



Advance Program

*Register by March 22
and save \$100!*



78th STLE Annual Meeting & Exhibition

May 19-23, 2024

Minneapolis Convention Center • Minneapolis, Minnesota (USA)



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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

Tribology & Lubrication Industry Get Ready for #STLE2024

Dear Industry Professional,

I can't tell you how excited I am for STLE's 78th Annual Meeting & Exhibition, May 19-23, 2024, at the Minneapolis Convention Center in Minneapolis, Minnesota. This promises to be one of our best meetings yet, as the STLE community comes together in one of the top convention cities in North America for the lubricant industry's premier technical and trade show event of the year!

STLE's Annual Meeting provides participants with a multifaceted program agenda featuring nearly 500 technical presentations and posters—with direct access to some of the world's leading industry experts and innovators covering all areas of tribology research and lubrication best practices—an opening keynote session, international exhibition, the popular Commercial Marketing Forum, networking and social activities and much more.

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 our Annual Meeting Program and Education Committees, working together with STLE staff and paper solicitation chairs (PSCs) representing STLE's 22 technical committees, have developed an excellent program that promises to deliver something for you and your company. To create greater flexibility for attendees, the 2024 Annual Meeting will feature 20 and 40-minute presentations that will be standardized each day across all sessions to help minimize programming conflicts.

In addition to the technical sessions, the STLE Annual Meeting offers the opportunity for career advancement and to further your technical knowledge. In Minneapolis, you can choose from 13 industry-specific education courses available on key subject areas from basic lubrication to metalworking fluids. This year, three

new courses are being offered on artificial intelligence (AI) and machine learning, auto/diesel, gasoline, hydrogen and ammonia, and an advanced-level electric vehicles program. Plus, individuals can earn continuing education credit toward renewal requirements of your STLE CLS, OMA and CMFS certifications. 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.

This year's trade show includes more than 100 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 Minneapolis Convention Center, only a few steps away from the technical sessions and education courses. Please make time in your schedule to connect with these companies to find cost-saving solutions that will help improve your company's bottom line.

Preliminary 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 or visit the conference website at www.stle.org/annualmeeting for the latest program updates.

I look forward to seeing you in Minneapolis!

Sincerely,

Ashlie



Ashlie Martini Ph.D.
University of California, Merced
2024 STLE Annual Meeting Program
Committee Chair

TIM & MADIE PHOTOGRAPHY • MEET MINNEAPOLIS



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 | **#STLE2024**

The 2024 Annual Meeting and Exhibition is sponsored by STLE.



LANE PELOVSKY • MEET MINNEAPOLIS • WWW.MINNEAPOLIS.ORG

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Welcome to Minneapolis

General Information & Policies

Conference Venue

Most events for STLE's 2024 Annual Meeting & Exhibition are being held in the **Minneapolis Convention Center**, 1301 2nd Ave. S, Minneapolis, Minnesota (USA) 55404. Phone: (612) 335-6000

Hotel Information

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

Hilton Minneapolis (Headquarters Hotel)

1001 S Marquette Ave.
Minneapolis, Minnesota (USA) 55403
(612) 376-1000

Hyatt Regency Minneapolis

1300 Nicollet Mall
Minneapolis, Minnesota (USA) 55403
(612) 370-1234

Millennium Hotel Minneapolis

1313 Nicollet Mall
Minneapolis, Minnesota (USA) 55403
(612) 332-6000

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 13,000 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.

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 and 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 21.

These photos will be used to promote the 79th STLE Annual Meeting & Exhibition at the Hyatt Regency Atlanta in Atlanta, Georgia (USA), May 18-22, 2025. 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.

Attendee Roster

The official attendee roster will be made available on the STLE website (www.stle.org/annualmeeting) in March 2024 prior to the annual meeting.

STLE Mobile App

Watch out for a new STLE mobile app to be released prior to the Annual Meeting in 2024.

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.**

2024 STLE Annual Meeting Registration Rates

Individual

	Early Bird by March 22 (Save \$100!)	After March 22
STLE Members	\$895	\$995
Speakers	\$895	\$995
Presenters	\$895	\$995
Non-members	\$1,300	\$1,400
Life Members	\$200	\$225
Student Members	\$125	\$125

Ala Carte Pricing

General Single Day Registration

STLE Members: \$400 (Before March 22) • \$595 (After March 22)

Non-members: \$585 (Before March 22) • \$780 (After March 22)

(Printed education course book \$25 additional fee)

Single STLE Education Course*

STLE Members: \$645 (Before March 22) • \$765 (After March 22)

Non-members \$825 (Before March 22) • \$945 (After March 22)

- AI Half-Day Education Course: \$230
- NLGI Grease Course: \$830
- ABMA Bearings Course: \$830

*Annual Meeting registration not required or included.

Cancellations

Requests must be received in writing at STLE’s headquarters no later than March 22, 2024, to receive refund less \$100 handling charge. **No refunds will be issued after March 22.**

Payment Method

STLE accepts US currency, check drawn from a US bank and major credit cards: Mastercard, Visa, American Express and Discover.

Onsite Registration

You may register onsite at the Minneapolis Convention Center, beginning at 12:00 pm on Saturday, May 18, 2024. The STLE registration desk is open daily thereafter through Thursday, May 23. Onsite registrants incur a \$100 surcharge. Advance registrants may pick up badges & registration materials at the registration desk during the following hours:

- **Saturday, May 18** – 12:00 pm – 5:00 pm
- **Sunday, May 19** – 6:30 am – 5:00 pm
- **Monday, May 20** – 6:30 am – 6:00 pm
- **Tuesday, May 21** – 6:30 am – 5:00 pm
- **Wednesday, May 22** – 6:30 am – 5:00 pm
- **Thursday, May 23** – 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 joining STLE and to access a membership application, log on to www.stle.org or call (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.

30+ COUNTRIES REPRESENTED

400 EDUCATION COURSE PARTICIPANTS

40 STUDENT POSTERS

500+ TECHNICAL PRESENTATIONS

1,600 INDUSTRY PROFESSIONALS

120 EXHIBITORS

40 COMMERCIAL MARKETING FORUM SESSIONS



78th STLE ANNUAL MEETING & EXHIBITION | **MAY 19-23, 2024**

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
- Technical training & education courses
- Explore latest new technologies
- Cutting-edge tribology research and lubrication best practices

“ 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 **#STLE2024** and stay up-to-date with the latest annual meeting programming information and much more!



Twitter | [@STLE_Tribology](https://twitter.com/STLE_Tribology)



Facebook | [Facebook.com/stle.org](https://www.facebook.com/stle.org)



Instagram | [@STLE_Tribology](https://www.instagram.com/STLE_Tribology)



LinkedIn | www.linkedin.com



Future Industry Meeting Dates

2024 STLE Tribology & Lubrication for E-Mobility Conference

Detroit Marriott at Renaissance Center • **October 22-25, 2024**, Detroit, Michigan (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)



Need a Visa? International attendees can request an invitation letter for the 2024 STLE Annual Meeting & Exhibition. For more information, contact Merle Hedland at (630) 428-2133, mhedland@bacon-hedland.com.

Housing & Room Reservations

Housing for the 2024 STLE Annual Meeting & Exhibition is at:



Hilton Minneapolis
(Headquarters Hotel)
1001 S Marquette Ave.
Minneapolis, Minnesota (USA) 55403
(612) 376-1000

The Hilton Minneapolis is located in downtown Minneapolis, connected via skyway to the Minneapolis Convention Center and just blocks away from the city's shopping, dining and entertainment attractions. The Hilton is a short drive from the Minneapolis-St. Paul International Airport, with convenient access to the light-rail transit system.

Hilton Hotel Amenities

- Complimentary in-room Wi-Fi
- Spacious guest rooms with refrigerator, laptop safe & 50-inch TV
- Complimentary 24-hour fitness center, indoor pool and sauna

Conference Rate:

- \$214 per night* (taxes not included)

Government Rate:

- \$148 per night* (based on availability – ID required at time of check-in)



Hyatt Regency Minneapolis
1300 Nicollet Mall
Minneapolis, Minnesota (USA) 55403
(612) 370-1234

The Hyatt Regency Minneapolis is located on Nicollet Mall in the heart of the downtown business district. The hotel provides spectacular views of the city skyline, connected via skyway to the Minneapolis Convention Center. The Hyatt is a short drive from the Minneapolis-St. Paul International Airport, with convenient access to the light-rail transit system.

Hyatt Regency Amenities

- Complimentary in-room Wi-Fi
- Refrigerator, 37-inch TV, laptop safe, coffee maker in each room
- Complimentary 24-hour fitness center and indoor pool

Conference Rate:

- \$215 per night* (taxes not included)

Government Rate:

- \$148 per night* (based on availability – ID required at time of check-in)



Millennium Hotel Minneapolis
1313 Nicollet Mall
Minneapolis, Minnesota (USA) 55403
(612) 332-6000

Situated along the tree-lined streets of Nicollet Mall, the Millennium Hotel Minneapolis is the closest full-service hotel to the Minneapolis Convention Center and is also moments away from the city's cultural districts. The Millennium Hotel offers 321 guest rooms and suites, combined with contemporary elegance with a residential feel featuring stunning views of downtown Minneapolis.

Millennium Amenities

- Restaurant, coffee house, cocktail bar
- Spacious guest rooms with refrigerator, laptop safe and flat-screen TVs
- Complimentary 24-hour fitness center, indoor pool, and sauna

Conference Rate:

- \$179 per night* (taxes not included)

Government Rate:

- \$148 per night* (based on availability – ID required at time of check-in)

Log on to www.stle.org/annualmeeting to access the hotel registration site to reserve your housing accommodations. **Room cancellation deadline is March 22, 2024. After March 22, cancellation fees will be assessed.** The cutoff date for room reservations is April 15, 2024. Housing is available on first come, first served basis, and STLE does not guarantee room availability after the April 15 room reservation deadline.

*Room rates are quoted exclusive of the applicable state and local taxes or applicable service, or hotel specific fees in effect at the Hilton, Hyatt, and Millennium 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.

All meeting events are in the Minneapolis Convention Center except for the Sunday evening New Member/Student Networking Reception and Monday evening Networking Reception at the Hilton Minneapolis, respectively.



2024 STLE Annual Meeting & Exhibition Registration Form

Minneapolis Convention Center | Minneapolis, Minnesota (USA) | **May 19-23, 2024**

Two Options to Register: Online at www.stle.org/annualmeeting or complete the form below.*

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: _____

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

Cancellation requests must be received in writing no later than **March 22, 2024**, to receive refund less than \$100 handling fee. **No refunds issued after that date.** Mail or fax this form to: STLE, 840 Busse Highway, Park Ridge, IL (USA) 60068, Fax: (847) 825-1456. **Questions?** Call (847) 825-5536.

Annual Meeting Registration Rates

Members/Speakers/Presenters: \$895 – Non-members: \$1,300

Life Members: \$200 – Student Members: \$125. After March 22 add \$100

STLE Education Courses: Discounted rate with full meeting registration (\$460 per course) – Lunch included. Machine Learning & AI half-day course (\$230). NLGI Grease course (\$830). ABMA Bearings course (\$830). Printed education course book (\$25 additional fee – no option for NLGI Grease course).

Sunday Education Courses, May 19, 2024

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

- Advanced Lubrication 301: Advanced Additives
- Basic Lubrication 103
- Bearings 101 (in partnership with ABMA)
- Electric Vehicles 101
- Grease 101 (in partnership with NLGI)
- Machine Learning and Artificial Intelligence in Tribology (Half-day course only!) **(NEW!)**
- Metalworking Fluids 105: Introduction to Metal Forming Fluids

Wednesday Education Courses, May 22, 2024

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

- Advanced Lubrication 302: Advanced Lubrication Regimes
- Auto/Diesel, Gasoline, Hydrogen and Ammonia **(NEW!)**
- Metalworking Fluids 240: Metalworking Fluid Formulation Concepts
- Sustainability: Biolubricants and Biofuels
- Synthetics: Basics & Applications

Thursday Education Course, May 23, 2024

- Electric Vehicles 202 **(NEW!)**

Social Functions (Please ✓ all that apply)

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

Ala Carte Offerings

- STLE Education Course and lunch only. Annual Meeting registration not required or included.
(Before March 22) **Members:** \$645 per course. **Non-members:** \$825 per course. (After March 22) **Members:** \$765 per course. **Non-members:** \$945 per course.
- Donate to STLE Scholarship & Investments for the Future Fund
\$25 _____ \$50 _____ \$100 _____ Other \$ _____

Single-Day Registration Admission

- (Before March 22) **Members:** \$400, **Non-members:** \$585
- (After March 22) **Members:** \$595, **Non-members:** \$780
- Monday, May 20 (Technical Sessions & Trade Show Only)
- Tuesday, May 21 (Technical Sessions & Trade Show Only)
- Wednesday, May 22 (Technical Sessions & Trade Show Only)
- Thursday, May 23 (Technical Sessions Only)

Payment Information

- Payment Enclosed Payment Type: _____

Credit Card #: _____

Exp. Date: _____

Name on Card: _____

Payment Amount: \$ _____ . _____

Signature: _____

WELCOME TO MINNEAPOLIS

Minneapolis is the largest city in the state of Minnesota that forms the “Twin Cities” with the neighboring state capital of St. Paul. Bisected by the Mississippi River, it’s known for its beautiful parks and lakes. Minneapolis is home to several Fortune 500 companies and many cultural landmarks such as the Walker Art Center, a contemporary art museum, and the adjacent Minneapolis Sculpture Garden, famed for Claes Oldenburg’s Spoonbridge and Cherry sculpture. The Minneapolis Skyway System, an interconnected climate-controlled system of footbridges throughout downtown, makes the restaurants, entertainment spots, shops, and sports centers all the more accessible.

Known as “The City of Lakes,” Minneapolis has 22 lakes located within city limits and many more in the surrounding area. In town, hordes of locals and tourists in-line skate or stroll around Lake Calhoun. Just outside of town, Fort Snelling State Park offers outdoor recreational activities from hiking to biking and golf to boating. Minneapolis offers lots for everyone to enjoy.

NOTABLE ATTRACTIONS: Minneapolis Sculpture Garden, Spoonbridge and Cherry, Weisman Art Museum, Mill City Museum, U.S. Bank Stadium, Paisley Park Studios, Walker Art Center, and Nicollet Mall.

For more information about Minneapolis, visit www.minneapolis.org.





GUTHRIE THEATER • COURTESY OF MEET MINNEAPOLIS



MILL CITY MUSEUM • COPPERSMITH PHOTOGRAPHY • MEET MINNEAPOLIS



NICOLLET MALL • COURTESY OF MEET MINNEAPOLIS



PAISLEY PARK • COURTESY OF NPG RECORDS & MEET MINNEAPOLIS



MINNEAPOLIS SCULPTURE GARDEN • KRIVIT PHOTOGRAPHY • COURTESY OF MEET MINNEAPOLIS



78th STLE ANNUAL MEETING & EXHIBITION | #STLE2024 Program-at-a-Glance

Saturday, May 18

12:00 pm – 6:00 pm
Onsite Registration

Sunday, May 19

6:30 am – 5:00 pm
Onsite Registration

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

Monday, May 20

6:30 am – 6:00 pm
Onsite Registration

7:00 am – 7:45 am
Speakers Breakfast

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

9:00 am – 2:00 pm
Tribology STEM Camp

Tuesday, May 21

6:30 am – 6:00 pm
Onsite Registration

7:00 am – 7:45 am
Speakers Breakfast

8:00 am – 12:00 pm
Technical Sessions and
Commercial Marketing Forum

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

10:00 am – 10:40 am
**Networking/Refreshment
Break**

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

Wednesday, May 22

6:30 am – 6:00 pm
Onsite Registration

7:00 am – 7:45 am
Speakers Breakfast

8:00 am – 12:00 pm
Technical Sessions and
Commercial Marketing Forum

8:00 am – 5:00 pm
Education Courses (pg. 45)*

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

10:00 am – 10:40 am
**Networking/Refreshment
Break**

12:00 pm – 1:40 pm
Lunch (on your own)

1:40 pm – 5:00 pm
Technical Sessions and
Commercial Marketing Forum

3:00 pm – 3:40 pm
**Networking/Refreshment
Break**

5:00 pm – 6:00 pm
Discussion Roundtables

Thursday, May 23

6:30 am – 12:00 pm
Onsite Registration

7:00 am – 7:45 am
Speakers Breakfast

8:00 am – 12:00 pm
Technical Sessions and
Commercial Marketing Forum

10:00 am – 10:40 am
**Networking/Refreshment
Break**

12:00 pm – 1:40 pm
Lunch (on your own)

1:40 pm – 5:00 pm
Technical Sessions

3:00 pm – 3:40 pm
Refreshment Break



8:00 am – 5:00 pm
Education Courses (pg. 45)*

6:30 pm – 8:00 pm
New Member & Student
Networking Reception (Hilton
Minneapolis)

10:00 am – 10:30 am
**Networking/Refreshment
Break**

10:30 am – 12:00 pm
Opening General Session –
Keynote Address:
“Tribology in the New
Space Economy,” (pg. 44)

12:00 pm – 1:40 pm
Lunch (on your own)

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

1:40 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 (Hilton
Minneapolis)

2:00 pm – 5:00 pm
Technical Sessions and
Commercial Marketing Forum

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

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



***Registration required**
Please note all technical
sessions and events will take
place in the Minneapolis
Convention Center unless
otherwise noted.

As of December 12, 2023

Technical Sessions and Commercial Marketing Forum Schedule

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

Monday, May 20

(8:00 am – 10:00 am)

- 1A • Tribochemistry I
- 1B • Tribotesting I
- 1C • Contact Mechanics I
- 1D • Synthetic Lubricants and Hydraulics I
- 1F • Nanotribology I
- 1G • Surface Engineering I
- 1I • Commercial Marketing Forum I
- 1M • Electric Vehicles I

(1:40 pm – 5:00 pm)

- 2A • Tribochemistry II
- 2B • Tribotesting II
- 2C • Contact Mechanics II
- 2D • Grease I
- 2F • Nanotribology II
- 2G • Surface Engineering II
- 2I • Commercial Marketing Forum II
- 2M • Electric Vehicles II

Tuesday, May 21

(8:00 am – 12:00 pm)

- 3A • Materials Tribology I
- 3B • Tribotesting III
- 3C • Lubrication Fundamentals I
- 3D • Grease II
- 3E • Biotribology I
- 3F • Nanotribology III
- 3I • Commercial Marketing Forum III
- 3M • Electric Vehicles III

(2:00 pm – 5:00 pm)

- 4A • Materials Tribology II
- 4C • Lubrication Fundamentals II
- 4D • Grease III
- 4E • Biotribology II
- 4F • Seals I
- 4I • Commercial Marketing Forum IV
- 4M • Electric Vehicles IV

Wednesday, May 22

(8:00 am – 12:00 pm)

- 5A • Materials Tribology III
- 5B • Condition Monitoring I
- 5C • Lubrication Fundamentals III
- 5D • Gears I
- 5E • Tribology of Biomaterials I
- 5F • Sustainable Power Generation I
- 5G • Fluid Film Bearings I
- 5I • Commercial Marketing Forum V
- 5M • Electric Vehicles V

(1:40 pm – 5:00 pm)

- 6A • Materials Tribology IV
- 6B • Condition Monitoring II
- 6C • Lubrication Fundamentals IV
- 6D • Rolling Element Bearings I
- 6E • Environmentally Friendly Fluids I
- 6F • Sustainable Power Generation II
- 6I • Commercial Marketing Forum VI
- 6M • Electric Vehicles VI

Thursday, May 23

(8:00 am – 12:00 pm)

- 7A • Materials Tribology V
- 7B • Condition Monitoring III
- 7C • Metalworking Fluids I
- 7D • Rolling Element Bearings II
- 7E • Environmentally Friendly Fluids II
- 7F • AI and Machine Learning I
- 7J • Nonferrous Metals I
- 7K • Wear I
- 7M • Electric Vehicles VII

(1:40 pm – 5:00 pm)

- 8C • Metalworking Fluids II
- 8D • Rolling Element Bearings III
- 8E • Environmentally Friendly Fluids III
- 8F • AI and Machine Learning II
- 8K • Wear II



The following is the preliminary 2024 STLE Annual Meeting technical program that will be updated right up until the meeting in Minneapolis. Please visit www.stle.org/annualmeeting for the latest program information. Registrants will also receive a Program Guide at the meeting with updated technical program schedule. Preliminary as of December 12, 2023 – Subject to change.

Monday, May 20, 2024

Session 1A TRIBOCHEMISTRY I

Session Chair: TBD

Session Vice Chair: TBD

8:00 am – 8:40 am

4002101: The Activation Volume in Tribocchemistry – What it Means and How to Calculate It

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

8:40 am – 9:00 am

3987831: Contact Mechanics Correction of Activation Volume in Mechanochemistry

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

9:00 am – 9:20 am

4000886: Molecular Dynamics Study of MAC Lubricants for Aerospace Applications

Daniel Miliate, Ashlie Martini, University of California-Merced, Merced, CA; Andrew Clough, Peter Frantz, Stephen. Didziulis, The Aerospace Corporation, El Segundo, CA

9:20 am – 9:40 am

4003869: The Effects of -H and -OH Termination on Adhesion of Si-Si Nanocontacts Examined Using Molecular Dynamics and Density Functional Theory

James Schall, North Carolina Agricultural and Technical State University, Greensboro, NC; Brian Morrow, Judith Harrison, United States Naval Academy, Annapolis, MD; Robert Carpick, University of Pennsylvania, Philadelphia, PA

9:40 am – 10:00 am

4006387: The Role of Shear Stress in ZDDP Tribofilm Formation at the Single Asperity Level

Kaisei Sato, Shinya Sasaki, Tokyo University of Science, Tokyo, Japan

10:00 am – 10:30 am – Break

Session 1B TRIBOTESTING I

Session Chair: TBD

Session Vice Chair: TBD

8:00 am – 8:40 am

3988407: Development of Within-Cycle Variable Slide-Roll Ratio Test Geometries

George Plint, James Morley, Phoenix Tribology Ltd., Kingsclere, Select, United Kingdom

8:40 am – 9:00 am

3988827: Development of a High-Stress Abrasion Test for Engineering Materials

Kenneth Budinski, Bud Labs, Rochester, NY

9:00 am – 9:20 am

3989113: Effect of Nitrogen-Rich Atmosphere on Fuel Lubricity Standards Using HFRR, BOCLE, and SLBOCLE

Caleb Matzke, Briana Segal, Nikhil Murthy, Stephen Berkebile, US Army DEVCOM Army Research Laboratory, Aberdeen Proving Ground, MD

9:20 am – 9:40 am

3991105: Viscosity Measurement In-Situ Under Pressure Using Ultrasound

Gladys Peretti, Rob Dwyer-Joyce, The Leonardo Centre for Tribology, The University of Sheffield, UK, Sheffield, United Kingdom; Nathalie Bouscharain, Fabrice Ville, INSA Lyon, CNRS, LaMCoS, Villeurbanne, France; Nicole Dörr, Markus Varga, AC2T research GmbH, Wiener Neustadt, Austria

9:40 am – 10:00 am

3998051: Experimental Analysis of Pasting of Brushed DC Motors

Roman Dzhaifarov, Daniel Braun, Stephan Diez, BMW AG, München, Germany

10:00 am – 10:30 am – Break

Session 1C CONTACT MECHANICS I

Session Chair: Daniel M. Mulvihill, University of Glasgow, Glasgow, Scotland, UK

Session Vice Chair: TBD

8:00 am – 8:40 am

4004711: A Semi-Analytical Transient Model of Elastohydrodynamic Mixed Lubrication Bearings Under Electrical Loads

Robert Jackson, Jack Janik, Auburn University, Auburn, AL; Sudip Saha, University of North Dakota, Grand Forks, ND

8:40 am – 9:00 am

4012275: Contact Electrification-Induced Electro-Adhesive Axisymmetric Contact Model

Yang Xu, Hefei University of Technology, Hefei, China

9:00 am – 9:20 am

4004997: Thermoelastic Contact Simulation with Reciprocating Motion and Worn Surfaces

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

9:20 am – 9:40 am

3987354: Inside Sliding Contact – Relationships Between Third Body Formation and Contact Waves

Mathieu Renouf, Alfredo Taboada, Université De Montpellier, Montpellier, France; Francesco Massi, Sapienza University, Rome, Italy

9:40 am – 10:00 am

4006032: An Investigation of Hertz Theory as Applied to Spinning, Bouncing Balls

Jeffrey Streator, Prairie View A&M University, Prairie View, TX

10:00 am – 10:30 am – Break

Session 1D SYNTHETICS AND HYDRAULICS I

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

Session Vice Chair: Paul Norris, Afton Chemical Ltd., UK, Bracknell, United Kingdom

8:00 am – 8:40 am

4000842: Hydraulic Fluid Performance Demonstrations According to ASTM D7721 – Energy Savings Validated with Shear-Stable, High-VI Technology

Ricardo Gomes, Frank-Olaf Maehling, Thilo Krapfl, Evonik Oil Additives, Darmstadt, Germany

8:40 am – 9:00 am

4002669: Zn-Free Strategies to Meet Bosch Rexroth Hydraulic Performance

Joshua Dickstein, Ryan Konrad, The Lubrizol Corporation, Wickliffe, OH

9:00 am – 9:20 am

3983883: Performance of Novel & Sustainable Synthetic Ester Base Oils with Hybrid Functionality

Martin Greaves, Jeff Dimaio, Ben Bergmann, Zach Hunt, VBASE Oil Company, Pendleton, SC

9:20 am – 9:40 am

3991059: Technical and Scientific Perspective from Using Polyglycol on a Composition of Compressor Lubricants

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

9:40 am – 10:00 am

3998770: Energy-Efficient Compressor Lubricants for Low-GWP Refrigerant Systems

Justin Kontra, Frank-Olaf Maehling Evonik Oil Additives, Horsham, PA; Xin Ding, Eckhard Groll, Davide Ziviani, Purdue University, West Lafayette, IN

10:00 am – 10:30 am – Break

Session 1F NANOTRIBOLOGY I

Session Chair: TBD

Session Vice Chair: TBD

8:00 am – 8:40 am

3997970: Revealing the Structure-Property Relationships of Amorphous Carbon Tribofilms on Platinum-Gold Nanocrystalline Alloys

Frank DelRio, Tomas Babuska, David Adams, Ping Lu, John Curry, Brad Boyce, Sandia National Laboratories, Albuquerque, NM; Filippo Mangolini, Camille Edwards, The University of Texas at Austin, Austin, TX; Jason Killgore, National Institute of Standards and Technology, Boulder, CO

8:40 am – 9:00 am

4006170: Atomistic Simulations of Chemomechanics at Electrified Interfaces

Aravind Krishnamoorthy, Texas A&M University, College Station, TX

9:00 am – 9:20 am

4001738: Chemical Absorption-Induced Hysteretic Friction Behavior of Supported Atomically Thin Nanofilm

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

9:20 am – 9:40 am

TBD

9:40 am – 10:00 am

TBD

10:00 am – 10:30 am – Break

Session 1G SURFACE ENGINEERING I

Session Chair: TBD

Session Vice Chair: Ali Beheshti, George Mason University, Sterling, VA

Session starts at 8:40 am

8:40 am – 9:00 am

4003937: Exploring the Tribological Behavior of Additively Manufactured Al-6061 Alloy for Space Applications

Pial Das, Sougata Roy, Iowa State University, Ames, IA; Matthew Mazurkivich, William Scott, Sara Rengifo, Marshall Space Flight Center NASA, Huntsville, AL

9:00 am – 9:20 am

4005694: Exploration of Spectrum Data from Non-Destructive Surface Roughness Measurement Techniques of Additively Manufactured Ti-6Al-4V

Robert Jackson, Loren Baugh, Samsul Arfin Mahmood, Kyle Schulze, Auburn University, Auburn, AL

9:20 am – 9:40 am

4043072: Physics-informed Machine Learning to Improve Manufactured Surfaces

Tevis Jacobs, Lars Pastewka, Surface Design Solutions, Pittsburgh, PA

9:40 am – 10:00 am

4004324: Ultrasonic Nanocrystal Surface Modification: State-of-the-Art and Tribological Properties

Auezhan Amanov, Tampere University, Tampere, Finland

10:00 am – 10:30 am – Break



Session 11 COMMERCIAL MARKETING FORUM I

Session Chair: TBD

8:00 am – 8:20 am

Available Presentation Slot

8:20 am – 8:40 am

Available Presentation Slot

8:40 am – 9:00 am

Available Presentation Slot

9:00 am – 9:20 am

Available Presentation Slot

9:20 am – 9:40 am

Colonial Chemical, Inc.

9:40 am – 10:00 am

LANXESS Corporation

10:00 am – 10:30 am – Break

Session 1M ELECTRIC VEHICLES I

Session Chair: TBD

Session Vice Chair: TBD

Session starts at 8:40 am

8:40 am – 9:00 am

4003758: Testing Approaches for Developing and Validating EV Fluids

Flavio Sarti, TotalEnergies, Solaize, France

9:00 am – 9:20 am

3990739: Development of Test Methods for Fluid Durability Study in Electrified Drivetrains

Cole Hudson, Southwest Research Institute, San Antonio, TX

9:20 am – 9:40 am

4004847: Oil Immersed Energized Copper Circuit Board Test Understanding

Hitesh Thaker, Scott Campbell, Infineum USA L.P., Linden, NJ

9:40 am – 10:00 am

4005529: Shaft Voltage Causes Bearing and Lubricant Degradation

Simon Hausner, Flucon, Barbis, Germany

10:00 am – 10:30 am – Break

Session 2A TRIBOCHEMISTRY II

Session Chair: TBD

Session Vice Chair: TBD

1:40 pm – 2:20 pm

3988134: Analytical Tribology with a High Resolution 6 Axes Tribometer

Julien Fontaine, Antoine Normant, Galipaud Jules, Frédéric Dubreuil, CNRS/Ecole Centrale de Lyon, Ecully Cedex, France

2:20 pm – 2:40 pm

4005299: Microscale Tribocchemistry of Diamond-Like Carbon Coatings

Brian Borovsky, Maureen Bowen, 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, State College, PA; Zhenbin Gong, Junyan Zhang, Lanzhou Institute of Chemical Physics, Lanzhou, China

2:40 pm – 3:00 pm

4003327: Selective Coating on Metal Surfaces with Friction-Assisted Electrodeposition

Yang Song, ChenXu Liu, Yonggang Meng, Tsinghua University, Beijing, China

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

4:00 pm – 4:20 pm

4001225: Friction and Wear Behavior of Gaseous and Volatile Fuels Using a Sealed Tribometer

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

4:20 pm – 4:40 pm

3981340: Chemical Compatibility of Metal Oxide Nanoparticles and Lubricant Co-Additives

Imène Lahouij, Adam Nassif, Zhengyuan Peng, Frédéric Georgi, Pierre Montmitonnet, MINES Paris PSL Research University, Sophia Antipolis, France

4:40 pm – 5:00 pm

4025582: The Effect of Lubricant Contamination with Water on Friction Modifiers Tribofilm Properties

Ajay Pratap Singh Lodhi, Ardian Morina, University of Leeds, Leeds, United Kingdom

Session 2B TRIBOTESTING II

Session Chair: TBD

Session Vice Chair: TBD

1:40 pm – 2:20 pm

3999049: Electrified Benchtop Tribology Grease Testing

Amani Byron, Ashlie Martini, University of California-Merced, Merced, CA; Tushar Khosla, Vishal Khosla, Rtec Instruments, San Jose, CA

2:20 pm – 2:40 pm

3999441: A Novel Approach for Tribological Evaluation of Textured Surfaces from Additive Manufacturing

Tobias Martin, Q. Jane Wang, Jian Cao, Northwestern University, Evanston, IL; Stephen Berkebile, US Army DEVCOM Army Research Laboratory, Aberdeen Proving Ground, MD

2:40 pm – 3:00 pm

4002066: Intelligent Lubrication – From Open-Loop to Closed-Loop

Min Yu, Imperial College London, London, United Kingdom

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

4:00 pm – 4:20 pm

4002289: Recent Advances in Design and Development of Tribotesting for Electric Vehicle Lubricants

Damien Yiyuan Khoo, Melinda Bullaro, Bruker Nano Inc., San Jose, CA

4:20 pm – 4:40 pm

4004486: Correlating Wear Performance with Lubricant Properties of Real Used Heavy-Duty Diesel Engine Oils

Thomas Kirkby, Mark Fowell, Tom Reddyhoff, Imperial College London, London, United Kingdom; Joshua Smith, Jacqueline Berryman, Infineum UK Ltd., Abingdon, United Kingdom; Claes Frennfelt, Patrick Holmes, Volvo Group Trucks Technology, Greensboro, NC

Session 2C CONTACT MECHANICS II

Session Chair: Shuangbiao Liu,
Northwestern University, Evanston, IL

Session Vice Chair: TBD

1:40 pm – 2:20 pm

4025271: Friction in Adhesive Contacts Between Hard Indenters and Soft Elastomers – Experiments and Simulations

Iakov Lyashenko, Valentin Popov, Berlin University of Technology, Berlin, Germany

2:20 pm – 2:40 pm

3981100: A Multiscale Modeling System for Simulating a Radial Pump Plunger to Observe and Improve Tribological Performance

Henry Soewardiman, Shuangbiao Liu, Yip-Wah Chung, Q. Jane Wang, Northwestern University, Evanston, IL; Nikhil Murthy, Stephen Berkebile, US Army DEVCOM Army Research Laboratory, Aberdeen Proving Ground, MD

2:40 pm – 3:00 pm

4011644: Design Improvement of Clearing Plate in a Biomass Comminution System through Contact Analysis

Lianshan Lin, James Keiser, Jun Qu, Oak Ridge National Laboratory, Oak Ridge, TN; Chris McKiernan, David Lanning, Forest Concepts, Auburn, WA

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

4:00 pm – 4:20 pm

3991076: Exploring the Mechanics of Triboelectric Nanogenerators via In-situ Experiments

Charchit Kumar, Gaurav Khandelwal, Elias Bokedal, Nikolaj Gadegaard, Daniel Mulvihill, University of Glasgow, Glasgow, United Kingdom

4:20 pm – 4:40 pm

4015264: Influence of Poroelasticity and Unloading Rates in Enhancement of Gel Adhesion

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

4:40 pm – 5:00 pm

4031878: On the Load Distribution Factors in a Radial Load Rolling Element Bearing

Mário Ricó, INPE, São José dos Campos, São Paulo, Brazil

Session 2D GREASE I

Session Chair: TBD

Session Vice Chair: TBD

1:40 pm – 2:20 pm

4005474: Recipes for Success – The Impact of Various Promoter Systems on Calcium Sulfonate Complex Grease Performance

Joseph Kaperick, Afton Chemical Corporation, Richmond, VA

2:20 pm – 2:40 pm

3986417: An Improved Model to Describe Oil-Separation Properties of Lubricating Greases

Femke Hogenberk, Dirk Van Den Ende, Matthijn de Rooij, University of Twente, Enschede, Overijssel, Netherlands; Piet Lugt, SKF Research and Technology Development, Houten, Netherlands

2:40 pm – 3:00 pm

3981847: Tribology and Grease Lubricated Ball Bearings

Piet Lugt, Sathwik Chatra K R, Nicola De Laurentis, SKF Research and Technology Development, Houten, Netherlands

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

4:00 pm – 4:20 pm

3983353: Controlling Micropitting on Wind Turbine Main Bearings

Marc Ingram, Thomas Baldwin, Ingram Tribology Ltd., Carmarthen, United Kingdom; Karl Petersen, Debottam Bose, Troels Moeller, Siemens Gamesa Renewable Energy A/S, Brande, Denmark

4:20 pm – 4:40 pm

3980531: Fast Screening of Wear Regimes in a Four Ball Setup

Lais Lopes, Dirk Drees, Pedro Baião, Falex Tribology, Rotselaar, Vlaams Brabant, Belgium

Session 2F NANOTRIBOLOGY II

Session Chair: TBD

Session Vice Chair: TBD

1:40 pm – 2:20 pm

4005864: Coatings Manufacturing Themselves – Formation, Interface Transfer, and Performance of Tribosintered Metal Oxide Coatings

Robert Carpick, Parker LaMascus, Nwachukwu Ibekwe, Daniel Delghandi, Andrew Jackson, University of Pennsylvania, Philadelphia, PA; Pranjal Nautiyal, Oklahoma State University, Stillwater, OK; Gordon Lee, ExxonMobil, Annandale, NJ; Tobias Gellen, Robert Wiacek, Pixelligent LLC, Baltimore, MD

2:20 pm – 2:40 pm

4029106: Surface Oxide Layers Dictate Interfacial Adhesion of Cold-Sprayed Bulk Metallic Glass Single Particles

Frank DelRio, Michael Kracum, Ping Lu, Ian Winter, Michael Chandross, Thomas Hardin, Sandia National Laboratories, Albuquerque, NM

2:40 pm – 3:00 pm

4004615: Observing and Modeling the Wear Process of Heterogeneous Interface

Xin Tang, Tianbao Ma, Tsinghua University, Beijing, China

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

4:00 pm – 4:20 pm

4001677: Nanolubricants for Increasing the Lifetime of Machine Elements and Cutting Tools for Machining Processes

Laura Pena-Paras, Demófilo Maldonado-Cortés, Martha Rodríguez-Villalobos, University of Monterrey, Nuevo Leon, San Pedro, Mexico

4:20 pm – 4:40 pm

4002106: Analytical Friction Models for Molecular Adsorbates

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



Session 2F (continued)

4:40 pm – 5:00 pm

3998763: Molecular Dynamics Analysis of Polymer Friction in Heterogeneous Surface

Hitoshi Washizu, Kazuki Ito, Masaki Hayama, Yudai Ogawa, Tomohiro Kinjo, University of Hyogo, Kobe, Hyogo, Japan; Yuji Higuchi, Kyushu University, Fukuoka, Japan

Session 2G SURFACE ENGINEERING II

Session Chair: TBD

Session Vice Chair: Ali Beheshti, George Mason University, Sterling, VA

1:40 pm – 2:00 pm

4003750: Enabling High-Performance Surface of Biodegrade WE43 Magnesium Alloys via Laser Shock Peening

Wenbo Wang, Oak Ridge National Laboratory, Knoxville, TN; Wenjun Cai, Virginia Tech, Blacksburg, VA

2:00 pm – 2:20 pm

4002591: Application of LST on Cutting inserts Used in CNC Machining of Aluminum Alloys to Increase Their Performance

Demófilo Maldonado-Cortés, Laura Pena-Paras, Renata Cruz Olace, Fabiola Alvarez del Bosque, Ana Paola Castillo Barraza, Universidad de Monterrey, San Pedro Garza Garc, Nuevo Leon, Mexico

2:20 pm – 2:40 pm

4004786: Understanding the Correlation Between Surface Topology and Lubrication Performances of Quasi-Random Nanostructure Surfaces by Using Deterministic Lubrication Models

Hongwei Zhang, Chicheng Ma, Chengjiao Yu, Hebei University of Technology, Tianjin, China; Shuangcheng Yu, Xingyi Metal Group, Haining, China

2:40 pm – 3:00 pm

4001578: A Novel Approach to Lubrication: Interactions Between Gadolinium-Doped DLC Coatings and Phosphorus-Based Ionic Liquids

Takeru Omiya, Albano Cavaleiro, Fabio Ferreira, University of Coimbra, Coimbra, Portugal; Filippo Mangolini, The University of Texas at Austin, Austin, TX

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

4:00 pm – 4:20 pm

3987454: The Influence of Geometry and Test Conditions on Lifetime and Endurance of Solid Film Lubricants – Testing Strategy and Data Production Method Enabling AI?

Lais Lopes, Pedro Baião, Dirk Drees, Falex Tribology, Rotselaar, Vlaams Brabant, Belgium; Nathan Pekoc, Everlube Products, Peachtree City, GA

4:20 pm – 4:40 pm

4004606: Structure and Friction Performance of Sulfonitro-carburizing Layer Prepared by Plasma Nitrocarburizing and Low Temperature Ion Sulfurizing

Zhehao Zhang, Tsinghua University, Beijing, China

4:40 pm

Surface Engineering Business Meeting

Session 2I COMMERCIAL MARKETING FORUM II

Session Chair: TBD

1:40 pm – 2:00 pm

Optimol Instruments Prüftechnik GmbH

2:00 pm – 2:20 pm

Monson Companies

2:20 pm – 2:40 pm

The Lubrizol Corporation

2:40 pm – 3:00 pm

Biosynthetic Technologies

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

4:00 pm – 4:20 pm

Advancion Corporation

Session 2M ELECTRIC VEHICLES II

Session Chair: TBD

Session Vice Chair: TBD

Session starts at 2:00 pm

2:00 pm – 2:20 pm

4004284: Development and Validation of Structure-Performance Ester Models for EV Fluids

Jared Nelson, Emery Oleochemicals LLC, Cincinnati, OH; Kevin Manouchehri, The Lubrizol Corporation, Wickliffe, OH

2:20 pm – 2:40 pm

4004397: Efficient Shear Stable Thickeners for the Heavy-Duty EV Market – Theory, Application, Proof

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

2:40 pm – 3:00 pm

3976801: Lubricant Requirements for Electrified Heavy-Duty Drivetrains

Torsten Murr, Shell Global Solutions Deutschland, Hamburg, Germany

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

4:00 pm – 4:20 pm

4004572: Ultrasonic Measurements of Electrode Degradation in Lithium-Ion Batteries

Daniel Williams, University of Sheffield, Sheffield, United Kingdom

4:20 pm – 4:40 pm

4004779: Thermal Conductivity Enhancement of EV Fluids by Carbon Nanotubes

Chanaka Kumara, Harshvardhan Singh, Wenbo Wang, Jun Qu, James Haynes, Hsin Wang, Oak Ridge National Laboratory, Oak Ridge, TN; Ning Ren, Jacob Bonta, Edward Murphy, Roger England, Valvoline Global Operations, Lexington, KY

4:40 pm – 5:00 pm

4004696: Beyond the Battery – A Holistic View of Thermal Management Fluids in BEVs

Gareth Brown, Lubrizol Ltd., Hazelwood, Derbyshire, United Kingdom

Tuesday, May 21, 2024

Session 3A

MATERIALS TRIBOLOGY I:

Tribute to Michael Dugger

Session Chair: John Curry, Sandia National Laboratories, Albuquerque, NM

Session Vice Chair: Kylie Van Meter, Florida State University, Tallahassee, FL

8:00 am – 8:40 am

4024752: Tuning the Friction Evolution and Aging Behavior of PVD MoS₂ Films

Michael Dugger, Tomas Babuska, John Curry, Alexander Mings, Steven Larson, Sandia National Laboratories, Albuquerque, NM

8:40 am – 9:20 am

Advances in Solid Lubrication for Space and Vacuum Applications

Christopher DellaCorte, The University of Akron, Akron, OH

9:20 am – 10:00 am

Mutual Interests in Metal Sulfide Solid Lubricants for Space and National Security Applications

Jeff Lince, Space Tribology Consulting, Inc., Culver City, CA

10:00 am – 10:40 am – Break

10:40 am – 11:20 am

In Situ Tribology of Solid Interfaces

Kathryn J. Wahl, Naval Research Laboratory, Arlington, VA

11:20 am – 11:40 am

4024754: A MoS₂ Composite Mystery – Uncovering Hidden Performance Traits

Tomas Babuska, Michael Dugger, Steven Larson, Alexander Mings, John Curry, Sandia National Laboratories, Albuquerque, NM

11:40 am – 12:00 pm

3999448: Effect of MoS₂ Coating Deposition Conditions on Water Sorption/Desorption via ToF-SIMS

Nicolas Molina Vergara, Andrei Dolocan, Filippo Mangolini, University of Texas at Austin, Austin, TX; John Curry, Michael Dugger, Tomas Babuska, Sandia National Laboratories, Albuquerque, NM

Session 3B

TRIBOTESTING III

Session Chair: TBD

Session Vice Chair: TBD

8:00 am – 8:40 am

4004801: Application of the Four-Ball EP Test as an FZG (A10/16.6R/90) Scuffing Screening Test with Reference Fluid Assessment

Kerry Cogen, Yanzhao Wang, Jannat Ahmed, Infineum USA LP, Linden, NJ

8:40 am – 9:00 am

4005000: Complete Mixing of Dilute Highly Viscous Samples for ICP Analysis

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

9:00 am – 9:20 am

4005068: Characterizing Tribofilms Formed on M50 and CR30 Bearing Steels

Daulton Isaac, Mathew Kirsch, Alexander Fletcher, Air Force Research Laboratory, Wright Patterson Air Force Base, OH; Justin Schuh, Elizabeth Craft, Ronald Zeszut, University of Dayton Research Institute, Dayton, OH

9:20 am – 9:40 am

4005119: Enhancing the Spacer Layer Imaging Method by Error-Correcting Colorimetry

Alexander MacLaren, Imperial College London, London, United Kingdom; Parker LaMascus, Robert Carpick, University of Pennsylvania, Philadelphia, PA

9:40 am – 10:00 am

4005128: Observation of Tribofilm Formation During Rolling Contact Fatigue Testing

Matthew Smeeth, PCS Instruments, London, United Kingdom; Marc Ingram, Ingram Tribology Ltd., Carmarthen, United Kingdom

10:00 am – 10:40 am – Break

10:40 am – 11:00 am

4005581: Analysis of Metals in Oils and Coolants with a Novel Nitrogen-Based Plasma Optical Emission Spectrometer

Mike Plantz, Eric Moen, Radom Corporation, Pewaukee, WI

11:00 am – 11:20 am

4014032: Fretting Testing – Challenges and Statistical Considerations

Melissa Mushrush, DuPont de Nemours Inc., Wilmington, DE

11:20 am – 11:40 am

3998708: What if Removing the Third Body Layer from a Dry Contact?

Simone Ciprari, Sapienza University of Rome – LaMCoS, INSA Lyon – Safran Landing Systems, Roma, Italy; Valentin Ripard, Safran Landing Systems, Villeurbanne, France; Aurélien Saulot, Univ. of Lyon, INSA Lyon, CNRS, LaMCoS, Villeurbanne, France; Francesco Massi, Sapienza University of Rome, Roma, Italy

11:40 am – 12:00 pm

4004549: Tribological Investigations Under Varying Pressure Atmospheres

Felix Zak, Gregor Patzer, Optimal Instruments Prüftechnik GmbH, Munich, Bavaria, Germany; Ameneh Schneider, Optimal Instruments, München, Germany

Session 3C

LUBRICATION FUNDAMENTALS I

Session Chair: TBD

Session Vice Chair: TBD

Session starts at 8:40 am

8:40 am – 9:00 am

4000333: Influence of Shear Stress and Pressure on the Mechanochemistry of ZDDP and ZDP

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

9:00 am – 9:20 am

4004698: Understanding the In-Situ Formation and Evolution of Phosphorus Antiwear Tribofilms with FFM and NanoIR-AFM

Kerry Cogen, Jannat Ahmed, Infineum USA LP, Linden, NJ; Matthew Flynn-Hepford, Arya Ahmadi, Mahshid Ahmadi, Olga Ovchinnikova, The University of Tennessee, Knoxville, Knoxville, TN



Session 3C (continued)

9:20 am – 9:40 am

4002804: Surface Competition of Lubricant Additives Impacting Antiwear Performance and Mitigation

Ashish Jha, Christophe Le Deore, Marco Mata Mendoza, Brendan Miller, Chevron Oronite, Richmond, CA

9:40 am – 10:00 am

3988349: New Polymeric Organic Friction Modifiers

Alina Filin, Ezio Amerio, John Dixon, Nouryon, Deventer, Netherlands

10:00 am – 10:40 am – Break

10:40 am – 11:00 am

4002795: Synergy of Additives Improving Engine Cleanliness Performance of Lubricant Oils

Allan Isenberg, Ashish Jha, Devin Wall, Matthieu Decaupere, Sandy Lemesle, Priyank Shah, Andrew Suen, Chevron Oronite, Richmond, CA

11:00 am – 11:20 am

4004620: Impact of Alcohol Branching on Lubricant Performance

David Racke, ExxonMobil, Annandale, NJ

11:20 am – 11:40 am

4001276: How Polymeric Additives Affect Lubricant Film Thickness

Janet Wong, Bastien Bolle, Imperial College London, London, United Kingdom; Mao Ueda, Shell Lubricants Japan, Kanagawa, Japan

11:40 am – 12:00 pm

3994940: PPD Selection Criteria for Evolving Market and Regulatory Trends

Durga Prasad Chalasani, Evonik Oil Additives, Horsham, PA

Session 3D

GREASE II

Session Chair: TBD

Session Vice Chair: TBD

8:00 am – 8:40 am

4001958: Dynamic Thixotropic Recovery of Lubricating Greases under Varied Recovery Conditions

Jacob Bonta, Valvoline Global Operations, Lexington, KY

8:40 am – 9:00 am

4004325: Characteristics of Hybrid Greases Blended with Nano Structure Urea Grease

Akihiro Shishikura, Idemitsu Kosan Co., Ltd., Ichihara, Chiba, Japan

9:00 am – 9:20 am

4004129: Comparative Analysis of Lithium and Urea Thickener Morphology and Implication for Grease Performance

Cindy Liu, Matthew Thorseth, Lauren Huffman, Pete Rozowski, Dow Chemical Company, Midland, MI; Jocelyn Zhao, Shell, Shanghai, China; Edward Worthington, Shell, Hamburg, Germany

9:20 am – 9:40 am

3985249: Probing the Effect of Different Type Base Oil on Microstructure, Rheological, and Tribological Properties of Polyurea Grease

Jiusheng Li, Jiabei Wang, Hengyi Lu, Shanghai Advanced Research Institute, Shanghai, China

9:40 am – 10:00 am

TBD

10:00 am – 10:40 am – Break

10:40 am – 11:00 am

4003024: Sub-Zero Temperature Friction and Film Stability of Lubricating Greases

Debdutt Patro, Amar Sheelwant, Sravan Josyula, Anshuman Dube, Ducom, Bangalore, India

11:00 am – 11:20 am

4004321: Methods to Measure Viscosity of Minute Volumes of Oil with Blotter Paper

Nicola De Laurentis, Piet Lugt, SKF Research and Technology Development, Houten, Netherlands; Laurine Yoe, University of Twente, Enschede, Netherlands

11:20 am – 11:40 am

4027387: On Grease Lubrication of Oscillating Rolling Bearings – Probing the Potential of Ionic Liquid Additives

Roman de la Presilla, Sergei Glavatskih, KTH Royal Institute of Tribology, Stockholm, Sweden; Johan Leckner, Axel Christiernsson Int. AB, Nol, Sweden

Session 3E

BIOTRIBOLOGY I

Session Chair: Meagan Elinski, Hope College, Holland, MI

Session Vice Chair: Max Marian, Pontificia Universidad Católica de Chile, Macul, Región Metropolitana, Chile; Quentin Allen, Brigham Young University, Provo, UT

8:00 – 8:40 am

INVITED TALK

4030037: The Science of Tribology in Medical Devices

Elizabeth Hippensteel, J&J MedTech, Warsaw, IN

8:40 am – 9:00 am

3976511: Rendering Contact Mechanical Stimuli for Texture Tactile Perception

Francesco Massi, Livia Felicetti, Sapienza University, Rome, Italy; Eric Chatelet, INSA Lyon, Villeurbanne, France

9:00 am – 9:20 am

4005538: Advancing Hemiarthroplasty – A Joint Motion-Simulating Biotribometer to Predict In Vivo Performance of Cartilage

Markus Wimmer, Amandine Impergre, Francesca De Vecchi, Rush University Medical Center, Chicago, IL; Olga Antipova, Argonne National Laboratory, Lemont, IL

9:20 am – 9:40 am

4001963: 2D Material-Enhanced Metal Matrix Composites – A Study on Their Mechanical and Tribological Properties for Biotribological Applications

Sangharatna Ramteke, Pontificia Universidad Catolica De Chile, Santiago, Chile; Max Marian, Pontificia Universidad Católica de Chile, Macul, Región Metropolitana, Chile

9:40 am – 10:00 am

4002174: MXene Nanosheets as Additives in Synovial Fluid

Max Marian, Pontificia Universidad Católica de Chile, Macul, Región Metropolitana, Chile; Cotty Quiroz Esteban, Andreas Rosenkranz, Universidad de Chile, Santiago, Chile

10:00 am – 10:40 am – Break

10:40 am – 11:00 am

4004290: Tribocorrosion Influence of PEEK in Metal on Polymer Joint Replacements – 3D Printed versus Conventional Manufacturing

Dilesh Raj Shrestha, Nazanin Emami, Lulea University of Technology, Lulea, Sweden; Rob Beadling, Richard Hall, Michael Bryant, University of Leeds, Leeds, United Kingdom

11:00 am – 11:20 am

4003663: Tribological Evaluations of Epoxy-Based Structlit™/UHMWPE Composite for Hip Implant Application as Acetabular Cup

Sujeet Sinha, Jaswant Hirwani, Indian Institute of Technology Delhi, New Delhi, Delhi, India

11:20 am – 11:40 am

4023547: Superlubricious Double-Network Hydrogels with Excellent Mechanical Properties Based on the In-suit Inhibition Strategy for Biomedical Application

Jian Song, Sun Yat-sen University, Shenzhen, Guangdong, China; Yuhong Liu, Tsinghua University, Beijing, China

Session 3F

NANOTRIBOLOGY III

Session Chair: TBD

Session Vice Chair: TBD

8:00 am – 8:40 am

4028860: Impact of Third Body on the Friction and Conductivity of Van Der Waals Interface

Ming Ma, Yuqing He, Tsinghua University, Beijing, China

8:40 am – 9:00 am

4001110: Clarifying Mechanism of Superlubricity of Solids

Bo Zhang, Saga Daigaku Riko Gakubu Daigakuin Kokagukei Kenkyuka, Saga-shi, Saga, Japan

9:00 am – 9:20 am

4002638: Nanotribological Study of MoS₂ Coatings Enhanced with Ti₃SiC₂ Nanoparticles

Robert Fleming, Morgan Diamond, Arkansas State University, Jonesboro, AR; Sujjan Ghosh, Nihal Ahmed, University of Arkansas-Little Rock, Little Rock, AR

9:20 am – 9:40 am

4004339: Interlayer Friction Behavior of Molybdenum Ditelluride with Different Structures

Lina Zhang, Tsinghua University, Beijing, China

9:40 am – 10:00 am

4006096: Single-Step Metal-Catalyzed Synthesis of Graphene – An Exploration of Tribological Behavior

Behnoosh Sattari Baboukani, University of California, Berkeley, Berkeley, CA; Zhijiang Ye, Miami University, Oxford, OH; Kyriakos Komvopoulos, University of California, Berkeley, Berkeley, CA

10:00 am – 10:40 am – Break

10:40 am – 11:20 am

INVITED TALK
2D Lubricant Materials

11:20 am – 12:40 pm

4004960: Nanotribology and Nanomechanical Factors Governing the Formation of Graphene Auto-Kirigami

Li Yuan, Jacob Goell, Cangyu Qu, Robert Carpick, University of Pennsylvania, Philadelphia, PA; Graham Cross, Trinity College Dublin, The University of Dublin, Dublin, Ireland

Session 3I

COMMERCIAL MARKETING FORUM III

Session Chair: TBD

8:00 am – 8:20 am

Available Presentation Slot

8:20 am – 8:40 am

Available Presentation Slot

8:40 am – 9:00 am

Available Presentation Slot

9:00 am – 9:20 am

The Lubrizol Corporation

9:20 am – 9:40 am

Münzing

9:40 am – 10:00 am

LANXESS Corporation

10:00 am – 10:40 am – Break

10:40 am – 11:00 am

Sasol Chemicals

11:00 am – 11:20 am

Falex Corporation



Session 3M

ELECTRIC VEHICLES III

Session Chair: TBD

Session Vice Chair: TBD

Session starts at 8:40 am

8:40 am – 9:00 am

3981183: SAPS-Free Bio-Based Additives for Lubrication in Next-Generation Vehicles

Xin He, Christelle Chretien, Solvay, Bristol, PA

9:00 am – 9:20 am

4001106: Improving Electric Vehicle Energy Efficiency Using the High-Performance Base Oil and the Film-Forming Friction Modifier

Moeka Okamura, Toshitaka Nakamura, Mari Iino, Akira Tada, Shingo Matsuki, ENEOS Corporation, Yokohama, Kanagawa, Japan

9:20 am – 9:40 am

4000942: Ester Base stocks for Electric Vehicle Drivetrains – Tailored Performance for Challenging Needs

Pieter Struelens, Oleon NV, Evergem, Belgium

9:40 am – 10:00 am

4003572: The Energy Efficiency Improvement Effect of Low Viscosity Engine Oil with MoDTC in a Large Displacement Engine

Kenji Yamamoto, Ryo Hanamura, Koichi Takano, Shinji Iino, Adeka Corporation, Tokyo, Japan

10:00 am – 10:40 am – Break

10:40 am – 11:00 am

4005324: High-Speed Air Entrainment Test Method Development for e-Fluids

Masahiro Ishikawa, Scott Campbell, Infineum USA, Linden, NJ

11:00 am – 11:20 am

4005447: Alternates to Fluorosilicone-Based Antifoams for Electric Vehicle Driveline Fluids Due to PFAS Regulations

Safia Peerzada, Münzing North America, LP Bloomfield, NJ

11:20 am – 11:40 am

3981837: Low Foaming/Aeration and Low Traction Coefficient Sustainable Synthetic Lubricant Solutions for High-Speed Electric Drivetrain Fluids

Philip Ma, Donna Mosher, Chad Steele, BASF, Tarrytown, NY

Session 4A

MATERIALS TRIBOLOGY II

Tribute to Michael Dugger

Session Chair: John Curry, Sandia National Laboratories, Albuquerque, NM

Session Vice Chair: Kylie Van Meter, Florida State University, Tallahassee, FL

2:00 pm – 2:40 pm

Frontiers Research on Solid Lubricants for Superlubricity

Ali Erdemir, Texas A&M University, College Station, TX

2:40 pm – 3:00 pm

4002627: Friction and Wear of Composite MXene/MoS₂ Coating Under Dry and Hydrocarbon-Lubricated Conditions

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

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

4:00 pm – 4:40 pm

3994581: Elucidating the Chemical and Structural Characteristics of Mechanocatalytically-Formed Carbonaceous Films on Platinum-Gold Surfaces

Filippo Mangolini, Camille Edwards, Hsu-Ming Lien, The University of Texas at Austin, Austin, TX; Tomas Babuska, John Curry, Frank DelRio, Michael Dugger, Sandia National Laboratories, Albuquerque, NM; Jason Killgore, National Institute of Standards and Technology, Boulder, CO

4:40 pm – 5:00 pm

4000873: Environment Dependence of MoS₂-Based Dry Film Lubricants

Samuel Leventini, Ashlie Martini, University of California-Merced, Merced, CA; Tysen Mulder, Brian Dykas, Scott Kihara, Blue Origin, LLC, Kent, WA

5:00 pm – 5:20 pm

3996626: Investigation of MoS₂-Coated NITINOL60 for Triboelements in Extreme Environments

Adam DeLong, Catherine Fidd, Thomas Lockhart, Brandon Krick, Florida State University, Tallahassee, FL; Tomas Babuska, John Curry, Steven Larson, Sandia National Laboratories, Albuquerque, NM; Christopher DellaCorte, The University of Akron, Akron, OH; Samuel Howard, NASA Glenn Research Center, Cleveland, OH; William Scott, Matthew Mazurkivich, Sara Rengifo, NASA Marshall Space Flight Center, Huntsville, AL

Session 4C

LUBRICATION FUNDAMENTALS II

Session Chair: TBD

Session Vice Chair: TBD

2:00 pm – 2:40 pm

4004463: Alternative Energy Carriers – Impact of Ammonia on Engine Oil Performance

Nicole Dörr, Adam Agocs, Charlotte Besser, AC2T research GmbH, Wiener Neustadt, Austria; Maria Rappo, Nicolas Obrecht, TotalEnergies, Courbevoie, France

2:40 pm – 3:00 pm

4004576: Oil Film Thickness of Two-Stroke Marine Diesel Engines at Different Operating Conditions

Oliver Spenceley, University of Sheffield, Leeds, United Kingdom

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

4:00 pm – 4:20 pm

3982139: Base Oil Properties Effect on Friction, Oil Film Thickness and Pressure Characteristics – Comparison to Multigrade Oils

Polychronis Dellis, National Technical University of Athens, Athens, Attiki, Greece

4:20 pm – 4:40 pm

3997421: The Impact of Biodiesel on Properties of Marine 4-Stroke Diesel Engine Oil

Jie Zhang, Richful Lube Additive Co., Ltd., Xinxiang, Henan, China

Session 4D GREASE III

Session Chair: TBD

Session Vice Chair: TBD

2:00 pm – 2:40 pm

3999326: Multiscale Approach for the Consideration of Limited Grease Availability in the Tribological Component Design

Cesar Pastor, Robert Bosch GmbH, Renningen, Germany

2:40 pm – 3:00 pm

4000256: Estimating Grease Degradation at the Inlet of a Cylindrical Roller Bearing Using CFD and Experimental Data from the Grease Worker

Robert Meijer, University of Twente, Enschede, Netherlands; Piet Lugt, SKF Research and Technology Development, Houten, Netherlands

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

4:00 pm – 4:20 pm

4001725: Influence of Processing on Polyurea Grease from Preformed Thickener

Cindy Liu, Lauren Huffman, Matthew Thorseth, Pete Rozowski, Dow Chemical Company, Midland, MI

4:20 pm – 4:40 pm

3998241: A Simple and Novel Method Determining the Suitability of a Grease Related to the White Etching Crack Phenomenon

Saba Mottaghi, Julian Wald, Tunap GmbH & Co. KG, Wolfratshausen, Bavaria, Germany

Session 4E BIOTRIBOLOGY II

Session Chair: Meagan Elinski, Hope College, Holland, MI

Session Vice Chair: Quentin Allen, Brigham Young University, Provo, UT; Max Marian, Pontificia Universidad Católica de Chile, Macul, Región Metropolitana, Chile

2:00 pm – 2:40 pm

4004279: Best Practices – Rheological and Tribological Testing of Soft Materials

Kartik Pondicherry, Paul Staudinger, Anton-Paar GmbH, Graz, Austria; Julius Heinrich, Anton Paar Germany, Ostfildern, Germany

2:40 pm – 3:00 pm

4004005: Sliding Induced Integration of Nanoparticles into Hydrogel Surfaces

Meagan Elinski, Connor Bovia, Griffin Gleeson, Brianna Couturier, Lauren Buckley, Morgan Platz, Hope College, Holland, MI

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

4:00 pm – 4:20 pm

4005448: Polyglycerol-Functionalized Nanodiamonds for Improved Lubrication of Artificial Joints in Simulated Body Fluid

Mohammad Eskandari, Asghar Shirani, Diana Berman, Ali Zayaan Macknoja, University of North Texas, Denton, TX

4:20 pm – 5:00 pm – Biotribology
Business Meeting

Session 4F SEALS I

Session Chair: Lassad Amami, CETIM, Nantes, France

Session Vice Chair: Jing Tang, Ultool, LLC, Duluth, GA

2:00 pm – 2:40 pm

4001211: Numerical Study of Textured Impulse Gas Seals

Noel Brunetière, Jean Bouyer, Institut Pprime, Futuroscope Chasseneuil Cedex, France; Andriy Zahorulko, Sumy State University, Sumy, Ukraine

2:40 pm – 3:00 pm

4003824: Experimental Test Rig to Investigate Gaseous Mixed Lubrication Regime

Oumaima Nakiri, Julian Le Rouzic, University of Poitiers, Chasseneuil du Poitou, France; Mihai Arghir, Université de Poitiers, Futuroscope Chasseneuil, France

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

4:00 pm – 4:20 pm

4004004: Topology Optimization for Low-Leakage and Low-Friction Surface Textured Face Seal

Iwa Ou, Eagle Industry Co., Ltd., Sakado-shi, Saitama-Ken, Japan; Kentaro Yaji, Osaka University, Suita, Osaka, Japan

4:20 pm – 4:40 pm

4012791: A Low-Leakage and Low- Drag Elastohydrodynamic Seal for Supercritical Carbon Dioxide Turbomachinery

Mohammad Fuad Hassan, Sevki Cesmeci, Mohammad Towhidul Islam, Ali Akbor Topu, Md Wasif Hasan, Jonah Henry, Joshua Bunting, Georgia Southern University, Statesboro, GA; Hanping Xu, Aaron Harcrow, Jing Tang, Ultool, LLC, Duluth, GA; Shuangbiao Liu, Northwestern University, Evanston, IL; David Dewis, Consultant, Bath, ME

4:40 pm – 5:00 pm

4018310: Optimal Design of Sealing Unit for Multi-Stage ROT (Radial Outflow Turbine) Considering Ratio of Tip Clearance

Yongbok Lee, Korea Institute of Science and Technology, Seoul, Republic of Korea; Yunseok Ha, Yeongdo Lee, University of Science and Technology, Seoul, Republic of Korea



Session 4I

COMMERCIAL MARKETING FORUM IV

Session Chair: TBD

2:00 pm – 2:20 pm

BASF Corporation

2:20 pm – 2:40 pm

VBASE Oil Company

2:40 pm – 3:00 pm

The Lubrizol Corporation

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

Session 4M

ELECTRIC VEHICLES IV

Session Chair: TBD

Session Vice Chair: TBD

2:00 pm – 2:20 pm

3997228: Electric Vehicle Drive System Exceptional Fluids

Anant Kolekar, Valvoline Global Operations, Lexington, KY

2:20 pm – 2:40 pm

4005300: Viscosity Dependence of Oil Churning Losses in an Electric Vehicle Gearbox at High Speeds

Alexander MacLaren, Amir Kadiric, Imperial College London, London, United Kingdom; Ning Ren, Valvoline Ltd., Lexington, KY

2:40 pm – 3:00 pm

4007600: Unraveling the Complex Tribochemistry of Lubricated Surfaces Under Electrified Sliding Conditions

Ali Erdemir, Pushkar Deshpande, Cagatay Yelkarasi, Seungjoo Lee, Texas A&M University, College Station, TX; Leonardo Farfan-Cabrera, Tecnologico de Monterrey, Monterrey, Nuevo Leon, Mexico

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

4:00 pm – 4:20 pm

4005532: Optimization of EV Drivetrain Efficiency Through Lubricant Selection

Amir Kadiric, Joseph Shore, Imperial College London, London, United Kingdom

4:20 pm – 4:40 pm

4015266: Simulation and Test-Based Methodologies for EDU Fluids Development

Thomas Wellmann, Jonathan Palmer, Kiran Govindswamy, FEV, Auburn Hills, MI

4:40 pm – 5:00 pm

4005366: Electrified Rheology and Elastohydrodynamic Lubrication (EHL) Behavior of Graphene-Based Low Viscosity Lubricants for EV Application

Leonardo Farfan-Cabrera, Tecnologico de Monterrey, Monterrey, Mexico; Peter Lee, Carlos Sanchez, Southwest Research Institute, San Antonio, TX; Ali Erdemir, Texas A&M University, College Station, TX

Wednesday, May 22, 2024

Session 5A

MATERIALS TRIBOLOGY III

Session Chair: TBD

Session Vice Chair: TBD

8:00 am – 8:40 am

3998720: Crystal Rotation Kinematics and the Activation of Different Twinning Systems Due to Tribological Loading

Christian Greiner, Karlsruhe Institute of Technology, Karlsruhe, Baden-Württemberg, Germany

8:40 am – 9:00 am

3981220: Synchrotron In-Situ Study of Scuffing Evolution

Cinta Lorenzo Martin, Dawid Bachnacki, Athena Butler-Christodoulou, Harvey Campos-Chavez, Oyelayo Ajayi, Argonne National Laboratory, Argonne, IL; Jun-Sang Park, Peter Kenesei, APS, Lemont, IL; Farida Koly, David Burris, University of Delaware, Newark, DE; Nikhil Murthy, Scott Walck, Stephen Berkebile, US Army DEVCOM Army Research Laboratory, Aberdeen Proving Ground, MD

9:00 am – 9:20 am

3998829: Microstructure of Self-Mated Steels Before and After Severe Wear Due to Scuffing

Stephen Berkebile, Nikhil Murthy, Scott Walck, Dawid Bachnacki, US Army DEVCOM Army Research Laboratory, Aberdeen Proving Ground, MD; Cinta Lorenzo Martin, Oyelayo Ajayi, Argonne National Laboratory, Argonne, IL; Jun-Sang Park, Peter Kenesei, APS, Argonne National

Laboratory, Lemont, IL; Farida Koly, David Burris, University of Delaware, Newark, DE

9:20 am – 9:40 am

4002756: Experimental Investigations of Scuffing Initiation and Coatings for Scuffing Prevention

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

9:40 am – 10:00 am

4011602: High Temperature Tribology of Inconel Alloy B4C Reinforcement

Ana Maria Fuentes Caparros, Anton Paar TriTec, Corcelles-Cormondreche, Switzerland

10:00 am – 10:40 am – Break

10:40 am – 11:00 am

3985728: Deformation Mechanisms of Refractory Multi-Principal Element Alloys at Extreme Temperature

Morgan Jones, Irene Beyerlein, University of California, Santa Barbara, Santa Barbara, CA

11:00 am – 11:20 am

4004898: Thermal Modeling of Shear Localization and Stick-Slip in High-Speed Machining of Metals

Ravi Srivatsa Bindiganavile Narasimhan, Dinakar Sagapuram, Texas A&M University, College Station, TX

11:20 am – 11:40 am

3983882: Tribological Performance of MoS₂ Coating Enhanced by Ti₃AlC₂ MAX Phases

Sujan Ghosh, Nihal Ahmed, Joshua Manley, University of Arkansas, Little Rock, Little Rock, AR; Bo Shen, Wan Shou, University of Arkansas, Fayetteville, Fayetteville, AR

11:40 am – 12:00 pm

4003493: Achieving Superlubricity and High Adhesion Strength of Hydrogenated Amorphous Carbon Film with Al/Cr/Si-Doping

Quansheng Ma, Tsinghua University, Beijing, China

Session 5B

CONDITION MONITORING I

Session Chair: Alfredo Garcia, Luval SA, Santiago, Region Metropolitana, Chile

Session Vice Chair: Marc Yarlott, Veolia North America, Vancouver, WA

8:00 am – 8:40 am

4000850: Taking a Holistic Approach to Fluid Analysis

Randy Clark, POLARIS Laboratories®, Indianapolis, IN

8:40 am – 9:00 am

4000240: Oil Condition Monitoring Based on Diagnostic Evaluation Using an RGB Sensor

Takeshi Hiraoka, Takashi Honda, Makoto Miyajima, Noriko Ayame, Tadashi Oshio, Eneos Corporation, Yokohama, Japan

9:00 am – 9:20 am

3999491: Chemical Cleaners for Varnish Removal from Component Surfaces

Jose Morales, Ashlie Martini, University of California-Merced, Merced, CA; Zhen Zhou, Jason Bahora, Zefu Zhang, Nathan Knotts, Chevron Lubricants, Richmond, CA

9:20 am – 9:40 am

4005086: The Critical Role of Hydraulic Oil in Keeping System Clean

Lin Wang, James Hannon, ExxonMobil, Annandale, NJ

9:40 am – 10:00 am

4001416: Lubrication Condition Monitoring via Ultrasonic Reflection Technique

Pan Dou, Min Yu, Tom Reddyhoff, Imperial College London, London, United Kingdom

10:00 am – 10:40 am – Break

10:40 am – 11:00 am

3998352: Experimental Investigation of an In-Situ, Temperature-Based Lubrication Gap Height Determination for Plain Bearings

Thao Baszenski, Georg Jacobs, Tobias Gemmeke, Kevin Kauth, Karl-Heinz Kratz, Benjamin Lehmann, RWTH Aachen University, Aachen, Germany

11:00 am – 11:20 am

3988395: Sensors for Wind Turbine Main Sliding Bearings

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

11:20 am – 11:40 am

4006600: Predicting Friction and Analyzing Surface Wear Mechanisms in Sliding Contacts Using Acoustic Emission

Robert Gutierrez, Imperial College London, London, United Kingdom

11:40 am – 12:00 pm

4002576: Reactive, Preventive, Predictive, Corrective Maintenance, and a Proactive Plan – Where Does It All Fit?

Michael Holloway, SGS, Highland Village, TX

Session 5C

LUBRICATION FUNDAMENTALS III

Session Chair: TBD

Session Vice Chair: TBD

8:00 am – 8:40 am

4000339: Lubricant Inerting – A New Route to Sustainability

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

8:40 am – 9:00 am

3981034: Flows Around a Contacting Asperity Modeled in the Micro and Nanometer Scales

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

9:00 am – 9:20 am

3987063: Lubrication Using Hydrogen

Jie Zhang, Janet Wong, Hugh Spikes, Imperial College London, London, United Kingdom; Tushar Bera, Shell Global Solutions (US) Inc., Houston, TX

9:20 am – 9:40 am

3985385: The Fast Response Regulation Mechanism of Friction Coefficient Induced by Microvis -

osity in the Contact Region

Caixia Zhang, Lihui Wang, Beijing University of Technology, Beijing, China; Zhifeng Liu, Jilin University, Changchun, China

9:40 am – 10:00 am

3998464: Understanding the Growth Dynamics of Capillary Bridges for Enhanced Grease Lubrication

Vincent Siekman, Dirk Van Den Ende, Frieder Mugele, University of Twente, Enschede, Overijssel, Netherlands; Piet Lugt, SKF Research and Technology Development, Houten, Netherlands

10:00 am – 10:40 am – Break

10:40 am – 11:00 am

4001256: Controlling Friction with an Electric Field

Janet Wong, Yun Zhao, Hugh Spikes, Imperial College London, London, United Kingdom

11:00 am – 11:20 am

4004481: Ion-Specific Ice Provides a Facile Approach for Reducing Ice Friction

Chang Dong, Liran Ma, Tsinghua University, Beijing, China

Session 5D GEARS I

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

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

8:00 am – 8:40 am

4000448: Oxide Formation During Loss of Lubrication and the Effect on Friction

Aaron Isaacson, Todd Palmer, The Pennsylvania State University, University Park, PA

8:40 am – 9:00 am

3985183: Investigations on the Influence of Synthetic Lubricants on the Pitting Load-Carrying Capacity of Cylindrical Gears

Markus Brummer, Thomas Tobie, Karsten Stahl, Gear Research Center (FZG), Technical University of Munich (TUM), Garching near Munich, Germany; Johannes König, ZF Group, Friedrichshafen, Germany



Session 5D (continued)

9:00 am – 9:20 am

3998690: Optimization of Gear Oil Formulation for Achieving Energy Efficiency & Long Life

Kavita Rai, Chanakya Tripathi, Sumit Bhaskaran, Rahul Meshram, Ajay Harinarain, Mukul Maheshwari, Indian Oil Corporation Ltd., Faridabad, India

9:20 am – 9:40 am

4000249: Improving the Tribological and NVH Properties of Sintered Gears by Mechanochemical Surface Finishing

Boris Zhmud, Linus Everlid, David Chobany, Tribonex AB, Uppsala, Sweden

9:40 am – 10:00 am

4000269: The Behavior of Tribofilms Under Realistic Gearbox Conditions

Marc Ingram, Thomas Baldwin, Ingram Tribology Ltd., Carmarthen, United Kingdom

10:00 am – 10:40 am – Break

10:40 am – 11:00 am

4002020: The Importance of Multi-Metal Compatibility in Modern Industrial Gearboxes

Paul Norris, Andrew Gant, Helen Dyer, Afton Chemical Ltd., UK, Bracknell, United Kingdom

11:00 am – 11:20 am

4002476: Experimental Investigations on Spin Power Losses Generated in a Planetary Gear Set

Marie Winger, Fabrice Ville, INSA Lyon, Villeurbanne, France; Yann Marchesse, Christophe Changenet, ECAM LaSalle, Lyon, France; Patrice Gédin, Safran Transmission Systems, Colombes, France

11:20 am – 11:40 am

4002907: Varnish Detection in Gear Systems by Microscopy

Brandon Van Horn, POLARIS Laboratories®, Indianapolis, IN

11:40 am – 12:00 pm – Gears Business Meeting

Session 5E

TRIBOLOGY OF BIOMATERIALS I

Session Chair: TBD

Session Vice Chair: TBD

Session starts at 9:00 am

9:00 am – 9:20 am

4004743: Polyamide with Nanocellulose and Carbonaceous Reinforcements – Sustainable and Functional Tribomaterials

Lucas Kneissl, Roberts Joffe, Nazanin Emami, Luleå University of Technology, Luleå, Norrbotten, Sweden; Mitjan Kalin, University of Ljubljana, Ljubljana, Slovenia

9:20 am – 9:40 am

3998077: Instantaneous Frictional Behavior of Corn Stover Biomass Particles

Cinta Lorenzo Martin, Oyelayo Ajayi, George Fenske, Jacob Lasso Garifalis, Argonne National Laboratory, Argonne, IL; Jordan Klinger, Yidong Xia, INL, Idaho Falls, ID; Benjamin Davis, Ricardo Navar, Los Alamos National Laboratory, Los Alamos, NM

9:40 am – 10:00 am

4017800: Morphological Characteristics of Biomass Materials as Supercapacitors

Mrudul Velhal, Kailash Arole, Hong Liang, Siddhi Mehta, Texas A&M University, College Station, TX

10:00 am – 10:40 am – Break

10:40 am – 11:00 am

4005801: Rate-Dependent Detachment Dynamics from Gradient-Stiffness Hydrogels Using AFM Nano-Indentation

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

11:00 am – 11:20 am

3986778: Examining Stopper-Syringe Contact in Freeze-Thaw Cycling of Prefilled Syringes

Catherine Fidd, Kylie Van Meter, Adam DeLong, Santiago Lazarte, Grace Lin, Brandon Krick, Florida State University, Tallahassee, FL; Nestor Rodriguez, Ludovic Gil, William Leverd, Becton Dickinson, Le Pont-de-Claix, France

11:20 am – 11:40 am

4005726: Exploring Structure-Property Relationships in 3D-Printed Polymeric Biomaterials

Santiago Lazarte, Brandon Krick, Florida State University, Tallahassee, FL; John Tolbert, Diana Hammerstone, Juan Mendoza, Lesley Chow, Lehigh University, Bethlehem, PA; Tomas Babuska, Sandia National Laboratories, Albuquerque, NM

11:40 am – 12:00 pm

4004331: A Nature-Inspired Lubricant-Infused Surface for Drag Reduction Prepared Using Porous Polydimethylsiloxane

Xiao Sang, Liran Ma, Tsinghua University, Beijing, China

Session 5F

SUSTAINABLE POWER GENERATION I

Session Chair: Ramesh Navaratnam, Patech Fine Chemicals, Dublin, OH

Session Vice Chair: Manish Patel, ExxonMobil Chemical Company, Spring, TX

8:00 am – 8:40 am

3988918: Assessing the Potential for Improved Lubricants to Reduce Wind Operations and Maintenance Costs

Michael Blumenfeld, Kathy Cooper, ExxonMobil, Annandale, NJ; Aubryn Cooperman, Jon Keller, Matthew Prilliman, Shawn Sheng, Gabriel Zuckerman, National Renewable Energy Laboratory (NREL), Golden, CO

8:40 am – 9:00 am

4042610: Empowering the World's Lower Carbon Ambitions Through Metallocene Basestock Technology in Industrial Lubricant Solutions

Lindsey Bunting, ExxonMobil, Spring, TX

9:00 am – 9:20 am

3986294: Wind to Wheels – Efficiency of the All-Electric Powertrain

Rob Dwyer-Joyce, University of Sheffield, Sheffield, United Kingdom

9:20 am – 9:40 am

4002147: Foaming in Wind Turbine Gearboxes: Causes, Impacts and Treatment – Part III

Kurtis Hartlen, Imperial Oil, Brights Grove, Ontario, Canada; Marianne Rodgers, WEICan, Tignish, Prince Edward Island, Canada

9:40 am – 10:00 am

4001960: Screener Test Development for Wind Turbine Gearbox Journal Bearings

Andrew Gant, Paul Norris, Helen Dyer, Afton Chemical Ltd., UK, Bracknell, United Kingdom

10:00 am – 10:40 am – Break

Session 5G

FLUID FILM BEARINGS I

Session Chair: TBD

Session Vice Chair: TBD

8:00 am – 8:40 am

3975548: Elastohydrodynamic Lubrication Analysis of a Porous Misaligned Crankshaft Bearing Operating with Nanolubricants

Benyebka Bou-Saïd, INSA Lyon, Villeurbanne, France; Mustapha Lahmar, Reda Hamel, Guelma University, Guelma, Algeria

8:40 am – 9:00 am

3984268: Performance of Orifice Compensated Hole-Entry Hybrid Spherical Thrust Bearing Operating with ER Lubricant

Satish Sharma, Nitin Agrawal, Indian Institute of Technology, Roorkee, Roorkee, India

9:00 am – 9:20 am

3985494: Exploring the Impact of Non-Newtonian Oils on Refrigerator Compressor's Journal Bearing – A Thermo-Hydrodynamic Investigation

Mateus da Silva Cardoso, Diego Berti Salvaro, Aloisio Nelmo Klein, Álvaro Toubes Prata, Cristiano Binder, Universidade Federal de Santa Catarina, Florianópolis, Brazil

9:20 am – 9:40 am

4005390: Comparison Between Prediction and Measurement of Start-Up Torque Reduction by Hydrostatic Lift Recess in Tilting Pad Journal Bearings

Hiroki Hatori, Wei Li, Manish Thorat, Elliott Group, Jeannette, PA

9:40 am – 10:00 am

3979929: Cryogenic Hydrostatic Bearing Failure from Pneumatic Hammer Instability During Liquid Nitrogen Supply

Keun Ryu, Minsoo Wee, Hyunsung Jung, Kyuman Kim, Hanyang University, Seoul, Republic of Korea

10:00 am – 10:40 am – Break

10:40 am – 11:00 am

4003391: Performance of Submerged Hybrid Thrust Bearing Reflecting Thermal Effects in Cryogenic Fluid

Yunseok Ha, Yeongdo Lee, University of Science and Technology, Seoul, Republic of Korea; Yongbok Lee, Korea Institute of Science and Technology, Seoul, Republic of Korea

11:00 am – 11:20 am

4015302: Nonlinear Bump Foil Stiffness Model in Foil Bearings – Experimental Measurements, Analytical Models, and Stability Characteristics

Woongeon Lee, Ehiremen Ebebele, Daejong Kim, University of Texas at Arlington, Arlington, TX

11:20 am – 11:40 am

4016163: Performance Evaluation and Comparison of Hybrid Rigid and Hybrid Foil Thrust Bearings

Ehiremen Ebebele, Woongeon Lee, Daejong Kim, University of Texas at Arlington, Arlington, TX

11:40 am – 12:00 pm

4000272: A Triangle Based Finite Volume Approach Applied to the Analysis of a Hydrodynamic Bearing Operating with Two-Phase Lubricant

Mihai Arghir, Anthony Voitus, Universite de Poitiers, Futuroscope Chasseneuil, France

Session 5I

COMMERCIAL MARKETING FORUM V

Session Chair: TBD

8:00 am – 8:20 am

Available Presentation Slot

8:20 am – 8:40 am

Available Presentation Slot

8:40 am – 9:00 am

Available Presentation Slot

9:00 am – 9:40 am

Afton Chemical Corporation

Session 5M

ELECTRIC VEHICLES V

Session Chair: TBD

Session Vice Chair: TBD

Session starts at 8:40 am

8:40 am – 9:00 am

4002326: Combination Effects of Phosphate and Sulfur Additives on Anti-Wear/Anti-Pitting Properties and Tribofilm Formation in Rolling-Sliding Contacts

Yunah Jeung, Kaito Yoshioka, Kaisei Sato, Shinya Sasaki, Tokyo University of Science, Katsushika, Tokyo, Japan; Ryotaro Ohashi, Graduate School of Tokyo University of Science, Katsushika, Japan

9:00 am – 9:20 am

4002715: Molybdenum Compounds as Additives in Future PCMO and EV Applications: A Comparative Study

David Boudreau, Vanderbilt Chemicals LLC, Norwalk, CT

9:20 am – 9:40 am

4007266: Antiwear and Antifatigue Components for E-Fluids

Kevin Chase, Chevron Oronite, Richmond, CA

9:40 am – 10:00 am

4000841: Electric Vehicle Testing – Correlation of Benchtop and Rig Tests Using Ester Containing Fluids

Gareth Moody, Chris Clayson, David Gillespie, Cargill, Snaith, East Yorkshire, United Kingdom; Alexei Kurchan, Cargill Inc., Plainsboro, NJ

10:00 am – 10:40 am – Break



Session 5M (continued)

10:40 am – 11:00 am

3982292: How Can We Measure the Performance of Greases for Connectors? A Hands-On Tribo-Method

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

11:00 am – 11:20 am

4004008: Electrical, Mechanical, and Performance Properties of Electric Vehicle Motor Greases with Silver Nano-Particle Additives

Jack Janik, Sudip Saha, Samuel Bond, German Mills, Robert Jackson, Auburn University, Auburn, AL; Carlos Sanchez, Peter Lee, Southwest Research Institute, San Antonio, TX

11:20 am – 11:40 am

4004955: Advanced Rheo-Tribological Testing of Greases for Electric Vehicles

Paul Staudinger, Kartik Pondicherry, Anton Paar GmbH, Graz, Austria; Julius Heinrich, Anton Paar Germany GmbH, Ostfildern, Germany

Session 6A

MATERIALS TRIBOLOGY IV

Session Chair: TBD

Session Vice Chair: TBD

1:40 pm – 2:20 pm

4005662: Robust Superlubricity in Mo_2TiC_2 MXenes Facilitated by Tribocatalytic Reaction at the Sliding Interfaces

Anirudha Sumant, Sai Varun Sunkara, Yuzi Liu, Subramanian Sankaranarayanan, Argonne National Laboratory, Lemont, IL; Brian Wyatt, Babak Anasori, Purdue University, West Lafayette, IN; Andreas Rosenkranz, University of Chile, Santiago, Chile

2:20 pm – 2:40 pm

3976685: Room Temperature Sintering of TiO_2 Nanoparticles – Exploiting Friction to Manufacture Wear-Resistant Coatings

Pranjal Nautiyal, Oklahoma State University, Stillwater, OK; Michael Moriarty, Parker LaMascus, Andrew Jackson, Robert Carpick, University of Pennsylvania, Philadelphia, PA; Gordon Lee, ExxonMobil Technology and Engineering Company, Clinton, NJ; Robert Wiacek, Pixelligent Technologies, LLC, Baltimore, MD

2:40 pm – 3:00 pm

4000936: Novel Organic Friction Modifiers with Extended Performance Durability

Pieter Struelens, Oleon NV, Evergem, Belgium

3:00 pm – 3:40 pm – Break

3:40 pm – 4:00 pm

Presentation by Mark Sidebottom

4:00 pm – 4:20 pm

4005345: Influence of Polymer Morphology on the Ultralow Wear Behavior PTFE Composites

Kylie Van Meter, Victoria Yang, Brandon Krick, Florida State University, Tallahassee, FL; Christopher Junk, Lehigh University, Bethlehem, PA

4:20 pm – 4:40 pm

4004823: Tribological Performance of Experimentally Developed 3D Printed High-Performance Polymer Composites

Nayan Dhakal, Nazanin Emami, Luleå University of Technology, Luleå, Sweden; Cayetano Conesa, Ardian Morina, University of Leeds, Leeds, United Kingdom

4:40 pm – 5:00 pm

3982319: Investigating the Friction and Wear Properties of Polymer Laser Sintered Components

Kieran Nar, University of Sheffield, Sheffield, United Kingdom

Session 6B

CONDITION MONITORING II

Session Chair: Marc Yarlott, Veolia North America, Vancouver, WA

Session Vice Chair: Alfredo Garcia, Luval SA, Santiago, Region Metropolitana, Chile

1:40 pm – 2:20 pm

4002620: Comparing New ASTM Methods for FTIR Analysis of Fluid Condition

David Swanson, POLARIS Laboratories®, Indianapolis, IN

2:20 pm – 2:40 pm

3970806: Extended Lubricant Analysis using Nuclear Magnetic Resonance (NMR)

Christoph Rohbogner, OELCHECK GmbH, Brannenburg, Germany

2:40 pm – 3:00 pm

4002568: Oil, Fuel, and Coolant Analysis – How Each Can Dramatically Extend Equipment Life

Michael Holloway, SGS, Highland Village, TX

3:00 pm – 3:40 pm – Break

3:40 pm – 4:00 pm

4005269: Application of Electrochemical Impedance Spectroscopy (EIS) to Lubricating Oil Condition Monitoring

Tianshi Fang, Jing Ning, Ryan Manthiri, Krystal Henry, Oluwaseyi Ogunsola, Shell Global Solutions (US) Inc., Houston, TX; Rihard Pasaribu, Shell Downstream Services International, Rotterdam, Netherlands; Robert Mainwaring, Shell Global Solutions (UK), London, United Kingdom

4:00 pm – 4:20 pm

4004685: Combining Oil Analysis Tests to Identify the Root Cause of Machine Failures (ASTM D2982-7 (2013) and ASTM D5185)

Ross Master, Bureau Veritas, Suwanee, GA

4:20 pm – 4:40 pm

4025260: Quantifying Severity of Wear and Contamination with a Filtergram

Daniel Walsh, Ray Garvey, Ametek, Chelmsford, MA; Kubale Shamabanse, Bryan Johnson, Palo Verde Generating Station, Tonopah, AZ

4:40 pm – 5:00 pm – Condition Monitoring Business Meeting

Session 6C LUBRICATION FUNDAMENTALS IV

Session Chair: TBD

Session Vice Chair: TBD

1:40 pm – 2:20 pm

4027747: Stop Overheating (Killing) your Bearings with Poor Lubrication Practices

Allan Rienstra, Kaitlyn Dobie, SDT Ultrasound Solutions Inc., Cobourg, Ontario, Canada

2:20 pm – 2:40 pm

4004588: Development of a Lifetime Model for the Oxidation Stability of Lubricating Greases

Nicole Dörr, Christoph Schneidhofer, Michael Schandl, AC2T research GmbH, Wiener Neustadt, Austria

2:40 pm – 3:00 pm

3982906: Investigating the Oil Aeration Performance of Lubricants

Eliane Gendreau, Hayley Bunce, Robert Mainwaring, Sarah Matthews, Shell, London, United Kingdom

3:00 pm – 3:40 pm – Break

3:40 pm – 4:00 pm

4000688: Influence of a Transmission Oil Degradation on System-Level Behavior

Busra Duran, Jerome Cavoret, Fabrice Ville, David Philippon, INSA Lyon, Villeurbanne, France; Arnaud Ruellan, Frank Berens, SKF France, Saint-Cyr-sur-Loire, France

4:00 pm – 4:20 pm

3999444: The Evaluation of Ti₃C₂Tz MXene Nanofluid (as a Single Fluid) for Balanced Lubrication and Thermal Management

Kailash Arole, Mohsen Tajedini, Micah Green, Hong Liang, Texas A&M University, College Station, TX

Session 6D ROLLING ELEMENT BEARINGS I

Session Chair: TBD

Session Vice Chair: TBD

1:40 pm – 2:20 pm

3983543: Comparison of Fatigue Performance of Different Aerospace Rolling Element Bearing Materials

Nikhil Londhe, The Timken Company, North Canton, OH

2:20 pm – 2:40 pm

4005361: Effect of Operation Temperature & Lubrication Regime on Bearing RCF Life Using Computational Modeling Tool

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

2:40 pm – 3:00 pm

3988753: Prediction of Bearing Damage Beyond Rolling Contact Fatigue

Patrick Wingertzahn, Oliver Koch, RPTU Kaiserslautern-Landau, Kaiserslautern, Germany

3:00 pm – 3:40 pm – Break

3:40 pm – 4:00 pm

4001217: Influence of High Leads on the Fatigue Life Behavior of Rolling Bearings

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

4:00 pm – 4:20 pm

3986667: The Effect of Current and Lambda on White-Etch-Crack Failures

Nicholaos Demas, Cinta Lorenzo Martin, Aaron Greco, Robert Erck, Argonne National Laboratory, Argonne, IL; Ryan Luna, GE Vernova, Schenectady, NY

4:20 pm – 4:40 pm

3998427: Mechanistic Study of White Etching Area Development in Butterflies Through 3D Investigations of Roller Bearings

Mostafa El Laithy, Ling Wang, Terry Harvey, University of Southampton, Southampton, Hampshire, United Kingdom; Wolfram Kruhoeffer, Schaeffler Technologies AG & Co. KG, Herzogenaurach, Germany

4:40 pm – 5:00 pm

4000734: Particular WEC Triggers and Their Failure Risk – It's All a Question of How Long They Last

Daniel Merk, Wolfram Kruhoeffer, Jörg Franke, Jörg Loos, Schaeffler Technologies, Schweinfurt, Bavaria, Germany

Session 6E ENVIRONMENTALLY FRIENDLY FLUIDS I

Session Chair: John Fang, Chevron Products Company, Richmond, CA

Session Vice Chair: Selim Erhan, Process Oils, Inc., Trout Valley, IL

1:40 pm – 2:20 pm

4004294: How Ester Technology Contributes to Technical and Sustainability Targets

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

2:20 pm – 2:40 pm

3993873: A Brief History of Refrigeration Lubricants

Michael Costello, Lubrizol, Midland, MI

2:40 pm – 3:00 pm

4005350: Meeting Sustainability Standards in Industrial Lubricants using Specialty Additives

Stefanie Velez, Münzing Chemie GmbH, Bloomfield, NJ

3:00 pm – 3:40 pm – Break

3:40 pm – 4:00 pm

4003821: Exploring the Additive Compatibility and Tribological Behavior of Regular and High Oleic Soybean Oil

Piash Bhowmik, Hyunsuk Choi, Clement Tang, University of North Dakota, Grand Forks, ND; Brajendra Sharma, Majher Sarker, USDA/ARS/NEA/ERRC, Wyndmoor, PA; Sougata Roy, Iowa State University, Ames, IA

4:00 pm – 4:20 pm

4002887: Environmentally Friendly Base Oils from Upcycled Plastic Waste

Robert Kennedy, Ryan Hackler, Aeternal Upcycling, Chicago, IL



Session 6E (continued)

4:20 pm – 4:40 pm

4003733: Candidate Marine Turbine Lubricant Additives – Ionic Liquids with High Lubricity and Eco-Friendliness

Wenbo Wang, Huimin Luo, Louise Stevenson, Peijia Ku, Tom Geeza, Jun Qu, Oak Ridge National Laboratory, Oak Ridge, TN

4:40 pm – 5:00 pm

4005438: An Investigation of Film Formation and Pressure Viscosity Relation of Water-Based Lubricants in Elastohydrodynamic Contacts

Mushfiq Hasan, Marcus Björling, Roland Larsson, Luleå University of Technology, Luleå, Sweden

5:00 pm – 5:30 pm – Environmentally Friendly Fluids Business Meeting

Session 6F

SUSTAINABLE POWER GENERATION II

Session Chair: Elaine Hepley, Solana Consulting Services LLC, Indianapolis, IN

Session Vice Chair: Matthew Hobbs, EPT, Calgary, Alberta, Canada

1:40 pm – 2:20 pm

4002573: Effects of Tribology on CO₂ Emissions in the Use Phase of Products – Contributions of Tribology to Defossilization (3rd Study of the German Society for Tribology)

Vasileios Bakolas, Tim Hosenfeldt, Schaeffler Technologies AG & Co. KG, Herzogenaurach, Germany; Mathias Woydt, Matrilub, Berlin, Germany; Eberhard Bock, Freudenberg Sealing Technologies, Weinheim, Germany; Rolf Luther, FUCHS Lubricants, Mannheim, Germany; Christoph Wincierz, Evonik Operations GmbH, Darmstadt, Germany

2:20 pm – 2:40 pm

3986386: Evaluation of Experimentally Developed High-Performance Polymer Composites for Hydropower Bearings

Julian Somberg, Kim Berglund, Nazanin Emami, Luleå University of Technology, Luleå, Norrbotten, Sweden

2:40 pm – 3:00 pm

3998419: Tribological Characterization of Carbon Composites for High Temperature Gas-Cooled Pebble Bed Reactor

Tomas Grejtak, Wenbo Wang, James Keiser, Nidia Gallego, Jun Qu, Oak Ridge National Laboratory, Oak Ridge, TN

3:00 pm – 3:40 pm – Break

3:40 pm – 4:00 pm

4001699: Understanding the Biomass Fouling Process on the Screw Feeder for Pyrolysis Reactors

Jun Qu, Oak Ridge National Laboratory, Oak Ridge, TN

4:00 pm – 4:20 pm

4002597: Lubricant Chemistry Management: The Proactive Solution to Turbine Oil Problems

Matthew Hobbs, EPT, Calgary, Alberta, Canada

Session 6I

COMMERCIAL MARKETING FORUM VI

Session Chair: TBD

1:40 pm – 2:00 pm

Available Presentation Slot

2:00 – 2:20 pm

BASF

Session 6M

ELECTRIC VEHICLES VI

Session Chair: TBD

Session Vice Chair: TBD

1:40 pm – 2:00 pm

4005830: High-Speed E-Motor Bearings for Electric Vehicles

Jitesh Modi, Schaeffler Group USA, Troy, MI

2:00 pm – 2:20 pm

3982753: Plastic Thrust Washers Enable Space Savings, Efficiency in Electric Drive Units

Greg Poterala, Solvay Specialty Polymers, Commerce Township, MI

2:20 pm – 2:40 pm

4002984: Influence of Ionic Liquids as Lubricant Additives on Electrically-Induced Bearing Damage

Sudip Saha, University of North Dakota, Grand Forks, ND; Jack Janik, German Mills, Robert Jackson, Auburn University, Auburn, AL; Jun Qu, Oak Ridge National Laboratory, Oak Ridge, TN

2:40 pm – 3:00 pm

3990353: High-Speed FZG Test Implementation and Severity Investigation

Caroline Louis, Southwest Research Institute, San Antonio, TX

3:00 pm – 3:40 pm – Break

3:40 pm – 4:00 pm

3990426: Electrification Effects on Oxidation Performance and Corresponding Changes Dielectric Properties of Drivetrain Lubricants

Joshua Conner, Southwest Research Institute, San Antonio, TX

4:00 pm – 4:20 pm

4001995: Shear Stability and Thermal Performance Analysis of Engine Oils for Electric Vehicles

Deepak Veeregowda, Fabio Alemanno, Ducom Instruments, Groningen, Netherlands

4:20 pm – 4:40 pm

3993569: Evaluation of Operational Conditions on EDU Gearbox Aeration Levels

Cole Frazier, Southwest Research Institute, San Antonio, TX

4:40 pm – 5:00 pm

4004810: Dedicated e-Fluids for Energy Efficiency

Hitesh Thaker, Changlin Zhao, Infineum USA L.P., Linden, NJ

Thursday, May 23, 2024

Session 7A

MATERIALS TRIBOLOGY V

Session Chair: TBD

Session Vice Chair: TBD

8:00 am – 8:40 am

3998813: The Direct Effect and Slip Strengthening in Nanoscale Rate-and-State Friction

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

8:40 am – 9:00 am

4004755: Low Friction Achieved by Diamond-Like Carbon Sliding on Ice Surface

Yuan Liu, Tsinghua University, Beijing, China

9:00 am – 9:20 am

4004740: Critical Influence of Contact Temperature for Tribology in Polymer Contacts and Models to Quantify It

Mitjan Kalin, Tomaz Pozar, Shoaib Siddiqui, University of Ljubljana, Ljubljana, Slovenia

9:20 am – 9:40 am

4000606: Lubricious Yet Tough Fabric Composites at Cryogenic Temperature by Sulfonated Polyether-Ether-Ketone Reinforcement

Zidan Wang, Tsinghua University, Beijing, China

9:40 am – 10:00 am

4001239: PTFE Tribology at Low Temperatures

Janet Wong, Shouyi Yin, Ambrose Taylor, Imperial College London, London, United Kingdom

10:00 am – 10:40 am – Break

10:40 am – 11:00 am

4006736: Tribological Performances of PEEK Reinforced with Lamellar and Granular Particles

Karl Delbé, Jean Denape, France Chabert, École Nationale d'Ingénieurs de Tarbes, Tarbes Cedex, France; Marie Doumeng, BioTanah, Pau, France; Florentin Berthet, Institut Clément Ader, Albi, France; Olivier Marsan, CIRIMAT, Toulouse, France

11:00 am – 11:20 am

4003254: On the Tribology of PEEK-Based Composites

Surojit Gupta, University of North Dakota, Grand Forks, ND

11:20 am – 11:40 am

3984344: An Efficient Testing Strategy for Polymer Materials, Accelerating Data Production Towards AI?

Lais Lopes, Dirk Drees, Pedro Baião, Falex Tribology, Rotselaar, Vlaams Brabant, Belgium; Erik Schwartz, Sabic HPP, Bergen op Zoom, Netherlands

11:40 am – 12:00 pm

3977914: Determining the Rolling Resistance of Golf Balls

Kenneth Budinski, Bud Labs, Rochester, NY

Session 7B

CONDITION MONITORING III

Session Chair: Alfredo Garcia, Luval SA, Santiago, Region Metropolitana, Chile

Session Vice Chair: Marc Yarlott, Veolia North America, Vancouver, WA

8:00 am – 8:40 am

4002562: Oil Analysis Addresses Changes in Diesel Engine Design and New Lubricant Formulations

Michael Holloway, SGS, Highland Village, TX

8:40 am – 9:00 am

3988388: Non-Invasive Detection of Cracks in Bearing Steel Using Ultrasound

Gary Nicholas, William Gray, Rob Dwyer-Joyce, The University of Sheffield, Sheffield, United Kingdom; Marc Ingram, Ingram Tribology Ltd., Carmarthen, United Kingdom

9:00 am – 9:20 am

4004953: Innovative Approach for Evaluating Dispersancy in New Lubricating Oils

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

9:20 am – 9:40 am

4001287: Enhanced Water Separation from Hydrocarbon-Based Lubricating Oils with a Novel, Multilayered Hydrophobic, Hydrophilic Coalescer

John Duchowski, Christian Adam, Johannes Staudt, HYDAC FluidCareCenter GmbH, Sulzbach, Saar, Germany; Christian Mueller, HYDAC Technology Corporation, Bethlehem, PA

9:40 am – 10:00 am

4000883: Simplifying Condition Monitoring Starting with Fluid Analysis

Randy Clark, POLARIS Laboratories®, Indianapolis, IN

10:00 am – 10:40 am – Break

10:40 am – 11:00 am

4003902: Measurement of Wear Debris in Oil Released During Endurance Testing of Bearings and Gears

Kenji Matsumoto, Toyo Corporation, Koto-ku, Tokyo, Japan; Yuji Mihara, Tokyo City University, Setagata-ku, Tokyo, Japan

11:00 am – 11:20 am

3989000: Key Aspects of Training in Maintaining Quality in the Lubricant Supply Chain

Michael Roe, Lubricant Distribution Consulting & Auditing, Cypress, TX



Session 7C

METALWORKING FLUIDS I

Session Chair: Nicole Clarkson, Barentz North America LLC, Lisle, IL

Session Vice Chair: Stephanie Cole, Münzing North America, LP, Bloomfield, NJ

8:00 am – 8:40 am

3989978: The Role of Metalworking Fluid Microbicides in an Increasingly Restrictive Regulatory Environment

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

8:40 am – 9:00 am

3980496: The Added Value of Friction Measurements in the Pin & Vee Block Method

Lais Lopes, Dirk Drees, Pedro Baião, Falex Tribology, Rotselaar, Vlaams Brabant, Belgium

9:00 am – 9:20 am

3984273: Improving the Sustainability of Metal Cleaners with Ether Carboxylic Acid

Jan Nilles, Kao Chemicals GmbH, Emmerich am Rhein, Germany

9:20 am – 9:40 am

3987468: Sustainability Strategies from the Perspective of a Performance Additive Manufacturer

Michael Stapels, Kao Chemicals GmbH, Emmerich, Germany

9:40 am – 10:00 am

3987878: Petrolatum- and Sulfonate-Free Coatings for Long-Term Outdoor Corrosion Protection

Amelia Hadler, Christopher Kabb, David Nickerson, Maria Shepherd, Britt Minch, The Lubrizol Corporation, Wickliffe, OH

10:00 am – 10:40 am – Break

10:40 am – 11:00 am

3993724: Towards a More Realistic Approach to Ranking Lubricant Emulsions and Tool Metallurgies with ASTM D-3233A Pin & Vee Block Method

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

11:00 am – 11:20 am

3999427: Machining High-Alloyed and Stainless Steel without Chlorinated Paraffins

Wilhelm Rehbein, LANXESS Deutschland GmbH, Mannheim, Germany

11:20 am – 11:40 am

3998301: A Comparative Analysis in Metalworking Fluids

James Justice, John Deere, Moline, IL

11:40 am – 12:00 pm

3993483: Naturally Derived Surfactants for Multiple Uses in Metalworking Fluids

Garret Bryant, Lucas Moore, Jordan Taylor, Colonial Chemical, South Pittsburg, TN

Session 7D

ROLLING ELEMENT BEARINGS II

Session Chair: TBD

Session Vice Chair: TBD

8:00 am – 8:40 am

3985471: A Novel Multiphase CFD Model for Investigating the Flow Dynamics of Aerated Bubbles in Bearing Lubrication

Ujjawal Arya, Farshid Sadeghi, Purdue University, West Lafayette, IN

8:40 am – 9:00 am

4000809: Lubrication of Cylindrical Roller Bearing Cage Pockets in Oil Bath Environment

Saeed Aamer, Farshid Sadeghi, Purdue University, West Lafayette, IN

9:00 am – 9:20 am

3986614: In Situ Measurement of the Inlet Meniscus Position and Contact Starvation

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

9:20 am – 9:40 am

3989802: In Situ Measurement of EHL Film Temperature in Cylindrical Roller Thrust Bearings Using Thin-Film Sensors

Manjunath Manjunath, Patrick De baets, Dieter Fauconnier, Department of Electromechanical, Systems & Metal Engineering, Zwijnaarde, Gent, East Flanders, Belgium; Martin Rekowski, Marcel Plogmeyer, Fraunhofer Institute for Surface Engineering and Thin Films IST, Tribology and Sensor Technology, Braunschweig, Germany

9:40 am – 10:00 am

4000280: Study on the Tribological Properties of Rolling Bearing Under Lubrication with Diketone Lubricants

Shaonan Du, Chenhui Zhang, State Key Laboratory of Tribology in Advanced Equipment, Tsinghua University, Beijing, China

10:00 am – 10:40 am – Break

10:40 am – 11:00 am

4002987: Micropitting, Macropitting, and Scuffing Using Commercial Wind Turbine Greases

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

11:00 am – 11:20 am

4004386: Transfer Film Formation in Dry-Lubricated Rolling Contacts Based on Molybdenum

Dennis Konopka, Florian Pape, Gerhard Poll, Institute of Machine Design and Tribology, Garbsen, Lower Saxony, Germany

11:20 am – 11:40 am

4016219: High-Speed E-Motor Bearings for Electric Vehicles

Jitesh Modi, Schaeffler Group USA, Troy, MI

Session 7E

ENVIRONMENTALLY FRIENDLY FLUIDS II

Session Chair: Selim Erhan, Process Oils, Inc., Trout Valley, IL

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

8:00 am – 8:40 am

4024541: Environmentally Acceptable Lubricants – HEES versus HEPR

John Fang, Nathan Knotts, Chevron Products Company, Richmond, CA

8:40 am – 9:00 am

4004831: U.S. Soy – The Sustainable Solution for Lubricants

Ray Balee, Omni Tech International, Midland, MI

9:00 am – 9:20 am

4004976: Biobased Base Oils for Lubrication Fluids

Lloyd Nelson, Amanda Marquez, Kraton Chemical, Savannah, GA

9:20 am – 9:40 am

4005143: Soybean-Based Cutting-Fluid Lubricants and Emulsifiers

Jeff Cafmeyer, Daniel Garbark, Battelle Memorial Institute, Columbus, OH

9:40 am – 10:00 am

TBD

10:00 am – 10:40 am – Break

10:40 am – 11:00 am

4004954: Synthesis and Lubricant Properties of Isostearic and Isooleic-Based Biolubricants

Brajendra Sharma, Majher Sarker, Helen Ngo, Michael Powell, USDA/ARS/NEA/ERRC, Wyndmoor, PA

11:00 am – 11:20 am

4002699: Evaluation of the Interaction Between Biofuels and Lubricating Oils in Achieving IMO's GHG Reduction Goals

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

11:20 am – 11:40 am

4000930: Biobased Ionic Liquid for Conductive Lubricants

Pieter Struelens, Oleon NV, Evergem, Belgium

Session 7F

AI & MACHINE LEARNING I

Session Chair: Max Marian, Pontificia Universidad Católica de Chile, Macul, Región Metropolitana, Chile

Session Vice Chair: Nikolay Garabedian, Karlsruhe Institute of Technology, Karlsruhe, Germany

8:00 am – 8:40 am

4013926: From Empiricism to Strategy – Targeted Development of Hybrid Plastic-Based Tribological Materials by Combining an Interlocking Experimental Technique with Artificial Neural Networks.

Alois Schlarb, RPTU, Kaiserslautern, RPL, Germany

8:40 am – 9:00 am

3999074: Transparent Data-Driven Predictions for Formation and Friction of Tribo-Sintered Metal Oxide Antiwear Coatings

Parker LaMascus, Daniel Delghandi, Andrew Jackson, Robert Carpick, University of Pennsylvania, Philadelphia, PA; Marjeta Fusha, Lei Zhang, Robert Wiacek, Pixelligent Technologies, LLC, Baltimore, MD

9:00 am – 9:20 am

4002132: Unlocking the Potential of Ensemble Machine Learning in Tribology

Max Marian, Sangharatna Ramteke, Pontificia Universidad Católica de Chile, Macul, Región Metropolitana, Chile; Naveen Venkatesh S., Sugumaran Vaithyanathan, Vellore Institute of Technology, Chennai, India

9:20 am – 9:40 am

3979196: Machine Learning Assisted Condition Monitoring Using Acoustic Emission Technology on Rotating Mechanical Components

Nikhil Murthy, Vincent Coburn, Stephen Berkebile, US Army DEVCOM Army Research Laboratory, Aberdeen Proving Ground, MD; Reece Teramoto, Mathworks, Natick, MA

9:40 am – 10:00 am

3993265: Machine Learning Approach to Identify the Friction Characteristics Causing a Nonlinearity in a Dynamical System

Matthias Wangenheim, Sebastian Tatzko, Leibniz University of Hannover, Garbsen, Germany

10:00 am – 10:40 am – Break

10:40 am – 11:00 am

3980467: Gaussian Processes Regression: A Powerful Machine Learning Tool for Elastohydrodynamic Film Thickness Predictions

Wassim Habchi, Lebanese American University, Byblos, Lebanon

11:00 am – 11:20 am

4005195: Prediction of Slender-like Elastohydrodynamic Contacts by Machine Learning Methods

Max Marian, Pontificia Universidad Católica de Chile, Macul, Región Metropolitana, Chile; Marko Tomic, Thomas Lohner, Technical University of Munich, Garching, Bavaria, Germany

11:20 am – 11:40 am

4000228: Artificial Intelligence in Simulation and Model Generation

Hannes Grillenberger, Andrei Degtiarev, Schaeffler AG & Co. KG, Herzogenaurach, Germany

11:40 am – 12:00 pm

4004342: Grinding the Gears of Knowledge and End-to-End Framework for Tribological Data

Ilija T. Bagov, Christian Greiner, Nikolay Garabedian, Karlsruhe Institute of Technology, Karlsruhe, Germany



Session 7J

NONFERROUS METALS I

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

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

8:00 am – 8:40 am

3982448: Simulating Friction in Aluminum Hot Rolling Emulsions on the Lab Scale

Pablo Bakermans, Yao Lu, Bas Smeulders, Quaker Houghton, Uithoorn, Netherlands; Tom Oleksiak, Quaker Houghton, Oswego, IL

8:40 – 9:00 am

3985744: Hot Rolling Emulsions and the Importance of Antioxidant Additives

Bill Poynor, Kaiser Aluminum, Spokane Valley, WA; Annie King, Wayne Jenkins, Total Energies, Rockingham, NC

9:00 am – 9:20 am

4002029: How Metalworking Emulsions Evolve During Usage – The Effects of High Temperatures and Contamination

Ariane Viat, Constellium Technology Center, Voreppe Cedex, France

9:20 am – 9:40 am

4005002: Lubricity Additives for Fully Synthetic Nonferrous Formulations

Tiffany Meyers, Clariant, Mount Holly, NC

9:40 am – 10:00 am

4005225: The Effects of High Magnesium Metallic Debris on the Lubrication Fluid from Condition Monitoring Testing

Steven Wheeler, Kimberly Williams, TotalEnergies, Rockingham, NC

10:00 am – 10:40 am – Break

10:40 am – 11:00 am

4025237: Oxidation of Aluminum Hot Rolling Oils – A Case Study

Josef Leimhofer, AMAG rolling GmbH, Ranshofen, Austria

11:00 am – 11:20 am

3988984: New Polymeric Antiwear Additives for Nonferrous Metalworking Fluids

Lucas Luz, Solvay, Paulínia, São Paulo, Brazil

11:20 am – 11:40 am

4002579: Bio Source Oil for Aluminum Cold Rolling

Gautier Burette, TotalEnergies, Nanterre, France; Annie King, TotalEnergies, Linden, NJ

11:40 am – 12:00 pm

3987935: Phosphonate from used Cooking Oil as Biobased Lubricant

Grigor Bantchev, USDA-ARS, Peoria, IL

12:00 pm – 12:30 pm – Nonferrous Business Meeting

Session 7K

WEAR I

Session Chair: Xue Han, Cummins, Inc., Columbus, IN

Session Vice Chair: Kora Farokhzadeh, DSM Engineering Materials, San Jose, CA

8:00 am – 8:40 am

4002592: PQ versus FerroQ – Understanding In-Service Lubricant Ferrous Debris Quantification

David Swanson, POLARIS Laboratories®, Indianapolis, IN

8:40 am – 9:00 am

4025908: A Digital Twin Approach for Evaluating the Real-Time Impact of Ice Collision Loads on Wear Development in Ship's Stern Tube Bearings

Ahmed Saleh, Markus Gilges, Benjamin Lehmann, Georg Jacobs, MSE – Institut für Maschinenelemente und Systementwicklung, RWTH Aachen University, Aachen, Germany

9:00 am – 9:20 am

3976527: Measuring Wear the Right Way

Mark Malburg, Digital Metrology Solutions, Columbus, IN

9:20 am – 9:40 am

4004540: Utilizing Vibration Analysis for Friction Prediction and Scuffing Prevention

Jeng-Haur Horng, Jin-Long Lin, Thi-Na Ta, National Formosa University, Huwei, Yunlin, Taiwan

9:40 am – 10:00 am

4023248: Surface Integrity, Microstructural Evolution and High Temperature Fretting Wear of Wrought and Additively Manufactured Inconel 625 Superalloy

Ali Beheshti, Manisha Tripathy, George Mason University, Fairfax, VA; Lloyd Hackel, Curtiss Wright Surface Technology, Livermore, CA

10:00 am – 10:40 am – Break

10:40 am – 11:00 am

4005334: A Quantitative Study of the Galling Resistance of Superalloys Based on Nickel and Cobalt

Ramanathan Krishnamurthy, Paul Crook, Haynes International, Kokomo, IN

11:00 am – 11:20 am

4000829: Elevated Temperature Wear and Fatigue Cracking on the Contact Sliding of Mg AZ31B

Yan Wang, University of Queensland, Brisbane, Queensland, Australia; Liangchi Zhang, Ang Liu, Chuhan Wu, The University of New South Wales, Sydney, New South Wales, Australia

11:20 am – 11:40 am

3979656: Influence of White Etching Layer on Rail Surface to Rail Wear Behavior and Microstructural Transformations with an Attempt to Generate WEL with Laser Beams

Yue Yang, Roger Lewis, The University of Sheffield, Sheffield, United Kingdom; Klaus Six, Virtual Vehicle Research GmbH, Graz, Austria

11:40 am – 12:00 pm – Wear Business Meeting

Session 7M

ELECTRIC VEHICLES VII

Session Chair: TBD

Session Vice Chair: TBD

Session starts at 8:40 am

8:40 am – 9:00 am

4006626: Probing the Effect of Electric Fields on Behaviors of Lubricant Additives Confined between Surfaces at the Molecular Level

Zhaoran Zhu, James Ewen, Daniele Dini, Imperial College London, London, United Kingdom

Session 8C

METALWORKING FLUIDS II

Session Chair: Stephanie Cole, Münzing North America, LP, Bloomfield, NJ

Session Vice Chair: Nicole Clarkson, Barentz North America LLC, Lisle, IL

1:40 pm – 2:00 pm

4000605: Investigation of Tribological Properties of Metalworking Fluid Lubricity Additives on Different Metals

Yixing Philip Zhao, Quaker Houghton, Conshohocken, PA

2:00 pm – 2:20 pm

4002646: The Role of Polymers in Quenching Fluids

Jacob Scherger, Functional Products Inc., Macedonia, OH

2:20 pm – 2:40 pm

4002677: Mapping Extreme Pressure Additive Activation from Lathe Machining on High Strength Steel

Ryan Weber, Gabe Kirsch, Britt Minch, John Hogan, Jeanne Petko, Glenn Black, Johnnie Thomlison, The Lubrizol Corporation, Wickliffe, OH

2:40 pm – 3:00 pm

4002705: Boundary Lubricant Additive Multimetal Optimization for AISI 1018 Steel, Aluminum, and Copper Alloys Using Twist Compression Tests (TCTs) and DOE

Ted McClure, Alex Morgan, Sea-Land Chemical Company, Cleveland, OH

3:00 pm – 3:40 pm – Break

3:40 pm – 4:00 pm

4004809: Application of Multifunctional Polymeric System for MWFs

Hoon Kim, Zschimmer & Schwarz US, Gordon, GA

4:00 pm – 4:20 pm

4004910: MWF Formulations and Performance Testing Using Estolides

Marlon Lutz, Biosynthetic Technologies, Indianapolis, IN

4:20 pm – 4:40 pm

4014426: Overview on Tribometric Screening Methods for Forming and Metalworking

Ameneh Schneider, Optimol Instruments, München, Germany

4:40 pm – 5:00 pm

4005611: Increasing Metalworking Fluid Performance with Amino Alcohols and Alkanolamides

Kathleen Havelka, Andrew Schiffer, Maxwell Petit, Advancion Corporation, Buffalo Grove, IL

Session 8D

ROLLING ELEMENT BEARINGS III

Session Chair: TBD

Session Vice Chair: TBD

1:40 pm – 2:20 pm

4005653: Propagation of Surface-Initiated Fatigue Cracks and its Significance to Fatigue Life Predictions

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

2:20 pm – 2:40 pm

4000229: Automated Cage Optimization Using Machine Learning

Hannes Grillenberger, Schaeffler AG & Co., Herzogenaurach, Germany

2:40 pm – 3:00 pm

4002170: Bearing Rotor Housing System Modelling

Abbas Shafiee, Farshid Sadeghi, Purdue University, West Lafayette, IN; Matthew G. Wilmer, The Timken Company, North Canton, OH

3:00 pm – 3:40 pm – Break

3:40 pm – 4:00 pm

4003498: Effect of Cage Wear on Lifetime of Cryogenic Bearing Under Various Load Conditions

Yeongdo Lee, University of Science and Technology, Seoul, Republic of Korea; Yunseok Ha, Yongbok Lee, Korea Institute of Science and Technology, Seoul, Republic of Korea

4:00 pm – 4:20 pm

3980974: A Fast and Efficient Calculation Method for Pitch Bearing – Blade Assembly Subjected to External Loads

Rémy Duquesne, Daniel Nelias, Sébastien Morterolle, Contact and Structural Mechanics Laboratory (LaMCoS), Lyon, France

4:20 pm – 4:40 pm

4001192: Frictional Torque Investigations of Radially Preloaded Cylindrical Roller Bearings

Tom Wittek, Leibniz University Hannover, Garbsen, Germany

4:40 pm – 5:00 pm

4005450: Modeling Raw Material CO₂ Emissions to Reduce the Bearing Industry Carbon Footprint

Samantha Melnik, Bryan Allison, SKF Aeroengine, Falconer, NY; Paul Lynch, Penn State Behrend, Erie, PA

Session 8E

ENVIRONMENTALLY FRIENDLY FLUIDS III

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

Session Vice Chair: Selim Erhan, Process Oils, Inc., Trout Valley, IL

1:40 pm – 2:20 pm

3987440: Sustainable High-Performance Lubricants & Greases – Eliminating Hazards and Enhancing Performance Using New Technologies of Non-hazardous Antiwear and Antioxidant Additives

Gregoire Herve, NYCO, PARIS Cedex 08, France

Session 8E (continued)

2:20 pm – 2:40 pm

4026812: Lubricant Requirements for Low GWP Refrigerants in HVAC Applications

Wasim Akram, Morgan Leehey, Trane Technologies, Bloomington, MN

2:40 pm – 3:00 pm

4002561: Sustainable Sourcing and Traceable Mass Balance – Unveiling the Path to Environmentally Friendly Fluids

Elisa Swanson-Parbäck, Valentina Serra-Holm, Alisha Bloodworth, Dominic Petruccio, Perstorp AB, Malmö, Sweden, Sweden

3:00 pm – 3:40 pm – Break

3:40 pm – 4:00 pm

4000928: A Comparison of Life Cycle Assessments (LCA) for Different Types of Estolide Production

Travis Thompson, Biosynthetic Technologies, Indianapolis, IN

Session 8F

AI & MACHINE LEARNING II

Session Chair: Max Marian, Pontificia Universidad Católica de Chile, Macul, Región Metropolitana, Chile

Session Vice Chair: Nikolay Garabedian, Karlsruhe Institute of Technology, Karlsruhe, Germany

1:40 pm – 2:20 pm

4027551: Navigating the Micro -scopic World – Autonomous Measurements Powered by Machine Learning

Yongtao Liu, Rama Vasudevan, Maxim Ziatdinov, Oak Ridge National Laboratory, Oak Ridge, TN; Sergei Kalinin, The University of Tennessee, Knoxville, TN

2:20 pm – 2:40 pm

4000725: Integrating AI and Machine Learning with Oil Analysis Data

Jorge Alarcon, POLARIS Laboratories®, Indianapolis, IN

2:40 pm – 3:00 pm

4004369: Application of Machine Learning to Pour Point Prediction of Transesterified Bio-oils for Biolubricant Production

Guillermo Díez Valbuena, University of Oviedo, Gijón, Asturias, Spain

3:00 pm – 3:40 pm – Break

Session 8K

WEAR II

Session Chair: Kora Farokhzadeh, DSM Engineering Materials, San Jose, CA

Session Vice Chair: Xue Han, Cummins, Inc., Columbus, IN

1:40 pm – 2:00 pm

4002989: Tribological Properties of Lubricating Oils Derived from Plastic Wastes Under Electrified Conditions

Seungjoo Lee, Ali Erdemir, Texas A&M University, College Station, TX; Leonardo Farfan-Cabrera, Tecnológico de Monterrey, Monterrey, Nuevo Leon, Mexico

2:00 pm – 2:20 pm

4004031: Effect of High-Pressure Hydrogen Gas on the Friction and Wear of PTFE Composite

Kotaro Ishii, Hironori Shinmori, Yoshinori Sawae, Takehiro Morita, Kyushu University, Fukuoka, Japan; Hikaru Hashimoto, Ayako Aoyagi, Shigenobu Honda, NOK Corporation, Fujisawa, Kanagawa, Japan

2:20 pm – 2:40 pm

4004248: Effects of Trace Moisture on Tribo-Film Formation, Friction and Wear of CF-Filled PTFE in Hydrogen under High Contact Pressure Condition

Qian Chen, Takehiro Morita, Yoshinori Sawae, Kyushu University, Fukuoka, Japan; Kanao Fukuda, Universiti Teknologi Malaysia, Johor Bahru, Malaysia

2:40 pm – 3:00 pm

4004395: Effect of the Accelerated Cryogenic Ageing on Mechanical and Tribological Properties of PEEK and PI Composites

Maksim Nikonovich, Nazanin Emami, Luleå University of Technology, Luleå, Sweden; Amílcar Ramalho, University of Coimbra, Coimbra, Portugal

3:00 pm – 3:40 pm – Break

3:40 pm – 4:00 pm

4000684: Study on the Friction Temperature Field and Wear Characteristics of Polymer Materials

Wichun Xia, Tsinghua University, Beijing, China

4:00 pm – 4:20 pm

4000274: A Strategy to Enhance the Wear Resistance of PTFE/Kevlar Fabric Liner via Oil-Containing Microcapsules

Weitang Xiong, Tsinghua University, Beijing, China

4:20 pm – 4:40 pm

3998295: The Impact Corrosion Has on the Particle Wear Emissions Generated from Different Brake Rotor Material

Ishmael Ghouri, University of Leeds, Rochdale, United Kingdom

4:40 pm – 5:00 pm

4001910: The Multifunctional Properties of Amine-Neutralized Phosphate Esters Antiwear Additives

Ezio Amerio, Alina Filin, John Dixon, Nouryon, Deventer, Netherlands

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Oct. 23-25, 2024

**Detroit Marriott at
Renaissance Center
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2024 STLE Tribology & Lubrication for E-Mobility Conference

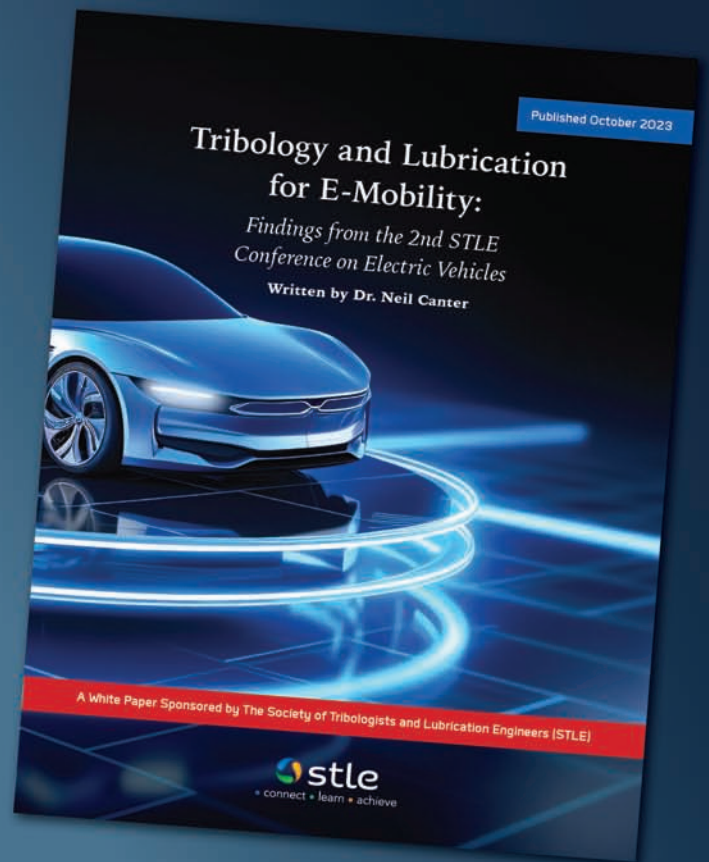
Oct. 23-25, 2024

STLE's Tribology & Lubrication for E-Mobility Conference explores the latest technical challenges and commercial opportunities that will impact the future of electric vehicle technology.

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 - Panel discussions on state-of-the-art developments in electric vehicle technology and lubrication
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To learn more about sponsorship opportunities, contact Tracy Nicholas VanEe at emeraldcomminc@yahoo.com, (847) 430-6767.



Tribology and Lubrication for E-Mobility: Findings from the 2nd STLE Conference on Electric Vehicles

This white paper summarizes the key findings and challenges discussed at the 2022 STLE Tribology & Lubrication for E-Mobility Conference held in San Antonio, Texas (USA), in November 2022, exploring the latest advancements and outlook for the electric vehicle market and technologies impacting the tribology and lubrication field.

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Tribology in the New Space Economy

In 2022, the number of objects launched into space exceeded the total quantity launched between 2000-2016. From today, the space economy is forecast to more than double by 2030, reaching up to \$1 trillion annually. For an industry that has historically been dominated by government funding, this renewed growth is increasingly driven by commercial investment and innovation.

A key feature of the newest generation of launch vehicles is reusability, enabling reductions in the cost of delivering payload to low earth orbit to under \$1000/lb. – a nearly order-of-magnitude reduction relative to previous generations of expendable launch vehicles. Reusability raises technical challenges in the design of propulsion, mechanical and structural systems, which must be designed for repeated exposure to launch and landing in seacoast and marine environments. This must be accompanied by order-of-magnitude longer lives than in expendable vehicles. At the same time, reductions in design cycle time and higher launch cadences allow for iterative approaches building on operational experience.

These trends offer renewed opportunities for tribology professionals to participate in the new space economy. Parallel hardware development and risk-based design approaches in the design of mechanical elements provide greater opportunity for hands-on learning and to reconsider previous design and technology constraints. Interdisciplinary and systems-based engineering approaches, long underpinning the field of tribology, are in critical need. From mega-constellations of communications satellites to lunar and low-earth-orbiting space stations – to crewed return to the lunar surface – this talk explores some of the opportunities for tribologists and suppliers in the growing space industry.



Brian Dykas currently leads experimental tribology for propulsion systems at Blue Origin. In this role, he works with design teams across all internal engine programs to identify technical risks and design solutions for tribological interfaces, mechanisms, seals and bearings. During his time at

Blue Origin, he has served in various roles, including leading the materials and processes review for human flight certification of the BE-3PM engine design for the New Shepard rocket.

Prior to joining Blue Origin, he spent over 10 years as an aerospace technologist and team leader at the US Army Research Laboratory (USARL) with a focus on aviation propulsion and power transmission research. While at the USARL, he was responsible for portfolio management for the Army's drivetrain and propulsion tribology research in collaboration with government, industry, academic, and international partners. He was selected for participation in the Engineer and Scientist Exchange Program at the Australian Defense Science and Technology Group in Melbourne, where he established collaborative research on aerospace and maritime propulsion diagnostics.

Brian earned a bachelor of science degree in aerospace engineering, as well as masters and doctorate degrees in mechanical engineering from Case Western Reserve University, respectively.



Opening General Session –
Keynote Address

Monday, May 20, 2024

10:30 am – 12:00 pm
Minneapolis Convention Center



#STLE2024 Education Courses

As of December 12, 2023

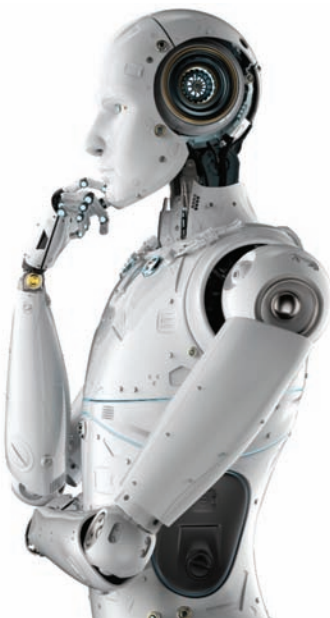


The largest and most useful meeting covering all aspects of tribology and lubrication engineering.”

The 2024 STLE Annual Meeting & Exhibition features 13 industry-specific education courses offered on Sunday, May 19, Wednesday, May 22, and Thursday, May 23. 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 by 5:00 pm). The half-day course runs from 1:00 pm – 4:00 pm. Fees for each course vary (see registration form on page 7 for additional information).

Please note digital and print copies of course books will be available for each course. Additional fees apply for printed course books. If you have questions regarding these courses, please contact Susan Luers, sluers@stle.org or 224-985-0015.

Visit www.stle.org/annualmeeting/edu to register and for the most up-to-date information, including list of course instructors.



Sunday, May 19

Machine Learning and Artificial Intelligence in Tribology (NEW!)

Please note this is a half-day course only.

This new course will include hands-on activities with the following curriculum: designing and organizing databases for use in tribology; orchestrating data for machine learning; the data pipeline in tribology; the use of physics-based machine learning – advancing fundamental understanding and simplifying the calculations of complex tribological systems; and application of machine learning/artificial intelligence to tribology (case studies).

Who should attend: Those in the industry who want to learn whether to use machine learning in their industry and how to accomplish this, and for tribology students wanting to learn how to incorporate into their research. The prerequisite for the course is an understanding of the basic principles of tribology, but a knowledge of MATLAB or Python programming would be useful.

Advanced Lubrication 301: Advanced Additives

Advanced Lubrication 301 covers the molecular structures and chemistries of lubricant additive types. Additives examined will include antioxidants, rust inhibitors, detergents, dispersants, antiwear additives, extreme pressure additives, friction modifiers, rheology and viscosity modifiers.

Who should attend: Engineers and scientists early/mid-career who want to brush up on their knowledge of lubricant additives. Lubricant additives provide

several performance functions in the engine, transmission, gear, and electric vehicle systems.



Basic Lubrication 103

Basic Lubrication 103 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. Thus, Basic Lubrication 103 is usually attended by a broad cross section of industry professionals such as technical, technical



#STLE2024 Education Courses

service, sales & marketing, maintenance, and managers who are involved in the industry. The course will focus on the fundamentals of lubrication associated with fluid and grease, as it applies to basic lubricated components such as gears and bearings. Also, the course includes a review of base stocks, synthetic lubricants and lab testing.

Who should attend: Lubricant Sales Personnel, Additive Sales, Lubricant/Additive Marketing, Lubricant Formulator or Manufacturer, Academia, Base Stock Sales or Manufacturer, Original Equipment Manufacturers (OEMs), Testing Equipment Manufacturers, Lubricant-Governing Associations.



Bearings 101 (in partnership with ABMA)

The American Bearing Manufacturers Association (ABMA) is offering this course on rolling element bearings for those involved in equipment design, reliability, and maintenance. It will include a basic overview of rolling bearing types, their selection, precision and mounting considerations, life prediction, and oil and grease lubrication related influences. The course also includes discussion of lubrication in linear type bearings and applications for mechatronic systems being developed and hands-on failure analysis session.

Who should attend: Engineers and scientists early/mid-career who want to brush up on their knowledge of equipment design, reliability, and maintenance of rolling element bearings.



Electric Vehicles 101

This course introduces hardware, tribology, lubrication, thermal management, and testing related to electric vehicles (EVs). 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: Students, engineers and scientists early/mid-career who are new to the electric vehicle industry or would like to brush up on fundamental knowledge of EV technologies and test methods.

Metalworking Fluids 105: Introduction to Metal Forming Fluids

Metalworking Fluids is designed for those involved in developing, working with, and using metal forming fluids in the manufacturing environment. Metalworking Fluids 105 is useful for formulators, technical service representatives, shop floor personnel and coolant service managers who need to know more about the fundamental concepts of metal forming fluids. This course is divided into modules covering metal forming operations, metal forming fluid chemistry, metal forming fluid mechanisms, controlling contamination and microbial growth, waste treatment and operator acceptance. By the end of the course, participants will have gained a good understanding of metal forming

operations, formulation of metal forming fluids, tools for identifying and correcting metal forming fluid failures and waste treatment of metal forming fluids.

Who should attend: Engineers, scientists, and other personnel early/mid-career involved in metal forming formulating, manufacturing, technical service, shop floor services, coolant service, sales, and marketing. Attendees can be from base oil suppliers, additive suppliers, independent lubricant manufacturers, academia, original equipment manufacturers (OEMs), and testing equipment manufacturers, or others with an interest in learning about the basics of metal forming processes and lubricants.

Grease 101 (in partnership with NLGI)

This course is a comprehensive overview of all aspects of lubricating grease. Grease formulation components are thoroughly covered, including base oils and different thickener types. Manufacturing technologies are reviewed, as well as grease testing significance and methods. Included is discussion detailing how to select the proper grease for different industrial and automotive applications and examples.

Who should attend: Engineers and scientists early/mid-career involved in lubricating grease sales and marketing, lubricating grease manufacturing, base oils or academia who want to brush up on their knowledge of lubricating greases. Users such as original equipment manufacturers (OEMs), grease testing equipment manufacturers and others with an interest in learning about the basics of lubricating greases.

Wednesday, May 22

**Advanced Lubrication 302:
Advanced Lubrication Regimes**

Advanced Lubrication 302 goes more in-depth on lubrication regimes, wear, and wear mechanisms, as well as lubricant failure analysis. This course includes a series of lubricant failure analysis case studies on automotive engines, gears, and bearings.

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.

**Auto/Diesel, Gasoline, Hydrogen
and Ammonia (NEW!)**

This course provides an overview of engine and drivetrain systems and lubrication requirements for internal combustion engines (Diesel, Gasoline, Hydrogen and Ammonia) and drivelines. The course will also look at engine oil qualification, fuel requirements and friction and wear testing of engine components.

Who should attend: Industry professionals working with internal combustion engines or formulating testing oils.



**Sustainability: Biolubricants and
Biofuels**

This course provides an overview of current progress in the development and use of biofuels and biolubricants. Course modules include an introduction to energy and alternative fuels, basic chemistry of biofuels and biolubes, general performance requirements, overview of market progress, niche markets, sustainability, and governmental and regulatory drivers. Products currently in various stages of commercialization will be discussed and information on European, US and OEM views will be included. The course primarily focuses on biolubricants, but includes a general overview of alternative transportation fuels, biofuel feedstocks, production, and quality issues.

Who should attend: Students, engineers, scientists early/mid-career, lubricant formulators.

**Metalworking Fluids 240:
Metalworking Fluid Formulation
Concepts**

This new course is in response to many students of our other MWF courses who asked for a course on how to formulate. Metalworking Fluids 240 begins with some universal formulating basics such as experimental design, order of additions for ingredients, and considerations when scaling up from beakers to large blending tanks. Also covered will be base stocks, performance additives, emulsifier selection, HLB, qualification tests, optimization for stability both in the drum and in use, bioresistance, microbicide selection and use, and recalcitrant functional additives. Instructors will then discuss formulating for disposability and for global distribution. A panel discussion with all instructors will complete the course. While several examples of formulations will be presented throughout the sessions, this course will not be providing specific ready-to-use commercial formulations.

Who should attend: Metalworking Fluid Formulators, MWF Compounders – Technical Service and Laboratory Personnel, Technical Sales and Marketing

Personnel, Health & Safety or Environmental Affairs Personnel, individuals who have taken STLE's 105/115 level education courses or STLE 2½-day Metalworking Fluid Management Program.

Synthetics: Basics & Applications

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. The course introduces synthetic lubricant base stocks 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.



Thursday, May 23

Electric Vehicles 202 (NEW!)

The Electric Vehicle (EV) 202 course will discuss more advanced topics related to electric vehicle research and development. This course will cover current trends of EV technology and testing, fluid development, and tribological challenges.

Who should attend: Engineers and scientists early/mid-career who are familiar with or are currently working on electric vehicle technology and research.



#STLE2024 Networking & Special Events

Please note that all annual meeting events are in the Minneapolis Convention Center, unless noted.

New Member & Student Networking Reception

Sunday, May 19 (Hilton Minneapolis)

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 20

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 20

During STLE's 2024 Annual Meeting, the Society is hosting area high school school 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 19-23

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 20 (Hilton Minneapolis)

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 20 and **Tuesday, May 21** (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 21 • Ticketed Event



Hong Liang



Jack McKenna

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 2023-2024 President

Hong Liang with Texas A&M University and 2024-2025 President Jack McKenna with Sea-Land Chemical Company. 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.



2024 STLE Student and Early Career Poster Competition

STLE is seeking student and early career posters for the 2024 Annual Meeting & Exhibition in Minneapolis, Minn. 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 2024 Annual Meeting to participate in the poster session.

Submission Criteria Requirements

- Abstract submission deadline: **March 13, 2024** (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 2023-2024 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 2023-2024 academic year.
- Posters can be no larger than 48 x 48 inches.
- Posters must be set up Sunday afternoon or Monday morning. The author must be present at the poster display during the judging session on Monday, May 20, during lunch and the scheduled conference break that afternoon.

Award 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 21.

For additional questions about the poster session, please contact Merle Hedland at (630) 428-2133 (STLE Conference Office), or email mhedland@bacon-hedland.com.

Exhibitors

2024 STLE Annual Meeting

More than 120 organizations are expected to display their newest products and services at the 2024 STLE Annual Meeting & Exhibition. Following is the list of exhibitors as of **December 12, 2023**. Visit www.stle.org/annualmeeting and see the Program Guide distributed on site in Minneapolis for the most up-to-date list.

Advanced Chemical Concepts Inc.

American Petroleum Institute

AnalytiChem

Applied Rigaku Technologies, Inc.

Baron USA, LLC

BASF Corporation

ChemCeed

Colonial Chemical Inc.

Compass Instruments

Emery Oleochemicals

Evonik Oil Additives USA, Inc.

Fuel Ox

Functional Products, Inc.

IMCD US

Industrial Quimica Lasem S.A.U.

INEOS Oligomers

Italmatch Chemicals

King Industries, Inc.

LANXESS Corporation

MOL-LUB Ltd.

Münzing

Optimol Instruments Pruftechnik GmbH

PCS Instruments

Phoenix Tribology Ltd.

Pilot Chemical Company

Ravago Chemicals North America

Richful Lube Additives

Rierden Chemical & Trading

Sasol Chemicals

SONGWON International – Americas Inc.

The Lubrizol Corporation

TUNAP GmbH & Co. KG

Vibration Institute

Zschimmer & Schwarz



#STLE2024 Meeting Exhibition & Sponsorship Opportunities

Please note that all annual meeting events are in the Minneapolis Convention Center, unless noted.

Reserve Your Exhibit Space in Minneapolis!

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:

\$2,975 (STLE Corporate Members) • \$3,375 (Non-Members)

Supersized 20 x 20 Booths:

\$16,722 (STLE Corporate Members) • \$17,122 (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

2024 Exhibition:

Minneapolis Convention Center Exhibit Hall

Exhibit Setup Hours:

Sunday, May 19 – 12:00 pm – 5:00 pm

Monday, May 20 – 6:00 am – 11:00 am

Exhibit Hours:

Monday, May 20 – 12:00 pm – 5:00 pm

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

Tuesday, May 21 – 9:30 am – 12:00 pm & 2:00 pm – 5:30 pm

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

Wednesday, May 22 – 9:30 am – 12:00 pm

Commercial Marketing Forum

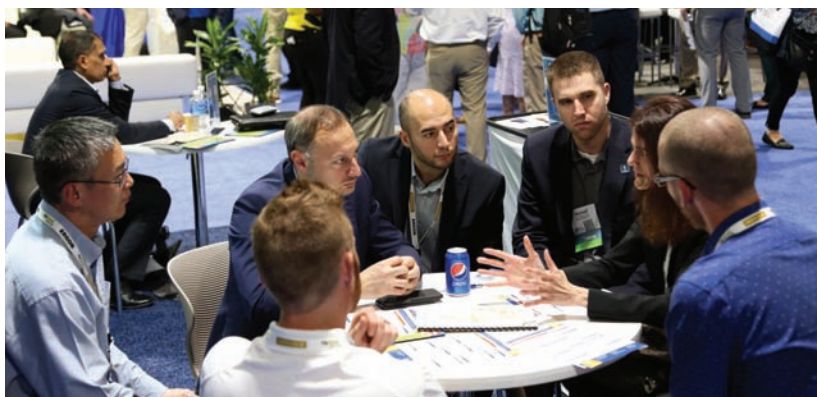
The Commercial Marketing Forum (CMF) is a series of 30-minute marketing sessions at STLE's 2024 Annual Meeting where participants may promote your company's products and services, something not allowed in the technical sessions. Your CMF session is promoted in the Annual Meeting Program Guide, directing 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 Member Exhibitors)
- \$850 (STLE Corporate Members)
- \$990 (STLE Individual Members)
- \$1,210 (Non-Members)

Be part of it!

MINNEAPOLIS



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 Minneapolis (thereby reaching some 1,600 members of the lubricants industry), STLE offers several sponsorship opportunities, including:

+ indicates additional material costs.

Sponsorships available at the following levels:

- Rhodium Plus (More than \$5,000)
- Rhodium (\$5,000)
- Palladium Plus (More than \$4,000)
- Palladium (\$4,000)
- Titanium Plus (More than \$3,000)
- Titanium (\$3,000)
- Platinum (\$2,000)
- Gold (\$1,000)

Rhodium Plus Level – \$5,000+

- Attendee Registration Email
- Badge Lanyards + (Sold)
- Guest Room Keycards + (Sold)
- Keynote Session
- Registration Bags + (Sold)

Palladium Plus Level – \$4,000+

- Directional Floor Signs + (Sold)
- Education Course Lunches + (Sold)
- Refreshment Breaks +

Palladium Level – \$4,000

- Annual Meeting Mobile App (Sold)

Titanium Plus Level – \$3,000+

- Recharging Lounge + (Sold)
- Exhibitor Appreciation Hour Raffle + (Sold)
- Welcome Gift + (Sold)

Titanium – \$3,000

- Education Course Materials (Sold)
- President's Luncheon

Platinum – \$2,000

- Speakers Breakfast Series

Multiple Sponsorship Opportunities

- Monday Evening Networking Reception

Exciting, High-Impact Branding – Opportunities for 2024 Sponsors!

- Video Wall
- Escalator Clings
- 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.

2024 STLE Annual Meeting Sponsors

STLE wishes to thank the following sponsors for their generous support of the 78th STLE Annual Meeting & Exhibition, **May 19-23, 2024** at the Minneapolis Convention Center, Minneapolis, Minnesota. Updated signage with sponsors information will be included onsite in Minneapolis (as of December 12, 2023).

Rhodium Plus: More than \$5,000

Azelis L&MF US
Registration Bags

Ergon
Badge Lanyards

The Lubrizol Corporation
Guestroom Keycards

Palladium Plus: More than \$4,000

Advancion
Directional Signs

Shell
Education Course Lunches

Palladium: \$4,000

Palmer Holland
Annual Meeting Mobile App

Titanium Plus: (More than \$3,000)

Afton Chemical
Re-Charging Lounge

Evonik Oil Additives
Exhibitor Appreciation Hour Raffle

Ideas, Inc.
Welcome Gift

Titanium: (\$3,000)

Cargill
Education Course Materials Handbook

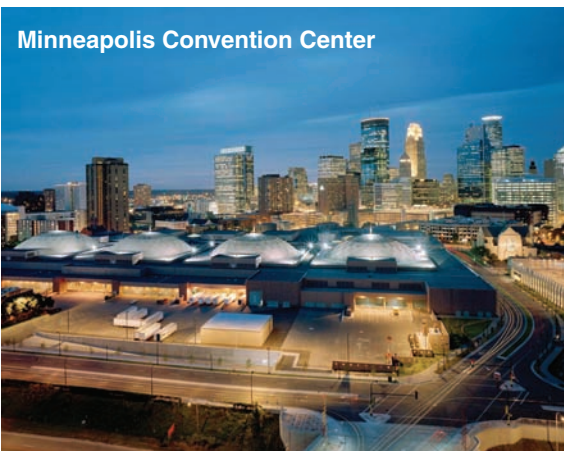


#STLE2024 Trade Show Floor Plan

Please note that all annual meeting events are in the Minneapolis Convention Center, unless noted.

Reserve your exhibit space in Minneapolis!

627	626	527	526	427	426	327	326	227	226	127	126
625	624	525	524	425	424	325	324	225	224	125	124
623	622	523	522	423	422	323	322	223	222	123	122
621											120
619	618	519	518	419	418	319	318	219	218	119	118
617	616	517	516	417	416	317	316	217	216	117	116
615	614	515	514	415	414	315	314	215	214	115	114
613	612	513	512	413			312	213		113	112
611	610	511	510	411	20'		310	211	20'	111	110
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Minneapolis Convention Center

2024 Exhibition:

Minneapolis Convention Center Exhibit Hall

Exhibit Setup Hours:

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

Wednesday, May 22 – 9:30 am – 12:00 pm

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A Stand Out in the Crowd...

A Heightened Profile...

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Choose from our traditional Corporate Member Basic or our expanded Corporate Member Premium programs. Benefits include:

- Individual membership in STLE
- Registrations to the STLE Annual Meeting & Exhibition
- Education courses
- Webinars
- Technical resources
- Discounts on booth space at the STLE Exhibition
- STLE Annual Meeting Commercial Marketing Forum presentation opportunities
- Corporate Member directory profile
- Companywide Digital TLT magazine subscription



Reap Huge Benefits at the
2024 STLE Annual Meeting &
Exhibition in Minneapolis!



MINNEAPOLIS

78th STLE ANNUAL MEETING & EXHIBITION | MAY 19-23, 2024


For details, contact
Tracy Nicholas VanEe
at (847) 430-6767 or
emeraldcomminc@yahoo.com.



Society of Tribologists and Lubrication Engineers
840 Busse Highway, Park Ridge, Illinois 60068 (USA)

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Certified Metalworking Fluids Specialist™



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ELECTRIFIED TRIBOLOGY

Empowering EVs with Surface, Material, and Lubricant Testing Solutions

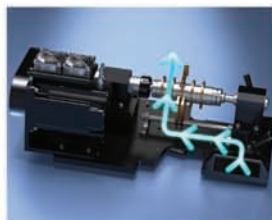
- Efficiency
- Thermal Management
- Lubricants
- Additives
- Grease
- Corrosion
- Electrical Contacts

ELECTRIFIED TEST SETUPS

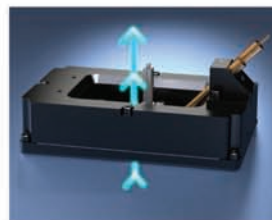
EV FLUIDS, AC, DC, CURRENT



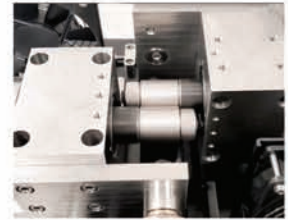
E-Rotary



E-Block on Ring



E-Linear & Scratch



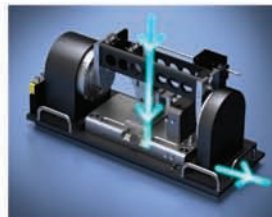
E-Two Roller



E-4 Ball



E-Mini Traction



E-Fretting/SRV



E-Micropitting

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- ✓ Increased oxidation resistance
- ✓ Reduced deposit formation & enhanced removal
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