<table>
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<tr>
<th>Time</th>
<th>Course</th>
<th>Instructor(s)</th>
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<tr>
<td>7:00 AM</td>
<td>Registration Opens</td>
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<tr>
<td>8:30 AM</td>
<td>Design and Assembly Process Principles for High Density Flexible and Rigid Flex Circuits</td>
<td>Instructor: Vern Solberg, Solberg Technical Consulting</td>
</tr>
<tr>
<td>8:30 AM</td>
<td>Jump Start – a Free Introduction to SMT Process Basics and Troubleshooting</td>
<td>Instructors: *Chrys Shea, Shea Engineering Services; Tom Foley, ASM Assembly Systems, LLC; Fred Dimock, BTU International; Keith Favre, FHP Reps; *Mike Buetow, Circuits Assembly Magazine</td>
</tr>
<tr>
<td>8:30 AM</td>
<td>Reflow, Wave and Rework Soldering Process Optimization in Electronics Manufacturing</td>
<td>Instructor: *Jasir Bath, Bath Consultancy LLC</td>
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<tr>
<td>8:30 AM</td>
<td>Tin Whiskers: A 2018 State of the Industry Assessment</td>
<td>Instructor: *David Hillman, Rockwell Collins</td>
</tr>
<tr>
<td>12:00 PM</td>
<td>Lunch Break</td>
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<tr>
<td>1:30 PM</td>
<td>Printing and Its Affect on Manufacturing Yield</td>
<td>Instructor: *Jasir Bath, Bath Consultancy LLC</td>
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<tr>
<td>1:30 PM</td>
<td>New Developments in Selective Soldering Technology</td>
<td>Instructor: Bob Klenke, ITM Consulting</td>
</tr>
<tr>
<td>1:30 PM</td>
<td>Solder Paste Qualification Using the SMTA Miniaturization Test Vehicle</td>
<td>Instructor: *Chrys Shea, Shea Engineering Services</td>
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<tr>
<td>5:00 PM</td>
<td>End of Courses</td>
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<tr>
<td>Time</td>
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<td>7:00 AM</td>
<td>Registration Opens</td>
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<tr>
<td>8:30 AM</td>
<td>Design and Assembly Process Challenges for Bottom Terminations Components (BTCs) such as QFN, DFN and MLF in Tin-Lead &amp; Lead Free World</td>
<td>*Ray Prasad, Ray Prasad Consultancy Group</td>
</tr>
<tr>
<td>8:30 AM</td>
<td>Achieving High Reliability for Lead-Free Solder Joints - Materials Consideration</td>
<td>*Ning-Ching Lee, Ph.D., Indium Corporation</td>
</tr>
<tr>
<td>8:30 AM</td>
<td>Solder Joint Reliability – Principles and Applications</td>
<td>Jennie Hwang, Ph.D., H-Technologies Group</td>
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<tr>
<td>8:30 AM</td>
<td>Weeding Out PCB Fabrication Defects Before Assembly:</td>
<td>Bihari Patel, Bihari Patel SMT Connection</td>
</tr>
<tr>
<td>8:30 AM</td>
<td>Defect Analysis and Process Troubleshooting: Part 1</td>
<td>*Jim Hall &amp; *Phil Zarrow, ITM Consulting</td>
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<tr>
<td>12:00 PM</td>
<td>Lunch Break</td>
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<tr>
<td>1:30 PM</td>
<td>Defect Analysis and Process Troubleshooting: Part 2</td>
<td>*Jim Hall &amp; *Phil Zarrow, ITM Consulting</td>
</tr>
<tr>
<td>1:30 PM</td>
<td>Ball Grid Array: Design and Assembly of BGAs with Emphasis on Backward Compatibility</td>
<td>*Ray Prasad, Ray Prasad Consultancy Group</td>
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<tr>
<td>1:30 PM</td>
<td>Design for Excellence II: Physics of Failure</td>
<td>*Dock Brown, CRE, DFR Solutions</td>
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<td>1:30 PM</td>
<td>Reliability of Electronics – the Role of Intermetallic Compounds</td>
<td>Jennie Hwang, Ph.D., H-Technologies Group</td>
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<td>5:00 PM</td>
<td>End of Courses</td>
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<tr>
<td>Time</td>
<td>Harsh Environments</td>
<td>Technical Innovations</td>
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<tr>
<td>7:00 AM</td>
<td>Registration Opens</td>
<td>Session TI1 - Smart Manufacturing for Electronics</td>
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<tr>
<td></td>
<td>Session HE1 - Predicting Component Life for Harsh Environments</td>
<td>Chair: Trevor Galbraith, Global SMT &amp; Packaging</td>
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<td>Chair: Sa’d Hamasha, Ph.D., Auburn University</td>
<td>Co-Chair: *Gregory Vance, Rockwell Automation</td>
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<td>Co-Chair: David Reitz, INVENTEC Performance</td>
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<td>Chemicals USA</td>
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<tr>
<td>8:30 AM</td>
<td>Second Round Robin Evaluation of INEMI Creep Corrosion Qualification Test</td>
<td>An Overview of Smart Manufacturing in the IoT Era. Challenges and Solutions</td>
</tr>
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<td></td>
<td>Chen Xu, Nokia Bell Labs; *Prabjit Singh, Ph.D., Haley Fu, Dem Lee, Jeffrey Lee, Karlos Guo, Jane Li, Simon Lee, Geoffrey Tong, IBM Corporation</td>
<td>Glen Farris, Universal Instruments</td>
</tr>
<tr>
<td>9:00 AM</td>
<td>Process and Materials Interaction Investigation: Test Methods for Electrochemical Consistency in PCB Assembly Processes - Revisited</td>
<td>How Do I Get Smart With IPC CFX?</td>
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<td>Brook Sandy-Smith, Effon Pender, Adam Murling, Indium Corporation</td>
<td>Michael Ford, Aegis Software</td>
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<tr>
<td>9:30 AM</td>
<td>Testing and Mitigating Resistor Silver Sulfide Corrosion</td>
<td>Smart Manufacturing In The Electronics Industry—Realizing The Digital Factory Vision</td>
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<tr>
<td></td>
<td>Pamela Lembke, *Marie Cole, Jacob Porter, Tim Toal, Jason Wertz, IBM Corporation; Jim Wilcox, Mike Gaynes, Mike Meilunas, Universal Instruments Corporation; Holly Rubin, Nokia</td>
<td>Oren Manor, Mentor, a Siemens Business</td>
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<tr>
<td>10:00 AM</td>
<td>Refreshment Break</td>
<td>iNEMI Industry 4.0 Roadmap</td>
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<tr>
<td></td>
<td>Session HE2 - Reliability of Lead-Free Solder Alloys in Automotive Environments</td>
<td>Ranjan Chatterjee, Cimetrix; Dan Gamota, Jabil</td>
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<td></td>
<td>Chair: *Babak Arfaei, Ph.D., Ford Motor Company</td>
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<td>Co-Chair: Keith Howell, Nihon Superior Co.</td>
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<tr>
<td>10:30 AM</td>
<td>Developing Pb-Free Soldering for Harsh Environment Applications</td>
<td>iNEMI Industry 4.0 Roadmap</td>
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<tr>
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<td>*Mehran Maalekian, Ph.D., AIM Solder</td>
<td>Ranjan Chatterjee, Cimetrix; Dan Gamota, Jabil</td>
</tr>
<tr>
<td>11:00 AM</td>
<td>Effect of Component Density on Sn-3.0Ag-0.5Cu Solder Joint Reliability Under Harsh Environment</td>
<td>ReMAP Industry 4.0 Workshop/Education Initiatives</td>
</tr>
<tr>
<td></td>
<td>Won Sik Hong, Ph.D., Jinju Yu, Chulmin Oh, Korea Electronics Technology Institute (KETI)</td>
<td>Irene Sterian, P.E., Celestica Inc.</td>
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<tr>
<td>11:30 AM</td>
<td>Effects of Mixing Solder Sphere Alloys with Bismuth-based Pastes on the Component Reliability in Harsh Thermal Cycling</td>
<td>Panel Discussion</td>
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<td>Francy John Akkara, Mohammed Abueed, Sa’d Hamasha, Ph.D., Jeff Suhling, Ph.D., Pradeep Lal, Ph.D., Auburn University</td>
<td>Moderator: Trevor Galbraith, Global SMT &amp; Packaging</td>
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<td>Panelists:</td>
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<td>Ranjan Chatterjee, Cimetrix</td>
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<td>Irene Sterian, P.E., Celestica Inc.</td>
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<td>*Greg Vance, Rockwell Automation</td>
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<td>Harsh Environments</td>
<td>Technical Innovations</td>
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<tr>
<td>12:00 PM</td>
<td>Lunch Break</td>
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<tr>
<td>12:30 PM</td>
<td>Session HE3 - New Materials and Methods for Electronic Products in Harsh Environments</td>
<td>TI Luncheon Keynote Presentation 12:30PM - 2:00PM</td>
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<tr>
<td></td>
<td>Chair: Robert Kinyanjui, Ph.D., John Deere Electronic Solutions, Inc.</td>
<td>Chair: Matt Kelly P.Eng, MBA, IBM Corporation</td>
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<td>Co-Chair: *Raiyo Aspandiar, Ph.D., Intel Corporation</td>
<td>The Connected Enterprise - Make Smart Manufacturing Work for You</td>
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<td>Bob Murphy, Rockwell Automation</td>
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<td>1:30 PM</td>
<td>How Wet is Wet – Robust Automotive Electronics in Humid Environment</td>
<td>TI3 - Blockchain and Predictive Field Reliability</td>
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<td>*Lothar Henneken, Daniel Markus, Daniel Koenig, Robert Bosch GmbH</td>
<td>Chair: *Tom Forsythe, KYZEN Corporation</td>
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<td>Co-Chair:</td>
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<td>2:00 PM</td>
<td>ASEP (Application Specific Electronics Package) A Next Generation Electronics</td>
<td>Blockchain Technology for the High-Tech Industry</td>
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<td>Manufacturing Technology</td>
<td>Quentin Samelson, IBM Corporation</td>
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<td>Victor Zaderej, Richard Fitzpatrick, Molex</td>
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<tr>
<td>2:30 PM</td>
<td>Fatigue and Shear Properties of High Reliable Solder Joints for Harsh Applications</td>
<td>Synergy Between Smart Manufacturing &amp; The Secure Supply Chain</td>
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<td>Su Sinan, Minghong Jian, Francy John Akkara, Mohammed Abueed, Sa’d Hamasha, Ph.D.,</td>
<td>Michael Ford, Aegis Software</td>
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<td>Jeff Suhling, Ph.D., Pradeep Lal, Ph.D., Auburn University</td>
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<td>3:00 PM</td>
<td>Refreshment Break</td>
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<tr>
<td>3:30 PM</td>
<td>Session HE4 - Improving Manufacturing Process To Provide Better Survivability of</td>
<td>Session TI4 - Additive Manufacturing (3D Printing) for Electronic Circuitry</td>
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<td>Electronic Products</td>
<td>Chair: Gary Tanel, Libra Industries</td>
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<td>Chair: *Iulia Muntele, Ph.D., Sanmina Corporation</td>
<td>Co-Chair: Carol Primdahl, Krypton Solutions</td>
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<td>Co-Chair: Sa’d Hamasha, Ph.D., Auburn University</td>
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<tr>
<td>4:00 PM</td>
<td>Reducing Spatter in Flux Cored Solder Wires for Robotic Soldering Applications</td>
<td>Fully Printed 3D Interconnects: Reducing Semiconductor Package Size and Reducing</td>
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<td>Geoffrey Post, Arturo Espejo, Olga Spaldon-Stewart, Kyle Loomis, Kester</td>
<td>Manufacturing Complexity</td>
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<td>Bryan Germann, Optomec, Inc.</td>
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<td>4:30 PM</td>
<td>The Effectiveness of 75% IPA/25% DI Extraction Solution on No-Clean Flux Residues</td>
<td>3D Printing of Multilayer PCBs and Non-Planar Circuitry</td>
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<td></td>
<td>David Lober, *Mike Bixenman, DBA, KYZEN Corporation; Mariette Lemieux, *Mark</td>
<td>Simon Fried, Nano Dimension USA</td>
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<td>McMeen, STI Electronics</td>
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<td>5:00 PM</td>
<td>Improved Condensation Testing to Evaluate Protection Performance of Conformal</td>
<td>Direct Digital Manufacturing for 3D Electronic Packaging</td>
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<td>Coatings Under Different Condensation Levels</td>
<td>Ken Church, nScrypt</td>
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<td>*Martin Wickham, Ph.D., Ling Zou, National Physical Laboratory</td>
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<tr>
<td>5:00 PM</td>
<td>Womens Leadership Program Connection Reception (5:00 PM - 6:00 PM)</td>
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<td>Day One Concludes</td>
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</table>
Advanced Packaging Technology Track

**Session APT1 - Trends in Advanced Packaging / 3D Interconnects**
- Chair: *Andrew Mawer, NXP Semiconductors*  
  Co-Chair: Sue Teng, Cisco

**Session APT2 - Assembly and Reliability of Bottom Termination Components**
- Chair: Pradeep Lall, Auburn University  
  Co-Chair: Jagdeep RadhaKrishan, Intel Corporation

**Session APT3 - Trends in Advanced Packaging Technology for Panel Level Packaging**
- Chair: *Leslie Breslow, Intel Corporation*  
  Co-Chair: Yuri Shkolnik, IBM

**Session APT4 - Thermal Fatigue Reliability of Quad Flat No-Lead Packages**
- Chair: *Donald Heflin, Anaren, Inc.*  
  Co-Chair: James O’Kane, BGA Technologies, Inc.

Manufacturing Excellence Track

**Session MFX1 - Surface Mount Dentistry**
- Chair: *John L. Fairley, Boston University*  
  Co-Chair: Ari Kiviranta, UPM

**Session MFX2 - Assembly Challenges**
- Chair: *Nils Munthe, Ph.D., Semikron Corporation*  
  Co-Chair: Robert Bagwski,Datasys Corporation

**Session MFX3 - Advanced Manufacturing**
- Chair: *Daniel May, US Navy*  
  Co-Chair: Randy Cherry, Richard Smoger, Mark Kirkman, IPC

Substrates/PCB Technology Track

**Session SUB1 - Solder Paste Development to Overcome Component Challenges**
- Chair: Urala Marques de Tito, Ph.D., Flexus Corp.  
  Co-Chair: Adam Marling, Indium Corporation

**Session SUB2 - Enhanced Copper Plating Technologies**
- Chair: *Richard L. Deering, Kester Corporation*  
  Co-Chair: Dora Tuza, I Source Technical Services, Inc.

**Session SUB3 - Solder Paste: Fundamental Material Property / Performance Map for Circuit Board Protection**
- Chair: *Dennis Fritz, SAC at NAVSEA Crane*  
  Co-Chair: Randy Cherry, Richard Smoger, Mark Kirkman, IPC

**Session SUB4 - Inkjet Printing**
- Chair: *Daniel May, US Navy*  
  Co-Chair: Randy Cherry, Richard Smoger, Mark Kirkman, IPC

Flux, Solder, Adhesives Track

**Session FSA1 - Solder Paste Development to Overcome Component Challenges**
- Chair: Urala Marques de Tito, Ph.D., Flexus Corp.  
  Co-Chair: Adam Marling, Indium Corporation

**Session FSA2 - Solder Paste Rheology, Performance and Aging**
- Chair: MI Houcine, Kester  
  Co-Chair: Doris Yau, S Source Technical Services, Inc.

Spotlight Series

**Spotlight 1**
- Chair: *William Caper, Honeywell FM&T*  
  Presenting at 11:00 AM

**Spotlight 2**
- Chair: Dennis Fritz, SAC at NAVSEA Crane (Retired)  
  Presenting at 2:30 PM

**Spotlight 3**
- Chair: *Ray Lawrence, General Microcircuits Inc.*  
  Presenting at 2:00 PM

**Spotlight 4**
- Chair: *William Caper, Honeywell FM&T*  
  Presenting at 3:30 PM

**Spotlight 5**
- Chair: *William Caper, Honeywell FM&T*  
  Presenting at 4:00 PM

Expo Hall Open Until 5:00 PM
## Sessions at a Glance: Wednesday, October 17

**Designates Distinguished Speaker**

### 8:00 AM

**Effect of Package Warpage and Expansion Characteristics on Failure Modes in Board-Level Thermal Cycling**
*Andrew McEwen, NSF Semiconductors*

### 8:30 AM

**Warpage of Flexible-Board Assemblies with BGAs During Reflow and Post-Assembly Usage**
*Pradeep Lall, Ph.D., Auburn University*

### 9:00 AM

**Thermal Shadow Moini to Cross-Section Correlation Study**
*Ahmad Cherif Guirguis, Weidong Xie, Ph.D., Mudasir Kalyan Nukala, M.S.Ch.E., Ravi Parthasarathy, Ramakrishna Hosur Venkatagiriyappa, Ph.D.; *Mark McMeen, STI Electronics; *Denis Jean, Kester Solder; Joe Dunl, Kurtz Ersa*

### 9:30 AM

**Solder Paste Selection Challenges For Bottom Termination Components (BTC) Attach**
*Anna Liffon, Westin Bent, Paul Salerno, Jason Fullerton, Frank Andrews, Alpha Assembly Solutions*

### 10:00 AM

**Influence of Bonding Parameters on Reliability of Copper Wire-Bonding to Electroless Ni/Pd/Au Flating**
*Yoshinori Ejiri, Takehisa Sakurai, Yoshinori Arayama, Yoshihiko Tsudomatsu, Kiyoshi Iwasegawa, Hitachi Chemical Co., Ltd.*

## Registration Opens

**Advanced Packaging Technology Track**

### 10:30 AM

**Session AP4 - Board Level Reliability**
Chair: Brian Roggeman, Qualcomm Technologies Inc.
Co-Chair: Thomas Zanotta, Zebra Technologies

**Solder Joint Reliability of a 0.65mm Pitch Molded Array Package for Automotive Applications**
*Burton Carpenter, Mothei Benson; Andrew McEwen, NSF Semiconductors*

**Characterization of SnP Assembly and Reliability Under Thermal Cycles**
*Reza Ghaffarian, Ph.D., Jet Propulsion Laboratories*

### 11:00 AM

**Solderability Characterization of No-Clean Flux Residues Under the QFN Component Using Different PCB Board Design Options**
*Mike Boeeman, DPA, David Lobey, KYZEN Corporation; *Mark McMeen, Collin Langley, STI Electronics*

**Assessing the Implications of Fine Mesh Solder Powder on Flux Residue Removal**
*Lothar Henneken, Ph.D., Robert Bosch GmbH; *Anna Liffon, Westin Bent, Paul Salerno, Jason Fullerton, Frank Andrews, Alpha Assembly Solutions*

### 11:30 AM

**Session AP5 - Advancements in Technology for Power Packaging**
Chair: *Marie Cole, IBM Corporation*
Co-Chair: *Jim Wilcox, Universal Instruments Corporation*

**New Soldering Technology for High Temperature Applications: Hot Powder Connection (HotPowCon)**
*Steffen Köss, *Jörg Trollet, S. Fritz, D. Fed, T. Herbarth, Heraeus Deutschland GmbH & Co.KG*

**Thermally Conductive Liquid Materials for Electronics Packaging**
John Timmerman, Ph.D., *Henkal*

### 12:00 PM

**Lunch on Show Floor (12:00-1:30PM)**

## Flux, Solder, Adhesives Track

### 1:30 PM

**Current Understanding of the Problem and Mitigation Measures in Place**
J. Magura, Motorola

**FMEA Project Definition**
J. Bacicco, D.J. Dignan, Lockheed Martin

**Microvia Reliability Modeling and Simulation**
G. Leanghej, *Siem, US Navy*

### 2:00 PM

**Rising Expectations for "High Reliability": A Panel Discussion**

**Spotlight Series (On the Show Floor)**

**Spotlight 3**
Chair: Bob Wettwerter, BEST Inc

### 2:30 PM

**Investigation of Copper Sinter Material for Die Attach**
*Christian Schwarzer, Heraeus Deutschland GmbH*

### 3:00 PM

**Beer Tasting & Expo Reception on the Show Floor - Hall F (3:00 PM - 4:00PM)**

### 4:00 PM

**Expo and Reception Concludes**
Sessions at a Glance: Thursday, October 18

7:00 AM
Registration Opens

7:30 AM
Advanced Packaging Technology Track

Manufacturing Excellence Track

Innovations

Innovations

Interconnects

Advanced Interconnects

Chair: Nitin Gopani, Mentor

Chair: Bruce Barrett, Abbe

Lead-Free Symposium

Inspection Technologies

Inspection Technologies

Chair: Uday Abensberg, Mentor

Chair: Steve Greathouse, Mentor

8:00 AM
Low Temperature Interconnect Reliability and Potential Applications in Engineering and Automation Technologies

Chair: Dan Golembiowski, Mentor

Chair: Steve Greathouse, Mentor

Lead-Free Symposium

Inspection Technologies

Chair: Uday Abensberg, Mentor

Chair: Steve Greathouse, Mentor

9:00 AM
The Role of Nickel in Solder Alloys - Part II: The Effect of Ni on the Integrity of the Intermetallic Inhibitor in Pb-Free Solder Joints in Copper Substrates

Kazuhiko Nogita, The University of Queensland; Keith Sweatman; Young-Woo Lee, Edward Ibe, Karl Loh, Portland State University

Chair: Burton Carpenter, NXP Semiconductors

Advanced Packaging Technology Track

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Advanced Packaging Technology Track