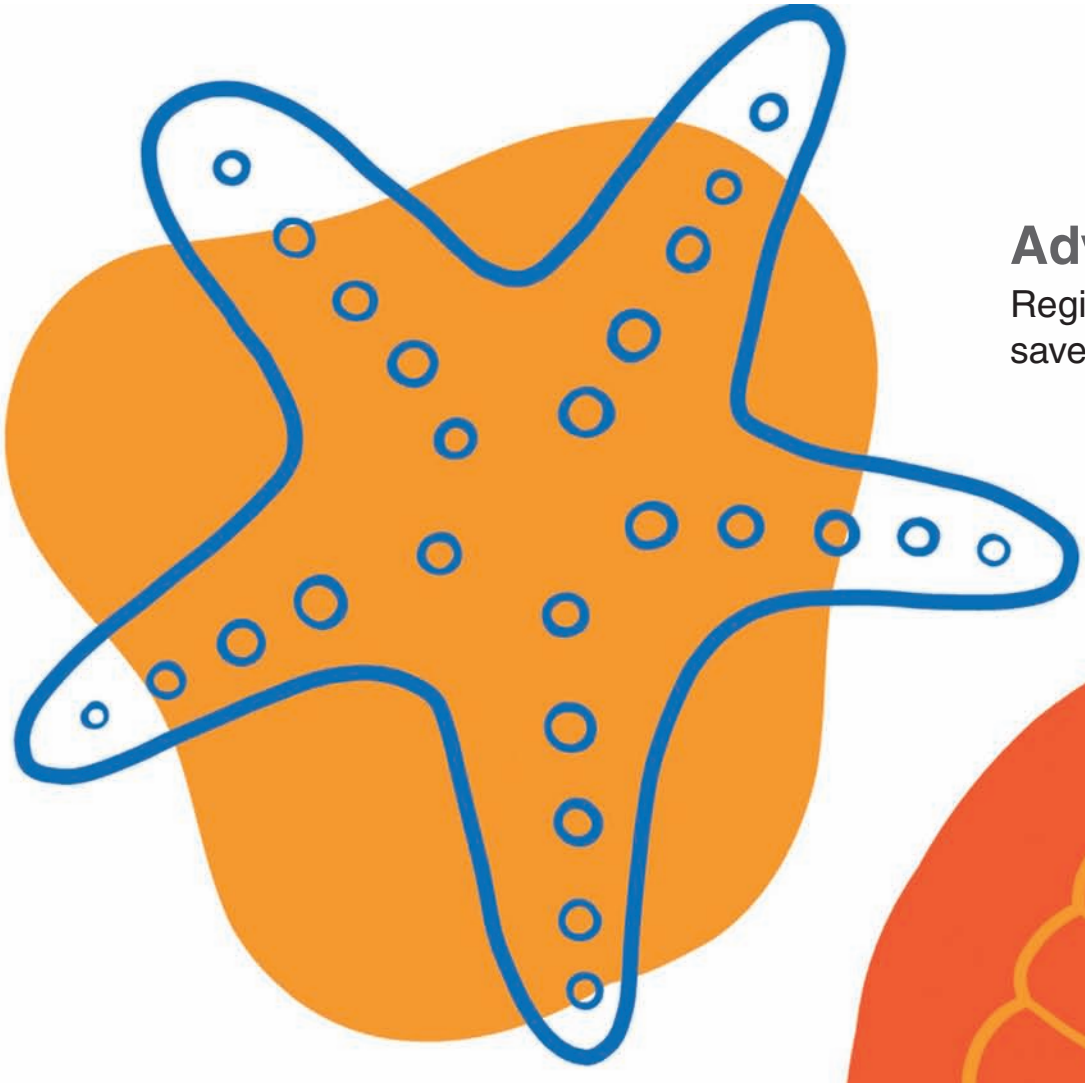
stle

Society of Tribologists and Lubrication Engineers



Advance Program

Register by April 24 and save $120!

77th STLE Annual Meeting & Exhibition

May 21-25, 2023

Long Beach Convention Center | Long Beach, California (USA) | **#STLE2023**

STRUGGLING WITH LITHIUM?
REFORMULATE WITH CONFIDENCE!

OUR PATENTED PROCESS FOR MANUFACTURING CALCIUM SULFONATE GREASE DELIVERS SUPERIOR PERFORMANCE COMPARED TO ITS LITHIUM COMPLEX COUNTERPARTS. PROVEN IN REAL-WORLD APPLICATIONS, OUR COST-EFFECTIVE SOLUTION IS THE ANSWER TO ONGOING VOLATILITY IN LITHIUM PRICING AND DEMAND.

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Message from the Chair

Join us for #STLE2023 in Long Beach!

77th STLE Annual Meeting & Exhibition
Long Beach Convention Center
Long Beach, California (USA)

Dear Industry Professional,

I'd like to extend a personal invitation for you to join me for STLE's 77th Annual Meeting & Exhibition, May 21-25, 2023, at the Long Beach Convention Center in sunny Long Beach, California. For those who haven't been to Long Beach, it's a fun and attractive city located in the heart of Southern California—about a 30-minute drive south of Los Angeles.

Whether you work in the field or the lab in industry, government, or academia, STLE's Annual Meeting has technical programming tailored specifically for your job. The meeting is unique because no other organization covers timely content related to the field of tribology and lubrication.

The Annual Meeting is always at the top of the list of benefits derived from STLE membership, and this year's program promises to deliver something for you and your company. STLE's Annual Meeting Program and Education Committees, working together with our headquarters staff and paper solicitation chairs (PSCs) representing STLE's 24 technical committees, have developed an excellent technical program featuring nearly 500 technical presentations, lubrication-specific education courses, the popular Commercial Marketing Forum, networking opportunities and much more—all valuable in-person content that can't be replicated outside of the live event.

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 development through education and certification offerings.

STLE has a well-known tradition of providing continuing education to industry professionals ready to take their careers to the next level and create value to their employers, customers, and peers. In past attendee surveys, participants have rated STLE's education courses as the most valuable portion of the event in terms of meeting their business needs. 11 industry-specific courses will be presented in Long Beach taught by the top experts in their respected fields.

For more experienced professionals, the STLE Annual Meeting is often the place where individuals advance their technical knowledge to prepare for one of STLE's four certification programs: Certified Lubrication Specialist (CLS)™, Certified Metalworking Fluids Specialist (CMFS)™ and Oil Monitoring Analyst I & II (OMA)™.

This year's trade show includes more than 120 companies and organizations displaying the industry's newest technologies, products, and services. Admission to the trade show is included in your meeting registration and will be held in the Long Beach Convention Center, only a few steps away from the technical sessions and education courses. Please make time in your schedule to engage with these companies to find cost-saving solutions that will help improve your company's bottom line.

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 the conference website at **www.stle.org/annualmeeting** for program updates.

I look forward to seeing you in Long Beach in May!

Sincerely,

Gareth

Gareth Fish Ph.D.
The Lubrizol Corporation
2023 STLE Annual Meeting Program Committee Chair

Society of Tribologists and Lubrication Engineers

840 Busse Highway, Park Ridge, Illinois (USA) 60068
Phone: (847) 825-5536 | Fax: (847) 825-1456 | Email: information@stle.org | Web: www.stle.org | **#STLE2023**

The 2023 Annual Meeting and Exhibition is sponsored by STLE.

LONG BEACH CONVENTION & VISITORS BUREAU

CONTENTS

Long Beach **California** (USA)

Conference Venue

Most events for STLE's 2023 Annual Meeting & Exhibition are being held in the:

Long Beach Convention Center
300 East Ocean Boulevard
Long Beach, California (USA) 90802
Phone: (562) 436-3636

Hotel Information

Housing accommodations for attendees have been arranged at these participating hotels:

Hyatt Regency Long Beach (Headquarters Hotel)
200 South Pine Avenue
Long Beach, California (USA) 90802
(562) 491-1234

Renaissance Long Beach Hotel
111 East Ocean Boulevard
Long Beach, California (USA) 90802
(562) 437-5900

Westin Long Beach
333 East Ocean Boulevard
Long Beach, California (USA) 90802
(562) 436-3000

Hotel registration will not be accepted by phone, but you can make your sleeping room reservation by registering online at **www.stle.org/annualmeeting** (see page 6 for housing information).

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, Illinois (a Chicago suburb), STLE is the leading technical organization serving more than 15,000 industry professionals and 200 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.

Attendee Roster

The official attendee roster will be made available on the STLE website (**www.stle.org**) in March 2023 prior to the annual meeting.

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 & Photography Policies

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. STLE's official photographer will take photos of select technical sessions, Commercial Marketing Forum presentations, social events and the trade show on Tuesday, May 23.

These photos will be used to promote the 78th STLE Annual Meeting & Exhibition in Minneapolis, Minnesota (USA), May 19-23, 2024. 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.

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.

STLE Mobile App

Find all the conference details and program updates in the Events Section of the STLE App. Download free from the iOS App Store or Google Play Store (search "STLE Mobile").

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 $460 per course with full registration. **Please see the registration form on page 7.**

2023 STLE Annual Meeting Individual **Registration Rates**

Individual	Early Bird by April 24 (Save $120!)	After April 24	Ala Carte: General Single Day Registration	Ala Carte: Single Education Course*
STLE Members	$830	$950	**$375** (Before April 24) **$495** (After April 24)	**$645** (Before April 24) • **$765** (After April 24)
Speakers	$830	$950		
Presenters	$830	$950		
Non-members	$1,200	$1,320	**$560** (Before April 24) **$680** (After April 24)	**$825** (Before April 24) • **$945** (After April 24)
Life Members	$185	$215		
Student Members	$125	$150		

Annual Meeting registration not required or included.

Cancellations

Requests must be received in writing at STLE's headquarters no later than April 24, 2023 to receive refund less $120 handling charge. **No refunds will be issued after April 24.**

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.

Onsite Registration

You may register onsite at the Long Beach Convention Center, beginning at noon on Saturday, May 20, 2023. The STLE registration desk is open daily thereafter through Thursday, May 25. Onsite registrants incur a $120 surcharge. Advance registrants may pick up badges and registration materials at the registration desk during the following hours:

Sunday, May 21 – 6:30 am – 5:00 pm

Monday, May 22 – 6:30 am – 6:00 pm

Tuesday, May 23 – 6:30 am – 5:00 pm

Wednesday, May 24 – 6:30 am – 5:00 pm

Thursday, May 25 – 6:30 am – 12:00 pm

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 globe. 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 complimentary one-year STLE membership—a $180 value.**

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

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 registration form on page 7 and send your completed form and payment to STLE headquarters.

Fax

Complete the enclosed registration form (see page 7) and submit via fax to (847) 825-1456.

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.**

LONG BEACH
May 21-25, 2023

30+ COUNTRIES REPRESENTED

500 EDUCATION COURSE PARTICIPANTS

40 STUDENT POSTERS

500+ TECHNICAL PRESENTATIONS

1,600 INDUSTRY PROFESSIONALS

120 EXHIBITORS

40 COMMERCIAL MARKETING FORUM SESSIONS

Top 5 Lubricant-Related Markets Attending

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

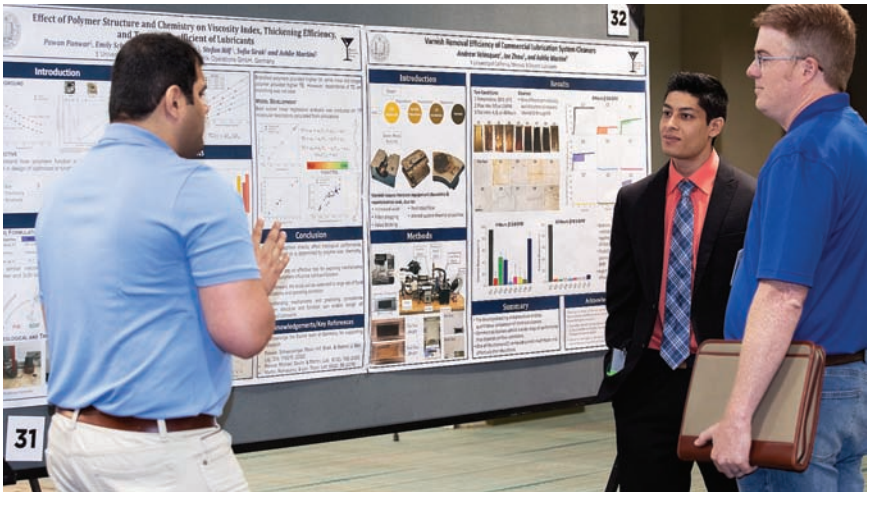
Attendee Profile

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

Conference Takeaways:

- **Industry networking**
- **Professional training & certification opportunities**
- **Explore latest new technologies**
- **Innovative research**

> ***"It (the STLE Annual Meeting) is the best industry conference that I attend, and the business networking is very valuable."***



Follow us on Social!

Stay connected and keep up with the chatter using the conference hashtag **#STLE2023** and stay up-to-date with the latest annual meeting programming information and much more!

Twitter | **@STLE_Tribology**

Facebook | **Facebook.com/stle.org**

Instagram | **@STLE_Tribology**

LinkedIn | **www.linkedin.com**

Future Industry Meeting Dates

2023 STLE Tribology Frontiers Conference/Tribology & Lubrication for E-Mobility Conference (Co-branded event) • **November 12-15, 2023**
Cleveland Marriott Downtown at Key Tower, Cleveland, Ohio (USA)

78th STLE Annual Meeting & Exhibition
Minneapolis Convention Center • **May 19-23, 2024,** Minneapolis, Minnesota (USA)

79th STLE Annual Meeting and Exhibition
Hyatt Regency Hotel • **May 18-22, 2025,** Atlanta, Georgia (USA)

80th STLE Annual Meeting and Exhibition
Hyatt Regency New Orleans • **May 17-21, 2026,** New Orleans, Louisiana (USA)

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

Need a Visa? **International attendees can request an invitation letter for the 2023 STLE Annual Meeting & Exhibition. For more information, contact Merle Hedland at (630) 428-2133, mhedland@stle.org.**

Housing & Room Reservations

Housing for the 2023 STLE Annual Meeting & Exhibition is at:

Hyatt Regency Long Beach
(Headquarters Hotel)
200 South Pine Avenue
Long Beach, California
(562) 491-1234

Conference rate: $289 per night*
(taxes not included)

Located on a premiere waterfront spot in the heart of Downtown Long Beach, the Hyatt Regency Long Beach is the only 4 Diamond award-winning hotel with all 531 guest rooms and suites offering ocean or harbor views. The Hyatt Regency Long Beach is centrally located within walking distance of the Long Beach Convention Center and the city's shopping, dining, and entertainment attractions, with convenient access to public transportation.

Hyatt Regency Hotel Amenities

- Pet-Friendly Hotel
- Cafe and bar/lounge
- Spacious guest rooms with refrigerator, laptop safe and flat-screen TVs
- Complimentary 24-hour fitness center and outdoor pool.

Renaissance Long Beach Hotel
111 East Ocean Boulevard
Long Beach, California
(562) 437-5900

Conference rate: $269 per night*
(taxes not included)

Downtown Long Beach hotel ideally located near the Long Beach Convention Center, Pine Avenue, Queen Mary, and the Aquarium of the Pacific. SIP Lounge, one of Long Beach's favorite spots, features indoor/outdoor seating for guests to enjoy cocktails, food, and overlooks stunning views of the Pacific Ocean. Convenient access to public transportation and a short 10-minute drive to the Long Beach Cruise Terminal and World Cruise Center.

Renaissance Hotel Amenities

- Wi-Fi access
- Cafe and bar/lounge
- Spacious guest rooms with refrigerator, laptop safe and flat-screen TVs
- Complimentary 24-hour fitness center and outdoor pool.

Westin Long Beach
333 East Ocean Boulevard
Long Beach, California
(562) 436-3000

Conference rate: $239 per night*
(taxes not included)

Located across from the Terrace Theater, Performance Arts Center, and the Long Beach Convention Center, the Westin Long Beach features 469 guest rooms and 31 suites and is situated in the downtown district – just blocks from beaches, shopping, bistros, and only minutes from popular area attractions such as Disneyland and Universal Studios.

Westin Amenities

- Pet-Friendly Hotel
- Restaurant, coffee house, cocktail bar
- Spacious guest rooms with refrigerator, laptop safe and flat-screen TVs
- Complimentary 24-hour fitness center, outdoor pool, and spa center.

Room rates are quoted exclusive of applicable state and local taxes or applicable service, or hotel specific fees in effect at the Hyatt, Renaissance, and Westin hotels at the time of the meeting. 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.

Airports: All three STLE conference hotels are located with easy access to three major airports: Long Beach Airport, Daugherty Field (LGB) (10 miles); Los Angeles Airport (LAX) (21 miles); John Wayne Airport (SNA) (23 miles).

For meeting and room reservations, log on to **www.stle.org/annualmeeting** to access the hotel registration site. All meeting events are at the Long Beach Convention Center. The cutoff date to receive discounted pricing at the Hyatt, Renaissance, and Westin hotels is **April 24, 2023.** Housing is assigned on a first-come, first-served basis, and STLE does not guarantee room availability. If you plan on attending the 2023 STLE Annual Meeting, make your room reservations ASAP!

2023 STLE Annual Meeting & Exhibition Registration Form

Long Beach Convention Center | Long Beach, California (USA) | May 21-25, 2023

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: _____

Email: _____ 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: _____

Meeting registration includes Technical Sessions, Trade Show Admission, Networking Reception, Commercial Marketing – *plus* one complimentary ticket to the President's Luncheon. STLE Education Courses are $460 with full meeting registration.

Cancellation requests must be received in writing no later than April 24, 2023, to receive refund less than $120 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: $830 – Non-members: $1,200

Life Members: $185 – Student Members: $125

After April 24 add $120

STLE Education Courses: Discounted rate with full meeting registration ($460 per course) – Lunch included.

Sunday Education Courses, May 21, 2023

Please ✔ one course only! (8:00 am – 5:00 pm)

❑ Advanced Lubrication 301: Advanced Additives

❑ Basic Lubrication 101

❑ Gears 101

❑ Hydraulics 201: Hydraulic Fluids and Systems Overview

❑ Metalworking Fluids 130: Metal Treatment Chemical

❑ Sustainability: Biolubricants and Biofuels **(NEW!)**

❑ Synthetics: Basics & Applications **(NEW!)**

Wednesday Education Courses, May 24, 2023

Please ✔ one course only! (8:00 am – 5:00 pm)

❑ Advanced Lubrication 302: Advanced Lubrication Regimes

❑ Basic Lubrication 102

❑ Metalworking Fluids 250: Understanding and Controlling Metal Removal

Thursday Education Course, May 25, 2023

❑ Electric Vehicles (8:00 am – 5:00 pm)

Social Functions (Please ✔ all that apply)

❑ Monday, May 22: Networking Reception (free). Qty: _____

❑ Tuesday, May 23: President's Luncheon **(one complimentary ticket included).**

❑ Tuesday, May 23: Additional President's Luncheon guest ticket ($50)

Ala Carte Offerings

❑ STLE Education Course and Lunch only. Annual Meeting registration not required or included. (Before April 24) **Members:** $645 per course. **Non-members:** $825 per course. (After April 24) **Members:** $765 per course. **Non-members:** $945 per course.

❑ Digital Proceedings (Technical Presentations) **Members:** $50, **Non-members**: $100, **Students:** $25

Single-Day Registration Admission

❑ (Before April 24) **Members:** $375, **Non-members:** $560

❑ (After April 24) **Members:** $495, **Non-members:** $680

❑ Monday, May 22 (Technical Sessions & Trade Show Only)

❑ Tuesday, May 23 (Technical Sessions & Trade Show Only)

❑ Wednesday, May 24 (Technical Sessions & Trade Show Only)

❑ Thursday, May 25 (Technical Sessions Only)

Payment Information

❑ Payment Enclosed ❑ Payment Type: _____

Credit Card #: _____

Exp. Date: _____

Name on Card: _____

Payment Amount: $ _____ . _____

Signature: _____

MARINE PARK

DESTINATIONS MAGAZINE

LONG BEACH CONVENTION & VISITORS BUREAU

California Dreamin ... WELCOME TO LONG BEACH

Long Beach is located on the Pacific Coast in Southern California, approximately 25 miles south of Los Angeles. It is the seventh largest city in California with a population of over 470,000 and is home to the United States' second busiest container port and is among the world's largest shipping ports. Major corporations such as Boeing, Verizon, Amazon, UPS, JetBlue Airways, United Pacific Railroad and Chase Bank have operations located in this vibrant city.

With 11 miles of sandy shoreline, the city offers beautiful beaches and marinas along with a busy dining and shopping scene on historic Pine Avenue in Downtown Long Beach and perfectly blends urban sophistication with beach-tower fun. Long Beach is quickly becoming a popular destination with over 40 attractions to enjoy and draws more than five million tourists each year.

Long Beach is widely known for its waterfront attractions, including the permanently docked RMS Queen Mary British ocean liner, and the Aquarium of the Pacific—Southern California's largest aquarium that features more than 11,000 animals representing over 500 different species. It is also home to the prestigious IndyCar Series race, The Grand Prix of Long Beach, traditionally held in April each year. Several leading educational institutions are in Long Beach, including California State University, Long Beach.

Walk, run, bike or blade on the smooth, fully paved bike path that spans the length of the beach from Downtown Long Beach to Belmont Shore. Or enjoy an array of watersports such as swimming, sailing, kayaking or jet skiing. Experience all that Long Beach has to offer along the shores of the Pacific.

NOTABLE ATTRACTIONS

Museum of Latin American Art ✸ Long Beach Waterfront

Catalina Express ✸ The Walter Pyramid ✸ Marine Park ✸ The Pike Ferris Wheel

The Richard and Karen Carpenter Performing Arts Center ✸ City Beach

For more information about Long Beach and things to do, visit **www.visitlongbeach.com**.

DESTINATIONS MAGAZINE

Fun Facts about Long Beach!

1. On average the city has 345 days of sunshine each year, and the temperatures are 74 degrees Fahrenheit.

2. Long Beach is considered one of the most walkable cities in the U.S.

3. The parks in Long Beach are some of the best in the nation and consistently winners of the Gold Medal Award from the National Association for Excellence in Parks and Recreation Management.

4. Long Beach was originally named "Wilmore City," but because of its long, wide beaches it was renamed "Long Beach" in 1888.

DESTINATIONS MAGAZINE

5. The original Queen Mary has been docked as the historic centerpiece of Long Beach harbor since 1967. It is now out of commission and has been transformed as an exclusive club and restaurant, and occasionally hosts concerts too.

6. The eye-catching large white dome next to the Queen Mary stands 115 feet high and 400 feet wide and is the world's largest, free-span aluminum geodesic structure. It was specifically designed to house Howard Hughes' giant flying boat, the Spruce Goose. The Spruce Goose is no longer located within the dome, which now serves as the Long Beach Cruise Terminal at the Queen Mary.

7. Long Beach has been named as one of the best cities for young people to live. 17% of the people living in Long Beach are between the ages of 25 and 34.

LONG BEACH CONVENTION & VISITORS BUREAU

8. Long Beach is a popular location for filming television and movies, including features such as Iron Man, Knight and Day, Transformers 2 and 3 and the latest Star Trek movie. Located less than 30 miles from Hollywood production studios, the city has been the backdrop for several TV shows, including Miami for Dexter and CSI Miami. NCIS: Los Angeles, True Blood and Criminal Minds have also been filmed.

9. Within eight blocks of Downtown Long Beach, there are over 125 restaurants where visitors can eat.

10. Long Beach is the childhood home of famous athletes and celebrities including tennis legend Billie Jean King and baseball hall-of-famer Tony Gwynn, actor Nicolas Cage, actress Bo Derek and rapper Snoop Dogg.

#STLE2023 Program-at-a-Glance

*As of December 8, 2022

77th STLE Annual Meeting & Exhibition
Long Beach Convention Center
Long Beach, California (USA)

Saturday, May 20

12:00 pm – 6:00 pm
Onsite Registration

Sunday, May 21

6:30 am – 5:00 pm
Onsite Registration

7:00 am – 7:45 am
Education Course Speakers Breakfast

8:00 am – 5:00 pm
Education Courses (pg. 51)*

6:30 – 8:00 pm
New Member & Student Networking Reception

***Registration required**

All annual meeting events are held in the Long Beach Convention Center.

Monday, May 22

6:30 am – 6:00 pm
Onsite Registration

7:00 am – 8:00 am
Speakers Breakfast

8:00 am – 10:00 am
Technical Sessions and Commercial Marketing Forum

10:00 am – 10:30 am
Refreshment Break

10:30 am – 12:00 pm
Opening General Session – **Keynote Address**

12:00 pm – 1:30 pm
Lunch (on your own)

12:00 pm – 5:00 pm
Commercial Exhibits and Student Posters

1:30 pm – 6:00 pm
Technical Sessions and Commercial Marketing Forum

3:00 pm– 4:00 pm
Exhibitor Appreciation Break

6:30 pm – 8:00 pm
Networking Reception

Tuesday, May 23

6:30 am – 5:00 pm
Onsite Registration

7:00 am – 8:00 am
Speakers Breakfast

8:00 am – 10:00 am
Technical Sessions and Commercial Marketing Forum

9:30 am – 12:00 pm
Commercial Exhibits and Student Posters

10:00 am – 10:30 am
Refreshment Break

12:00 pm – 2:00 pm
President's Luncheon/ Business Meeting

2:00 pm – 5:30 pm
Commercial Exhibits and Student Posters

2:00 pm – 6:00 pm
Technical Sessions and Commercial Marketing Forum

3:00 pm – 4:00 pm
Exhibitor Appreciation Break

4:00 pm – 6:00 pm
Roundtable Discussions

Wednesday, May 24

6:30 am – 5:00 pm
Onsite Registration

7:00 am – 8:00 am
Speakers Breakfast

8:00 am – 5:00 pm
Education Courses (pg. 52)*

8:00 am – 10:00 am
Technical Sessions and Commercial Marketing Forum

9:30 am – 12:00 pm
Commercial Exhibits and Student Posters

10:00 am – 10:30 am
Refreshment Break

12:00 pm – 1:30 pm
Lunch (on your own)

1:30 pm – 6:00 pm
Technical Sessions and Commercial Marketing Forum

3:00 pm – 3:30 pm
Refreshment Break

Thursday, May 25

6:30 am – 12:00 pm
Onsite Registration

7:00 am – 8:00 am
Speakers Breakfast

8:00 am – 5:00 pm
Education Course (pg. 53)*

8:00 am – 12:00 pm
Technical Sessions

10:00 am – 10:30 am
Refreshment Break

12:00 pm – 1:30 pm
Lunch (on your own)

1:30 – 6:00 pm
Technical Sessions and Commercial Marketing Forum

3:00 pm – 3:30 pm
Refreshment Break

Technical Sessions and Commercial Marketing Forum Schedule

Please visit **www.stle.org/annualmeeting** for the latest program information and detailed schedule.

Monday, May 22

(8:00 am – 10:00 am)

- 1A • Lubrication Fundamentals I: Forecasting Trends
- 1B • Rolling Element Bearings I
- 1C • Sustainable Power Generation I
- 1D • Materials Tribology I
- 1E • Condition Monitoring I
- 1G • Non-Ferrous Metals I
- 1H • Commercial Marketing Forum I
- 1I • Electric Vehicles I
- 1K • Metalworking Fluids I
- 1M • Mining Tribology I
- 1N • Nanotribology I
- 1O • AI & Machine Learning I

(1:30 pm – 6:00 pm)

- 2A • Lubrication Fundamentals II: Marine Engines
- 2B • Rolling Element Bearings II
- 2C • Wind Turbine Tribology I
- 2D • Materials Tribology II
- 2E • Condition Monitoring II
- 2F • Environmentally Friendly Fluids I
- 2G • Non-Ferrous Metals II
- 2H • Commercial Marketing Forum II
- 2I • Electric Vehicles II
- 2K • Metalworking Fluids II
- 2M • Mining Tribology II
- 2N • Nanotribology II
- 2O • AI & Machine Learning II

Tuesday, May 23

(8:00 am – 12:00 pm)

- 3A • Lubrication Fundamentals III: Friction Modifiers
- 3B • Rolling Element Bearings III
- 3C • Fluid Film Bearings I
- 3D • Materials Tribology III
- 3E • Condition Monitoring III
- 3F • Environmentally Friendly Fluids II
- 3G • Gears I
- 3H • Commercial Marketing Forum III
- 3I • Electric Vehicles III
- 3K • Metalworking Fluids III
- 3N • Nanotribology III

(2:00 pm – 6:00 pm)

- 4A • Lubrication Fundamentals IV: Polymers
- 4B • Rolling Element Bearings IV
- 4C • Fluid Film Bearings II
- 4D • Materials Tribology IV
- 4F • Environmentally Friendly Fluids III
- 4G • Gears II
- 4H • Commercial Marketing Forum IV
- 4I • Electric Vehicles IV
- 4K • Metalworking Fluids IV
- 4L • Tribochemistry I
- 4N • Nanotribology IV

Wednesday, May 24

(8:00 am – 12:00 pm)

- 5A • Lubrication Fundamentals V: Wear & Engines
- 5B • Rolling Element Bearings V
- 5C • Herbert S. Cheng Memorial Symposium: Challenges in Lubricaiton and Modeling
- 5D • Materials Tribology V
- 5E • Tribochemistry II
- 5F • Contact Mechanics I
- 5G • Tribotesting I
- 5H • Commercial Marketing Forum V
- 5I • Electric Vehicles V
- 5L • Surface Engineering I
- 5M • Grease I
- 5N • Nanotribology V

(1:30 pm – 6:00 pm)

- 6A • Lubrication Fundamentals VI: Innovative Test Methods
- 6B • Rolling Element Bearings VI
- 6C • Synthetic Lubricants and Hydraulics I
- 6D • Materials Tribology VI
- 6E • Tribochemistry III
- 6F • Contact Mechanics II
- 6G • Tribotesting II
- 6H • Commercial Marketing Forum VI
- 6I • Electric Vehicles VI
- 6K • Tribology of Biomaterials I
- 6L • Surface Engineering II
- 6M • Grease II
- 6N • Wear I

Thursday, May 25

(8:00 am – 12:00 pm)

- 7A • Lubrication Fundamentals VII: Nanoparticles & Coatings
- 7C • Seals I
- 7D • Materials Tribology VII
- 7E • Tribochemistry IV
- 7F • Biotribology I
- 7G • Tribotesting III
- 7I • Electric Vehicles VII
- 7J • Metalworking Fluids V
- 7K • Surface Engineering III
- 7L • Grease III
- 7M • Wear II

(1:30 pm – 6:00 pm)

- 8A • Lubrication Fundamentals VIII: Modeling
- 8C • Seals II
- 8E • Tribochemistry V
- 8F • Biotribology II
- 8G • Tribotesting IV
- 8I • Engine and Drivetrain I
- 8L • Grease IV
- 8M • Wear III

Choose from 500 technical presentations!

The following is the preliminary 2023 STLE Annual Meeting technical program that will be updated right up until the meeting in Long Beach. Please visit **www.stle.org/annualmeeting** for the latest program information. Registrants will also receive a Program Guide at the meeting with updated information.

Preliminary as of December 8, 2022 – Subject to change.

Monday, May 22, 2023

Session 1A

LUBRICATION FUNDAMENTALS I: FORECASTING TRENDS

Session Chair: TBD

Session Vice Chair: TBD

8:00 am – 8:30 am

3833921: What Makes a Sulfur Compound Inactive versus Active? An Examination of Sulfur Compounds and Its Effect on Lubrication

Mark Harr, Dover Chemical, Dover, OH

8:30 am – 9:00 am

3835945: Sustainable Cooperation in the Lubricant Industry – A Transformation Towards a Circular and Sustainable Lubricant Value Chain!

Inga Herrmann, VSI Verband Schmierstoff-Industrie e.V., Hamburg, Hamburg, Germany

9:00 am – 9:30 am

3823908: Challenges for Lubrication R&D in Future Powertrains Applications and Potential Solutions in Precompetitive Research

Christian Kunze, Dirk Arnold, Forschungsvereinigung Antriebstechnik e.V., Frankfurt, Germany

9:30 am – 10:00 am

3812531: Experimental Investigation into Minimum Flowrate Conditions for Ultra-Smooth Surfaces

Michael Handschuh, The Ohio State University, Columbus, OH

10:00 am – 10:30 am – Break

Session 1B

ROLLING ELEMENT BEARINGS I

Session Chair: Kushagra Singh, Purdue University, West Lafayette, IN

Session Vice Chair: Alexander Fletcher, AFRL/RQTM, Wright Patterson Air Force Base, OH

8:00 am – 8:30 am

3809275: Transfer to the Miniature World – Performance Analysis of Miniature Ball Bearings with an Emphasis on Dynamic Simulation and Friction Torque Testing

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

8:30 am – 9:00 am

3813088: Cryogenic Test and Evaluation of Pin-on-disk with the Various Cage Materials for Solid Lubricated Bearings

Wonil Kwak, Yeongdo Lee, Jeonkook Lee, Yongbok Lee, Korea Institute of Science and Technology, Seoul, Republic of Korea

9:00 am – 9:30 am

3813004: Augmented Lubricant Replenishment for Rolling Bearings at Limited Lubricant Supply Conditions

Patrick Pat-Iam Wong, City University of Hong Kong, Kowloon, Hong Kong

9:30 am – 10:00 am

3833954: An Improved Dynamic Bearing Model Considering Cage Lubrication

Thomas Russell, Farshid Sadeghi, Purdue University, West Lafayette, IN

10:00 am – 10:30 am – Break

Session 1C

SUSTAINABLE POWER GENERATION I

Session Chair: TBD

Session Vice Chair: TBD

8:00 am – 8:30 am

3812250: Towards an Accelerated Protocol for the Evaluation of Solar Cells

Emmanouil Georgiou, Angelos Koutsomichalis, Hellenic Air-Force Academy, Athens, Greece, Dirk Drees, Lais Lopes, Falex Tribology, Rotselaar, Vlaams Brabant, Belgium, Tom Van Der Donck, Jean-Pierre Celis, KU Leuven, Leuven, Belgium

8:30 am – 9:00 am

3833897: Advances in Varnish Condition Monitoring

Elaine Hepley, POLARIS Laboratories, Indianapolis, IN

9:00 am – 9:30 am

3830424: Sustainable Aeroderivative Gas Turbine Operation Through Lubricant Chemistry Management

Matthew Hobbs, EPT, Calgary, Alberta, Canada

9:30 am – 10:00 am – Sustainable Power Generation Business Meeting

10:00 am – 10:30 am – Break

Session 1D

MATERIALS TRIBOLOGY I

Session Chair: TBD

Session Vice Chair: TBD

8:00 am – 8:30 am

3814793: Development of a Novel Thermo-Mechanical Friction Model for Machining Simulations in Unidirectional Composite Materials

Oscar Seward, AMRC IDC, Sheffield, United Kingdom

8:30 am – 9:00 am

3814091: A Ready-to-Use Temperature Model for Polymer/Steel Contacts

Mitjan Kalin, University of Ljubljana, Ljubljana, Slovenia

9:00 am – 9:30 am

3831914: Characterizing Billiard Chalk in the Cue Tip-Cue Ball Interface

Alan Martin, The University of Sheffield, Leeds, West Yorkshire, United Kingdom

9:30 am – 10:00 am

3819733: Nanoscale Rate-and-State Friction, Atomic Insights Via Complex Sliding Protocols

John McClimon, Robert Carpick, David Goldsby, University of Pennsylvania, Philadelphia, PA, Khagendra Baral, Izabela Szlufarska, University of Wisconsin-Madison, Madison, WI

10:00 am – 10:30 am – Break

Session 1E

CONDITION MONITORING I

Session Chair: Alfredo Garcia, Luval SA, San Bernardo, Chile

Session Vice Chair: TBD

8:00 am – 8:30 am

3809926: A Hybrid Modeling Approach for Transferring Machine Learning Assisted Condition Monitoring of Rolling Bearings to Differing Machine Types

Christoph Bienefeld, Bosch, Renningen, Germany

8:30 am – 9:00 am

3812707: Application of Envelope Spectrum Analysis and Spectral Kurtosis to Diagnose Debris Fault in Bearing Using Acoustic Signals

Henry Omoregbee, University of Lagos, Nigeria, Lagos, Nigeria, Mabel Olanipekun, Tshwane University of Technology, Pretoria, Gauteng, South Africa, Bright Edward, Federal University of Petroleum Resources, Effurun, Delta State, Nigeria

9:00 am – 9:30 am

3841570: Anomaly Detection Methodology for Centrifugal Compressors and Steam Turbines

Sandeep Kogge, L&T Technology Services, Bengaluru, India

9:30 am – 10:00 am

3806620: The Opportunities of Rolling Bearing Impedance Signal Analysis for Condition Monitoring

Florian Michael Becker-Dombrowsky, Technical University of Darmstadt, Darmstadt, Hesse, Germany

10:00 am – 10:30 am – Break

Session 1G

NON-FERROUS METALS I

Session Chair: Tom Oleksiak, Quaker Houghton, Oswego, IL

Session Vice Chair: Grigor Bantchev, NCAUR, USDA-ARS, Peoria, IL

8:00 am – 8:30 am

3833550: Emulsions for Aluminium Hot Rolling: Which Droplet Size Distribution is Beneficial to Lubricity?

Ariane Viat, Constellium Technology Center, Voreppe Cedex, France

8:30 am – 9:00 am

3811844: Additives for High Lubricity Fully Synthetic Aluminum Machining Formulations

Steffen Glaenzer, Stephanie Cole, Clariant Corporation, Mount Holly, NC

9:00 am – 9:30 am

3831286: Correlations Between Two Methods for Cloud Point and Pour Point Determination of Biobased Materials

Grigor Bantchev, USDA-ARS, Peoria, IL

9:30 am – 10:00 am

3832150: Hot Mill Coolant Filtration Improvements

Andrea Knopp, Constellium, Ravenswood, WV

10:00 am – 10:30 am – Break

Session 1H

COMMERCIAL MARKETING FORUM I

Session Chair: TBD

Session Vice Chair: TBD

8:00 am – 8:30 am – Open Slot

8:30 am – 9:00 am – Open Slot

9:00 am – 9:30 am
ANGUS Chemical Company

9:30 am – 10:00 am
Colonial Chemical, Inc.

10:00 am – 10:30 am – Break

Session 1I

ELECTRIC VEHICLES I

Session Chair: TBD

Session Vice Chair: TBD

8:00 am – 8:30 am

3833677: Lubrication Regimes and BEV Power Unit Efficiency Improvement Opportunities

Kalyan Mutyala, Arup Gangopadhyay, Ford Motor Company, Dearborn, MI

8:30 am – 9:00 am

3816216: Electrical Behaviors of Tribocontacts in Association with Friction and Wear Properties as Key Concepts for Lubes in Electrified Powertrains

Mathias Woydt, Matrilub, Berlin, Germany, Gregor Patzer, Optimol Instruments GmbH, Munich, Germany

9:00 am – 9:30 am

3815343: Can Conventional ATFs be Used Safely in Electrified Transmissions?

Alejandro García Tuero, Noelia Rivera Rellán, Eduardo Rodríguez Ordóñez, Rubén González Rodríguez, José Luis Viesca Rodríguez, University of Oviedo, Gijón, Asturias, Spain

9:30 am – 10:00 am

3840017: Development of Test Methods for and Fluid Durability Study in Electrified Drivetrains

Cole Hudson, Southwest Research Institute, San Antonio, TX

10:00 am – 10:30 am – Break

Session 1K

METALWORKING FLUIDS I

Session Chair: TBD

Session Vice Chair: TBD

8:00 am – 8:30 am

3809282: Improving Metalworking Fluid Efficiency by Creating Hydrophilic Protective Barriers

Volker Demel, Matthias Reihmann, Gelita AG, Eberbach, Baden-Württemberg, Germany

8:30 am – 9:00 am

3811097: Overcoming Metalworking Fluid Instability – Beyond HLB

Hoon Kim, Michael Creamer, Zschimmer-Schwarz US, Gordon, GA

9:00 am – 9:30 am

3831459: A Novel Way to Measure Stability and Shelf-life of a Metalworking Fluid Formulation

Ravinder Elupula, Formulaction, Piscataway, NJ

9:30 am – 10:00 am

3833753: Surfactant Roles in Emulsifiable Oils

Robert Golden, Pilot Chemical Company, Cincinnati, OH

10:00 am – 10:30 am – Break

Session 1M

MINING TRIBOLOGY I

Session Chair: TBD

Session Vice Chair: TBD

Presentations TBD

Session 1N

NANOTRIBOLOGY I

Session Chair: Wai Oo, University of California-Merced, Merced, CA

Session Vice Chair: TBD

8:00 am – 8:30 am

3834331: Nano-scale Friction of Graphitic Surfaces in n-hexadecane

Behnoosh Sattari Baboukani, University of California-Berkeley, Berkeley, CA, Zhijiang Ye, Miami University, Oxford, OH, Prathima Nalam, University at Buffalo, Buffalo, NY

8:30 am – 9:00 am

3812927: AFM Cantilever Tip Radius Estimation Through Contact Resonance Force Spectroscopy

Thomas Mathias, Philip Egberts, University of Calgary, Calgary, Alberta, Canada

9:00 am – 9:30 am

3833291: The Effects of -H and -OH Termination on Adhesion, Friction, and Wear of Silicon-Silicon Interfaces – A Molecular Dynamics Investigation

Judith Harrison, United States Naval Academy, Annapolis, MD, Robert Carpick, University of Pennsylvania, Philadelphia, PA, J. David Schall, North Carolina AT&T University, Greensboro, NC

9:30 am – 10:00 am

3810859: Unique Frictional Characteristics of Germanium-based Nanofilm

Chaochen Xu, University of Calgary, Calgary, Alberta, Canada

10:00 am – 10:30 am – Break

Session 1O

AI & MACHINE LEARNING I

Session Chair: Wilfred Tysoe, University of Wisconsin-Milwaukee, Milwaukee, WI

Session Vice Chair: Prathima Nalam, University at Buffalo, Buffalo, NY

8:00 am – 9:00 am

3834306: Deep Learning Data-driven Model for Coefficient of Friction Prediction of Lubricated Tribo-pairs

Maria Victoria Granja Oramas, C. Fred Higgs III, Rice University, Houston, TX

9:00 am – 9:30 am

3823140: Towards the Prediction of EHL Film Thickness Parameters by Machine Learning Approaches

Max Marian, Pontificia Universidad Católica de Chile, Macul, Región Metropolitana, Chile

9:30 am – 10:00 am

3834040: Digitalization: Bringing a "Frictionless" Future Closer to Reality

Sravani Gullapalli, Edward Malisa, Oluwaseyi Ogunsola, Shell Global Solutions (US) Inc., Houston, TX, Dillawar Syed, Shell Global Solutions (UK), London, United Kingdom

10:00 am – 10:30 am – Break

Session 2A

LUBRICATION FUNDAMENTALS II: MARINE ENGINES

Session Chair: TBD

Session Vice Chair: TBD

1:30 pm – 2:00 pm

3833984: Performance of Additives Improving Asphaltene Dispersancy in GII Base Stocks

Ashish Jha, Chevron, Richmond, CA

2:00 pm – 2:30 pm

3816198: A Study on Performance Improvement of TPEO for 4-Stroke Engines with Low-Sulphur Blended Fuels

Jie Zhang, Li Kai, Chen Ligong, Tao Yida, Richful Lube Additive Co. Ltd., Xinxiang, Henan, China

2:30 pm – 3:00 pm

3819130: Experimental Evaluation on a Special Cylinder Oil Additive Package Applied in Blender on Ship Board

Jie Zhang, Li Kai, Chen Ligong, Tao Yida, Richful Lube Additive Co.Ltd., Xinxiang, Henan, China

3:00 pm – 4:00 pm – Exhibitor Appreciation Break

4:00 pm – 4:30 pm

3833833: Marine Engine Test and Bench Tests Correlation for Deposit Formation Performance

Matthieu Decuupere, Shenghua Li, Chevron Oronite, Gonfreville l'Orcher, France

4:30 pm – 5:00 pm

3833947: Reduction of Carbon Footprint and Maintenance of Oil Life through Performance Selection of Lube Oils

Sara Rezaee, Ganesh Natrajan, Aparna Bala, Ramaratnam Visweswaran, Viswa Group, Houston, TX

5:00 pm – 5:30 pm

3812345: Accelerating the Development of Piston-Liner Tribology in Marine Diesel Engines Using Ultrasonic Transducers

Oliver Spenceley, University of Sheffield, Leeds, United Kingdom

✸ Session 2B

ROLLING ELEMENT BEARINGS II

Session Chair: Kushagra Singh, Purdue University, West Lafayette, IN

Session Vice Chair: Alexander Fletcher, AFRL/RQTM, Wright Patterson Air Force Base, OH

1:30 pm – 2:00 pm

3812856: Contribution of Rolling Bearings to Improve Driving Range of Electric Vehicles

Jitesh Modi, Schaeffler Group USA, Troy, MI

2:00 pm – 2:30 pm

3831269: Influence of Bearing and System Design on CO_2 Emission Savings

Vasilios Bakolas, Philipp Rödel, Schaeffler Technologies AG & Co. KG, Herzogenaurach, Germany

2:30 pm – 3:00 pm

3812197: Influence of Form Deviated Bearing Seats on the Operating Behavior of Cylindrical Roller Bearings

Oliver Koch, Onur Atalay, RPTU, Kaiserslautern, Germany

3:00 pm – 4:00 pm – Exhibitor Appreciation Break

4:00 pm – 4:30 pm

3799607: Experimental and Analytical Investigation of Oil Flow in a Ball Bearing

Ujjawal Arya, Farshid Sadeghi, Purdue University, West Lafayette, IN, Andreas Meinel, Hannes Grillenberger, Schaeffler Technologies AG & Co. KG, Herzogenaurach, Germany

4:30 pm – 5:00 pm

3810080: Experimental and Analytical Investigation of Angular Contact Ball Bearing Cage Pocket Lubrication

Saeed Aamer, Farshid Sadeghi, Purdue University, West Lafayette, IN, Andreas Meinel, Hannes Grillenberger, Schaeffler Technologies AG & Co. KG, Herzogenaurach, Germany

5:00 pm – 5:30 pm

3831812: In-Situ Measurement of Grease Churn within a Full-Scale Cyclindrical Roller Bearing

William Gray, Rob Dwyer-Joyce, The University of Sheffield, Sheffield, United Kingdom

5:30 pm – 6:00 pm

3834982: Air Squeeze Film Damper Design and Analysis for a Failed Aircraft ACM Ball Bearing Turborotor

Edgar Gunter, University of Virginia, Charlottesville, VA

✸ Session 2C

WIND TURBINE TRIBOLOGY I

Session Chair: TBD

Session Vice Chair: TBD

1:30 pm – 2:00 pm

3833961: Foaming in Wind Turbine Gearboxes: Causes, Impacts and Treatment Continued

Kurtis Hartlen, Imperial Oil, Brights Grove, Ontario, Canada, Marianne Rodgers, Wind Energy Institute of Canada, Tignish, Prince Edward Island, Canada

2:00 pm – 2:30 pm

3833779: Dynamic Model of a Double Row Spherical Roller Main Bearing of a Wind Turbine

Elisha de Mello, University of Sheffield, Rugby, United Kingdom

2:30 pm – 3:00 pm

3831417: Autonomously Triggered Application of Corrosion Preventing Lubricants

Sharon Flank, Jonathan Schupp, InfraTrac Inc., Smithsburg, MD

3:00 pm – 4:00 pm – Exhibitor Appreciation Break

4:00 pm – 4:30 pm

3811827: Non-invasive Detection of Cracks in Bearing Steel Using Ultrasound

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

4:30 pm – 5:00 pm

3811250: Sustainable Solutions for Wind Turbines

Mar Combarros, Marc Alumà, IQL, Castellgalí, Barcelona, Spain, Ariadna Emeric, Gerard Cañellas, Àngel Navarro, Taro Ehara, Industrial Química Lasem, Castellgalí, Spain

5:00 pm – 5:30 pm – Wind Turbine Tribology Business Meeting

✸ Session 2D

MATERIALS TRIBOLOGY II

Session Chair: TBD

Session Vice Chair: TBD

1:30 pm – 2:00 pm

3813080: Effect of Diamond-like Carbon Composition on Oxidation Reactivity and Friction

Seokhoon Jang, Seong Kim, Pennsylvania State University, State College, PA, Muztoba Rabbani, Ashlie Martini, University of California-Merced, Merced, CA

2:00 pm – 2:30 pm

3848254: Process-Structure-Property Driven Development of High-Quality MoS_2 Coatings

Tomas Babuska, Michael Dugger, Steven Larson, John Curry, Sandia National Laboratories, Albuquerque, NM, Brandon Krick, Florida State University, Tallahassee, FL

Session 2D (continued)

2:30 pm – 3:00 pm

3832185: Quality Assurance Methods for MoS_2-Based Solid Lubricants

Michael Dugger, Mark Rodriguez, Sandia National Laboratories, Albuquerque, NM, Olivia Smithhisler, Michael Walsh, Theresa Pond, National Security Campus, Kansas City, MO

3:00 pm – 4:00 pm – Exhibitor Appreciation Break

4:00 pm – 4:30 pm

3832904: Wear and Corrosion Resistant Ni-SiC Coatings Fabricated by Adaptive Additive Manufacturing

Mohsen Tajedini, Peter Renner, Hong Liang, Texas A&M University, College Station, TX

4:30 pm – 5:00 pm

3833836: High-Frequency Reciprocating Tribological Assessment of MoVN-Cu Coating in Low-Viscosity Fuel Environments Under Various Load, Temperature, and Sliding Velocity Conditions

Kelly Jacques, Asghar Shirani, Jesse Smith, Thomas Scharf, University of North Texas, Denton, TX, Scott Walck, Stephen Berkebile, US Army DEVCOM Army Research Laboratory, Aberdeen Proving Ground, MD, Osman Eryilmaz, Argonne National Laboratory, Lemont, IL, Andrey Voevodin, Samir Aouadi, Diana Berman, University of North Texas, Denton, TX

5:00 pm – 5:30 pm

3834225: Ultralow Wear PEALD Ternary Nitrides: Understanding Process-Structure-Property Relationships

Kylie Van Meter, Santiago Lazarte, Brandon Krick, Florida State University, Tallahassee, FL, Md. Chowdhury, Nicholas Strandwitz, Lehigh University, Bethlehem, PA, Mark Sowa, Veeco ALD, Waltham, MA, Alexander Kozen, University of Maryland, College Park, MD

Session 2E

CONDITION MONITORING II

Session Chair: Kemberlee Snelling, Trico Corporation, Davison, MI

Session Vice Chair: TBD

1:30 pm – 2:00 pm

3801921: Lifetime Extension Strategies in Wind Turbine Using an OCM – Oil Condition Monitoring Program

Yesid Gomez, Adolfo Malaga, Jose Ignacio Ciria, Bureau Veritas Spain – OCM, Eibar, Gipuzkoa, Spain

2:00 pm – 2:30 pm

3812603: Suggested Sampling Methods for In-Service Oil and Grease Lubricated Equipment

Victoria Bunchek, Raymond Dalley, Trico Corporation, Pewaukee, WI, Bernie Hall, Checkfluid, London, Ontario, Canada, Richard Wurzbach, MRG Laboratories, York, PA, George Staniewski, Tribology Consultant, Mississauga, Ontario, Canada

2:30 pm – 3:00 pm

3836660: Optimizing Operational Savings with Fluid Analysis

Henry Neicamp, POLARIS Laboratories, Indianapolis, IN

3:00 pm – 4:00 pm – Exhibitor Appreciation Break

4:00 pm – 4:30 pm

3833723: A Sea Change in Fluid Analysis (aka Oil Analysis) Has Arrived

Jack Poley, CMI, Miami, FL

4:30 pm – 5:00 pm

3833861: Using Oil Analysis to Identify Incorrect Bearing Lubrication

Evan Zabawski, Eurofins TestOil, Strongsville, OH

5:00 pm – 5:30 pm – Condition Monitoring Business Meeting

Session 2F

ENVIRONMENTALLY FRIENDLY FLUIDS I

Session Chair: Brajendra Sharma, USDA/ARS/NEA/ERRC, Wyndmoor, PA

Session Vice Chair: Daniel Garbark, Battelle Memorial Institute, Columbus, OH

1:30 pm – 2:00 pm

3811431: Global Fluid Trends

Edward Jones, Hangsterfer's Labs. Inc., Mantua, NJ

2:00 pm – 2:30 pm

3812469: Using the Life Cycle Assessment (LCA) Tool to Determine the Carbon Footprints of Castor Oil Derivatives

Travis Thompson, Biosynthetic Technologies, Indianapolis, IN

2:30 pm – 3:00 pm

3830719: Potential of Lubricant Base Oils From Microalgae

Brajendra Sharma, USDA/ARS/NEA/ERRC, Wyndmoor, PA, Derek Vardon, Robert McCormick, National Renewable Energy Laboratory, Golden, CO, John Scott, University of Illinois at Urbana-Champaign, Champaign, IL, Kenneth Doll, USDA-ARS-National Center for Agricultural Utilization Research, Peoria, IL, Timothy Strathmann, Colorado School of Mines, Golden, CO

3:00 pm – 4:00 pm – Exhibitor Appreciation Break

4:00 pm – 4:30 pm

3810970: Maximize Performance and Improve Sustainability Through Group V Ester Technology

Gemma Stephenson, Kevin Duncan, Cargill, Snaith, United Kingdom

4:30 pm – 5:00 pm

3832044: Overcoming the High Viscosity Limitation of Readily Biodegradable EAL Base Fluid

Ramesh Navaratnam, Jerry Wu, Patech Fine Chemicals, Dublin, OH

Session 2G

NON-FERROUS METALS II

Session Chair: Ariane Viat, Constellium Technology Center, Voreppe Cedex, France

Session Vice Chair: Annie King, Total Energies, Linden, NJ

1:30 pm – 2:00 pm

3818372: Improving Aluminum Cold Mill Lubricant Performance with a Surface-Active Agent

Thomas Oleksiak, Quaker Houghton, Oswego, IL

2:00 pm – 2:30 pm

3833171: Carbon Negative Liquid Hydrocarbons – Next Generation GTL Technology Commercializing in the US

William Anderson, ClearShift, Avon, IN

2:30 pm – 3:00 pm

3833991: Considerations for Changing Cold Rolling Base Oil

James Anglin, Allegheny Petroleum, Monroeville, PA

3:00 pm – 4:00 pm – Exhibitor Appreciation Break

4:00 pm – 4:30 pm

3848321: Influence of Raw Material Quality Variations on the In-Service Performance of Aluminum Hot Rolling Oils

Josef Leimhofer, AMAG Rolling GmbH, Ranshofen, Austria

4:30 pm – 5:00 pm – Open Slot

5:00 pm – 6:00 pm – Nonferrous Metals Business Meeting

Session 2H

COMMERCIAL MARKETING FORUM II

Session Chair: TBD

Session Vice Chair: TBD

1:30 pm – 2:00 pm
Evonik Oil Additives USA, Inc.

2:00 pm – 2:30 pm
LANXESS Corporation

2:30 pm – 3:00 pm
The Lubrizol Corporation

3:00 pm – 4:00 pm – Exhibitor Appreciation Break

4:00 pm – 4:30 pm – Open Slot

4:30 pm – 5:00 pm
IMCD US

Session 2I

ELECTRIC VEHICLES II

Session Chair: TBD

Session Vice Chair: TBD

1:30 pm – 2:00 pm

3833969: Various Copper Corrosion Test Methods for Electric Drivetrain Fluid Evaluations

Yungwan Kwak, Christopher Cleveland, Afton Chemical Corporation, Richmond, VA

2:00 pm – 2:30 pm

3808209: Next-Generation Tribology Component Technologies for E-Fluids

Christelle Chretien, Solvay, Bristol, PA

2:30 pm – 3:00 pm

3823603: Technologies for Improving the Performance of E-Axle Fluids

Mari Iino, Shigeki Matsui, Shingo Matsuki, Akira Tada, Toshitaka Nakamura, ENEOS Corporation, Yokohama, Kanagawa, Japan

3:00 pm – 4:00 pm – Exhibitor Appreciation Break

4:00 pm – 4:30 pm

3835030: Performance Characteristics of Some EV Drivetrain Lubricants Under Electrified Condition

Ali Erdemir, Pushkar Deshpande, Leonardo Farfan-Cabrera, Seungjoo Lee, Texas A&M University, College Station, TX, William Anderson, Yungwan Kwak, Afton Chemical Corporation, Richmond, VA

4:30 pm – 5:00 pm

3839909: Comparison of Electric Drive Unit Lubricant Aeration Under High Speed Operation

Cole Frazier, Nolan Erickson, Cole Hudson, Southwest Research Institute, San Antonio, TX

5:00 pm – 5:30 pm

3854042: Electrically Conductive Nanoparticle Additives for Greases Used in Electric Vehicles and Other Applications

Robert Jackson, Samuel Bond, German Mills, Auburn University, Auburn, AL

5:30 pm – 6:00 pm

3833980: A Study of the Effects of Foam and Antifoam Performance in Electric Vehicle Base Fluids

Safia Peerzada, Münzing North America, LP, Bloomfield, NJ

Session 2K

METALWORKING FLUIDS II

Session Chair: TBD

Session Vice Chair: TBD

1:30 pm – 2:00 pm

3802879: ASTM Standards Addressing Metalworking Fluid Health and Safety Issues

Frederick Passman, Biodeterioration Control Associates, Inc., Princeton, NJ

2:00 pm – 2:30 pm

3809305: The Study of Novel Calcium Overbased Sulfonates Used for Rust Preventives

James Jianjun Wei, Wayne Mackwood, LANXESS, Toronto, Ontario, Canada

2:30 pm – 3:00 pm

3810790: Case Study of Monitor and Correction of Field Coolant Emulsions by Light Scattering Instrument and Good Correction Method

Yixing Philip Zhao, Quaker Houghton, Conshohocken, PA

3:00 pm – 4:00 pm – Exhibitor Appreciation Break

4:00 pm – 4:30 pm

3810961: Extreme Pressure Sulfurized Additives for Metalworking Fluid Ester-Based Formulation

Guillaume Notheaux, SEQENS, Porcheville, France

Session 2K (continued)

4:30 pm – 5:00 pm

3811719: Sustainability Beyond Carbon Footprint

Michael Stapels, Kao Chemicals GmbH, Emmerich, Germany

5:00 pm – 5:30 pm

3808450: Chlorine Use in Stainless Steel Tube Manufacturing

James Brooks, RichardsApex Inc., Philadelphia, PA

5:30 pm – 6:00 pm

3833657: Analysis of the Tool Margin-Wall Contact During MQL Deep-Hole Drilling of AISI 4140 Steel Through a Surface Integrity Study

Peter Neal, University of Sheffield, Sheffield, South Yorkshire, United Kingdom

Session 2M

MINING TRIBOLOGY II

Session Chair: TBD

Session Vice Chair: TBD

Presentations TBD

Session 2N

NANOTRIBOLOGY II

Session Chair: Mehmet Baykara, University of California-Merced, Merced, CA

Session Vice Chair: TBD

1:30 pm – 2:30 pm

Invited Talk

3847661:The Nucleation, Growth, and Adhesion of Water Bridges in Sliding Nano-contacts

Bart Weber, Felix Cassin, Rachid Hahury, Thibault Lancon, Steve Franklin, Advanced Research Center for Nanolithography, Amsterdam, Netherlands

2:30 pm – 3:00 pm

3831137: Molecular Dynamics Investigation of the Friction Mechanism in a Humid Nanocontact

Igor Stankovic, Institute of Physics Belgrade, Zemun, Belgrade, Serbia; Olivier Noel, Le Mans Universite, Le Mans, France; Pierre-Emmanuel Mazeran, Sorbonne Universites, Universite de Technologie de Compiegne, Compiegne, France

3:00 pm – 4:00 pm – Exhibitor Appreciation Break

4:00 pm – 4:30 pm

3812874: Friction Evolution and High Cycle Wear Behavior of Monolayer Graphene, MoS_2, and WSe_2

Nima Barri, Ma Islam, Boran Kumral, Akshat Rastogi, Pedro Demingos, Yaoping Hou, Chandra Veer Singh, Tobin Filleter, University of Toronto, Toronto, Ontario, Canada, Momoko Onodera, Tomoki Machida, University of Tokyo, Tokyo, Japan

4:30 pm – 5:00 pm

3832988: Using Friction Hysteresis of 2D Materials to Uncover Properties of the Substrate

Philip Egberts, Chaochen Xu, University of Calgary, Calgary, Alberta, Canada, Zhijiang Ye, Miami University, Oxford, OH

5:00 pm – 5:30 pm

3833606: MXene Nanosheets Exhibiting Layer-Dependent Friction Properties

Eui-Sung Yoon, Prashant Pendyala, Seon Joon Kim, Korea Institute of Science and Technology, Seoul, Republic of Korea

5:30 pm – 6:00 pm

3813225: Nanoscale Friction of High Entropy Alloy Sulfide Thin Films in Comparison with Molybdenum Disulfide

Gokay Adabasi, Joshua Ancheta, Emmanuel Maldonado, Mehmet Ozdogan, Mehmet Baykara, University of California-Merced, Merced, CA, Aditya Deshpande, Koichi Tanaka, University of California-Los Angeles, Los Angeles, CA, Suneel Kodambaka, Virginia Tech, Blacksburg, VA

Session 2O

AI & MACHINE LEARNING II

Session Chair: Wilfred Tysoe, University of Wisconsin-Milwaukee, Milwaukee, WI

Session Vice Chair: Prathima Nalam, University at Buffalo, Buffalo, NY

1:30 pm – 2:00 pm

3833889: A New Perspective on Tribological Data Via Advanced Statistics and Artificial Intelligence

Nicole Dörr, Georg Vorlaufer, Josef Prost, AC2T research GmbH, Wiener Neustadt, Austria

2:00 pm – 2:30 pm

3833776: Chemometric and FTIR Spectroscopy for Determination of Physicochemical Properties of Engine Oil

Sara Rezaee, Ganesh Natrajan, Aparna Bala, Ramaratnam Visweswaran, Viswa Group, Houston, TX

2:30 pm – 3:00 pm

3831643: Digital Advancements in Tribofilm Analysis

Oluwaseyi Ogunsola, Shell Global Solutions (US) Inc., Houston, TX, Sanket Deshmukh, Rishu Saxena, Shell India Markets Pvt Ltd., Bangalore, India, Grace Uche, Shell Information Technology International Inc., Houston, TX, Gary Pollock, Altin Veliu, Shell Global Solutions (UK), London, United Kingdom

3:00 pm – 4:00 pm – Exhibitor Appreciation Break

4:00 pm – 4:30 pm

3840701: Using Machine Learning Algorithms to Relate the Surface Topography of As-built Surfaces to Additive Manufacturing Process Parameters

Bart Raeymaekers, Virginia Tech, Blacksburg, VA

4:30 pm – 5:00 pm

3834513: How to Get to Big Data in Tribology? A Hands-On Example

Nikolay Garabedian, Ilia Bagov, Christian Greiner, Karlsruhe Institute of Technology, Karlsruhe, Germany

5:00 pm – 6:00 pm – Panel Discussion

Tuesday, May 23, 2023

Session 3A

LUBRICATION FUNDAMENTALS III: FRICTION MODIFIERS

Session Chair: TBD

Session Vice Chair: TBD

8:00 am – 8:30 am

3811668: Friction Reduction Performance of Nanodiamonds in Presence of Organic Friction Modifier

Afrina Khan Piya, A. Al Sheikh Omar, Liuquan Yang, Ardian Morina, University of Leeds, Leeds, West Yorkshire, United Kingdom; Nazanin Emami, Luleå University of Technology, Luleå, Sweden

8:30 am – 9:00 am

3831281: Research on the Activation and Performance Retention of Organomolybdenum Additives

Brian Casey, David Boudreau, Vanderbilt Chemicals, LLC, Norwalk, CT

9:00 am – 9:30 am

3834157: Effect of Organic Friction Modifiers on Friction and Wear of HDDEO Formulations

Alexei Kurchan, Cargill Inc., Plainsboro, NJ

9:30 am – 10:00 am

3812392: Study of the Interaction Between Esters and Different Friction Modifier Additives in a Group IV Base Stock

Gerard Cañellas, Ariadna Emeric, Àngel Navarro, Lluís Beltran, Industrial Química Lasem, Castellgalí, Spain, Mar Combarros, IQL, Castellgalí, Barcelona, Spain, Montserrat Vilaseca, Eurecat, CTM, Manresa, Barcelona, Spain, Jordi Vives, UPC, Manresa, Barcelona, Spain

10:00 am – 10:30 am – Break

10:30 am – 11:00 am

3813355: Bench Friction Evolution of Engine-Aged Oils

Brendan Miller, Ramoun Mourhatch, Chevron Oronite Company, Richmond, CA

11:00 am – 11:30 am

3808868: Measuring the Frictional Behavior of Lubricants with an Antiwear Additive and Different Friction Modifiers

Katherine Tomlinson, Tom Slatter, University of Sheffield, Sheffield, United Kingdom; Nick Morris, Paul King, Loughborough University, Leicestershire, United Kingdom

Session 3B

ROLLING ELEMENT BEARINGS III

Session Chair: Alexander Fletcher, AFRL/RQTM, Wright Patterson Air Force Base, OH

Session Vice Chair: Daulton Isaac, AFRL Turbine Engine Division, Wright Patterson Air Force Base, OH

8:00 am – 8:30 am

3833592: Influence of Residual Stresses Due to Cold Forming on Stainless Steel Bearings

Alexander Bodewig, Florian Pape, Gerhard Poll, Leibniz University Hannover, Garbsen, Lower Saxony, Germany

8:30 am – 9:00 am

3833799: Influence of High Loads on the Fatigue Life Behavior of Rolling Bearings

Simon Dechant, Institute for Machine Design and Tribology, Hanover, Germany

9:00 am – 9:30 am

3831513: An Investigation into Rolling Contact Fatigue Performance of Aerospace Bearing Materials

Steven Lorenz, Farshid Sadeghi, Purdue University, West Lafayette, IN

9:30 am – 10:00 am

3813418: Predicting Surface Pitting Fatigue Behavior using Torsion Fatigue Characteristics

Kushagra Singh, Farshid Sadeghi, Purdue University, West Lafayette, IN

10:00 am – 10:30 am – Break

10:30 am – 11:00 am

3834141: Effect of Surface Roughness & Lubrication Regime on Bearing RCF Life Using Computational Modeling Tool

Behrooz Jalalahmadi, Nick Weinzapfel, Sentient Science, Buffalo, NY

11:00 am – 11:30 am

3812340: Wear Induced Changes in Surface Topography During Running-In of Rolling-Sliding Contacts

Maruti Sai Dhiraj Sakhamuri, Terry Harvey, Robert Wood, University of Southampton, Southampton, United Kingdom, Bernd Vierneusel, Schaeffler Technologies AG & Co. KG, Schweinfurt, Germany

11:30 am – 12:00 pm

3812773: Investigation on Strength of Steel and Silicon Nitride Rollers Against Fracture

Nikhil Londhe, Aaron Muhlenkamp, Hiroshi Marunaka, The Timken Company, North Canton, OH

Session 3C

FLUID FILM BEARINGS I

Session Chair: TBD

Session Vice Chair: TBD

8:00 am – 8:30 am

3804785: An Optimized Normalization of the Inlet Computation Zone for Isothermal EHL Contacts

Yuko Higashitani, Sanemasa Kawabata, DENSO Corporation, Showa-cho, Kariya-shi, Japan; Marcus Björling, Andreas Almqvist, Luleå University of Technology, Luleå, Sweden

8:30 am – 9:00 am

3811673: Experimental Investigation on Thrust Bearing Cooling Arrangement Within Tilting Pads

Farooq Najar, G A Harmain, NIT Srinagar, Srinagar, J&K, India

9:00 am – 9:30 am

3804389: Static and Dynamic Behavior of a Porous Bearing Lubricated by Nanofluids

Benyebka Bou-Saïd, INSA Lyon, Villeurbanne, France

Session 3C (continued)

9:30 am – 10:00 am

3811830: Dynamic Analysis of Finite Porous Journal Bearing Considering Cavitation

Elizabeth Clifford, The University of Akron, Akron, OH

10 – 10:30 am – Break

10:30 am – 11:00 am

3811880: Thin Film Momentum and Energy "Bulk Flow" Equations with Velocity and Temperature Profiles

Mihai Arghir, Universite de Poitiers, Futuroscope Chasseneuil, France

11:00 am – 11:30 am

3834094: A Directed-Lubrication Thrust Bearing Solution for High-Speed and/or High-Load Applications

Bruce Fabijonas, Richard Rodzwic, Kingsbury, Inc., Philadelphia, PA

Session 3D

MATERIALS TRIBOLOGY III

Session Chair: TBD

Session Vice Chair: TBD

8:00 am – 8:30 am

3834326: Dry Sliding Wear of Metal-oxide Filled PTFE Composites

Jackson Swets, Joseph Berbach, Harman Khare, Gonzaga University, Spokane, WA

8:30 am – 9:00 am

3835100: Qualitative Analysis of Transfer Film Properties on Wear Performance of Metal Filled Fluoropolymer Composites

Faysal Haque, Mark Sidebottom, Miami University, Oxford, OH

9:00 am – 9:30 am

Presentation TBD

Mark Sidebottom, Miami University, Oxford, OH

9:30 am – 10:00 am

Presentation TBD

David Burris, University of Delaware, Newark, DE

10:00 am – 10:30 am – Break

10:30 am – 11:00 am

3834303: On the Dry Sliding Wear of PEEK-PTFE Composites

Elizabeth Anders, Harman Khare, Gonzaga University, Spokane, WA

11:00 am – 11:30 am

3834238: Tribological Behavior of PTFE-PEEK: Influence of Composite Processing

Kylie Van Meter, Brandon Krick, Florida State University, Tallahassee, FL, Christopher Junk, CJ Ideas LLC, Wilmington, DE

11:30 am – 12:00 pm

3830056: Design of PEEK-Based Composites for Multifunctional Applications

Surojit Gupta, Shawn Ruggiero, Caleb Matzke, University of North Dakota, Grand Forks, ND, Stephen Berkebile, US Army DEVCOM Army Research Laboratory, Aberdeen Proving Ground, MD

Session 3E

CONDITION MONITORING III

Session Chair: Greg Horwich, Gastops, Dartmouth, Nova Scotia, Canada

Session Vice Chair: TBD

8:00 am – 8:30 am

3816883: Wear Metal Alarm Limits versus Trending

Evan Zabawski, Eurofins TestOil, Strongsville, OH

8:30 am – 9:00 am

3831987: Rapid Identification and Quantification of Ethylene and Propylene Glycol in Engine Coolant by Gas Chromatography

Nicholas Lancaster, Cory Schomburg, Lee Marotta, Leeman Bennington, PerkinElmer, Waltham, MA

9:00 am – 9:30 am

3832529: Filter Element Construction and Electrostatic Discharge Polarity in Hydraulic Systems

John Duchowski, Hydac FluidCareCenter GmbH, Sulzbach, Saar, Germany, Keith Windebank, Tobias Daley, Hydac Technology Ltd., Witney, Oxfordshire, United Kingdom

9:30 am – 10:00 am

3833748: An Automated Approach to Gravimetric Dilution for Lubricant ICP Sample Preparation and Analysis

Steven Twining, Elemental Scientific, Inc., Navasota, TX

10:00 am – 10:30 am – Break

10:30 am – 11:00 am

3833834: Asset Condition Assessment, Field Application

Marc Yarlott, Veolia North America, Vancouver, WA

11:00 am – 11:30 am

3812939: Real-Time Online Determination of Lubricant Remaining Useful Lifetime and Detection of Common Lubrication Contamination Events

Timothy Mack, Greg Horwich, Gastops, Dartmouth, Nova Scotia, Canada

11:30 am – 12:00 pm

3831245: The Impact of Oil Additive Types and Their Content on the Oil Electrical Conductivity

John Duchowski, Andrei Wenzel, Hydac FluidCareCenter GmbH, Sulzbach, Saar, Germany

Session 3F

ENVIRONMENTALLY FRIENDLY FLUIDS II

Session Chair: Brajendra Sharma, USDA/ARS/NEA/ERRC, Wyndmoor, PA

Session Vice Chair: Daniel Garbark, Battelle Memorial Institute, Columbus, OH

Session Starts at 8:30 am

8:30 – 9:00 am

3811270: Viscosity Modifiers with an Environmental Acceptable Design and an Improved Performance

Mar Combarros, Marc Alumà, Taro Ehara, IQL, Castellgalí, Barcelona, Spain, Ariadna Emeric, Gerard Cañellas, Àngel Navarro, Industrial Química Lasem, Castellgalí, Spain

9:00 am – 9:30 am

3811333: Degradation and Lubrication of Stern Tube Seals – Understanding Seal Durability

Tom Briggs, Philippa Cann, Marc Masen, Imperial College London, Oxford, United Kingdom

9:30 am – 10:00 am

3830387: Achieving Performance and Sustainability Objectives with Ester Technologies

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

10:00 am – 10:30 am – Break

10:30 am – 11:00 am

3804219: An Environmentally-Responsible Approach to Improving Your Heat Transfer Fluid Chemical Hygiene

Richard Beemsterboer, ORG CHEM Group LLC, Oak Lawn, IL

11:00 am – 11:30 am

3831292: A New Safer and Sustainable Turbine Oil

Gregoire Herve, NYCO, Paris, France

Session 3G

GEARS I

Session Chair: Chengjiao Yu, Hebei University of Technology, Tianjin, China

Session Vice Chair: Pinzhi Liu, ExxonMobil Research and Engineering, Annandale, NJ

8:00 am – 8:30 am

3810701: Pitting Detection in an Early Damage Stage for AI-Based Operating Strategies in Wind Power Drives

Lukas Merkle, Martin Dazer, Andreas Nicola, University of Stuttgart, Stuttgart, Germany

8:30 – 9:00 am

3811272: Formulating for an Increasingly Complex Industrial Gear Landscape

Paul Norris, Helen Ryan, Afton Chemical Ltd., Bracknell, United Kingdom

9:00 am – 9:30 am

3811282: Investigations on the Pitting Resistance and Efficiency of Gears with Very Smooth Surfaces

Adrian Sorg, Thomas Tobie, Karsten Stahl, Technical University Munich, Garching bei München, Germany, Dominik Kratzer, Klüber Lubrication Muenchen GmbH & Co. KG, Munich, Germany

9:30 am – 10:00 am

3812296: Method for Characterization of Wear Behavior of Steel-bronze Rolling-sliding Contacts Relating to Worm Gears

Philipp Schnetzer, Technical University of Munich, Garching bei München, Germany

10:00 am – 10:30 am – Break

10:30 – 11:00 am

3810716: AI-Based Prognostic and Health Management in Wind Power Drives

Lisa Binanzer, Martin Dazer, Andreas Nicola, University of Stuttgart, Stuttgart, Germany

11:00 am – 11:30 am

3815106: Catastrophic Failure of Gears in a Tube Mill

Arturo Cardenas, GIGATEC, San Luis Potosi, SLP, Mexico

11:30 am – 12:00 pm

3852012: Development of an Industrial Gearbox Relevant Micropitting Test

Marc Ingram, Thomas Baldwin, Ingram Tribology Ltd., Carmarthen, United Kingdom, Matthew Smeeth, Clive Hamer, PCS Instruments, London, United Kingdom

Session 3H

COMMERCIAL MARKETING FORUM III

Session Chair: TBD

Session Vice Chair: TBD

8:00 am – 8:30 am – Open Slot

8:30 am – 9:00 am
Biosynthetic Technologies

9:00 am – 9:30 am

3824034: (LANXESS Deutschland GmbH) A New VOC-Free Temporary Corrosion Inhibitor, Bt Diluted in Water – A Contradiction?

Wilhelm Rehbein, Isabell Lange, LANXESS Deutschland GmbH, Mannheim, Germany

9:30 am – 10:00 am

3831329: (King Industries) Introducing KX460 – A High Performance Water-Based Rust Preventive Additive for Formulations Demanding Superior Metal Parts Protection in Severe Corrosion Conditions

Clifford Pratt, King Industries, Inc., Norwalk, CT

10:00 am – 10:30 am – Break

10:30 – 11:00 am
Eastman Chemical Company

11:00 am – 11:30 am
The Lubrizol Corporation

11:30 am – 12:00 pm
Münzing

Session 3I

ELECTRIC VEHICLES III

Session Chair: TBD

Session Vice Chair: TBD

8:00 am – 8:30 am

3808007: High Temperature Lightweight Al-Alloys for EV Regenerative Brake Rotors

Tomas Grejtak, Amit Shyam, Janet Meier, James Haynes, Jun Qu, Oak Ridge National Laboratory, Oak Ridge, TN, Peter Blau, Blau Tribology Consulting, Enka, NC

8:30 am – 9:00 am

3818885: High-Pressure Fuel Pump Performance with Low Lubricity Fuels Monitored With Acoustic Emission Technology

Nikhil Murthy, Vincent Coburn, Stephen Berkebile, US Army DEVCOM Army Research Laboratory, Aberdeen Proving Ground, MD

9:00 am – 9:30 am

3834898: Impact of High Speed of Rolling Element Bearings in Oil Lubricated Contacts

Farrukh Qureshi, The Lubrizol Corporation, Wickcliffe, OH, Azzedine Dadouche, Rami Kerrouche, National Research Council, Ottawa, Ontario, Canada

9:30 – 10:00 am

3810703: A Novel Method of EV Fluid Differentiation in Compatibility with Enameled-Insulated Copper Wires

Annabelle Minz-Schuett, Minz Pruef + Test GmbH, Limburg, Germany, Joerg Fahl, Volkswagen AG, Wolfsburg, Germany

Session 3I (continued)

10:00 am – 10:30 am – Break

10:30 am – 11:00 am

3848344: Multi-Physics and Multi-Scale Prediction of Tribological Behavior of Electric Powertrain

Mahdi Mohammadpour, Loughborough University, Loughborough, United Kingdom

11:00 am – 11:30 am

3829359: Performance Evaluation of Greases for Electric Vehicle Motors

Gabriel Calderon Salmeron, Sergei Glavatskih, KTH Royal Institute of Technology, Stockholm, Sweden, Johan Leckner, Axel Christiernsson Int. AB, Nol, Sweden

11:30 am – 12:00 pm

3811805: Ultrasonic Measurement of Interference Pressures for a Planetary Gear Shaft-Bush Contact

Gary Nicholas, Rob Dwyer-Joyce, The University of Sheffield, Sheffield, United Kingdom, Hiroyuki Suzuki, Hino Motors Ltd., Tokyo, Japan

Session 3K

METALWORKING FLUIDS III

Session Chair: TBD

Session Vice Chair: TBD

8:00 am – 8:30 am

3809212: Environmental Advantages of Sulfur Containing EP Additives in Metalworking Processes

Wilhelm Rehbein, Thomas Klein, LANXESS Deutschland GmbH, Mannheim, Germany

8:30 am – 9:00 am

3834082: How To Design a Sustainable Metalworking Fluid Formulation Using Renewable Base Fluids

Jesse Ziobro, Univar Solutions, Houston, TX, Stephanie Cole, Clariant Corporation, Mount Holly, NC

9:00 am – 9:30 am

3812454: Pick a PAG, Any PAG – Selecting Polyalkylene Glycols for Synthetic Coolants

Zach Magness, Calvary Industries, Fairfield, OH

9:30 am – 10:00 am

3815117: Total Rehab of a Metalforming Fluid System in a Tube Mill Machine

Arturo Cardenas, Oltec, San Luis, SLP, Mexico

10:00 am – 10:30 am – Break

10:30 am – 11:00 am

3811678: Development of a Benchtop, Tribological Test to Emulate Metal Cutting

Syed Ashir Sajid, Rob Dwyer-Joyce, University of Sheffield, Sheffield, South Yorkshire, United Kingdom, Christopher Taylor, AMRC with Boeing, Sheffield, United Kingdom, Thawhid Khan, Manchester Metropolitan University, Manchester, United Kingdom

11:00 am – 11:30 am

3834110: Boundary Lubricant Additive Response Comparisons Between Aluminum and Copper Alloys Using Twist Compression Tests (TCT)

Ted McClure, Sea-Land Chemical/SLC Testing Services, Westlake, OH, Alexes Morgan, Sea-Land Chemical Company, Westlake, OH

11:30 am – 12:00 pm

3812650: The Aminolysis and Hydrolysis of Esters in Water-Dilutable Metalworking Fluids

Karl Zhong, Quaker Houghton, Wayne, PA

Session 3N

NANOTRIBOLOGY III

Session Chair: Mehmet Baykara, University of California-Merced, Merced, CA

Session Vice Chair: TBD

8:00 am – 9:00 am

3832034: Invited Talk: Superlubricity: Toward Design of Zero-Friction and Zero-Wear Materials

Diana Berman, University of North Texas, Denton, TX

9:00 am – 9:30 am

3811864: Speed Dependence of Friction in the Structural Superlubricity Regime

Wai Oo, Mehmet Baykara, University of California-Merced, Merced, CA

9:30 am – 10:00 am

3811155: Role of Contact Line in Structural Lubricity Breakdown

Hongyu Gao, Universität des Saarlandes, Saarbrücken, Germany

10:00 am – 10:30 am – Break

10:30 am – 11:00 am

3810593: Single-Asperity Sliding Friction Across the Super - conducting Phase Transition

Andre Schirmeisen, Dirk Dietzel, Justus-Liebig University, Giessen, Germany, Wen Wang, Southwest Jiaotong University, Chengdu, China

11:00 am – 11:30 am

3815745: Investigating Nano-tribological Behavior of Graphitic Surfaces in the Binary Mixtures of Hexadecane and Cyclohexane

Prathima Nalam, Thomas Bui, Bhadrakalya Pathirannehelage, Luis Velarde, University at Buffalo, Buffalo, NY, Behnoosh Baboukani, University of California-Berkeley, Berkeley, CA

11:30 am – 12:00 pm

3834279: Connecting Interfacial Structure and Friction for Graphene-based Interfaces

Li Yuan, Daniel Sanchez, Robert Carpick, University of Pennsylvania, Philadelphia, PA, Ashlie Martini, University of California-Merced, Merced, CA, Suzhi Li, Xi'an Jiaotong University, Xi'an, China, Graham Cross, Trinity College Dublin, Dublin, Ireland

Session 4A

LUBRICATION FUNDAMENTALS IV: POLYMERS

Session Chair: TBD

Session Vice Chair: TBD

2:00 pm – 2:30 pm

3810988: Same Engine – Less CO_2 Lubricant Solutions to Maximize Fuel Economy without Compromising Oil Consumption

Seemann Michael, Phil Hutchinson, Thomas Schimmel, Sabrina Strube, Evonik Specialty Chemicals, Singapore, Singapore, Ellington JoRuetta, Evonik Oil Additives USA, Inc., Horsham, PA

2:30 pm – 3:00 pm

3832539: Dual Functional Additives: Polymer Adsorption and Boundary Effects

Amran Mohamed, Janet Wong, Imperial College London, London, United Kingdom, Sarah Matthews, Shell Global Solutions (UK) Ltd., London, United Kingdom

3:00 pm – 4:00 pm – Exhibitor Appreciation Break

4:00 pm – 4:30 pm

3829833: Low Temperature Viscometrics and PPD Effect on Group III Base Oils

Jacob Scherger, Functional Products Inc., Macedonia, OH

4:30 pm – 5:00 pm

3833360: Viscoelasticity of Lubricants with Polymer Additives Sheared in Nanogaps and Their Temperature Dependence

Shintaro Itoh, Takumi Nozue, Kenji Fukuzawa, Naoki Azuma, Hedong Zhang, Nagoya University, Nagoya, Japan

5:00 pm – 5:30 pm

3832683: Effect of Polarity of Polymer Additives on Their Adsorption and Boundary Film Formation

Yuxi Song, Kenji Fukuzawa, Shintaro Itoh, Naoki Azuma, Hedong Zhang, Nagoya University, Nagoya, Japan; Tomoko Hirayama, Naoki Yamashita, Kyoto University, Kyoto, Japan

5:30 pm – 6:00 pm – Lubrication Fundamentals Business Meeting

Session 4B

ROLLING ELEMENT BEARINGS IV

Session Chair: Alexander Fletcher, AFRL/RQTM, Wright Patterson Air Force Base, OH

Session Vice Chair: Kushagra Singh, Purdue University, West Lafayette, IN

2:00 pm – 2:30 pm

3801800: Atomistic Investigation of White Etching Bands Transformations in Rolling Element Bearings

Mostafa El Laithy, Ling Wang, Terry Harvey, nCATS, Southampton, United Kingdom, Bernd Vierneusel, Schaeffler Technologies AG & Co. KG, Schweinfurt, Germany

2:30 pm – 3:00 pm

3811078: Initiation and Drivers of Butterfly and White Etching Area Manifestation in Bearing Steels

Mostafa El Laithy, nCATS, Southampton, United Kingdom, Ling Wang, Terry Harvey, University of Southampton, Southampton, Hampshire, United Kingdom, Alexander Schwedt, Joachim Mayer, RWTH Aachen University, Aachen, Germany, Wolfram Kruhoeffer, Schaeffler Technologies AG & Co. KG, Herzogenaurach, Germany

3:00 pm – 4:00 pm – Exhibitor Appreciation Break

4:00 pm – 4:30 pm

3830596: Thermal Simulation of Bearing Components in Customer Applications

Travis Shive, Fabrizio Mandrile, SKF USA Inc., Lansdale, PA

4:30 pm – 5:00 pm

3832888: Comparison of Thermal Characteristics of an Aero-Engine Cylindrical Roller Bearings – All-Steel versus Hybrid

Azzedine Dadouche, Rami Kerrouche, National Research Council, Ottawa, Ontario, Canada, Salah Boukraa, University of Blida, Blida, Algeria

5:00 pm – 5:30 pm

3808858: Simulation of Temperature Distribution in Rolling Bearings

Hannes Grillenberger, Philipp Rödel, Yunsheng Huang, Schaeffler Technologies AG & Co. KG, Herzogenaurach, Germany

5:30 pm – 6:00 pm

3834108: Investigation of Heat Generation in Ball Bearings for Liquid Rocket Engine Turbopumps

Hiromitsu Kakudo, Satoshi Takada, Japan Aerospace Exploration Agency, Kakuda-shi, Japan

6:00 pm – 6:30 pm – Rolling Element Bearings Business Meeting

Session 4C

FLUID FILM BEARINGS II

Session Chair: TBD

Session Vice Chair: TBD

2:00 pm – 2:30 pm

3830467: Nonlinear Dynamics of an Accelerating Rotor Supported on Self-Acting Air Journal Bearings

Manas Pattnayak, Jayanta Dutt, Raj Pandey, Indian Institute of Technology Delhi, Delhi, India

2:30 pm – 3:00 pm

3829137: Observation of Polymer Chain Deformation in Oil Under High Shear

Tatsuya Kusumoto, Moritsugu Kasai, Idemitsu Kosan Co., Ltd., Ichihara-Shi, Japan, Mikihito Takenaka, Kyoto University–Institute for Chemical Research, Kyoto, Japan

3:00 pm – 4:00 pm – Exhibitor Appreciation Break

4:00 pm – 4:30 pm

3833882: On the Experimental Performance of Additively Manufactured Hybrid Fluid Film Bearings

Keun Ryu, Junwon Heo, Minsoo Wee, Yeseul Kim, Jihan Kim, Hyunsung Jung, Homin Lim, Hanyang University, Ansan, Gyeonggi-do, Republic of Korea

4:30 pm – 5:00 pm

3833660: Multi-Objective Taguchi-Grey Relational Analysis of Bearing Parameters on The Steady-State Performance of Three-Lobe Journal Bearing Lubricated with Non-Newtonian Fluid and Operating with Slip/No-Slip Conditions

Amar Ambekar, Manipal Institute of Technology, Manipal Academy of Higher Education, Manipal, Karnataka, India

Session 4D

MATERIALS TRIBOLOGY IV

Session Chair: TBD

Session Vice Chair: TBD

2:00 pm – 2:30 pm

3812323: Investigating the Effect of Solid Lubricant Inclusion on the Friction and Wear Properties of Laser Sintered Polyamide-12 Components

Kieran Nar, University of Sheffield, Sheffield, United Kingdom

2:30 pm – 3:00 pm

3834332: Dry Sliding Wear of Additively Manufactured Polymers

Joseph Berbach, Andrew Kelley, Harman Khare, Gonzaga University, Spokane, WA

3:00 pm – 4:00 pm – Exhibitor Appreciation Break

4:00 pm – 4:30 pm

3811709: Comparing the Performance of Molded versus Machined High-Performance Plastics in Unlubricated Friction and Wear Environments

Tanner Alauzen, Allegheny Performance Plastics, Pittsburgh, PA

4:30 pm – 5:00 pm

3831322: Tribological Study of Oil-Lubricated Thick Polydopamine + Polytetrafluoroethylene + Cu Nanoparticle Coatings

Sujan Ghosh, Min Zou, David Huitink, Hayden Carlton, Charles Miller, University of Arkansas at Fayetteville, Fayetteville, AR, Samuel Beckford, German Perez, SurfTec, Fayetteville, AR

5:00 pm – 5:30 pm

3832482: Mechanistic Understanding of Substrate Roughness Effect and Coating Cohesion on the Scratch Resistance of Polytetrafluoroethylene-Based Thin Coatings

Charles Miller, Min Zou, University of Arkansas at Fayetteville, Fayetteville, AR

Session 4F

ENVIRONMENTALLY FRIENDLY FLUIDS III

Session Chair: Brajendra Sharma, USDA/ARS/NEA/ERRC, Wyndmoor, PA

Session Vice Chair: Daniel Garbark, Battelle Memorial Institute, Columbus, OH

2:00 pm – 2:30 pm

3811848: How Polyalkylene Glycols Save Energy in Industrial Gear Application – A Sustainable Case Study

David Schaeffel, Stephanie Cole, Clariant Corporation, Mount Holly, NC

2:30 pm – 3:00 pm

3817741: Tribological Performance in High-Pressure Carbon Dioxide Environment for Compressor Application

Ayesha Asif, Ahmad Amiri, Andreas Polycarpou, Texas A&M University, College Station, TX

3:00 pm – 4:00 pm – Exhibitor Appreciation Break

4:00 pm – 4:30 pm

3831911: Novel Green Friction Modifiers for Aqueous Lubricants

Sam Davison, Joseph Lanigan, University of Sheffield, Sheffield, United Kingdom

4:30 – 5:00 pm

3833026: Investigating the Effect of Novel Processing Routes in Enhancing the Tribological Behavior of Soybean Oil

Piash Bhowmik, Clement Tang, Sougata Roy, University of North Dakota, Grand Forks, ND, Brajendra Sharma, Majher Sarker, USDA/ARS/NEA/ERRC, Wyndmoor, PA

Session 4G

GEARS II

Session Chair: Nikhil Murthy, DEVCOM Army Research Laboratory, Aberdeen Proving Ground, MD

Session Vice Chair: Pinzhi Liu, ExxonMobil Research and Engineering, Annandale, NJ

2:00 pm – 2:30 pm

3831228: Industrial Gear Efficiency Demonstration

Andrew Gant, Afton Chemical Ltd., Bracknell, Berkshire, United Kingdom

2:30 pm – 3:00 pm

3833949: Performance Enhancement of Plastic Gears – The Potential of Laminated Woven-Carbon-Fiber Einforced Plastics

Damijan Zorko, Zoran Bergant, Borut Cerne, University of Ljubljana, Ljubljana, Solvenia

3:00 pm – 4:00 pm – Exhibitor Appreciation Break

4:00 pm – 4:30 pm – Gears Business Meeting

Session 4H

COMMERCIAL MARKETING FORUM IV

Session Chair: TBD

Session Vice Chair: TBD

2:00 pm – 2:30 pm – Open Slot

2:30 pm – 3:00 pm
Evonik Oil Additives USA, Inc.

3:00 pm – 4:00 pm – Exhibitor Appreciation Break

Session 4I

ELECTRIC VEHICLES IV

Session Chair: TBD

Session Vice Chair: TBD

2:00 pm – 2:30 pm

3834255: Oil Aeration: Findings for Testing in High Speed, Low Volume Systems

Ricardo Hein, Conexo Inc., Acworth, GA

2:30 pm – 3:00 pm

3833698: Flammability and Combustibility of Oils in the Presence of High Voltages

Paul Shiller, FirstPower Group LLC, Twinsburg, OH

3:00 pm – 4:00 pm – Exhibitor Appreciation Break

4:00 pm – 4:30 pm

3852434: Rheological Test Methods for E-Lubricants

Carlos Sanchez, Southwest Research Institute, San Antonio, TX

4:30 pm – 5:00 pm

3813679: Test Development for Copper Corrosion in E-Fluids

Gwenaelle Philibert, Jiayi Liu, Shell, Houston, TX, Christopher Dobrowolski, Shell Global Solutions, Hamburg, Germany

5:00 pm – 5:30 pm

3831841: Monitoring of Electrode Degredation Within Lithium-Ion Batteries During Prolonged Use

Daniel Williams, University of Sheffield, Sheffield, United Kingdom

5:30 pm – 6:00 pm

3833906: Efficiency and Range Determination Aspects for Fluid Development of Battery Electric Vehicles

Thomas Wellmann, FEV North America, Auburn Hills, MI

✸ Session 4K

METALWORKING FLUIDS IV

Session Chair: TBD

Session Vice Chair: TBD

2:00 pm – 2:30 pm

3815325: Assessing the Functional Lubricity of MWFs by an Innovative Tool

Ameneh Schneider, Optimol Instruments, München, Germany

2:30 pm – 3:00 pm

3819234: Performance Testing of Sulfur-Based Estolides in a Full Metalworking Fluid Formulation with Comparison of Other Commercialized Sulfur-Based Additives

Marlon Lutz, Biosynthetic Technologies, Indianapolis, IN

3:00 pm – 4:00 pm – Exhibitor Appreciation Break

4:00 pm – 4:30 pm

3829851: Post Machining Cleaning – How to Pick the Right Surfactant for the Job

Stephanie Cole, Clariant Corporation, Mount Holly, NC

4:30 pm – 5:00 pm

3833803: Synergy of Polymeric Esters in Synthetic Metal Forming Fluids

Andrew Yoder, The Lubrizol Corporation, Wickliffe, OH

5:00 pm – 5:30 pm

3833542: Polyglykol as Performance Wear Lubricant and Synergism with EP Additives on Net Oil Metalworking Fluid – Part II

Eduardo Lima, Dow Chemical Brazil, Jundiai, Brazil

5:30 pm – 6:00 pm

3830588: Next Generation Multi-Metal Wire Drawing Fluids

Kathleen Havelka, ANGUS Chemical Company, Buffalo Grove, IL

6:00 pm – 6:30 pm – Metalworking Fluids Business Meeting

✸ Session 4L

TRIBOCHEMISTRY I

Session Chair: TBD

Session Vice Chair: TBD

2:00 pm – 2:30 pm

3829853: Synergistic Effects of Anti-Friction and Anti-Wear Additives on the Tribological Behavior of Lubricants Derived From Plastic Wastes Under Boundary Lubrication

Pushkar Deshpande, Seungjoo Lee, Ali Erdemir, Texas A&M University, College Station, TX, Ryan Hackler, Massimiliano Delferro, Argonne National Laboratory, Lemont, IL, Yiyu Wang, Ranjan Behera, Wenyu Huang, Aaron Sadow, Iowa State University, Ames, IA

2:30 pm – 3:00 pm

3809257: Synergistic Interactions Between Bio-Based Oleate Ester and Low-Concentration ZDDP Under Reciprocating Contacts

Ju Shu, Cayetano Conesa, Mitjan Kalin, Ardian Morina, University of Leeds, Leeds, United Kingdom

3:00 pm – 4:00 pm – Exhibitor Appreciation Break

4:00 pm – 4:30 pm

3833824: Mechanochemistry Study of ZDDP Antiwear Additives

Lu Fang, Robert Carpick, Martin Webster, University of Pennsylvania, Philadelphia, PA, Spyridon Korres, ExxonMobil, Hamburg, Germany

4:30 pm – 5:00 pm

3830539: Influence of the Organic Moiety on the Tribological Properties of MoS_2: Glycol Hybrid Nanoparticles-Based Dispersions

Fabrice Dassenoy, Jules Galipaud, LTDS/ECL, Ecully, France, Inaki Garcia, Ivet Kosta, Hans Grande, Eva Garcia-Lecina, CIDETEC, San Sebastian, Spain

5:00 pm – 5:30 pm

3811302: The Influence of Slide-Roll Ratio on Glycerol Oleate Tribofilm Formation in the Boundary Lubrication Regime

Marjan Homayoonfard, University of Leeds, Leeds, United Kingdom

5:30 pm – 6:00 pm

3812998: In-Situ Carbon Tribofilm Formation Given by a Novel Organic Friction Modifier

Wei Song, Jinjin Li, Jianbin Luo, Tsinghua University, Beijing, China

✸ Session 4N

NANOTRIBOLOGY IV

Session Chair: Diana Berman, University of North Texas, Denton, TX

Session Vice Chair: TBD

2:00 pm – 3:00 pm

Invited Talk – Presentation TBD

Astrid de Wijn, Norwegian University of Science and Technology, Tronheim, Norway

3:00 pm – 4:00 pm – Exhibitor Appreciation Break

4:00 pm – 5:00 pm

Invited Talk

3852275: Molecular Friction Studied by Stereographic Force Spectroscopy

Bizan Balzer, University of Freiburg, Freiburg, Germany

5:00 pm – 6:00 pm – Nanotribology Business Meeting

Wednesday, May 24, 2023

Session 5A

LUBRICATION FUNDAMENTALS V: WEAR & ENGINES

Session Chair: TBD

Session Vice Chair: TBD

8:00 am – 8:30 am

3805121: Lubrication Fundamentals of Threaded Fasteners

Bryan Bergeron, Mark Guenther, A.W. Chesterton, Groveland, MA

8:30 – 9:00 am

3833745: Plastic Deformation of a Steel Ball During Impact Loading Against a Lubricated Flat

Roland Jones, Hugh Spikes, Amir Kadiric, Imperial College London, London, United Kingdom

9:00 am – 9:30 am

3812529: Steel Ball-on-Flat Fretting Test Results Using Grease Lubrication

Robert Erck, Nicholaos Demas, Aaron Greco, Argonne National Laboratory, Lemont, IL

9:30 am – 10:00 am

3811763: Correlation of Friction and Surface Condition in Rolling-sliding Contacts with Oil-Impregnated Sinter Materials

Nicolai Sprogies, Thomas Lohner, Karsten Stahl, Technical University of Munich, Garching bei München, Germany

10:00 am – 10:30 am – Break

10:30 am – 11:00 am

3801630: Detailed Simulating Test Rig Experimental Results for Piston-Ring Lubrication

Polychronis Dellis, ASPETE, Athens, Attiki, Greece

11:00 am – 11:30 am

3830729: Impact of Lubricant Formulation on Aeration Control for Next Generation Passenger Car Motor Oils

Lori Crom, Matthias Eggenstein, Robert Mainwaring, Carl Stow, Neil Elsby, Shell, London, United Kingdom, Mark Jackson, Matt Irving, Infineum, Abingdon, United Kingdom

11:30 am – 12:00 pm

3812176: The Performance of Diesel Engine Oil with an Ashless Anti-Wear Additive Under Actual Driving Conditions

Yasunori Shimizu, Moritsugu Kasai, Idemitsu Kosan Co., Ltd., Chiba, Japan

Session 5B

ROLLING ELEMENT BEARINGS V

Session Chair: Alexander Fletcher, AFRL/RQTM, Wright Patterson Air Force Base, OH

Session Vice Chair: Kushagra Singh, Purdue University, West Lafayette, IN

8:00 am – 8:30 am

3807966: Analyzing the Electrical Transmission Behavior of Rolling Element Bearings

Maximilian Hausmann, Philipp Liehr, Eckhard Kirchner, Technical University of Darmstadt, Darmstadt, Germany

8:30 am – 9:00 am

3808347: Lubrication Condition Monitoring of Radially Loaded Ball Bearings by Electrical Impedance Method

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

9:00 am – 9:30 am

3812184: Differences Between the Cathodic and Energetic WEC Fatigue in the View of Bearings in Electric Applications

Daniel Merk, Jörg Franke, Jörg Loos, Schaeffler Technologies AG & Co. KG, Herzogenaurach, Germany

9:30 am – 10:00 am

3808483: Influence of Electrical Current on Rolling Contact Fatigue

Ling Wang, nCATS, Southampton, United Kingdom

10:00 am – 10:30 am – Break

10:30 am – 11:00 am

3812896: Detection of Micropitting Evolution Using Acoustic Emission and Electrostatic Sensing Techniques

Zaihao Tian, Shuncai Wang, Robert Wood, University of Southampton, Southampton, United Kingdom, Daniel Merk, Schaeffler Technologies AG & Co. KG, Herzogenaurach, Germany

11:00 am – 11:30 am

3834175: Damage and Failure in Rolling-Sliding Lubricated Contacts Subjected to Transverse Vibrations

David Uribe Saenz De Camara, Amir Kadiric, Imperial College London, London, United Kingdom, Armando Felix-Quiñonez, SKF Research & Technology Development, Houten, Netherlands

11:30 am – 12:00 pm

3812130: Rolling Element Bearing Defect Detection and Monitoring

John Yu, Baker Hughes, Marietta, GA

Session 5C

Herbert S. Cheng Memorial Symposium

CHALLENGES IN LUBRICATION AND TRIBOLOGY MODELING

Session Chair: TBD

Session Vice Chair: TBD

This symposium invites presentations to honor Professor Herbert S. Cheng, discussing achievements in more than four decades of the Patir-Cheng average flow model and challenges in modeling lubrication and tribology facing future technology developments.

8:00 am – 8:30 am

3833491: Unsteady Multiscale Simulation of Lubricated Rough Surfaces

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

8:30 am – 9:00 am

3833864: Explicit Flow-Continuity-Enforced Elastohydrodynamic Lubrication Analyses with a Mass Conservation Algorithm

Shuangbiao Liu, Qian (Jane) Wang, Yip-Wah Chung, Northwestern University, Evanston, IL, Stephen Berkebile, US Army DEVCOM Army Research Laboratory, Aberdeen Proving Ground, MD

9:00 am – 9:30 am

3854905: Strength from Weakness: Dynamicity in Biotribological Interfaces

W. Gregory Sawyer, Research Institute of Industrial Science and Technology, Gainesville, FL

9:30 am – 10:00 am – Open Slot

10:00 am – 10:30 am – Break

Session 5D

MATERIALS TRIBOLOGY V

Session Chair: TBD

Session Vice Chair: TBD

8:00 am – 8:30 am

3813123: Synthesis and Sliding Behavior of Bearing Steel/MAX-Phase Composites

Stephen Berkebile, Nikhil Murthy, US Army DEVCOM Army Research Laboratory, Aberdeen Proving Ground, MD, Caleb Matzke, Shawn Ruggiero, Emily Dahlke, Abdulrahman Aldossary, Surojit Gupta, University of North Dakota, Grand Forks, ND

8:30 am – 9:00 am

3831212: In-Situ Methods to Study Scuffing Failures of Self-Mated Steels in Real-Time – Part I: Experimental Details

Farida Ahmed Koly, Arnab Bhattacharjee, David Burris, University of Delaware, Newark, DE, Nikhil Murthy, Stephen Berkebile, DEVCOM Army Research Laboratory, Aberdeen Proving Ground, MD, Ben Gould, Oyelayo Ajayi, Maria Cinta Lorenzo Martin, Argonne National Laboratory, Argonne, IL

9:00 am – 9:30 am

3818526: In-Situ Methods to Study Scuffing Failures of Self-Mated Steels in Real-Time – Part II: Initial XRD Analysis

Maria Cinta Lorenzo Martin, Dawid Bachnacki, Trenton Culverhouse, Zachary Jernigan, Jun-Sang Park, Oyelayo Ajayi, Benjamin Gould, Argonne National Laboratory, Argonne, IL, Farida Koly, Arnab Bhattacharjee, David Burris, University of Delaware, Newark, DE, Nikhil Murthy, Scott Walck, Stephen Berkebile, US Army DEVCOM Army Research Laboratory, Aberdeen Proving Ground, MD

9:30 am – 10:00 am

3812298: Influence of Dislocation Mobility on the Tribo-Oxidation of Single Crystalline Copper

Ines Blatter, Julia Rau, Christian Greiner, Karlsruhe Institute of Technology, Karlsruhe, Baden-Württemberg, Germany, Baptiste Gault, Max Planck Institute for Iron Research, Düsseldorf, Germany, Lisa Belkacemi, Leibniz-Institute for Materials Oriented Technologies (IWT), Bremen, Germany

10:00 am – 10:30 am – Break

10:30 am – 11:00 am

3801462: Study of Cryogenic Friction and Wear Characteristics of Invar 36 Alloy Against Si_3N_4 Ceramic Balls

Bin Wang, Yanbao Guo, Zheng Zhang, Deguo Wang, China University of Petroleum (Beijing), Beijing, China

11:00 am – 11:30 am

3812729: Investigate Wear Transition of CoCrMo Alloys after the Heat Treatment

Jiahui Qi, The University of Sheffield, Sheffield, United Kingdom

11:30 am – 12:00 pm

3843109: Mesoscale Modelling of High Temperature Deformation Mechanisms in Refractory High Entropy Alloys

Morgan Jones, Irene Beyerlein, University of California-Santa Barbara, Santa Barbara, CA, Nicolas Argibay, Ames Laboratory, Ames, IA

Session 5E

TRIBOCHEMISTRY II

Session Chair: TBD

Session Vice Chair: TBD

8:00 am – 8:30 am

3832309: Atomic-Scale Wear Inside Diamond-Quartz Contacts

Jagjeevan Bhamra, James Ewen, Carlos Latorre, Daniele Dini, Imperial College London, London, United Kingdom; John Bomidi, Marc Bird, Baker Hughes, The Woodlands, TX

8:30 am – 9:00 am

3833419: Analysis of Boundary Lubrication of DLC Using Molecular Dynamics Simulation

Hitoshi Washizu, HIrotoshi Akiyama, Rio Nakae, Yosuke Hamano, Koshiro Torimoto, Yudai Tanaka, Ryuichi Okamoto, University of Hyogo, Kobe, Japan

9:00 am – 9:30 am

3812901: Microscale Tribochemistry of Diamond-like Carbon Coatings – How the Run-in to Low Friction is Affected by Sliding Distance and Contact Size

Brian Borovsky, Ana Colliton, Hind Flaih, Eskil Irgens, Lucas Kramarczuk, Griffin Rauber, Zachary Van Fossan, Jordan Vickers, St. Olaf College, Northfield, MN, Seokhoon Jang, Seong Kim, Pennsylvania State University, University Park, PA, Zhenbin Gong, Junyan Zhang, Lanzhou Institute of Chemical Physics, Lanzhou, China

9:30 am – 10:00 am

3805937: The Analytical Study of Friction Reduction in Instrumented Single-Cylinder Block

Yue Guan, Jules Galipaud, Frédéric Dubreuil, Maria-Isabel De Barros Bouchet, Ecole Centrale de Lyon, Écully, France, Johnny Dufils, Etienne Macron, IREIS/HEF GOURPE, Andrézieux-Bouthéon, France, Fabrice Dassenoy, LTDS/ECL, Ecully, France

10:00 am – 10:30 am – Break

10:30 am – 11:00 am

Presentation TBD

John Curry, Sandia National Laboratories, Albuquerque, NM

11:00 am – 11:30 am

3811899: Molecular Structure and Environment Dependence of Shear-Driven Chemical Reactions

Yu-Sheng Li, Seokhoon Jang, Seong Kim, The Pennsylvania State University, State College, PA, Fakhrul Hasan Bhuiyan, Ashlie Martini, University of California-Merced, Merced, CA

11:30 am – 12:00 pm

3831621: Durability of Materials for Nanoelectromechanical Switches Studied by Scanning Probe Microscopy

Cangyu Qu, Robert Carpick, University of Pennsylvania, Philadelphia, PA

Session 5F

CONTACT MECHANICS I

Session Chair: TBD

Session Vice Chair: TBD

8:00 am – 8:30 am

3831690: Understanding the Role of Contact Interfaces on Tribo-Electrification in Triboelectric Nanogenerators

Charchit Kumar, Jack Perris, Satyaranjan Bairagi, Nikolaj Gadegaard, Daniel M. Mulvihill, University of Glasgow, Glasgow, United Kingdom, Yang Xu, Hefei University of Technology, Hefei, China

8:30 am – 9:00 am

3812297: A New Approach for Calculating the Contact Heat Transfer Coefficient Based on Real Component Surfaces

Patrick Wingertszahn, Stefan Thielen, Oliver Koch, RPTU Kaiserslautern-Landau, Kaiserslautern, Germany

9:00 am – 9:30 am

3808042: Tribological Issues in the Wheel-Rail Interaction: Background and Experiences

Angelo Mazzu, University of Brescia, Brescia, Italy

9:30 am – 10:00 am

3810658: Identification and Analysis of Some New Influencing Parameters on the Surface Damage of Rolling Elements Bearings by a CEL Model

Amakoe Ahyee, Daniel Nelias, Thibaut Chaise, Arnaud Duval, INSA DE LYON, Lyon, Villeurbanne, France

10:00 am – 10:30 am – Break

10:30 am – 11:00 am

3816862: Investigating the Contact Area Reduction over a Nearly Complete Rough Surface Spectrum

Robert Jackson, Auburn University, Auburn, AL, Tevis Jacobs, University of Pittsburgh, Pittsburgh, PA

11:00 am – 11:30 am

3847781: Contact Mechanics of the Patterned Surfaces Generated by Spinodal Decomposition and Amplified Instability

Wonhyeok Lee, Melih Eriten, University of Wisconsin-Madison, Madison, WI

11:30 am – 12:00 pm

3847744: A Numerical Model for Simulating the Transient Frictional Viscoelastic Sliding Contact

Dongze Wang, Ali Ghanbarzadeh, Greg de Boer, Institute of Functional Surfaces, Leeds, United Kingdom

Session 5G

TRIBOTESTING I

Session Chair: TBD

Session Vice Chair: TBD

8:00 am – 8:30 am

3831949: Physicochemical and Tribological Comparison of Bio- and Halogen-Based Ionic Liquids

Md Hafizur Rahman, Tatianna Macias, Manoranjan Misra, Pradeep Menezes, University of Nevada-Reno, Reno, NV, Ting Liu, Ashlie Martini, University of California-Merced, Merced, CA, Manish Patel, ExxonMobil, Austin, TX

8:30 am – 9:00 am

3816669: Experimental Analysis of Pasting of Brushed DC Motors

Roman Dzhafarov, Daniel Braun, Stephan Diez, Joerg Kopitzke, BMW AG, Munich, Germany

9:00 am – 9:30 am

3805962: Another Approach to Tribotesting: Enabling AI

Dirk Drees, Lais Lopes, Falex Tribology, Rotselaar, Vlaams Brabant, Belgium, Emmanouil Georgiou, Hellenic Air-Force Academy, Dekelia Air Force Base, Athens, Greece

9:30 am – 10:00 am

3812432: Measuring Lubricant Viscosity Under Shearing In-Situ Using Ultrasound

Gladys Peretti, Rob Dwyer-Joyce, The University of Sheffield, Sheffield, United Kingdom, Nathalie Bouscharain, Fabrice Ville, Insa Lyon, Lyon, France; Fabio Tatzgern, Nicole Dörr, AC2T research GmbH, Wiener Neustadt, Austria

10:00 am – 10:30 am – Break

10:30 am – 11:00 am

3817410: A Simulated Test Methodology for Screening of Friction, Wear, and Extreme Pressure Properties of Hydraulic Oils

Rajendra Mahapatra, Indian Oil Corporation Ltd. R&D Centre, Faridabad, Haryana, India

11:00 am – 11:30 am

3806602: Measuring the Damping Capacity of Oils

Kenneth Budinski, Bud Labs, Rochester, NY

11:30 am – 12:00 pm

3813143: Effect of Environment on Fuel Lubricity Standards

Stephen Berkebile, Monica Ferrera, Briana Segal, US Army DEVCOM Army Research Laboratory, Aberdeen Proving Ground, MD

Session 5H

COMMERCIAL MARKETING FORUM V

Session Chair: TBD

Session Vice Chair: TBD

8:00 am – 8:30 am – Open Slot

8:30 am – 9:00 am – Open Slot

9:00 am – 9:30 am
Advanced Chemical Concepts, Inc.

9:30 am – 10:00 am
The Lubrizol Corporation

10:00 am – 10:30 am – Break

Session 5I

ELECTRIC VEHICLES V

Session Chair: TBD

Session Vice Chair: TBD

8:00 am – 8:30 am

3832068: Novel Sustainable Low-Viscosity Synthetic Base Fluids for E-Mobility

Ramesh Navaratnam, Michael Liang, Patech Fine Chemicals, Dublin, OH

8:30 am – 9:00 am

3810965: Sustainable E-Fluid Concepts for Electric Motor Cooling and Gearbox Lubrication

Christopher Dobrowolski, Shell Global Solutions, Hamburg, Germany

9:00 am – 9:30 am

3830293: Extrinsic Sustainability Benefits of Esters Suitable for Use in Electric Vehicle Gear and Battery Cooling Systems

Gareth Moody, Bethan Warren, Chris Clayson, Cargill, Goole, United Kingdom

9:30 am – 10:00 am

3812488: Study on the Impact of Dedicated Electric Drive Fluid Properties on Total Efficiency of Drive Unit

Pedro Cawich, Masato Yokomizo, Scott Rajala, Idemitsu Lubricants America Corporation, Wixom, MI, Hiroyuki Tatsumi, Idemitsu Kosan Co., Ltd., Ichihara-shi, Chiba, Japan

10:00 am – 10:30 am – Break

10:30 am – 11:00 am

3804913: Polyalkylene Glycols as Base Oils and Co-Base Oils for Gear Oils in Electric Vehicle Drivetrains

Steffen Glaenzer, Stephanie Cole, Clariant Corporation, Mount Holly, NC

11:00 am – 11:30 am

3813071: Fine Tuning the Structure of Esters to Optimize Their Properties as E-Coolants

Siegfried Lucazeau, NYCO, Paris, France

11:30 am – 12:00 pm

3831897: Shear Stable Ester Thickeners – EVs and Beyond

David Gillespie, Kevin Duncan, Cargill, Snaith, East Yorkshire, United Kingdom

✸ Session 5L

SURFACE ENGINEERING I

Session Chair: TBD

Session Vice Chair: TBD

Session Starts at 8:30 am

8:30 am – 9:00 am

3812617: Tribological Behavior of Textured Surfaces Produced by Laser Powder Bed Fusion

Tobias Martin, Qian (Jane) Wang, Jian Cao, Northwestern University, Evanston, IL, Stephen Berkebile, DEVCOM Army Research Laboratory, Aberdeen Proving Ground, MD

9:00 am – 9:30 am

3833013: Development and Performance Evaluation of Novel Surface Polishing Technique for Additively Manufactured Components

Kommineni Uday Venkat Kiran, Sougata Roy, University of North Dakota, Grand Forks, ND, Brady Kimbrel, NASA Marshall Space Flight Center, Huntsville, AL

9:30 am – 10:00 am

3833893: Friction and Deformation of Additively Manufactured Micro/Nano-Hierarchical Structures with Different Structural Stiffness

Mahyar Afshar Mohajer, Min Zou, University of Arkansas at Fayetteville, Fayetteville, AR, Xingwei Yang, Rong Long, University of Colorado-Boulder, Boulder, CO

10:00 am – 10:30 am – Break

10:30 am – 11:00 am

3833052: A Comparative Analysis in Tribo-Mechanical Behavior of Cold Rolled and Additively Manufactured Nickel Titanium Alloy

Hyunsuk Choi, Sougata Roy, University of North Dakota, Grand Forks, ND

11:00 am – 11:30 am

3848291: Additively Manufactured Inconel 625 Subjected to Shot Peening and Laser Peening Processes – Microstructural and Elevated Temperature Fretting Wear Analyses

Ali Beheshti, Manisha Tripathy, George Mason University, Sterling, VA, Keivan Davami, The University of Alabama, Tuscaloosa, AL, Lloyd Hackel, Curtiss Wright Surface Technology, Livermore, CA

11:30 am – 12:00 pm

3833036: Exploring the Wear Resistance of Additively Manufactured Al Parts for Future Lunar Exploration Via Custom Developed Testing Strategies

Pial Das, Sougata Roy, University of North Dakota, Grand Forks, ND, Nicholas Dyrstad-Cincotta, Junior Nasah, Institute of Energy Studies, Grand Forks, ND

✸ Session 5M

GREASE I

Session Chair: TBD

Session Vice Chair: TBD

8:00 am – 8:30 am – Open Slot

8:30 am – 9:00 am

3803372: Role of the Grease Components on the Overall Frictional Response of a Greased Contact Subjected to Low-sliding Velocity Conditions

Francesco Massi, Ilaria Ghezzi, Davide Tonazzi, Sapienza University of Rome, Rome, Italy, Cédric Le Coeur, Michael Rovere, Jeremy Chorier, SOMFY SAS, Cluses, France, Yves Berthier, Université de Lyon, INSA-Lyon, CNRS, Villeurbanne, France

9:00 am – 9:30 am

3814543: Unraveling the Role of Particle-Particle Contacts on Microscopic, Rheological and Tribological Characteristics of Nanoenhanced Greases

Jackson Uhryn, Leonardo Martin-Alarcon, Babak Soltannia, Aleksandra Govedarica, Milana Trifkovic, Philip Egberts, University of Calgary, Calgary, Alberta, Canada

9:30 am – 10:00 am

3817326: Structural Changes of Thickener and Rheological Properties of Lubricating Greases Under Shear Flow

Takashi Noda, Kentaro Sonoda, NSK Ltd., Fujisawa, Japan, Yuki Takayama, Hitoshi Washizu, University of Hyogo, Hyogo, Japan, Shigeo Kuwamoto, Hyogo Science and Technology Association, Hyogo, Japan

10:00 am – 10:30 am – Break

10:30 am – 11:00 am

3831963: The Matrix Revisited: Exploration of Additive Choice with Different Thickener Types

Joseph Kaperick, Afton Chemical Corporation, Richmond, VA

11:00 am – 11:30 am

3834151: Ionic Materials in Greases – Influence on Lubrication and Electric Conductivity

Sergei Glavatskih, KTH Royal Institute of Tribology, Stockholm, Sweden

Session 5M (continued)

11:30 am – 12:00 pm

3848545: OBCaS Grease Green One and Customized One

Guillaume Notheaux, SEQENS, Porcheville, France

Session 5N

NANOTRIBOLOGY V

Session Chair: Gokay Adabasi, University of California-Merced, Merced, CA

Session Vice Chair: TBD

8:00 am – 8:30 am

3819587: Understanding the Corrosion and Wear at Nanoscale Interface Using Machine Learning Technique

Ran Zhang, Saugat Tripathi, Ashutosh Pitkar, Miao Wang, Zhijiang Ye, Miami University, Oxford, OH, Yufei Wang, Hang Ren, University of Texas at Austin, Austin, TX

8:30 am – 9:00 am

3833797: Frictional Behavior of Surfaces Textured with Various Core-shell Nanostructures

Colin Phelan, Charles Miller, Josue Goss, Min Zou, University of Arkansas at Fayettevile, Fayetteville, AR, Robert Fleming, Arkansas State University, Jonesboro, AR, Christopher Rincon, Ronghua Wei, Southwest Research Institute, San Antonio, TX

9:00 am – 9:30 am

3817233: Effect of Oxidation of Metal Surface on Additive Adsorption and Friction Property

Lin Sun, Tomoko Hirayama, Naoki Yamashita, Kyoto University, Kyoto-shi, Kyoto, Japan, Hironobu Nakanishi, Kobe Steel, Ltd., Kobe, Japan

9:30 am – 10:00 am

3811486: Molecular Friction Models for Molecular Adsorbates

Wilfred Tysoe, University of Wisconsin-Milwaukee, Milwaukee, WI

10:00 am – 10:30 am – Break

10:30 am – 11:00 am

3810952: Tribological Behavior of Graphene Quantum Dots as Novel Additives for Green Lubrication

Irfan Nadeem, Mitjan Kalin, University of Ljubljana, Ljubljana, Slovenia

11:00 am – 11:30 am

3833794: Probing the Mechanical Properties of Soot to Understand the Tribology of Contaminated Diesel Engine Oils

Alaaeddin Al Sheikh Omar, Institute of Functional Surfaces (iFS), Leeds, West Yorkshire, United Kingdom

Session 6A

LUBRICATION FUNDAMENTALS VI: INNOVATIVE TEST METHODS

Session Chair: TBD

Session Vice Chair: TBD

1:30 pm – 2:00 pm

3813027: Boundary Lubrication in an Inert Atmosphere – A New Route to Sustainability

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

2:00 pm – 2:30 pm

3833863: Differential Topography on the Challenges of Three-Dimensional Characterization of Tribofilms

Nicole Dörr, Viktoria Seidl, Georg Vorlaufer, Serhiy Budnyk, AC2T research GmbH, Wiener Neustadt, Austria

2:30 pm – 3:00 pm

3830022: Achieving Macroscale Superlubricity in Non-Polar Oil by Sacrificial Carbon Nanotube Coating

Chanaka Kumara, Michael Lance, Jun Qu, Oak Ridge National Laboratory, Oak Ridge, TN

3:00 pm – 3:30 pm – Break

3:30 pm – 4:00 pm

3813470: Lubricating Properties of Volatile and Gaseous Fuels

Hugh Spikes, Jie Zhang, Imperial College, London, United Kingdom, Matthew Smeeth, Clive Hamer, PCS Instruments, London, United Kingdom

4:00 pm – 4:30 pm

3834006: Evolution of Surface Roughness and Correlation with Friction Using In-Situ Profilometry

Debdutt Patro, Sravan Josyula, Fabio Alemanno, Ducom Instruments, Groningen, Netherlands, Deepak Veeregowda, Ducom Instruments (EUROPE) B.V., Groningen, Netherlands

4:30 pm – 5:00 pm

3839578: Inevitable Deviations in Surface Profile and System Vibration Determine Tribological Behavior

Yulong Li, Nikolay Garabedian, Johannes Schneider, Christian Greiner, Karlsruhe Institute of Technology, Karlsruhe, Germany

5:00 pm – 5:30 pm

3803597: Investigation of Emission Characteristics and Lubricant Properties in a Hydrogen Internal Combustion Engine

Modestino De Feo, Aramco Overseas, Rueil-Malmaison, France

Session 6B

ROLLING ELEMENT BEARINGS VI

Session Chair: Daulton Isaac, AFRL Turbine Engine Division, Wright Patterson Air Force Base, OH

Session Vice Chair: Kushagra Singh, Purdue University, West Lafayette, IN

1:30 pm – 2:00 pm

3812999: Numerical Analysis for Tapered Roller Bearing in Relation to Roller Profile Based on Running-In Method

Renshui Cao, Yonggang Meng, Tsinghua University, Beijing, China

2:00 pm – 2:30 pm

3819320: Efficient Residual Stress Quantification in M50NiL Bearing Steel

Daulton Isaac, Mathew Kirsch, AFRL Turbine Engine Division, Wright Patterson Air Force Base, OH, Teresa Wong, Adrian DeWald, Hill Engineering, LLC, Rancho Cordova, CA

2:30 pm – 3:00 pm

3810628: Prediction of Rotation of a Shrink-Fitted Cup of a Tapered Roller Bearing Under Thermal Loading

Victor Pinardon, Sébastien Morterolle, Daniel Nelias, INSA Lyon, Villeurbanne, France, Timothée Gentieu, Safran, Vélizy-Villacoublay, France

3:00 pm – 3:30 pm – Break

3:30 pm – 4:00 pm

3808525: A Generalized Machine Learning Model for Bearing Fault Diagnosis

Ling Wang, Amirmasoud Kiakojouri, nCATS, Southampton, United Kingdom, Honor Powrie, GE Aviation, Southampton, United Kingdom, Patric Mirring, Schaeffler Technologies AG & Co. KG, Herzogenaurach, Germany

4:00 pm – 4:30 pm

3799664: Performance Evaluation and Life Estimation of Cryogenic Ball Bearing from Accelerated Life Test Results

Yeongdo Lee, Wonil Kwak, Korea Institute of Science and Technology, Seoul, Republic of Korea

4:30 pm – 5:00 pm

3813109: Accelerated Life Time for Cryogenic Ball Bearing: Evaluation and Discussion of Tribological Phenomena with the Various Internal Clearance Design

Yongbok Lee, Wonil Kwak, Yeongdo Lee, Korea Institute of Science and Technology, Seoul, Republic of Korea

5:00 pm – 5:30 pm

3812159: Diagnosis of Grease Condition Using Dielectric Spectroscopy

Shunsuke Iwase, Taisuke Maruyama, NSK Ltd., Fujisawa, Kanagawa, Japan, Satoru Maegawa, Fumihiro Itoigawa, Nagoya Institute of Technology, Nagoya, Japan

Session 6C

SYNTHETIC LUBRICANTS AND HYDRAULICS I

Session Chair: Ryan Fenton, BASF Corporation, Tarrytown, NY

Session Vice Chair: Lauren Huffman, Dow Chemical, Midland, MI

1:30 pm – 2:00 pm

3812992: Liquid Amides – Novel High-Performance Base Oils

Claire Ward, Cargill, Goole, East Yorkshire, United Kingdom

:00 pm – 2:30 pm

3812460: Synthetic Esters with the Advent of Electric Vehicles (EVs) Era – Electric Power Factor & Heat Capacity, Structure-Property-Performance Relationships

Hoon Kim, Michael Creamer, Doug Placek, Zschimmer-Schwarz US, Gordon, GA

2:30 pm – 3:00 pm

3834140: Ionic Lubricant Design Considerations

Sergei Glavatskih, KTH Royal Institute of Tribology, Stockholm, Sweden

3:00 pm – 3:30 pm – Break

3:30 pm – 4:00 pm

3832052: Sustainability – "Energy Savings are Just an Oil Change Away"

Brian Hess, Evonik Oil Additives USA, Inc., Horsham, PA, Denis Sepoetro, Evonik Operations GmbH, Darmstadt, Germany

4:00 pm – 4:30 pm

3833575: Technical and Scientific Perspective From Using Polyglycol on a Composition of Compressor Lubricants

Eduardo Lima, Dow Chemical Brazil, São Paulo, Brazil

4:30 pm – 5:00 pm

3819310: Testing Results of a Novel Bio-Based Oil-Soluble PAG Base Fluid and its Comparative Analysis to Conventional Oil-Soluble PAGs

Marlon Lutz, Biosynthetic Technologies, Indianapolis, IN

5:00 pm – 5:30 pm

3829733: An Investigation of Varnish Formation and Removal in a High-Pressure Piston Pump

Shriya Kalijaveedu, Paul Michael, Milwaukee School of Engineering, Milwaukee, WI, Nathan Knotts, Zefu Zhang, Chevron Lubricants, Products & Technology, Richmond, CA

5:30 pm – 6:00 pm – Synthetic Lubricants and Hydraulics Business Meeting

Session 6D

MATERIALS TRIBOLOGY VI

Session Chair: TBD

Session Vice Chair: TBD

1:30 pm – 2:00 pm

3859389: An Investigation into Wear of a Metal-Metal Interface in a Jet Engine

Mary Makowiec, Elizabeth Miller, Michael Fox, Pratt & Whitney, East Hartford, CT

2:00 pm – 2:30 pm

3812631: Formation of Wear-Protective Tribofilms on Different Steel Surfaces During Lubricated Sliding

Arman Khan, Tobias Martin, Jannat Ahmed, Shuangbiao Liu, Yip-Wah Chung, Qian (Jane) Wang, Northwestern University, Evanston, IL, Stephen Berkebile, US Army DEVCOM Army Research Laboratory, Aberdeen Proving Ground, MD

2:30 pm – 3:00 pm

3812205: Holistic Measurement of the Friction Behavior of Wet Disk Clutches

Patrick Strobl, Georg Johann Meingaßner, Katharina Voelkel, Hermann Pflaum, Karsten Stahl, Technical University of Munich, Garching bei München, Germany

3:00 pm – 3:30 pm – Break

3:30 pm – 4:00 pm

3834192: Slip Induced Solid Lubrication and Friction Reduction on Polymeric Substrates

Pallav Jani, Saad Khan, Lilian Hsiao, North Carolina State University, Raleigh, NC

4:00 pm – 4:30 pm

3832307: SLiPP+ Fiber Fabric: Flexible Ultra-low Friction and Wear Material by Mimicking Articular Cartilage

Hong Liu, Lanzhou Jiaotong University, Lanzhou, China

4:30 pm – 5:00 pm

3834379: Tribological Performance Evaluation and Enhancement of Bio-Lubricants by using Nano Additives and Ionic Liquids

Muhammad Bhutta, National University of Sciences & Technology (NUST), Islamabad, Capital, Pakistan

Session 6D (continued)

5:00 pm – 5:30 pm

3811472: Effect of Composition on Friction in Pine Loblloly Biomass Material

Maria Cinta Lorenzo Martin, Oyelayo Ajayi, George Fenske, Argonne National Laboratory, Argonne, IL, Jordan Klinger, Yidong Xia, Idaho National Laboratory, Idaho Falls, ID, Troy Semelsberger, Ricardo Navar, Los Alamos National Laboratory, New Mexico, NM

5:30 pm – 6:00 pm – Materials Tribology Business Meeting

Session 6E

TRIBOCHEMISTRY III

Session Chair: TBD

Session Vice Chair: TBD

1:30 pm – 2:00 pm

3807754: Encapsulation of Halogen-Free Boron-Based Ionic Liquids within Polymer Microshells

Filippo Mangolini, Jieming Yan, Kenechukwu Moneke, The University of Texas at Austin, Austin, TX

2:00 pm – 2:30 pm

3834000: Differences in ZDDP and Ionic Liquid-Based Tribofilms

Florian Pape, Gerhard Poll, Leibniz University Hanover, Garbsen, Lower Saxony, Germany

2:30 pm – 3:00 pm

3833990: Mechanochemical Synergy Between Metal Oxide Nanocrystals and Surface-Active Molecules at Lubricated Contacts: An In-Situ Atomic Force Microscopy Study

Pranjal Nautiyal, Andrew Jackson, Robert Carpick, University of Pennsylvania, Philadelphia, PA, Robert Wiacek, Pixelligent Technologies LLC, Baltimore, MD

3:00 pm – 3:30 pm – Break

3:30 pm – 4:00 pm

3833100: Molecular Mechanisms of Tribochemical Reactions: Reactive Molecular Dynamics Simulations of Cyclic Organic Molecules

Fakhrul Hasan Bhuiyan, Ashlie Martini, University of California-Merced, Merced, CA, Yu-Sheng Li, Seong Kim, The Pennsylvania State University, State College, PA

4:00 pm – 4:30 pm

3811471: Understanding the Effect of Forces on Tribochemical Reaction Rates

Wilfred Tysoe, University of Wisconsin-Milwaukee, Milwaukee, WI

4:30 pm – 5:00 pm

3833820: How are Chemical Reactions Activated in Tribological Interfaces?

Seong Kim, Pennsylvania State University, University Park, PA, Ashlie Martini, University of California-Merced, CA

Session 6F

CONTACT MECHANICS II

Session Chair: TBD

Session Vice Chair: TBD

1:30 pm – 2:00 pm

3833768: Macro-Scale Characterization of the Contact Between Ski and Snow

Kalle Kalliorinne, Andreas Almqvist, Luleå University of Technology, Luleå, Sweden

2:00 pm – 2:30 pm

3810729: Effects of Mechanical Stimulation on Reconstructed Skin at Different Levels of Maturity

Na Qiao, Ecole centrale de Lyon, Ecully, France

2:30 pm – 3:00 pm

3812991: Impact of Plantar Pressure Variations on the Ski-Snow Contact During the Double Poling Cycle in Cross-Country Skiing

Gustav Hindér, Kalle Kalliorinne, Joakim Sandberg, Andreas Almqvist, Hans-Christer Holmberg, Roland Larsson, Luleå University of Technology, Luleå, Sweden

3:00 pm – 3:30 pm – Break

3:30 pm – 4:00 pm

3810971: An Application of Hydrodynamic Lubrication Theory to Automotive Windscreen Wipers

Bradley Graham, James Knowles, Georgios Mavros, Loughborough University, Leicester, United Kingdom

4:00 pm – 4:30 pm

3815309: Coupling Effect of Boundary Tribofilm and Hydrodynamic Film

Bao Jin, Yongyong He, Tsinghua University, Beijing, China

4:30 pm – 5:00 pm

3812168: Relationship Between Hertzian Contact Pressure and Raman Band Shift – The Case of an Alumina-Glass Pair

Karl Delbé, Jean-Yves Paris, Malik Yahiaoui, École Nationale d'Ingénieurs de Tarbes, Tarbes Cedex, France

5:00 pm – 5:30 pm

3834272: Flows Around a Contacting Asperity Modeled in the Micro and Nanometer Scales

Nicole Dorcy, Henry Soewardiman, Shuangbiao Liu, Yip-Wah Chung, Qian (Jane) Wang, Northwestern University, Evanston, IL, Stephen Berkebile, US Army DEVCOM Army Research Laboratory, Aberdeen Proving Ground, MD

Session 6G

TRIBOTESTING II

Session Chair: TBD

Session Vice Chair: TBD

1:30 pm – 2:00 pm

3810635: Friction and Lubrication with Dry Powdered Soaps Used in Wire Drawing

Marie-Louise Schlichting, Marc Masen, Janet Wong, Amir Kadiric, Imperial College London, London, United Kingdom, Stijn De Pauw, Hendrik Van Hoecke, Marc Derdeyn, NV Bekaert SA, Ingelmunster, Belgium

2:00 pm – 2:30 pm

3813312: Reducing Agglomeration of Gas-Phase Synthesized Graphene in Group IV PAO Base Oil to Enhance Anti-Wear Performance

Gordon Krauss, Albert Dato, Huijie Li, Harvey Mudd College, Claremont, CA, Matthew Siniawski, Loyola Marymount University, Los Angeles, CA

2:30 pm – 3:00 pm

3830800: Image Processing Test Development to Quantify Separation of Gas-Phase Synthesized Graphene from Base Oils and Predict Anti-Wear Effectiveness

Gordon Krauss, Albert Dato, Huijie Li, Harvey Mudd College, Claremont, CA, Matthew Siniawski, Loyola Marymount University, Los Angeles, CA

3:00 pm – 3:30 pm – Break

3:30 pm – 4:00 pm

3833989: Tribological Properties of the Cold Spray Deposited Cermet Coatings

Subin Jose, Pradeep Menezes, Ashish Kasar, University of Nevada-Reno, Reno, NV

4:00 pm – 4:30 pm

3824194: Soot Wear in Heavy-Duty Diesel Engine Oils

Thomas Kirkby, Tom Reddyhoff, Imperial College London, London, United Kingdom, Joshua Smith, Jacqueline Berryman, Infineum UK Ltd., Milton Hill, Abingdon, United Kingdom, Mark Fowell, Volvo Group Trucks Technology, Göteborg, Sweden

4:30 pm – 5:00 pm

3831910: Accelerated Endurance Testing of Lubricants Using High-Speed KRL Shear

Deepak Veeregowda, Fabio Alemanno, Ducom Instruments (EUROPE) B.V., Groningen, Netherlands, Debdutt Patro, Sravan Josyula, Ducom Instruments, Bangalore, India

5:00 pm – 5:30 pm

3831927: Twin-Disc Evaluation of Wheel Flange Lubricants and Top of Rail Friction Modifiers

Deepak Veeregowda, Fabio Alemanno, Ducom Instruments (EUROPE) B.V., Groningen, Netherlands; Debdutt Patro, Sravan Josyula, Ducom Instruments, Bangalore, India

Session 6H

COMMERCIAL MARKETING FORUM VI

Session Chair: TBD

Session Vice Chair: TBD

1:30 pm – 2:00 pm – Open Slot

2:00 pm – 3:00 pm
Afton Chemical's Key Driver Seminar

3:00 pm – 3:30 pm – Break

Session 6I

ELECTRIC VEHICLES VI

Session Chair: TBD

Session Vice Chair: TBD

1:30 pm – 2:00 pm

3804553: The Effect of Esters on the Tribological Performance of Electric Vehicle (EV) Transmission Lubricants

Johann Watson, Ardian Morina, Farnaz Motamen Salehi, Shahriar Kosarieh, University of Leeds, Leeds, West Yorkshire, United Kingdom, Gareth Moody, David Gillespie, Cargill, Snaith, East Yorkshire, United Kingdom

2:00 pm – 2:30 pm

3832111: Shelf-Stable hBN-Based Additive as Sulfur-Free Anti-Wear and Efficiency Booster for Low Viscosity E-Driveline Fluid Applications

Peter Moore, Stephan Wieber, Dmitriy Shakhvorostov, Andreas Hees, Evonik Oil Additives, Horsham, PA

2:30 pm – 3:00 pm

3812753: Promising Aspects of Nanolubricants Use for EVs – A Critical Review

Waleed Ahmed Abdalglil Mustafa, Fabrice Dassenoy, LTDS/ECL, Ecully, France

3:00 pm – 3:30 pm – Break

3:30 pm – 4:00 pm

3833573: The Effect of Friction Modifiers Under Ultra Low Viscosity Engine Oils

Kenji Yamamoto, Kouichi Takano, Shinji Iino, ADEKA Corporation, Tokyo, Japan

4:00 pm – 4:30 pm

3818318: The Response of Phosphonium Ionic Liquids (ILs) in Lubricating Greases with Respect to Various Tribological Contacts

William Stibbs, Eamonn Conrad, Derek Voice, Jean-Noel Tourvielle, Solvay, Niagara Falls, Ontario, Canada, Mehdi Fathi-Najafi, Jinxia Li, NYNAS, Nynashamn, Sweden

4:30 pm – 5:00 pm

3815330: Influence of Additive/Ionic Liquid Concentration on the Electrical and Tribological Properties of an ATF

Alejandro García Tuero, Noelia Rivera Rellán, Alfonso Fernández González, José Luis Viesca Rodríguez, Antolín Estaeban Hernández Battez, University of Oviedo, Gijón, Asturias, Spain

5:00 pm – 5:30 pm

3810591: Investigation on Gear and Bearing Protection with Lower Viscosity Lubricants for Electric Vehicles

Hiroyuki Tatsumi, Kazushige Matsubara, Yasuhito Nakahara, Daisuke Takekawa, Keiichi Narita, Idemitsu Kosan Co., Ltd., Ichihara-shi, Chiba, Japan

5:30 – 6:00 pm

3834101: Combining Durability and Efficiency for Electric Vehicle Transmission Fluids

Thorsten David, Castrol, Hamburg, Germany

6:00 pm – 6:30 pm – Electric Vehicles & Engine and Drivetrain Business Meeting

Session 6K

TRIBOLOGY OF BIOMATERIALS I

Session Chair: TBD

Session Vice Chair: TBD

1:30 pm – 2:00 pm

3834223: In-Situ Measurements of Syringe-Stoppers Contact Interfaces in Deep Cold Storage for Shipment and Storage of Biologics

Adam DeLong, Kylie Van Meter, Catherine Fidd, Brandon Krick, Florida State University, Tallahassee, FL, Nestor Rodriguez, Guilllaume Lehee, Grace Lin, Ludovic Gil, BD Medical-Pharmaceutical Systems, Pont de Claix, France

2:00 pm – 2:30 pm

3832949: Relationship Between Friction Coefficient and Permeability of Physically and Chemically Crosslinked Hydrogels

Nusrat Chowdhury, University of Illinois at Urbana-Champaign, Urbana, IL

2:30 pm – 3:00 pm

3810826: Sliding Friction Through Dislocation Glide in Shape Complementary Soft Interfaces

Jasreen Kaur, Lehigh University, Bethlehem, PA

3:00 pm – 3:30 pm – Break

3:30 pm – 4:00 pm

3832706: Dynamic Viscoelasticity Measurement of Hydrated Polymer Brush Film in Narrowing Shear Gap

Fengchang Lin, Shintaro Itoh, Kenji Fukuzawa, Naoki Azuma, Hedong Zhang, Nagoya University, Nagoya, Aichi, Japan

4:00 pm – 4:30 pm

3832182: The Role of Gradient Layer on Depth-Dependent Adhesion in Hydrogel Using AFM Nano-indentation

Md Mahmudul Hasan, Alison Dunn, University of Illinois at Urbana-Champaign, Urbana, IL

4:30 pm – 5:00 pm

3834053: Study of Biological Interfaces from Cartilages to Personal Care Products

Kartik Pondicherry, Paul Staudinger, Julius Heinrich, Anton Paar GmbH, Graz, Austria, Mayank Warshney, Anton Paar India, Gurugram, India

5:00 pm – 5:30 pm

3834204: Characterization of Mechanical Properties of Solvent-Cast 3D-Printed Peptide-Polymer Scaffolds for Osteochondral Tissue Regeneration

Santiago Lazarte, Tomas Babuska, Catherine Fidd, Brandon Krick, Florida State University, Tallahassee, FL, Tyler French, Diana Hammerstone, John Tolbert, Andrew Kitson, Lesley Chow, Lehigh University, Bethlehem, PA

5:30 pm – 6:00 pm – Biotribology Business Meeting

Session 6L

SURFACE ENGINEERING II

Session Chair: TBD

Session Vice Chair: TBD

1:30 pm – 2:00 pm

3832278: Tribological and Tribo-Corrosion Mechanisms of Al7075-T6 Alloy by Ultrasonic Nanocrystal Surface Modification

Auezhan Amanov, Young-Sik Pyun, Sun Moon University, Asan, Republic of Korea, Domenico Furfari, Airbus Operations GmbH, Hamburg, Germany

2:00 pm – 2:30 pm

3809868: A Multiscale Modeling System for Surface Texturing a Radial Pump Plunger to Improve Tribological Performance

Henry Soewardiman, David Pickins, Yip-Wah Chung, Qian (Jane) Wang, Northwestern University, Evanston, IL, Blake Johnson, Nikhil Murthy, Stephen Berkebile, US Army DEVCOM Army Research Laboratory, Aberdeen Proving Ground, MD

2:30 pm – 3:00 pm

3815718: Interaction Between Lubricants and Surface Texture Under EHL Conditions

Mohd Syafiq Abd Aziz, Tom Reddyhoff, Jie Zhang, Imperial College London, London, United Kingdom, Mohd Syafiq Abd Aziz, Universiti Teknikal Malaysia Melaka, Durian Tunggal, Malaysia

3:00 pm – 3:30 pm – Break

3:30 pm – 4:00 pm

3814721: Adjustment of the Properties of Frictional Hysteresis Loops in Metallic Contacts by Surface Engineering

Mirco Jonkeren, Katharina Brinkmann, Matthias Wangenheim, Leibniz University of Hannover, Garbsen, Germany, Paolo Giudici, ML ENGRAVING srl, Onore, Italy, Anastasia Dianova, Marta Brizuela, TECNALIA, Basque Research and Technology Alliance (BRTA), Donostia-San Sebastián, Spain

4:00 pm – 4:30 pm

3813005: Combining Concentrated Polymer Brushes and Laser Surface Texturing to Achieve Durable Superlubricity

Sorin-Cristian Vladescu, King's College London, London, United Kingdom, Chiharu Tadokoro, Takuo Nagamine, Saitama University, Saitama, Sakura, Japan, Mayu Miyazaki, Ken Nakano, Yokohama National University, Yokohama, Japan, Tom Reddyhoff, Imperial College London, London, United Kingdom; Shinya Sasaki, Tokyo University of Science, Tokyo, Japan, Yoshinobu Tsujii, Kyoto University, Kyoto, Japan

4:30 pm – 5:00 pm

3812590: Increasing Tire Tread Ice Traction by Superhydrophobic Laser Texture

Matthias Wangenheim, Michael Hindemith, Leibniz University of Hannover, Hannover, Germany

5:00 pm – 5:30 pm – Surface Engineering Business Meeting

Session 6M

GREASE II

Session Chair: TBD

Session Vice Chair: TBD

1:30 pm – 2:00 pm

3814128: Shear Properties of Various Greases in Micrometer-Order Gap

Hanul Chun, Tomoko Hirayama, Naoki Yamashita, Kyoto University, Kyoto-shi, Nishikyo-ku, Kyoto-fu, Japan

2:00 pm – 2:30 pm

3833718: Impact of Thermo-Mechanical Aging of Grease During Churning on Grease Properties and Life

Sathwik Chatra K R, SKF, Houten, Netherlands, Jude Osara, University of Twente, Enschede, Netherlands, Piet Lugt, SKF Research and Technology Development, Houten, Netherlands

2:30 pm – 3:00 pm

3815401: Effects of Shear Aging on Oil-Separation Properties of Lubricating Greases

Femke Hogenberk, Jude Osara, Dirk Van Den Ende, University of Twente, Enschede, Netherlands, Piet Lugt, SKF Research and Technology Development, Houten, Netherlands

3:00 pm – 3:30 pm – Break

3:30 pm – 4:00 pm

3823866: Bevel Gear Grease – A Sustainability Case Study

Johan Leckner, Axel Christiernsson Int. AB, Nol, Sweden

4:00 pm – 4:30 pm

3830847: Benchtop Tribological Characterization of Electric Motor Greases for Hybrid Bearings

Abhishek Kumar, Jose Vasquez-Reyes, Ashlie Martini, University of California-Merced, Merced, CA, Christina Cheung, Thomas Murray, Anoop Kumar, Chevron Corporation, Richmond, CA

4:30 pm – 5:00 pm – Open Slot

5:00 pm – 5:30 pm – Grease Business Meeting

Session 6N

WEAR I

Session Chair: TBD

Session Vice Chair: TBD

1:30 pm – 2:00 pm

3803642: Adjusting for Running-In: Extension of the Archard Wear Equation

Michael Varenberg, John Crane, Inc., Morton Grove, IL

2:00 pm – 2:30 pm

3803822: An Advanced Numerical Model for Wear

Jamal Choudhry, Andreas Almqvist, Roland Larsson, Luleå University of Technology, Luleå, Sweden

2:30 pm – 3:00 pm

3806376: Wear Behavior of Metallic Part Repaired by an Additive Manufacturing Process

Théo Zurcher, Eric Charkaluk, Laboratoire de Mécanique des Solides-Ecole Polytechnique, Palaiseau, France; Vincent Fridrici, Bruno Berthel, Laboratoire de Tribologie et Dynamique des Systèmes-Ecole Centrale de Lyon, Lyon, France, Benoit Dodin, Société Nationale des Chemins de fer Français, Saint-Denis, France

3:00 pm – 3:30 pm – Break

3:30 pm – 4:00 pm

3807117: Tribology Analysis of Additive Manufactured, Nickel-Based Super Alloys

Khosro Shirvani, SUNY Farmingdale, Farmingdale, NY

4:00 pm – 4:30 pm

3810351: Effects of Temperature and Lubricant on Reciprocating Sliding Wear Behavior of HNBR/FKM

Zhangyu Qiao, China University of Petroleum, Beijing, China

4:30 pm – 5:00 pm

3812212: Computational Modelling of the Antiwear Effect of Zinc Dialkyldithiophosphate Tribofilms in Mixed Mode Lubricated Contact

Robert Anderluh, Hrvoje Jasak, University of Cambridge, Cambridge, Cambridgeshire, United Kingdom

5:00 pm – 5:30 pm – Wear Business Meeting

Thursday, May 25, 2023

Session 7A

LUBRICATION FUNDAMENTALS VII: NANOPARTICLES AND COATINGS

Session Chair: TBD

Session Vice Chair: TBD

8:00 am – 8:30 am

3831473: Influence of Lubricant Additive Urea-ZrP on Viscosity

Kailash Arole, Yan Chen, Adolfo Delgado, James Hubbard, Hong Liang,Texas A&M University, College Station, TX

8:30 am – 9:00 am

3805242: Macro Topography Effect on Friction in Presence of Surface Textures in Conformal Contacts

Gerda Vaitkunaite, Erik Hansen, Johannes Schneider, Bettina Frohnapfel, Peter Gumbsch, Karlsruhe Institute of Technology (KIT), Karlsruhe, Germany

9:00 am – 9:30 am

3824576: Tribological Properties of MoS2 and Doped-MoS_2 Spray Coatings in Low Viscosity Hydrocarbons

Euan Cairns, Samir Aouadi, Diana Berman, Andrey Voevodin, University of North Texas, Denton, TX, Stephen Berkebile, US Army DEVCOM Army Research Laboratory, Aberdeen Proving Ground, MD

9:30 am – 10:00 am

3834300: Tribological Properties of h-BN, Ag and MgO Nanostructures as Lubricant Additives in Vegetable Oils

Maria Victoria Granja Oramas, C. Fred Higgs III, Rice University, Houston, TX

10:00 – 10:30 am – Break

10:30 am – 11:00 am

3811476: Performance and Lubrication Mechanism of New TiO_2 Particle-Based High-Performance Lubricant Additives

Fabrice Dassenoy, Sophie Pavan, Galipaud Jules, LTDS/ECL, Ecully, France, Istvan Jenei, Stockholm University, Stockholm, Sweden, Stephan Wieber, EVONIK, Darmstadt, Germany

Session 7A (continued)

11:00 am – 11:30 am

3806344: Influence of the Dispersant on the Tribological Performance of MoS_2 Nanoparticles Used as Lubricant Additives

Marina Benmansour, Fabrice Dassenoy, Jules Galipaud, Beatrice Vacher, LTDS/ECL, Ecully, France, Pavel Afanasiev, IRCE Lyon, Lyon, France, Lucile Joly-Pottuz, INSA Lyon, Lyon, France

11:30 am – 12:00 pm

3813207: Presentation TBA – Pending Government Approval

Parker LaMascus, Daniel Delghandi, Pranjal Nautiyal, Andrew Jackson, Robert Carpick, University of Pennsylvania, Philadelphia, PA, Meagan Elinski, Hope College, Holland, MI, Julia Griffin, Mount Holyoke College, South Hadley, MA, Lei Zheng, Robert Wiacek, Pixelligent, LLC, Baltimore, MD

Session 7C

SEALS I

Session Chair: Paul Michael, Milwaukee School of Engineering, Milwaukee, WI

Session Vice Chair: Hanping Xu, Ultool, LLC, Duluth, GA

8:00 am – 8:30 am

3812275: Modeling and Simulation of the Dynamic Sealing and Lubrication Mechanism of Rotary Shaft Seals

Jeremias Grün, Simon Felmeth, Frank Bauer, University of Stuttgart, Stuttgart, Germany

8:30 am – 9:00 am

3831169: A Secondary Self-Opening Start-Up Clearance Seal

Jing Tang, Hanping Xu, Ultool LLC, Duluth, GA, Sevki Cesmeci, Fuad Hassan, Georgia Southern University, Statesboro, GA

9:00 am – 9:30 am

3834075: Endurance Testing of Cylinder Rod and Piston Seals

Paul Michael, Milwaukee School of Engineering, Milwaukee, WI

9:30 am – 10:00 am

3849023: Radial Lip Seal Friction Torque – A Suitable Lubricant-Elastomer Compatibility Indicator?

Christian Wilbs, Daniel Froelich, Matthias Adler, Freudenberg FST GmbH, Weinheim, Germany

10:00 am – 10:30 am – Break

10:30 am – 11:00 am

3833033: Rheological Sealing Material

Hanping Xu, Jing Tang, Aaron Harcrow, Ultool, LLC, Duluth, GA, Jacqueline Johnson, Leonard Lee, Sharon Gray, Terekhov Yuryevich, UTSI, Tullahoma, TN

11:00 am – 11:30 am

3833540: A Test Rig for Performance Evaluation of Dry Gas Seals with Choked Flow

Pascal Jolly, Noel Brunetiere, Institut Pprime – CNRS – Université de Poitiers, Chasseneuil du Poitou, France

11:30 am – 12:00 pm

3834144: Tribological Challenges of High Pressure H2 Compression Using Reciprocating Industrial Compressors

Tanil Ozkan, Jonathan Penaranda, Dover Innovation Laboratory, Houston, TX, Burak Bekisli, Dover Precision Components, Woodlands, TX

Session 7D

MATERIALS TRIBOLOGY VII

Session Chair: TBD

Session Vice Chair: TBD

Presentations TBD

Session 7E

TRIBOCHEMISTRY IV

Session Chair: TBD

Session Vice Chair: TBD

8:00 am – 8:30 am

3808686: Tribocorrosion in FLiNaK Molten Salt

Jun Qu, Xin He, Chanaka Kumara, Dino Sulejmanovic, James Keiser, Nidia Gallego, Oak Ridge National Laboratory, Oak Ridge, TN

8:30 am – 9:00 am

3833050: Ultra-High Tribocorrosion Resistance of Metals Enabled by Nano-Layering

Wenbo Wang, Oak Ridge National Laboratory, Knoxville, TN

9:00 am – 9:30 am

3836499: Novel Tribo-Corrosion Mechanisms of Laser Shock Peened Steel Manufactured by High-Pressure Deposition Additive Manufacturing Process

Alessandro Ralls, Jacob Frizell, Pradeep Menezes, University of Nevada-Reno, Reno, NV

9:30 am – 10:00 am

3849044: Mechanochemical Decomposition of Tricresyl Phosphate (TCP) Between Sliding Ferrous Surfaces

Egheosa Ogbomo, Imperial College London, London, United Kingdom

10:00 am – 10:30 am – Break

10:30 am – 11:00 am

3834074: Aircraft Turbine Oil Antiwear Additive Reactivity with Aerospace Bearing Steels

Alexander Fletcher, Mathew Kirsch, Daulton Isaac, Patrick Hellman, Air Force Research Laboratory, Wright-Patterson Force Base, OH, Daesung Chong, University of Dayton Research Institute, Dayton, OH

11:00 am – 11:30 am

3801783: In-Situ Observation of the Effect of the Tribofilm Growth on Scuffing in Rolling Sliding Contact

Mao Ueda, Shell Lubricants Japan, Kanagawa, Japan, Hugh Spikes, Amir Kadiric, Imperial College London, London, United Kingdom

Session 7F

BIOTRIBOLOGY I

Session Chair: TBD

Session Vice Chair: TBD

8:00 am – 8:30 am

3832881: Optimizing Oral Lubrication Properties of Plant Proteins by Microgelation for Improved Functionality and Fat-Replacement

Ben Kew, Melvin Holmes, Evangelos Liamas, Anwesha Sarkar, University of Leeds, Leeds, Yorkshire, United Kingdom

8:30 am – 9:00 am

3834114: Comparing Stiffness and Lubrication Properties of Triple Network Hydrogels to PAMPS/P(NIPAAm-co-AAm) Hydrogel and Ex-Vivo Cartilage

Nabila Ali, Alison Dunn, University of Illinois at Urbana-Champaign, Urbana, IL, Connor Demott, Melissa Grunlan, Texas A&M University, College Station, TX

9:00 am – 9:30 am

3848864: Modelling the Interaction Between Skin and Products with Application to Tactile Perception

Marc Masen, Imperial College of London, London, United Kingdom

9:30 am – 10:00 am

3810768: Development of a Synthetic Skin Test Bed for the Assessment of Beauty and Personal Care Product Consumer Experience

Phoebe Bramley, University of Sheffield, Sheffield, United Kingdom

10:00 am – 10:30 am – Break

10:30 am – 11:00 am

3812383: The Effectiveness of Chalk as a Friction Modifier for Finger Pad Contact with Rocks of Varying Roughness

Katherine Tomlinson, Ben Clarke, Tom Slatter, Roger Lewis, Matt Carre, University of Sheffield, Sheffield, United Kingdom

11:00 am – 11:30 am

3829218: Microgel-Reinforced Hydrogel with Ultra-High Lubricity for Oral Therapeutic Application

Olivia Pabois, Jing Hu, Anwesha Sarkar, University of Leeds, Leeds, United Kingdom

11:30 am – 12:00 pm

3818435: Oral Frictional Properties of Plant and Eairy Proteins – Role of Saliva

Fran Brown, Alan Mackie, Anwesha Sarkar, University of Leeds, Leeds, United Kingdom, Qi He, Jochen Pfeifer, Mondelez International, Reading, United Kingdom

Session 7G

TRIBOTESTING III

Session Chair: TBD

Session Vice Chair: TBD

8:00 am – 8:30 am

3833790: Development of a Novel Sled Tribometer

Joakim Sandberg, Kalle Kalliorinne, Gustav Hindér, Andreas Almqvist, Hans-Christer Holmberg, Roland Larsson, Luleå University of Technology, Luleå, Sweden

8:30 am – 9:00 am

3833407: Synergistic Influence of Epoxidation and Solid Lubricant Additives Incorporation on the Lubrication Performance of Inedible Mustard Oil

Soumya Sikdar, Md Hafizur Rahman, Pradeep Menezes, University of Nevada-Reno, Reno, NV

9:00 am – 9:30 am

3834203: In-Situ Deposition of Protective Films via Metastable Additive Molecules Carried into Sliding Interfaces by Lubricant Flow

Harry Wise, Tobias Martin, Jane Wang, Yip-Wah Chung, Northwestern University, Evanston, IL, Jack Loken, University of Wisconsin-Madison, Madison, WI

9:30 am – 10:00 am

3834073: Ball-on-Disk Tribological Testing in the Presence of an Electric Field

Steven Thrush, Allen Comfort, James Dusenbury, US Army DEVCOM GVSC, Warren, MI

10:00 am – 10:30 am – Break

10:30 am – 11:00 am

3834311: Tribological Properties of Nanocrystalline Al-Mg Material Manufactured Using Cold Spray

Amanendra Kushwaha, Manoranjan Misra, Pradeep Menezes, University of Nevada-Reno, Reno, NV

11:00 am – 11:30 am

3834315: Tribological Performance of Aluminum Sheet Forming Lubricants

Daniel Sanchez Garrido, Novelis, Kennesaw, GA

11:30 am – 12:00 pm

3834190: Comparison of Tribometer Reciprocating Performance Under Identical Conditions

Cole Frazier, Southwest Research Institute, San Antonio, TX

Session 7I

ELECTRIC VEHICLES VII

Session Chair: TBD

Session Vice Chair: TBD

8:00 am – 8:30 am

3833903: High-Speed Elastohydro-dynamic Traction and Film Thickness in Electric Vehicle Transmissions

Alexander MacLaren, Hugh Spikes, Amir Kadiric, Imperial College London, London, United Kingdom

8:30 – 9:00 am

3834025: Optimizing Electric Vehicle Transmission Efficiency Using a Thermally Coupled Gearbox Lubrication Model

Joseph Shore, Amir Kadiric, Imperial College London, London, United Kingdom

9:00 am – 9:30 am

3825698: Study on the Discharge Behavior of EV Motor Bearings

Liang Guo, Thijs Nijdam, Henk Mol, Lieuwe de Vries, SKF BV, Houten, Netherlands

Session 7I (continued)

9:30 am – 10:00 am

3807461: Numerical Investigation of the Influence of Pitting Size on Electrical Properties of Roller Bearings

Anatoly Zaiat, Karim Khaled Ibrahim, Marcel Neu, Eckhard Kirchner, Institute of Product Development and Machine Elements, Darmstadt, Germany, Florian Michael Becker-Dombrowsky, Technical University of Darmstadt, Darmstadt, Hesse, Germany

10:00 am – 10:30 am – Break

10:30 am – 11:00 am

3835060: Electric Vehicle Drive System Specialty Fluids

Anant Kolekar, Valvoline LLC, Lexington, KY

11:00 am – 11:30 am

3848522: Vehicle Electrification Trends and Traction Inverter

Ayush Lal, Aptiv, Pickering, Ontario, Canada

Session 7J

METALWORKING FLUIDS V

Session Chair: TBD

Session Vice Chair: TBD

Session Starts at 8:30 am

8:30 am – 9:00 am

3811283: Application of High-Speed Tribology to Evaluate the Performance of Cutting Fluids on Ti-6Al-4V Under Machining Conditions

Jack Secker, Chris Taylor, University of Sheffield, Sheffield, United Kingdom, Edward Jones, Hangsterfer's Labs Inc., Mantua, NJ

9:00 am – 9:30 am

3833702: Enhancing Lubricity for Increased CGI Machining Speeds

Amelia Hadler, Johnnie Thomlison, The Lubrizol Corporation, Wickliffe, OH, George Georgiou, GE02 SQUARED Consulting, Windsor, Ontario, Canada, Britt Minch, The Lubrizol Corporation, Wickliffe, OH

9:30 am – 10:00 am

3830552: Advances in Bio-Based Metalworking Fluids – Addressing Formulation Challenges by Balancing the Use of Additives

Kathleen Havelka, ANGUS Chemical Company, Buffalo Grove, IL

10:00 am – 10:30 am – Break

10:30 am – 11:00 am

3808552: Next-Generation Anti-Wear for Metalworking Fluids

Lucas Luz, Solvay, Paulínia, São Paulo, Brazil

Session 7K

SURFACE ENGINEERING III

Session Chair: TBD

Session Vice Chair: TBD

Session Starts at 9:00 am

9:00 am – 9:30 am

3804786: Making Surface Texture Meaningful: Case Studies in Surface Analysis for Tribological Applications

Mark Malburg, Digital Metrology Solutions, Columbus, IN

9:30 am – 10:00 am

3812254: How Can We Avoid PET Bottle Pile-ups During Conveying by Better Understanding Friction and Adhesion Phenomena?

Emmanouil Georgiou, Hellenic Air-Force Academy, Athens, Greece, Dirk Drees, Falex Tribology, Rotselaar, Vlaams Brabant, Belgium, Lais Lopes, Christian Gerlach, Procter & Gamble Services Company S.A., Grimbergen, Belgium

10:00 am – 10:30 am – Break

10:30 am – 11:00 am

3832761: Tribology – Adhesion, Friction, and Socioeconomy

Pankaj Tomar, IGDTUW/GGSIPU, New Delhi, Delhi, India

11:00 am – 11:30 am

3833336: Stick-Slip Friction: Mechanics, Mechanism, and Electro-Adhesion

Pankaj Tomar, IGDTUW/GGSIPU, New Delhi, Delhi, India

Session 7L

GREASE III

Session Chair: TBD

Session Vice Chair: TBD

8:00 am – 8:30 am – Open Slot

8:30 – 9:00 am

3835074: Grease Patterns After Rolling Contact

Hao Qi, L.B. Foster, Burnaby, British Columbia, Canada

9:00 am – 9:30 am

3810505: Dissipative Particle Dynamics Simulations of Thickener Fiber Formation Process and Behavior Under Shear Flow

Honami Yanagisawa, Takashi Noda, NSK Ltd., Fujisawa-shi, Kanagawa, Japan, Tomoya Hasegawa, Hitoshi Washizu, University of Hyogo, Kobe-shi, Hyogo, Japan

9:30 am – 10:00 am

3811289: Visualization of Grease Fluidity in a Ball Bearing Using Neutron Imaging Technology

Kazumi Sakai, Rui Ogata, Shuhei Yamada, Nobuharu Kimura, ENEOS Corporation, Yokohama, Japan, Yoshihiro Matsumoto, Comprehensive Research Organization for Science and Society, Tokai, Japan, Keisuke Kurita, Japan Atomic Energy Agency, Tokai, Japan

10:00 am – 10:30 am – Break

10:30 am – 11:00 am

3811764: Analyzing Wear and Additive Elements in Greases – XRF, RDE-OES or ICP-OES?

Christoph Rohbogner, Thomas Fischer, OELCHECK GmbH, Brannenburg, N/A, Germany

11:00 am – 11:30 am

3813040: Effect of Oxidation on the Lubricating Performance of Greases

George S. Dodos, ELDON'S S.A., Athens, Greece

11:30 am – 12:00 pm

3831450: Film Thickness in Grease Lubricated Bearings: Effects of Grease Filling, Bearing Size and Grease Properties

Pramod Shetty, Robert Meijer, Jude Osara, University of Twente, Enschede, Netherlands, Rihard Pasaribu, Shell Project and Technology, Amsterdam, Netherlands, Piet Lugt, SKF Research and Technology Development, Houten, Netherlands

Session 7M

WEAR II

Session Chair: TBD

Session Vice Chair: TBD

8:00 am – 8:30 am

3814171: New Amine Phosphate Esters as Multifunctional Antiwear Additives

Ezio Amerio, John Dixon, Alina Filin, Rudy Venderbosch, Nouryon, Deventer, Netherlands

8:30 am – 9:00 am

3814203: RNT Wear Testing with Ultra-Low Viscosity Engine Oil on Full Bench Engine

Matthias Eggenstein, Shell Global Solutions, Hamburg, Germany, Peter Berlet, IAVF Antriebstechnik, Karlsruhe, Germany

9:00 am – 9:30 am

3819630: Wear of Aerospace Bearing Steels in Lubricated Reciprocating Tribotesting

Mathew Kirsch, Air Force Research Laboratory, Wright Patterson Air Force Base, OH

9:30 am – 10:00 am

3832512: The Use of the MTM Rig for Wear Testing

Matthew Smeeth, Clive Hamer, PCS Instruments, London, United Kingdom

10:00 am – 10:30 am – Break

10:30 am – 11:00 am

3832581: Effects of Trace Moisture Content on Tribo-Film Formation, Friction and Wear of CF-Filled PTFE in High-Purity Hydrogen

Qian Chen, Kyushu University, Fukuoka, Fukuoka, Japan

11:00 am – 11:30 am

3812387: Enhanced Metal Corrosion of Long-Life Antifreeze Coolants

Hong Gao, Shell Global Solutions (US) Inc., Houston, TX

11:30 am – 12:00 pm

3813013: Local Contact Pressure Governs Mild Wear Mechanisms at Multi-Asperity Interfaces

Cyrian Leriche, ARCNL, Diemen, Noord-Holland, Netherlands

Session 8A

LUBRICATION FUNDAMENTALS VIII: MODELING

Session Chair: TBD

Session Vice Chair: TBD

1:30 pm – 2:00 pm

3804989: Scaling of Friction Behavior in the Mixed Lubrication Regime through a Modified Hersey Number

Erik Hansen, Gerda Vaitkunaite, Johannes Schneider, Peter Gumbsch, Bettina Frohnapfel, Karlsruhe Institute of Technology (KIT), Karlsruhe, Germany

2:00 pm – 2:30 pm

3833624: Off-Lattice Hybrid Kinetic Monte Carlo (kMC) Modeling of Film Growth at Solid-liquid Interfaces

Stavros Ntioudis, James Ewen, Daniele Dini, Imperial College London, London, United Kingdom, C. Turner, University of Alabama, Tuscaloosa, AL

2:30 pm – 3:00 pm

3833503: Influence of Polar Lubricant Additives on Wall Slip and Bulk Shear

Seyedmajid Mehrnia, Peter Pelz, Technische Universität Darmstadt, Darmstadt, Germany

3:00 am – 3:30 pm – Break

Session 8C

SEALS II

Session Chair: Lassad Amami, CETIM, Nantes, France

Session Vice Chair: Maximilian Engelfried, University of Stuttgart, Stuttgart, Germany

1:30 pm – 2:00 pm

3812371: Modelling of the Pumping Rate Behavior of Shaft Sealing Counterfaces

Maximilian Engelfried, Matthias Baumann, Frank Bauer, University of Stuttgart, Stuttgart, Germany

2:00 pm – 2:30 pm

3833697: Experimental Study of a Reverse Pumping Spiral Groove Face Seal

Abdel-Salem Medjahed, Noel Brunetiere, Antoinette Blouin, Institut Pprime, Futuroscope Chasseneuil Cedex, France; Bálint PAP, Safran, Colombes, France

2:30 pm – 3:00 pm

3829259: Tolerance Analyses on the Geometrical Parameters of Surface Textured Seals

Markus Brase, Matthias Wangenheim, Leibniz University of Hannover, Garbsen, Germany

3:00 pm – 3:30 pm – Break

3:30 pm – 4:00 pm

3806295: Experimental Determination of the Benefits of Textured Mechanical Seals on the Service Life of Systems

Lassad Amami, CETIM, Nantes, France

4:00 pm – 4:30 pm

3846279: Measurement of Leakage and Visualization of Seal Surface of Dry Gas Seals with a Simple Inner Ring Groove

Masayuki Ochiai, Tokai University, Hiratsuka, Kanagawa, Japan

4:30 pm – 5:00 pm

3850067: Radial Shaft Sealing System Failure Mode – Shaft Lead

Adrian Heinl, Christian Wilbs, Daniel Froelich, Matthias Adler, Freudenberg FST GmbH, Weinheim, Baden-Württemberg, Germany

Session 8E

TRIBOCHEMISTRY V

Session Chair: TBD

Session Vice Chair: TBD

1:30 pm – 2:00 pm

3811471: Understanding the Effect of Forces on Tribochemical Reaction Rates

Wilfred Tysoe, University of Wisconsin-Milwaukee, Milwaukee, WI

2:00 pm – 2:30 pm

3833820: How are Chemical Reactions Activated in Tribological Interfaces?

Seong Kim, Pennsylvania State University, University Park, PA, Ashlie Martini, University of California-Merced, Merced, CA

2:30 pm – 3:00 pm

3808686: Tribocorrosion in FLiNaK Molten Salt

Jun Qu, Xin He, Chanaka Kumara, Dino Sulejmanovic, James Keiser, Nidia Gallego, Oak Ridge National Laboratory, Oak Ridge, TN

3:00 pm – 3:30 pm – Break

3:30 pm – 4:00 pm

3805937: The Analytical Study of Friction Reduction in Instrumented Single-Cylinder Block

Yue Guan, Jules Galipaud, Frédéric Dubreuil, Maria-Isabel De Barros Bouchet, Ecole Centrale de Lyon, Écully, France, Johnny Dufils, Etienne Macron, IREIS/HEF GOURPE, Andrézieux-Bouthéon, France, Fabrice Dassenoy, LTDS/ECL, Ecully, France

4:00 pm – 4:30 pm

3833100: Molecular Mechanisms of Tribochemical Reactions: Reactive Molecular Dynamics Simulations of Cyclic Organic Molecules

Fakhrul Hasan Bhuiyan, Ashlie Martini, University of California-Merced, Merced, CA, Yu-Sheng Li, Seong Kim, The Pennsylvania State University, State College, PA

4:30 pm – 5:00 pm

3836499: Novel Tribo-Corrosion Mechanisms of Laser Shock Peened Steel Manufactured by High-Pressure Deposition Additive Manufacturing Process

Alessandro Ralls, Jacob Frizell, Pradeep Menezes, University of Nevada-Reno, Reno, NV

Session 8F

BIOTRIBOLOGY II

Session Chair: TBD

Session Vice Chair: TBD

1:30 pm – 2:00 pm

3809745: Haptic Tribometer Characterizing the Dynamic Contact Between the Human Finger and the Automotive Touchscreen

Rexhina Shyti, Roberto Vargiolu, Hassan Zahouani, Laboratoire de Tribologie et Dynamique des Systèmes, Ecully, France, Pascale Nays, Renault Group, Paris, France

2:00 pm – 2:30 pm

3811662: Molecular Modeling of Low-Friction Hair Care Formulations

Erik Weiand, James Ewen, Stefano Angioletti-Uberti, Daniele Dini, Imperial College London, London, United Kingdom, Peter König, Steven Page, Francisco Rodriguez-Ropero, Yuri Roiter, Procter & Gamble, Mason, OH

2:30 pm – 3:00 pm

3809804: Biotribological Characterization of the Physical Mechanisms at the Astringency Sensation Origin

Ianis Ammam, Roberto Vargiolu, Cyril Pailler-Mattei, Hassan Zahouani, Laboratoire de Tribologie et Dynamique des Systèmes – Ecole Centrale de Lyon, Lyon, France, Clément Nivet, INRAE, Dijon, France, Francis Canon, INRAE, Dijon, France

3:00 pm – 3:30 pm – Break

3:30 pm – 4:00 pm

3810348: Biotribological Behavior of MXene-UHMWPE Composites

Max Marian, Pontificia Universidad Católica de Chile, Macul, Región Metropolitana, Chile, Klara Feile, Benedict Rothammer, Bartz Marcel, Wartzack Sandro, Friedrich-Alexander-University Erlangen-Nuremberg (FAU), Erlangen, Germany, Andreas Rosenkranz, Universidad de Chile, Santiago, Chile

4:00 pm – 4:30 pm

3830758: Investigating the Tribological and Corrosion Behavior of Co-Cr Alloy as an Implant Material for Orthodontic Applications

Sudip Saha, Kommineni Uday Venkat Kiran, Sougata Roy, University of North Dakota, Grand Forks, ND

4:30 pm – 5:00 pm

3830887: Photo-Responsive Hydrogel Lubricity

Allison Chau, Sophia Bailey, Kseniia Karnaukh, Javier Read de Alaniz, Angela Pitenis, University of California-Santa Barbara, Santa Barbara, CA

5:00 pm – 5:30 pm

3832875: A Study on the Role of Synovial Fluid Constituents in Boundary Lubrication Mechanism at Articular Cartilage Surface

Wenxiao Li, Takehiro Morita, Yoshinori Sawae, Kyushu University, Fukuoka, Japan

Session 8G

TRIBOTESTING IV

Session Chair: TBD

Session Vice Chair: TBD

1:30 pm – 2:00 pm

3834410: Grinding Method Process Under Lab Conditions to Evaluate Railway Microstructural Response

Luis Wilches Peña, Valentina Castano, Miguel Vélez, Universidad EIA, Medellín, Antioquia, Colombia; Jaime Carvalho, Juan Sánchez, Hugo Santana, John Valencia, SENA, Centro de Tecnología de la Manufactura Avanzada, Medellín, Antioquia, Colombia

2:00 pm – 2:30 pm

3834337: Cast Iron Chef – The Final Season

Alexander McGhee, University of Wisconsin-Madison, Madison, WI, Kylie Van Meter, Brandon Krick, Florida State University, Tallahassee, FL

2:30 pm – 3:00 pm

3835228: Effect of Gas Environment and Test Speed on Reciprocating Wear Testing for Compressor Packing Seal Materials

Jonathan Penaranda, Burak Bekisli, Tanil Ozkan, Dover Precision Components, Houston, TX

3:00 pm – 3:30 pm – Break

Session 8I

ENGINE AND DRIVETRAIN I

Session Chair: TBD

Session Vice Chair: TBD

1:30 pm – 2:00 pm

3847574: Ring-Liner Testing in a Hydrogen Environment

Peter Lee, Southwest Research Institute, San Antonio, TX

2:00 pm – 2:30 pm

3832947: How to Improve Engine Lifetime by Use of Premium Fuel

Marcella Frauscher, Adam Agocs, Thomas Wopelka, Andjelka Ristic, AC2T research GmbH, Wiener Neustadt, Austria, Austria

Session 8L

GREASE IV

Session Chair: TBD

Session Vice Chair: TBD

1:30 pm – 2:00 pm

3832174: Quantum-Leap Grease Formulation Through Preform Chemistry

Noura Smaili Iderkou, Novitas Chem Solutions, Tomball, TX

2:00 pm – 2:30 pm

3834150: Best Practices for Making Urea Grease from a Powdered Thickener

Lauren Huffman, Dow Chemical, Midland, MI

2:30 pm – 3:00 pm

3811237: Influence of Grease Thickener Types on the Film Formation

Tomoki Kamihata, Kazumi Sakai, ENEOS Corporation, Yokohama, Japan

3:00 pm – 3:30 pm – Break

3:30 pm – 4:00 pm

3813022: DIN 51830-2 – Evolution of an Advanced Method for Characterization of Thermo-oxidative Grease Failure

Markus Matzke, Robert Bosch GmbH, Renningen, Germany, Olav Höger, Shell Global Solutions Germany GmbH, Hamburg, Germany, Thomas Litters, FUCHS Lubricants Germany GmbH, Mannheim, Germany, Jürgen Fischer, DIN Technical Committee on Mineral Oil and Fuel Standardization, Hamburg, Germany

4:00 pm – 4:30 pm

3829730: Oxidation and Grease Life in Rolling Bearings

Piet Lugt, SKF Research and Technology Development, Houten, Netherlands, Mikael Holgerson, Fredrik Reinholdsson, SKF, Gothenburg, Sweden

Session 8M

WEAR III

Session Chair: TBD

Session Vice Chair: TBD

1:30 pm – 2:00 pm

3833731: An Investigation into the Tribological Performance of Wear-Resistant PVD Coatings Atop Various Tool Steels Used in Injection Moulding Applications

Roshan Lal, University of Birmingham, Wolverhampton, United Kingdom

2:00 pm – 2:30 pm

3833738: Friction & Wear Characteristics of Pitch & Poly-acrylonitrile-Based Carbon-Carbon Composites in Air and Nitrogen Environment Under Aircraft Taxi Conditions

Akshat Sharma, Farshid Sadeghi, Purdue University, West Lafayette, IN

2:30 pm – 3:00 pm

3833918: Wear Characteristics of ZDDP-Tribofilm

Armand Tamouafo Fome, Leibniz University Hannover, Hanover, Germany

3:00 pm – 3:30 pm – Break

Participant's Index

Preliminary as of December 8, 2022.

Please note presenting and co-authors listed with multiple presentations in the program schedule.

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Mark Your Calendar!

Cleveland Marriott Downtown at Key Tower, Cleveland, Ohio (USA)

2023 STLE Tribology Frontiers Conference

November 12-15, 2023

Two Conferences Worth of Content in One Location

2023 STLE Tribology Frontiers Conference

Learn about the technical, environmental and social issues that will impact tribology research in the 21st Century.

For the seventh year, STLE is convening an international community to share tribology's most cutting-edge research. Engage with tribology's top minds and leave with a better understanding of how your company's products will fit into an ever-evolving technical future.

Conference Highlights:

- Daily Keynote Presentations
- Invited "Spotlight" Talks by noted Principal Investigators
- AI and Machine Learning in Tribology Session
- Early Career and Student Research Poster Competition
- "Beyond the Cutting Edge" Special Symposium (organized by the editors of Tribology Letters)

The 3rd STLE Tribology & Lubrication for E-Mobility Conference

Explore the latest technical challenges and commercial opportunities that will impact the future of electric vehicle technology.

Conference Highlights:

- Expert-led Presentations from Leading Companies and Organizations with an Interest in E-Mobility
- Networking Opportunities
- Panel Discussions on State-of-the-Art Developments in Electric Vehicle Technology and Lubrication
- Corporate Sponsorships

Watch for more information to come soon!

Visit **www.stle.org** for program updates.

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#STLE2023 Education Courses

*As of December 8, 2022

"The largest and most useful meeting covering all aspects of tribology and lubrication engineering."

The 2023 STLE Annual Meeting & Exhibition features 11 industry-specific education courses offered on Sunday, May 21, Wednesday, May 24, and Thursday, May 25. The schedule is designed to give attendees more flexibility when planning their conference attendance. All courses are full day (start at 8:00 am and end at 5:00 pm). STLE education courses are $460 with a full meeting registration.

If you have questions regarding these courses, please contact Rebecca Lintow, STLE Director of Professional Development, **rlintow@stle.org** or (224) 985-0009.

Please note that course titles and content are subject to change.* Visit **www.stle.org/annualmeeting** and see the Program Guide distributed onsite in Long Beach for the most up-to-date information and list of course instructors.

Sunday, May 21

Advanced Lubrication 301: Advanced Additives

Course Chair: Farrukh Qureshi, The Lubrizol Corporation

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.

Who should attend: Engineers and scientists early/mid-career who want to brush up on their knowledge of lubricant additives.

Basic Lubrication 101

Course Chair: Yvette Trzcinski, HF Sinclair

Basic Lubrication 101 is primarily for individuals entering the lubrication field who need a broad introduction to the field of lubrication, lubrication principles and lubricating materials. This course is also for individuals not directly involved but who need a broad overview of lubricants and basic lubricating components. This course does not require a formal scientific degree or background, although many technical terms and concepts are covered. Experienced industry professionals 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.

Who should attend: Lubricant Sales Personnel, Additive Sales, Lubricant/Additive Marketing, Lubricant Formulator or Manufacturer, Academia, Base Stock Sales or Manufacturer, Original Equipment Manufacturer (OEM), Testing Equipment Manufacturer, Lubricant-Governing Associations.

Gears 101

Course Chair: Larry Ludwig, Schaeffer Manufacturing Company

Gears 101 is designed to provide a general understanding of industrial gearing. This course will serve as a guide to establish not only a basic knowledge of gears and their supporting components but also their lubrication. In this course, you will learn about gear functions and types, basic gear terminology, the different types of industrial gear lubricants, the factors that affect gear lubrication, industrial gear lubricant requirements and their proper selection, open gear lubrication, gear wear modes, gear failure analysis and condition monitoring.

Who should attend: Students, Lubricant Formulators, End-Users of Gear Lubricants, and anyone interested in knowing more about industrial gearing and their lubrication.

#STLE2023 Education Courses

*As of December 8, 2022

Sunday, May 21 (continued)

Hydraulics 201: Hydraulic Fluids and Systems Overview

Course Chair: Nathan Knotts, Chevron

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.

Who should attend: Lubricant Sales Personnel, Additive Sales, Lubricant/ Additive Marketing, Lubricant Formulator or Manufacturer, Academia, Base Stock Sales or Manufacturer, Original Equipment Manufacturer (OEM), Testing Equipment Manufacturer, Lubricant-Governing Associations.

Metalworking Fluids 130: Metal Treatment Chemical

Course Chair: Jennifer Lunn, JTM Products, Inc.

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.

Who should attend: Chemists, Engineers, Technical Support Staff and Field Service Technicians working with and using metalworking fluids.

(NEW!)

Sustainability: Biolubricants and Biofuels

Course Chair: Brajendra K. Sharma, USDA

This course will be 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, niche markets, sustainability, and governmental and regulatory drivers. Products currently in various stages of commercialization 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 also be covered. An outstanding list of speakers with first-hand knowledge in these areas will teach the course.

Who should attend: Students, Engineers, Scientists, Lubricant Formulators, Users early/mid-career.

(NEW!)

Synthetics: Basics & Applications

Course Chair: Vasu Bala, Tiarco LLC

Designed primarily for formulators and users of lubricating materials, this course provides an overview of non-petroleum-based lubricants, their comparison to each other and to petroleum oil. It provides an introduction to synthetic lubricant basestocks and applications, as well as compares the use of these synthetic lubricants to petroleum-based products and between types of synthetic lubricants.

Who should attend: Students, Engineers, Scientists, Lubricant Formulators, Users early/mid-career.

Wednesday, May 24

Advanced Lubrication 302: Advanced Lubrication Regimes

Course Chair: Weixue Tian, ExxonMobil

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.

Who should attend: Lubricant Sales Personnel, Additive Sales, Lubricant/ Additive Marketing, Lubricant Formulator or Manufacturer, Academia, Base Stock Sales or Manufacturer, Original Equipment Manufacturer (OEM), Testing Equipment Manufacturer, Lubricant-Governing Associations.

Basic Lubrication 102

Course Chair: Yvette Trzcinski, HF Sinclair

Basic Lubrication 102 is an overview of equipment systems (gears, bearings, seals, compressors, and engines) and their lubrication requirements, including a module on grease. Like Basic Lubrication 101, this course does not

require a formal scientific degree or background, although many technical terms and concepts related to the use of lubricants in various mechanical devices are covered. This course assumes fundamental knowledge of lubricants and lubrication principles, as presented in the Basic Lubrication 101 course.

Who should attend: Lubricant Sales Personnel, Additive Sales, Lubricant/ Additive Marketing, Lubricant Formulator or Manufacturer, Academia, Base Stock Sales or Manufacturer, Original Equipment Manufacturer (OEM), Testing Equipment Manufacturer, Lubricant-Governing Associations.

Metalworking Fluids 250: Understanding and Controlling Metal Removal

Course Chair: Kevin Saunderson, BP

Once a metalworking fluid has been qualified for use in an application, its performance depends on successful fluid management. In turn, successful fluids management depends on a fundamental understanding of the factors that work against fluid life and fluid performance, as well as cost-effective strategies for preventing these factors from causing metalworking fluid failure. Metalworking Fluids 250 is designed to meet both of these needs. It covers primary failure mechanisms, including the effect of contaminant particle size, water quality, microbes and oil contamination. Also presented are recommendations on how best to prevent each of these factors from destroying metalworking fluid performance and shortening metalworking fluid functional life.

Who should attend: Plant Managers, Shop Supervisors, Chemical Management Personnel, Technical Sales and Marketing Personnel, Health & Safety or Environmental Affairs Personnel, Maintenance Personnel, Waste Treatment Personnel, Coolant Compounder – Technical Service and Laboratory Personnel, Chemical Process Operators, Individuals new to metalworking technology.

Thursday, May 25

Electric Vehicles

Course Chair: Carlos Sanchez, Southwest Research Institute

This course introduces hardware, tribology, lubrication, thermal management, and testing related to EV. It includes an overview of hybrid, fully battery and fuel-cell electric vehicles and covers the driveline systems of hybrid and full electric units. Other topics covered include lubricant, tribology and thermal management challenges and requirements for EVs and concludes with discussion about established test methods for EV fluid evaluation.

Who should attend: Lubricant Manufacturers, Raw Material Suppliers, Distributors, End-users of Lubricants, Senior Corporate Management, Technical Sales and Marketing Personnel Formulators, Engineers & Chemists, Plant Managers, Research & Product Developers.

#STLE2023 Networking & Special Events

Please note that all Annual Meeting events are in the Long Beach Convention Center, unless noted.

New Member & Student Networking Reception

Sunday, May 21

New STLE members and students are welcomed to come for an evening of networking and great food and to build friendships and expand your professional connections. This event is for new members and students only.

Opening General Session

Monday, May 22

STLE honors its esteemed journal publishing award recipients during the Monday General Session program. You'll also hear a keynote presentation from a world-renowned thought leader, addressing the latest innovations and emerging technologies impacting the tribology and lubricants industry.

Tribology STEM Camp

Monday, May 22

During STLE's 2023 Annual Meeting, the Society is hosting area middle- and high school-aged students for its annual Tribology STEM Camp. Students will have the opportunity to see demonstrations and participate in hands-on experiments, led by engineers and scientists, to learn about areas of research within the fields of tribology and lubrication engineering. The goal of the camp is to expose students interested in STEM (science, technology, engineering and mathematics) to careers in tribology and lubrication engineering.

Speakers Breakfast

Sunday through Thursday, May 21-25

Lead authors and education course presenters are invited to meet with Session and Paper Solicitation Chairs for a continental breakfast at 7:00 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.

Networking Reception

Monday, May 22

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.

Exhibitor Appreciation Hour

Back by popular demand, two hours of dedicated exhibit time will occur at this year's show:

Monday, May 22 and **Tuesday, May 23** (3:00 pm-4:00 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.

President's Luncheon

Tuesday, May 23 | Ticketed Event

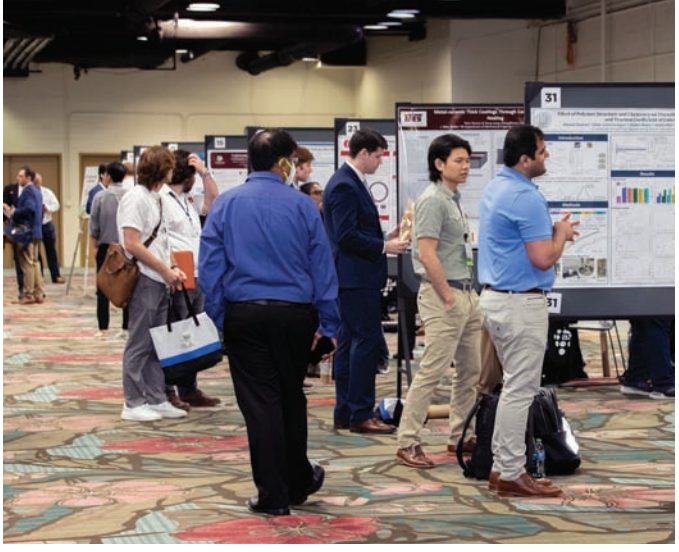
Ryan Evans

Hong Liang

The annual meeting's major business function draws virtually all attendees for a two-hour event honoring STLE's incoming and outgoing presidents, award winners and top volunteers. Come honor 2022-2023 President Ryan Evans with The Timken Company and 2023-2024 President Hong Liang with Texas A&M University. 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 onsite at the STLE Registration Desk.

STLE is seeking sponsorships for the Keynote Session, Networking Reception, Speakers Breakfast, President's Luncheon, and Refreshment Breaks.

For more information, contact national sales manager Tracy Nicholas VanEe at (630) 922-3459, **emeraldcomminc@yahoo.com**.



2023 STLE Student and Early Career Poster Competition

STLE is seeking student and early career posters for the 2023 Annual Meeting & Exhibition in Long Beach, Calif. Event organizers are inviting students and early career professionals from all areas of tribology research to participate in a special session dedicated to student and early career posters. Posters must deal with an aspect of tribology research that can be translated into friction, wear, and lubrication. Poster research topics can be co-authored by faculty and other researchers. For student posters, 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 posters.

Please note students and early career professionals must be registered to attend the 2023 Annual Meeting to participate in the poster session.

Submission Criteria Requirements:

- Abstract submission deadline: March 10, 2023 (via **www.stle.org/annualmeeting**). Notification of acceptance will be sent out to students shortly after this date.
- The poster must present original work by the student during the 2022-2023 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 2022-2023 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 22, during lunch and the scheduled conference break that afternoon.

Award Categories: (*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 23.**

Questions about the poster session: Contact Merle Hedland at (630) 428-2133 (STLE Conference Office), or **email mhedland@stle.org**.

#STLE2023 Annual Meeting Exhibitors

More than 120 organizations are expected to display their newest products and services at the 2023 STLE Annual Meeting & Exhibition. Following is the list of exhibitors as of December 8. Visit **www.stle.org/annualmeeting** and see the Program Guide distributed on site in Long Beach for the most up-to-date list.

Acme-Hardesty Company
Advanced Chemical Concepts, Inc.
Applied Rigaku Technologies, Inc.
Barentz North America, LLC
Baron USA, LLC
Biosynthetic Technologies
Bruker
Cannon Instrument Company
Colonial Chemical, Inc.
DC Scientific
Eastman
Emery Oleochemicals
ENEOS USA, Inc.
Evonik Oil Additives USA, Inc.
FedChem/Federal Process
Formulaction, Inc.
Huntsman
Industrial Quimica Lasem S.A.U.
INEOS Oligomers
King Industries, Inc.
Koehler Instrument Company, Inc.
LANXESS Corporation
Münzing
Napoleon Engineering Services
Optimol Instruments Pruftechnik GmbH
Palmer Holland, Inc.
PCC Chemax, Inc.
Phoenix Tribology Ltd.
Pilot Chemical Company
Ravago Chemicals North America
Savant Labs
Sea-Land Chemical Company
SONGWON International – Americas, Inc.
Tannas Company & King Refrigeration
The Lubrizol Corporation
The Lubrizol Corporation and IMCD
Turbomachinery Laboratory
United Soybean Board
Univar Solutions
VBASE Oil Company
Xinxiang Richful Lube Additive Co., Ltd.

#STLE2023 Meeting Exhibition & Sponsorship Opportunities

Please note that all annual meeting events are in the Long Beach Convention Center.

Reserve Your Exhibit Space in Long Beach!

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.

Standard booth sizes are 10-by-10-foot plus six 20-by-20-foot super-sized booths (special package rates apply).

Booth Pricing Fees:

Standard 10 x 10 Booths:
$2,875 (STLE Corporate Members) | $3,275 (Non-Members)

Supersized 20 x 20 Booths:
$16,322 (STLE Corporate Members) | $16,722 (Non-Members)

STLE's exhibition features companies from the following product and service categories:

- Lubricant additives
- Metalworking fluids and additives
- Base oils
- Environmental protection re-refining
- Condition monitoring/testing analysis
- Industrial fluids
- Consulting services
- Equipment material supplies and services
- Lubrication management
- Synthetic lubricants

Commercial Marketing Forum

The Commercial Marketing Forum (CMF) is a series of 30-minute marketing sessions at STLE's 2023 Annual Meeting where participants 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 time slots are sold on a "first come, first serve" basis. Pricing for time slots to present is based on membership status and if you are exhibiting at the annual meeting.

Commercial Marketing Forum Pricing:

- $710 | STLE Corporate Exhibitors
- $850 | STLE Corporate Members
- $990 | STLE Individual Members
- $1,210 | Non-Members

SPONSORSHIPS

Annual Meeting sponsorships come in all shapes, sizes and prices and are designed to fit everyone's marketing budget.

If you are interested in gaining exposure and raising your company's profile in Long Beach (thereby reaching some 1,600 members of the lubricants industry), STLE offers several sponsorship opportunities, including:

Rhodium Level – $5,000 (plus material costs where applicable)

- Annual Meeting Confirmation **(sold)**
- Badge Lanyards **(sold)**
- Guest Room Keycards **(sold)**
- Keynote Session **(sold)**
- Registration Bags **(sold)**
- Wi-Fi Service

Palladium Level – $4,000 (plus material costs where applicable)

- Annual Meeting Mobile App **(sold)**
- Directional Floor Signs **(sold)**
- Education Course Lunches **(sold)**
- Refreshment Breaks (Plus Water Stations)

Titanium Plus Level – $3,500

- Exhibitor Appreciation Hour Raffle **(sold)**
- Recharging Lounge
- Welcome Gift

Titanium Level – $3,000

- Education Course Materials **(sold)**
- President's Luncheon

Platinum Level – $2,000

- Speakers Breakfast Series

Multiple Sponsors Opportunities

- Monday Networking Reception

Sponsorships available at the following levels:

- Rhodium ($5,000)
- Palladium ($4,000)
- Titanium Plus ($3,500)
- Titanium ($3,000)
- Platinum ($2,000)
- Gold ($1,000)

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- Escalator Panels
- Leader Board

For more information about Annual Meeting exhibit booth reservations, CMF, and sponsorship opportunities, contact national sales manager Tracy Nicholas VanEe at (630) 922-3459, **emeraldcomminc@yahoo.com**.

Annual Meeting Sponsors

STLE wishes to thank the following sponsors for their generous support of the **77th STLE Annual Meeting & Exhibition,** May 21-25, 2023, at the Long Beach Convention Center, Long Beach, California. Updated signage with sponsors information will be included onsite in Long Beach. **Sponsors as of December 8, 2022.**

Rhodium: $5,000

Azelis L&MF US
Registration Bags

Ergon, Inc.
Badge Lanyards

Huntsman
Keynote Session

IMCD US
Annual Meeting Confirmation

The Lubrizol Corporation
Guest Room Keycards

Palladium Plus: $4,500

ANGUS Chemical Company
Directional Floor Signs

Palladium: $4,000

Palmer Holland, Inc.
Annual Meeting Mobile App

Shell
Education Course Lunches

Titanium Plus: $3,500

Evonik Oil Additives USA, Inc
Exhibitor Appreciation Hour Raffle

Titanium: $3,000

Cargill
Education Course Materials

#STLE2023 Trade Show Floor Plan

Please note that all annual meeting events are in the Long Beach Convention Center.

"The mixture of academia, technical professionals and people from the commercial side is the most dynamic I have seen in quite some time …"

Reserve your exhibit space in Long Beach, California!

2023 Exhibition Hours

Exhibit Setup Hours:

Sunday, May 21
12:00 pm – 5:00 pm

Monday, May 22
6:00 am – 11:00 am

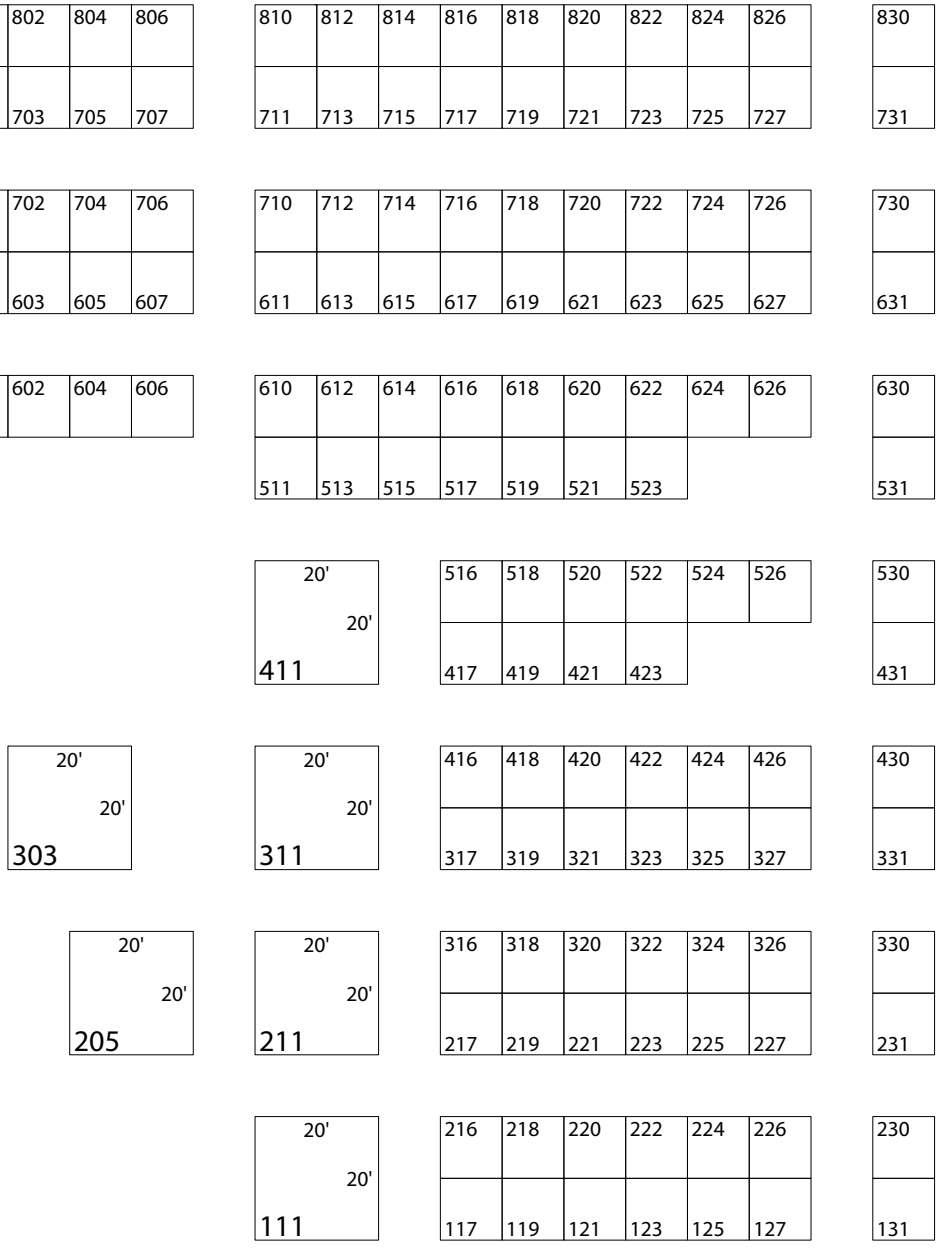
Exhibit Hours:

Monday, May 22
12:00 pm – 5:00 pm
Exhibitor Appreciation Hour
(3:00 pm – 4:00 pm)

Tuesday, May 23
9:30 am – 12:00 pm &
2:00 pm – 5:30 pm
Exhibitor Appreciation Hour
(3:00 pm – 4:00 pm)

Wednesday, May 24
9:30 am – 12:00 pm

To reserve your booth space at the 2023 Trade Show, contact Tracy Nicholas VanEe at 630-922-3459 or **emeraldcomminc@yahoo.com**.



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STLE is the premier technical organization representing lubrication professionals and tribology researchers. Professionals from industry, academia and government join STLE because they know no organization offers a more in-depth and complete look at the field of tribology. STLE provides the lubricant industry's highest level of technical training and professional development.

But the benefits of membership don't stop there.

STLE membership is a mark of distinction. It confers the seal of authority on you and your organization and affiliates you with the world's leading experts in lubrication.

You work in a technical world. You belong in a technical society. You belong in STLE.

Learn more about the benefits of STLE membership and how to join at **www.stle.org.**

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Notes

Notes


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throughout the year
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- ☑ Enhanced additive solubility
- ☑ Inherent biodegradability

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