

## Message from the STLE president



Hello STLE Members and Friends,

As STLE President, it is my pleasure to welcome the more than 1,000 participants from nearly 40 countries that will be attending the **2021 STLE Virtual Annual Meeting & Exhibition** during the week of May 17-20. First, I would like to congratulate the STLE Annual Meeting Program Committee (AMPC), and especially chair Dr. Min Zou (University of Arkansas), for the great work in organizing this event. The AMPC has assembled a superb technical program featuring 300 papers, eight keynote and plenary speakers, poster presentations, the popular Commercial Marketing Forum sessions, virtual exhibit booths and an array of networking opportunities to connect with lubricant industry professionals from around the world during the four-day meeting.

STLE is excited and proud to be offering you our first Virtual Annual Meeting! While we would have preferred to see you in New Orleans for the 75th STLE Annual Meeting, providing you with timely content and the ability to network with your peers is the ultimate goal of any meeting—be it in-person or virtual. We know we will accomplish both by leveraging a user-friendly, virtual platform that will safely provide attendees with a full conference experience from the comfort of your local office or home. This year's virtual format makes it possible for many of our members and industry colleagues to attend the Annual Meeting, maybe for the first time. Also, all sessions will be recorded and made available to participants for up to 90 days following

the conclusion of the meeting.

In addition to the technical sessions, to better accommodate and maximize the opportunities, the education courses usually held the same week as the Annual Meeting will be segregated in the weeks before and after the meeting. STLE's Education Committee has converted five courses dealing with basic and advanced lubrication and metalworking fluids to be presented online, starting in early May and concluding during the first full week of June. No course will be presented during the Annual Meeting dates, allowing you greater flexibility to attend the meeting, trade show, and take as many courses as you desire. If you haven't done so, visit the STLE website ([www.stle.org](http://www.stle.org)) to register for courses still available.

Don't forget to make time in your schedule to check out the **2021 trade show** and visit with the more than 65 exhibitors with virtual booths displaying the lubricant industry's newest technologies, products and services. You'll be able to talk directly with technical experts and engage with the industry's leading companies looking to help

provide you with solutions and strategies to improve your company's bottom line.

Another positive with the virtual format is that you can spend extra time during the week engaging with the exhibitors and still be able to catch up on all of the recorded technical presentations on demand for the next 90 days. In theory, there are no lost opportunities with the virtual format compared to traditional in-person meetings.

Details on the technical program and other aspects of the Annual Meeting are included in this convenient **Program Guide** to help you prepare in advance, with up-to-date information available on the STLE website and in the virtual platform when the meeting starts.

This is going to be a great week and I look forward to following many of the technical presentations, keynote and plenary talks, and visiting the exhibits from my home office in British Columbia.

**Look forward to connecting with you online at the 75th STLE Annual Meeting!**



**Paul Hetherington, STLE President**  
(HollyFrontier Lubricants & Specialties)



## 2021 STLE Virtual Annual Meeting & Exhibition NETWORKING & SPECIAL EVENTS

Attending an in-person meeting is more than just education, it's catching up with old friends and meeting new faces. While the STLE Virtual Annual Meeting & Exhibition changes the way we network, it's not impossible.

**Virtual Networking Breaks** have been scheduled in the mornings & afternoons between each breakout technical sessions and will last for 30 minutes. While this does allow for you to catch up on work or at-home responsibilities, it's also a chance to recap the previous sessions, ask a burning question, or just say "hello!" and connect virtually with a colleague. In addition to networking with your peers, be sure to visit the virtual exhibit booths and view the student research posters in the Poster Gallery.

**"Industry Insights" Chat Sessions** will be hosted in the mornings or afternoons each day where you can connect with industry and academic leaders for a more informal networking

exchange discussing the latest hot topics in the field of tribology and lubrication.

**Virtual Networking Reception** will occur on Monday evening, May 17 (6:30-8 pm EDT). Bring your libation of choice and plan to add to the conversation! This isn't your traditional networking setting, but it's designed to really get people to engage and find real value in connecting with your colleagues in the field.

**Exhibitor Appreciation Hours** will occur with 90 minutes of dedicated exhibit time: Monday, May 17 (3-4 pm EDT) and Tuesday, May 18 (3-3:30 pm EDT)—no need to worry about missing a Commercial Marketing Forum presentation or technical session! This year's virtual setting will feature three halls of booths that will link attendees to the industry's latest new products and technologies with more than 60 companies that will be represented looking to do business with you.

### STLE Virtual Business Meeting – May 18



Paul Hetherington



Ken Hope

The annual meeting's major business function goes virtual on Tuesday, May 18 (1-2 pm EDT) honoring STLE's incoming and outgoing presidents, award winners and top volunteers.

Join us as we salute **2020-2021 STLE President Paul Hetherington** with HollyFrontier Lubricants & Specialties and **2021-2022 STLE President Ken Hope** with Chevron Phillips Chemical.

Visit [www.stle.org/annualmeeting](http://www.stle.org/annualmeeting) for the most up-to-date list on additional exhibitors that will be participating.

### ANNUAL MEETING EXHIBITORS • Preliminary as of April 12, 2021

STLE's annual trade show is where you can catch up on the lubricant industry's latest products, services and technologies. This year's event features more than 60 companies with virtual booths. Check out the **Exhibitor Directory on page 75** for details about each of these companies.

Acme-Hardesty Company  
ADEKA Corporation  
Advanced Chemical Concepts Inc.  
Afton Chemical Corporation  
Analytik Jena US  
ANGUS Chemical Company  
BASF Corporation  
Beckman Coulter  
Biosynthetic Technologies  
Bruker  
BYK USA Inc.  
Cannon Instrument Company  
Chevron Phillips Chemical Company  
Clariant  
Colonial Chemical Inc.  
Compass Instruments  
CRC Press/Taylor and Francis  
Croda Inc.  
Dow  
Eastman

Emery Oleochemicals  
Ergon, Inc.  
Evonik Oil Additives USA, Inc.  
ExxonMobil Chemical Company  
Falex Corporation  
FedChem/Federal Process  
Functional Products, Inc.  
GREEN FRIX  
Huntsman  
INEOS Oligomers  
Italmatch Chemicals  
Kao Chemicals GmbH  
King Industries, Inc.  
Koehler Instrument Company Inc.  
LANXESS Corporation  
LSI Chemical  
Microtap USA, Inc.  
Münzing  
Napoleon Engineering Services  
OilDoc GmbH

Oil Filtration Systems  
Optimol Instruments Prüftechnik GmbH  
OQ Chemicals Corporation  
Palmer Holland Inc.  
PCC Chemax, Inc.  
PCS Instruments  
PerkinElmer, Inc.  
Pilot Chemical Company  
Ravago Chemicals North America  
Savant Labs  
Sea-Land Chemical Company  
Shanghai Million Chemical Limited  
Soltex, Inc.  
SONGWON Industrial Group  
Tannas Company & King Refrigeration  
Teknor Apex Company  
The Lubrizol Corporation  
Troy Corporation  
United Soybean Board  
Vanderbilt Chemicals, LLC



## 2021 STLE Virtual Annual Meeting & Exhibition KNOW BEFORE YOU GO!

**It's almost time for the first STLE Virtual Annual Meeting & Exhibition! We have included a few important details in advance of the meeting to help you prepare. For more helpful tips, visit [www.stle.org/annualmeeting](http://www.stle.org/annualmeeting) or look for the login invitation email to arrive a few days prior to the event.**

- An invitation email to access the virtual conference platform, **e-Attend™**, powered by Image Audiovisuals (STLE's virtual event partner) for the Annual Meeting will be sent to the email address used with online registration (we cannot change this email) a week before the meeting starts. **Be sure to know your email address that you used to register on the STLE website.**
- The login instructions will be sent from this email address: **STLE Annual Meeting ([kphipp@stle.org](mailto:kphipp@stle.org))** and will be titled **"2021 STLE Virtual Annual Meeting & Exhibition – Registration Login Details."** Monitor your email for this notice and check your spam/junk folder. If you have not received the email notice, please email us ASAP at **[information@stle.org](mailto:information@stle.org)**.
- Visit the virtual event site (**<https://stle2021annualmeeting.e-attend.com>**) to make sure your login process goes smoothly. Initial login requires just your email address. Once logged in, please update your profile and add a photo that will facilitate networking with other attendees. Bookmark the site address and your email for easy access.
- In your profile, you can view the program agenda and manually set your itinerary schedule to your preferred time zone. **Please Note: All times listed in the program agenda are US Eastern Daylight Time (EDT).**
- We strongly recommend using **Google Chrome, Firefox, Safari** or **Microsoft Edge** internet browser to access the virtual event.
- Be sure to join your peers in our virtual **"Networking Lounge,"** to share ideas and key takeaways from the event with other attendees and make new connections. If you wish to engage in 1:1

chat, you can select an attendee's name in the Chat box at the bottom of your screen to start a private conversation, or you can arrange small group chats by sharing a link in your profile to your preferred virtual conferencing platform (Zoom, Microsoft Teams, etc.). **A virtual Networking Reception will be held on Monday evening, May 17 (6:30-8 pm EDT).**

- Technical sessions will not begin until the original date and time listed in the program schedule. Session chairs will serve as moderators for each technical session and attendees will be able to join the online chat in the platform for discussion with other attendees and can type questions in the Chat box. Speakers will be asked to join for live Q&A during their designated presentation times and address the questions posted. You can also reach out directly to speakers through the private chat function in the platform.
- If you have questions about navigating the site, you can email **[support@e-attend.com](mailto:support@e-attend.com)** for technical support from Image Audiovisuals. If you have STLE-related questions, you can chat with STLE staff at our virtual booth in the lobby area.
- Prepare as you would for an in-person event. Plan your day with adequate time and have what you need for the sessions you are attending. Come to the sessions focused so you can fully participate.

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**PS: Don't forget you'll have 90 days of access to all sessions on the platform after the Annual Meeting. Most of the sessions will be prerecorded and available on-demand on the platform shortly after each presentation is broadcast during the Annual Meeting.**

### Education Courses

New for this year, five education courses are being offered virtually before and after the STLE Annual Meeting.

Each course is a two-day event on Tuesday and Wednesday of its respective week. The course modules will be pre-recorded presentations, followed by a live Q&A with the presenter.

STLE 2021 Education Course Schedule
<b>May 4-5</b> Basic Lubrication 101
<b>May 11-12</b> Basic Lubrication 102
<b>May 25-26</b> Metalworking Fluids 105
<b>June 1-2</b> Advanced Lubrication 301
<b>June 8-9</b> Advanced Lubrication 302

If you registered for any courses, participants will receive a separate email from **[customercare@gotowebinar.com](mailto:customercare@gotowebinar.com)** a few days before your designated course starts, with a GoToWebinar link and password. Course handouts will be available on the day of the course, downloadable from the GoToWebinar platform. Each course will have its own unique link and password. Please check your spam/junk folder. If you do not have the link for your specific course(s), please contact STLE at **[information@stle.org](mailto:information@stle.org)** ASAP!



## ASME Journal of Tribology to Host Special Symposium on Additive Manufacturing at the STLE 2021 Annual Meeting & Exhibition

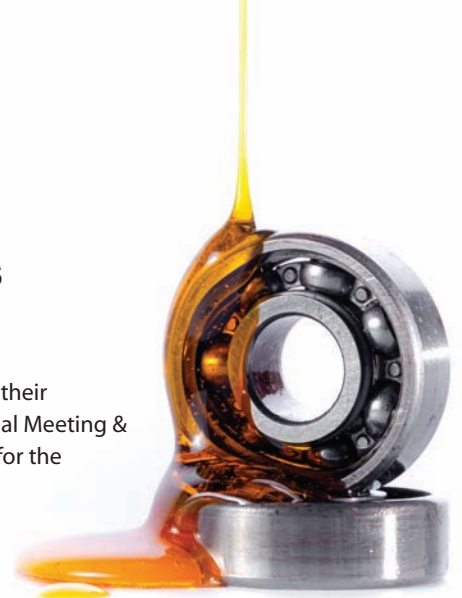
Additive manufacturing (AM) enables rapid fabrication of parts with complex geometries, which cannot easily be manufactured with traditional methods. While originally limited to rapid prototyping, recent advances in AM technology also enable direct fabrication of functional end-use parts in, e.g., aerospace, medical devices, and military applications. However, the transition from rapid prototyping to fabricating end-use parts has also revealed technology barriers, including surface quality, accuracy, part variability, and uncertainty about the process-structure-property relationship, to only name a few. Crucially, fundamental questions about friction, wear, and lubrication of AM parts have led to substantial research interest in the tribology community.

The symposium, sponsored by the ASME Journal of Tribology, provides significant value to the tribology community by highlighting recent advances of tribology research related to AM, defining the state-of-the-art of tribology knowledge, and framing the challenges and opportunities for future tribology research in this exciting field. Many of the papers presented in this symposium have been peer-reviewed and are scheduled to appear in a special May issue of the ASME Journal of Tribology. **The symposium sessions will take place on Tuesday, May 18 – Session 4B Additive Manufacturing I (2-5:30 pm EDT) and Thursday, May 20 – Session 8F Additive Manufacturing II (2-5:30 pm EDT).**

## ANNUAL MEETING SPONSORS

Sponsors as of April 12, 2021

STLE wishes to thank the following sponsors for their generous support of the 2021 STLE Virtual Annual Meeting & Exhibition. Visit [www.stle.org/annualmeeting](http://www.stle.org/annualmeeting) for the most up-to-date sponsors list.



### Palladium Plus Level (\$5,000)

#### Monson—An Azelis Company

Keynote Session

#### PCS Instruments, Inc.

Exhibit Hall Ambassador

#### Pilot Chemical Company

Keynote Session

#### Shell

Keynote Session

### Palladium Level (\$4,000)

#### Afton Chemical Corporation

General Conference Sponsorship

#### ExxonMobil Chemical Company

General Conference Sponsorship

#### Palmer Holland Inc.

General Conference Sponsorship

#### The Lubrizol Corporation

General Conference Sponsorship

### Titanium Plus Level (\$3,500)

#### Chevron Phillips Chemical Company

President's Luncheon/Ceremony

#### Eastman

General Conference Sponsorship

#### Evonik Oil Additives

Recharging Lounge

### Titanium Level (\$3,000)

#### ANGUS Chemical Company

General Conference Sponsorship

#### BASF Corporation

Education Courses

#### Sea-Land Chemical Company

General Conference Sponsorship

#### Vanderbilt Chemicals, LLC

General Conference Sponsorship

### Platinum Level (\$2,000)

#### King Industries, Inc.

General Conference Sponsorship

#### Zschimmer & Schwarz

General Conference Sponsorship

### Gold Level (\$1,000)

#### ASME (American Society of Mechanical Engineers)

General Conference Sponsorship

#### Compass Instruments

General Conference Sponsorship

#### Daubert Chemical Company

General Conference Sponsorship

#### Falex Corporation

General Conference Sponsorship

#### Ideas, Inc.

General Conference Sponsorship

#### Lockhart Chemical

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#### Optimol Instruments

#### Prüftechnik GmbH

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#### Southwest Research Institute

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#### The Timken Company

General Conference Sponsorship



# 2021 STLE Virtual Annual Meeting & Exhibition

## PROGRAM SCHEDULE AT A GLANCE • Preliminary as of April 12, 2021

### Monday, May 17, 2021

#### 8:30 – 10 am

Opening Welcome and Monday Keynote Session

#### Keynote Speakers:

- Dr. Said Jahanmir, Assistant Director of Federal Partnerships, National Institute of Standards and Technology (NIST) Office of Advanced Manufacturing
- Dr. Mike Lovell, President, Marquette University
- Dr. Kathy Wahl, Head of Molecular Interfaces and Tribology Section, Naval Research Laboratory

#### 10 – 10:30 am

Networking Break & Special Programming

#### 10 am – 4 pm

Virtual Exhibits and Student Posters

#### 10:30 am – 1 pm

##### Monday Technical Sessions:

- 1A – Seals I
- 1B – Environmentally Friendly Fluids I
- 1C – Fluid Film Bearings I
- 1D – Gears I
- 1E – Metalworking Fluids I
- 1F – Nanotribology I
- 1G – Power Generation and Wind Turbine Tribology I
- 1H – Commercial Marketing Forum I
- 1I – Synthetic Lubricants and Hydraulics I

#### 1 – 2 pm

Networking Break & Special Programming

#### 2 – 6 pm

##### Monday Technical Sessions:

- 2A – Engine & Drivetrain Session on Electric Vehicles I
- 2B – Environmentally Friendly Fluids II
- 2D – Materials Tribology I
- 2E – Metalworking Fluids II
- 2F – Nanotribology II
- 2G – Power Generation and Wind Turbine Tribology II
- 2I – Commercial Marketing Forum II
- 2J – Synthetic Lubricants and Hydraulics II

#### 3 – 4 pm – Exhibitor Appreciation Hour & Networking Break

#### 6:30 – 8 pm

Virtual Networking Reception

### Tuesday, May 18, 2021

#### 8:30 – 10 am

Tuesday Keynote Session

#### Keynote Speaker:

- Dr. Melissa Orme, Vice President, Boeing Additive Manufacturing

#### 10 – 10:30 am

Networking Break & Special Programming

#### 10 am – 3:30 pm

Virtual Exhibits and Student Posters

#### 10:30 am – 1 pm

##### Tuesday Technical Sessions:

- 3A – Condition Monitoring I
- 3B – Lab to Field: Bridging the Gap Between Bench and Engine: Engine & Drivetrain & Lubrication Fundamentals Joint Session I
- 3C – Nonferrous Metals I
- 3D – Materials Tribology II
- 3E – Metalworking Fluids III
- 3F – Nanotribology III
- 3G – Rolling Element Bearings I
- 3H – Lubrication Fundamentals I: Non-Tribological Oil Properties
- 3I – Commercial Marketing Forum III

#### 1 – 2 pm

STLE Virtual Business Meeting

#### 2 – 6 pm

##### Tuesday Technical Sessions:

- 4A – Condition Monitoring II
- 4B – Additive Manufacturing I: Special Symposium
- 4C – Nonferrous Metals II: Tribology and Biobased Session in Memory of Dr. Girma Biresaw
- 4D – Materials Tribology III
- 4E – Metalworking Fluids IV
- 4F – Nanotribology IV
- 4G – Rolling Element Bearings II
- 4H – 2D Materials/Superlubricity: Material Tribology & Nanotribology Joint Session I
- 4I – Commercial Marketing Forum IV

#### 3 – 3:30 pm

Networking Break & Exhibitor Appreciation

## Wednesday, May 19, 2021

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### 8:30 – 10 am

Wednesday Keynote Session

#### Keynote Speaker:

- Dr. Armit Parikh, Research Manager, Smith & Nephew, Inc.

### 10 – 10:30 am

Networking Break & Special Programming

### 10 am – 3:30 pm

Virtual Exhibits and Student Posters

### 10:30 am – 1 pm

#### Wednesday Technical Sessions:

- 5A – Biotribology I
- 5B – 2D Materials/Superlubricity: Material Tribology & Nanotribology Joint Session II
- 5C – Engine & Drivetrain I
- 5D – Lubrication Fundamentals II: Additives I
- 5E – Wear I
- 5F – Tribotesting I
- 5G – Rolling Element Bearings III
- 5H – Nonferrous Metals III
- 5I – Commercial Marketing Forum V

### 1 – 2 pm

Plenary Program – Session #1

#### Plenary Speaker:

- Dr. Jack Zakarian, Consultant, JAZTech Consulting LLC

### 2 – 6 pm

#### Wednesday Technical Sessions:

- 6A – Biotribology II
- 6B – 2D Materials/Superlubricity: Material Tribology & Nanotribology Joint Session III
- 6C – Engine & Drivetrain II
- 6D – Lubrication Fundamentals III: Additives II
- 6E – Wear II
- 6F – Tribotesting II
- 6G – Rolling Element Bearings IV
- 6H – Tribochemistry – Materials Tribology & Nanotribology Joint Session I
- 6I – Grease I
- 6J – Commercial Marketing Forum VI

### 3 – 3:30 pm

Networking Break & Special Programming

## Thursday, May 20, 2021

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### 8:30 – 10 am

Thursday Keynote Session

#### Keynote Speaker:

- Dr. Christopher Williams, Professor of Mechanical Engineering, Virginia Tech

### 10 – 10:30 am

Networking Break & Special Programming

### 10 am – 3:30 pm

Virtual Exhibits and Student Posters

### 10:30 am – 1 pm

#### Thursday Technical Sessions:

- 7A – Grease II
- 7B – Contact Mechanics I
- 7C – Engine & Drivetrain III
- 7D – Lubrication Fundamentals IV: EHL
- 7E – Tribochemistry – Materials Tribology & Nanotribology Joint Session II
- 7F – Tribotesting III
- 7G – Rolling Element Bearings V
- 7H – Surface Engineering I

### 1 – 2 pm

Plenary Program – Session #2

#### Plenary Speaker:

- Dr. Jim MacLeod, Group Leader, National Research Council Canada

### 2 – 6 pm

#### Thursday Technical Sessions:

- 8A – Grease III
- 8B – Contact Mechanics II
- 8C – Engine & Drivetrain IV
- 8D – Lubrication Fundamentals V: Viscosity
- 8E – Tribochemistry – Materials Tribology & Nanotribology Joint Session III
- 8F – Additive Manufacturing II: Special Symposium
- 8G – Rolling Element Bearings VI
- 8H – Surface Engineering II

### 3 – 3:30 pm

Networking Break & Special Programming