

# 2019 AGENDA OCTOBER 22-24

*Windsor, Colorado*

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## Monday, October 21

### **6:00 PM Welcome Reception & Registration**

Coating Tech Institute will hold a 'Welcome Reception' for all registered attendees, speakers and guests at the Hilton Garden Inn, Fort Collins, Colorado. Attendees are encouraged to pick up their registration materials and mingle with other participants. Hors d'oeuvres and beverages will be served. Event will conclude at 8:00 pm.

## Tuesday, October 22

### **Continental Breakfast served at Hilton Garden Inn for all Hotel Guests**

NOTE: Breakfast will not be provided at Carestream, but coffee will be available upon arrival.

### **7:30 AM Registration & Load Transportation**

Those who were unable to attend the 'Welcome Reception' are encouraged to pickup registration materials in the lobby of the Hilton Garden Inn, prior loading the bus to Carestream.

### **7:45 AM Depart Hilton Garden Inn for Carestream**

### **8:30 AM Welcome, Course Overview, Introduction & Safety Briefing**

A brief presentation will welcome you and introduce you to your hosts, the equipment utilized in fluid coating, an explanation of the operations, define commonly used industry terminology, and provide an overview of the functions of various pieces of equipment. Individuals from Coating Tech Slot Dies (CTSD), Carestream, and other host partners will introduce themselves and their functional expertise. A safety briefing will also be included during this session.

### **9:15 AM Rheology Application – Alfredo Fenoglio, Carestream**

Rheology and coating are intimately related: in this introductory session we will review the relationships between materials and their rheological behavior. The nature of viscoelasticity and its interactions with process conditions will be discussed with the support of application examples.

### **10:00 AM Mid-Morning Break (approximate time) – Refreshments will be provided**

### **10:15 AM Hands-on Demonstration: Rheology & Defect Analysis - Carestream Staff Facility Tour – Carestream Staff (2 Sessions)**

Rapid response on defect analysis can save critical time and money in the manufacturing process. To perform this you need a diverse set of tools and experience to identify the cause. Attendees will get to experience what is involved in choosing the right measurement system and testing criteria, which includes actual use of instruments. Two groups will alternate between hands-on Rheology and a tour of the Carestream facility including coating lines, laboratories, and testing areas. The groups will trade places at approximately 11:15 am.

**12:15 PM**    **Onsite Lunch provided by Coating Tech Slot Dies**

**1:15 pm**    **Rheology – Mark Miller, Coating Tech Slot Dies**

Rheology is a fundamental requirement of slot die coating technology. The study of fluid flow provides the basis for equipment design and process development. Shear rate versus viscosity data will be explained and basic formulas will be presented for understanding.

**2:15 PM**    **System – Mark Miller, Coating Tech Slot Dies**

A slot die fluid coating system consists of more than the slot die. A variety of equipment is required for precision coating such as positioners, backing roll, and other optional equipment depending upon your substrate and fluid delivery system. These components will be highlighted during the hands-on portion of the seminar.

**3:00 PM**    **Process – Mark Miller, Coating Tech Slot Dies**

When it comes to slot die coating, understanding your process and the desired outcomes is central to developing a fluid coating system. Slot die fundamentals, limitations of slot die technology and various types of applications will be presented. An understanding of statistical process window development will also be provided during this session. Session includes assembly and dismantle of a slot die.

**3:45 PM**    **Depart Carestream to Hilton Garden Inn for a Brief Stop**

**4:30 PM**    **Coating Tech Institute Social Event – Magic Brew Bus Tour**

Transportation to the evening's social event will leave Hilton Garden Inn (promptly) at 4:30 pm. The 'Magic Brew Bus' will take the group to three local breweries where participants will receive samplings of local craft brews. Tour includes tasting flights, on-board appetizers, and dinner at one of the brewery stops. Approximate time of tour is 4 - 5 hours. *MUST BE 21 TO ATTEND.*

## Wednesday, October 23

**Continental Breakfast served at Hilton Garden Inn for all Hotel Guests**

NOTE: Breakfast will not be provided at Carestream, but coffee will be available upon arrival.

**7:30 AM**    **Begin Loading Transportation to Carestream**

**7:45 AM**    **Depart Hilton Garden Inn for Carestream**

**8:30 AM**    **Solution Delivery System – Bill Devine, Carestream**

Solution delivery is a key component of any pre-metered coating process. This presentation will cover key design considerations for solution delivery processes including:

- Flow and Temperature Control
- Pump Selection
- Deaeration
- Filtration

The need for upfront understanding of coating solution properties such as rheology, solubility, and filterability will also be discussed.

**9:15 AM**    **Equipment Highlight: Pump & Slot Die Hands-On – Mark Miller, Coating Tech Slot Dies & Bill Devine, Carestream**

After a brief introduction, participants will split into two groups and switch positions in two stations. The stations will include an explanation of a pump technology as well as assembly and disassembly demonstration with hands-on opportunities. The groups will begin at 9:15 am and switch at approximately 9:45 am.

- 10:15 AM** **Mid-Morning Break (approximate time) – Refreshments will be provided**
- 10:30 AM** **Drying - Jim Johnston, Carestream**  
Drying conditions greatly affect the dried film properties and hence, product performance. In this section we will discuss the best ways of removing the desired solvents without ruining the appearance or function of the product.
- 11:30 AM** **Technique – Mark Miller, Coating Tech Slot Dies**  
There are multiple ways to utilize a slot die for fluid coating. Both direct and indirect methods will be presented including lane coating, intermittent coating and tensioned web over slot die (TWOSD) applications.
- 12:15 PM** **Onsite lunch provided by Coating Tech Slot Dies**
- 1:00 PM** **Coating Defects & Resolutions– Mark Miller, Coating Tech Slot Dies**  
Common coating defects and the appropriate troubleshooting plan will be provided for participants. The CTSD toolbox including formulas and calculators will be introduced as a starting point for all slot die coating applications.
- 2:00 PM** **Modeling – Lee Runyon, Carestream**  
Through modeling, a trained designer can take a finite, defined section of fluid flow within a slot die and expand it across the full coating width. This can help one to understand the flow as it is affected by volumetric changes, shear, pressure differences and velocity gradients. Geometry such as fluid inlet sweeps, manifold end sweeps, and transitional radii are not easily accounted for unless three dimensional flow modeling is employed.
- 2:45 PM** **Mid-Afternoon Break (approximate time) – Refreshments will be provided**
- 3:00 PM** **Hands-on Demonstration: Coating & Inspection – Mark Miller, CTSD**  
This session will include a hands-on coating demonstration and inspection process monitoring.
- 4:15 PM** **Conclusion, Discussion, & Event Wrap Up**  
Presentation of Certificates of Completion & Group Photo will take place during this time.
- 4:30 PM** **Depart Carestream for Hilton Garden Inn**  
Coating Tech Institute will not include organized events this evening and attendees are free to make plans on their own.

## Thursday, October 24

**Continental Breakfast served at Hilton Garden Inn for all Hotel Guests**

NOTE: Breakfast will not be provided for those not staying at the hotel.

- 9:00 AM** **Individual Project Review with a Process Engineer**  
We encourage all attendees to participate in our private, individualized project consultations at Hilton Garden Inn, Fort Collins, Colorado 9:00 am - 12:00 pm. Participants wishing to take advantage of this opportunity must sign up to ensure space is available. *Please see the event planner or Mark Miller to reserve your time slot.*
- 12:00 PM** **Conclusion of Coating Tech Institute USA West 2019**



Thank you to CARESTREAM for providing the facilities and staff to assist with Coating Tech Institute USA West. For further information on Carestream, visit their website at [www.carestream.com/en/us](http://www.carestream.com/en/us).



### **Mark Miller, Founder and Principal, Coating Tech Slot Dies**

Mark's first introduction to the world of slot die coating was in 1996, when he was learning the technology at 3M. Today, Mark and Tim Marion own and operate Coating Tech Slot Dies, which supplies precision coating equipment. In addition, CTSD provides education and consultation for improved coating efficiencies and increased coating capability. Mark is a contributing editor to PFFC, an online trade journal for the converting industry.

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### **Tim Marion, Founder and Principal, Coating Tech Slot Dies**

With extensive experience in design engineering, project management, coating equipment and process development, Tim Marion brings a wealth of knowledge to the slot die coating industry. Tim also brings a background in mechanical design, engineering, project management and equipment integration. Tim holds degrees from both Chippewa Valley Technical College and the University of Wisconsin Eau Claire. He is a principal and founder of Coating Tech Slot Dies, creator of Coating Tech Institute.

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### **Alfredo Fenoglio, Director of Media Manufacturing Technology, Carestream**

Alfredo has developed his in depth process technology expertise over his 35 years in the areas of roll-to-roll coating, polymeric films and reinforced materials. He has been with 3M for 13 years and was the Specialty Materials R&D manager at Ferrania Technologies. More recently he was the Director of R&D at Chiorino, a manufacturer of power transmission and conveyor belts used in electronics and textiles manufacturing, food processing and other industrial applications. Alfredo holds a Master's degree in Chemical Engineering from the University of Genoa (Italy) and is an inventor or co-inventor for 4 patents in optical films and coating technology.

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### **Jim Johnston, Senior Process Development Engineer, Carestream**

Jim Johnston has spent over 35 years working in all facets of coated product development, product engineering and research for coating and drying. He has extensive experience in product modeling and drying model development. He has worked in product process co-design developing new drying techniques in conjunction with new materials and manufacturing techniques to bring new products to market. Jim has worked at Eastman Kodak and Carestream Health. He has spent the last 10 years in polyester web manufacturing. Jim has a BS from the University of Buffalo.

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### **Lee Runyon, Research & Development Engineer, Carestream**

Lee (Keith) Runyon is a specialist in developing new ways to simulate chemical and physical behavior of materials and the processes that generate new products. He enjoys straddling the fence between chemical engineer, material scientist and computer scientists. In his current role at Carestream, Lee works on the development of engineering software and computational methods for improving engineering analysis in addition to improving process and product analysis tools and reducing engineering resources required to perform analysis.

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### **Bill Devine, Senior Process Development Engineer, Carestream**

Bill has over 30 years of experience in coating technologies in R&D and manufacturing roles at Eastman Kodak and Carestream Health. At Carestream, Bill has held solution delivery process engineering as well as product development roles and has led scale-up efforts for transparent conductive films and several novel contract manufacturing products. At Kodak, Bill was an instructor in the Coating Engineer Training Program. Bill holds a Master's degree in Chemical Engineering from the University of Pittsburgh and is an inventor or co-inventor for 15 U.S. Patents in coating process technology and medical imaging films. He is a Certified Six Sigma Black Belt.

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### **Qi Yao, CAL Manager & PLM Alliances, Carestream**

While at Carestream, Qi has held a number of positions including Sensitizing Technical Manager, Site Service Technical Manager and Coating Assessment Lab Manager. Currently, he serves as Carestream's CAL Manager & PLM Alliances in Windsor, Colorado. Prior to joining Carestream, Qi spent a number of years with Eastman Kodak as Process Engineer and Lead Process/Manufacturing Engineer. Qi attended the Rochester Institute of Technology where he earned a Master of Engineering in Mechanical Engineering. With over 20 years experience in coating technologies, Qi is proficient in lean manufacturing concepts including Six Sigma, Kaizen, 5S and Poke-Yoke. He possesses exemplary communication skills with the ability to communicate with individuals at all levels and is bilingual in Chinese (Mandarin, Shanghainess, Cantonese) and English.

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