. Cinta Lorenzo Martin, Oyelayo Ajayi, Sheera Lum, George Fenske, Argonne National Laboratory, Lemont, IL, Girma Biresaw, Grigor Bantchev, Rogers Harry-O'kuru, USDA-ARS-NCAUR-BOR, Peoria, IL

4:30 – 5 pm | Water Soluble/ Dispersible Corrosion Inhibitors for Nonferrous Metalworking Fluids

Tiffany Meyers, Clariant, Mount Holly, NC

5 – 5:30 pm | Nuclear Magnetic Resonance Spectroscopy as a Useful Tool for the Analysis of Emulsions, Part II

Josef Leimhofer, AMAG Rolling GmbH, Ranshofen, Austria

5:30 – 6 pm | Synthesis and Detailed Characterization of Dimer and Trimer Acid Products Using Acid Zeolite Catalysts

Helen Ngo, Jianwei Zhang, Alberto Nunez, Robert Moreau, USDA, Wyndmoor, PA

6 – 6:30 pm | Nonferrous Business Meeting

2M | Fluid Film Bearings II

1:30 – 2 pm | Experimental Investigations of Oil Pockets Effect on the Lubrication Regime Transition of Journal Bearings

Jaroslaw Sep, Lidia Galda, Rzeszow University of Technology, Rzeszow, Poland, Artur Olszewski, Tomasz Zochowski, Gdansk University of Technology, Gdansk, Poland

2 – 2:30 pm | On The Effect of Journal Kinematics on the Force Coefficients of a Test Squeeze Film Damper Supplied With an Air in Oil Mixture

Luis San Andrés, Xueliang Lu, Texas A&M University, College Station, TX, Wei Zhang, Tianjin University, Tianjin, China

2:30 – 3 pm | Dynamic Experimental Research of Controllable Squeeze Film Damper

Chao Chen, Xiaojing Wang, Nie Zhou, Jun Liu, Jiaqi Zheng, Caizhi Zhu, Shanghai University, Shanghai, China

3 – 4 pm – Exhibitor Appreciation Break

4 – 4:30 pm | A New Test Rig to Meet Industrial Applications: Startup and Performance of a Two Lobe Journal Bearing

Jean Bouyer, Pascal Jolly, Michel Fillon, Institute Pprime, Futuroscope Chasseneuil Cedex, France

4:30 – 5 pm | Ultrasonic Oil Film Measurements in Journal Bearings

Scott Beamish, Henry Brunskill, Andrew Hunter, Rob Dwyer-Joyce, University of Sheffield, Sheffield, United Kingdom

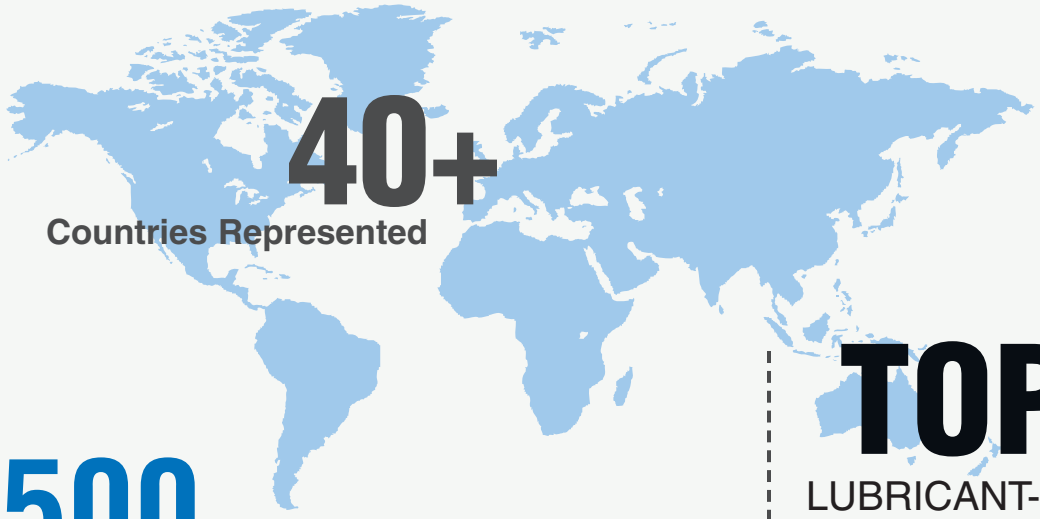
5 – 5:30 pm | Development of a Gaseous Cavitation Model for Oil-Film Bearing Considering Thermal Effect

Aoshuang Ding, Xuesong Li, Xiaodong Ren, Chunwei Gu, Tsinghua University, Beijing, China

BY THE NUMBERS

DID YOU KNOW ABOUT THE STLE ANNUAL MEETING?

95% of surveyed attendees indicated that STLE's Annual Meeting met or exceeded their overall expectations.



40+
Countries Represented

40 COMMERCIAL MARKETING FORUM SESSIONS

500 Education Course Participants

60
STUDENT POSTERS

500+
TECHNICAL PRESENTATIONS

150 Student Attendees

1,600 INDUSTRY PROFESSIONALS

120 EXHIBITORS

TOP 5
LUBRICANT-RELATED MARKETS ATTENDING

- Oil Analysis
- Metalworking Fluids
- Automotive
- Manufacturing
- Bearings

ATTENDEE PROFILE

5%	5%	6%		18%	66%
Academia	Students	Government		Other	Industry

Tuesday, May 21, 2019

3D | Wear I

8 – 8:30 am | Effects of Shoe Design and Progressive Wear on Traction Performance
Sarah Hemler, Kurt Beschorner, University of Pittsburgh, Pittsburgh, PA

8:30 – 9 am | Methods to Study the Life of an Asperity Subjected to Tribological Contact
Arnab Bhattacharjee, Nikolay Garabedian, David Burris, University of Delaware, Newark, DE

9 – 9:30 am | Gait Parameters of Shoe Wear: A Case Study of the Shoe Wear Rate by Individual Gait Parameters
Erika Pliner, Sarah Hemler, Kurt Beschorner, University of Pittsburgh, Pittsburgh, PA

9:30 – 10 am | Ash-Induced Wear on Biomass Pre-Conversion Equipment
Kyungjun Lee, Jun Qu, James R. Keiser, Oak Ridge National Laboratory, Oak Ridge, TN, Erik Kuhn, Edward Wolfrum, National Renewable Energy Laboratory, Denver, CO

10 – 10:30 am – Break

10:30 – 11 am | Predicting Slip Risk Based on Footwear
Sarah Hemler, Kurt Beschorner, University of Pittsburgh, Pittsburgh, PA

11 – 11:30 am | Influence of Film Structure on Vane Pump Protection
Xinggao Fang, Mark Devlin, Phillipe Ezanno, Afton Chemical Corp., Richmond, VA

11:30 am – Noon | The Role of Counterface Roughness Orientation in the Thermal Effects on the Deposition of PEEK Transfer Films
Cris Schwartz, Mark Placette, Iowa State University, Ames, IA

3E | Commercial Marketing Forum III

8 – 8:30 am | Vanderbilt Chemicals, LLC

8:30 – 9 am | Chevron Phillips Chemical Co.

9 – 9:30 am | Sea-Land Chemical Co.

9:30 – 10 am | Lockhart Chemical Co.

10 – 10:30 am – Break

10:30 – 11 am | Croda Inc.

11 – 11:30 am | King Industries Inc.

11:30 am – Noon | Münzing

3F | Metalworking Fluids III

8 – 8:30 am | Effect of Different Organic Acids in Organosilanes/ Organic Acids Combo Systems as Stain/Corrosion Inhibitors in Metalworking Fluids for Application on Aluminum Alloys
Hoon Kim, Joana Costa, John Pentangelo, BASF/Chemetall, New Providence, NJ

8:30 – 9 am | Substitution of Zinc Stearate in Cold Extrusion Processes
Wilhelm Rehbein, LANXESS Deutschland GmbH, Mannheim, Germany

9 – 9:30 am | A Dynamic Industry Needs Dynamic Additives – State-of-the-Art Wetting Agents
Kai Wirz, Evonik Nutrition & Care GmbH, Essen, Germany

9:30 – 10 am | High-Oil Emulsions for MWFs Based on Heavy Naphthenic Base Oils
Thomas Norrby, Linda Malm, Nynas AB, Nynashamn, Sweden

10 – 10:30 am – Break

10:30 – 11 am | Overcoming the Field Trial Challenges of Rust Protection in Outdoor Environments through Effective Performance Modeling
Clifford Pratt, Ross Dworet, Charlie Harris, Kathleen Clancy, King Industries Inc., Norwalk, CT

11 – 11:30 am | Foam Mechanism for Soluble Oils
Robert Golden, Pilot Chemical Co., Cincinnati, OH

11:30 am – Noon | Evaluation of Performance Properties of Slideway Lubricants
John Hogan, The Lubrizol Corp., Wickliffe, OH

3G | Tribotesting I

8 – 8:30 am | In-Situ Measurement of Friction by Causing Nano-Scale Slip with a High-Powered Ultrasonic Wave
Rob Dwyer-Joyce, Xiangwei Li, University of Sheffield, Sheffield, United Kingdom

8:30 – 9 am | Development of a Test Procedure, System and Process for High Throughput Tribological Testing of Used Oil Samples as Part of a Condition Monitoring Protocol
George Plint, Phoenix Tribology Ltd., Kingsclere, Select, United Kingdom

9 – 9:30 am | Florescent Nanoparticle – Assisted Probing of Fluidic Behavior on 3D Printed Surfaces
Peter Renner, Hong Liang, Wei Dai, Texas A&M University, College Station, TX

9:30 – 10 am | Contamination Impact on Gas-Phase Synthesized Graphene and Graphene Platelets Effectiveness as a Lubricant Additives in Bio-Derived Oil & PAO
Gordon Krauss, Albert Dato, Harvey Mudd College, Claremont, CA, Matthew Siniawski, Loyola Marymount University, Los Angeles, CA

10 – 10:30 am – Break

10:30 – 11 am | The Influence of Operating Parameters and Viscometrics in Energy Efficiency in Rolling Sliding Concentrated Contacts
Mukesh Dubey, R. Mahapatra, Ajay Harinarain, Sarita Seth, Sarita Garg, Deepak Saxena, S S V Ramakumar, Indian Oil Corp. Limited, R&D Centre, Faridabad, Haryana, India

11 – 11:30 am | Testing the Wear Life of Sandpaper
Kenneth Budinski, Bud Labs, Rochester, NY

11:30 am – Noon | Insoluble Residues from Thin Films of Hydraulic Fluids and Engine Oils after Prolonged Heating
Svajus Asadauskas, Dalia Brazinskiene, Asta Griguceviciene, Center for Physical Sciences and Technology, Vilnius, Lithuania

3H | Fluid Film Bearings III

8 – 8:30 am | Dynamic Performance Analysis of Hydrostatic Oil Film Considering Oil Pad Damage Under Extreme Working Conditions
Zhifeng Liu, Yongsheng Zhao, Qiang Cheng, Congbin Yang, Institute of Advanced Manufacturing and Intelligent Technology, Beijing University of Technology, Beijing, China

8:30 – 9 am | TEHD Analysis of Dynamic Behavior of a Planetary Star Gearbox Journal Bearing Due to Misalignment Torque
Balint Pap, Alexis Dombek, Patrice Gedin, Ludwig Biadalla, Safran Transmission Systems, Colombes, France, Michel Fillon, Institut Pprime, Chasseneuil-du-Poitou, France

9 – 9:30 am | Comparison of CFD-FSI and Reynolds Equation Based Approaches in the Prediction of Dynamic Coefficients of a Convergent-Divergent Slider Bearing with an Eeforming Liner
Troy Snyder, Minel Braun, The University of Akron, Akron, OH

9:30 – 10 am | Thermal Characteristics of a Vertical Hydrostatic Guideway System with Ballscrew Drive of Precision Milling Machines
Hua-Chih Huang, National Kaohsiung University of Science and Technology, Kaohsiung City, Taiwan, Wen-Hao Yang, Hiwin Technologies Corp., Taichung, Taiwan

10 – 10:30 am – Break

10:30 – 11 am | Numerical and Experimental Investigations of the Performance of Pocketed Thrust Bearings Operating in Micro-Electro-Mechanical Systems
Peng Wang, Thomas Reddyhoff, Daniele Dini, Francisco Profito, Imperial College London, London, United Kingdom

11 – 11:30 am | Determination of Inducer Shape Influence on Acoustic Levitation Characteristics
Bartosz Bastian, Michal Wodtke, Gdansk University of Technology, Gdansk, Pomorskie, Poland

3I | Engine & Drivetrain I

8 – 8:30 am | DD13 Liners – Batch Consistency and Scuffing Initiation
Peter Lee, Carlos Sanchez, Jose Starling, Southwest Research Institute, San Antonio, TX

8:30 – 9 am | Real-Time Wear Mapping of a 2.0L Turbocharged Gasoline Direct Injection Engine
Peter Lee, Craig Wileman, Gregory Hansen, Southwest Research Institute, San Antonio, TX

9 – 9:30 am | Effect of Surface Textures on Fuel Economy
Stephen Hsu, Govindaiah Patakamuri, George Washington University, Washington DC, Timothy Cushing, GMC, Warren, MI

9:30 – 10 am | Experimental Research on the Tribological Performance of Laser Textured Cylinder Liner
Bifeng Yin, Bo Xu, Hekun Jia, Huiqin Zhou, Xin Kuang, School of Automotive and Traffic Engineering, Jiangsu University, Zhenjiang, China

10 – 10:30 am – Break

10:30 – 11 am | A Comparison of Tribosystems, Wear Mechanism and Lubricant Effects in Silent and Roller Timing Chains
Ramoun Mourhatch, Shelby Skelton, Seyedeh Mahboobeh Hosseini, Chevron Oronite LLC, Richmond, CA

11 – 11:30 am | Friction and Wear Investigations on Chain Joints of Timing Chains
Andre Becker, Sauer Bernd, Institute of Machine Elements, Gears, and Transmissions, University of Kaiserslautern, Kaiserslautern, Germany

11:30 am – Noon | Real-Time Measurements of Piston Ring and Liner Lubrication in a Marine Diesel Engine Using Ultrasound
Xiangwei Li, Henry Brunskill, Rob Dwyer-Joyce, Leonardo Centre for Tribology, Sheffield, United Kingdom, Matthias Stark, Winterthur Gas & Diesel, Winterthur, Switzerland

3J | Nanotribology III

8 – 8:30 am | Block Copolymer Nanoparticles Prepared via Polymerisation-Induced Self Assembly for Use as a Friction Modifier in Motor Oils
Liam Pratt, Rob Dwyer-Joyce, Steve Armes, University of Sheffield, Sheffield, United Kingdom

8:30 – 9 am | Scale Dependent Tribological Behavior of Steel on MoS_2 Co-Deposited Commercial Lubricants with Macroscopic and Nanoscale Contacts
Peter Serles, Tobin Filleter, The University of Toronto, Toronto, Ontario, Canada, Guillaume Colas, Institut FEMTO-ST, Besançon, France, Aurélien Saulot, INSA Lyon, Lyon, France

9 – 9:30 am | Frictional Anisotropy in Single Crystalline Superlubric Heterojunctions: The Case of Graphite/Molybdenum Disulfide Interface
Ming Ma, Tsinghua University, Beijing, China

9:30 – 10 am | A Direct Experimental Link Between Atomic-Scale and Macro-Scale Friction
Nikolay Garabedian, David Burris, University of Delaware, Newark, DE

10 – 10:30 am – Break

10:30 – 11:30 am | Nanotribology of Tunable Polymer Coatings
Marina Ruths, University of Massachusetts-Lowell, Lowell, MA

11:30 am – Noon | Improved Parameter Estimation for Nanoindentation Measurements
John Despard, Matthew Brake, Rice University, Houston, TX, Hamid Ghaednia, Harvard Medical School, Boston, MA

3K | Environmentally Friendly Fluids I

8 – 8:30 am | Positive Effects of Mono-Unsaturation on Hydraulic Fluid Performance
Svajus Asadauskas, Linas Labanauskas, Center for Physical Sciences and Technology, Vilnius, Lithuania, Jean Couturier, Jean Dubois, Arkema, Europe, France

8:30 – 9 am | Ecolabel 2018 and VGP2018 II. Changes and Challenges in 2019
Paula Vettel, Novvi LLC, Emeryville, CA

9 – 9:30 am | Soybean Oil: Lubricating Performance
Robert Brentin, Omni Tech International, Midland, MI

9:30 – 10 am | Evaluation of Water Soluble Polymers for Aqueous Lubricants
Erik Willett, Functional Products Inc., Macedonia, OH

10 – 10:30 am – Break

10:30 – 11 am | Performance Comparison of Hydraulic Oil Blends Made with Vegetable-Based Fluids; Evaluations of High Oleic, Low Oleic Vegetable Oils as Well as a Mineral Oil Blend
Doug Adams, RSC Bio Solutions, Indian Trail, NC

11 – 11:30 am | Bio-Based Base Oils for Performance Lubricants
Basudeb Saha, University of Delaware, Newark, DE

11:30 am – Noon | Estolides – The Latest in High Viscosity Biosynthetic Base Oils
Jakob Bredsguard, Biosynthetic Technologies, Rancho Santa Margarita, CA

3L | Lubrication Fundamentals III

8 – 8:30 am | Towards a Fundamental Understanding of Organic Friction Modifier Additives
Sophie Campen, Janet Wong, Imperial College London, London, United Kingdom

8:30 – 9 am | Research on Polyalkylene Glycols Superlubricity System
Wenrui Liu, Yuhong Liu, Tsinghua University, Beijing, China

9 – 9:30 am | Influence of the Oil Additives and Their Molecular Structure on the Wetting and Friction Performance
Mitjan Kalin, University of Ljubljana, Ljubljana, Slovenia

9:30 – 10 am | Traction Curves and Rheological Properties of Some Lubricating Fluids
Robert Erck, Argonne National Laboratory, Lemont, IL

10 – 10:30 am – Break

10:30 – 11 am | Effect of Different Running-In Stages on Fatigue Life of Mixed-Lubricated Circular Contacted Machine Elements
Hui Cao, Yonggang Meng, Tsinghua University, Beijing, China

11 – 11:30 am | Prediction of Friction in EHL Point Contacts Operating Under Mixed Lubrication Conditions
Marcus Björling, Andreas Almqvist, Luleå University of Technology, Luleå, Sweden

11:30 am – Noon | The Role of Fatty Amine Chemistry in Friction Reduction
Toby Stein, Nouryon, Stenungsund, Sweden

3M | 2D Materials

Materials Tribology and Nanotribology Joint Session I

8 – 8:30 am | Friction on 2D Materials: Friction Contrast Between Graphene, MoS_2 and Graphene-MoS_2 Heterostructures
Mohammad Rasool Vazirisereshk, Ashlie Martini, University of California, Merced, Merced, CA, Han Ye, Mengqiang Zhao, A.T. Charlie Johnson, Robert Carpick, University of Pennsylvania, Philadelphia, PA, Zhijiang Ye, Miami University, Oxford, OH

8:30 – 9 am | Interlayer Friction and Superlubricity in Single-Crystalline Contact Enabled by 2D Flake-Wrapped AFM Tips
Yanmin Liu, Tianbao Ma, State Key Laboratory of Tribology, Beijing, China

9 – 9:30 am | Pressure-Induced Friction Collapse of Graphite Flake Sliding on Muscovite Surfaces
Bingtong Liu, Jin Wang, Ming Ma, Tsinghua University, Beijing, China

9:30 – 10 am | Robust Microscale Superlubricity in Graphite/Hexagonal Boron Nitride Layered Heterojunctions
Yiming Song, Ming Ma, Quanshui Zheng, Tsinghua University, Beijing, China, Davide Mandelli, Oded Hod, Michael Urbakh, Tel Aviv University, Tel Aviv, Italy

10 – 10:30 am – Break

10:30 – 11 am | Raman Spectroscopy as an Effective Tool to Detect Interaction on 2D Material Interfaces
Xiang Zhou, Dameng Liu, Jianbin Luo, State Key Laboratory of Tribology, Beijing, China

11 – 11:30 am | Friction Modulation on Graphene: Underlying Substrate, Atomic Roughness, Defects, and Beyond
Jun Liu, Chang Ye, Yalin Dong, The University of Akron, Akron, OH, Qunyang Li, Xi-qiao Feng, Tsinghua University, Beijing, China, Zengfeng Di, Chinese Academy of Sciences, Beijing, China, Wen Yue, China University of Geosciences, Beijing, China

11:30 am – Noon | Eliminating Delamination of Graphite Sliding on Diamond Like Carbon
Yujie Gongyang, Tsinghua University, Beijing, China

4D | Wear II

2 – 2:30 pm | Effects of Unevenly Worn Cage Pockets on the Service Life of a Solid Lubricated Rolling Bearing

Rahul Dahiwal, Sascha Pörsch, Sauer Bernd, University of Kaiserslautern, Kaiserslautern, Rheinland Palatinate, Germany

2:30 – 3 pm | Modeling of Low Wear of Rough Disc in Sliding Contact with Flat Ring

Pawel Pawlus, Andrzej Dzierwa, Wieslaw Zelasko, Rafel Reizer, Rzeszow University of Technology, Rzeszow, Poland

3 – 4 pm – Exhibitor Appreciation Break

4 – 4:30 pm | Impact of Wear Models on the Local Behavior of Railroad Brake Pad

Mathieu Renouf, University of Montpellier, Montpellier, France, Eric Chapteuil, Yves Berthier, INSA Lyon, Villeurbanne, France

4:30 – 5 pm | Surface Damage from Micro-Slip: Analytical Versus F.E.M. Approach

Iyabo Lawal, Matthew Brake, Rice University, Houston, TX

5 – 5:30 pm | Evolution of the Contact Interface: Towards the Introduction of a Tribological Circuit in a Multi-Scale and Multi-Physics Modeling

Vincent Magnier, Yassine Waddad, Philippe Dufrenoy, University of Lille, Villeneuve d'Ascq, France

5:30 – 6 pm | Wear Business Meeting

4E | Commercial Marketing Forum IV

2 – 2:30 pm | Afton Chemical Corp.

2:30 – 3 pm | Afton Chemical Corp.

3 – 4 pm – Exhibitor Appreciation Break

4 – 4:30 pm | LANXESS Corp.

4:30 – 5 pm | Eastman Chemical Co.

5 – 5:30 pm | Evonik Oil Additives USA

4F | Metalworking Fluids IV

2 – 2:30 pm | A New Generation of Anti-Wear Solutions and Staining Inhibitors for Metalworking Fluids

Claude Hedoire, Solvay, Aubervilliers, France

2:30 – 3 pm | Application of Predictive Safety Screening Tools in GHS Labeling and TSCA New Chemical Notifications: A Small Company Perspective

Pamela Spencer, University of Michigan, Ann Arbor, MI

3 – 4 pm – Exhibitor Appreciation Break

4 – 4:30 pm | Boundary Lubricant Additive Response Comparisons on Aluminum Alloys Using Twist Compression Tests (TCT)

Ted McClure, Sea-Land Chemical Co., Westlake, OH

4:30 – 5 pm | Tribological and Anti-Corrosion Property of IF–WS_2 Particle in Aqueous System

Girija Chaubey, George Diloyan, Nanotech Industrial Solutions, Avenel, NJ

5 – 5:30 pm | Surface Integrity Analysis of the Hardened Bearing Steel Ground Under Different Cooling-Lubrication and Cutting Conditions

Rosemar Da Silva, Bruno Abrão, Mayara Pereira, Raphael De Paiva, Antonio De Mello, Federal University of Uberlandia, Uberlandia, Minas Gerais, Brazil, Emmanuel Ezugwu, Air Force Institute of Technology, Kaduna, Nigeria

5:30 – 6 pm | Tribological Approach of Grinding Stainless Steel with Semi Synthetic-Based Cutting Fluid

Rosemar Da Silva, Mayara Pereira, Bruno Abrão, Antonio De Mello, Federal University of Uberlandia, Uberlandia, Minas Gerais, Brazil, Alisson Machado, Pontifícia Universidade Católica do Paraná – PUC-PR, Curitiba, Paraná, Brazil, Rodolfo De Oliveira, Saint-Gobain do Brasil Produtos Industriais e para Construção Ltda, Sao Paulo, Brazil

4G | Tribotesting II

2 – 2:30 pm | A New High Resolution Ultra-High Vacuum Tribometer Based on a Unique 6-Axis Force Sensor

Julien Fontaine, Matthieu Guibert, Thierry Le Mogne, Jules Galipaud, CNRS/Ecole Centrale de Lyon, Ecully Cedex, France, Thibaut Durand, Sophie Pavan, Ecole Centrale de Lyon, Ecully, France

2:30 – 3 pm | New Developments in Non-Invasive Ultrasonic Lubricant Film Thickness, Viscosity, and Cavitation Sensors – A Review of Case Studies

Henry Brunskill, Peak to Peak Measurement Solutions/University of Sheffield, Sheffield,United Kingdom, Rob Dwyer-Joyce, University of Sheffield, Sheffield, United Kingdom

3 – 4 pm – Exhibitor Appreciation Break

4 – 4:30 pm | Scuffing Performance of Low-Viscosity Gear Oil Containing ZrO_2 Nanocrystals

Nicholaos Demas, Benjamin Gould, Aaron Greco, Argonne National Laboratory, Argonne, IL

4:30 – 5 pm | Do You Count Water and Antifoam as Containment Particles or Not?

Thomas Canty, J.M. Canty Inc., Lockport, NY

5 – 5:30 pm | Low Temperature Testing of Greases

Kartik Pondicherry, Florian Rummel, Georg Krenn, Anton Paar GmbH, Graz, Austria

5:30 – 6 pm | Tribotesting Business Meeting

4H | Fluid Film Bearings IV

Sessions TBD

4I | Engine & Drivetrain II

2 – 2:30 pm | Effects of Ionic Liquids on Micropitting Behavior for Rear Axle Lubrication

Sougata Roy, Huimin Luo, Jun Qu, Oak Ridge National Laboratory, Oak Ridge, TN, Lake Speed Jr., Driven Racing Oil, Olive Branch, MS, Michael Viola, General Motors, Pontiac, MI

2:30 – 3 pm | Compatibility Between Ionic Liquids and Friction Modifiers

Weimin Li, Lanzhou Institute of Chemical Physics, Chinese Academy of Science, Lanzhou, China, Chanaka Kumara, Harry M. Meyer III, Huimin Luo, Jun Qu, Oak Ridge National Laboratory, Oak Ridge, TN

3 – 4 pm – Exhibitor Appreciation Break

4 – 4:30 pm | Alloy-Dependence of the Antagonistic Effects Between Soot and ZDDP

Jun Qu, Chanaka Kumara, Harry M. Meyer III, Oak Ridge National Laboratory, Oak Ridge, TN

4:30 – 5 pm | Impact of Amine-Based Friction Modifiers on ZDDP Tribofilms

Joanna Dawczyk, Hugh Spikes, Imperial College London, London, United Kingdom

5 – 5:30 pm | New Organic Friction Modifiers for Wet-Clutch Motorcycle Engine Oils

David Gillespie, Croda, Cowick Hall, United Kingdom

4J | Nanotribology IV

2 – 3 pm | Invited Talk

Dr. Izabela Szlufarska, University of Wisconsin-Madison, Madison, WI

3 – 4 pm – Exhibitor Appreciation Break

4 – 4:30 pm | Nanotribology of Graphene in Hexadecane

Prathima Nalam, Behnoosh Sattari Baboukani, University at Buffalo, Buffalo, NY, Zhijiang Ye, Nethmi De Alwis, Miami University, Oxford, OH

4:30 – 5 pm | Tuning Friction at Material-Nanoparticle-Liquid Interfaces with an External Electric Field

Jacqueline Krim, Biplav Acharya, Caitlin Seed, Donald Brenner, Alex Smirnov, North Carolina State University, Raleigh, NC

5 – 5:30 pm | Sliding Over 10,000 Times Faster: QCM Integrated Microtribometry to Probe Friction Fundamentals via Single-Crystal MoS_2

Nikolay Garabedian, David Burris, University of Delaware, Newark, DE, Raymond Wieser, Gabriel McAndrews, Brian Borovsky, St. Olaf College, Northfield, MN

5:30 – 6 pm | Tribofilm Growth Mechanisms of ZrO_2 Nanoparticle Additives in a Fully Formulated Low Viscosity Gear Oil

Meagan Elinski, Zachary Milne, Andrew Jackson, Robert Carpick, University of Pennsylvania, Philadelphia, PA, Lei Zheng, Robert Wiacek, Pixelligent Technologies, Baltimore, MD

6 – 6:30 pm | The Molecular Arrangement and Frictional Response of Sams of a Planar Phthalocyanine Molecule

Yijun Qiao, Yuhong Liu, Tsinghua University, Beijing, China

4K | Environmentally Friendly Fluids II

2 – 2:30 pm | High Viscosity Esters to Boost Lubricant Performance Profile

Matthias Hof, Emery Oleochemiclas GmbH, Monheim, NRW, Germany

2:30 – 3 pm | A Peculiar Observation of "Gelling" in Bio-Derived Phosphonate Ester

M. Cinta Lorenzo Martin, Oyelayo Ajayi, Argonne National Laboratory, Lemont, IL, Grigor Bantchev, Girma Biresaw, Rogers Harry-O'kuru, USDA-ARS-NCAUR-BOR, Peoria, IL

3 – 4 pm – Exhibitor Appreciation Break

4 – 4:30 pm | New Class of Biolubricants Based on the Unique Fatty Acid Structure of Chinese Violet Seed Oil

Diana Berman, Asghar Shirani, Kent Chapman, University of North Texas, Denton, TX, Edgar Cahoon, University of Nebraska-Lincoln, Lincoln, NE

4:30 – 5 pm | The Issues Facing the EAL Industry: The Stability of Oil and the Eco-Friendliness

Ashok Cholli, Polnox Corp., Lowell, MA

5 – 5:30 pm | Environmentally Friendly Fluids Business Meeting

4L | Lubrication Fundamentals IV

2 – 2:30 pm | Fatty Acid Ionic Liquids (FAILs): Anion Effect on Physicochemical, Environmental and Tribological Properties

David Blanco, Noelia Rivera, Javier Faes, Paula Oulego, Rubén González, Antolín Hernández-Battez, University of Oviedo, Gijón, Asturias, Spain

2:30 – 3 pm | Exploration of Macrocsale Superlubricity Enabled by Hydrated Ions

Tianyi Han, Chenhui Zhang, Jianbin Luo, Tsinghua University, Beijing, China

3 – 4 pm – Exhibitor Appreciation Break

4 – 4:30 pm | Lubricating Titanium Using a Vegetable Oil Containing Ionic Liquids

Haitao Duan, Wuhan Research Institute of Materials Protection, Wuhan, Hubei, China

4:30 – 5 pm | Impacts of Glyceride and Ionic Liquid Additives on Tribological Properties of Water-Based Drilling Mud

Min Ji, Shuhai Liu, Huaping Xiao, China University of Petroleum-Beijing, Beijing, China

4M | 2D Materials

Materials Tribology and Nanotribology Joint Session II

2 – 2:30 pm | Run-In Behaviors of Solid Lubricants

John Curry, Sandia National Laboratories, Albuquerque, NM

2:30 – 3 pm | Modified Molybdenum Disulfide for Improved Wear Resistance in Antifriction Coatings

Melissa Mushrush, Gary Weber, Dow-Dupont, Auburn, MI

3 – 4 pm – Exhibitor Appreciation Break

4 – 4:30 pm | Superlubricity at Macroscale in Oil-Free Rolling/Sliding Contacts

Kalyan Mutyala, Anirudha Sumant, Jianguo Wen, Argonne National Laboratory, Lemont, IL, Gary Doll, The University of Akron, Akron, OH

4:30 – 5 pm | Simultaneous In-Situ Formation of MoS_2 and Carbon-Containing Tribofilms

Manel Rodriguez Ripoll, Sara Spiller, AC2T Research GmbH, Wiener Neustadt, Austria, Bernhard Kohlhauser, Carsten Gachot, TU Wien, Vienna, Austria

5 – 5:30 pm | Assessment of the Tribological Properties of 2D Black Phosphorus (BP) Flakes Exfoliated and Dispersed in Choline Chloride Urea (CCU) Ionic Liquid

Hesham El-Sherif, Nabil Bassim, McMaster University, Hamilton, Ontario, Canada

5:30 – 6 pm | Tribological Properties of Different Nano-Sized Layered Double Hydroxides as Oil-Based Lubricant Additives

Hongdong Wang, Jianbin Luo, Tsinghua University, Beijing, China

6 – 6:30 pm | Material Tribology Business Meeting

4N | Discussion Roundtables

Session Starts at 3:30 pm

Wednesday, May 22, 2019

5A | Rolling Element Bearings I

8:30 – 9 am | Roughness Effect in Rolling Contact Fatigue of Silicon Nitride

Mohsen Mosleh, Keron Bradshaw, Sonya Smith, Howard University, Washington, DC, Khosro Shirvani, Rowan University, Glassboro, NJ, John Belk, ZeroTechnology, St. Louis, MO

9 – 9:30 am | Experimental and Numerical Studies into the Mechanisms of Surface Crack Propagation Under Rolling Contact

Amir Kadiric, Pawel Rycerz, Björn Kunzelmann, Imperial College London, London, United Kingdom

9:30 – 10 am | A Model for Hybrid Bearing Life with Surface and Subsurface Survival

Antonio Gabelli, SKF, Nieuwegein, Netherlands, Guillermo Morales-Espejel, SKF Research and Technology Development, Nieuwegein, UT, Netherlands

10 – 10:30 am – Break

10:30 – 11 am | An Analysis of Rolling Element Bearings Fatigue Life Reduction Caused by Debris Denting

Alexis Bonetto, Daniel Nélias, Thibaut Chaise, Univ Lyon, INSA-Lyon, CNRS UMR5259, LaMCoS, Villeurbanne, France, Laurent Zamponi, Airbus, Marignane, France

11 – 11:30 am | Innovation in Testing and Calculation Methods Against Surface Initiated Damage Mechanisms (SID) in Rolling Bearings

Daniel Merk, Bernd Vierneusel, Jörg Franke, Schaeffler Technologies AG & Co. KG, Schweinfurt, Germany

11:30 am – Noon | Investigation of the Dent Resistance of Instrument Bearings with NiTi-Hf Rolling Elements

Samuel Howard, NASA Glenn Research Center, Cleveland, OH, Christopher DellaCorte, NASA, Cleveland, OH

5B | Wear III

8 – 8:30 am | Developing Improved Anti-Wear Additives by Leveraging from Industry Trends

Christelle Chretien, Solvay, Bristol, PA

8:30 – 9 am | A Study on Wear Effects From Methyl-Ester in Oil Mixtures

Gustavo Molina, Emeka Onyejizu, John Morrison, Valentin Soloiu, Georgia Southern University, Statesboro, GA

9 – 9:30 am | Adhesive Wear Performance of Pyrowear 675 in All Metal and Hybrid Configuration: Part II

Mathew Kirsch, Daulton Isaac, Andrew Foye, Patrick Hellman, U.S. Air Force Research Laboratory, Wright-Patterson AFB, OH, Hitesh Trivedi, UES, Inc., Dayton, OH

9:30 – 10 am | Understanding How Scanning Strategy Affects the Wear Behavior of 3D-Printed Stainless Steel

Mohanad Bahshwan, Tom Reddyhoff, Connor Myant, Imperial College London, London, United Kingdom

10 – 10:30 am – Break

10:30 – 11 am | Adhesive Wear Performance of Pyrowear 675 in All Metal and Hybrid Configuration: Part I

Daulton Isaac, Mathew Kirsch, Patrick Hellman, Andrew Foye, U.S. Air Force Research Laboratory, Wright-Patterson AFB, OH, Hitesh Trivedi, UES Inc., Dayton, OH

11 – 11:30 am | High Temperature Friction and Wear Behavior of Nimonic C263

Deepak Halenahally Veeregowda, Fabio Alemanno, Ducom Instruments Europe B.V, Groningen, Groningen, Netherlands, Ahmad Afiq Bin Pauzi, TNB Research, Kualalumpur, Malaysia

5C | Commercial Marketing Forum V

8 – 8:30 am | Available Presentation

8:30 – 9 am | Available Presentation

9 – 9:30 am | Pilot Chemical

9:30 – 10 am | Available Presentation

10 – 10:30 am – Break

10:30 – 11 am | The Lubrizol Corp.

11 – 11:30 am | Zschimmer & Schwarz

11:30 am – Noon | The Lubrizol Corp.

5D | Frontiers of Tribology Research I: Design

Joint STLE/CTI Symposium

8:30 – 9 am | New Advancement in Superlubricity

Jianbin Luo, Tsinghua University, Beijing, China

9 – 9:30 am | Advances in Surface and Interface Engineering for Ultra-low Wear and Friction

Ali Erdemir, Argonne National Laboratory, Lemont, IL

9:30 – 10 am | Dental Biotribology and Bionic Design

Zhongrong Zhou, Southwest Jiaotong University, Chengdu, Sichuan, China

10 – 10:30 am – Break

10:30 – 11 am | Co CMP

Hong Liang, Texas A&M University, College Station, TX

11 – 11:30 am | Surface Texture Recognition from the Fingertip Skin Frictional Sension

Shirong Ge, China University of Mining & Technology, Xuzhou, Jiangsu, China

11:30 am – Noon | Application of Fluid Rheological Measurements to Improve the Accuracy of Rolling Element Bearing Torque Calculations

Ryan Evans, William Hannon, Praveen Pauskar, The Timken Co., North Canton, OH

5E | Tribotesting III

8 – 8:30 am | Why All Test Rigs Do Not Give the Same Friction and Wear Response

Carlos Sanchez, Peter Lee, Michael Moneer, Southwest Research Institute, San Antonio, TX

8:30 – 9 am | A Holistic Approach to Characterize the Tribological Performance of Lubricants Applied to New EALs in Plain Bearings

Henry Brunskill, Peak to Peak Measurement Solutions/University of Sheffield, Sheffield, United Kingdom, Scott Beamish, Rob Dwyer-Joyce, University of Sheffield, Sheffield, United Kingdom

9 – 9:30 am | A Study on Viscosity and Lubricity Effects of N-Butanol and its Mixtures in Oil

Gustavo Molina, John Morrison, Cesar Carapia, Valentin Soloiu, Georgia Southern University, Statesboro, GA

9:30 – 10 am | Erosion-Corrosion of Heat-Exchanger Materials by Water/Ethylene-Glycol/Alumina Nanofluids

Gustavo Molina, Fnu Aktaruzzaman, Valentin Soloiu, Mosfequr Rahman, Georgia Southern University, Statesboro, GA

10 – 10:30 am – Break

10:30 – 11 am | Pump Failures: A Laboratory Method to Distinguish Between Lack of Lubricity and Presence of Abrasive Nanoparticles

Philip De Vaal, University of Pretoria, Pretoria, South Africa

11 – 11:30 am | The Tribological Performance of Fuel-Efficient Gear Oils in a Limited Slip Differential

Gregory Hansen, Southwest Research Institute, San Antonio, TX

11:30 am – Noon | Infrared Microscope Analysis – A Tool for Understanding Failure Analysis and Improving Equipment Reliability

Keith Schomburg, PerkinElmer, Magnolia, TX

5F | Synthetics & Hydraulics Lubricants I

8 – 8:30 am | Sensitivity Analysis of the FMVP Test Method to Evaluate Hydraulic Fluids for Vane Pumps

Emmanuel Georgiou, Dirk Drees, Michel De Bilde, Falex Tribology NV, Rotselaar, Belgium, Michael Anderson, Falex Corp., Sugar Grove, IL

8:30 – 9 am | Polymer-Enhanced Fluid Effects on Mechanical Efficiency of Hydraulic Pumps

Paul Michael, Milwaukee School of Engineering, Milwaukee, WI, Ashlie Martini, Michelle Len, University of California, Merced, Merced, CA

9 – 9:30 am | Improving Hydraulic Efficiency by Controlling Fluid Flow Characteristics

Timothy Smith, Lubrizol, Hazelwood, Derbyshire, United Kingdom

9:30 – 10 am | Tribological Performance of Composite Basefluid for Hydraulic Systems

M. Cinta Lorenzo Martin, Oyelayo Ajayi, Julie Nguyen, George Fenske, Argonne National Laboratory, Lemont, IL

10 – 10:30 am – Break

10:30 – 11 am | Harvesting Benefits from the Next Generation of Agriculture Lubricant Specifications

Ricardo Gomes, Brian Hess, Joan Souchik, Evonik Oil Additives, Horsham, PA

11 – 11:30 am | Fluid Effects on Low Temperature Power Consumption and Cavitation Noise in Hydraulic Systems

Zheng Dai, Petro-Canada Lubricants, Mississauga, Ontario, Canada, Kimberly Rodriguez, University of California, Merced, CA, Paul Michael, Milwaukee School of Engineering, Milwaukee, WI

11:30 am – Noon | Study on Water Separation of Evaluation for Hydraulic Oil

Zhongguo Liu, Dalian Lubrication R&D Institute, Dalian, Liaoning, China

5G | Engine & Drivetrain III

8 – 8:30 am | Effects of SAE 0W-20 Engine Oil Formulations in Taxi Cab Severe Field Service

JoRuetta Ellington, Andre Dawson, Evonik Oil Additives, Horsham, PA, Boris Eisenberg, Evonik Resource Efficiency GmbH, Darmstadt, Germany, Brian Hess, Evonik Oil Additives, Horsham, PA

8:30 – 9 am | Automatic Transmission Fluid VII Effects in Taxi Cab Field Service

JoRuetta Ellington, Andre Dawson, Brian Hess, Evonik Oil Additives, Horsham, PA, Jennifer Holtzinger, Evonik Resource Efficiency GmbH, Darmstadt, Germany

9 – 9:30 am | Motor Oil, Fuel Economy and Real Driving Emissions in the Era of E-Mobility

Boris Zhmud, Applied Nano Surfaces, BIZOL Lubricants, Uppsala, Sweden

9:30 – 10 am | PPD Selection for Next Generation Engine Oil Formulations

Justin Mills, Joan Souchik, John Maxwell, Evonik Oil Additives, Horsham, PA

10 – 10:30 am – Break

10:30 – 11 am | Low-Viscosity Passenger Car Motor Oils and Automatic Transmission Fluids: A Comparative Evaluation of Group III, Group III+, Renewable Group III+, and PAO-Based Formulations

Lynn Rice, David Matucha, Steve Haffner, Paula Vettel, Novvi LLC, Emeryville, CA

11 – 11:30 am | Hydroynamic Friction Reduction Due to Laser Texturing of IC Engine Journal Bearing Shells

Tom Reddyhoff, Sorin Vladescu, Daniele Dini, Imperial College London, South Kensington, United Kingdom, Mark Fowell, Volvo Trucks, Göteborg, Sweden

11:30 am – Noon | Fuel Economy Modeling: Engine to Engine Operating Regime Differences

Brendan Miller, Shelby Skelton, Chevron Oronite Co. LLC, Richmond, CA

5H | Nanotribology V

8 – 8:30 am | Exploring the Limits of Contact Mechanics Models for Nanoscale Metal Contacts Using In-Situ and in Silico Techniques

Sai Bharadwaj Vishnubhotla, Subarna Khanal, Tevis Jacobs, University of Pittsburgh, Pittsburgh, PA, Rimei Chen, Ashlie Martini, University of California, Merced, Merced, CA

8:30 – 9 am | Atomic-Scale Friction Behavior of Few-Layer Graphene Under Ultra-High Vacuum Conditions

Philip Egberts, Peng Gong, University of Calgary, Calgary, Alberta, Canada

9 – 9:30 am | The Chemistry of Friction, Wear and Tribofilm Growth on 2D materials

Shivaranjan Raghuraman, Jonathan Felts, Texas A&M University, College Station, TX

9:30 – 10 am | Tribological Behavior Comparison of MoS_2 and Graphene Influenced by Humidity and Counter Surface Oxides

Taib Arif, Tobin Filleter, University of Toronto, Mississauga, Ontario, Canada, Guillaume Colas, FEMTO-ST Institute, Besançon, Bourgogne Franche-Comté, France

10 – 10:30 am – Break

10:30 – 11:30 am | Pushing Tiny Sliders Or What We Can Learn from the Controlled Translation of Really Small Objects on Well-Defined Surfaces

Udo Schwarz, Yale University, New Haven, CT

11:30 am – Noon | Atomic-Scale Insights into Contacts Between Nanoscale Bodies: In-Situ Experiments and Matched Atomistic Simulations

Tevis Jacobs, Sai Bharadwaj Vishnubhotla, Subarna Khanal, University of Pittsburgh, Pittsburgh, PA, Rimei Chen, Xiaoli Hu, Ashlie Martini, University of California, Merced, Merced, CA

5I | Surface Engineering I

8 – 8:30 am | Numerical and Experimental Studies on Friction Reduction by Surface Modification in TEHL Contacts

Max Marian, Tim Weikert, Stephan Tremmel Friedrich-Alexander-Universität Erlangen-Nürnberg, Erlangen, Germany

8:30 – 9 am | The Effect of Graphene as Additive on the Anti-Corrosion of Polyurethane Coating

Hai Tan, Deguo Wang, Yanbao Guo, China University of Petroleum-Beijing, Beijing, China

9 – 9:30 am | Dynamical Characterization of Micro Cantilevers by Different Excitation Methods in Dynamic AFM

Xinfeng Tan, Dan Guo, Jianbin Luo, Tsinghua University, Beijing, China

9:30 – 10 am | Ultralow Friction of Concentrated Polymer Brushes Sustained by Surface Texturing

Mayu Miyazaki, Takahiro Tsuchiya, Ken Nakano, Yokohama National University, Yokohama-shi Hodogaya-ku, Kanagawa, Japan, Chiharu Tadokoro, Saitama University, Saitama-shi, Japan, Shinya Sasaki, Tokyo University of Science, Tokyo, Japan, Keita Sakakibara, Yoshinobu Tsujii, Kyoto University, Uji-shi, Japan

10 – 10:30 am – Break

10:30 – 11 am | Multi-Resolution Characterization of Surface Topography for Improved Properties Prediction

Tevis Jacobs, Abhijeet Gujrati, Subarna Khanal, University of Pittsburgh, Pittsburgh, PA, Lars Pastewka, University of Freiburg, Freiburg, Germany

11 – 11:30 am | Low Cost Fabrication Method for Surface Textures on Engine Components

Stephen Hsu, Govindaiah Patakamuri, George Washington University, Washington DC

11:30 am – Noon | The Deterioration Characteristics and Mechanism of Polishing Pads and Slurry in Chemical Mechanical Polishing (CMP) of Fused Silica

Chengxi Kang, Guoshun Pan, Dan Guo, Xin Zhang, Tsinghua University, Beijing, China

5J | Lubrication Fundamentals V

8 – 8:30 am | Molecular Science and Engineering Application of High Performance Lubricants

Weimin Liu, Lanzhou Institute of Chemical Physics, Chinese Academy of Sciences, Lanzhou, Gansu, China

8:30 – 9 am | The Autoxidation of Polyisobutylene Succinimide Dispersant Mimics: Products, Mechanisms and Performance Implications

Jonny Ruffell, Moray Stark, Thomas Farmer, Duncan Macquarrie, University of York, York, United Kingdom

9 – 9:30 am | Relationship Between Structures and Anti-Oxidation Performance of Hindered Phenolic Antioxidants

Tom Tang, Smith Scott, Glenn Kenreck, Amaron Barr-Cook, Gertrude Jacobs, SI Group, Orangeburg, SC

9:30 – 10 am | Fuel Economy Low Viscosity Engine Oil Compatible with Low Speed Pre-Ignition

Jiayang Zhao, Sinopec Lubricant Co., Ltd., Beijing, China

10 – 10:30 am – Break

10:30 – 11 am | Is Oxidation Terminated? Latest Technologies for Low Varnishing and Long-Life Turbine Oils Highlight the Need for Revised Oxidative Stability Testing

Alex Mannion, Eugene Scanlon, Ryan Fenton, Jeff Schoonmaker, Michael Hoey, Thomas Rühle, BASF, Florham Park, NJ

11 – 11:30 am | The Use of Microcapsulated Additives Fuel Economy Enhancement

Stephen Hsu, Govindaiah Patakamuri, George Washington University, Washington DC, Timothy Cushing, GMC, Warren, MI

11:30 am – Noon | Evolution of ZDDP Crystallinity and Its Effect on Film Durability

Mao Ueda, Amir Kadiric, Hugh Spikes, Imperial College London, London, United Kingdom

5K | Tribology of Biomaterials

Biotribology & Materials Joint Session

8 – 9 am | Invited Talk

9 – 9:30 am | Bio-Tribocorrosion of CoCrMo During Reciprocating Sliding Against Bovine Articular Cartilage

Manel Rodriguez Ripoll, Bojana Stojanovic, Friedrich Franek, AC2T Research GmbH, Wiener Neustadt, Austria, Christoph Stotter, Christoph Bauer, Thomas Klestil, Stefan Nehrer, Danube University Krems, Krems, Austria

9:30 – 10 am | Biomechanics of Hierarchically-Structured Enamel in Grinding Dentitions

Tomas Grejtak, Tomas Babuska, Xiu Jia, Brandon Krick, Lehigh University, Bethlehem, PA, Siddhartha Pathak, University of Nevada, Reno, Reno, NV, Stephen Hendricks, Gregory Erickson, Florida State University, Tallahassee, FL

10 – 10:30 am – Break

10:30 – 11 am | Fabrication of Cartilage-Inspired Surface Textures Using Photolithography for Orthopedic Implants

Dipankar Choudhury, Gabriel Dharwadker, Evelyn Smith, Josh Goss, Min Zou, University of Arkansas, Fayetteville, AR

11 – 11:30 am | Friction Across Soft Matter Interfaces

Angela Pitenis, University of California, Santa Barbara, Santa Barbara, CA

11:30 am – Noon | Understanding the Interaction Between Contact Lens and Eye Using In-Vivo and In-Silico Techniques

Rachel Morecroft, Yunok Craze-Romero, Raman Maiti, University of Sheffield, Sheffield, United Kingdom, William Kay, Stephen Connell, Pete Toomey, Royal Hallamshire Hospital, Sheffield, United Kingdom

6A | Rolling Element Bearings II

1:30 – 2 pm | Microstructural Improvements of Advanced Ball Bearing Materials through Alloying Elements, Powder Metallurgy and Deformation Processes

Christopher DellaCorte, NASA, Cleveland, OH

2 – 2:30 pm | The Lubricant Formulation: Driver for Premature Bearing Failures and White Etching Cracks?

Kenred Stadler, SKF GmbH, Schweinfurt, Germany, Arnaud Ruellan, SKF B.V., Nieuwegein, Netherlands

2:30 – 3 pm | Surface Driven Formation of White Etching Cracks in Bearings Used in Wind Turbines

Mohanchand Paladugu, The Timken Co., North Canton, OH

3 – 3:30 pm – Break

3:30 – 4 pm | The Evolution of Dark Etching Regions and White Etching Bands in Bearing Steel Due to Rolling Contact Fatigue

Mostafa El Laithy, Ling Wang, Terry Harvey, University of Southampton, Southampton, Hampshire, United Kingdom, Bernd Vierneusel, Martin Correns, Toni Blass, Schaeffler Technologies GmbH & Co. KG, Schweinfurt, Germany

4 – 4:30 pm | The Major Acceleration Factor of White Etching Crack (WEC)

Yujiro Toda, NSK Ltd., Fujisawa, Kanagawa, Japan

4:30 – 5 pm | Formation of White Etching Areas/Cracks on a Four Disk Rig – Influence of Electrical Current and Slip

Florian Steinweg, Institute for Materials Applications in Mechanical Engineering, RWTH Aachen University, Aachen, Germany, Adrian Mikitisin, Central Facility for Electron Microscopy, RWTH Aachen University, Aachen, Germany

5 – 5:30 pm | The Influence of Material Properties and Steel Cleanliness on the Formation of Subsurface Cracking Failures Associated with Microstructural Alterations

Benjamin Gould, Aaron Greco, Nicholaos Demas, Argonne National Laboratory, Argonne, IL

5:30 – 6 pm | Structure Change of Cementite Just Below the Sliding Surface on Ball Bearings

Kenji Matsumoto, Honda R&D Co.,Ltd., Haga-gun, Tochigi, Japan, Naoaki Yoshida, Kyushu University, Kasuga, Fukuoka, Japan

6 – 6:30 pm | Analysis of Material Defects in Relation to Different Damage Mechanisms

Joerg Binderszewsky, Toni Blass, Wolfram Kruhoeffer, Joerg Loos, Schaeffler Technologies AG & Co. KG, Schweinfurt, Germany

6:30 – 7 pm | Rolling Element Bearings Business Meeting

6B | Biotribology I

1:30 – 2 pm | Invited Talk

Itai Cohen, Cornell University, Ithaca, NY

2 – 2:30 pm | Cartilage Fluid Load Support in the Migrating Contact Area: How Much Migration is Necessary?

Jamie Benson, David Burris, University of Delaware, Newark, DE

2:30 – 3 pm | Rate-Dependent Cartilage Adhesion Derived from Poroviscoelastic Relaxations

Guebum Han, Corinne Henak, Melih Eriten, University of Wisconsin-Madison, Madison, WI

3 – 3:30 pm – Break

3:30 – 4 pm | Quantifying Adhesion in Articular Cartilage

Jamie Benson, David Burris, University of Delaware, Newark, DE

4 – 4:30 pm | Elegant Shadow Making Tiny Force Visible and Measurable

Hongyu Lu, Wei Yin, Yonggang Meng, Yu Tian, Tsinghua University, Beijing, China, Yelong Zheng, Tianjin University, Tianjin, China

4:30 – 5 pm | Biotribology Business Meeting

6C | Commercial Marketing Forum VI

Sessions TBD

6D | Frontiers of Tribology Research II: Lubricant and Chemistry

Joint STLE/CTI Symposium

1:30 – 2 pm | Molecular Science and Engineering Application of High Performance Lubricants

Weimin Lu, Lanzhou Institute of Chemical Physics, Chinese Academy of Sciences, Lanzhou, China

2 – 2:30 pm | Tribochemistry – Myths and Facts

Seong Han Kim, Pennsylvania State University, State College, PA

2:30 – 3 pm | Boundary Lubrication of Polar Molecule in Aqueous Solutions Under Electric Field

Yonggang Meng, Jun Zhang, Tsinghua University, Beijing, China

3 – 3:30 pm – Break

3:30 – 4 pm | Tribological and Electric Properties of C/Cu Pairs Under Dynamic Contact During Current-Carrying Sliding

Yongzhen Zhang, Feng Ni, Chenfei Song, Yanyan Zhang, Zhenghai Yang, Bao Shangguan, Henan University of Science and Technology, Luoyang, Henan, China

4 – 4:30 pm | Tribochemical Reaction Pathways Explored with Reactive Atomistic Simulations

Ashlie Martini, University of California, Merced, Merced, CA

4:30 – 5 pm | Integrated Biomechanics and Biotribology of Artificial Joints

Zhongmin Jin, Southwest Jiaotong University, Chengdu, China

5 – 5:30 pm | Fundamental Insights into Adhesion, Friction and Wear Through Nanoscale Contact

Robert Carpick, University of Pennsylvania, Philadelphia, Pennsylvania

5:30 – 6 pm | Bio-inspired Adhesive Technology: From Biology to Engineering

Zhendong Da, Nanjing University of Aeronautics and Astronautics, Nanjing, Jiangsu, China

6E | Tribochemistry

Materials Tribology and Nanotribology Joint Session I

1:30 – 2 pm | The Effect of TiO_2 Nanoparticle Addition to the Tribological Performance of MoDTC-Containing Lubricants

Fabrice Dassenoy, Pushkar Deshpande, Clotilde Minfray, Thierry Le Mogne, Ecole Centrale de Lyon, Ecully, France, Istvan Jenei, University of Stockholm, Stockholm, Sweden, Benoit Thiebaut, TOTAL, Solaize, France

2 – 2:30 pm | One-Pot Synthesis of Serpentine at Polymer Nanoparticles with Outstanding Anti-Wear Property

Qiuying Chang, Hao Zhang, Beijing Jiaotong University, Beijing, China, Pavlo Rudenko, Tribotex, Colfax, WA

2:30 – 3 pm | A Stress-Activated Model for Tribofilm Growth Based on a Nanoparticle Sintering Mechanism

Allen Comfort, Steven Thrush, US Army TARDEC, Warren, MI

3 – 3:30 pm – Break

3:30 – 4 pm | Tribochemistry of Ultralow Wear PTFE-Based Composites: Assessing the Role of the Sliding Environment

Kasey Campbell, Cooper Atkinson, Tomas Babuska, Brantley Balsamo, Lehigh University, Bethlehem, PA, Mark Sidebottom, Miami University, Oxford, OH, Christopher Junk, Brandon Krick, Lehigh University, Bethlehem, PA

4 – 4:30 pm | Nanomechanics of Ultralow Wear PTFE-Based Composites: Microstructure and Mechanics of Filler Particles

Cooper Atkinson, Lehigh University, Allentown, PA, Mark Sidebottom, Miami University, Oxford, OH, Tomas Babuska, Tomas Grejtak, Brantley Balsamo, Kasey Campbell, Brandon Krick, Christopher Junk, Lehigh University, Bethlehem, PA, Heidi Burch, Du Pont Company, Wilmington, DE

4:30 – 5 pm | Promotion of Ultralow-Wear Fluoropolymer-Metal-Oxide Composites through Tribochemistry

Mark Sidebottom, Miami University, Oxford, OH, Christopher Junk, Tomas Babuska, Kasey Campbell, Cooper Atkinson, Brandon Krick, Lehigh University, Bethlehem, PA, Holly Salerno, Heidi Burch, Gregory Blackman, DuPont Co., Wilmington, DE

6F | Synthetics & Hydraulics Lubricants II

1:30 – 2 pm | Synthesis of Dibenzyl Toluene as Heat Transfer Fluid
Peng Li, Zhongguo Liu, Daxin Sun, Chaoliang Wei, Chao Yang, Xianzhen Gao, Yanbo Zheng, Dalian Lubricating Oil Research and Development Institute, Dalian, Liaoning, China

2 – 2:30 pm | A New Group V Base Oil for Low Viscosity Engine Oil
Yaokun Han, Dow Chemical, Shanghai, China

2:30 – 3 pm | Naphthenic Base Oils for High Performance, High Viscosity Index Hydraulic Fluids Applications
Thomas Norrby, Jinxia Li, Nynas AB, Nynashamn, Sweden

3 – 3:30 pm – Break

3:30 – 4 pm | Performance and Implemenation of Perfluoropolyether (PFPE) Lubricants
Joanna Dawczyk, Janet Wong, Imperial College London, London, United Kingdom

4 – 4:30 pm | Thermodynamic Characterization of Base Oil Viscosity and Vapor Pressure
Tom Karis, TEK Data Systems, Aromas, CA, Raj Shah, Koehler Instrument Co., Inc., Holtsville, NY

4:30 – 5 pm | Synthetics and Hydraulics Business Meeting

6G | Engine & Drivetrain IV

Advanced Fuel-Efficiency Engine and Drivetrain Hardware Technologies

1:30 – 2 pm | Invited Talk
Arun Solomon, General Motors, Rochester, MI

2 – 2:30 pm | Invited Talk
Feng Dong, BorgWarner, Auburn Hills, MI

2:30 – 3 pm | Tribological Challenges of Advanced Engine Technologies
Peter Lee, Southwest Research Institute, San Antonio, TX

3 – 3:30 pm – Break

3:30 – 4 pm | Modifications of Ferrous-Based Thermal Spray Coatings for Improved Tribological System Performance
Paulo Rosa, Comau, Southfield, MI

4 – 4:30 pm | Open Discussion

4:30 – 5:30 pm | Engine and Drivetrain Business Meeting

6H | Nanotribology VI

1:30 – 2 pm | In-Situ Tribofilm Growth Study of a Mechanical Sintering Nanoparticle Antiwear Additive
Steven Thrush, Allen Comfort, US Army, Warren, MI

2 – 2:30 pm | Tribological Behavior of Plasma Functionalized ZnO Nano-Additives
Kimaya Vyavhare, Pranesh Aswath, University of Texas at Arlington, Arlington, TX, Ali Erdemir, Argonne National Laboratory, Lemont, IL

2:30 – 3 pm | In-Situ SEM Nanomechanical Characterization of Tribofilms Derived from Inorganic Nanoparticles
Kora Farokhzadeh, Praveena Manimunda, Joseph Lefebvre, Syed-Asif Syed-Amanulla, Steven Shaffer, Bruker Nano Surfaces, San Jose, CA

3 – 3:30 pm – Break

3:30 – 4 pm | Dislocations Associated with Stick-Slip Friction of Lubricants in Boundary Lubrication
Rong-Guang Xu, Yongsheng Leng, George Washington University, Washington, DC

4 – 4:30 pm | ZrO_2 Nanoparticles as Nanoadditives in Fully Formulated Low Viscosity Gear Oil
Robert Wiacek, Lei Zheng, Z. Serpil Gonen-Williams, James Iohuis, Pixelligent Technologies, LLC, Baltimore, MD, Meagan Elinski, Zachary Milne, Andrew Jackson, Robert Carpick, University of Pennsylvania, Philadelphia, PA, Nicholaos Demas, Benjamin Gould, Argonne National Laboratory, Argonne, IL

4:30 – 5 pm | PEI-RGO Nanosheets as a Nanoadditive for Enhancing the Tribological Properties of Water-Based Lubricants
Chengcheng Liu, Deguo Wang, Yanbao Guo, China University of Petroleum-Beijing, Beijing, China

5 – 5:30 pm | Nanotribology Business Meeting

6I | Surface Engineering II

1:30 – 2 pm | Friction Properties of Milling Micro-Textured Surface on Al-Si Alloy Under Sliding Boundary Conditions
Chao Guo, Qinghua Song, Zhanqiang Liu, Bing Wang, Key Laboratory of High Efficiency and Clean Mechanical Manufacture, School of Mechanical Engineering, Shandong University, Jinan, China, Long Chen, National Demonstration Center for Experimental Mechanical Engineering Education, Shandong University, Jinan, China

2 – 2:30 pm | Chemical Mechanical Polishing Behavior of PS/Sio_2 Nanospheres with Different Shell Thickness on Fused Silica
Xin Zhang, Dan Guo, Guoshun Pan, Chengxi Kang, Tsinghua University, Beijing, China

2:30 – 3 pm | Surface Micro-Cavities in Powder Metallurgy Steel and Their Effect on the Tribological Performance of Lubricated Point Contacts
Guido Boidi, Daniele Dini, Amir Kadiric, Imperial College London, London, United Kingdom, Francisco Profito, Izabel Machado, Polytechnic School, University of São Paulo, São Paulo, Brazil

3 – 3:30 pm – Break

3:30 – 4 pm | Mastering the Art of Honing

Boris Zhmud, Applied Nano Surfaces, BIZOL Lubricants, Uppsala, Sweden

4 – 4:30 pm | Bi-Gaussian Stratified Feature of Impregnated Graphite Surfaces after a Laser Treatment

Songtao Hu, Xi Shi, Zhike Peng, Shanghai Jiao Tong University, Shanghai, China, Tom Reddyhoff, Imperial College London, London, United Kingdom, Weifeng Huang, Xiangfeng Liu, Tsinghua University, Beijing, China

4:30 – 5 pm | Patterning and Fusion of Alumina Particles on S7 Tool Steel by Pulsed Laser Remelting

Shixuan Chen, Melih Eriten, University of Wisconsin-Madison, Madison, WI

5 – 5:30 pm | Tribological and Physical Properties of PTFE Micropowder-Filled NBR Rubber Under Water Lubrication

Yanfeng Han, Wei Feng, Jiaxu Wang, Chongqing University, Chongqing, China

5:30 – 6 pm | Surface Engineering Business Meeting

6J | Lubrication Fundamentals VI

1:30 – 2 pm | Proposals to Improve the Viscosity Index Method, ASTM D2270

Jack Zakarian, JAZTech Consulting, LLC, Orinda, CA

2 – 2:30 pm | Effects of Oiliness Additives on Lubrication Conditions in Rolling Bearings

Taisuke Maruyama, Masayuki Maeda, NSK Ltd., Fujisawa, Kanagawa, Japan, Ken Nakano, Yokohama National University, Yokohama, Japan

2:30 – 3 pm | Mechanism of ZDDP Boundary Film Formation

Hugh Spikes, Imperial College London, London, United Kingdom

3 – 3:30 pm – Break

3:30 – 4 pm | A Mixed Lubrication Model for Paralleled Plain Faces

Yuechang Wang, Gaolong Zhang, Ying Liu, Tsinghua University, Beijing, China

4 – 4:30 pm | The Investigation of Oil Replenishment in a Rolling Bearing

He Liang, Yu Zhang, Hongbai Chen, Wenzhong Wang, Beijing Insititute of Technology, Beijing, China

4:30 – 5 pm | Lubrication Fundamentals Business Meeting

6K | Condition Monitoring I

1:30 – 2 pm | Contributing Factors That Influence Oil Analysis Data

Michael Holloway, ALS Tribology, Highland Village, TX

2 – 2:30 pm | Monitoring Engine Lubricating Oil Viscosity In-Situ in a Test Marine Diesel Engine Using a Novel Ultrasonic Technique

Xiangwei Li, Tomos Brenchley, Olivia Manfredi, Henry Brunskill, Rob Dwyer-Joyce, University of Sheffield, Sheffield, United Kingdom, Matthias Stark, Winterthur Gas & Diesel, Winterthur, Switzerland

2:30 – 3 pm | Management of Lubricated Machinery Assets in an Industrial Setting

Bryan Johnson, Arizona Public Service, Tonopah, AZ

3 – 3:30 pm – Break

3:30 – 4 pm | Study on the Condition Monitoring System for the Sliding Surface Using Machine Learning

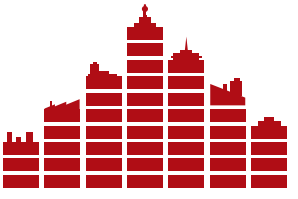
Tomomi Honda, Yuka Hashimoto, Yusuke Mochida, University of Fukui, Fukui, Japan, Kazuhiko Sugiyama, Yumiko Nakamura, Chikako Takatoh, Ebara Corp., Fujisawa, Kanagawa, Japan

4 – 4:30 pm | A New Approach to Onsite Oil Analysis for Industry 4.0

Lisa Williams, Spectro Scientific, Chelmsford, MA

4:30 – 5 pm | Bridging the Gap: Filter Debris Analysis

Henry Neicamp, Polaris Laboratories, Indianapolis, IN



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In an effort to provide attendees with the opportunity of not missing a presentation, STLE encourages speakers to submit an optional 2-3 page extended abstract or provide digital copies of their presentation slides. We recommend speakers submit materials before **April 19, 2019,** to ensure presentations are available to attendees before the meeting.

Submissions must be in PDF format and can be emailed to Karl Phipps at **presentations@stle.org**.

For more information about requirements, please visit **www.stle.org/annualmeeting**.

Thursday, May 23, 2019

7A | Rolling Element Bearings III

8 – 8:30 am | Hoot Noise of Rolling Element Bearings – Are Non Linear Vibrations the Key Theory?

Hannes Grillenberger, Mark Nichols, Stefan Kopsch, Christoph Schroeder, Schaeffler Technologies AG & Co. KG, Herzogenaurach, Germany

8:30 – 9 am | "Reliving Pain" – Highest Performance at Toughest Conditions/The Development of a New Ball Bearing Type with Integrated Tilt Compensation

Thomas Kreis, Herbert Niedermeier, Gebr. Reinfurt GmbH & Co. KG, Rimpar, Bavaria, Germany

9 – 9:30 am | Investigations on Cage Dynamics in Rolling Bearings by Test and Simulation

Sebastian Schwarz, Stephan Tremmel, Friedrich-Alexander-Universität Erlangen-Nürnberg (FAU), Erlangen, Germany, Hannes Grillenberger, Schaeffler Technologies AG & Co. KG, Herzogenaurach, Germany

9:30 – 10 am | Effect of Microgravity and High Temperature on the Dynamics of Ball Bearing

Yuanqing Liu, Wenzhong Wang, Beijing Institute of Technology, Beijing, China

10 – 10:30 am – Break

10:30 – 11 am | Measured Lubricant Rheology-Based Traction Model for Rolling Bearings

Pradeep Gupta, PKG Inc., Clifton Park, NY, Scott Bair, Georgia Instititue of Technology, Atlanta, GA

11 – 11:30 am | Experimental and Numerical Investigation of Hydraulic Losses in Rolling Bearings

Attila Gonda, Sauer Bernd, Technical University of Kaiserslautern, Kaiserslautern, Germany, Daniel Großberndt, Hubert Schwarze, Technical University of Clausthal, Clausthal, Germany

11:30 am – Noon | The Effectiveness of Ball-On-Disc Tests at Simulating Friction in Greased Rolling Bearings – A Direct Comparison of Experimental Results

Nicola De Laurentis, Yuta Kanazawa, Amir Kadiric, Imperial College London, London, United Kingdom

7B | Biotribology II

8 – 8:30 am | Lubricity of Synovial Fluid Constituents for Hydrogel Cartilage Model

Yoshinori Sawae, Mayo Kubota, Hironori Shinmori, Takehiro Morita, Tetsuo Yamaguchi, Kyushu University, Fukuoka, Japan

8:30 – 9 am | Size of Worn Region Predicts Fluid Pressures During Human Slips

Kurt Beschorner, Sarah Hemler, University of Pittsburgh, Pittsburgh, PA, Vani Sundaram, University of Colorado-Boulder, Boulder, CO

9 – 9:30 am | Role of Poroviscoelastic Relaxations in Rate-Dependent Cartilage Microfracture

Guebum Han, Melih Eriten, Corinne Henak, University of Wisconsin-Madison, Madison, WI

9:30 – 10 am | Competitive Rates of Cartilage Rehydration

David Burris, University of Delaware, Newark, DE

10 – 10:30 am – Break

10:30 – 11 am | Tribocorrosion of Duplex Treatments on Ti-6Al-4V in Ringer's Solution

Brandon Strahin, Gary Doll, The University of Akron, Akron, OH

11 – 11:30 am | Raman Spectroscopic Analysis of the Biochemical Reaction of Hyaluronic Acid in Joint Replacement

Risha Rufaqua, Martin Vrbka, David Rebenda, Ivan Krupka, Martin Hartl, Brno University of Technology, Brno, Czechia, Dipankar Choudhury, University of Arkansas, Fayetteville, AR, Dušan Hemzal, Masaryk University, Brno, Czech Republic, Brno, Czechia

11:30 am – Noon | Agarose Hydrogel as a Carrier for Hyaluronic Acid with the Lubrication Efficiency of the Sustained Release

Mahshid Hafezi, Liquo Qin, Guangneng Dong, Qunfeng Zeng, Institute of Design Science and Basic Components, Xian, Shaanxi, China

7C | Power Generation I

8 – 8:30 am | The Tribological Performance of Gas Turbine Lubricants

Jake Airey, Mark Simmons, Richard Greenwood, The University of Birmingham, Derby, Derbyshire, United Kingdom, Matt Spencer, Rolls-Royce Plc, Derby, Derbyshire, United Kingdom

8:30 – 9 am | Oxidation Life and Sludge of Turbine Oil by Dry-TOST Test

Daxin Sun, Yu Jiang, Chao Yang, Yanbo Zheng, Zhongguo Liu, Dalian Lubricating Oil Research & Development Institute, PetroChina Lubicant Co., Dalian, Liaoning, China, Peng Li, Dalian Lubricating Oil Research and Development Institute, Dalian, Liaoning, China

9 – 9:30 am | There are No "Varnish-Free" Turbine Oils

Matthew Hobbs, Peter Dufresne, EPT, Calgary, Alberta, Canada

9:30 – 10 am | High Performance New Hybrid Turbine Oil Made by Mineral Oil and PAG

Hiroki Sekiguchi, Yuhei Shirakura, Junya Iwasaki, Idemitsu Kosan Co., Ltd., Ichihara-shi,Chiba, Japan

10 – 10:30 am – Break

7E | Tribochemistry

Materials Tribology and Nanotribology Joint Session II

8 – 8:30 am | Formation and Nature of Lubricious Carbon-Containing Tribofilms

Arman Khan, Hongxing Wu, Yip-Wah Chung, Qian Wang, Northwestern University, Evanston, IL

8:30 – 9 am | Interactions Between Tri-Cresyl Phosphate Lubricant Additive and Iron Oxide Explored Using Statistical Analysis of Reactive Molecular Dynamics Simulations

Arash Khajeh, Xiaoli Hu, Ashlie Martini, University of California, Merced, Merced, CA, Stephen Berkebile, US Army Research Laboratory, Baltimore, MD

9 – 9:30 am | Reactive Molecular Dynamics Simulations of Thermal and Tribochemical Film Growth from Di-tert-butyl Disulfide on an Fe(100) Surface

Karen Mohammadtabar, Ashlie Martini, University of California, Merced, Merced, CA, Stefan Eder, Pedro Bedolla, Nicole Doerr, AC2T Research GmbH, Wiener Neustadt, Lower Austria, Austria

9:30 – 10 am | Surface Absorption and Chemical Reaction of Additives Studied by Molecular Dynamics

Hitoshi Washizu, University of Hyogo, Kobe, Japan

10 – 10:30 am – Break

10:30 – 11 am | Impact of Nanodiamonds on ZDDP Tribo-Film Formation at Stainless-Steel Contacts

Biplav Acharya, Jacqueline Krim, North Carolina State University, Raleigh, NC

11 – 11:30 am | In-Situ Raman Spectroscopic Characterization of ZDDP Tribofilms

Carlos Garcia, Hugh Spikes, Janet Wong, Imperial College London, London, United Kingdom

11:30 am – Noon | Effect of ZDDP on Hydrogen Absorption in Two Synthetic Oils

Monica Ratoi, Angelos Stavrinidis, Brian Mellor, University of Southampton, Southampton, Hampshire, United Kingdom, Vlad Niste, Hiroyoshi Tanaka, Joichi Sugimura, Kyushu University, Fukuoka, Japan

7F | Synthetics & Hydraulics Lubricants III

8 – 8:30 am | Novel Functionalized Polyalkylene Glycols and Their Synergy with Primary Anti-oxidants

Martin Greaves, Dow Chemical, Horgen, Switzerland

8:30 – 9 am | From Jet Engine Oils to High Temperature Industrial Lubricants: High Performance Anti-oxidants for Synthetic Esters

Siegfried Lucazeau, NYCO, Paris Cedex, France

9 – 9:30 am | Time-Resolved Oxidative Degradation of Ester-Based Lubricants Identified by Mass Spectrometry

Nicole Doerr, Marcella Frauscher, Andjelka Ristic, Charlotte Besser, AC2T Research GmbH, Wiener Neustadt, Austria, Guenter Allmaier, Vienna University of Technology, Vienna, Austria

9:30 – 10 am | Hydraulic Lubricant Performance – A Corrosion and Oxidative Perspective

Rajeev Kumar, Kathleen Cooper, ExxonMobil, Annandale, NJ

10 – 10:30 am – Break

10:30 – 11 am | Hybrid Antifoam Technology for Lubricating Oils

Ernest Galgoci, Justin Mykietyn, Münzing, Bloomfield, NJ

11 – 11:30 am | Ionic Liquid Additized Environmentally-Friendly Hydraulic Fluids

Xin He, Huimin Luo, Jun Qu, Oak Ridge National Laboratory, Oak Ridge, TN

11:30 am – Noon | Hydrocarbon-Mimicking Ionic Liquids as Low Vapor Pressure Triboimprovers

Erik Nyberg, Didac Llopart, Ichiro Minami, Luleå University of Technology, Luleå, Sweden

7G | Grease I

8 – 8:30 am | Back to the Basics: Fundamental Building Blocks of Grease Formulation

Joseph Kaperick, Afton Chemical Corp., Richmond, VA

8:30 – 9 am | A New Preformed Polyurea Thickener for Grease

Zhe Jia, John Cuthbert, Nathan Wilmot, Bruce Hook Dow Chemical, Freeport, TX

9 – 9:30 am | Film Thickness in a Grease Lubricated Ball Bearing

Piet Lugt, SKF Research and Technology Development, Nieuwegein, Utrecht, Netherlands

9:30 – 10 am | Film Thickness and Friction Measurements Under Starved/Fully Flooded Conditions for a Range of Different Grease Types

Rory McAllister, Marc Masen, Philippa Cann, Imperial College London, London, United Kingdom

10 – 10:30 am – Break

10:30 – 11 am | How Reliable and Sensitive is the New Indentation/Retraction Method in Measuring Tackiness of Industrial Greases?

Emmanuel Georgiou, Dirk Drees, Michel De Bilde, Falex Tribology NV, Rotselaar, Belgium, Michael Anderson, Falex Corp., Sugar Grove, IL

11 – 11:30 am | Simulation of Grease Flow in Speed Reducer of Robot

Akihiro Shishikura, Hideki Nakata, Kei Sakakura, Idemitsu Kosan Co., Ltd., Chiba, Japan

11:30 am – Noon | Effect of Rheological Properties of Grease on Rotational Torque of Ball Bearings Caused by Stirring Resistance

Yurie Yamashita, Takeshi Tsuda, Kouji Yoshizaki, JTEKT Corp., Kashiwara, Osaka, Japan

7H | Materials Tribology III

8 – 9 am | Mechanisms of Abrasive Wear in WC/Co Hardmetals

Mark Gee, National Physical Laboratory, Teddington, United Kingdom

9 – 9:30 am | Nickel MAX-Phase Composites for High Temperature and High Sliding Applications

Nikhil Murthy, Stephen Berkebile, US Army Research Laboratory, Aberdeen Proving Ground, MD, Maharshi Dey, Matt Fuka, Surojit Gupta, University of North Dakota, Grand Forks, ND

9:30 – 10 am | Effect of MoS_2 on the Tribological Performance of AA7075/Si_3N_4 Composite

Mir Irfan Ul Haq, Ankush Anand, Shri Mata Vaishno Devi University, Jammu, India

10 – 10:30 am – Break

10:30 – 11 am | Influence of Operational and Surface Conditions on the Tribological Performance of Self-Lubricating Polymer Composite Bearing Materials Used in Hydropower Applications

Maria Rodiouchkina, Kim Berglund, Roland Larsson, Luleå University of Technology, Lulea, Sweden

11 – 11:30 am | Tribological Behavior of Self-Lubricating Polymer Composite Bearing Materials During Long-Time Dry Sliding

Maria Rodiouchkina, Leonardo Pelcastre, Kim Berglund, Roland Larsson, Luleå University of Technology, Lulea, Sweden, Jonna Lind, Åsa Kassman Rudolphi, Uppsala University, Uppsala, Sweden

11:30 am – Noon | Fabrication of Porous Alumina-IF-MoS_2 Self-Lubricant Composite and its Tribological Behavior

Abdul Salam, Tsinghua University, Beijing, China

7I | Contact Mechanics I

8 – 8:30 am | Indenting Soft Swollen Elastomers with a Microparticle

Jonathan Pham, Justin Glover, University of Kentucky, Lexington, KY, Michael Kappl, Hans-Jürgen Butt, Max Planck Institute for Polymer Research, Mainz, Germany

8:30 – 9 am | Transparent Hydrogel Indentation and Slip Mechanics Through In-Situ Particle Inclusion and Exclusion

Alison Dunn, Christopher Johnson, Jiho Kim, Shabnam Bonyadi, University of Illinois at Urbana-Champaign, Urbana, IL

9 – 9:30 am | Small Forces, Large Noise: Scaling Nano-Indentation to the Micro Scale

Christopher O'Bryan, Kyle Schulze, Thomas Angelini, University of Florida, Gainesville, FL

9:30 – 10 am | Eliminating the Challenges Associated with Physically Oscillating Contact Instruments

Daniel Garcia, Thomas Angelini, University of Florida, Gainesville, FL

10 – 10:30 am – Break

10:30 – 11 am | Shape Memory: The Contact Mechanics of Photonic Crystal Structure

Kyle Schulze, Yongliang Ni, W. Gregory Sawyer, University of Florida, Gainesville, FL

11 – 11:30 am | The Tribomechady - namics of Jointed Interfaces: New Observations and Their Ramifications

Matthew Brake, Rice University, Houston, TX

11:30 am – Noon | Method for Calculating the Contact Between Roller End Face and Ring Flange in Multi-Body Simulations

Sven Wirsching, Stephan Tremmel, Sandro Wartzack, Friedrich-Alexander-Universität Erlangen-Nürnberg, Erlangen, Germany, Christof Bohnert, Schaeffler Technologies AG & Co. KG, Herzogenaurach, Germany

7J | Surface Engineering III

8 – 8:30 am | Experimental Comparison of Conventional and Textured Dynamic Seal Surfaces

Johan Bothe, Leibniz University Hannover – Institute of Dynamics and Vibration Research, Hannover, Germany

8:30 – 9 am | Increase in Mechanical Properties and Wear Resistance of Selective Laser Melted Stainless Steel 316L by Surface Modification

Auezhan Amanov, Jun-Seok Roh, Young-Sik Pyun, Sun Moon University, Asan, Republic of Korea

9 – 9:30 am | Characterization and Tribological Application of High Porosity Coatings

Hamed Ghaednia, Arup Gangopadhyay, Brian Almeria, Ford Motor Co., Dearborn, MI

9:30 – 10 am | Elastic and Elastic-Plastic Analysis of an Axisymmetric Sinusoidal Surface Asperity Contact

Swarna Saha, Robert Jackson, Auburn University, Auburn, AL

10 – 10:30 am – Break

10:30 – 11 am | Laser Additive Manufacturing of Ni-Al-Cr-C Alloys: A High Temperature Sliding Wear Study

Tyler Torgerson, Srinivas Mantri, Rajarshi Banerjee, Thomas Scharf, The University of North Texas, Denton, TX

11 – 11:30 am | Tribological Behavior of 17-4 PH Stainless Steel Fabricated by Traditional Subtractive and Laser-Based Additive Manufacturing Methods

Sanjeev KC, Auburn University, Auburn, AL

11:30 am – Noon | The Effect of Texture Shape on the Frictional Resistance Under Unidirectional Sliding

Pawel Pawlus, Slawomir Wos, Waldemar Koszela, Rzeszow University of Technology, Rzeszow, Poland

7K | Lubrication Fundamentals VII

8 – 8:30 am | Impact of Solvent Dilution Technique on Soft Particle Detection by Laser Particle Counter

Lin Wang, David Holt, Derek Selby, Exxonmobil, Annandale, NJ

8:30 – 9 am | Influence of Base Oil Ageing on Viscosity Modifiers Behavior

Eliane Gendreau, Hugh Spikes, Janet Wong, Imperial College London, London, United Kingdom

9 – 9:30 am | Lubrication of a Stretchable Sheet at the Tool Tip-Sheet Interface in Single-Point Incremental Forming (SPIF)

Tao He, Dohyun Leem, Xin Zhang, Newell Moser, Jian Cao, Qian Wang, Northwestern University, Evanston, IL, Hirotaka Miwa, Toshikazu Nanbu, Murakami Ryou, Nissan Research Center, Kanagawa, Japan

9:30 – 10 am | Friction Modification Mechanism of Surface Pores

Arman Khan, Qian Wang, Northwestern University, Evanston, IL, Zhe Li, Yuchuan Liu, Fanghui Shi, General Motors, Detroit, MI

10 – 10:30 am – Break

7L | Condition Monitoring II

8 – 8:30 am | Root Cause Analysis of Varnish Generation in Lube Systems
Jatin Mehta, Cristian Soto, Fluitec International, Bayonne, NJ

8:30 – 9 am | Development of an Oil Split Test Method for Emulsions Without the Use of Strong Oxidizing Acids
Jon Lewis, Quaker Chemical Corp., Conshohocken, PA

9 – 9:30 am | Identification of Unknown Elements in a Lubricant Sample and High Throughput Wear Metals Analysis by ICP-OES
Autumn Wassmuth, PerkinElmer Inc., Shelton, CT

9:30 – 10 am | Determination of Total Base Number in In-Service Lubricants Using FT-IR
Ariel Bohman, PerkinElmer Inc., Shelton, CT

10 – 10:30 am – Break

10:30 – 11 am | In-Situ Analysis of Degraded Gear Oils Using Ultrasonic Reflectometry
Tomos Brenchley, Michele Schirru, Rob Dwyer-Joyce, University of Sheffield, Sheffield, United Kingdom

11 – 11:30 am | Oxidation Analysis of Lubricants Using Ambient Pressure Differential Scanning Calorimetry (DSC) Techniques to Determine Antioxidant Performance
Keith Schomburg, PerkinElmer, Magnolia, TX

8A | Rolling Element Bearings IV

1:30 – 2 pm | A Mathematical Emulation of Bair's High Pressure Visualization Cell and Improved EHL Traction Analysis for Heavily Loaded Rolling Contacts
Coda Pan, Rensselaer Polytechnic Institute, Millbury, MA, Daejong Kim, University of Texas at Arlington, Arlington, TX, Michael Khonsari, Louisiana State University, Baton Rouge, LA

2 – 2:30 pm | Numerical and Experimental Performance Analysis of an Aircraft Engine Roller Bearing Using under Race Lubrication Method
Rami Kerrouche, Salah Boukraa, University Saad Dahlab of Blida 1, Blida, Algeria, Azzedine Dadouche, Mahmoud Mamou, National Research Council Canada, Ottawa, Ontario, Canada

2:30 – 3 pm | Real-Time Modeling of Thermal Interactions in Cryogenic Ball Bearings
Pradeep Gupta, PKG Inc., Clifton Park, NY, Howard Gibson, NASA/MSFC, Marshall Space Flight Center, AL

3 – 3:30 pm – Break

3:30 – 4 pm | Modeling Heat Generation in Turbine Engine Rolling Bearings
Jared Taketa, Craig Price, Rolls-Royce Corp., Indianapolis, IN, Pradeep Gupta, PKG Inc., Clifton Park, NY

4 – 4:30 pm | Thermal Conductivity and Flash Temperature of Bearing Steel
Tom Reddyhoff, Hugh Spikes, Imperial College London, London, United Kingdom, Aaron Schmidt, Massachusetts Institute of Technology, Cambridge, MA

4:30 – 5 pm | A New Film Thickness-Roughness Ratio, Λz, in Rolling Bearings
Valery Dunaevsky, VVD Engineering, Monroeville, PA

5 – 5:30 pm | Measurement of Free Volume of Lubricants from Pressure Dependence of Bulk Modulus
Bo Zhang, Toshifumi Mawatari, Saga University, Saga-shi, Saga, Japan

5:30 – 6 pm | Investigation of the Synthetic Stiffness for Elastohydrodynamically Lubricated Cylindrical Roller Bearings
Zeliang Xiao, Xi Shi, Shanghai Jiao Tong University, Shanghai , China

8B | Biotribology III

1:30 – 2 pm | Invited Talk
Michelle Oyen, East Carolina University, Greenville, NC

2 – 2:30 pm | Shear-Induced Cellular Death Response
Samuel Hart, Juan Urueña, Angela Pitenis, Padraic Levings, W. Gregory Sawyer, University of Florida, Gainesville, FL

2:30 – 3 pm | Mitigating Cartilage Strain and Shear by Simulating Activity Regimes with In-Situ Cartilage Explants
Steven Voinier, Brian Graham, Axel Moore, Christopher Price, David Burris, University of Delaware, Newark, DE

3 – 3:30 pm – Break

3:30 – 4 pm | Effect of Shoe Outsole Backing on the Coefficient of Friction
Arian Iraqi, Kurt Beschorner, University of Pittsburgh, Pittsburgh, PA

4 – 4:30 pm | Open Slot

4:30 – 5 pm | Open Slot

8C | Power Generation II

1:30 – 2 pm | Fluorescence Spectroscopy for Online Condition Monitoring of Machinery Lubricants
Pooja Suresh, Oleg Sosnovski, Gastops, Ottawa Ontario, Canada

2 – 2:30 pm | Consequences of Incorrect EHC Fluid Maintenance and Opportunities for Improvement
Peter Dufresne, EPT, Calgary, Alberta, Canada

2:30 – 3 pm | Understanding EHC Fluid Condition Monitoring
Ken Brown, Canoil, Mississauga, Ontario, Canada, Matthew Hobbs, EPT, Calgary, Alberta, Canada

3 – 3:30 pm – Break

3:30 – 4 pm | Evaluation of Turbine Oil Performance
Jatin Mehta, Fluitec International, Bayonne, NJ

4 – 4:30 pm | Power Generation Business Meeting

8D | Seals I

1:30 – 2 pm | Impact of Natural Surface Texture on the Lubrication of Mechanical Face Seals
Noel Brunetiere, Institut Pprime, Futuroscope Chasseneuil Cedex, France

2 – 2:30 pm | Wear and Surface Fatigue of Rubbers for Static Seals in Reciprocating Sliding Contact
Joichi Sugimura, Hiroyoshi Tanaka, Kyushu University, Fukuoka, Japan

2:30 – 3 pm | Frictional Properties of Diamond Coated (and UNCD® coated) Silicon Carbide and Tungsten Carbide Mechanical Seal Faces
Mark Lapansie, Charles West, Jon Hohol, Advanced Diamond Techologies, Inc., Romeoville, IL

3 – 3:30 pm – Break

3:30 – 4 pm | Effect of Combined Mechanical Stress and Salt Spray Aging on Dynamic Friction Behavior of O-Rings
Jian Wu, Haohao Li, Youshan Wang, Benlong Su, Zhibo Cui, Zhe Li, Harbin Institute of Technology, Weihai, Shandong, China

4 – 4:30 pm | Dynamic Behavior of a Fractional Viscoelastic Seal with Solid Contact
Arne Leenders, Leibniz University Hannover, Hannover, Germany

4:30 – 5 pm | Simulation of Mixed Friction Between a Surface Textured Seal and a Smooth Rod
Markus Brase, Matthias Wangenheim, Leibniz University Hannover, Hannover, Germany

5 – 5:30 pm | Online Wear Simulation of Parallel Plane Seal Under Mixed Lubrication
Ran Wang, Dan Guo, Tsinghua University, Beijing, China

5:30 – 6 pm | Seals Business Meeting

8E | Tribochemistry

Materials Tribology and Nanotribology Joint Session III

1:30 – 2 pm | Synthesis and Characterization of Novel Ni-Matrix Composites
Surojit Gupta, Maharshi Dey, Matt Fuka, University of North Dakota, Grand Forks, ND, Nikhil Murthy, Stephen Berkebile, US Army Research Laboratory, Aberdeen Proving Ground, MD

2 – 2:30 pm | Tribofilms in Wet Clutch Applications
Darryl Williams, Afton Chemical Corp., Richmond, VA

2:30 – 3 pm | Tribo-CAS Film with Unprecedented Lubrication and Wear Performance Characteristics
Kenneth Chao, Deere & Co., Cedar Falls, IA

3 – 3:30 pm – Break

3:30 – 4 pm | Effect of Lubricants on Friction Properties of the Steel/PEEK Contact
Go Tatsumi, Monica Ratoi, Brian Mellor, University of Southampton, Southampton, United Kingdom, Yuji Shitara, Kiyomi Sakmoto, JXTG Nippon Oil & Energy Corp., Yokohama, Japan

4 pm – 4:30 pm | Electric Field Effect on the Lubrication Performance of Cus Nanoparticle Additive
Chenxu Liu, Yu Tian, Yonggang Meng, Tsinghua University, Beijing, China, Ofir Friedman, Yuval Golan, Ben-Gurion University of the Negev, Be'er-Sheva, Israel

4:30 – 5 pm | Analysis of the Tribochemical Absorbed Films on Steel Surfaces Lubricated with 1,3-Diketone
Shumin Zhang, Chenhui Zhang, Xinchun Chen, State Key Laboratory of Tribology, Tsinghua University, Beijing, China, Ke Li, Intelligent Transport Systems Research Center, Wuhan University of Technology, Wuhan, China

8G | Grease II

1:30 – 2 pm | A New Anti-Wear Grease Containing Nanoparticles
Yan Chen, Xuezhen Wang, Abraham Clearfield, Hong Liang, Texas A&M University, College Station, TX

2 – 2:30 pm | Studying the Effects of Zinc Dialkyldithiophosphates on the Performance of Rust Inhibitors in Grease Additive Packages
Evan Robinson, Italmatch Chemical, Cleveland, OH

2:30 – 3 pm | Use of High Temperature Oven Aging to Determine COF of Candiate Greases as Oil Loss Within the Grease Occurred
Bryan Johnson, Arizona Public Service, Tonopah, AZ

3 – 3:30 pm – Break

3:30 – 4 pm | Grease Evaluation for the Continuous Caster Bearings: Development of an Innovative Technique to Accurately Measure Water Content in These Greases
Kuldeep Mistry, Carl Hager, Nigel Los, Jill Myers, The Timken Co., North Canton, OH, Raj Shah, Koehler Instrument Co., Inc., Holtsville, NY, Hank Levi, Scientific Gear LLC, Fairfax, VA

4 – 4:30 pm | When Your Supply of Grease Ceases and You Need a Replacement, What Do You Do?
Michael Moneer, Peter Lee, Southwest Research Institute, San Antonio, TX

4:30 – 5 pm | Biolubricant Enhancement Using Combined Raw Carbon Nanostructures
Andrey Pérez, CINVESTAV, Querétaro, Mexico

5 – 6 pm | Grease Business Meeting

8H | Materials Tribology IV

1:30 – 2 pm | Environmental Sensitivity and Aging of Composite Solid Lubricant Coatings
Michael Dugger, Brendan Nation, John Curry, Sandia National Laboratories, Albuquerque, NM

2 – 2:30 pm | Improving Tribological Performance of PDA/PTFE Thin Film by Incorporating Ag Nanoparticles in the PDA Underlayer
Dipankar Choudhury, Isabelle Niyonshuti, Jingyi Chen, Min Zou, University of Arkansas, Fayetteville, AR

2:30 – 3 pm | Improved Wear Life of 60NiTi by PDA/PTFE + Graphite Solid Lubricant Coatings
Dipankar Choudhury, Charles Miller, University of Arkansas, Fayetteville, AR

3 – 3:30 pm – Break

3:30 – 4 pm | Tribological Behavior of the WSC Coated Silicon Carbide in Vacuum and Air

Kosta Simonovic, Tomas Polcar, Czech Technical University, Prague, Slovenia, Albano Cavaleiro, University of Coimbra, Coimbra, Portugal

4 – 4:30 pm | Low Friction Behaviors of Ag-Doped γ-Fe_2O_3 at SiO_2 Coatings Under a Wide Range of Temperature Conditions

Qunfeng Zeng, Xi'an Jiaotong University, Xi'an, Shaanxi, China

4:30 – 5 pm | Study on the Tribological Properties During Drilling of CFRP with Carbide Tool

Xiong Liang, Wu Dan, State Key Laboratory of Tribology, Tsinghua University, Beijing, China

5 – 5:30 pm | Ultra-Low Wear of PEALD Nitride Thin Films

Tomas Babuska, Nicholas Strandwitz, Lehigh University, Bethlehem, PA, Mark Sowa, Veeco CNT, Boston, MA, Alexander Kozen, U.S. Naval Research Laboratory, Washington, DC, Guosong Zeng, Lawrence Berkeley National Laboratory, Berkeley, CA, Brandon Krick, Lehigh University, Bethlehem, PA

5:30 – 6 pm | Friction and Oxidation of MoS_2 In Low Earth Orbit: Results from the Space Tribometers

Brandon Krick, Lehigh University, Bethlehem, PA, John Curry, Sandia National Laboratory, Albuquerque, NM, Tomas Babuska, Lehigh University, Bethlehem, PA, Christopher Muratore, University of Dayton, Dayton, OH, Michael Dugger, Nicolas Argibay, Somuri Prasad, Sandia National Laboratories, Albuquerque, NM, Andrey Voevodin, University of North Texas, Denton, TX, John Jones, Air Force Research Laboratory, Dayton, OH, W. Gregory Sawyer, University of Florida, Gainesville, FL

8I | Contact Mechanics II

1:30 – 2 pm | Theoretical and Finite Element Analysis of Static Friction Between Multi-Scale Rough Surfaces

Robert Jackson, Yang Xu, Auburn University, Auburn, AL, Xianzhang Wang, Tsinghua University, Beijing, China

2 – 2:30 pm | Investigating the Effect of the Evolution of the Radius of Curvature During Elastic-Plastic Contact of Asperities

Eoghan O'Neill, Hamid Ghaednia, Gregory Mifflin, Matthew Brake, Rice University, Houston, TX

2:30 – 3 pm | When Does Roughness Affect Elastic-Plastic Contact?

Senyo Ahadzie, Hamid Ghaednia, Matthew Brake, Rice University, Houston, TX

3 – 3:30 pm – Break

3:30 – 4 pm | An Elastoplastic Finite Element Study of Unidirectional Cylindrical Sliding Contact for Steel/Steel and Inconel617/Incoloy800H

Huaidong Yang, Itzhak Green, Georgia Institute of Technology, Atlanta, GA

4 – 4:30 pm | Contact Mechanics Business Meeting

8J | Surface Engineering IV

1:30 – 2 pm | Characterization, Mechanical Properties and Tribo-Corrosion Behavior of Electroless Ni-P Functional Multilayers

Vanesa Martinez-Nogues, Asier Salicio-Paz, Hans-Jurgen Grande, Eva García-Lecina, CIDETEC, San Sebasitan-Donostia, Spain, Eva Pellicer, Universtita Autonoma de Barcelona, Barcelona, Spain, Jordi Sort, ICREA, Barcelona, Spain, Ruben Offoiach, Maria Lekka, University of Udine, Udine, Italy

2 – 2:30 pm | The Effects of Laser Shock Peening on the Fatigue Performance of the 3D-Printed AlSi10Mg Alloy

Hao Zhang, Zhencheng Ren, Ruixia Zhang, Chang Ye, Yalin Dong, The University of Akron, Akron, OH

2:30 – 3 pm | Improved Wear and Fatigue Resistance of a Boron-Doped DLC Coating Deposited on UNSM Pre-Treated 52100 Steel Substrate

Zhencheng Ren, Haifeng Qin, Gary Doll, Yalin Dong, Chang Ye, The University of Akron, Akron, OH

3 – 3:30 pm – Break

3:30 – 4 pm | Improving Surface Finish and Wear Resistance of Additive Manufactured Nickel-Titanium by Ultrasonic Nano-Crystal Surface Modification

Chi Ma, Haifeng Qin, Zhencheng Ren, Hao Zhang, Gary Doll, Yalin Dong, Chang Ye, The University of Akron, Akron, OH, Mohsen Andani, Narges Moghaddam, Hamdy Ibrahim, Mohammad Elahinia, The University of Toledo, Toledo, OH

8K | Engine & Drivetrain V

1:30 – 2 pm | Friction Test of Cylinder Liner-Piston Ring Pair with the Lubricating Oil Diluted by Fuel

Bo Xu, Bifeng Yin, Xin Kuang, School of Automotive and Traffic Engineering, Jiangsu University, Zhen Jiang, China

2 – 2:30 pm | Tribological Development of Piston Assembly Based on Theoretical Analysis and Experimental Verification

Yihu Tang, Shanghai Marine Diesel Engine Research Institute, Shanghai, China

2:30 – 3 pm | Computational Fluid Dynamics (CFD) Modeling of Torque Converter and Experimental Validation

Farrukh Qureshi, David Whitticar, Michael Huston, The Lubrizol Corp., Wickliffe, OH, William Liou, Yang Yang, Western Michigan University, Kalamazoo, MI

3 – 3:30 pm – Break

3:30 – 5 pm | Open Time Slots

8L | Condition Monitoring III

1:30 – 2 pm | Single Lubricant Solution for Natural Gas and Diesel Engines

Isabella Goldmints, David Brass, Infineum USA, Linden, NJ

2 – 2:30 pm | Oil Conductivity as an Early Indicator of Oil Oxidative and Additive Thermal Degradation Processes

John Duchowski, Timo Lang, Valérie Diehl-Klein, HYDAC FluidCareCenter GmbH, Sulzbach, Saar, Germany

2:30 – 3 pm | Correlating Acoustic Emission Signals with the Tribological Behavior of Steel

Tom Reddyhoff, Imperial College, South Kensington, United Kingdom, Zhe Geng, Suzhou Institute of Industrial Technology, Suzhou, China

3 – 3:30 pm – Break

3:30 – 4 pm | Fast and Efficient Quality Control of Lubricants and Its Foaming Tendency by FoamDDI – An Upgraded, Fully Automatized Detection Imaging Apparatus

Aaron Mendez, Ayalytical Instruments, Houston, TX

4 – 4:30 pm | Condition Monitoring Business Meeting

Education Courses

The 2019 STLE Annual Meeting & Exhibition features 12 industry-specific education courses offered on two days of the conference: Sunday, May 19, and Wednesday, May 22. The schedule is designed to give attendees more flexibility when planning their conference attendance. All courses are full day (start at 8 am and end at 5 pm).

STLE education courses are $365 with a full meeting registration (except for the ABMA Bearings course which is $650), $550 for STLE members without a meeting registration and $775 for a non-member with no meeting registration. If you have questions regarding these courses, please contact Stefan Carrera, education manager at (847) 825-5536, scarrera@stle.org.

Please note that course titles and content are subject to change. Visit www.stle.org/annualmeeting and see the Program Guide distributed onsite in Nashville for the most up-to-date information and list of course instructors.

Sunday, May 19

ABMA Bearings and Their Lubrication (Presented in cooperation with ABMA)

This course includes a basic overview of bearings, their selection, precision and mounting considerations, and lubrication-related influences, including a hands-on failure analysis session.

Advanced Lubrication 301: Advanced Additives

Advanced Lubrication 301 covers the molecular structures and chemistries of lubricant additive types. Additives examined will include antioxidants, rust inhibitors, detergents, dispersants, antiwear additives, extreme pressure additives, friction modifiers and rheology and viscosity modifiers.

Advanced Tribology 301: Nanotribology

This course will begin with an introduction to the topic of nanotribology. The course will then cover molecular dynamics, tribochemistry and nanomechanical characterization. The course day will conclude with a module covering nanoparticle additives.

Automotive Lubrication 201: Diesel

Automobile Lubrication 201 provides a comprehensive overview of the various aspects of a typical diesel engine tribological system including modern fuels and lubricants. Lubrication and surface engineering principles will be applied to provide a unified approach to practical diesel powertrain systems.

Biolubricants and Biofuels

This course is an overview of current progress in the development and use of biofuels and biolubricants. The course elements will include an introduction to energy and alternative fuels; basic chemistry of biofuels and biolubes; general performance requirements; overviews of market progress; nitch markets; and governmental and regulatory drivers. Products currently in various stages of commercial - ization will be discussed. Information on European, U.S. and OEM views will be included. The course will primarily focus on biolubricants but will include a general overview of alternative transportation fuels. Biofuel feedstocks, production and quality issues will be covered. An outstanding list of speakers with first-hand knowledge in these areas will teach the course.

Hydraulics 201: Hydraulic Fluids and System Overview

This course provides an overview of the basic mechanical components used in hydraulic fluid power transmission. The composition and performance of hydraulic fluids will be discussed. The course will also feature sections on maintenance and troubleshooting as they pertain to hydraulic systems and in-service fluid analysis.

Metalworking 115: Metal Removal Fluids

Metalworking 115 covers the key concepts needed to better understand how metalworking fluids are prepared, used and maintained. Attendees will be informed about the reasons for using metal removal fluids and their functions. The chemistry of metal removal fluids, insight into the need to control microbial contamination and importance of adopting a health and safety program in a facility that machines metal are covered. Key topics include measures needed to understand and control metal removal fluid failure.

Synthetic Lubricants 203: Non-Petroleum Fluids and Their Uses

This course is designed primarily for formulators and users of lubricating materials. Synthetic Lubricants 203 provides an overview of non-petroleum-based lubricants, their comparison to each other and to petroleum oil. Each section covers the chemistry, strength and weaknesses of each material and basic application.

Wednesday, May 22

Advanced Lubrication 302: Advanced Lubrication Regimes

Advanced Lubrication 302 goes more in-depth on lubrication regimes, wear and wear mechanisms, as well as lubricant failure analysis. This course includes a series of lubricant failure analysis case studies on automotive engines, gears and bearings.

STLE Certification Exams

Thursday, May 23

Basic Lubrication 103

Basic Lubrication 103 is designed primarily for the person entering the lubrication field who needs a broad introduction to lubricants, lubricant building blocks, and lubricating materials. This course is also for persons not directly involved, but who need a broad overview of lubricants and basic lubricating components. This course does not require the course taker to have a formal scientific degree or background, although many technical terms and concepts are covered. Experienced people attend the course to be kept up to date on the latest developments, especially in those areas not directly related to their job function or area of expertise. Thus, Basic Lubrication 103 is usually attended by a broad cross-section of people such as technical, technical service, sales, marketing, manufacturing, maintenance and management, who in some way are involved in the industry. The course will focus on the fundamentals of lubrication associated with fluid film lubrication and grease as it applies to basic lubricated components such as gears and bearings. Also, the course will review some basics around base stocks, synthetic lubricants and lab testing.

Metalworking 130: Metal Treatment Chemicals

Metalworking 130 is intended for chemists, engineers, technical support staff and field service technicians working with and using metalworking fluids. While processing parts using metalworking fluids, there is a need for treating, cleaning, and protecting chemical and/or coatings. Substrates either are immersed in these chemicals or have them applied during some point of the processing. This course covers heat treating, including oil and polymer quenching, cleaning parts and protecting parts from rust and corrosion. Individuals learn the basics of metallurgy as it applies to heat treating and quenching.

Synthetic Lubricants 204: Base stock Selection and Applications

This course provides an introduction to synthetic lubricant base stocks and applications. It compares the use of these synthetic lubricants to petroleum-based products and compares between types of synthetic lubricants. Synthetic Lubricants 204 is a continuation from the Synthetic Lubricants 203: Non-Petroleum Fluids and Their Uses course, however, attendance of the Synthetic Lubricants 203 course is not a prerequisite.

All four STLE technical certifications exams: Certified Lubrication Specialist™, Oil Monitoring Analyst I and II™ and Certified Metalworking Fluids Specialist™ will be conducted concurrently on Thursday, May 23, from 9 am to noon. If you are interested in taking an exam during STLE's 2019 Annual Meeting & Exhibition, please contact Gina Cairo at (847) 825-5536 or email certification@stle.org.

Exam Fees:

- **First exam: $405 (STLE member) $540 (Non-member)**
- **Retake exam: $203 (STLE member) $270 (Non-member)**

> ***It is the only location where you can receive solid education information regarding the lubricant industry.***

Networking & Special Events

***Please note that all annual meeting events are at the Omni Nashville Hotel.**

Student Networking Reception

Sunday, May 19 • Ticketed Event

Students and young tribologists from around the world gather for an event defined by its networking value, camaraderie and good times. If you're from the next generation of STLE members, come join us for an evening of friendship and relationship building. The 2019 event is still being planned at an offsite location in Nashville, and information will be released as details are available.

Tribology STEM Camp

Monday, May 20

During STLE's 2019 Annual Meeting, the society is hosting area high school students for its 7th Annual Tribology STEM Camp. Students will have the opportunity to see demonstrations and participate in hands-on experiments, led by STLE members, to learn about areas of research within the fields of tribology and lubrication engineering. The goal of the camp is to engage high school students interested in STEM (science, technology, engineering and mathematics) to careers in tribology and lubrication engineering. If you would like to learn more or to participate, contact Karl Phipps at (847) 825-5536, **kphipps@stle.org**.

Networking Reception

Monday, May 20

This is the annual meeting's central networking event and a way for you to reconnect with old friends while making new ones. Since people come to STLE's Annual Meeting & Exhibition from around the world, this truly is an international event. Relax, socialize and add to your list of professional contacts through this outstanding networking event.

Speakers Breakfast

Monday through Thursday, May 20-23

Lead authors and course presenters are invited to meet with Session and Paper Solicitation Chairs for a continental breakfast at 7 am on the days of their presentations. This is a great time to review the session schedule and note any last-minute changes. Speakers should plan on attending.

President's Luncheon

Tuesday, May 21 • Ticketed Event

The annual meeting's major business function draws virtually all attendees for a two-hour event honoring STLE's incoming and out-going presidents, award winners and top volunteers. Come honor 2018-2019 President Greg Croce with Chevron Products Co. and 2019-2020 President Mike Duncan with Daubert Chemical Co. Inc. A ticket for the President's Luncheon is included in your meeting registration and free to STLE Corporate Member representatives (two tickets) and students. Guest tickets for the luncheon are $50 and can be purchased at the STLE Registration Desk.

STLE is seeking sponsorships for the 2019 Networking Reception, President's Luncheon, Student Networking Reception and Speakers Breakfast.

For more information, contact Tracy Nicholas VanEe at (630) 922-3459, **tnicholas@stle.org**.

Opening General Session: Keynote Address

Speaker:

Jeff Hemphill
Chief Technical Officer, Americas
Schaeffler Group USA Inc.

Monday, May 20 | 10:30 am – Noon
Omni Nashville Hotel

"Racing into the Future - Impact of Tribology on Vehicle Electrification"

Electric mobility is quickly moving from someday to today as electric cars are becoming common, and even electric scooters and bikes are entering the mobility scene. The benefits of electrification are many, including reduced emissions and maintenance, and improved performance. It is also unsettling to many engineers who have spent a career enabling conventional engines and transmissions. While the needs of electric powertrains are different, the fundamentals are the same. We have been learning about those needs on the racetrack, through Formula E, as well as in conventional automotive powertrains. This talk will share some of these lessons and point the way of future tribology efforts.

Biography:

Jeff Hemphill currently serves as Chief Technical Officer, Americas, for Schaeffler Group USA Inc., and is responsible for research and new product development for automotive transmission, engine, chassis, as well as industrial components and systems. His scope of responsibilities also encompasses IT and digitalization functions, which include facilitating the integration of digital capability into Schaeffler's new products and business models.

Jeff started his career at Schaeffler as a machinist and co-op student while earning a bachelor of science in mechanical engineering from The University of Akron. He also holds an executive certificate in strategy and innovation from MIT. He has over 30 years of experience in automotive and industrial product development, including manufacturing, product design, testing and vehicle development, and has 79 patents filed or issued.

Call for Student Posters

STLE is seeking student posters at its 2019 Annual Meeting & Exhibition. Event organizers are inviting students from all areas of tribology research to participate in a special session dedicated to student posters. Posters must deal with an aspect of tribology research that can be translated into friction, wear and lubrication. Student poster research topics can be co-authored by faculty and other researchers, but only students may exhibit their posters and discuss their work at the session. The posters will be judged by a conference committee, and awards will be given to the best nine posters.

Submission criteria & information

- Abstract submission deadline: **March 15, 2019** (via **www.stle.org**). Notification of acceptance will be sent to students shortly after this date.
- The poster must present original work by the student during the 2018-2019 academic year.
- The student may submit only one poster as the lead author.
- As the lead author of the poster, the student should have performed the major portion of the work.
- Lead authors must be full-time graduate or undergraduate students registered during the 2018-2019 academic year.
- Posters can be no larger than 48 x 48 inches.
- Posters must be set up Sunday afternoon or Monday morning. The author must be present at the poster display during the judging session on Monday, May 20, during lunch and the scheduled conference break that afternoon.

Award category (three winners in each category)

- **Platinum:** superior scientific and presentation quality ($300 prize)
- **Gold:** good technical quality ($200 prize)
- **Silver:** overall quality worthy to be encouraged ($100 prize)

*Winners will be announced during the President's Luncheon on Tuesday, May 21.

For additional questions about the student poster session, please contact Merle Hedland at (630) 428-2133 or email **mhedland@stle.org**.

STLE 2019 Exhibition/Sponsorship Opportunities

STLE's annual trade show is where you can catch up on the lubricant industry's latest products, services and technologies. Many annual meeting attendees say they have saved thousands of dollars and solved complex lubricant-related problems by making a connection at STLE's trade show.

STLE has several sponsorship and advertising opportunities sure to raise your company's profile in Nashville. For more information or to customize a plan that meets your needs and budget, contact national sales manager Tracy Nicholas VanEe at (630) 922-3459, **tnicholas@stle.org**.

***Booths are 10 x 10 feet and are $2,575 for STLE Corporate Members and $2,975 for non-members.**

Exhibitor Appreciation Hour

Back by popular demand, two hours of dedicated exhibit time will occur at this year's show:

Monday, May 20 and **Tuesday, May 21** from 3-4 pm. Refreshments will be served in the trade show. Technical sessions, education courses, Commercial Marketing Forum presentations and all other annual meeting activities will cease at this time. Come support the meeting's exhibitors—and find solutions to your most pressing technical issues.

STLE's 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

For more information or to reserve a booth, contact Tracy Nicholas VanEe at (630) 922-3459, tnicholas@stle.org.

Commercial Marketing Forum

The Commercial Marketing Forum (CMF) is a series of 30-minute marketing sessions at STLE's 2019 Annual Meeting where you may promote your company's products and services, something not allowed in the technical sessions. Your CMF session is promoted in the Annual Meeting Program Guide, directing attendees to your presentation. CMF timeslots are sold on a "first-come, first-serve" basis.

Commercial Marketing Forum Pricing:

- $610 for STLE Corporate Members who exhibit
- $750 for STLE Corporate Members
- $890 for individual members
- $970 for non-members

Sponsorships come in all shapes, sizes and prices and are designed to fit everyone's marketing budget.

To reserve a sponsorship at the 2019 STLE Annual Meeting & Exhibition, contact Tracy Nicholas VanEe at (630) 922-3459, **tnicholas@stle.org**.

If you are interested in gaining exposure and raising your company's profile at the annual meeting (thereby reaching some 1,600 members of the lubricants industry), STLE offers several sponsorship opportunities, including:

- Badge Lanyards **(SOLD!)**
- Education Course Lunches
- Education Course Materials **(SOLD!)**
- Speakers Breakfast **(SOLD!)**
- Registration Bags **(SOLD!)**
- Networking Reception Sponsorships (Monday evening)
- President's Luncheon (Tuesday afternoon)
- Directional Floor Signs (multiple sponsorships)
- Guest Room Keycards **(SOLD!)**
- Annual Meeting Mobile App **(SOLD!)**
- Relaxation/Recharging Lounge **(SOLD!)**
- Refreshment Breaks Plus Water Stations
- Wi-Fi Service **(SOLD!)**
- Welcome Gift
- Exhibitor Appreciation Hour Raffle **(SOLD!)**
- Student Activities Sponsorships

2019 *Annual Meeting* Sponsors

*As of Dec. 4, 2018

STLE wishes to thank the following sponsors for their generous support of the 74th STLE Annual Meeting & Exhibition, May 19-23, 2019, at the Omni Nashville Hotel in Nashville, Tennessee. Updated signage with sponsors information will be included onsite in Nashville.

Palladium Plus: More than $4,000

Afton Chemical Corp.: Guest Room Keycards

ANGUS Chemical Co.: Registration Bags

The Lubrizol Corp.: Wi-Fi Service

Münzing: Badge Lanyards

Palmer Holland/Focus Chemical: Annual Meeting Mobile App

Titanium Plus: More than $3,000

Evonik Oil Additives: Exhibitor Appreciation Hour Raffle

Pilot Chemical: Relaxation/Recharging Lounge

Titanium: $3,000

CRODA Inc.: Educational Course Materials Handbook

Platinum: $2,000

Zchimmer & Schwarz: Speakers Breakfast

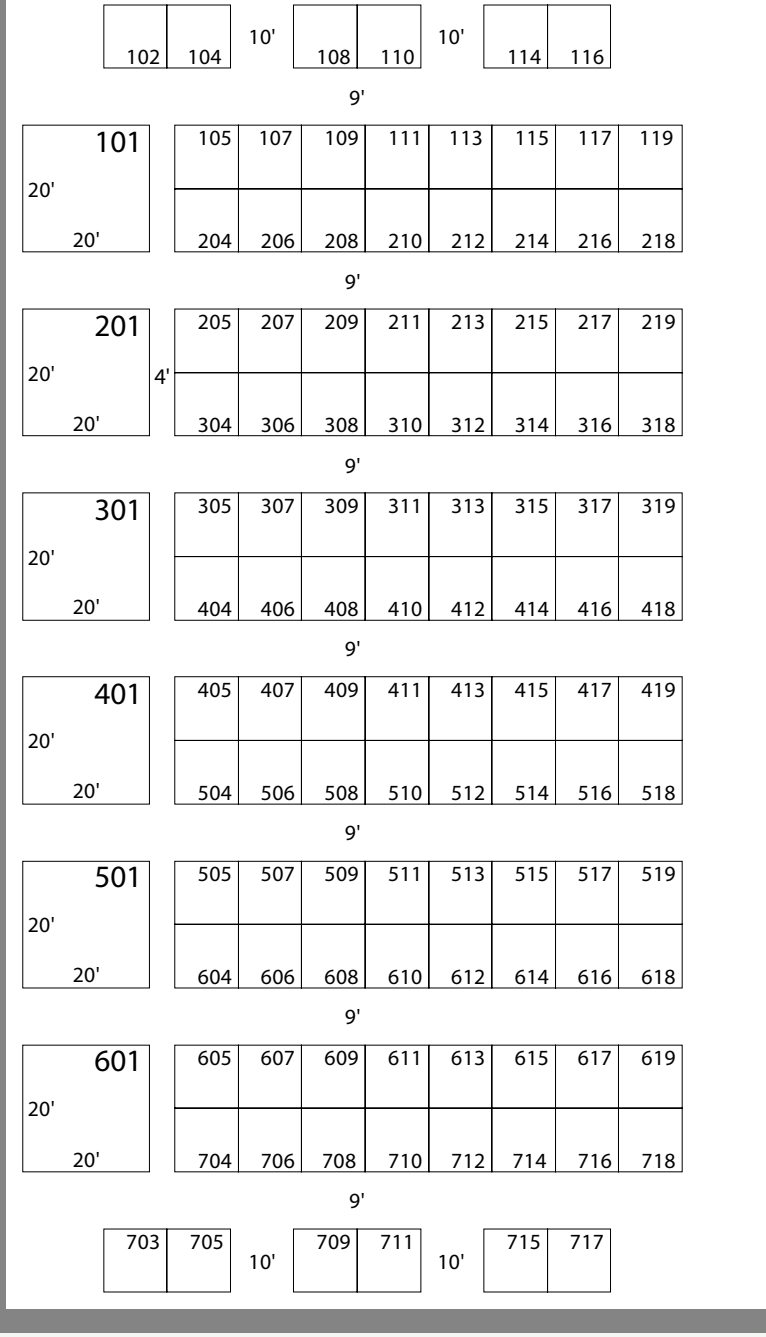
Gold: $1,000

American Society of Mechanical Engineers (ASME): Networking Reception

2019 Annual Meeting Exhibition Hours

Omni Nashville Hotel | **Broadway Ballroom**

Monday, May 20 • Noon-5 pm
Tuesday, May 21 • 9:30 am – Noon & 2 – 5:30 pm
Wednesday, May 22 • 9:30 am – Noon



2019 *Annual Meeting* Exhibitors

More than 100 organizations are expected to display their newest products and services at the 2019 STLE Exhibition. Following is the list of exhibitors as of Dec. 4, 2018. Visit **www.stle.org/annualmeeting** and see the Program Guide distributed onsite in Nashville for the most up-to-date list.

Acme-Hardesty Co.
Advanced Chemical Concepts Inc.
Afton Chemical Corp.
ANGUS Chemical Co.
Baron USA, LLC
Beckman Coulter
Cannon Instrument Co.
Colonial Chemical Inc.
Compass Instruments/Falex Corp.
The Dow Chemical Corp.
Eastman
Italmatch Chemicals
Emery Oleochemicals
Ergon, Inc.
Evonik Oil Additives USA, Inc.
ExxonMobil Chemical Co.
FedChem, LLC
Focus Chemical
Functional Products, Inc.
GEO Specialty Chemicals
Huntsman
Ingevity
Kao Chemicals GmbH
KH Neochem Americas, Inc.
King Industries, Inc.
LANXESS Corp.
Münzing
Napoleon Engineering Services
Phoenix Tribology Ltd.
Pilot Chemical Co.
PolyOne Corp.
Polytec, Inc.
Quimica Lasem
Rtec-Instruments, Inc.
Sasol North America
Savant Labs & Institute of Materials (IOM)
Sea-Land Chemical Co.
Soltex, Inc.
Tannas Co. & King Refrigeration
Teknor Apex Co.
Temix Oleo
The Lubrizol Corp.
Vanderbilt Chemicals, LLC
Vantage

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